



3509 & 3511 BACKHOE 3-POINT HITCH / CATEGORY II

OPERATOR'S MANUAL



PALADIN™
LIGHT CONSTRUCTION GROUP



The Power of Combined Excellence



SERIAL NUMBER: _____

MODEL NUMBER: _____

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3509 & 3511 BACKHOES

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TO THE OWNER

GENERAL COMMENTS

Congratulations on the purchase of your new backhoe! Your backhoe was carefully designed and manufactured to give you many years of dependable service. Your backhoe will require some minor maintenance (such as cleaning and lubricating) to keep it in top working condition. Be sure to observe all maintenance procedures and safety precautions in this manual and on the safety decals located on the backhoe and on any equipment on which the backhoe is mounted.

ABOUT THIS MANUAL

Read this manual before using your backhoe. This manual has been designed to help you to do a better, safer job. Read this manual carefully, and become familiar with the operating procedures before attempting to operate your new backhoe. **Remember, never let anyone operate this backhoe without them having read and completely understand the "Safety Precautions" and "Operating Instructions" section of this manual, or having them be fully trained by an experienced, qualified person who has read and completely understands the "Safety Precautions" and "Operating Instructions" (see sections B and G respectively).**

SERVICE

When servicing your backhoe, remember to use only original manufacturer replacement parts. Substitute parts may not meet the standards required for safe, dependable operation.

To facilitate parts ordering, record the model and serial number of your backhoe in the space provided on this page. This information may be obtained from the backhoe identification plate located on the left side of the backhoe console.

MODEL _____ **SERIAL NO.** _____

Your parts department needs this information to insure that you receive the correct parts or attachments for your specific backhoe.

SAFETY ALERT SYMBOL



This is the "Safety Alert Symbol" used by this industry. This symbol is used to warn of possible injury. Be sure to read all warnings carefully. They are included for your safety and for the safety of others working around you.

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SAFETY PRECAUTIONS

TAKE NOTE! THIS SAFETY ALERT SYMBOL FOUND THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY OR OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.



THIS SYMBOL MEANS:

ATTENTION!

BECOME ALERT!

YOUR SAFETY IS INVOLVED!

SIGNAL WORDS: Note the use of signal words DANGER, WARNING, and CAUTION with the safety messages. The appropriate signal word for each has been selected using the following guidelines:

DANGER: Indicates an imminently hazardous situation, which if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations, **typically for machine components which, for functional purposes, cannot be guarded.**

WARNING: Indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury, and **includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.**

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.**

SAFETY PRECAUTIONS

THE OPERATOR

A careful operator is the best operator. Most accidents can be avoided by taking certain precautions. The following precautions are suggested here to help prevent accidents. Read and understand these safety precautions before operating the vehicle and backhoe. Make sure that the equipment is operated only by responsible individuals with the proper instruction. The operator should be familiar with the controls, all safety precautions, and all potential hazards.

To be mounted ONLY on Category II tractors with 50 - 120 horsepower, 2400 - 5000 lbs. rated hitch lift capacity, and up to 12000 lbs. GVW. Do NOT attach this backhoe or any equipment that may exceed the lift capacity of your tractor's three point hitch system. Refer to your tractor's operator's manual, or consult your nearest dealer.

This is the "Safety Alert Symbol" used by this industry.



Remember, when you see this symbol it means: **ATTENTION BECOME ALERT! YOUR SAFETY IS INVOLVED!** This symbol with its appropriate warnings are throughout this book. Be sure all operators read them before using the backhoe.

THE VEHICLE

1. **READ THE ENTIRE VEHICLE AND BACKHOE OPERATOR'S SAFETY MANUALS BEFORE EVER ATTEMPTING TO USE THE VEHICLE. THIS KNOWLEDGE IS NECESSARY FOR SAFE OPERATION.**
2. **Follow all safety decals** on the vehicle. Keep them clean, and replace them if they become worn and hard to read.
3. **Pay attention** to the job at hand. Do not let your mind lose concentration on what you are doing.
4. **Know the limitations of your equipment.** Do not use equipment for anything other than what it was originally designed.
5. **Tractor must be equipped with ROPS or ROPS CAB and seat belt.** Keep foldable ROPS systems in "Locked UP" position at all times. Keep seatbelt securely fastened. Check seat belt daily, & replace if frayed or damaged. Falling off of the tractor can result in death from being run over or crushed.

SAFETY PRECAUTIONS

6. Do not take passengers on the vehicle or backhoe. There is no safe place for a passenger.
7. Use the handholds and step plates when getting on/off the vehicle. Failure to do so could cause a fall.
8. Inspect the vehicle before you try to operate the unit. Check for needed maintenance or repairs, and be sure to have them done before using the equipment.
9. Before performing maintenance. Set the parking brake, place the gear shift lever in neutral, turn off the vehicle, and remove the key.
10. Wear appropriate clothing such as a hard hat, safety glasses, ear plugs, etc. Do not wear loose fitting clothing, it could get caught on the equipment.
11. Never operate or transport unit with covers or shields removed.
12. Never leave unit running unattended. Follow vehicle operator's manual for correct operation.
13. Reduce speed when driving over rough terrain, on a slope, or turning, to avoid overturning the vehicle. Look before backing.
14. Do not smoke when refueling the vehicle. Allow room in the gas tank for expansion. Wipe up any spilled fuel. Secure cap tightly when done.
15. Do not modify the backhoe in any way unless authorized by Bradco to do so. Unauthorized modifications could result in equipment damage and/or personal injury.
16. Do not use a 3-point quick hitch. The quick hitch may result in improper PTO driveline geometry and older quick hitches may release under load.
17. Do not operate backhoe unless there is adequate operator clearance.
18. Keep 3-point lift quadrant lever in lowered position at all times.
19. If tractor is equipped with draft sensing control, set to "HEAVY" position (minimum sensitivity).
20. A minimum 20% of tractor and equipment weight must be on tractor front wheels with backhoe in the transport position. Weight may be obtained with a front end loader, ballast in tires or front wheel weights. Do not exceed the ROPS weight certification. Weigh the tractor and equipment (including front weights). Do not estimate.
21. Make sure all hydraulic hoses and fittings are in good condition and not leaking, twisted, kinked or frayed before starting the tractor or using the equipment.

SAFETY PRECAUTIONS

22. Before operating equipment, purge any air in the system by operating all hydraulic controls several times after connecting equipment, connecting hoses, or doing any hydraulic maintenance.

WORKING WITH THE BACKHOE

1. Never operate backhoe by standing up on, or beside the machine. Operate only from the backhoe seat.
2. Do not lift or carry people on the backhoe; they could fall and be crushed.
3. Do not adjust relief valve setting. This valve is factory set and should be adjusted only by a qualified service person. Incorrect valve setting could result in equipment damage, and/or personal injury.
4. Check your work area. Avoid hitting overhead electrical wires, underground cables and pipes, fence post, gas lines, etc.
5. Block off work area from all bystanders, livestock, etc. Allow plenty of room for backhoe reach and swing.
6. When operating on slopes, dig with the backhoe uphill and avoid full reach and swinging the backhoe bucket to the downhill side. Tipping could result.
7. Operate backhoe only from the backhoe seat.
8. Use your backhoe only for digging. Do not use it to pull things, as a battering ram, or attach ropes, chains, etc., to the unit.
9. Never work under raised stabilizers or a raised bucket.
10. Lower stabilizers and bucket when removing backhoe. This will increase the stability of the unit.
11. Do not dig close to stabilizers; the ground could collapse from under the backhoe
12. Do not lift loads in excess of backhoe capacity.
13. Always lower the backhoe bucket and stabilizers to the ground, shut off engine, remove key, and apply the parking brake before leaving the unit unattended.

TRANSPORTING THE BACKHOE

1. Be sure to engage the boom lock and swing lock before transporting backhoe. Failure to do so could cause an unstable traveling condition.
2. Allow for height of backhoe when transporting backhoe, so as not to catch unit on low overhangs or wires.

SAFETY PRECAUTIONS

3. When driving on public roads use safety lights, reflectors, Slow Moving Vehicle signs, etc., to prevent accidents. Check with local governments for regulations that may affect you.
4. Do not drive close to ditches, excavations, etc.; cave-in could result. Drive slow over rough terrain.

MAINTENANCE

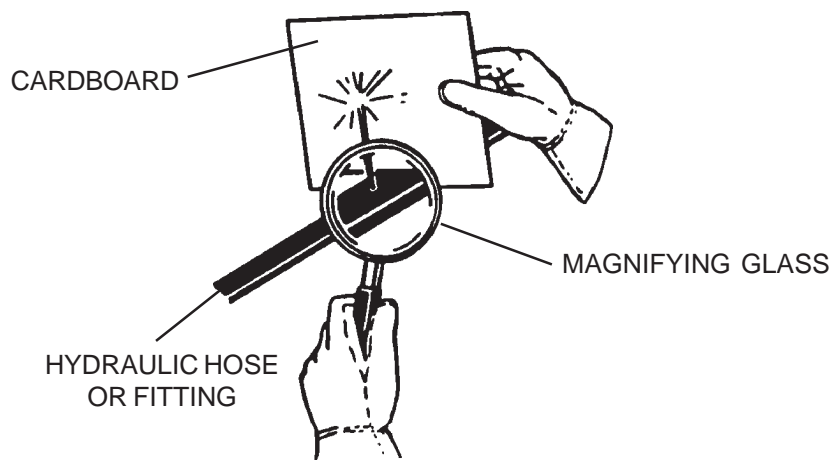
1. Never work on equipment while it is running. Block up equipment, set hand brake, lower bucket and stabilizers, turn off the tractor, and remove the key before performing repairs.
2. Never make hydraulic repairs while the system is under pressure, or the cylinders are under load. Serious personal injury or death could result.
3. Observe proper maintenance schedules and repairs to keep unit in safe working order.
4. Always wear safety goggles or glasses when working on equipment.
5. Use a brass drift and hammer when pressing out pins to prevent the pin from shattering.

WARNING! 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 to research immediately to determine the proper treatment.



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INTERNATIONAL SYMBOLS

As a guide to the operation of your equipment, various international symbols have been utilized on the instruments and controls. The symbols are shown below with an indication of their meaning.



Engine speed



Hours recorded



Engine water temperature



Lights



Horn



Engine oil pressure



Hazard warning



Axle connect



Axle disconnect



Continuously variable



Increase



Decrease



Diesel fuel



Creeper range



High range



Low range



Alternator charge



Power take-off (on)



Power take-off (off)



"Tortoise," slow or minimum setting



"Hare," fast or maximum setting



Caution



Control lever operating direction



Rock shaft (raised)



Rock shaft (lowered)



Remote cylinder (extended)



Remote cylinder (retracted)



Remote cylinder (FLOAT)



Differential lock



Read operators manual



Neutral



Forward



Reverse

PRE-OPERATION

3509 & 3511 BACKHOE

GENERAL INFORMATION

The purpose of this manual is to assist in setting up, operating and maintaining your backhoe. Read it carefully. It furnishes information and instructions that will help you achieve years of dependable performance.

Right and left, when referred to in this manual, are determined from the operator's control position when facing the backhoe.

The illustrations and data used in this manual were current (according to the information available to us) at the time of printing, however, we reserve the right to redesign and change the backhoes as may be necessary without notification.

PREPARING THE TRACTOR

WARNING! Never let anyone operate this tractor and backhoe without first reading the "Safety Precautions" and "Operating Instructions" sections of this manual (see Sections B and G respectively). Always choose hard, level ground to park the tractor on and set the brake so that the tractor cannot roll.



Before you install a 3-point hitch backhoe on any tractor, there are certain critical points that must be checked. Failure to address these points could result in serious damage to the equipment, and serious injury or even death to the operator. Do NOT attempt to install the backhoe until you have gone through the following points and made any corrections to the equipment that might be deemed necessary.

PRELIMINARY CLEARANCE CHECK

The first point to consider is if there will be adequate clearance between the backhoe operator and the tractor. Proper clearance is essential for operator safety. When mounted, there must be a minimum of 24" horizontal clearance (with seat in forward position), and a minimum of 28.43" horizontal clearance (with seat in the extended position). There must also be a minimum vertical clearance of 8" between the operator's head and any portion of the tractor.

Follow the procedure below to check for minimum clearances.

1. With the tractor 3-point hitch lower links set approximately 8" to 9" off the ground, measure the horizontal distance between the lower link ball joint and any object that comes the closest to interfering with the backhoe seat (such as the ROPS or cab). See Figure #1

PRE-OPERATION

3509 & 3511 BACKHOE

FIGURE #1

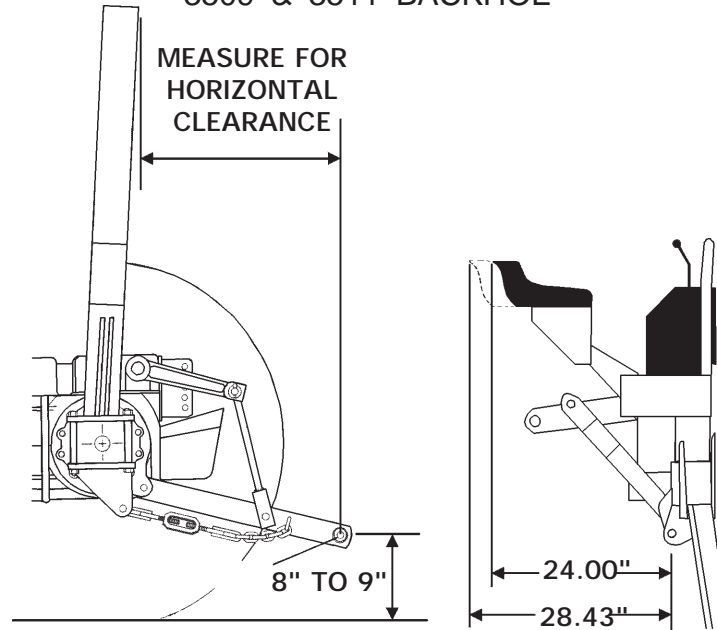
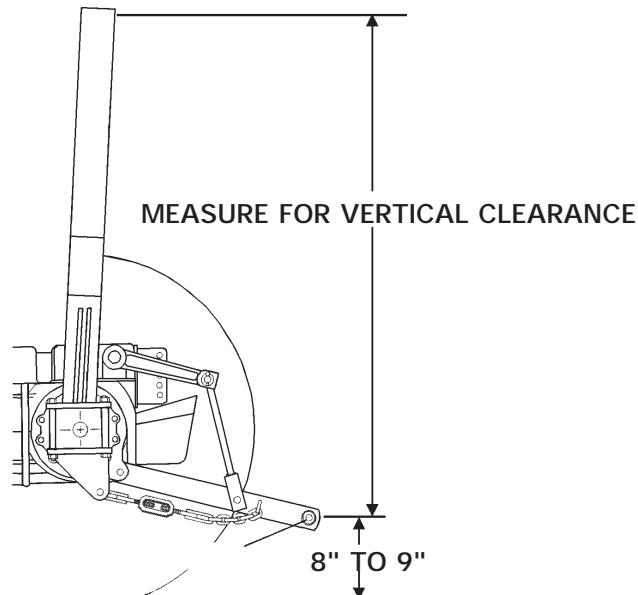


Figure #1 also shows the minimum horizontal distances between the seat (in the forward and the extended positions), and the lower link mounting point. The distance found in step #1 must be greater than these distances to safely operate the backhoe. Do not mount the backhoe if the distance found in step #1 is less than the 24" minimum. (If the distance found in step #1 is greater than 24" but less than 28.43", make sure the seat is in the forward position.)

2. To check the vertical clearance, first make sure the lower links are approximately 8" to 9" off the ground. Measure the vertical distance between the lower link ball joint center and any solid object that could interfere with the backhoe operator's head (such as the tractor cab or ROPS). See Figure #2

FIGURE #2



The distance found in step #2 must be at least 78". This distance allows for the height of the backhoe, the height of the seated operator, and the minimum 8" clearance. This figure assumes the operator is 6' tall. You will have to add 1/2" for every inch your operator is over 6' to achieve the correct figure. The distance found in step #2 must be greater than this distance to safely operate the backhoe. Do not mount the backhoe if the distance found in step #2 is less than the 78" minimum.

PRE-OPERATION

3509 & 3511 BACKHOE

NOTE: If your particular situation does not allow for the required backhoe clearance, look for ways to increase the clearance, such as adjusting the backhoe seat in, or moving items on the tractor, etc.

CAUTION! These clearances are considered minimum to prevent backhoe operator injury during use. The backhoe should not be used in applications where minimum clearances cannot be held. A **HARD HAT SHOULD ALWAYS BE WORN WHEN OPERATING A BACKHOE.**



DRAFT CONTROL CHECK

For tractors with a top link draft control system, make sure the draft control is in its heaviest load position and disconnect the top link draft sensor linkage to cut off the draft control function. It is important to prevent the top link from exerting pressure that may activate the draft control system. Do NOT attempt to lift the backhoe with the 3-point hitch.

IMPORTANT: On tractors with draft control, digging forces of the backhoe could be large enough to trigger the draft control system. Since the mounting system of the backhoe is a solid mount, draft control operation will only cause excess oil pressure and resultant high temperatures. This eventually will lead to hydraulic fluid overheating and to pump failure.

BACKHOE VALVE COMPATIBILITY

The backhoe valve must be compatible with the hydraulic system that will power it. Make sure you are powering the backhoe with an open center hydraulic system. If you are using a closed center hydraulic system or a power beyond set-up, the valve must be converted for this use. Contact your AG ATTACH dealer for valve conversions. If you do not know how your valve is currently set up, check with your tractor dealer. Failure to convert the hydraulic valve will result in seal damage.

HYDRAULIC OIL

Your backhoe has been filled with oil at the factory. The oil in the unit is compatible with most tractor manufacturer's oil. Do not move any control levers on the unit until after the hydraulic connections to the tractor have been made.

BACKHOE OPTIONS

Basic backhoes are shipped complete with bucket. However, several bucket options are available for the backhoe.

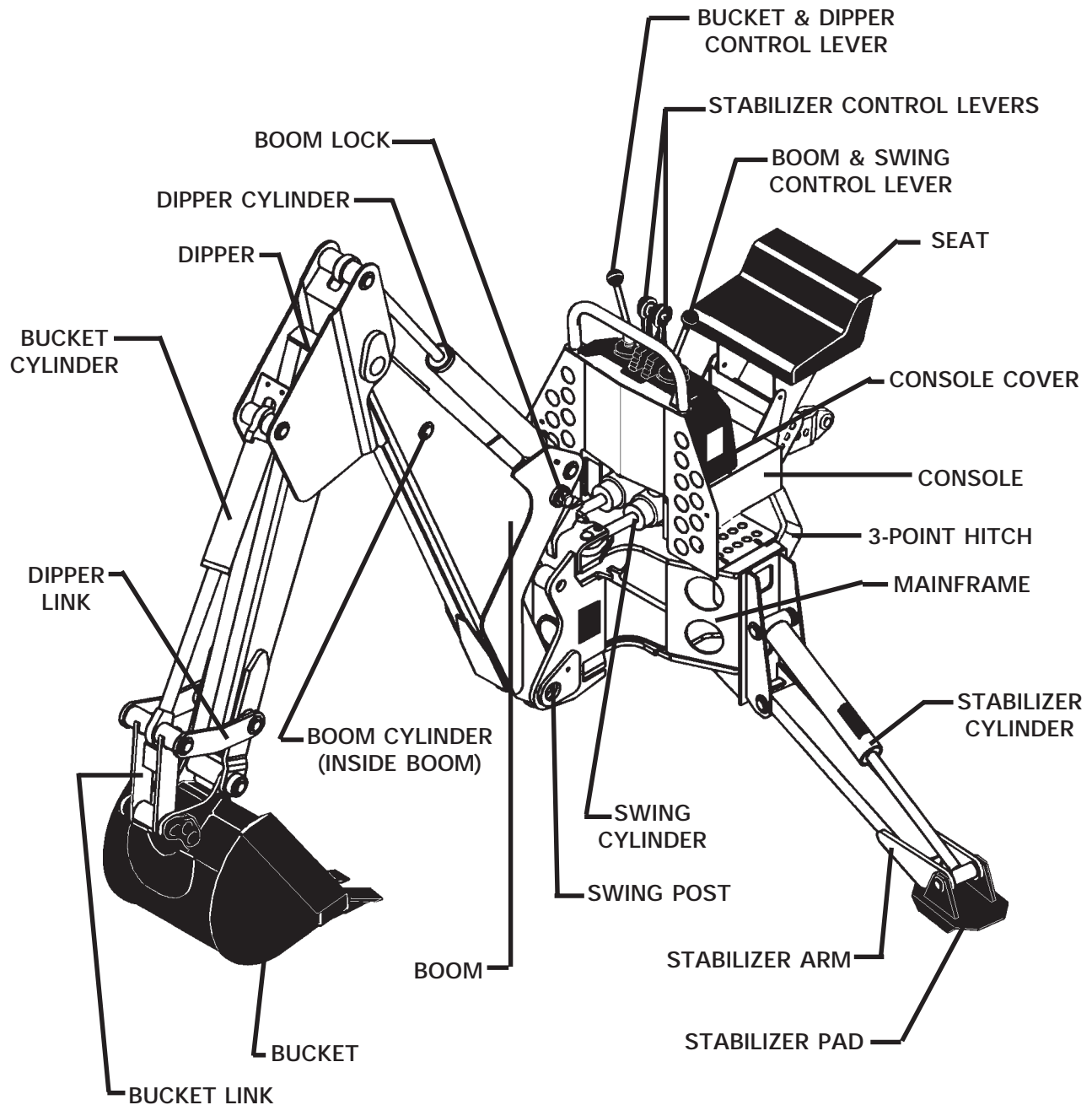
<u>DESCRIPTION</u>	<u>ORDER CODE</u>
12" BUCKET	#85012
16" BUCKET	#85016
18" BUCKET	#85018
20" BUCKET	#85020
24" BUCKET	#85024

PRE-OPERATION

BACKHOE MAJOR COMPONENT NOMENCLATURE 3509 & 3511 BACKHOE

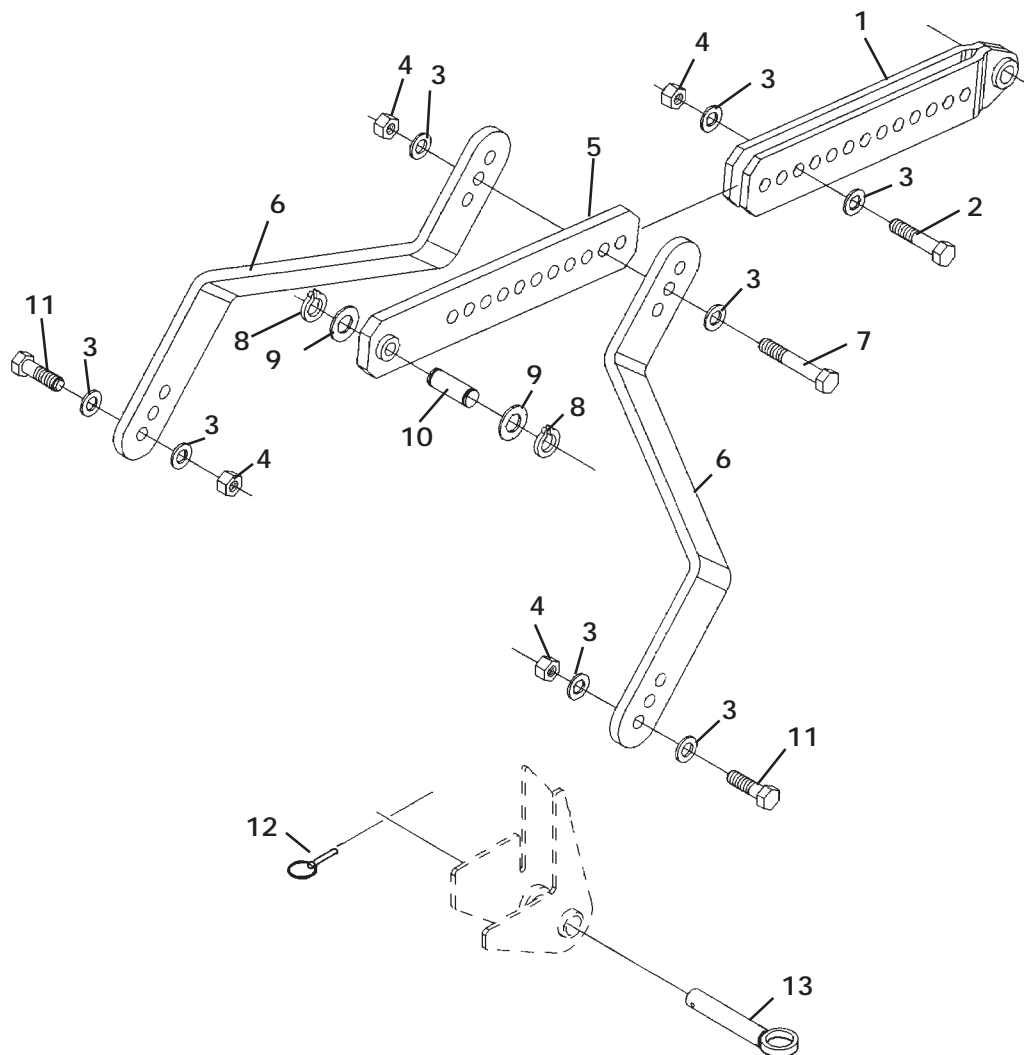
GENERAL INFORMATION

Throughout this manual, reference is made to various backhoe components. The purpose of this page is to acquaint you with the various names of these components. This knowledge will be helpful when reading through this manual or when ordering service parts.



MOUNTING INSTRUCTIONS

3-POINT HITCH ADAPTER KIT #88623



MOUNTING INSTRUCTIONS

3-POINT HITCH ADAPTER KIT #88623

<u>NO</u>	<u>REQ'D</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	87742	Center Double Link
2	1	1145	.75" UNC X 3.50" Hex Capscrew
3	8	1649	.75" Hard Flat Washer
4	4	1534	.75" UNC Hex Locknut
5	1	87743	Center Single Link
6	2	87741	Hitch Lock Out Arm
7	1	1149	.75" UNC X 5.00" Hex Capscrew
8	2	1570	Snap Ring
9	2	57462	Thrust Washer
10	1	87805	Pin
11	2	1142	.75" UNC X 2.75" Hex Capscrew
12	2	6626	Klik Pin
13	2	88117	Pin

NOTE: USE HIGH STRENGTH PIN SUPPLIED BY YOUR TRACTOR MANUFACTURER TO ATTACH CENTER LINK TO TRACTOR.

MOUNTING INSTRUCTIONS

3-POINT HITCH BACKHOE

GENERAL INFORMATION

The basic 3509 & 3511 backhoe includes a 3-point hitch adapter links and the following hydraulics: check valve, inline filter and two #3708 hoses (.50" X 48" - 8MP-8FJX). Although the adapter links and hydraulic hoses have been installed at the factory, diagrams and parts lists have been included in this section for your convenience. Study the diagrams to make sure that all the necessary parts have been supplied and installed correctly. Install any parts that were not installed at the factory. Refer to the diagrams at the front of this section for proper installation of parts.

ADDITIONAL HYDRAULIC INFORMATION

You will have to adapt to your tractor hydraulic system. You will find that your backhoe will be shipped with the inline filter, check valve, and a pair of hydraulic hoses already installed. Your dealer should provide the rest of the system hook-up to your tractor.

IMPORTANT

Always know your hydraulic system and be sure to observe the following:

Always use hoses of adequate pressure rating for your highest available pressure.

Always use hoses of sufficient size to handle the highest flow available.

Always route the hoses to the attachment in a way that loops, kinks, sharp edges, or snagging possibilities are eliminated.

Always route hoses as far as possible from areas occupied by operator.

Always use the proper kit, if possible, or use identical or equal parts in your assembly.

Hose length supplied is adequate to reach the backhoe before attaching, but not so long as to be able to loop up around the fender or operator after the backhoe is mounted.

All bends and loops etc. do not exceed hose manufacturer's rated radius specification.

OPTIONAL HYDRAULICS - EXAMPLES

Following are several examples of optional hydraulic flow diagrams with captions to explain each use. Additional information may be obtained from your local dealer.

MOUNTING INSTRUCTIONS

3-POINT HITCH BACKHOE

IMPORTANT: The following hydraulic flow diagrams are for open center systems **ONLY!** Be sure that any system you design is compatible with the backhoe valve and tractor hydraulic system (open center - closed center), to prevent damage to the equipment.

FIGURE #1

(Existing tractor pump with auxiliary 4-way control valve.)

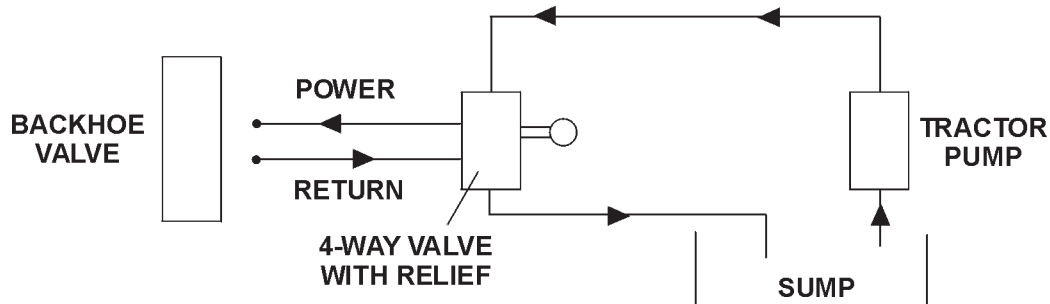
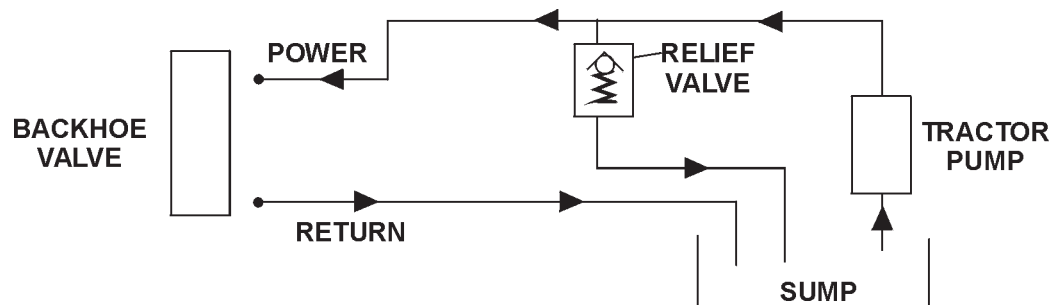


FIGURE #2

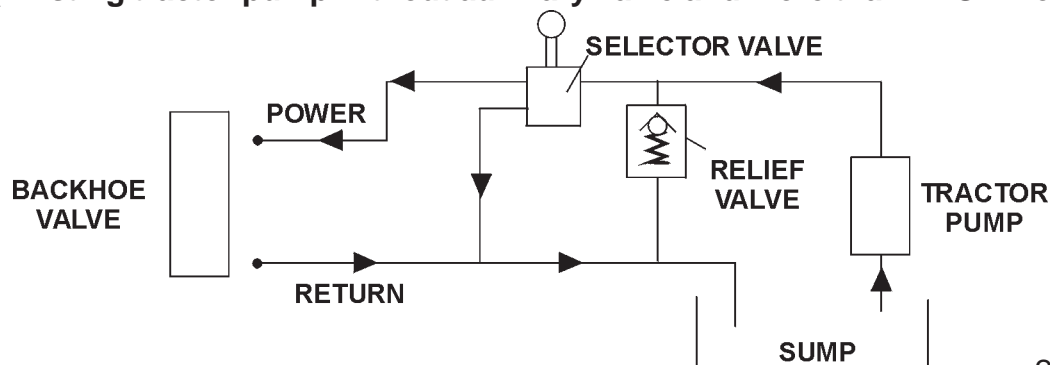
(Existing tractor pump without auxiliary valve and less than 11 GPM output.)



IMPORTANT: Unless there is a way to disconnect the pump from the engine, it will be necessary to connect a loop hose from the power (pressure) to the return when the backhoe is removed from the tractor.

FIGURE #3

(Existing tractor pump without auxiliary valve and more than 11 GPM output.)



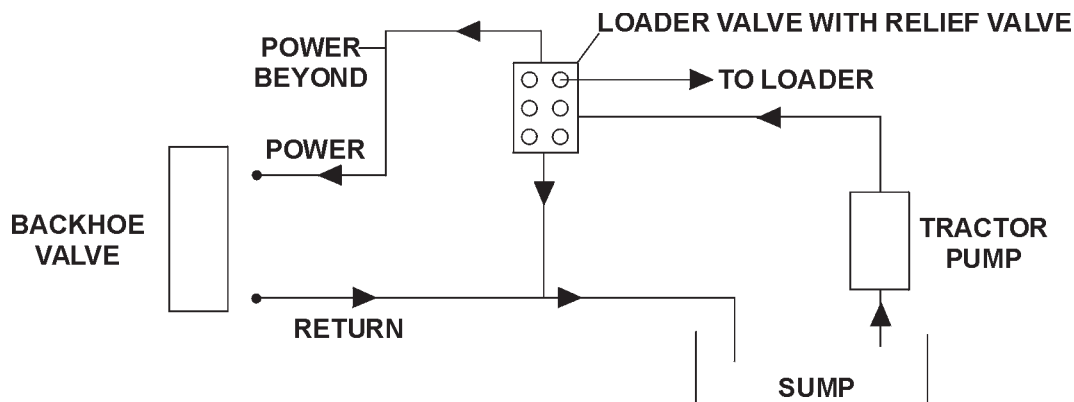
MOUNTING INSTRUCTIONS

3-POINT HITCH BACKHOE

IMPORTANT: Unless there is a way to disconnect the pump from the engine, it will be necessary to connect a loop hose from the power (pressure) to the return when the backhoe is removed from the tractor.

FIGURE #4

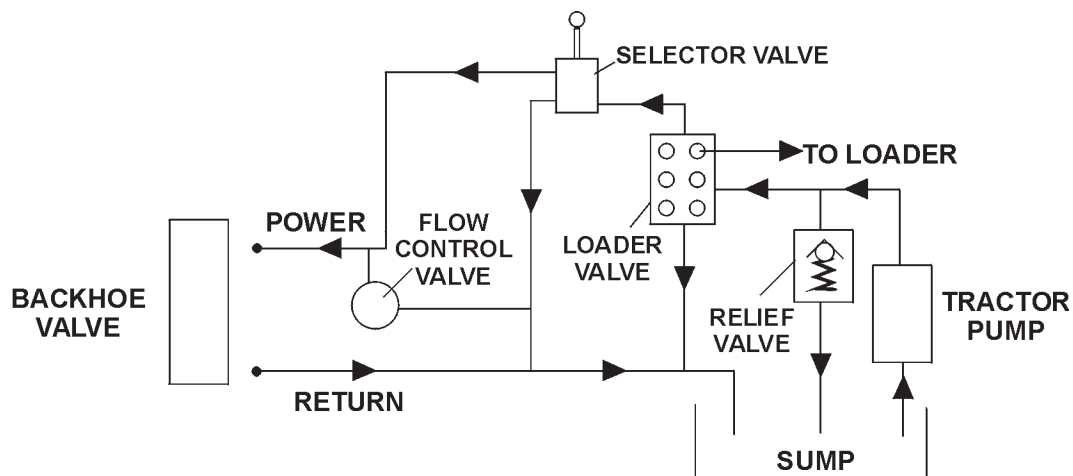
(Existing tractor pump (less than 11 GPM) and loader utilizing loader valve power beyond.)



IMPORTANT: Unless there is a way to disconnect the pump from the engine, it will be necessary to connect a loop hose from the power (pressure) to the return when the backhoe is removed from the tractor.

FIGURE #5

(Existing tractor pump (more than 11 GPM) and loader utilizing loader valve power beyond and flow control valve.)

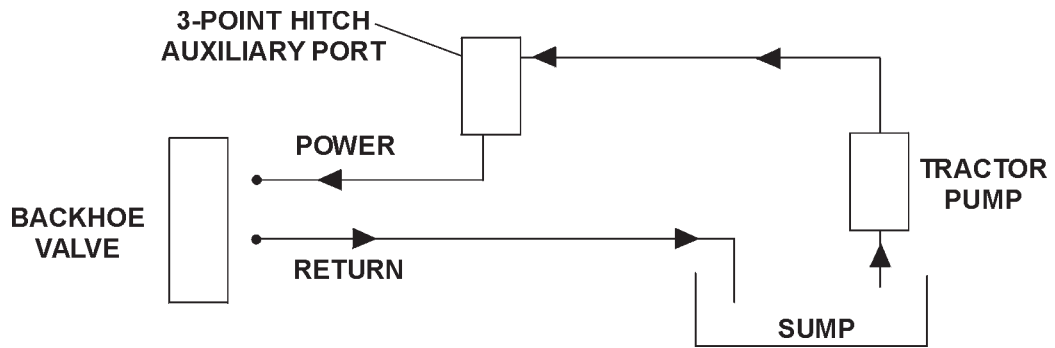


MOUNTING INSTRUCTIONS

3-POINT HITCH BACKHOE

FIGURE #6

(Direct connect to 3-point hitch auxiliary port.)



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BACKHOE INSTALLATION

CAT. II 3-POINT HITCH BACKHOE

GENERAL INFORMATION

The following instructions will help you to mount your backhoe onto a category 2 three-point hitch system. Remember to read all safety warnings, decals, and operating instructions before operating the tractor or backhoe.

WARNING! Three point hitch backhoes used on tractors equipped with either ROPS or cabs can be dangerous, and may cause injury or death if not properly installed, operated, and maintained.



Always read the operator's manual.

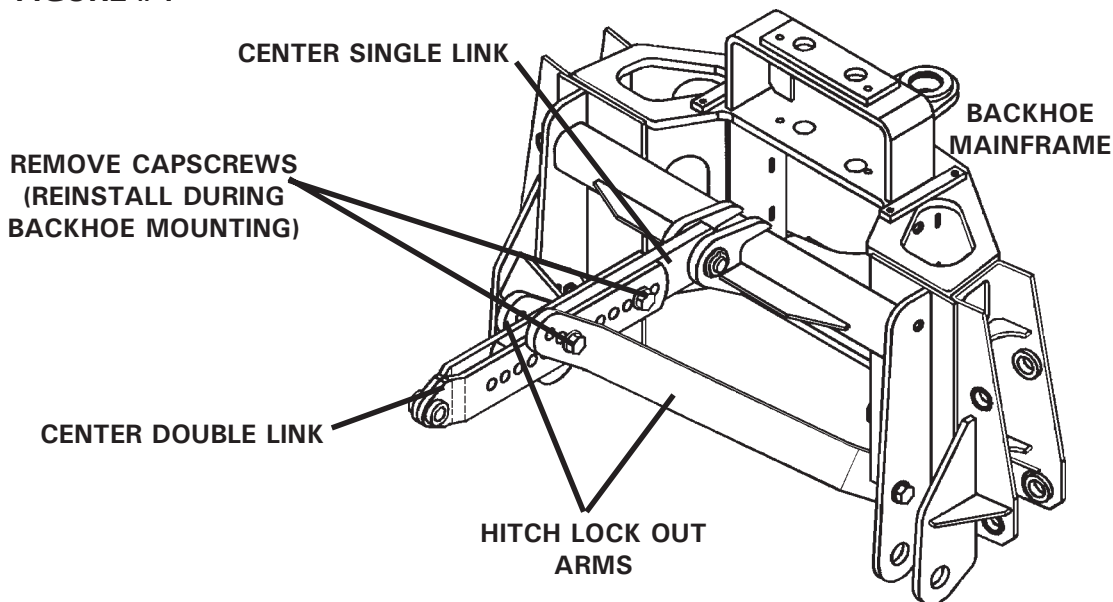
Always maintain an 8" clearance between the operator and the cab or ROPS.

Always use pins of the proper size and grade at the 3-point hitch points.

MOUNTING INSTRUCTIONS

1. Remove the top link from the tractor.
2. If the tractor is equipped with draft control, render it inoperable. If this is not possible, adjust the draft lever to its heaviest load position.
3. Remove the steel shipping banding from around the backhoe and skid.
4. The 3-point hitch adaptor kit should have been installed onto the backhoe at the factory. Remove the two capscrews from the single and double link, and remove the double link. Allow the hitch lock out arms to drop. See Figure #1

FIGURE #1



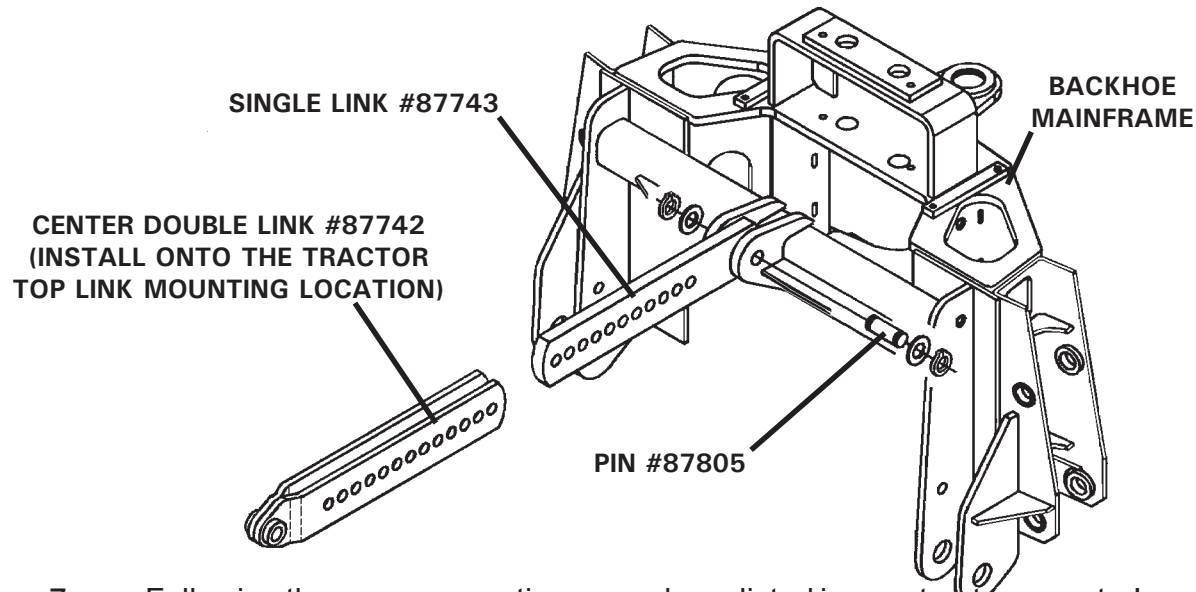
5. Check to be sure that the single link is installed onto the backhoe with pin #87805, thrust washers, and snap rings. See Figure #2

BACKHOE INSTALLATION

CAT. II 3-POINT HITCH BACKHOE

6. Install the center double link onto the tractor top link location using the existing high strength pin supplied by your tractor manufacturer. See Figure #2

FIGURE #2



7. Following the proper operating procedures listed in your tractor operator's manual, slowly back the tractor up to the backhoe. (Back the tractor only close enough to connect the hydraulic system.)

WARNING! 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.

8. Hook up the hydraulic system to the tractor with the hydraulic pressure going to the backhoe inline filter and coming from the backhoe check valve and going to the tractor.

We recommend that you involve your dealer for the initial hydraulic hook-up. Install the correct hydraulic couplers that fit your tractor onto the backhoe pressure and return hoses.

BACKHOE INSTALLATION

CAT. II 3-POINT HITCH BACKHOE

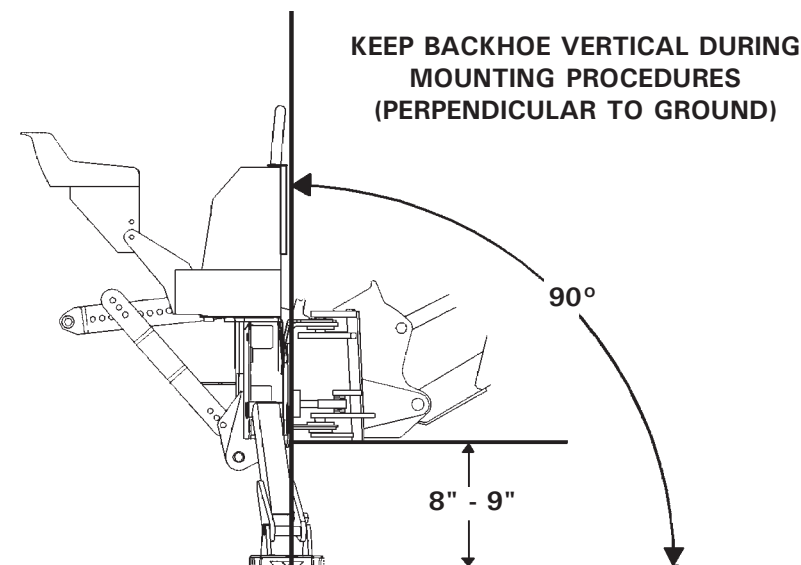
9. Start the tractor engine and operate at low RPM. Activate the tractor valve to provide hydraulic power to the backhoe. (Check for any hydraulic leaks.)

CAUTION! Until the backhoe is securely mounted onto the tractor, keep all people clear of your work area and make sure that no portion of the operator's body is beneath any part of the backhoe.



10. Raise the backhoe using the stabilizer and boom control levers until the swing post is approximately eight to nine inches above ground level. Make sure the backhoe is vertical (perpendicular to the ground). See Figure #3

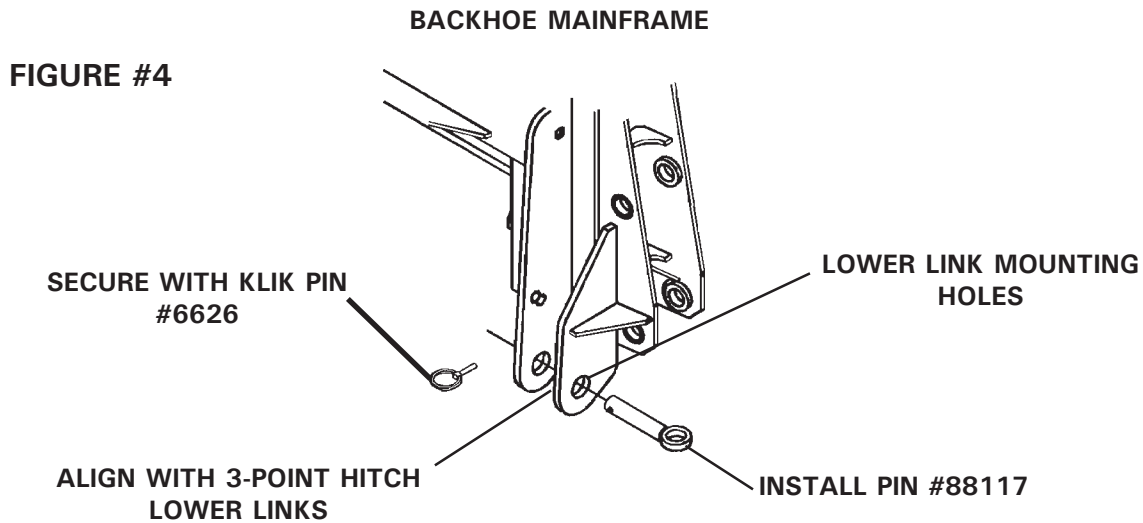
FIGURE #3



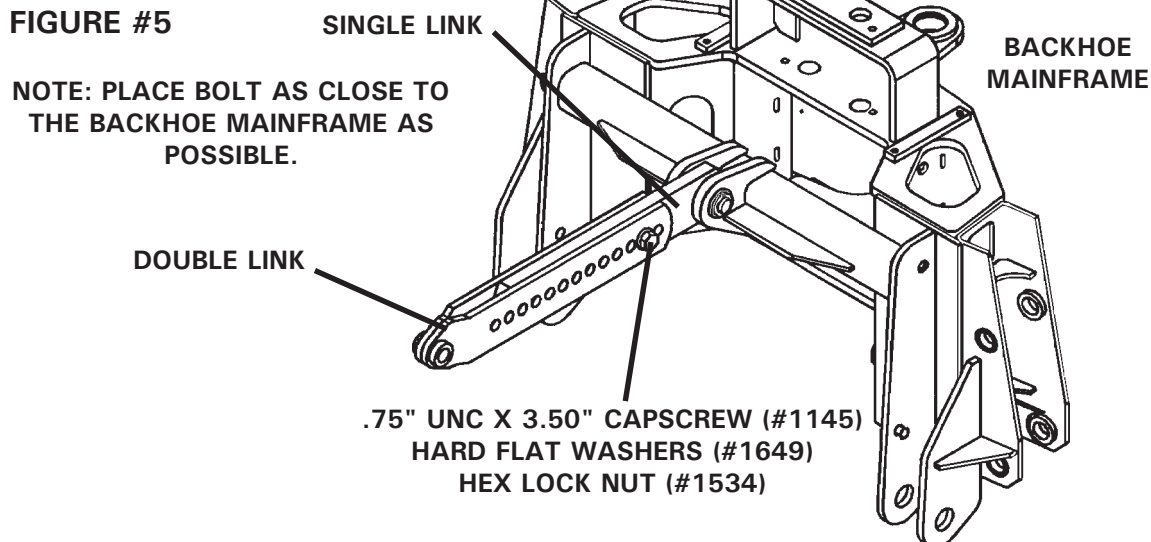
11. Back the tractor until the lower link ball joints are in line with the mounting holes in the backhoe mainframe. NOTE: While backing tractor be aware of the location of the hydraulic hoses and top links. See Figure #4
12. Install the (2) #88117 hitch pins connecting the lower links to the backhoe mainframe. Secure in place using the two klik pins provided. See Figure #4

BACKHOE INSTALLATION

CAT. II 3-POINT HITCH BACKHOE



13. Position the single top link in-between the double link. Adjust the backhoe height until at least one hole lines up between the two links. Keep backhoe vertical while adjusting the height. Install the .75" X 3.50 capscrew (#1145), two hard flat washers (both sides) and lock nut provided. See Figure #5

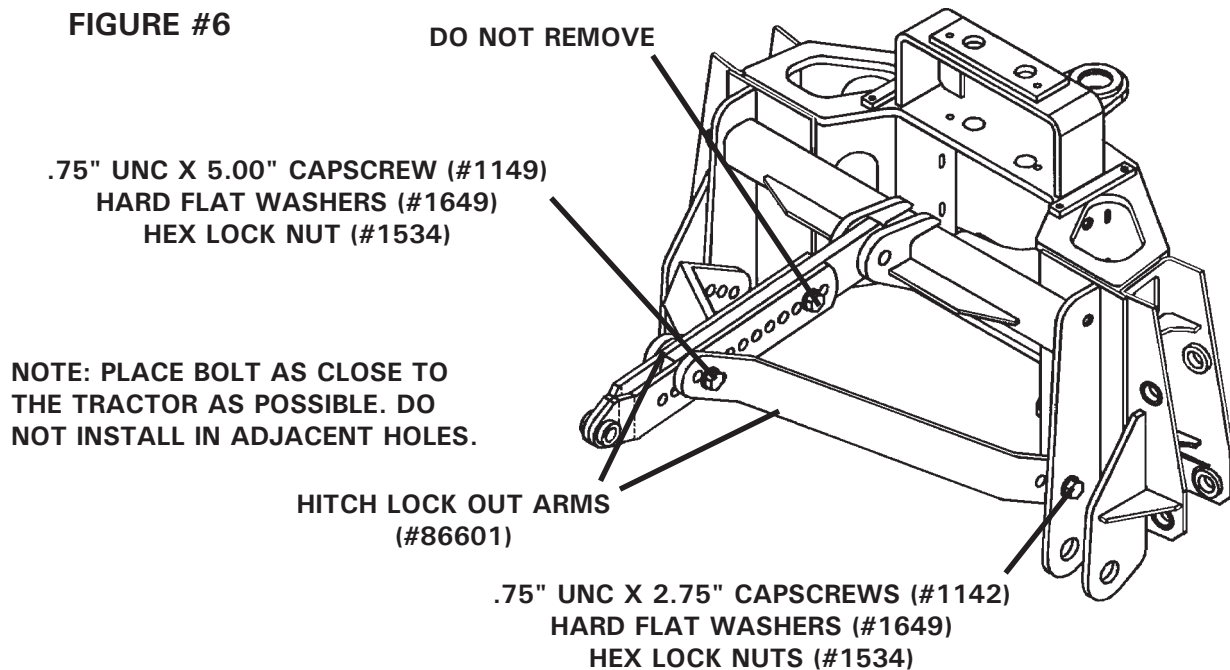


14. (If the hitch lock-out arms were not installed at the factory, position them to the inside of the mounting holes, and bolt into place using the two .75" X 2.75" capscrews, hard flat washers (both sides), and lock nuts provided. Position the hitch lock-out arms on each side of the top links, align one of the holes (as far away from the capscrew installed in step #13 as possible), and install the .75" x 5.00" capscrew (#1149), two hard flat washers (both sides), and lock nut provided. See Figure #6

BACKHOE INSTALLATION

CAT. II 3-POINT HITCH BACKHOE

FIGURE #6



It is important to pick a set of holes that place the backhoe in a vertical position in relationship to the ground with 8" - 9" of ground clearance at the boom pivot pin.

15. Torque all mounting bolts. Refer to the chart in Section "O" of this manual.
16. Check hose routing to ensure that they are kept away from the operator during backhoe operation. Do not let them touch the ground. Secure all hydraulic lines in place for operator safety and to prevent them from being damaged.
17. Double check clearance between the backhoe operator and any solid portion of the tractor, such as the cab or ROPS. If 8" of head clearance is not available, **DO NOT USE THIS BACKHOE ON THIS TRACTOR.** Failure to observe these instructions may cause severe personal injury or death.

CAUTION!



Do not attempt to modify the mounting in any way. Incorrect mounting or modifying of the backhoe 3-point mounting could allow the backhoe to raise up during use, resulting in injury or death.

IMPORTANT: DO NOT attempt to raise the backhoe with the 3-point hitch. The backhoe center links along with the hitch lock out arms make the backhoe a solid mount that is immovable. Any attempt to raise the backhoe with the 3-point hitch will cause the hydraulic lift oil to go over relief and eventually damage the hydraulic system due to excessive heat build-up.

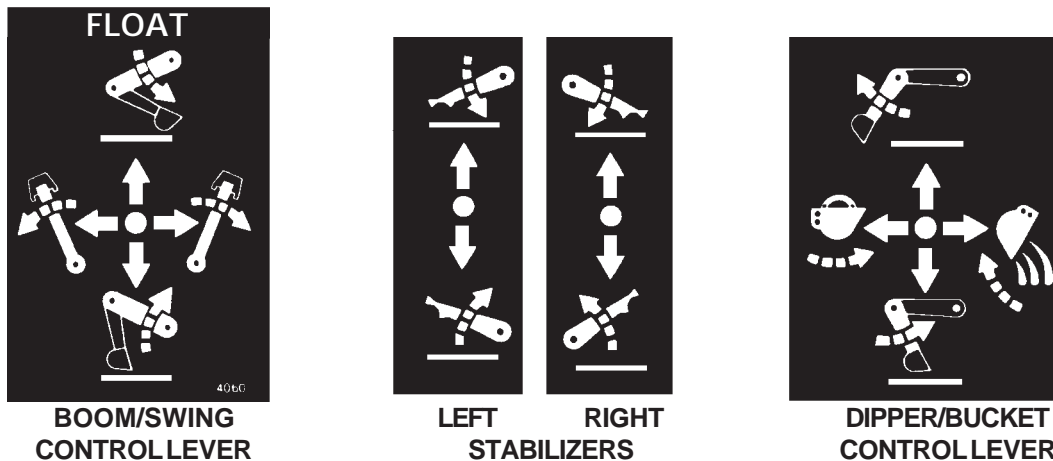
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OPERATING INSTRUCTIONS

CONTROLS

GENERAL INFORMATION

Your backhoe is operated by four different control levers. Two are for stabilizer operation and the other two operate the swing, boom, dipper, and bucket functions. The information contained below will help you become familiar with the operation of each control lever. Read the safety precautions (Section B) of this manual before attempting to use the backhoe. Remember, right and left when referred to on this page are determined by the operator's position seated at the backhoe controls facing the bucket.



BACKHOE STABILIZER LEVERS

Moving the stabilizer lever(s) forward will bring the backhoe stabilizer (s) "Down". Moving the stabilizer lever(s) backward will raise the backhoe stabilizers "Up". Both stabilizers are required to be down for proper stability of the backhoe when in operation.

BOOM/SWING LEVER (LEFT HAND LEVER)

Pushing the boom/swing lever forward will "Lower" the boom dipstick and bucket. Full forward is the "FLOAT" position. Pulling the lever backward will "Lift" the boom, dipstick, and bucket.

Pushing the boom/swing lever to the left will swing the boom and bucket to the "Left". Pushing the lever to the right will swing the boom, and bucket to the "Right".

DIPPER/BUCKET LEVER (RIGHT HAND LEVER)

Pushing the dipper/bucket lever forward will move the dipper "Out" or away from the operator. Pulling the lever backward will move (crowd) the dipper "In" or toward the operator.

Pushing the dipper/bucket lever to the left will "Fill" or curl the bucket (move inward). Pushing the lever to the right will "Dump" the bucket (move outward).

OPERATING INSTRUCTIONS

OPERATING TECHNIQUES ATTACHMENT TYPE BACKHOES

GENERAL INFORMATION

When operating the backhoe, smoothness of technique should be strived for at all times. Smoothness will come with experience and practice at feathering the controls. Establish a flowing digging cycle to increase operator efficiency and save unnecessary wear on the machine.

Observe the following points to obtain the best results and to fully utilize the digging force of the backhoe.

WARNING! Operate the backhoe only when seated at the controls. Any other method could result in serious personal injury or death.



Never attempt to drive the tractor when seated at the backhoe controls.

Check the prospective digging area for hidden utility lines before operating the backhoe or when in doubt of their location, contact the local utility companies. When operating the backhoe in an area where utilities are expected to be present, throttle the backhoe down and proceed with caution. If you feel the backhoe bucket made contact with anything out of the ordinary, stop digging at once. Have the obstruction checked by hand. If a utility line has been damaged, contact the affected utility at once.

BEFORE YOU START DIGGING

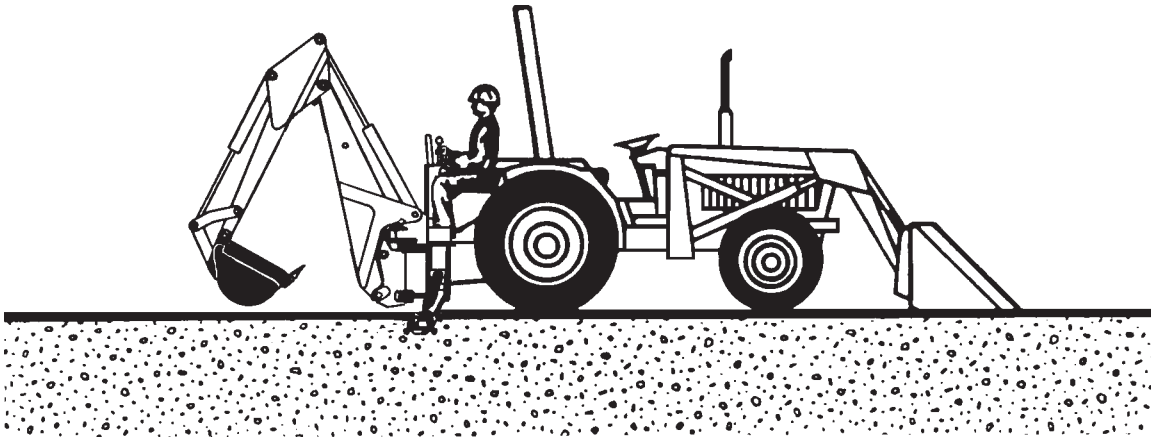
Before any excavating is started, it is always a good idea to plan out the job first. Various things need to be considered and taken into account prior to the actual digging. The operator should inspect the job site and take notice of any potential hazards in the area. He should have a complete understanding of the tasks he is expected to perform. Figure out what will be done with the spoil (excavated soil), will it be used to backfill or be trucked out? What are the soil conditions like? Will you have to work around others? Etc.

Once you have become familiar with the job site and understand the job requirements, it is time to set up for the actual digging. Position the backhoe in such a way as to minimize repositioning the unit and to maximize digging efficiency. Consider the placement of spoil and position the backhoe to be able to dig the maximum amount of soil, accurately, while leaving enough room for the spoil removed to be piled in the desired area.

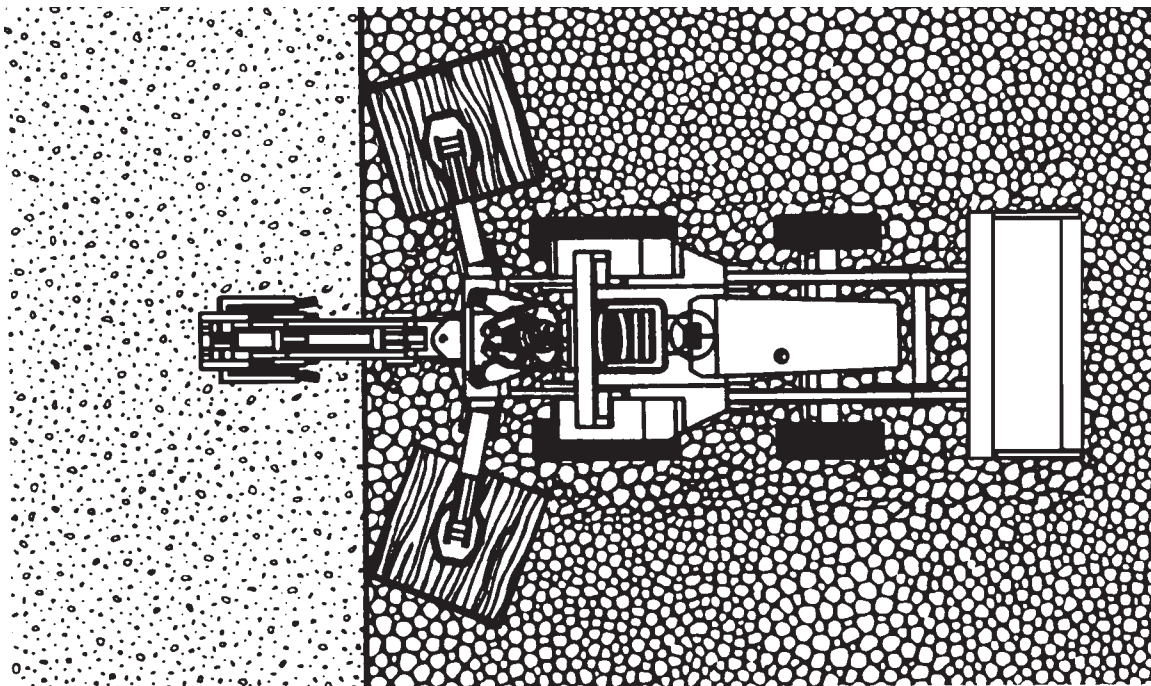
OPERATING INSTRUCTIONS

OPERATING TECHNIQUES ATTACHMENT TYPE BACKHOES

BEFORE YOU START DIGGING (CONTINUED)



Once the unit is positioned, lower the stabilizers to the ground. The tires should still be supporting most of the vehicle weight with the stabilizers relieving only part of the weight, and mainly acting to give the unit a wider base for increased stability and to keep the unit from moving or bouncing with backhoe use. The front end loader should also be lowered if the unit is so equipped. The vehicle should at no time be supported by the stabilizers and loader with any of its wheels off the ground. Severe damage to the vehicle could result. When operating the unit on a delicate surface (such as concrete, or stone work) or on sandy, loose, or soft ground place plywood under the stabilizers to help distribute the load over a wider area.

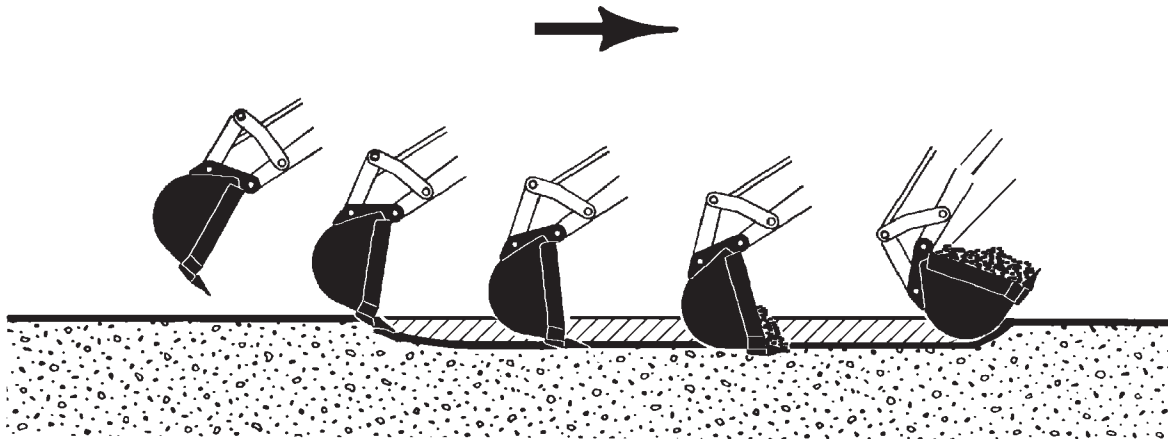


OPERATING INSTRUCTIONS

OPERATING TECHNIQUES ATTACHMENT TYPE BACKHOES

BASIC DIGGING TECHNIQUE

When starting an excavation, make the first cut of each section shallow, being careful to follow the exact layout of the excavation. The reason for the shallow cut is to minimize damage to the sod and to facilitate replacement. These first cuts are also important because they will act as guides for the remaining cuts, thus getting the first few cuts as accurate as possible will help in keeping all future cuts accurate.



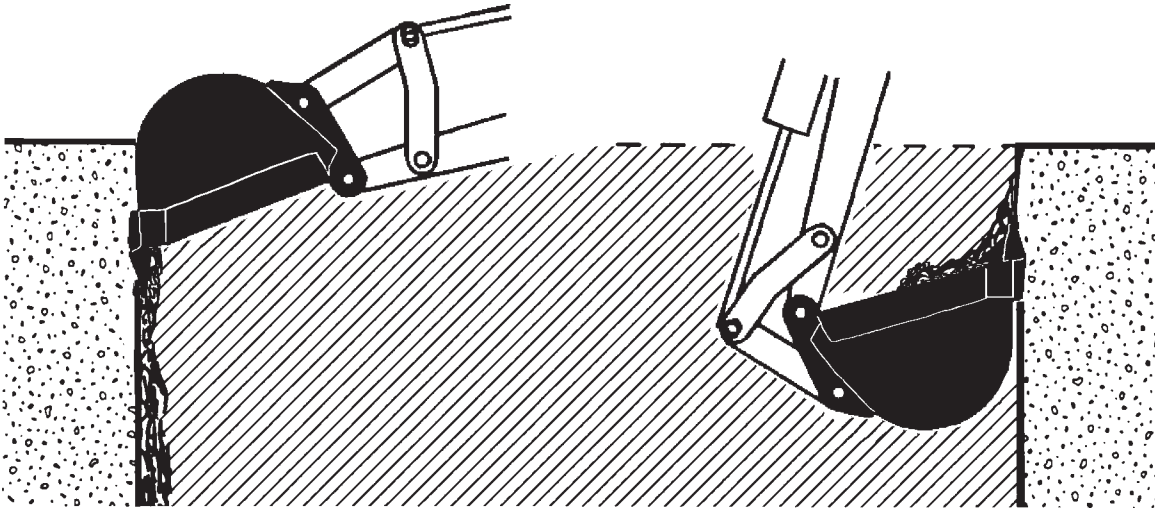
When digging with the backhoe, extend the boom, dipper and bucket out, away from the operator. Lower the boom and dipper to start the digging process. The bucket teeth should be at a 30° to 45° entry angle. As the digging starts, curl the bucket until the cutting edge is level with the horizon. Crowd the bucket in toward the operator working the bucket lever to keep the bucket level. As the bucket moves toward the operator, manipulate the boom lever to keep the cut level. At the end of the digging cycle, crowd the dipper out and completely curl the bucket while lifting it from the excavation. Once you have cleared the excavation, swing the bucket to the spoil pile. Start to dump the bucket before the pile is approached. Once the bucket is empty, swing the unit back to the excavation, positioning the bucket and dipper for the next cut in the process. The whole digging process should be one smooth cycle that is repeated until the excavation is completed.

When the excavation has been dug to within six inches of the finished bottom, clear and touch up the sides of the excavation. Use the flat sides of the bucket to scrape off any high spots. Dislodge any exposed rocks if they seem loose. When finishing walls, finish the far wall by curling the bucket out, crowding the dipper out, and forcing the bucket down. To finish the closest wall, lift the bucket up and curl it in.

OPERATING INSTRUCTIONS

OPERATING TECHNIQUES ATTACHMENT TYPE BACKHOES

BASIC DIGGING TECHNIQUES (CONTINUED)



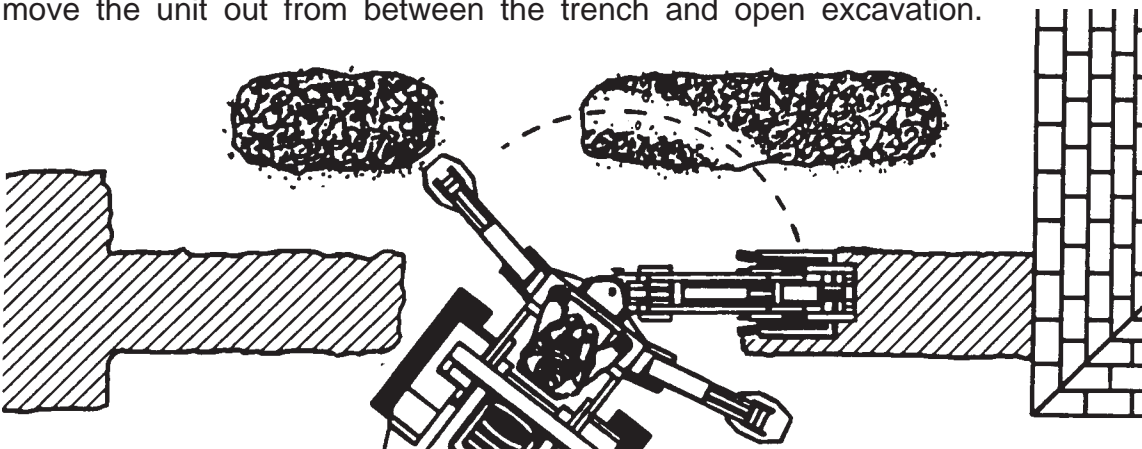
Once the sides are cleaned up, finish grading the bottom of the excavation. This is done by making the remaining cuts long and shallow, concentrating on making them level and smooth. Remove any remaining spoil. Check the excavation bottom for depth and levelness, making any adjusting cuts as needed.

The basic steps just listed are the same regardless of the excavation. All other digging jobs are simply variations of this basic procedure. Remember to make your cuts in smooth cycles. This will reduce operator fatigue and machine wear while increasing productivity and efficiency.

SPECIAL APPLICATIONS

TRENCHING BETWEEN A BUILDING AND AN OPEN EXCAVATION

Start the trench at the building and trench toward the open excavation. Dig toward the open excavation until there is just enough room to move the unit out from between the trench and open excavation.

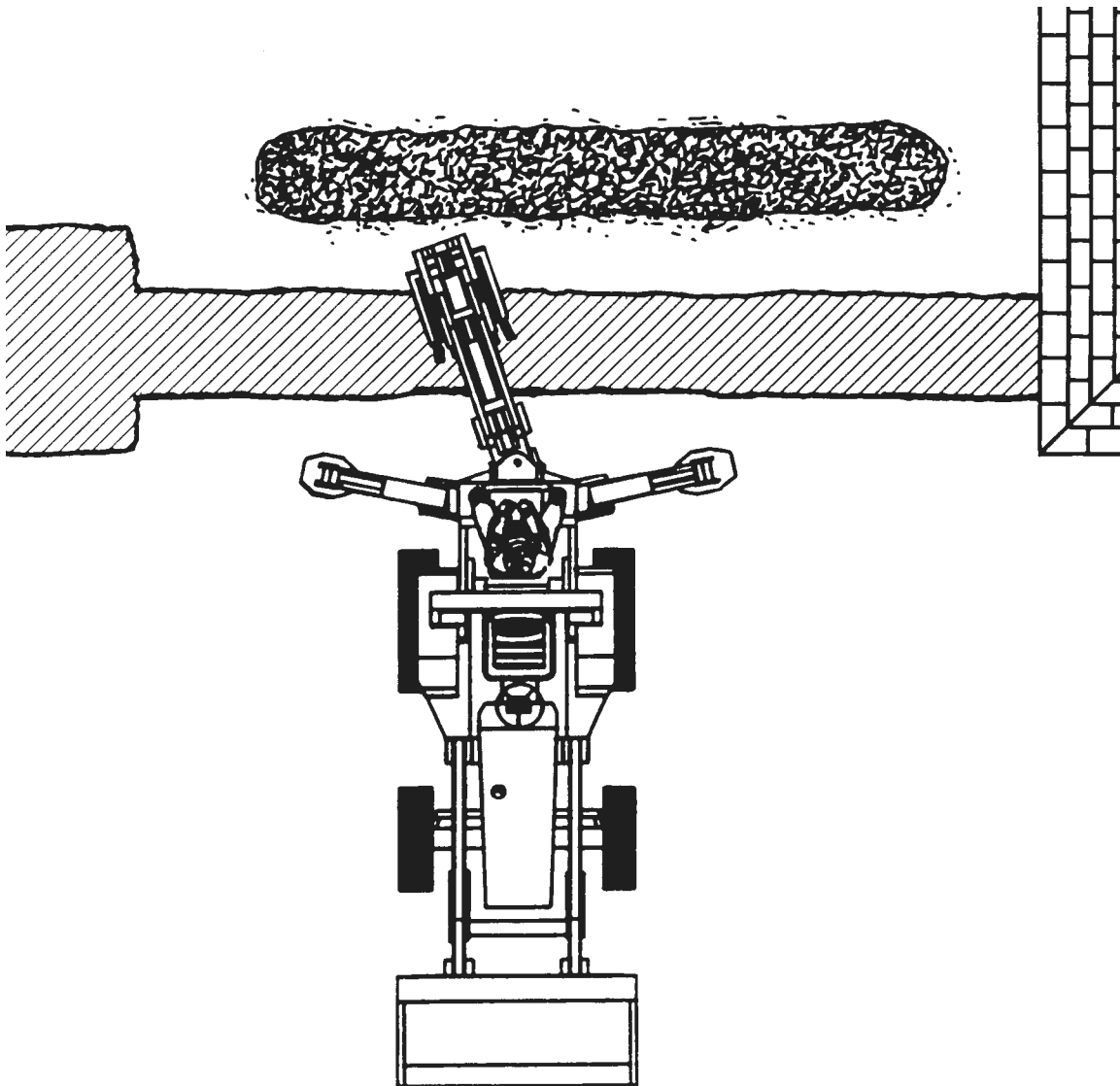


OPERATING INSTRUCTIONS

OPERATING TECHNIQUES ATTACHMENT TYPE BACKHOES

TRENCHING BETWEEN A BUILDING AND AN OPEN EXCAVATION (CONTINUED)

Position the unit so the backhoe swing post is over the centerline of the trench connection. Dig with the backhoe at extreme swing positions, and in as close to the stabilizers as possible. Pile the soil on the opposite side of the trenches.

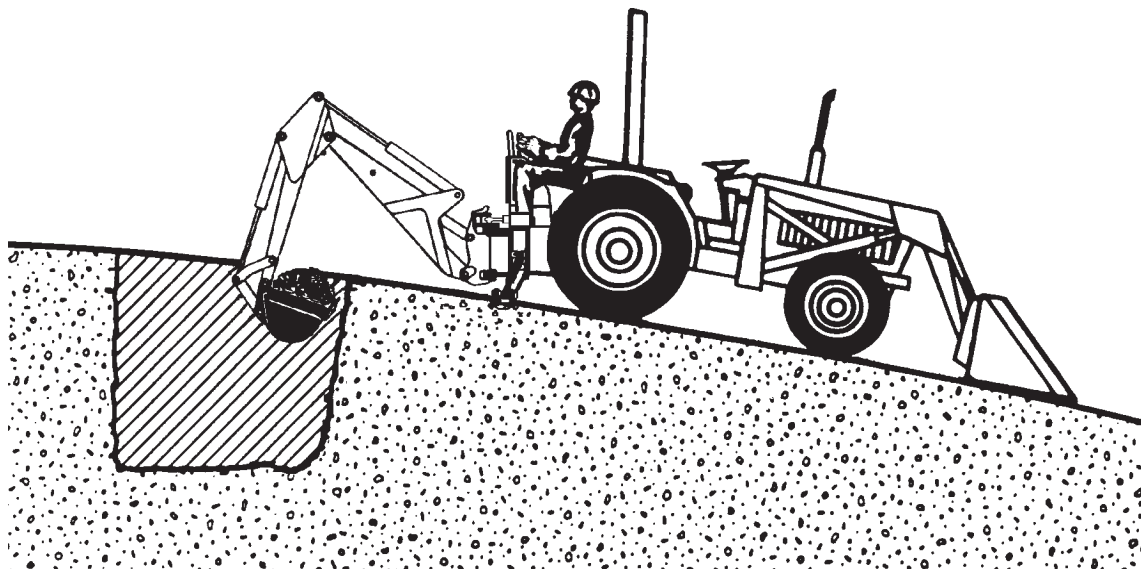


Position the unit forward so the two trenches can be connected. Pile the spoil on the opposite side of the trench.

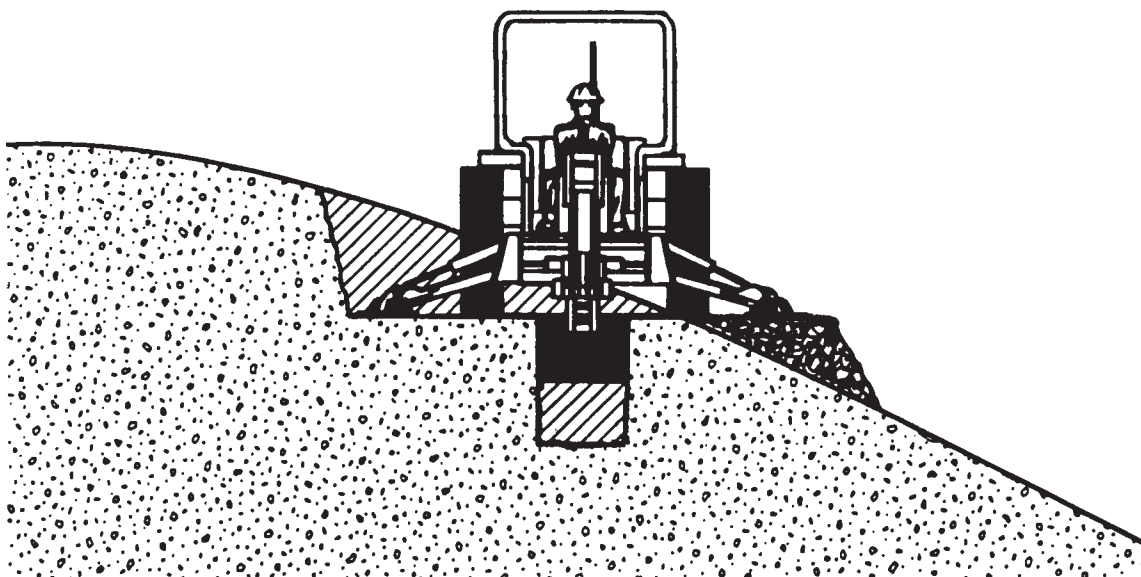
OPERATING INSTRUCTIONS

OPERATING TECHNIQUES ATTACHMENT TYPE BACKHOES

EXCAVATING ON SLOPES



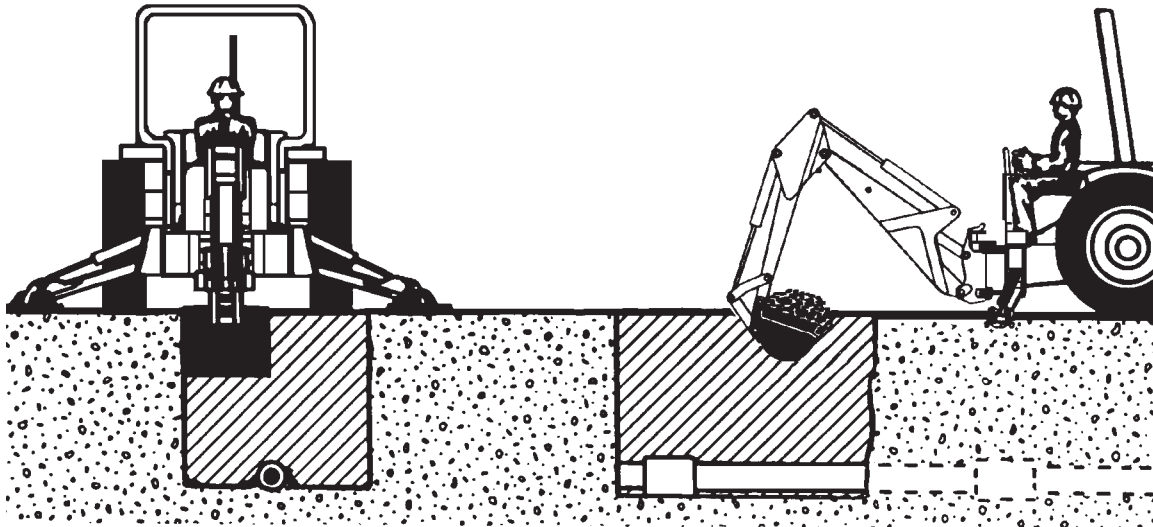
When digging on slopes always face the backhoe upgrade whenever possible. It may be necessary to cut a level surface in the hill for the backhoe to sit in when operating on slopes. This will allow the backhoe to sit level for digging the main excavation. Pile the spoil from the surface downhill. When digging the main excavation, pile the spoil uphill.



OPERATING INSTRUCTIONS

OPERATING TECHNIQUES ATTACHMENT TYPE BACKHOES

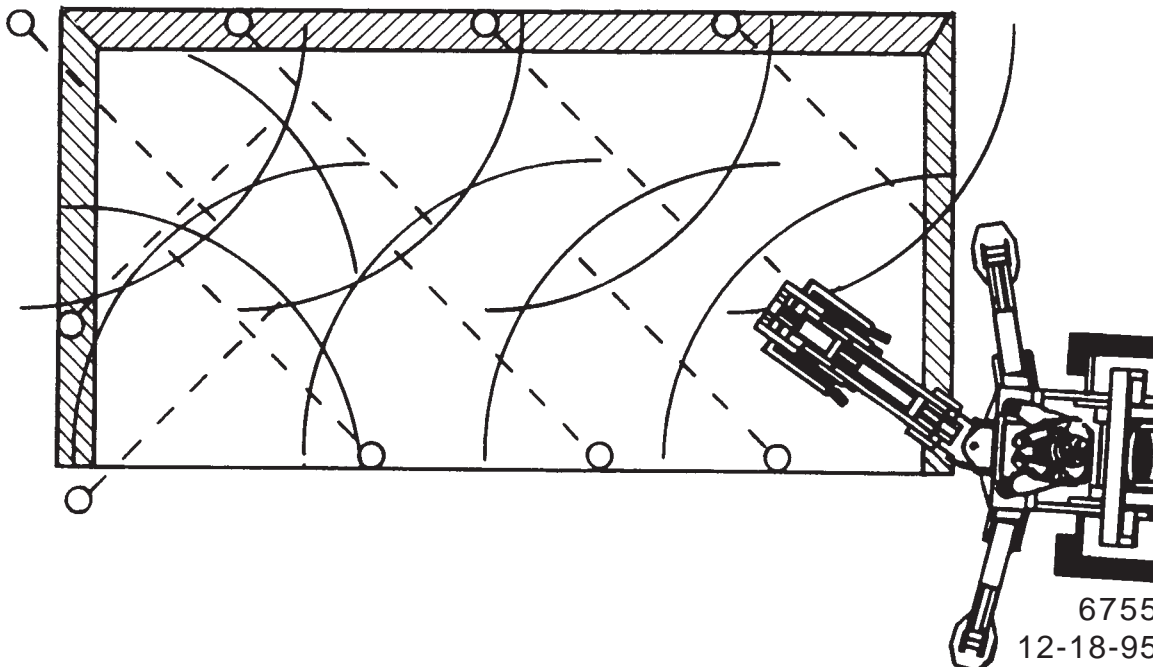
PIPELINE LEAK REPAIR



To check for pipeline leaks, start by digging a bellhole about six feet wide and ten feet long. Then, dig lengthwise along the pipeline to locate the leak. Once the leak is located, position the unit to dig at grade level on both sides of the pipeline. If a section of pipe is to be replaced, strip the soil from both ends of the bellhole. Enlarge the hole enough to allow the workmen adequate working space in the leak area.

DIGGING STRAIGHT WALL SHALLOW BASEMENTS

Begin at one corner, and remove as much material as possible to grade level. Reset the unit forward and continue digging to the grade level. Progress around the edge of the basement, finishing each corner as you come to it.



OPERATING INSTRUCTIONS

OPERATING TECHNIQUES ATTACHMENT TYPE BACKHOES

MISCELLANEOUS - BACKFILLING

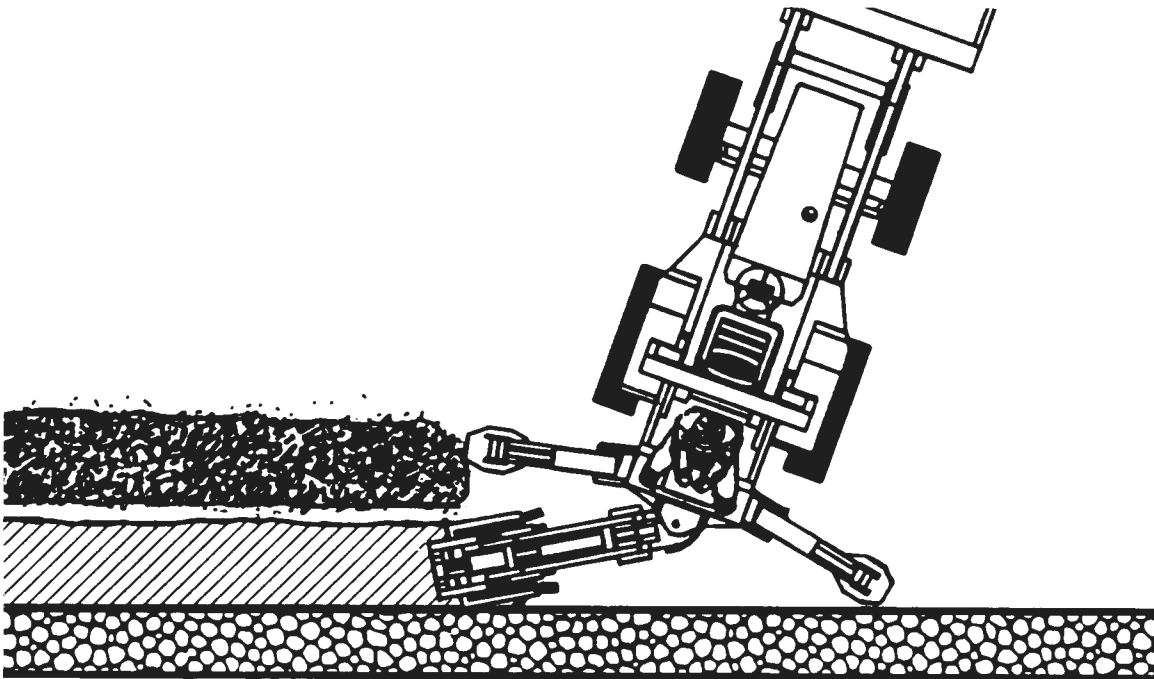
To backfill an excavation, lower the extended bucket into the spoil pile. Curl the bucket and lift it clear of the spoil pile. Swing the bucket to the excavation and extend the bucket. Return the bucket to the spoil pile and continue the cycle until the job is completed.

IMPORTANT: Do not backfill by using the swing circuit and dragging the bucket sideways. Doing so could cause damage to the dipper, boom, and swing cylinders or mainframe.

IMPORTANT: Avoid constant jarring or hammering contact between the spoil pile and the loaded bucket as this may cause premature wear to the backhoe pins and bushings.

MISCELLANEOUS - EXCAVATING BY A WALL

To excavate by a wall, where the wall will interfere with the stabilizer placement, move the backhoe in at an angle to the wall. Concentrate on getting the swing pin as close to the wall as possible while leaving enough swing arc left to dump the spoil.



MISCELLANEOUS - HARD GROUND OPERATION

When digging in hard ground, it may be necessary to decrease the bucket angle of entry to the point where the back of the bucket almost contacts the ground. It may also be necessary to apply downward pressure with the boom on the bucket.

OPERATING INSTRUCTIONS

TRANSPORTING

GENERAL INFORMATION

Follow the simple steps listed below when preparing the backhoe for transportation between work sites. Read and follow the safety precautions for backhoe transporting listed in Section B of this manual before moving the backhoe.

1. Before transporting the backhoe, raise the boom, dipper, and bucket to the transporting position.
2. Engage the swing lock (if so equipped) by pushing down and to the left on the red swing lock ball handle.
3. Engage the boom lock by moving the boom lock handle to the left/down therefore locking the boom to the swing post in the transporting position.
4. Raise all stabilizers.

CAUTION! Be sure to install a SMV (Slow Moving Vehicle) sign on the backhoe dipper before attempting to transport the backhoe.



When transporting the backhoe on a road or highway at night or during the day, use accessory lights and devices for adequate warning to the operators of other vehicles. In this regard, check local government regulations.

Always drive slowly over uneven terrain to avoid tipping the backhoe.

LUBRICATION

3509 & 3511 BACKHOE

GENERAL INFORMATION

Economical and efficient operation of any machine is dependant upon regular and proper lubrication of all moving parts with a quality lubricant. Neglect leads to reduced efficiency, heavy draft, wear, breakdown, and needless replacement parts.

All parts provided with grease fittings should be lubricated as indicated. If any grease fittings are missing, replace them immediately. Clean all fittings thoroughly before using grease gun.

IMPORTANT: Avoid excessive greasing. Dirt collects on exposed grease and greatly increases wear. After greasing, wipe off excessive grease from fittings.

LUBRICATION SYMBOLS

The following symbol is used on the lubrication diagram printed on the following page. It is reproduced here with its meaning for your convenience.



Lubricate daily or every 8 hours of operation, whichever comes first, with SAE Multi-Purpose Lubricant or equivalent SAE Multi-Purpose type grease.

CAUTION! Shut off vehicle engine before lubricating equipment.

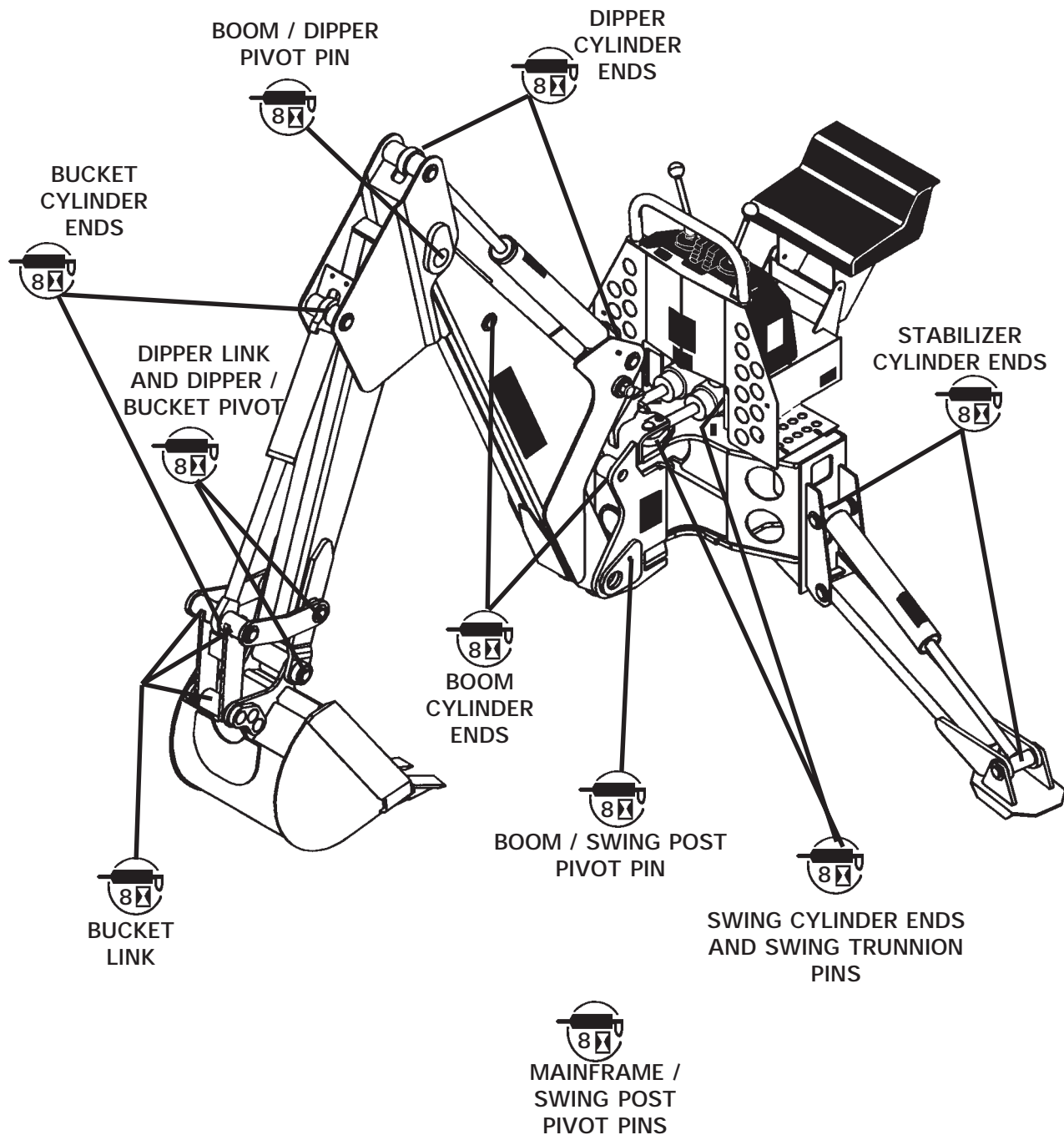


LUBRICATION

3509 & 3511 BACKHOE

BACKHOE LUBRICATION DIAGRAM

The following diagram is provided to help you locate all the points on your backhoe that need lubricating. Be sure to follow the lubrication intervals as noted by the lubrication symbols on this page. Always replace any missing grease fittings as soon as possible.



MAINTENANCE

GENERAL MAINTENANCE

GENERAL INFORMATION

Regular maintenance is the key to long equipment life and safe operation. Maintenance requirements have been reduced to an absolute minimum. However, it is very important that these maintenance functions be performed as described below.

EVERY 8 HOURS OF OPERATION

Visually inspect the unit. Check all connections to 3-point hitch arms to ensure hitch pins are correctly installed and retaining pins are in place.

Grease all swivel points (ram and base end of all cylinders) thoroughly. Excessive wear and even mechanical damage to pins and cylinders can result from inadequate lubrication. Use a multi-purpose grease.

Lubricate all grease fittings with a multi-purpose grease. For grease locations, refer to the lubrication chart in Section H.

EVERY 40 HOURS OF OPERATION

Check hydraulic reservoir fluid level. If oil is low, check all lines, fittings, and control valve for signs of leakage.

IMPORTANT: Hydraulic fluid level should be checked with backhoe in transport position.

WARNING! Escaping hydraulic/diesel fluid under pressure can penetrate the skin causing serious injury.

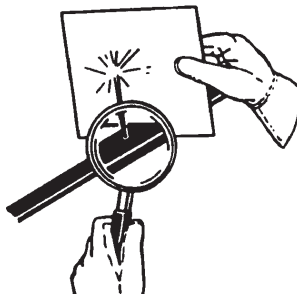


DO NOT use your hand to check for leaks. Use a piece of cardboard or paper to search for leaks.

Stop engine and relieve pressure before connecting or disconnecting lines.

Tighten all connections before starting engine or pressurizing lines.

If any hydraulic/diesel fluid is injected into the skin, obtain medical attention immediately or gangrene or other serious injury may result.



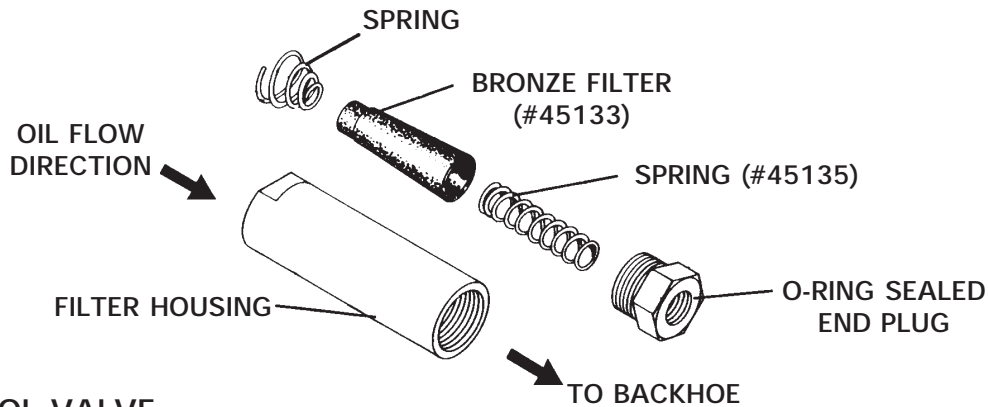
Physically check all pins, bushings, cotter pins, nuts, etc., for signs of wear or loose fit. Tighten as required, replacing where necessary. (Bolts and pins may vibrate loose during operation.) Clean equipment of all dirt, oil, and excess grease. This will assist you in making visual inspection and help avoid overlooking worn or damaged components.

MAINTENANCE

GENERAL MAINTENANCE

EVERY 200 HOURS OF OPERATION

Pressure relief valve should be checked by a qualified technician to assure operation at designated pressure level. On units equipped with an inline filter (#45132) remove the 90 micron sintered bronze filter element from the filter housing and clean it in solvent. Replace the element if it is difficult to blow through after cleaning. Be careful not to damage the o-ring seal when assembling and disassembling the filter.



CONTROL VALVE

The hydraulic control valve maintenance is normally limited to the replacement of o-ring seals, cleaning and the replacement of valve sections or relief valve cartridges.

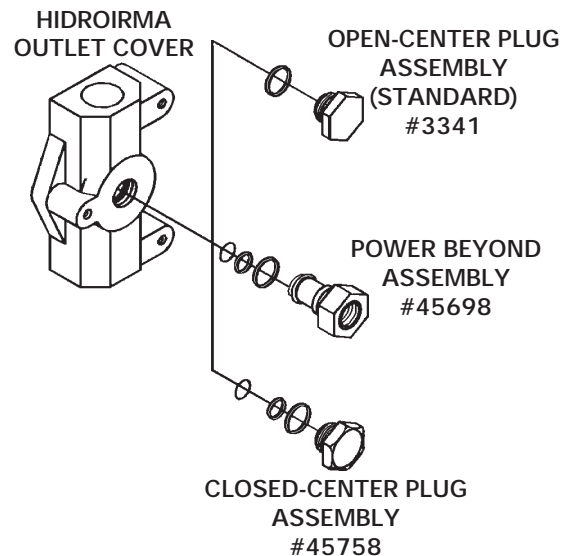
The most common cause of premature wear and malfunctioning of the hydraulic system components is the ingress of contaminants and incorrect high pressure inlet and low pressure return connections (cavitation).

Observe a high standard of cleanliness when doing valve maintenance.

CONTROL VALVE CONVERSION

It is imperative that the backhoe valve be of the same type (open center, or closed center) as the tractor hydraulic system it is fitted to. If the backhoe valve is not compatible with the tractor hydraulics, and then is installed and operated directly off of the tractor's hydraulic system, damage to the equipment can result.

The standard backhoe valve contains an open center plug but can be converted to a closed center or power beyond system simply by removing the existing plug in the valve outlet cover and installing the appropriate plug. The plugs come complete with new seals. Plugs should be torqued to 20 ft. lbs.

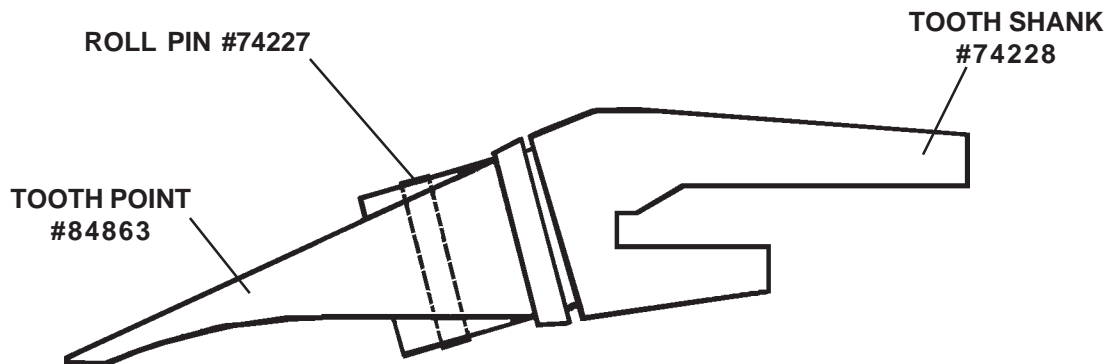


GENERAL MAINTENANCE

REPLACING BUCKET TOOTH POINTS

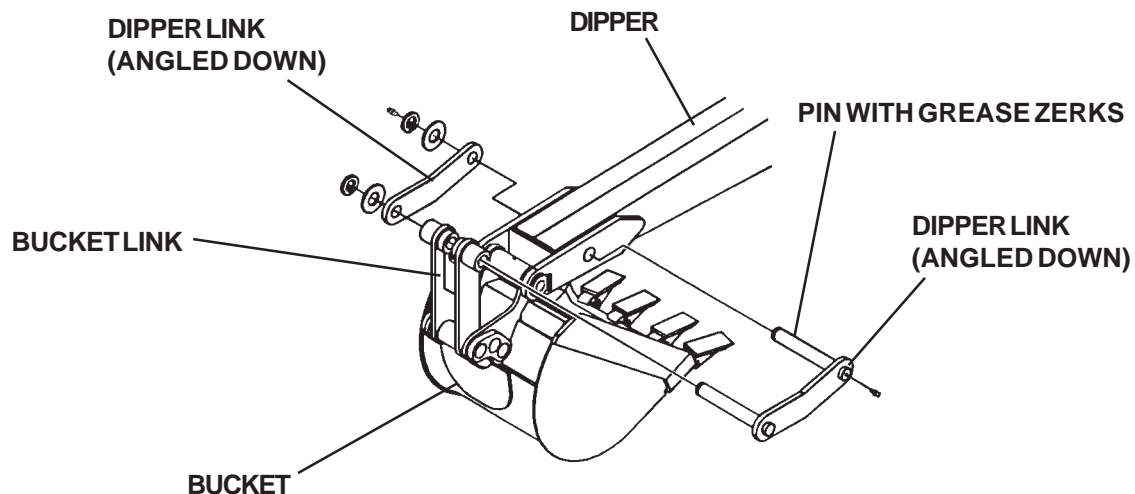
The bucket teeth are self-sharpening and require little attention: however, the points on the bucket teeth shanks can be replaced when they become worn or broken.

A tooth point can be removed from the welded tooth shank by removing the roll pin and sliding the tooth point off of the shank. Install the new point and secure in place with the roll pin.

CHANGING BUCKETS

The bucket is connected to the dipper and bucket link with two cotter pin style pins. To change buckets, remove the cotter pins and washers and then remove the old bucket and position the new bucket in its place. Install the pivot pins and secure with washers and cotter pins. Lubricate all bucket and bucket link grease fittings before operating.

NOTE: Dipper Link must be installed with the with the pin containing the grease zerks at the dipper end and angled as shown in the diagram.



MAINTENANCE

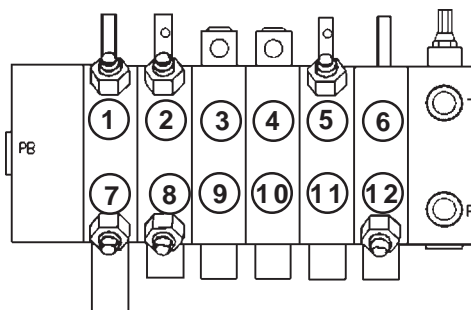
HOSE ROUTING - 3509 3511 BACKHOE

GENERAL INFORMATION

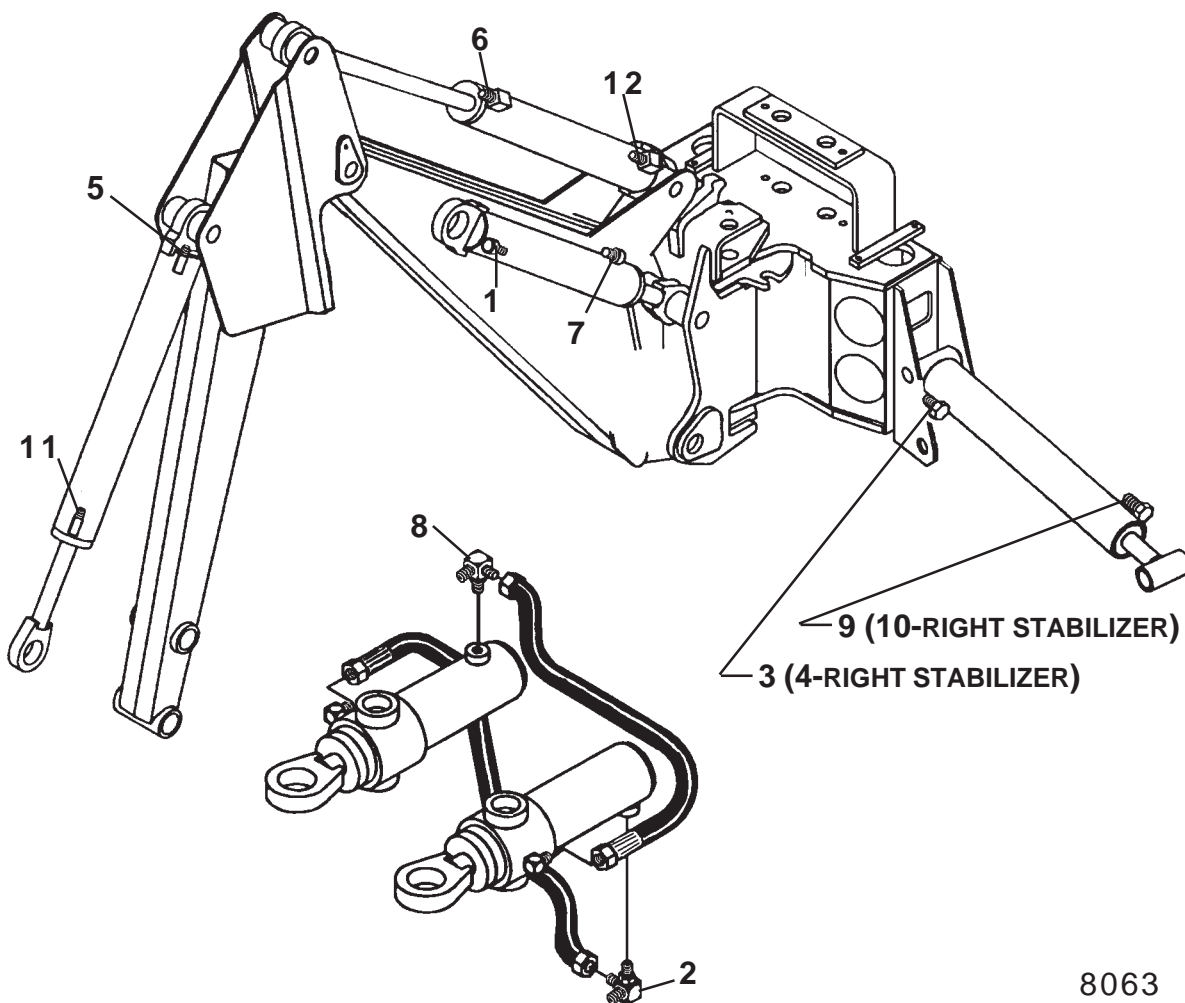
The purpose of this page is to show the hydraulic hose routing between the backhoe control valve and the various backhoe hydraulic cylinders. This information is helpful when trouble shooting cylinder and control valve related problems. Simply match the number of the hydraulic cylinder port (shown in the bottom diagram), to the corresponding number on the backhoe control valve (shown in the top diagram).

NOTE: The fittings on the hydraulic cylinders have been altered for clarity purposes. This will assist you in distinguishing between the rod end and the barrel end of the various hydraulic cylinders.

BACKHOE CONTROL VALVE



BACKHOE CYLINDERS



MAINTENANCE INSTRUCTIONS

CYLINDER SEAL REPLACE

GENERAL INFORMATION

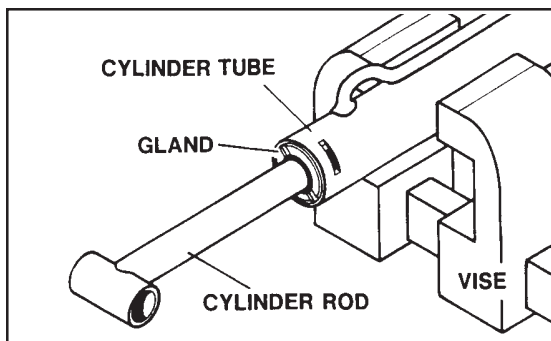
The following information is provided to assist you in the event you should need to repair or rebuild a hydraulic cylinder. When working on hydraulic cylinders, make sure that the work area and tools are clean and free of dirt to prevent contamination of the hydraulic system and damage to the hydraulic cylinders. Always protect the active part of the cylinder rod (the chrome section). Nicks or scratches on the surface of the rod could result in cylinder failure. Clean all parts thoroughly with a cleaning solvent before reassembly.

DISASSEMBLY PROCEDURE

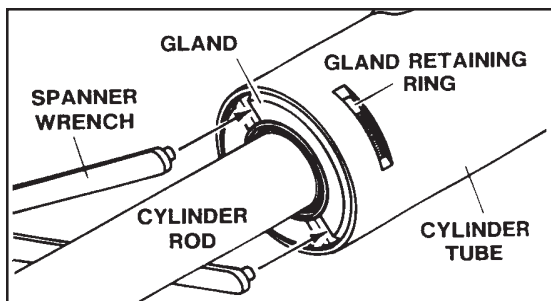
IMPORTANT: Do not contact the active surface of the cylinder rod with the vise. Damage to the rod could result.

RETAINING RING TYPE GLAND

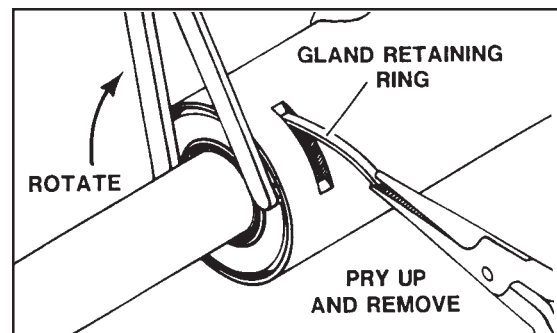
1. Mount the cylinder tube securely in a vise. **CAUTION:** Do not clamp too tight and distort the tube.



2. Rotate the gland with a spanner wrench (available from your dealer) until the gland retaining ring appears in the milled slot.

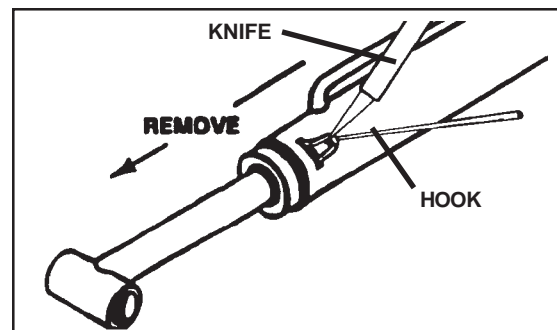


Pry up the end of the gland retaining ring with a pointed tool. Rotate the



gland with a spanner wrench while removing the retaining ring.

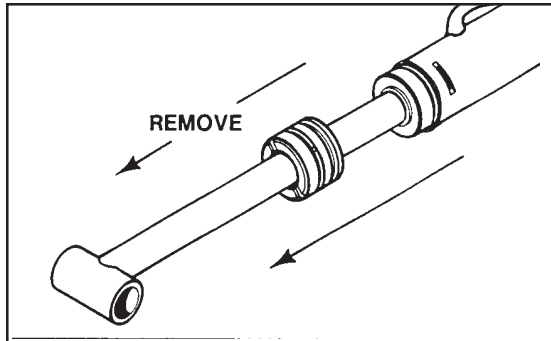
NOTE: On cylinders with gland retaining rings, the gland and piston seal(s) can be pulled out and cut as they appear in the milled slot during disassembly. After cutting, pull them on out through the milled slot.



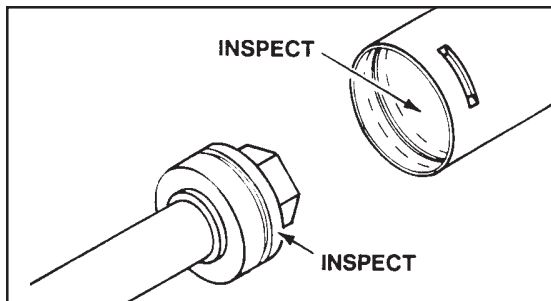
MAINTENANCE INSTRUCTIONS

CYLINDER SEAL REPLACE

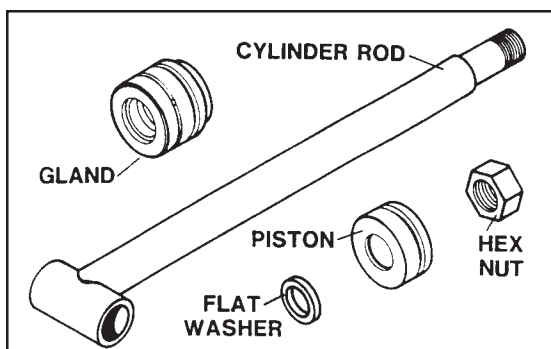
3. Pull the cylinder rod from the cylinder tube.



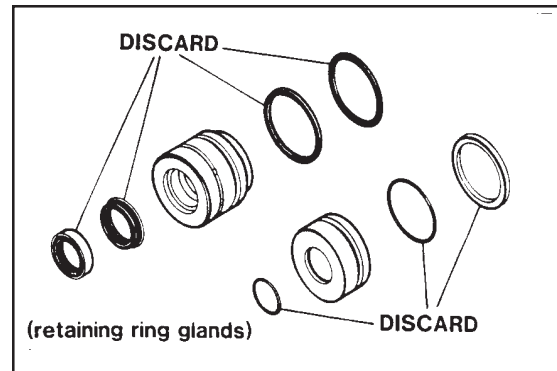
4. Inspect the piston and the bore of the cylinder tube for deep scratches or galling. If damaged, the piston and cylinder tube must be replaced.



5. Remove the hex nut, piston, flat washer or spacer tube (if so equipped), and gland from the cylinder rod. If the cylinder rod is rusty, scratched, or bent, it must be replaced.

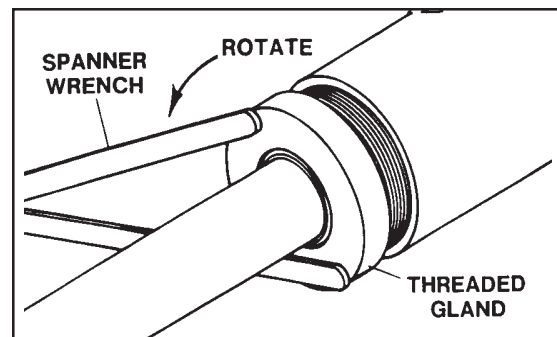
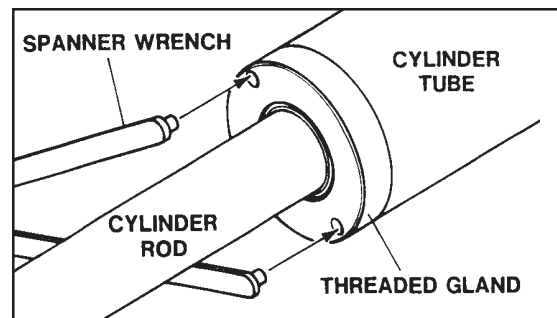


6. Remove and discard all old seals.



THREADED TYPE GLAND

1. Rotate the gland with a spanner wrench counter-clockwise until the gland is free of the cylinder tube.

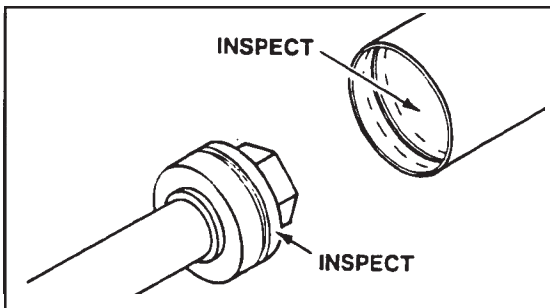


2. Pull the cylinder rod from the cylinder tube same as shown with the retaining ring type gland.

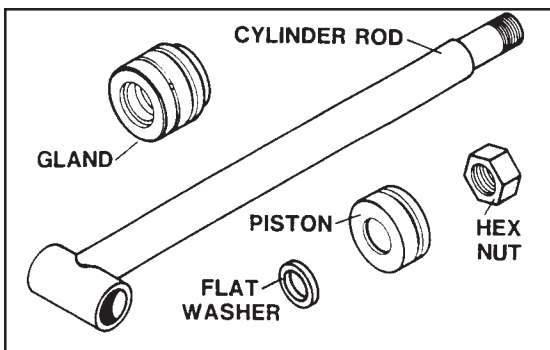
MAINTENANCE INSTRUCTIONS

CYLINDER SEAL REPLACE

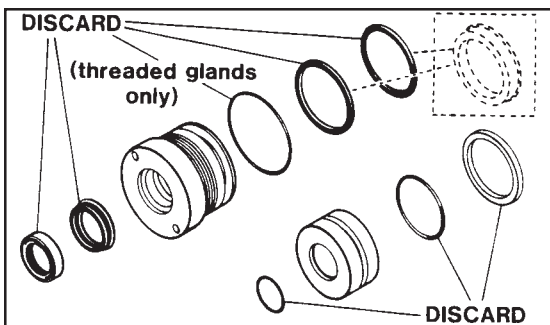
3. Inspect the piston and the bore of the cylinder tube for deep scratches or galling. If damaged, the piston and cylinder tube must be replaced.



4. Remove the hex nut, piston, flat washer or spacer tube (if so equipped), and gland from the cylinder rod. If the cylinder rod is rusty, scratched, or bent, it must be replaced.



5. Remove and discard all the old seals.



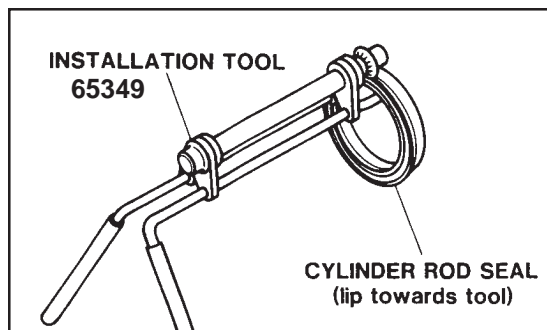
ASSEMBLY PROCEDURE

GENERAL

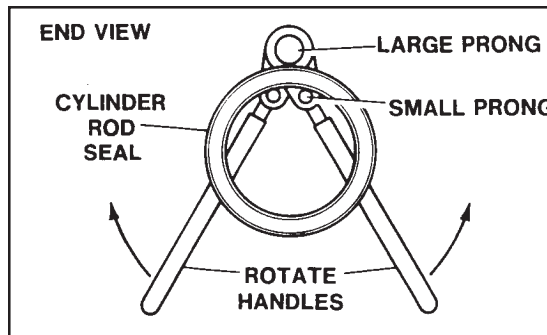
IMPORTANT: Replace all seals even if they do not appear to be damaged. Failure to replace all seals may result in premature cylinder failure.

1. Install the cylinder rod seal in the gland first. Be careful not to damage the seal in the process as it is somewhat difficult to install.

A special installation tool is available to help with installing the seal. Simply fit the end of the tool over the seal so that the large prong of the tool is on the outside of the seal, and the two smaller prongs on the inside. The lip of the seal should be facing towards the tool.

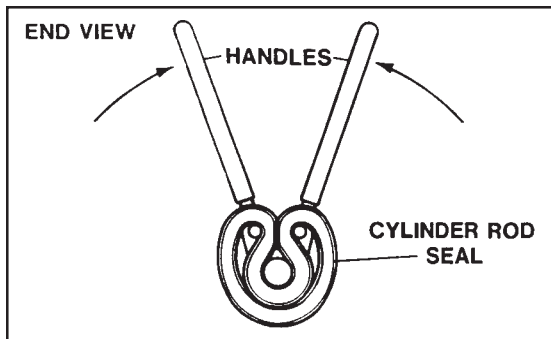


Rotate the handles on the tool around to wrap the seal around the end of the tool.

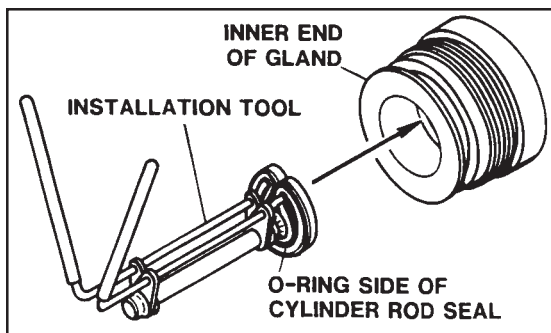


MAINTENANCE INSTRUCTIONS

CYLINDER SEAL REPLACE



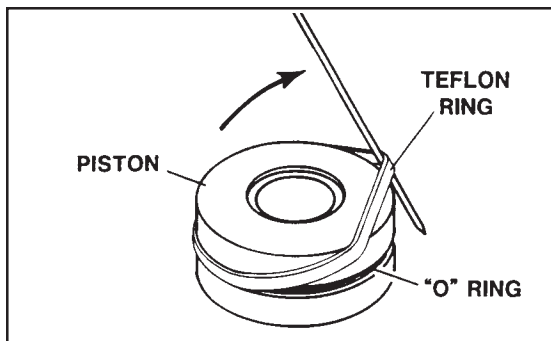
Now insert the seal into the gland from the inner end. Position the seal in its groove, and release and remove the tool. Press the seal into its seat the rest of the way by hand.



NOTE: Threaded gland is shown above for reference.

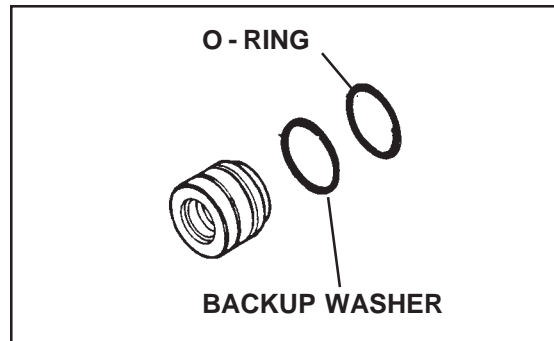
2. Install the new piston ring, rod wiper, O-rings, and backup washers, if applicable, on the piston.

Be careful not to damage the seals. Caution must be used when installing the piston ring. The ring must be stretched carefully over the piston with a smooth, round, pointed tool.

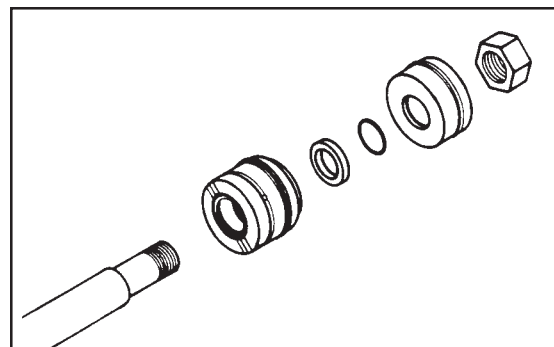


RETAINING RING TYPE GLAND

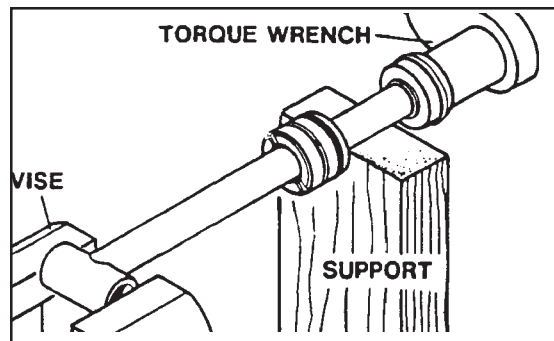
1. After installing the internal gland seal, install the external O-ring and backup washer.



2. Slide the gland onto the cylinder rod being careful not to damage the rod wiper. Then install the spacer, or flat washer (if so equipped), small O-ring, piston, and hex nut onto the end of the cylinder rod.



3. Secure the cylinder rod (mounting end) in a vise, with a support at its center. Torque the nut to the amount



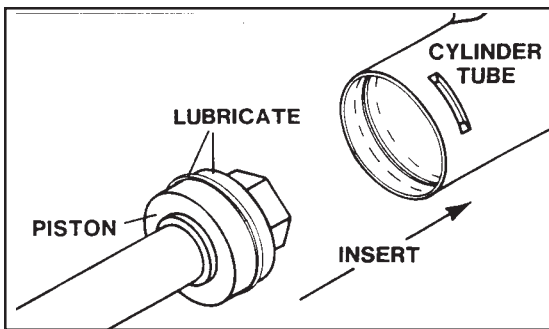
MAINTENANCE INSTRUCTIONS

CYLINDER SEAL REPLACE

shown on the chart for the thread diameter of the cylinder rod.(see chart)

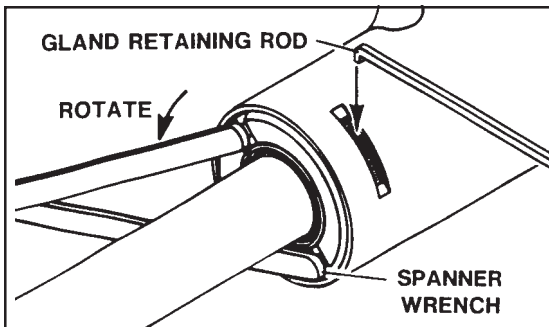
IMPORTANT: Do not contact the active surface of the cylinder rod with the vise. Damage to the rod could result.

4. Apply a lubricant (such as Lubriplate #105) to the piston and teflon ring. Insert the cylinder rod assembly into the cylinder tube.



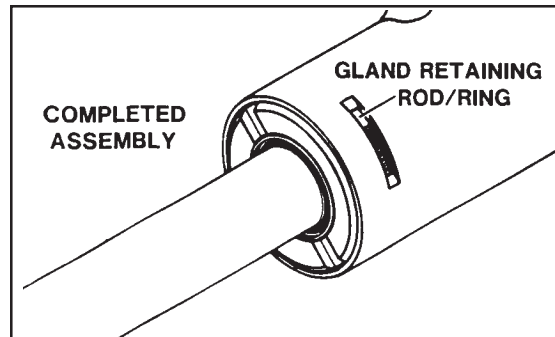
IMPORTANT: Ensure that the piston ring fits squarely into the cylinder tube and piston groove, otherwise the ring may be damaged and a leak will occur.

5. Rotate the gland with a spanner wrench until the hole (drilled into the retaining slot of the gland) appears in the milled slot of the cylinder tube. Insert the hooked end of the gland retaining rod into the hole.



Rotate the gland until the gland retaining rod forms a ring between the gland and the cylinder tube.

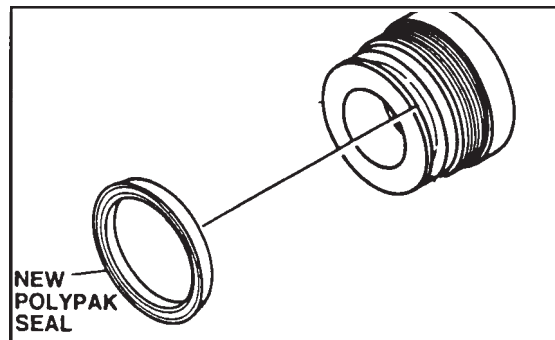
When complete, the bent end of the gland retainer ring should be hidden (not turned so it is exposed in the slot) to prevent it from popping out.



THREADED TYPE GLAND

1. After installing the rod seal inside the gland as shown in the general instructions, install the external seal.

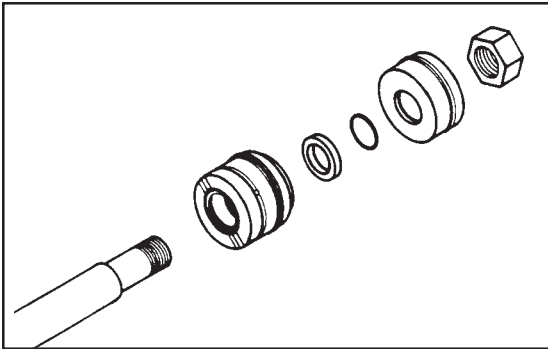
NOTE: Threaded glands may have been equipped with a separate O-ring and backup washer system or a polypak (all-in-one) type seal. Current seal kits contain a polypak (all-in-one) type seal to replace the discarded seal types on all threaded glands.



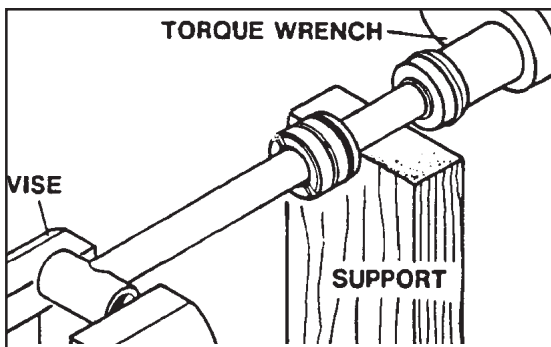
MAINTENANCE INSTRUCTIONS

CYLINDER SEAL REPLACE

2. Slide the gland onto the cylinder rod being careful not to damage the rod wiper. Then install the spacer, or flat washer (if so equipped), small O-ring, piston, and hex nut onto the end of the cylinder rod.



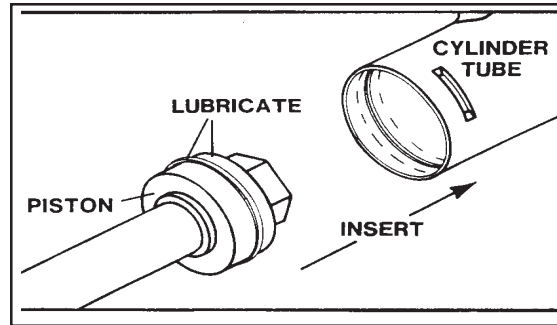
3. Secure the cylinder rod (mounting end) in a vise, with a support at its center. Torque the nut to the amount shown for the thread diameter of the cylinder rod (see chart).



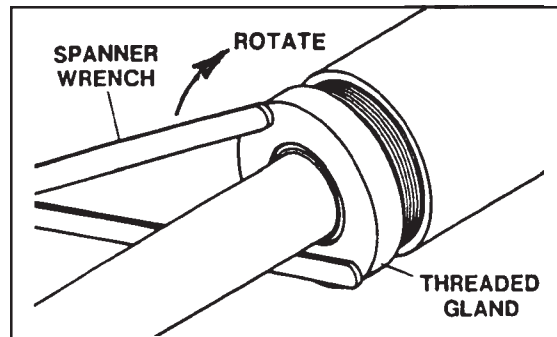
IMPORTANT: Do not contact the active surface of the cylinder rod with the vise. Damage to the rod could result.

4. Apply a lubricant (such as Lubriplate #105) to the piston and teflon ring. Insert the cylinder rod assembly into the cylinder tube.

IMPORTANT: Ensure that the piston ring fits squarely into the cylinder tube and piston groove, otherwise the ring may be damaged and a leak will occur.



5. Use a spanner wrench to rotate the gland clockwise into the cylinder. Continue to rotate the gland with the spanner wrench until it is tight.



NOTE: Seal kits will service all backhoe cylinders of similar bore size and rod diameter.

WARNING! Cylinders serviced in the



field are to be tested for leakage prior to the hoe being placed in work. Failure to test rebuilt cylinders could result in damage to the cylinder and/or backhoe, cause severe personal injury, or even death.

MAINTENANCE INSTRUCTIONS

CYLINDER SEAL REPLACE

TORQUE SPECIFICATION CHART

Use the following torque values when tightening the nuts on the cylinder rod threads.

Thread Diameter	POUNDS - FEET	
	Minimum	Maximum
7/8 "	150	200
* 1 "	230	325
1-1/8 "	350	480
1-1/4 "	490	670
1-3/8 "	670	900

* 1" Thread Diameter WITH 1.25" Rod Diameter Min. 230 ft. lbs. Max. 250 ft. lbs.


BACKHOE REMOVAL AND STORAGE

3509 & 3511 BACKHOE

BACKHOE REMOVAL

To remove the backhoe, just follow the simple procedure outlined below. Remember, always position the tractor on hard and level ground when the backhoe is to be removed.

1. Lower both stabilizers and the backhoe bucket to the ground to take up the backhoe weight.

CAUTION!  Keep limbs and body parts out from under the backhoe during the rest of these procedures. Severe injury could result if the backhoe accidentally lowered onto a person.

2. Remove the top link pin from the tractor 3-point.
3. Remove the pins from the backhoe mainframe 3-point hitch mounting holes.
4. Pull the tractor forward just enough to clear the backhoe and allow for disconnecting of the hydraulic hook-up. Lower the backhoe to the ground using the stabilizer and boom controls.

IMPORTANT: Be careful not to pull the tractor so far forward that damage to the hydraulic lines results.

5. Stop the tractor engine and set the parking brake. Relieve the hydraulic pressure from the hoses by working the backhoe control levers.

IMPORTANT: Do not restart the engine until Step 6 has been completed. The hydraulic circuits may be open and oil loss could result if the engine is started.

6. Unhook the backhoe hydraulic system from the tractor. Be sure to protect both tractor and backhoe hydraulic systems from any dirt or contaminants entering. Re-establish proper hydraulic circulation for the tractor without the backhoe.

BACKHOE STORAGE

To prepare the backhoe for storage, first wash off all dirt and grime from the unit. Coat the exposed portions of the cylinder rods with grease. Lubricate all grease fittings. Make sure the backhoe hydraulic system is properly sealed against contaminants entering the unit. When storing the backhoe, place the unit in a clean dry place with a cover over the unit if possible.

PROBLEM	POSSIBLE CAUSE	REMEDY
Backhoe fails to lift or swing	Low oil supply	Add oil
	Improper hose hookup	Check hydraulic diagram; reinstall properly
	Worn control valve section	Replace section
	Pump damaged or worn	Replace pump
	Broken hydraulic line	Check for leaks and replace line
	Jammed swing linkage	Remove interference
	Bent cylinder rod	Replace or repair cylinder
Backhoe lifting or swinging too slowly	Swing speed control completely closed	Open swing speed control valve
	Cold oil	Warm oil with engine at idle speed
	Engine speed too slow	Open throttle
	Oil leaking past control valve	Replace or repair worn section
	Oil too heavy	Use recommended oil
	Pump damaged or worn	Replace or repair pump
	Oil leaking past cylinder packings	Replace packings
	Dirty oil filter	Replace filter
	Faulty relief valve	Clean or replace
	Incorrect restrictors in valve	Check restrictor orifice size with those shown on valve assembly page

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Backhoe fails to hold up load	Broken or leaking lines	Replace broken hose and check for leaks
	Dirty oil	Drain and refill oil, replace filter
	Oil leaking past cylinder packings	Replace packings
	Oil leaking past control valve	Replace or repair worn section
	Faulty relief valve	Clean or replace
Oil heating	Dirty oil	Drain and refill oil, replace filter
	Air entering suction line to pump	Eliminate leaks
	Partially plugged inlet filter	Clean filter element
	Control valve held open too long	Return control to neutral position when not in use
	Worn pump	Replace pump
	Relief valve set too low	Set valve correctly
	Oil too light in hot weather	Use recommended oil
	Engine running too fast	Reduce throttle
	Damaged oil lines	Replace damaged lines
	Poor operating technique causing excessive oil flow over relief valve	Learn smooth operating methods

PROBLEM	POSSIBLE CAUSE	REMEDY
External leakage	Control valve tie bolts loose	Torque bolts to 20 ft.lbs.
	Damaged O-rings between valve sections	Repair control valve
	Damaged O-rings on valve spools	Repair control valve
	Cylinder seals damaged	Repair cylinder
	Damaged O-rings on valve drop check	Repair control valve
	Broken oil lines	Replace hose and check for leaks
Swing cylinder malfunctioning	Oil leaking past packing or seals	Replace packing or seals
	Faulty relief valve	Clean or replace
Control valve sticking or working hard	Dirty valve	Clean valve
	Scored bore or bent spool	Replace valve section
	Control linkage misaligned	Correct misalignment
	Control valve tie bolts too tight	Tighten bolts only to 20 ft.lbs.
	Return spring binding or broken	Replace spring
	Foreign matter in spool bore	Clean valve








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BOLT TORQUE

BOLT TORQUE SPECIFICATIONS

GENERAL TORQUE SPECIFICATION TABLE

Use the following torques when special torques are not given. These values apply to fasteners as received from suppliers, dry, or when lubricated with normal engine oil. They do not apply if special graphited or moly disulphide greases or other extreme pressure lubricants are used. This applies to both UNF and UNC threads. Remember to always use grade five or better when replacing bolts.

SAE Grade No.		2				5				8*			
Bolt head identification marks as per grade. NOTE: Manufacturing Marks Will Vary						  				  			
Bolt Size		TORQUE				TORQUE				TORQUE			
Inches	Millimeters	Pounds Feet		Newton-Meters		Pounds Feet		Newton-Meters		Pounds Feet		Newton-Meters	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1/4	6.35	5	6	6.8	8.13	9	11	12.2	14.9	12	15	16.3	30.3
5/16	7.94	10	12	13.6	16.3	17	20.5	23.1	27.8	24	29	32.5	39.3
3/8	9.53	20	23	27.1	31.2	35	42	47.5	57.0	45	54	61.0	73.2
7/16	11.11	30	25	40.7	47.4	54	64	73.2	86.8	70	84	94.9	113.9
1/2	12.70	45	52	61.0	70.5	80	96	108.5	130.2	110	132	149.2	179.0
9/16	14.29	65	75	88.1	101.6	110	132	149.2	179.0	160	192	217.0	260.4
5/8	15.88	95	105	128.7	142.3	150	180	203.4	244.1	220	264	298.3	358.0
3/4	19.05	150	185	203.3	250.7	270	324	366.1	439.3	380	456	515.3	618.3
7/8	22.23	160	200	216.8	271.0	400	480	542.4	650.9	600	720	813.6	976.3
1	25.40	250	300	338.8	406.5	580	696	786.5	943.8	900	1080	1220.4	1464.5
1-1/8	25.58	-	-	-	-	800	880	1084.8	1193.3	1280	1440	1735.7	1952.6
1-1/4	31.75	-	-	-	-	1120	1240	1518.7	1681.4	1820	2000	2467.9	2712.0
1-3/8	34.93	-	-	-	-	1460	1680	1979.8	2278.1	2380	2720	3227.3	3688.3
1-1/2	38.10	-	-	-	-	1940	2200	2630.6	2983.2	3160	3560	4285.0	4827.4

* Thick Nuts must be used with Grade 8 bolts

METRIC BOLT TORQUE SPECIFICATIONS

		5.6			8.8			10.9		
Size of Screw	Grade No.	Coarse Thread			Fine Thread					
		Pitch (mm)	Pounds Feet	Newton-Meters	Pitch (mm)	Pounds Feet	Newton-Meters			
M6	5.6	1.0	3.6-5.8	4.9-7.9	-	-	-			
	8.8		5.8-9.4	7.9-12.7		-	-			
	10.9		7.2-10	9.8-13.6		-	-			
M8	5.6	1.25	7.2-14	9.8-19	1.0	12-17	16.3-23			
	8.8		17-22	23-29.8		19-27	25.7-36.6			
	10.9		20-26	27.1-35.2		22-31	29.8-42			
M10	5.6	1.5	20-25	27.1-33.9	1.25	20-29	27.1-39.3			
	8.8		34-40	46.1-54.2		35-47	47.4-63.7			
	10.9		38-46	51.5-62.3		40-52	54.2-70.5			
M12	5.6	1.75	28-34	37.9-46.1	1.25	31-41	42-55.6			
	8.8		51-59	69.1-79.9		56-68	75.9-92.1			
	10.9		57-66	77.2-89.4		62-75	84-101.6			
M14	5.6	2.0	49-56	66.4-75.9	1.5	52-64	70.5-86.7			
	8.8		81-93	109.8-126		90-106	122-143.6			
	10.9		96-109	130.1-147.7		107-124	145-168			
M16	5.6	2.0	67-77	90.8-104.3	1.5	69-83	93.5-112.5			
	8.8		116-130	157.2-176.2		120-138	162.6-187			
	10.9		129-145	174.8-196.5		140-158	189.7-214.1			
M18	5.6	2.0	88-100	119.2-136	1.5	100-117	136-158.5			
	8.8		150-168	203.3-227.6		177-199	239.8-269.6			
	10.9		175-194	237.1-262.9		202-231	273.7-313			
M20	5.6	2.5	108-130	146.3-176.2	1.5	132-150	178.9-203.3			
	8.8		186-205	252-277.8		206-242	279.1-327.9			
	10.9		213-249	288.6-337.4		246-289	333.3-391.6			

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SPECIFICATIONS

3509 & 3511 BACKHOES

GENERAL INFORMATION

The information contained on this page may be particularly helpful in determining backhoe and tractor compatibility. It is provided here for your convenience.

TRACTOR SPECIFICATIONS FOR MOUNTING BRADCO BACKHOES

3-Point Category	Category II
Tractor Horsepower	50 - 120 HP
Rated Hitch Lift Capacity	2400 - 5000#
GVW	UP TO 12000#
GPM*	9 - 12 GPM

* Optimum oil flow is 9-12 GPM. Flows higher than 12 GPM may cause the oil to overheat and the backhoe to respond erratically. Your tractor's GPM can be controlled by the engine RPM. Slow engine RPM if the oil is overheating or the backhoe controls are not functioning smoothly.

NOTICE:

BRADCO MAKES NO CLAIMS OR WARRANTY, IMPLIED OR OTHERWISE, as to the compatibility or structural integrity of any tractors 3-point hitch assembly or components when used with any BRADCO 3-point hitch type backhoe. Since many models of tractors have standard category hitches and backhoes have standard category attaching points, it is possible to mount tractor or backhoe combinations that are not compatible.

DEALERS AND/OR OWNERS MUST DETERMINE THAT COMPATIBILITY BETWEEN THE TRACTOR AND BACKHOE EXISTS.

Compatibility includes, but is not limited to items such as operator clearance, hitch component strength, tractor case strength and hydraulics.

Suggestions given as to hitch categories and horsepower ranges used with various models of backhoes are suggestions only and not recommendations as to suitability of any combination of tractors and backhoes.

BRADCO also manufactures solid 4-point mounting kits for many models of tractors. These kits do NOT mount to the 3-point hitch. If in doubt about your hitch compatibility, solid 4-point mounting type kit and backhoe should be used.

SPECIFICATIONS

3509 & 3511 BACKHOES

CYLINDER SPECIFICATION TABLE

CYLINDER	3509	3511		
BUCKET CYLINDER				
Cylinder #	87718	87718		
Bore	3.00"	3.00"		
Stroke	18.38"	18.38"		
Rod Diameter	2.00"	2.00"		
DIPPER CYLINDER				
Cylinder #	87717	87737		
Bore	3.00"	3.00"		
Stroke	21.38"	27.00"		
Rod Diameter	1.75"	1.75"		
BOOM CYLINDER				
Cylinder #	86259	87736		
Bore	2.75"	3.00"		
Stroke	24.83"	24.83"		
Rod Diameter	1.50"	1.50"		
SWING CYLINDER				
Cylinder #	81827	81827		
Bore	2.50"	2.50"		
Stroke	7.65"	7.65"		
Rod Diameter	1.25"	1.25"		
STABILIZER CYLINDER				
Cylinder #	86605	86605		
Bore	2.50"	2.50"		
Stroke	16.43"	16.43"		
Rod Diameter	1.50"	1.50"		
SEVERE DUTY BUCKETS AND CAPACITIES				
Bucket	Struck	Heaped	Weight	Number
Size	Cap. Ft. ³	Cap. Ft. ³	Lbs.	Of Teeth
12"	1.43	1.83	140	3
16"	1.98	2.56	154	4
18"	2.25	2.98	162	4
20"	2.52	3.40	168	4
24"	3.07	4.32	185	4

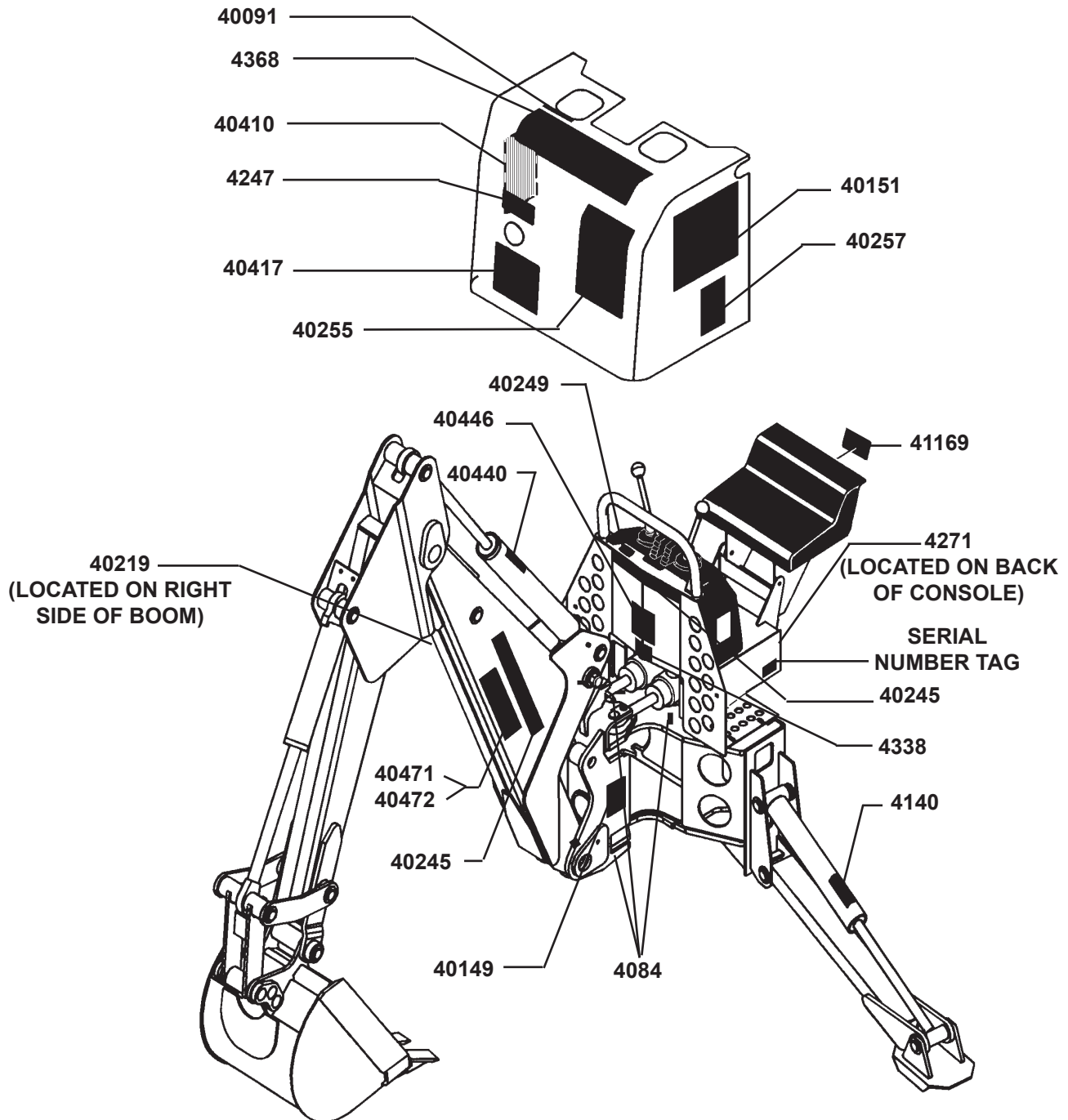
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DECALS

DECAL PLACEMENT

GENERAL INFORMATION

The diagrams on this page shows the location of all the decals used on the 3509 & 3511 backhoes. The decals are identified by their part numbers, with reductions of the actual decals located on the following pages. Use this information to order replacements for lost or damaged decals. Be sure to read all decals before operating the backhoe. They contain information you need to know for both safety and backhoe longevity.



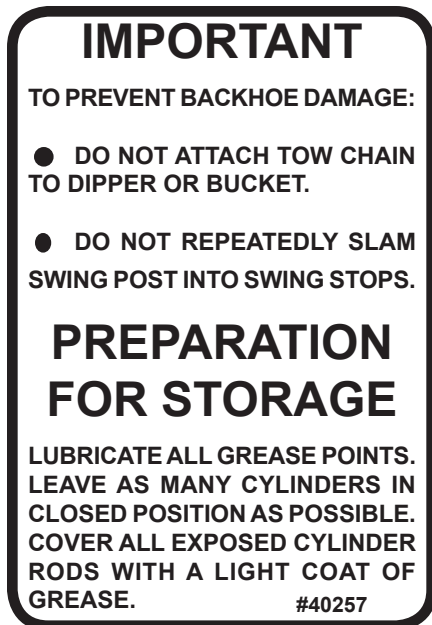
DECALS



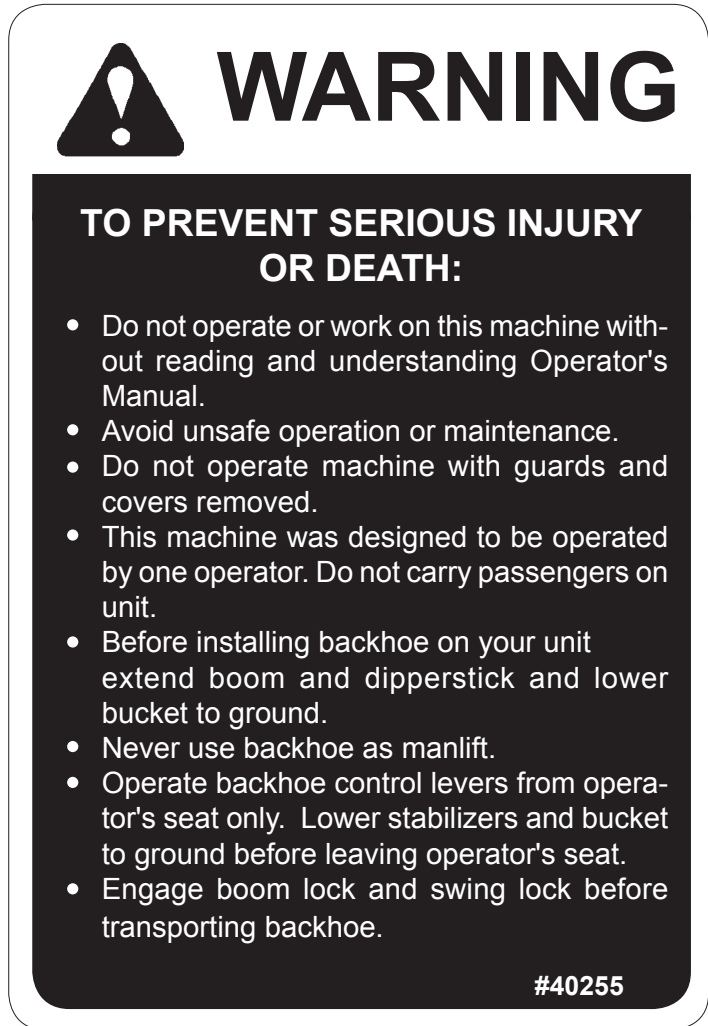
PART #40151
HIGH PRESSURE FLUID DECAL



PART #41169
DANGER! BACKHOE SECURE



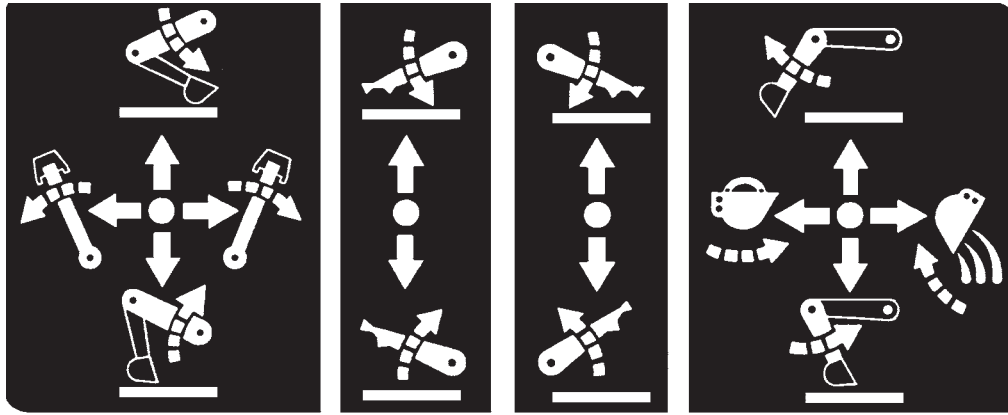
PART #40257
IMPORTANT! DECAL



PART #40255
OPERATIONAL WARNING DECAL



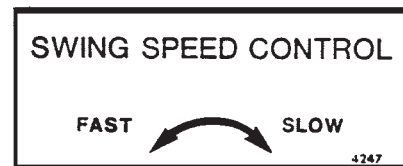
PART #40149
DANGER! PINCH POINTS



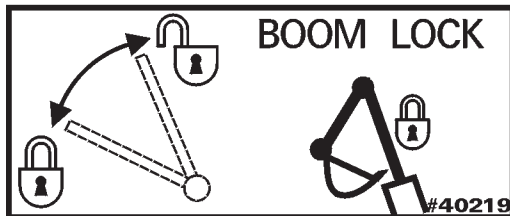
PART #4368
OPERATING CONTROLS DECAL

FLOAT

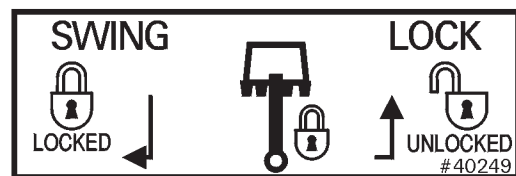
PART #40091
FLOAT DECAL



PART #4247
SWING SPEED CONTROL DECAL



PART #40219
BOOM LOCK DECAL



PART #40249
SWING LOCK DECAL

DECALS

IMPORTANT

The backhoe bucket is capable of contacting this stabilizer and/or cylinder. Careful operation will avoid backhoe damage.

#4140

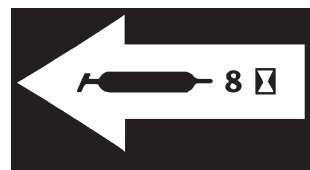
PART #4140
BUCKET CONTACT WARNING DECAL



PART #4338
MADE IN U.S.A. DECAL



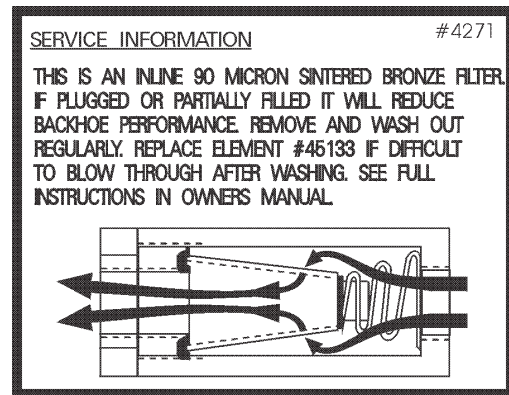
PART #40440
CALL BEFORE YOU DIG



PART #4084
GREASE 8 HOURS



PART #40446
 CAUTION! BACKHOE LIMITATIONS



PART #4271
 INLINE FILTER DECAL

**IMPORTANT NOTICE REGARDING
 3-POINT HITCH BACKHOES.**

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#40410

PART #40410
 IMPORTANT NOTICE

BRADCO

PART #40245
BRADCO LOGO - SILVER

3509

PART #40471
3509 MODEL NUMBER

3511

PART #40472
3511 MODEL NUMBER

WARNING

TO AVOID SERIOUS INJURY OR DEATH.

- Use **ONLY** on Category II tractors.
- Do not use 3-point quick attaching coupler to mount backhoe on tractor.
- Minimum of 20% of tractor and equipment weight must be on the tractor front wheels with the backhoe in the transport position.
- Operate PTO at 540 RPM (if so equipped).
- Backhoe digging forces can lift and turn tractor over. Make sure stabilizer pads are on firm ground and avoid steep banks.
- Do not exceed ROPS certification weight.
- Consult local utilities before digging. Know location of and avoid contacting all underground cables, pipelines, overhead wires and other hazards in digging area. #40417

PART #40417
WARNING!

BACKHOE CHECKLIST

FOR USE WITH BACKHOES AND BACKHOE MOUNTING KITS

DEALER RESPONSIBILITY:

The following check list is to be completed by the equipment dealer. This checklist is to be completed by the dealer at time of delivery. When purchasing a mounting kit for an existing backhoe it is the equipment dealers responsibility to review this checklist with the customer and instruct them to check each item at time of installation onto their prime mover.

BACKHOE:

1. _____ Check and lubricate backhoe. See "Lubrication Section" in Operator's Manual.
2. _____ Visually inspect the backhoe for bent, loose, cracked, damaged or missing parts or any other irregularities prior to operation.
3. _____ Verify backhoe control lever function and direction of operation are in accordance with the control lever decals.
4. _____ Run cylinders through their full cycle to purge any air from the system. Recheck hydraulic system for correct hydraulic fluid levels.
5. _____ Check all hydraulic connections for leaks and all hoses for proper positioning to reduce chafing and binding.
6. _____ Check prime mover system relief valve pressure and compare and adjust to recommended operating pressure listed in the "Specifications Section" of the Operator's Manual.
7. _____ Make sure decals are not damaged or missing and are in their right location. See "Decals Section" of the Operator's Manual.
8. _____ Customer instructed to read and understand Operator's Manual before operating backhoe.
9. _____ Complete and return the manufacturers "Warranty Validation Form".

MOUNTING:

1. _____ Check backhoe, mounting, and prime mover to ensure they are all compatible.
2. _____ Check backhoe mounting bolts for tightness. Instruct owner to retighten after the first eight working hours, and after every forty working hour interval thereafter. See "Bolt Torque Specifications" in Operator's Manual.
3. _____ If customer is installing the mounts and mounting the backhoe to the prime mover, the dealer must review the proper mounting procedure and possible consequences of improper installation.
4. _____ Verify the owner is in possession of an operator's manual and instruct them to read and understand all safety and operating techniques.

OWNERS RESPONSIBILITY:

It is the owner's responsibility to make sure that the dealer has completed this checklist and instructed him/her on safe and proper operation of the backhoe. If installation instructions are unclear, bring backhoe, mounting and prime mover to the equipment dealership for proper installation.

Owner's Signature

Date

Dealership Signature

Date

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Limited Warranty

Except for the Excluded Products as described below, all new products are warranted to be free from defects in material and/or workmanship during the Warranty Period, in accordance with and subject to the terms and conditions of this Limited Warranty.

1. Excluded Products. The following products are excluded from this Limited Warranty:

(a) Any cable, part that engages with the ground (i.e. sprockets), digging chain, bearing, teeth, tamping and/or demolition head, blade cutting edge, pilot bit, auger teeth and broom brush that either constitutes or is part of a product.

(b) Any product, merchandise or component that, in the opinion of Paladin Light Construction¹, has been (i) misused; (ii) modified in any unauthorized manner; (iii) altered; (iv) damaged; (v) involved in an accident; or (vi) repaired using parts not obtained through Paladin Light Construction.

2. Warranty Period. The Limited Warranty is provided only to those defects that occur during the Warranty Period, which is the period that begins on the first to occur of: (i) the date of initial purchase by an end-user, (ii) the date the product is first leased or rented, or (iii) the date that is six (6) months after the date of shipment by Paladin Light Construction as evidenced by the invoiced shipment date (the "Commencement Date") and ends on the date that is twenty-four (24) months after the Commencement Date.

3. Terms and Conditions of Limited Warranty. The following terms and conditions apply to the Limited Warranty hereby provided:

(a) Option to Repair or Replace. Paladin Light Construction shall have the option to repair or replace the product.

(b) Timely Repair and Notice. In order to obtain the Limited Warranty, (i) the product must be repaired within thirty (30) days from the date of failure, and (ii) a claim under the warranty must be submitted to Paladin Light Construction in writing within thirty (30) days from the date of repair.

(c) Return of Defective Part or Product. If requested by Paladin Light Construction, the alleged defective part or product shall be shipped to Paladin Light Construction at its manufacturing facility or other location specified by Paladin Light Construction, with freight PRE-PAID by the claimant, to allow Paladin Light Construction to inspect the part or product.

Claims that fail to comply with any of the above terms and conditions shall be denied.

LIMITATIONS AND EXCLUSIONS.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY BASED ON A COURSE OF DEALING OR USAGE OF TRADE.

IN NO EVENT SHALL PALADIN LIGHT CONSTRUCTION BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGES.

IN NO EVENT SHALL PALADIN LIGHT CONSTRUCTION BE LIABLE FOR ANY LOSS OR CLAIM IN AN AMOUNT IN EXCESS OF THE PURCHASE PRICE, OR, AT THE OPTION OF PALADIN LIGHT CONSTRUCTION, THE REPAIR OR REPLACEMENT, OF THE PARTICULAR PRODUCT ON WHICH ANY CLAIM OF LOSS OR DAMAGE IS BASED. THIS LIMITATION OF LIABILITY APPLIES IRRESPECTIVE OF WHETHER THE CLAIM IS BASED ON BREACH OF CONTRACT, BREACH OF WARRANTY, NEGLIGENCE OR OTHER CAUSE AND WHETHER THE ALLEGED DEFECT IS DISCOVERABLE OR LATENT.

¹Attachment Technologies Inc., a subsidiary of Paladin Brands Holding, Inc. (PBHI) is referred to herein as Paladin Light Construction.