



OPERATOR'S MANUAL

3511B BACKHOE 3-POINT HITCH / CATEGORY II



SERIAL NUMBER: _____

MODEL NUMBER: _____

Manual Number: OM846
Part Number: 75746
Rev.

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3511B BACKHOES

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PREFACE

GENERAL COMMENTS

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

This manual has been designed to help you do a better, safer job. Read this manual carefully and become familiar with its contents.

WARNING!  **Never let anyone operate this unit without reading the "Safety Precautions" and "Operating Instructions" sections of this manual. Always choose hard, level ground to park the vehicle on and set the brake so the unit cannot roll.**

Unless noted otherwise, right and left sides are determined from the operator's control position when facing the attachment.

NOTE: 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 attachment as may be necessary without notification.

BEFORE OPERATION

The primary responsibility for safety with this equipment falls to the operator. Make sure the equipment is operated only by trained individuals that have read and understand this manual. If there is any portion of this manual or function you do not understand, contact your local authorized dealer or the manufacturer to obtain further assistance. Keep this manual available for reference. Provide the manual to any new owners and/or operators.

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 with you.

SERVICE

Use only manufacturer replacement parts. Substitute parts may not meet the required standards.

Record the model and serial number of your unit on the cover of this manual. The parts department needs this information to insure that you receive the correct parts.

SOUND AND VIBRATION

Sound pressure levels and vibration data for this attachment are influenced by many different parameters: some items are listed below (not inclusive):

- prime mover type, age, condition, with or without cab enclosure and configuration
- operator training, behavior, stress level
- job site organization, working material condition, environment

Based on the uncertainty of the prime mover, operator, and job site, it is not possible to get precise machine and operator sound pressure levels or vibration levels for this attachment.

NOTE: A list of all Paladin Patents can be found at <http://www.paladinattachments.com/patents.asp>.

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SAFETY STATEMENTS



THIS SYMBOL BY ITSELF OR WITH A WARNING WORD THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY OR THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.



DANGER

THIS SIGNAL WORD IS USED WHERE SERIOUS INJURY OR DEATH WILL RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.



WARNING

THIS SIGNAL WORD IS USED WHERE SERIOUS INJURY OR DEATH COULD RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.



CAUTION

THIS SIGNAL WORD IS USED WHERE MINOR INJURY COULD RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.

NOTICE

NOTICE INDICATES A PROPERTY DAMAGE MESSAGE.

GENERAL SAFETY PRECAUTIONS

WARNING!

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.

GENERAL SAFETY PRECAUTIONS

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.

WARNING!



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.

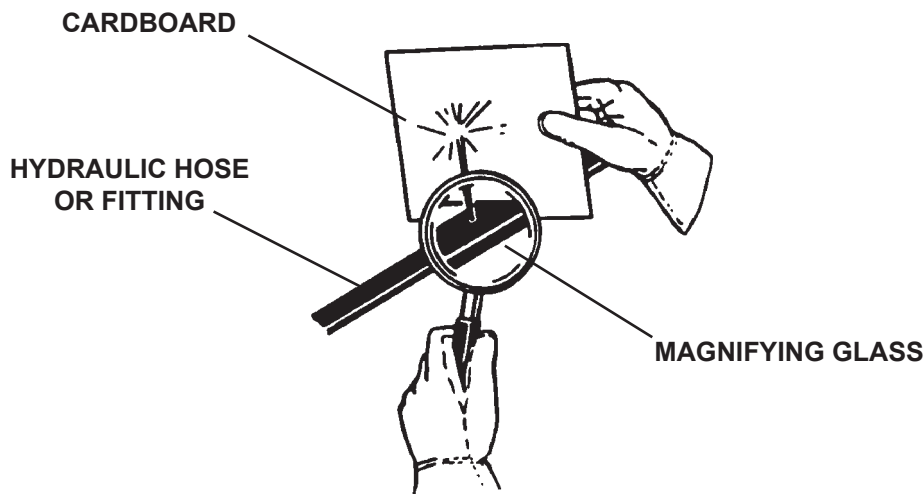
WARNING!



USE CARE WITH HYDRAULIC FLUID PRESSURE

Hydraulic fluid 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.
- 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.
- Wear safety glasses, protective clothing, and use a piece of cardboard or wood when searching for hydraulic leaks. **DO NOT USE YOUR HANDS!** **SEE ILLUSTRATION.**



GENERAL SAFETY PRECAUTIONS

WARNING!



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 modifications must be authorized in writing by the manufacturer.

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.



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.

- 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 engine running, or with this attachment in a raised position.
- 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.

EQUIPMENT SAFETY PRECAUTIONS

WARNING!



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.

WARNING!



EXPOSURE TO RESPIRABLE CRYSTALLINE SILICA DUST ALONG WITH OTHER HAZARDOUS DUSTS MAY CAUSE SERIOUS OR FATAL RESPIRATORY DISEASE.

It is recommended to use dust suppression, dust collection and if necessary personal protective equipment during the operation of any attachment that may cause high levels of dust.

WARNING!



REMOVE PAINT BEFORE WELDING OR HEATING

Hazardous fumes/dust can be generated when paint is heated by welding, soldering or using a torch. Do all work outside or in a well ventilated area and dispose of paint and solvent properly. Remove paint before welding or heating.

When sanding or grinding paint, avoid breathing the dust. Wear an approved respirator. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

WARNING!



END OF LIFE DISPOSAL

At the completion of the useful life of the unit, drain all fluids and dismantle by separating the different materials (rubber, steel, plastic, etc.). Follow all federal, state and local regulations for recycling and disposal of the fluid and components.



OPERATING THE BACKHOE

- Do NOT use 3-point quick attaching coupler to mount backhoe onto tractor.
- Use only on Category II tractors.
- Verify backhoe is securely attached to tractor before operating.
- Block off work area from bystanders, livestock, etc. Allow plenty of room for backhoe swing.
- Operate only from the operator's station.
- Use the backhoe only for digging. Do not use the backhoe to pull things, as a battering ram, or attach ropes, chains etc., to the unit.
- Do not dig close to the stabilizers. The ground could collapse from under the backhoe.
- Do not lift loads in excess of the capacity of the backhoe or prime mover.
- When operating on slopes, dig with the backhoe uphill, and avoid swinging the backhoe to the downhill side. Avoid steep hillside operation, which could cause the prime mover to overturn.
- Reduce speed when driving over rough terrain, on a slope, or turning, to avoid overturning the vehicle.
- Do not adjust relief valve settings. Incorrect valve settings could result in equipment damage and/or personal injury.

EQUIPMENT SAFETY PRECAUTIONS



OPERATING THE BACKHOE (continued)

- An operator must not use drugs or alcohol, which can change his or her alertness or coordination. An operator taking prescription or over-the-counter drugs should seek medical advice on whether or not he or she can safely operate equipment.
- Before exiting the prime mover, lower the backhoe bucket and stabilizers to the ground, turn off the prime mover's engine, remove the key and apply the brakes.



TRANSPORTING THE BACKHOE

- Minimum of 20% of tractor and equipment weight must be on the tractor front wheels with the backhoe in the transport position.
- Do not drive the tractor when seated at the backhoe controls.
- Be sure to engage boom and swing locks before transporting backhoe to prevent uncontrolled movement.
- 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., cave in could result.
- Do not smoke when refueling the prime mover. Allow room in the fuel tank for expansion. Wipe up any spilled fuel. Secure cap tightly when done.



MAINTAINING THE BACKHOE

- Before performing maintenance, lower the attachment to the ground, turn off the engine, remove the key and apply the brakes.
- Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manuals before any repair is made. After completing maintenance or repair, check for correct functioning of the backhoe. If not functioning properly, always tag "DO NOT OPERATE" until all problems are corrected.
- Worn, damaged, or illegible safety decals must be replaced. New safety decals can be ordered from Paladin.
- Never make hydraulic repairs while the system is under pressure, or cylinders under load. Serious personal injury or death could result.
- Never work under a raised attachment.

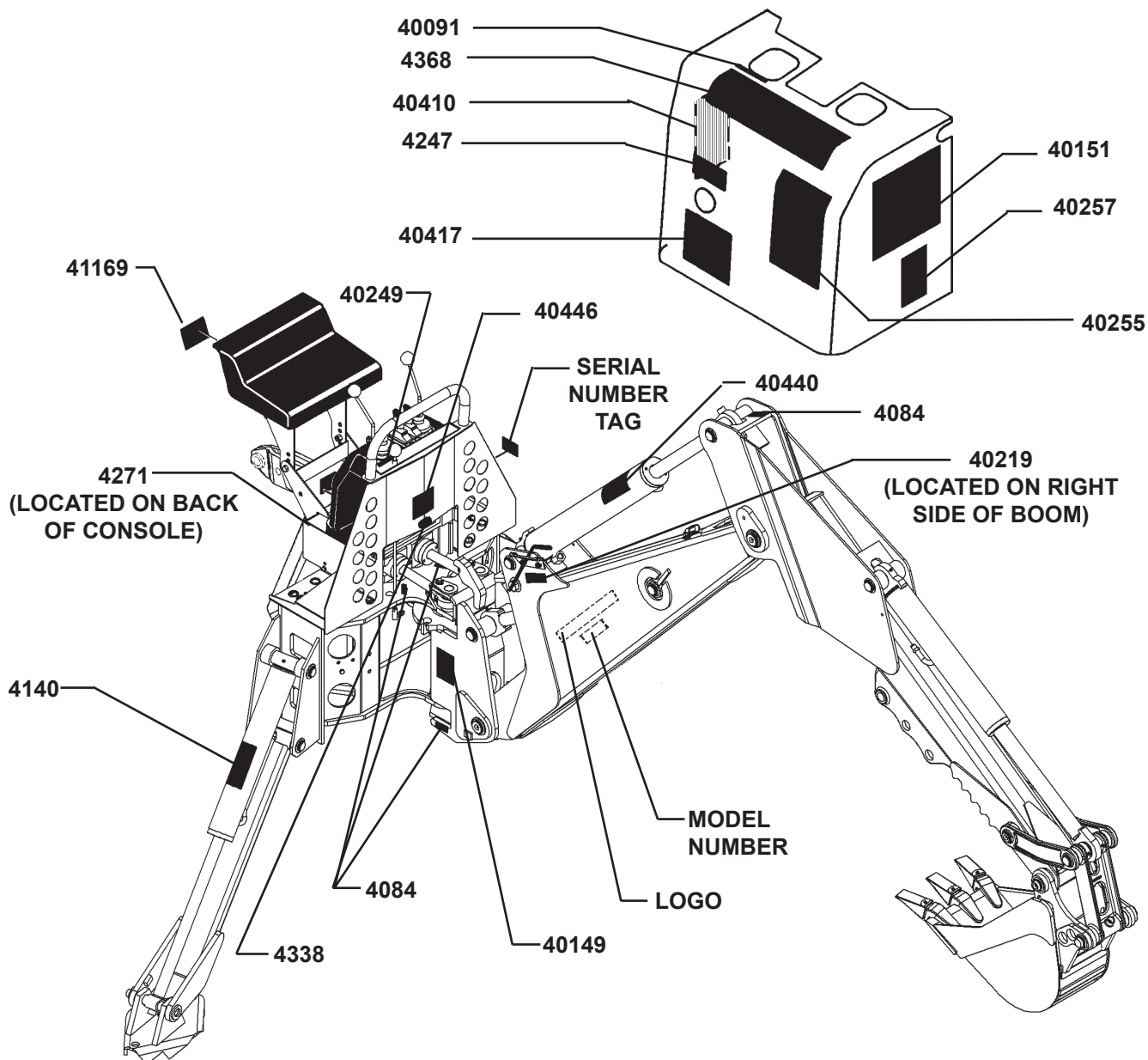
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DECALS

DECAL PLACEMENT

GENERAL INFORMATION

The diagrams on this page shows the location of all the decals used on the 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.



IMPORTANT: Keep all safety decals clean and legible. Replace all missing, illegible or damaged safety decals. When replacing parts with safety decals attached, the safety decals must also be replaced.

REPLACING SAFETY DECALS: Clean the area of application with a nonflammable solvent, then wash the same area with soap and water. Allow the surface to dry. Remove the backing from the safety decal, exposing the adhesive surface. Apply the safety decal to the position shown in the diagram, and smooth out any bubbles.

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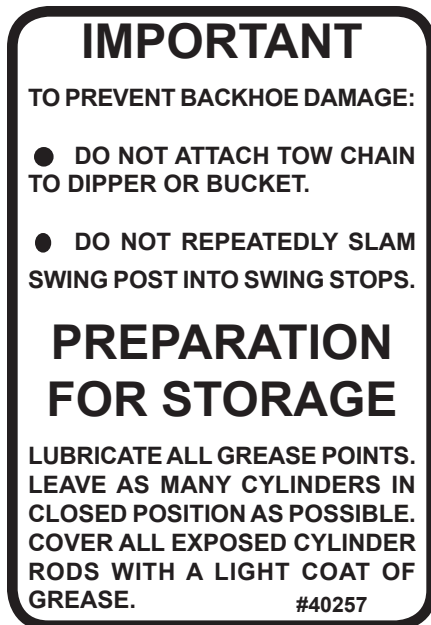
DECALS



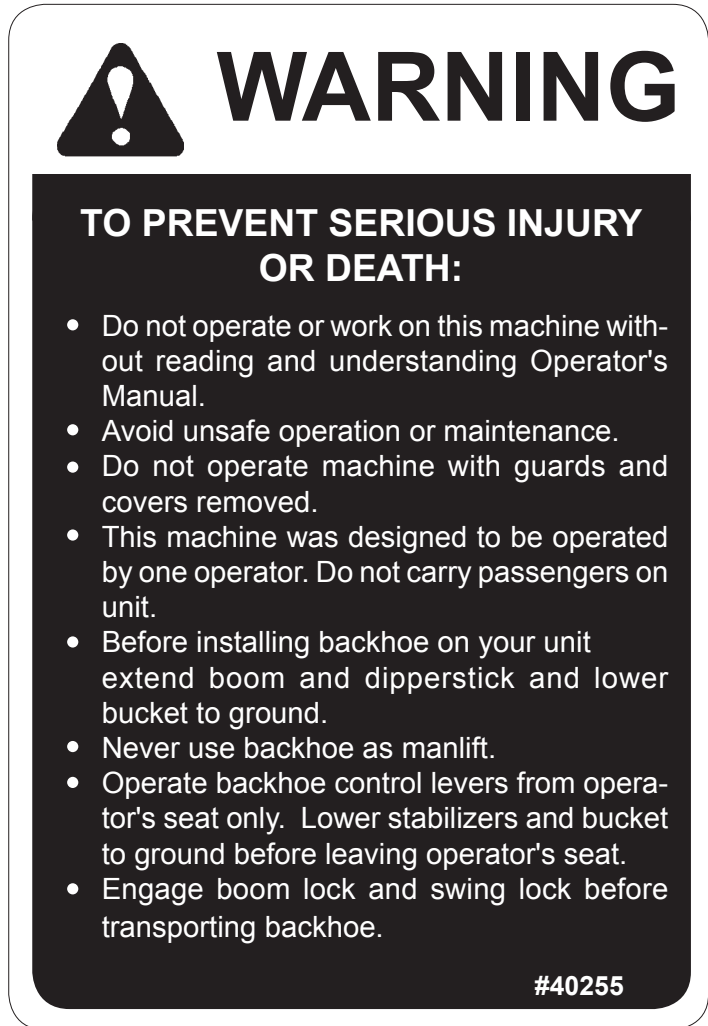
PART #40151
HIGH PRESSURE FLUID DECAL



PART #41169
DANGER! BACKHOE SECURE



PART #40257
IMPORTANT! DECAL

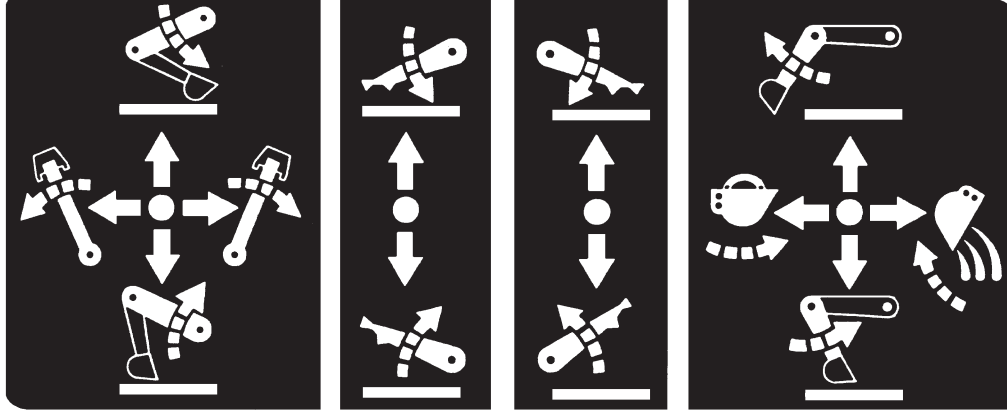


PART #40255
OPERATIONAL WARNING DECAL



PART #40149
DANGER! PINCH POINTS

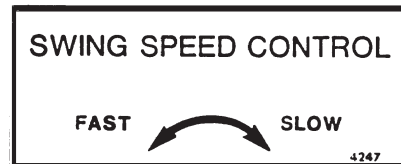
DECALS



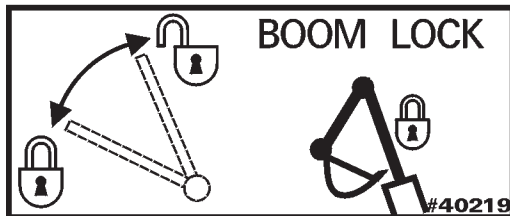
PART #4368
OPERATING CONTROLS DECAL

FLOAT

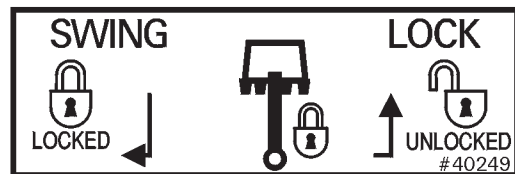
PART #40091
FLOAT DECAL



PART #4247
SWING SPEED CONTROL DECAL



PART #40219
BOOM LOCK DECAL

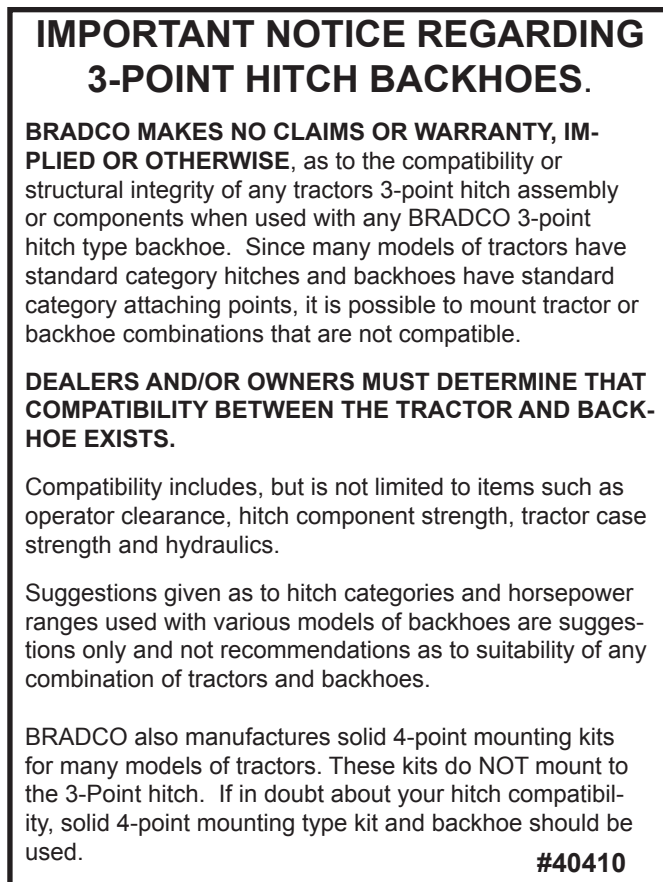


PART #40249
SWING LOCK DECAL

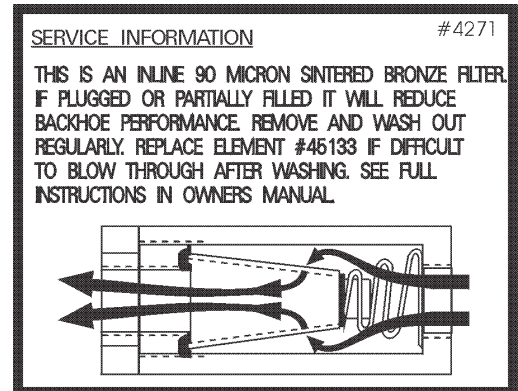
DECALS



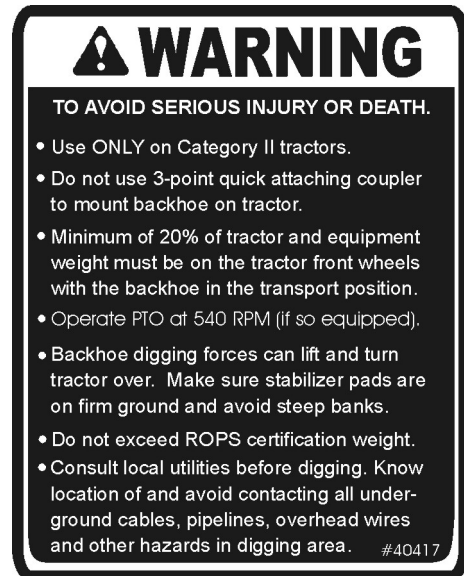
PART #40446
CAUTION! BACKHOE LIMITATIONS



PART #40410
IMPORTANT NOTICE



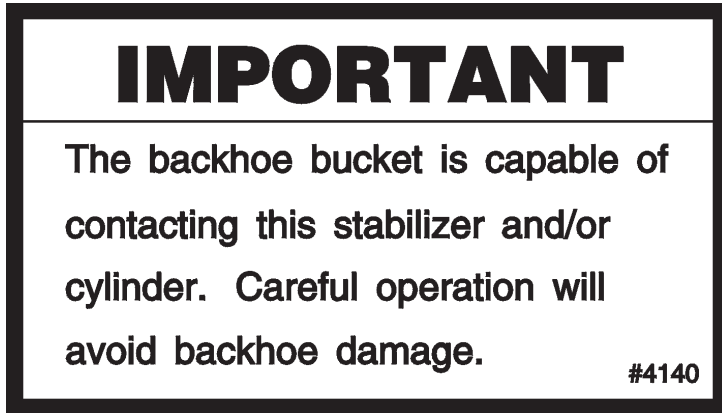
PART #4271
INLINE FILTER DECAL



PART #40417
WARNING!

**NOTE: CONTACT PALADIN OR YOUR LOCAL DEALER
FOR MODEL NUMBER AND LOGO DECALS.**

DECALS



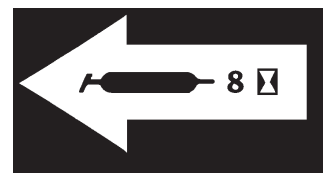
PART #4140
BUCKET CONTACT WARNING DECAL



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



PART #40440
CALL BEFORE YOU DIG



PART #4084
GREASE 8 HOURS

PRE-OPERATION


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. 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

FIGURE #1

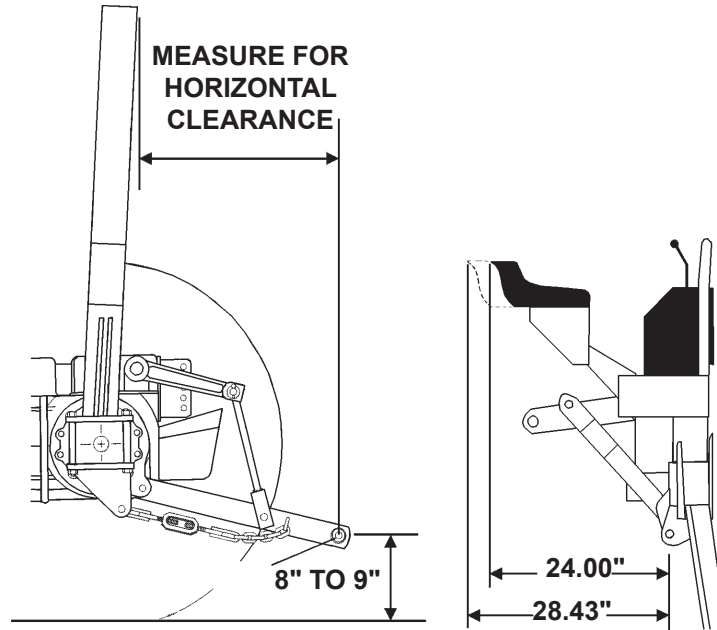
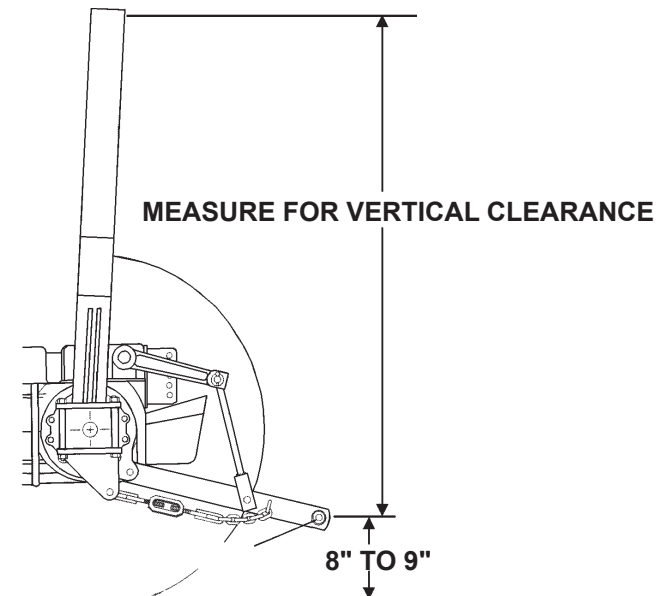


Figure #1 also shows the minimum horizontal distances between the seat (in the forward and the extended positions), and the lower link mounting point. The distance found in step #1 must be greater than these distances to safely operate the backhoe. Do not mount the backhoe if the distance found in step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

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 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.

BUCKET ASSEMBLIES

12"	#110012
16"	#110016
18"	#110018
20"	#110020
24"	#110024

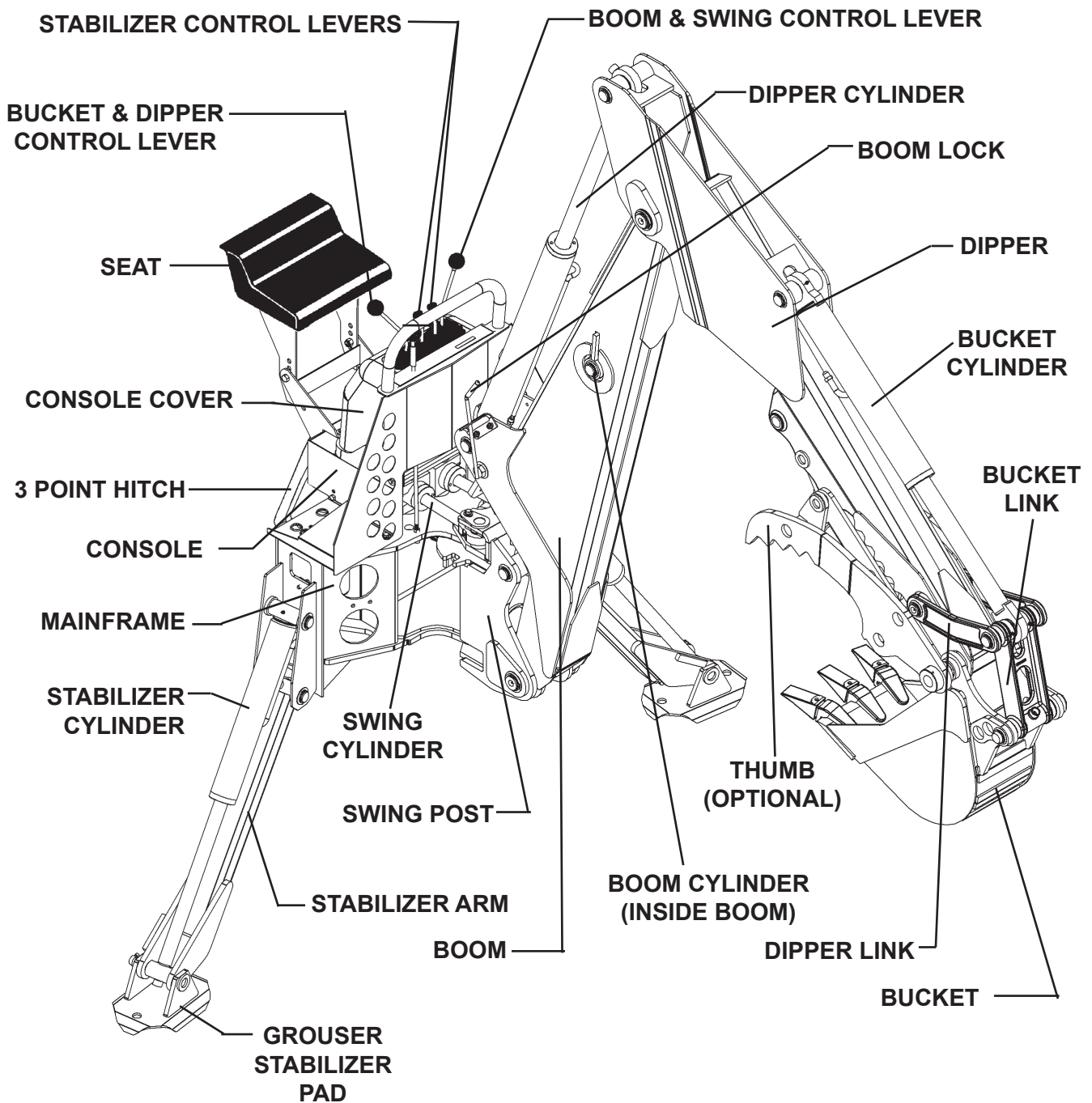
Additional specialty buckets are available upon request.

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PRE-OPERATION

NOMENCLATURE

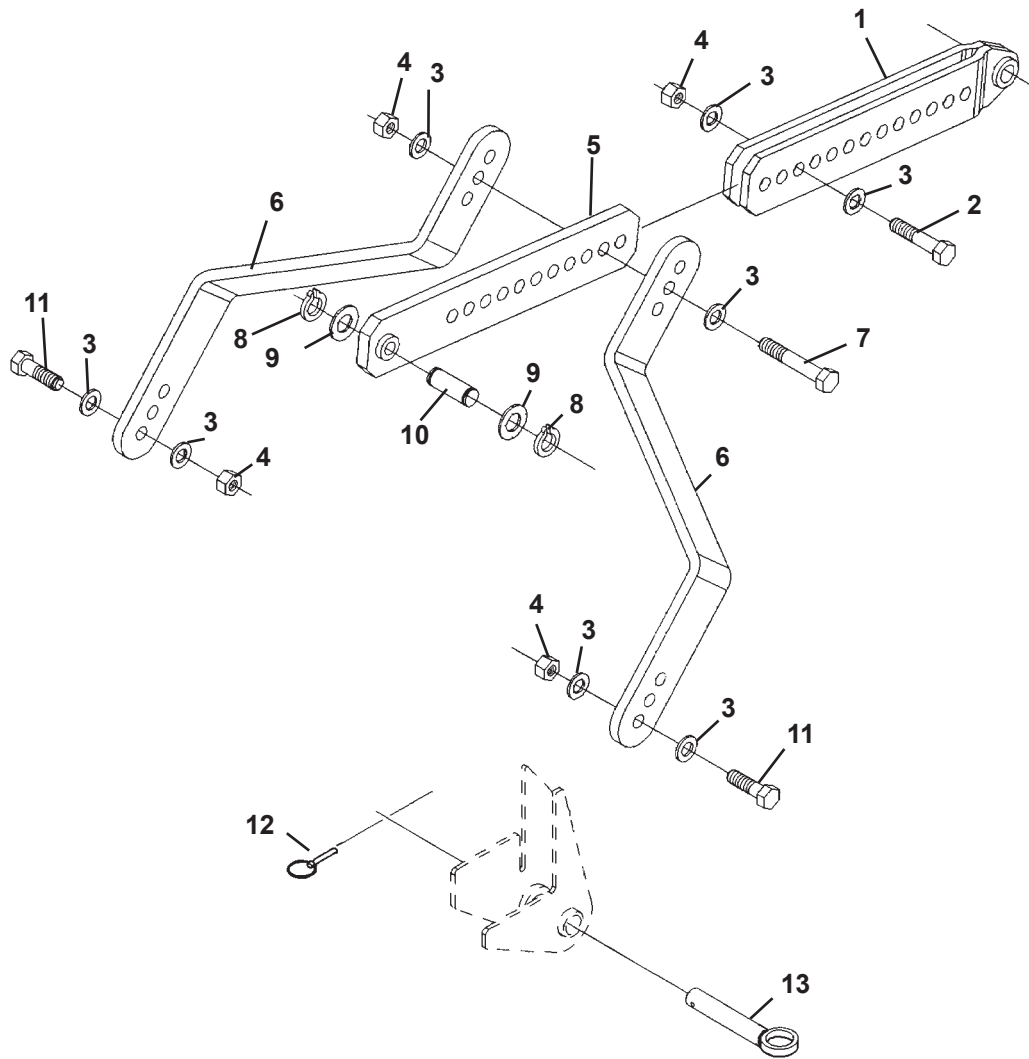
Throughout this manual, reference is made to various backhoe components. Study the following diagram to acquaint yourself with the various names of these components. This knowledge will be helpful when reading through this manual or when ordering service parts.



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MOUNTING INSTRUCTIONS

3-POINT HITCH ADAPTER KIT #88623



MOUNTING INSTRUCTIONS

3-POINT HITCH ADAPTER KIT #88623

<u>ITEM</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 3511B backhoe includes a 3-point hitch adapter kit and a check valve and inline filter. Although the adapter links have been installed at the factory, diagram and parts list has been included in this section along with the following mounting instructions for your convenience. Study the diagram 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 diagram at the front of this section and the following mounting instructions 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 and check valve (8FP ports) installed. Your dealer should provide the rest of the hydraulic system hook-up to your tractor. (Hoses or fittings going to the inline filter and check valve require an 8MP end.)

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 should be 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.)

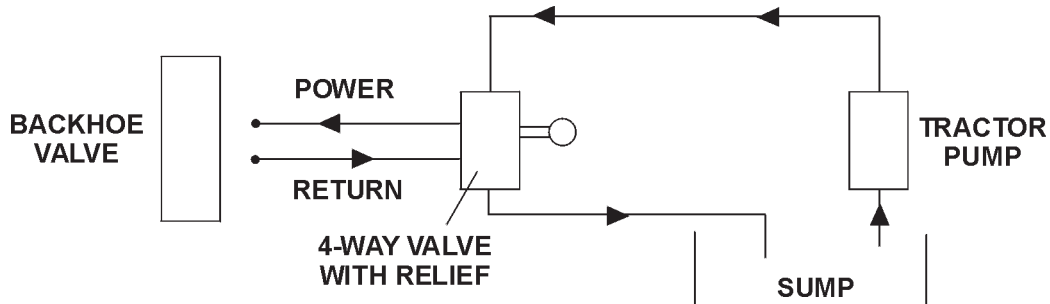


FIGURE #2

(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.

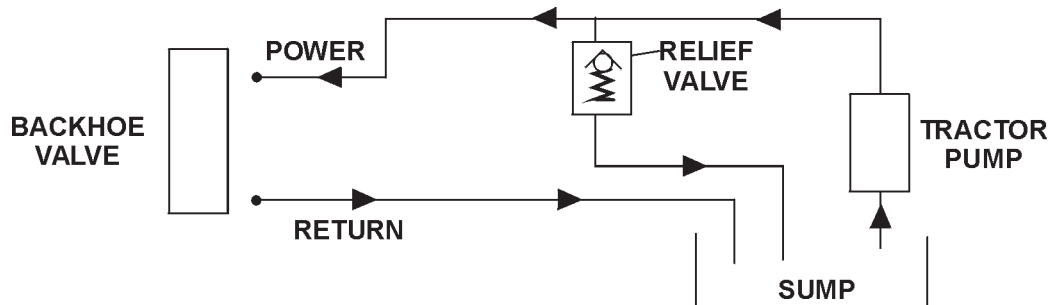
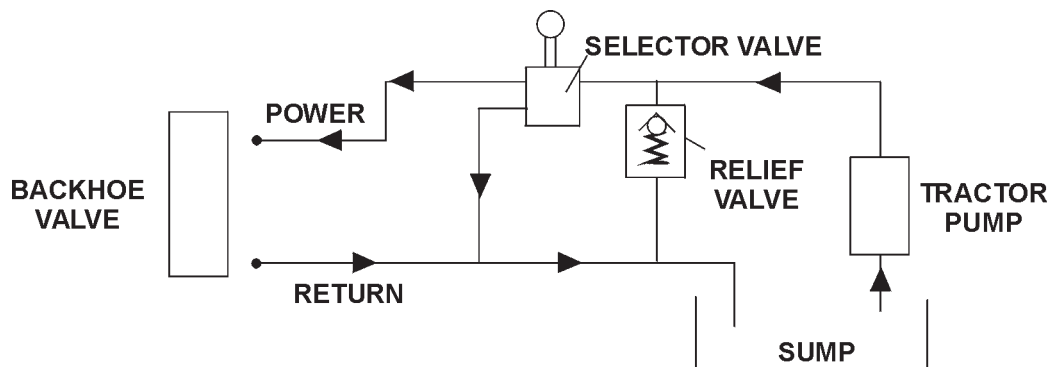


FIGURE #3

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



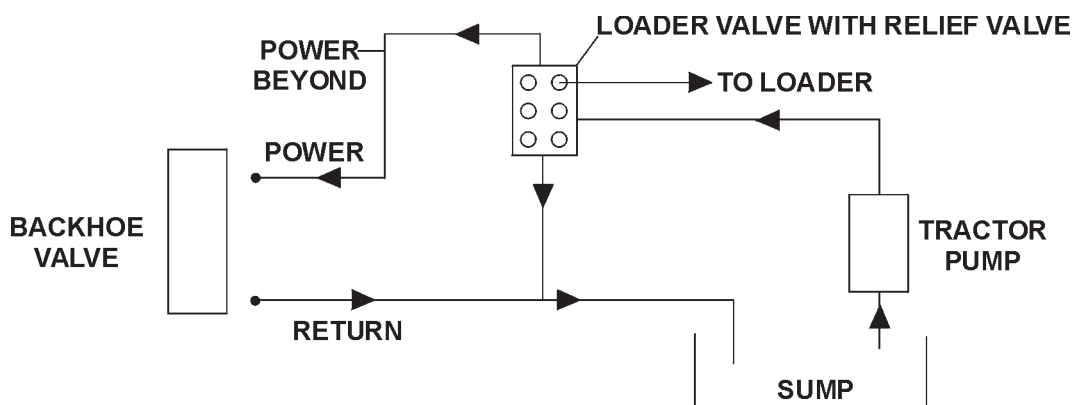
MOUNTING INSTRUCTIONS

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

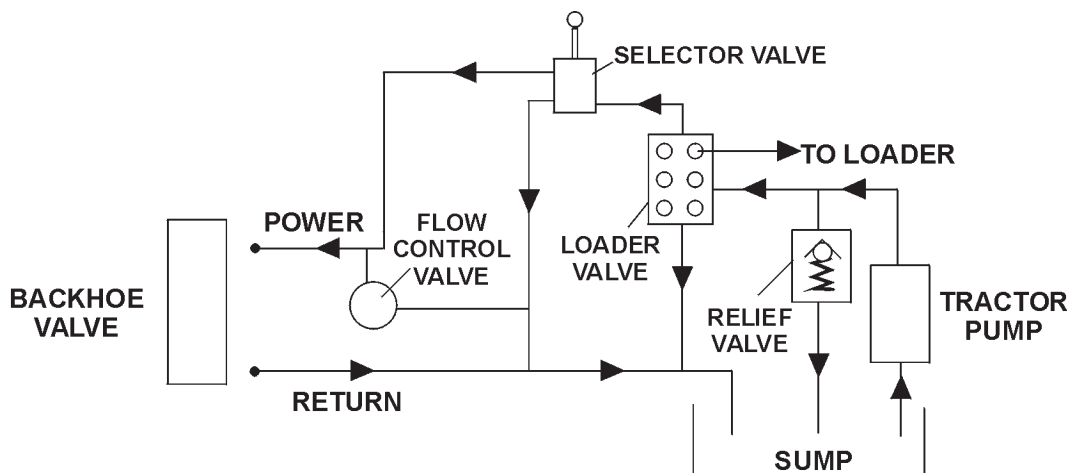
(Existing tractor pump (less than 11 GPM) and loader utilizing loader valve power beyond.)



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.)

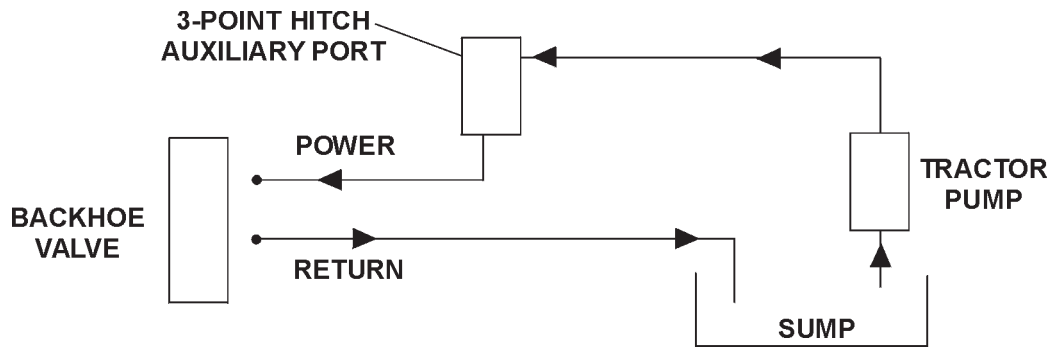


MOUNTING INSTRUCTIONS

3-POINT HITCH BACKHOE

FIGURE #6

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



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.

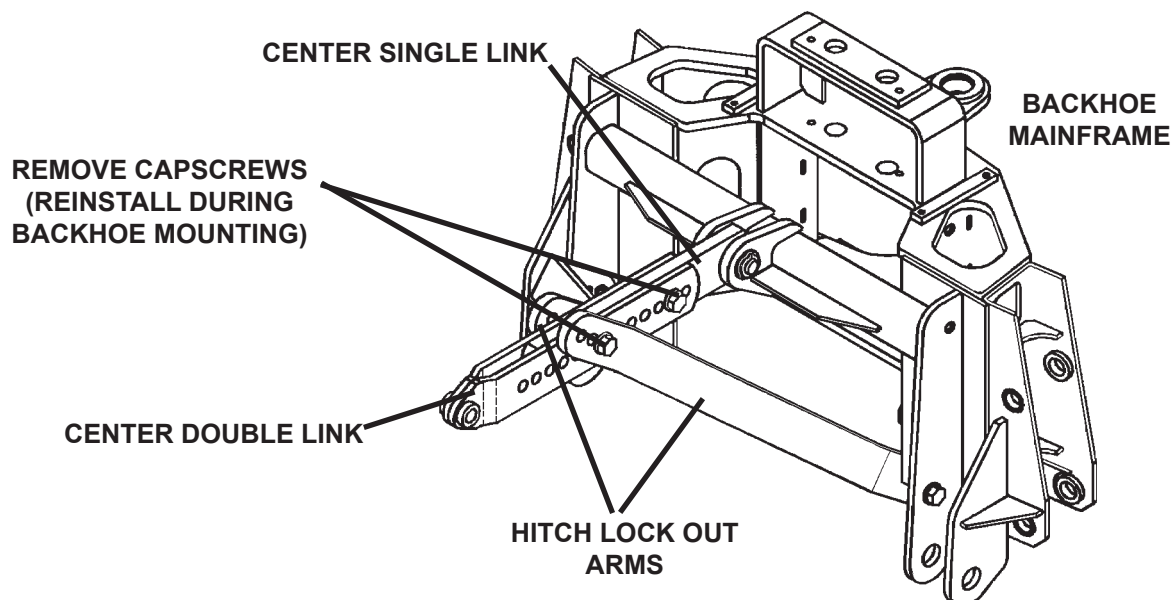
Always maintain an 8" clearance between the operator and the cab or ROPS.

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

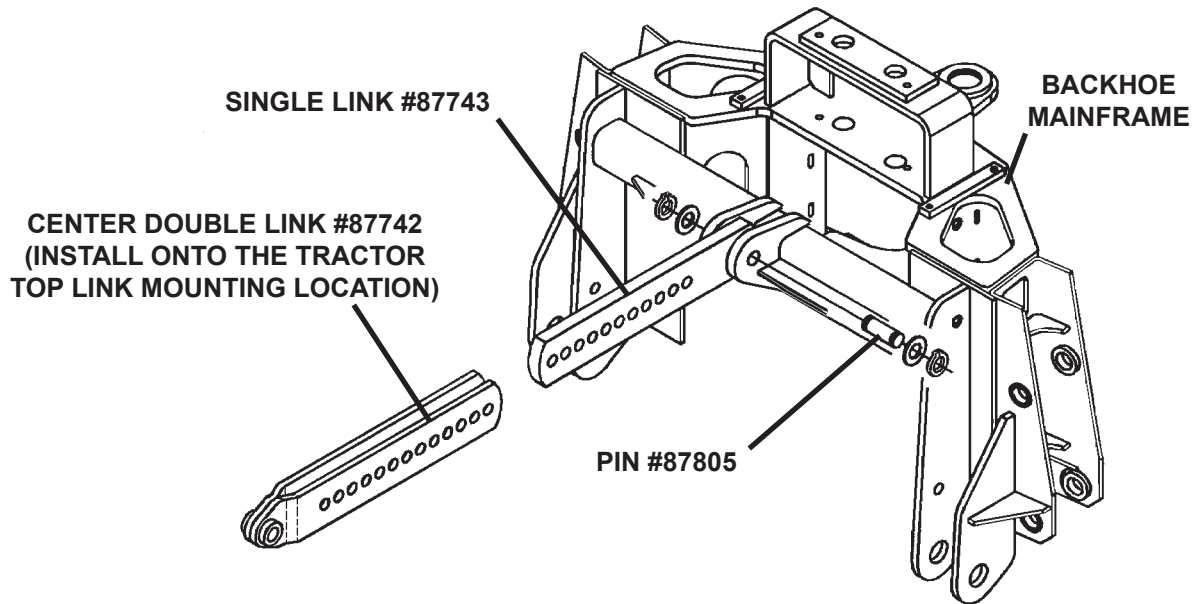
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BACKHOE INSTALLATION

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

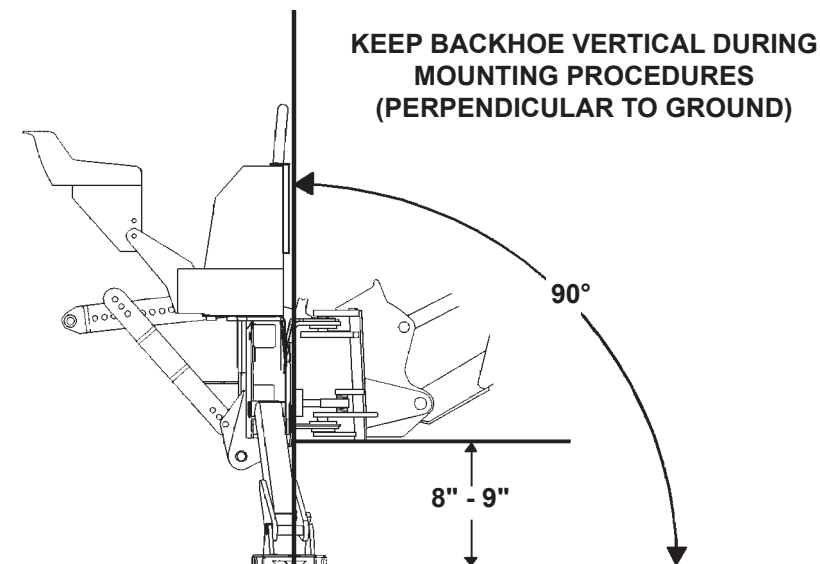
9. Start the tractor engine and operate at low RPM. Activate the tractor valve to provide hydraulic power to the backhoe. (Check for any hydraulic leaks.)

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



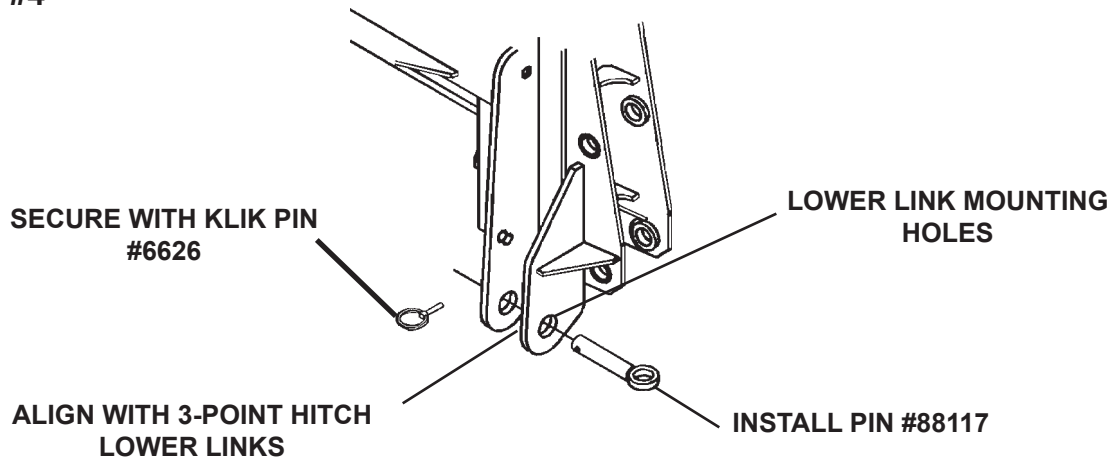
11. Back the tractor until the lower link ball joints are in line with the mounting holes in the backhoe mainframe. NOTE: While backing tractor be aware of the location of the hydraulic hoses and top links. See Figure #4
12. Install the (2) #88117 hitch pins connecting the lower links to the backhoe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

BACKHOE INSTALLATION

CAT. II 3-POINT HITCH BACKHOE

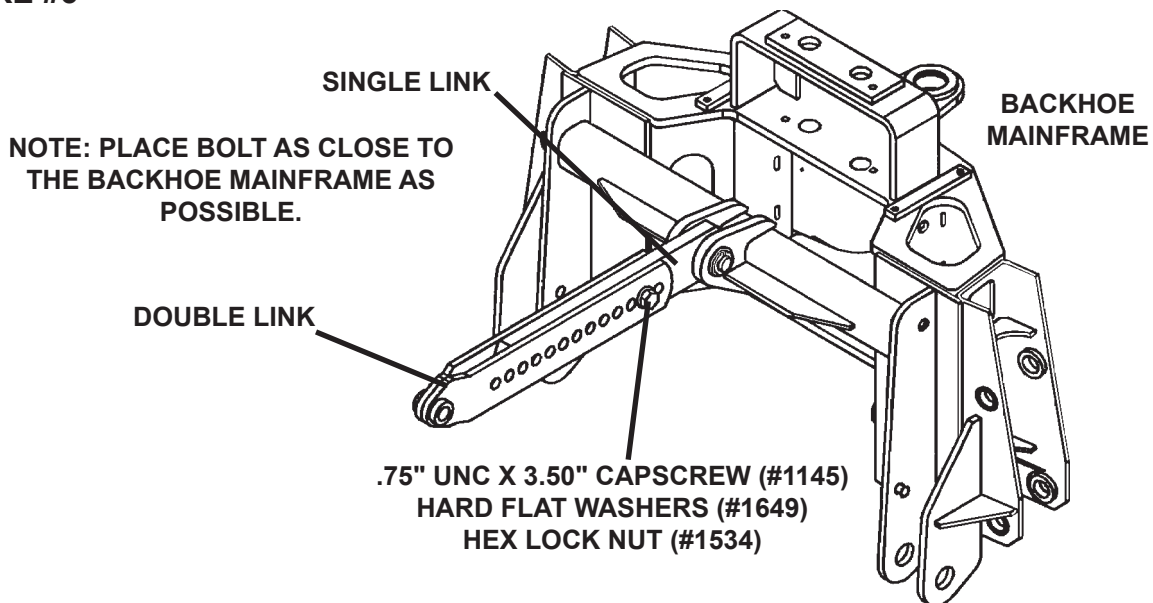
BACKHOE MAINFRAME

FIGURE #4



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

FIGURE #5

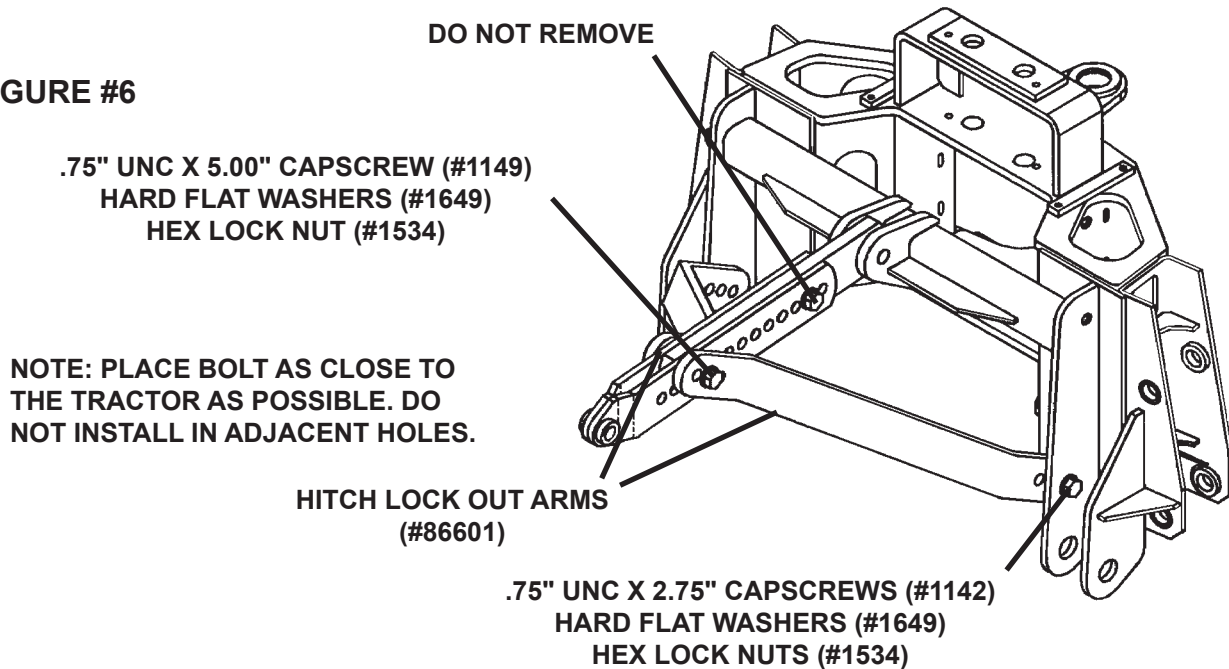


14. (If the hitch lock out arms were not installed at the factory, position them to the inside of the mounting holes and bolt into place using the two .75" X 2.75" capscrews, hard flat washers (both sides) and lock nuts provided.) Position the hitch lock out arms on each side of the top links, align 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 Bolt Torque Specifications page 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.

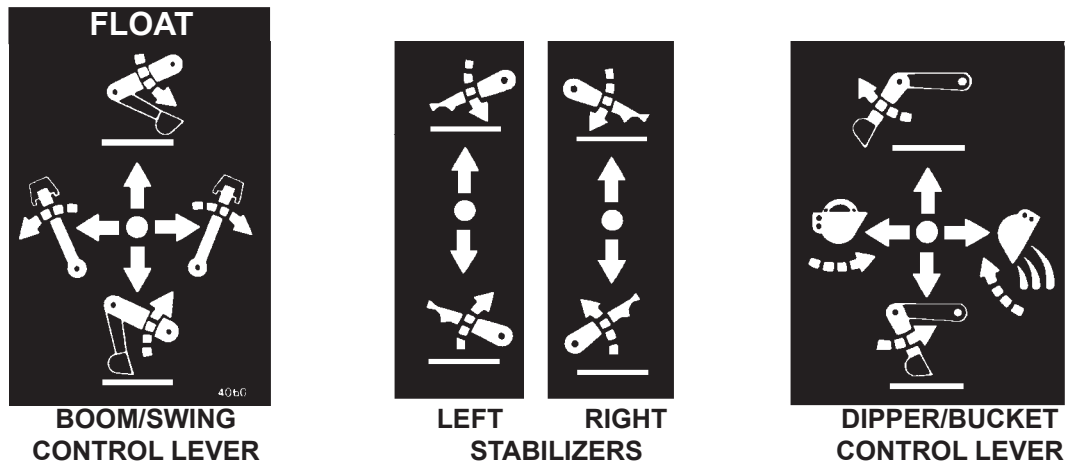


IMPORTANT: DO NOT attempt to raise the backhoe with the 3-point hitch. The backhoe center links along with the hitch lock out arms make the backhoe a solid mount that is immovable. Any attempt to raise the backhoe with the 3-point hitch will cause the hydraulic lift oil to go over relief and eventually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

OPERATING INSTRUCTIONS

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 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

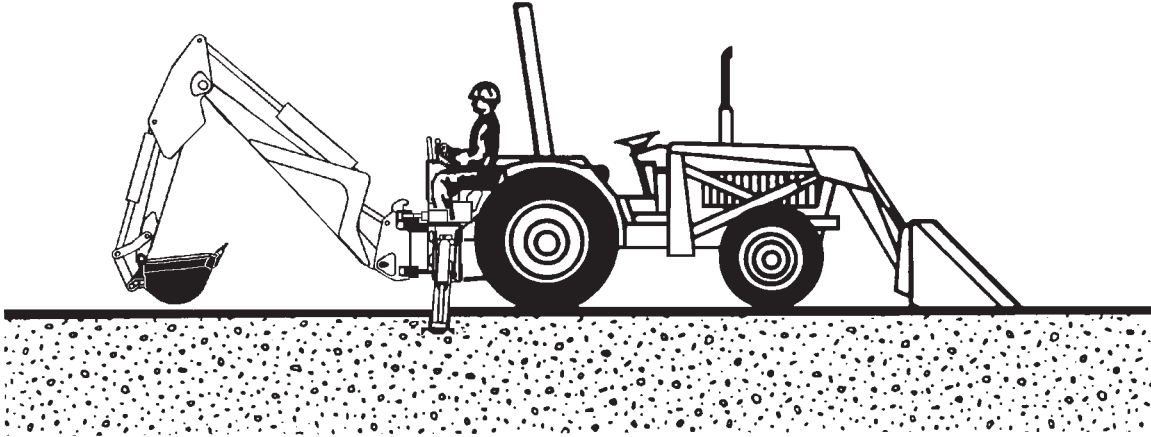
Before any excavating is started, it is always a good idea to plan out the job first. Various things need to be considered and taken into account prior to the actual digging. The operator should inspect the job site and take notice of any potential hazards in the area. He should have a complete understanding 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.

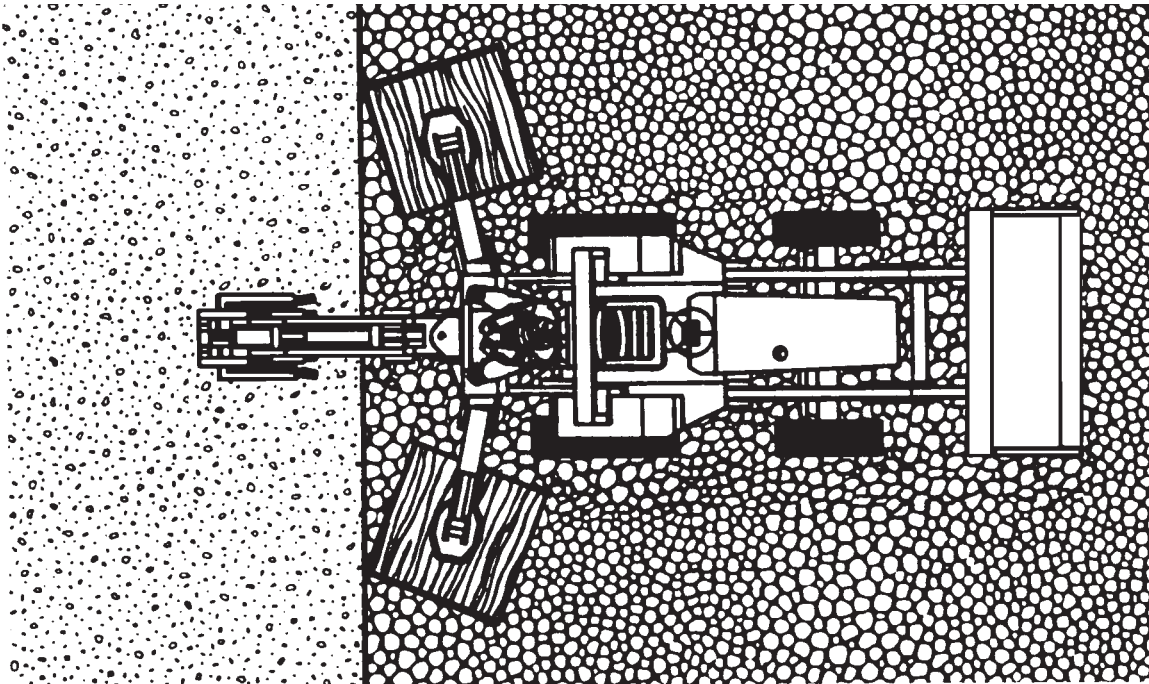
OPERATING INSTRUCTIONS

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.



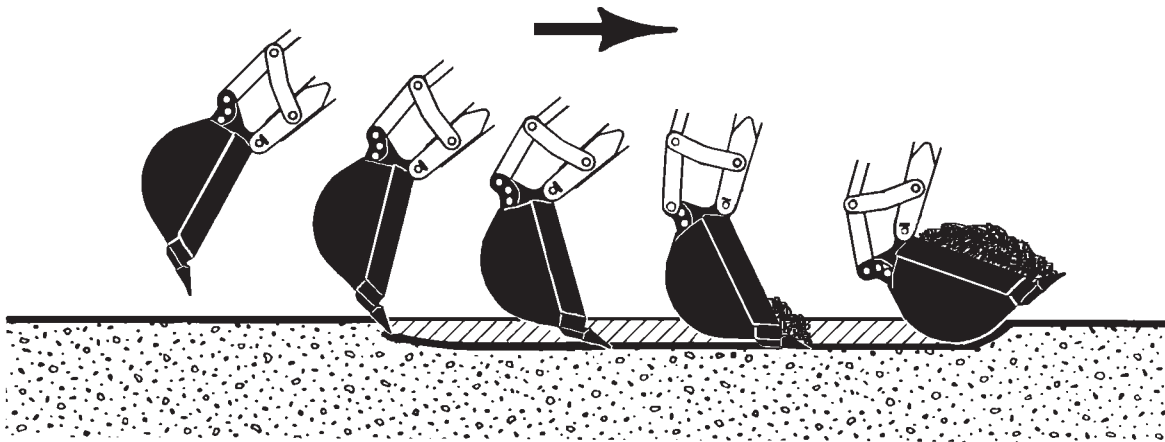
OPERATING INSTRUCTIONS

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.

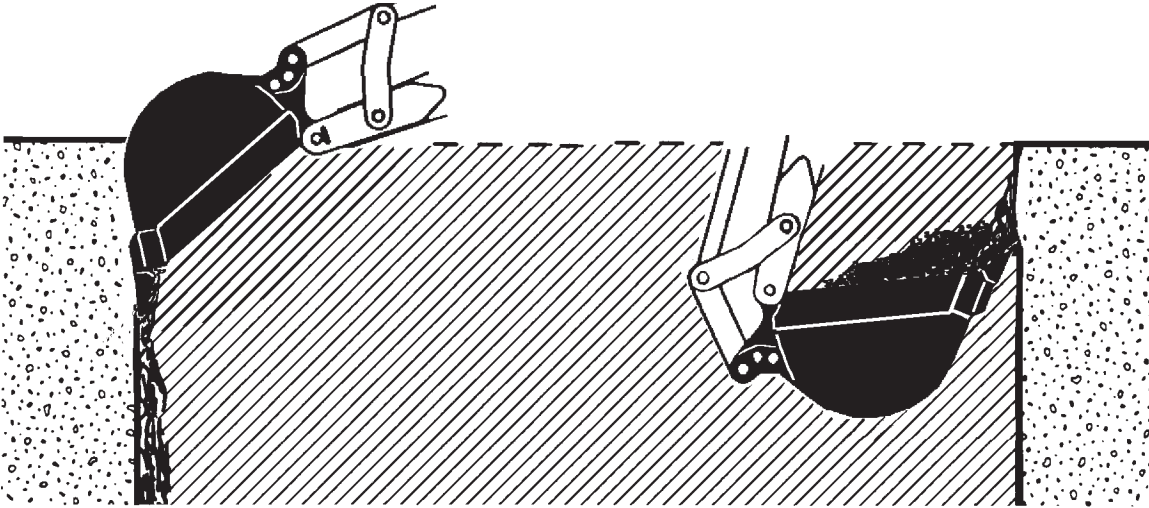
When the excavation has been dug to within six inches of the finished bottom, clear and touch up the sides of the excavation. Use the flat sides of the bucket to scrape off any high spots. Dislodge any exposed rocks if they seem loose. When finishing walls, finish the far wall by curling the bucket out, 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)



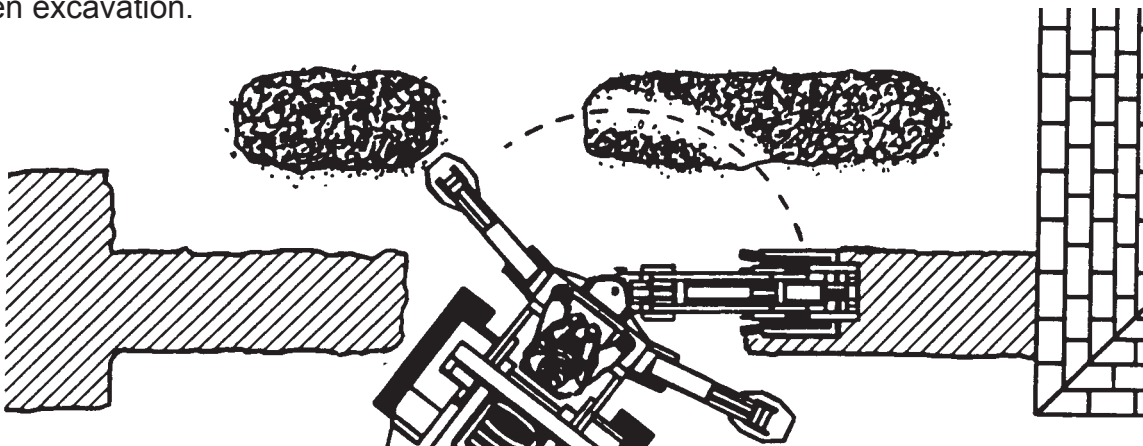
Once the sides are cleaned up, finish grading the bottom of the excavation. This is done by making the remaining cuts long and shallow, concentrating on making them level and smooth. Remove any remaining spoil. Check the excavation bottom for depth and levelness, making any adjusting cuts as needed.

The basic steps just listed at 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.

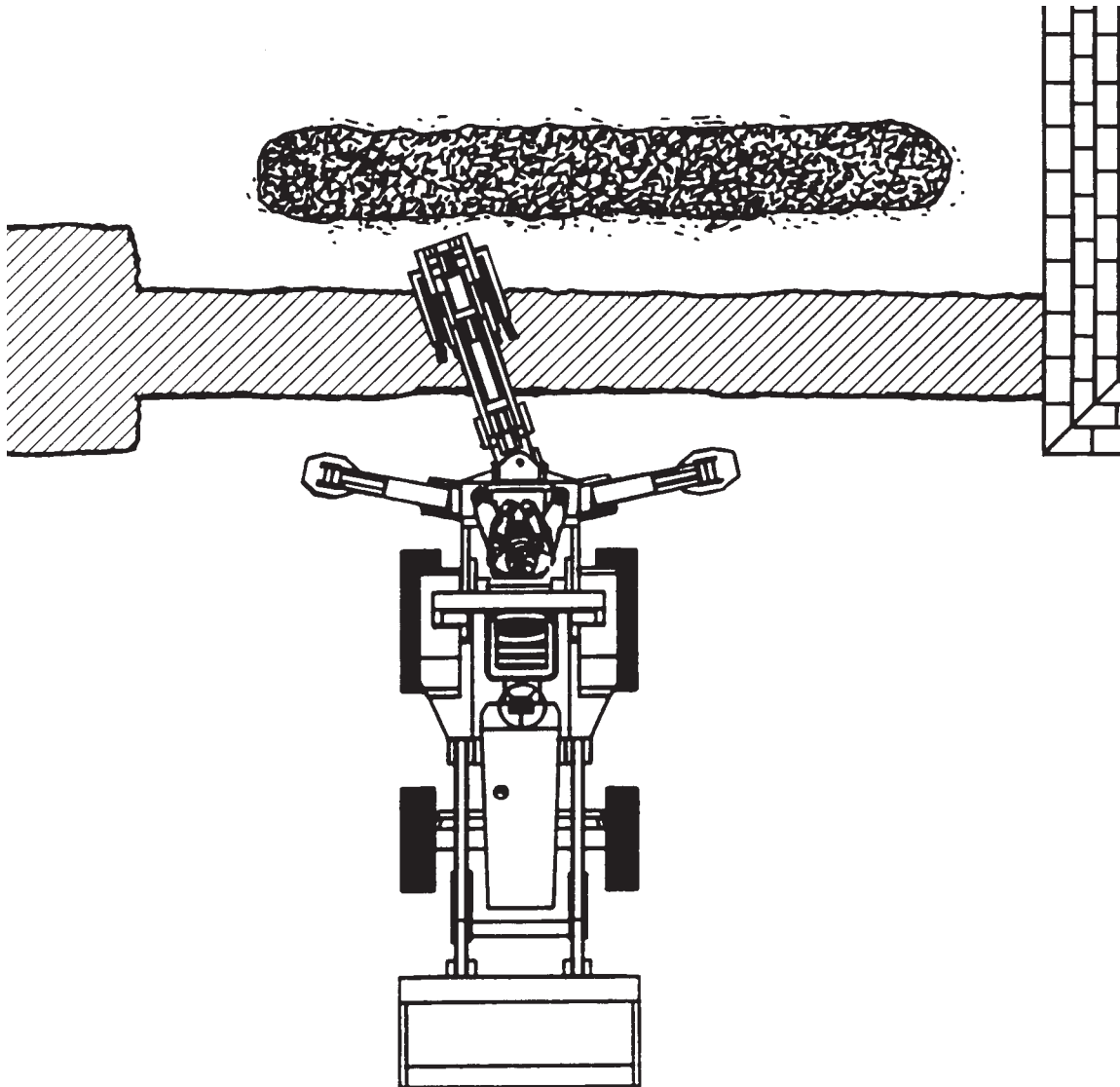


OPERATING INSTRUCTIONS

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 center line 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.



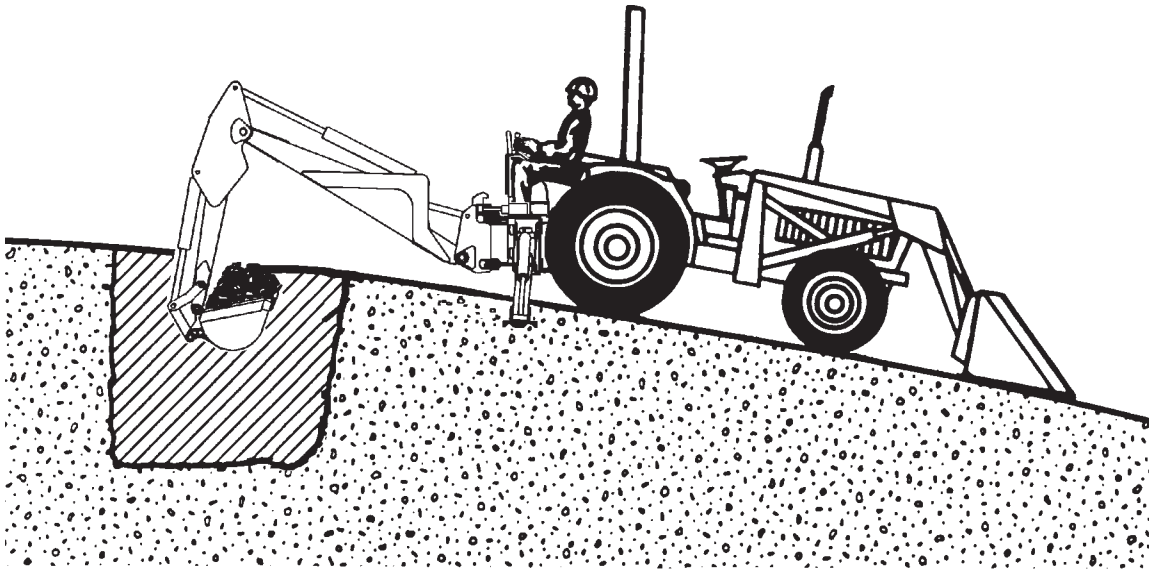
Position the unit forward so the two trenches can be connected. Pile the spoil on the opposite side of the trench.

OPERATING INSTRUCTIONS

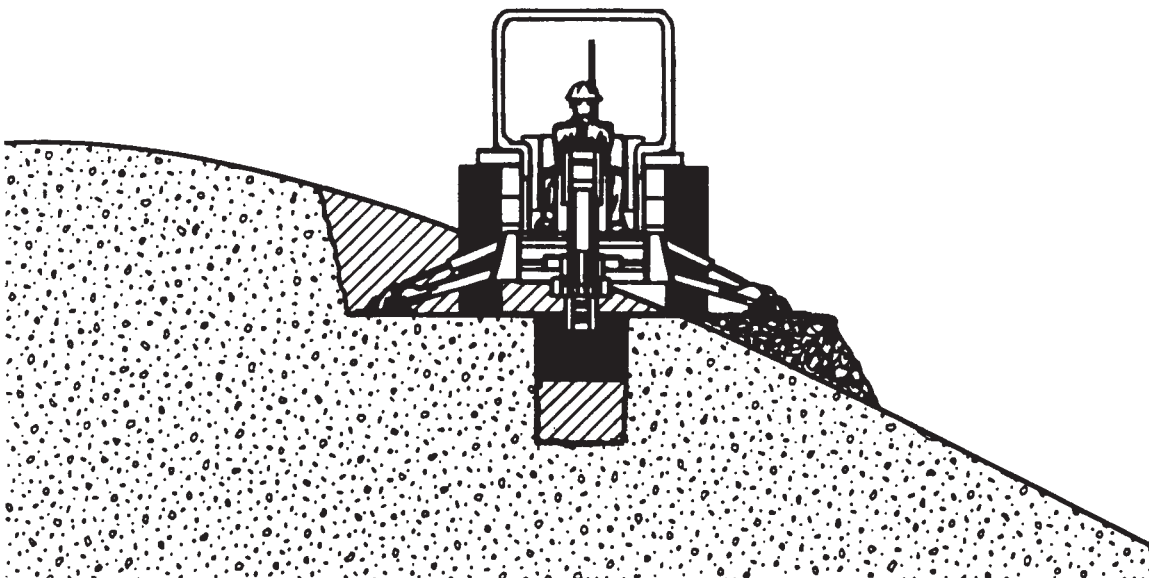
OPERATING TECHNIQUES

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.

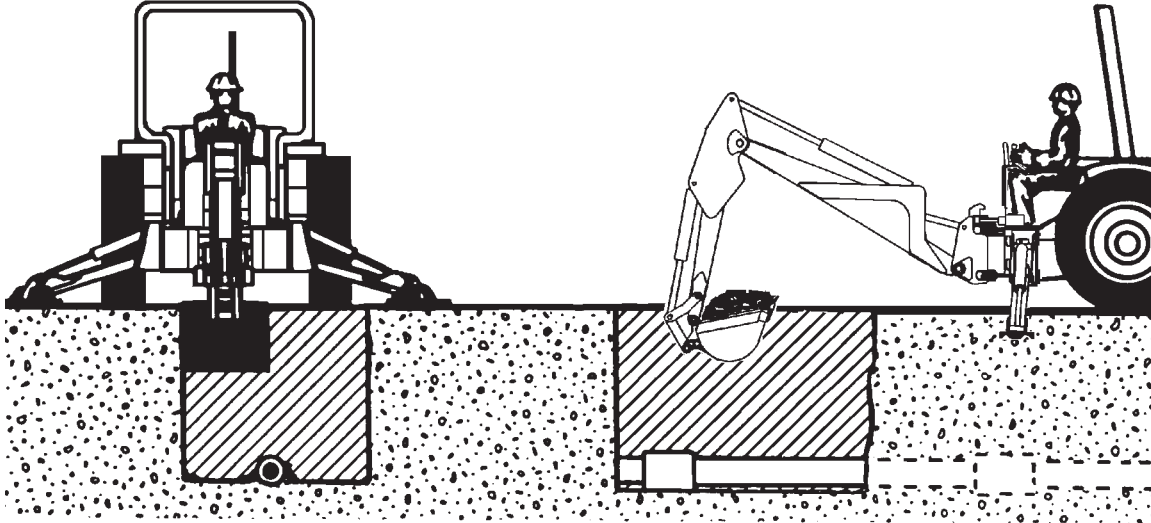


OPERATING INSTRUCTIONS

OPERATING TECHNIQUES

ATTACHMENT TYPE BACKHOES

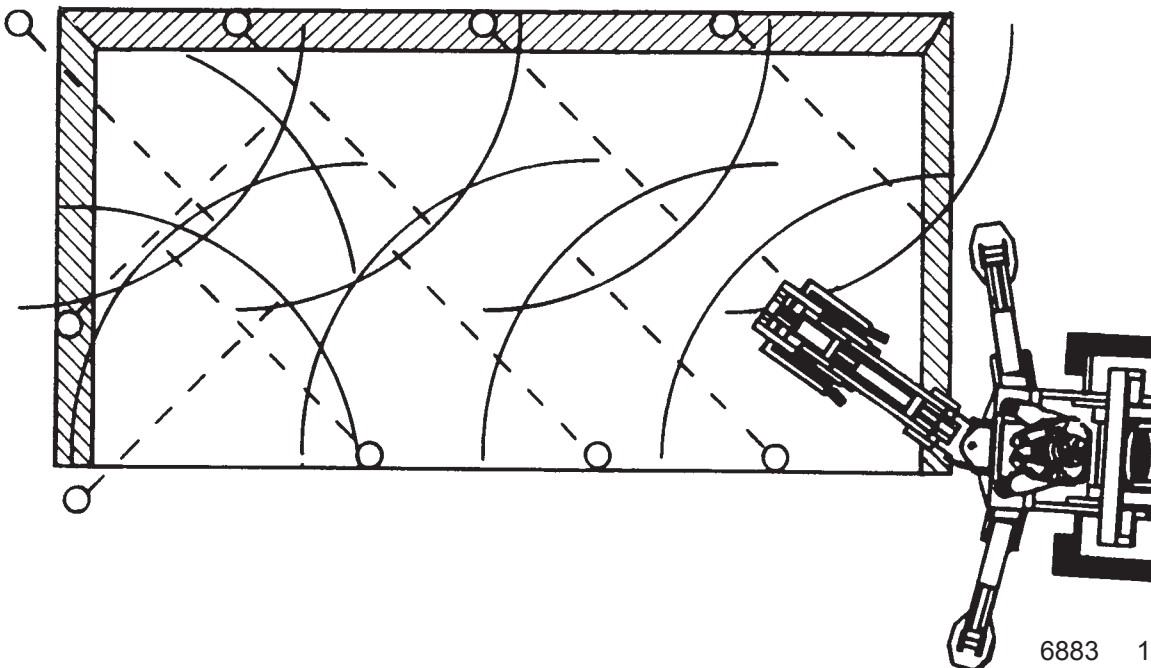
PIPELINE LEAK REPAIR



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.



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OPERATING INSTRUCTIONS

OPERATING TECHNIQUES ATTACHMENT TYPE BACKHOES

MISCELLANEOUS - BACKFILLING

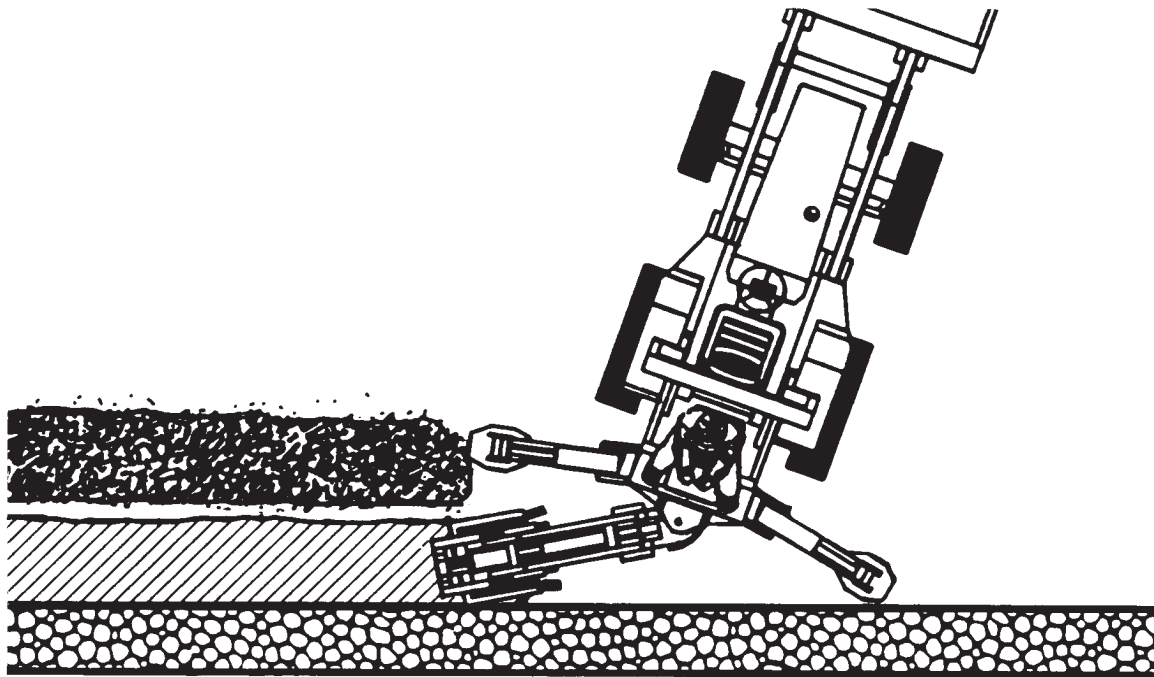
To backfill an excavation, lower the extended bucket into the spoil pile. Curl the bucket and lift it clear of the spoil pile. Swing the bucket to the excavation and extend the bucket. Return the bucket to the spoil pile and continue the cycle until the job is completed.

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 main-frame.

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

OPERATING TECHNIQUES ATTACHMENT TYPE BACKHOES

TRANSPORTING

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 safety section 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).
3. Engage the boom lock.
4. Raise all stabilizers.

CAUTION! When backhoe is mounted to the back of a tractor, be sure to install a SMV (Slow Moving Vehicle) sign on the backhoe dipper before attempting to transport.



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

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

BACKHOE STORAGE

To prepare for storage:

- Clean the unit thoroughly, removing all mud, dirt, and grease.
- Tighten loose nuts, capscrews and hydraulic connections.
- Inspect for visible signs of wear, breakage, or damage. Order any parts required and make the necessary repairs to avoid delays upon removal from storage.
- Replace decals that are damaged or in unreadable condition.
- Coat exposed portions of the cylinder rods with grease.
- Lubricate all grease fittings.
- Seal hydraulic system from contaminants and secure all hydraulic hoses off the ground to help prevent damage.
- Store unit in a dry and protected place. Leaving the unit outside will materially shorten its life.

Additional Precautions for Long Term Storage:

- Touch up all unpainted surfaces with paint to prevent rust.

REMOVING FROM STORAGE

- Wash off all dirt and grime from the unit.
- Check all hydraulic hoses and fittings for damage before installing the backhoe onto your power unit. (Check for leaks after the backhoe has been properly installed.)
- Check all lubrication points to ensure there is sufficient grease for smooth operation.
- Check all bolts for tightness.

OPERATING INSTRUCTIONS

OPERATING TECHNIQUES ATTACHMENT TYPE BACKHOES

LIFT POINTS

Lifting points are identified by lifting decals where required. Lifting at other points is unsafe and can damage attachment. Do not attach lifting accessories around cylinders or in any way that may damage hoses or hydraulic components.

- Attach lifting accessories to unit at recommended lifting points.
- Bring lifting accessories together to a central lifting point.
- Lift gradually, maintaining the equilibrium of the unit.

WARNING! Use lifting accessories (chains, slings, ropes, shackles and etc.) that are capable of supporting the size and weight of your attachment. Secure all lifting accessories in such a way to prevent unintended disengagement. Failure to do so could result in the attachment falling and causing serious personal injury or death.



TIE DOWN POINTS

Tie down points are identified by tie down decals where required. Securing to trailer at other points is unsafe and can damage attachment. Do not attach tie down accessories around cylinders or in any way that may damage hoses or hydraulic components.

- Attach tie down accessories to unit as recommended.
- Check unit stability before transporting.

WARNING! Verify that all tie down accessories (chains, slings, ropes, shackles and etc.) are capable of maintaining attachment stability during transporting and are attached in such a way to prevent unintended disengagement or shifting of the unit. Failure to do so could result in serious personal injury or death.



LUBRICATION

BACKHOE

GENERAL INFORMATION

Economical and efficient operation of any machine is dependent 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 an equivalent SAE Multi Purpose type grease.

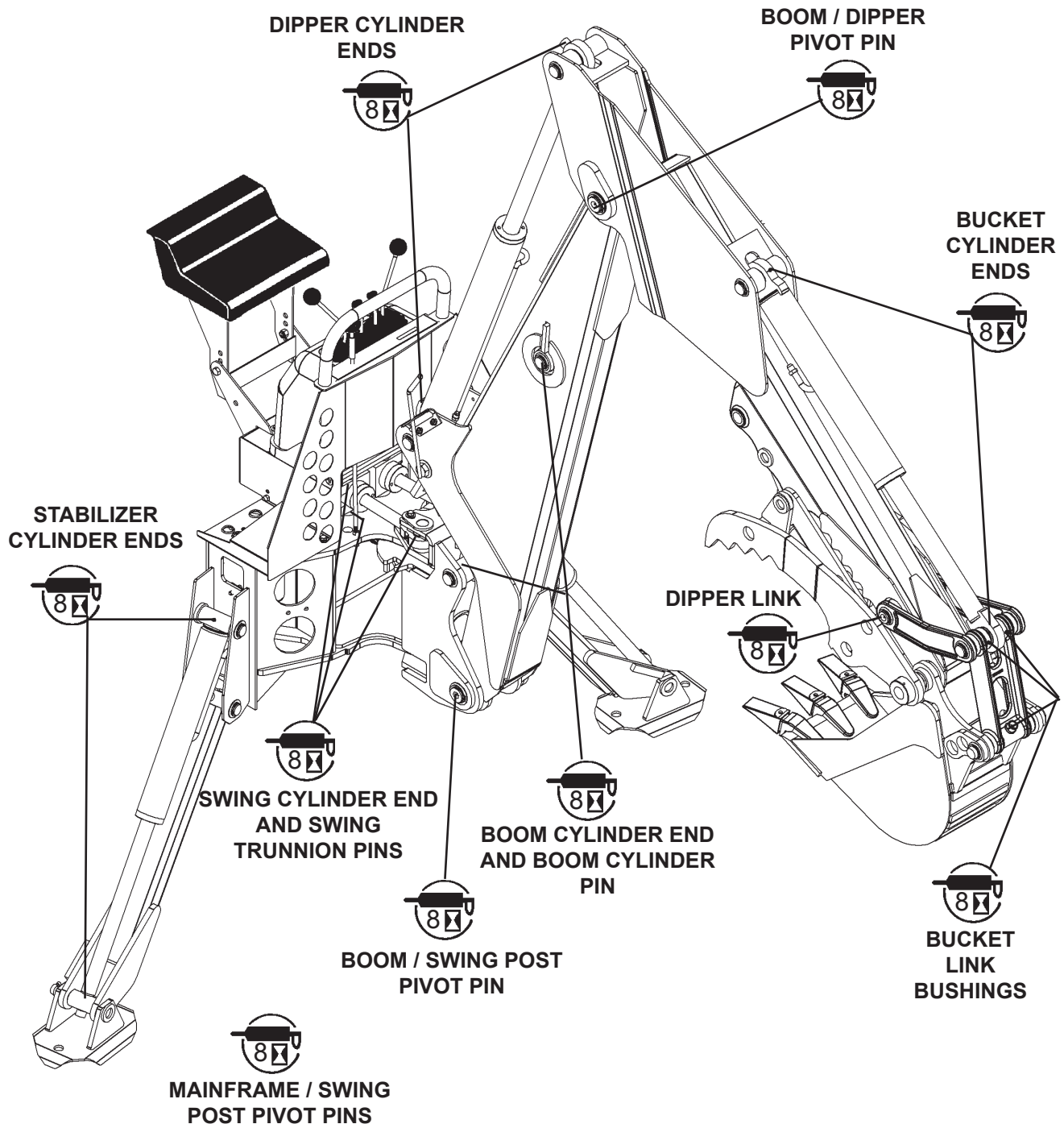
CAUTION! Shut off vehicle engine before lubricating equipment.



LUBRICATION

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 used on this page. Always replace any missing grease fittings as soon as possible.



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.

Procedure	Daily	Every 40 Hours	2500 Hours or 12 Months
Lubricate all grease fittings with multi-purpose grease. See Lubrication diagram for locations.	✓		
Check all connections to 3-point hitch arms to ensure hitch pins are correctly installed and retaining pins are in place.	✓		
Hardware - Check for tightness (see Bolt Torque Specifications)	✓		
Hydraulic System - Check for leaks and tighten as necessary. Check for damage and replace as needed.	✓		
Decals - Check for missing or damaged safety decals and replace as necessary.	✓		
Check all pins, bushings cotter pins, nuts, etc for signs of wear or loose fit. Tighten as required and replace where necessary.	✓		
Inspect attachment for any worn parts or cracked welds. Repair as required.	✓		
Hydraulic Oil - Check prime mover hydraulic system for adequate oil levels.		✓	

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.

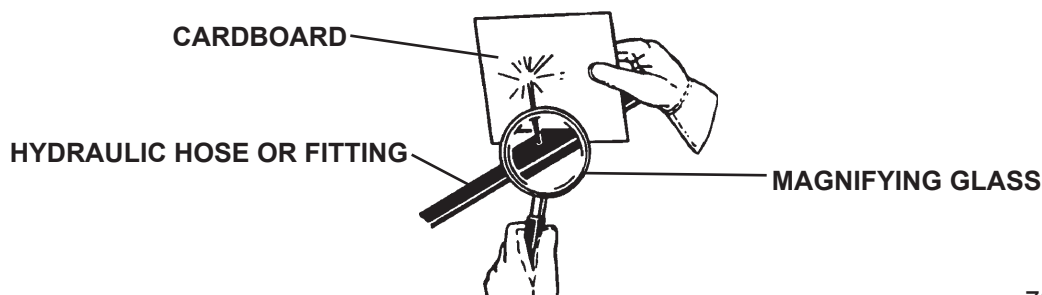


DO NOT use your hand to check for leaks. Use a piece of cardboard or paper to search for leaks.

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 will result.



MAINTENANCE AND SERVICE

CONTROL VALVE

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

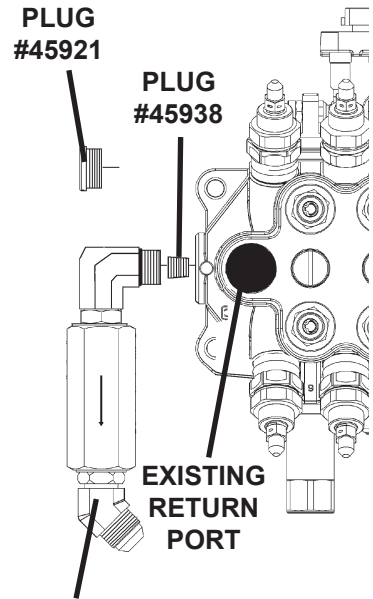
To convert your monoblock valve from open center to either closed center or power beyond, the optional plug #45938 must be purchased and installed in your valve.

Remove plug #45921 from the end of your valve and install plug #45938 inside port (approximately 1") followed by the fittings and hose from the existing return port. Install plug #45921 into the existing return port for closed center or use this port as your power beyond.

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

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

Observe a high standard of cleanliness when doing valve maintenance.

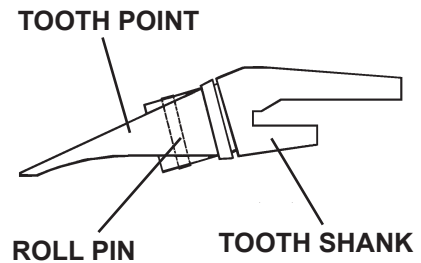


MOVE RETURN PORT FITTINGS AND HOSE TO END OF VALVE

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.

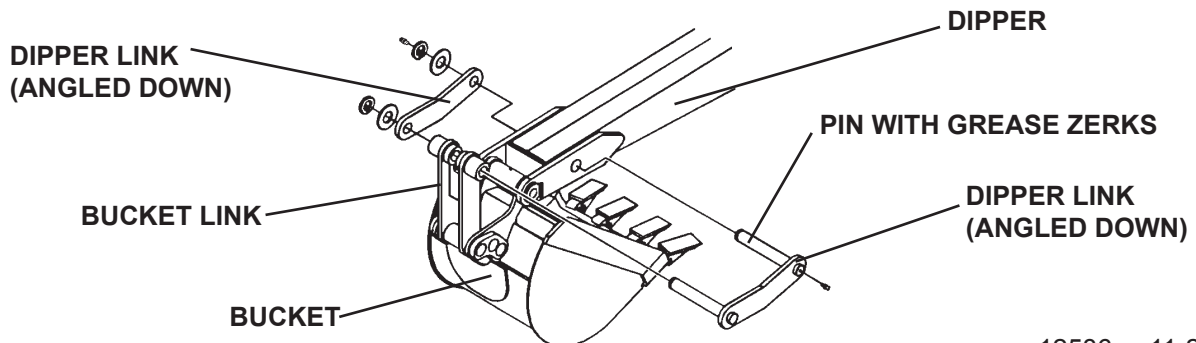
A tooth point can be removed from the welded tooth shank by removing the roll pin and sliding the tooth point off of the shank. Install the new point and secure in place with the roll pin.



CHANGING BUCKETS

The bucket is connected to the dipper and bucket link with two snap ring style pins. To change buckets, remove the snap rings 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 snap rings. Lubricate all bucket and bucket link grease fittings before operating.

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

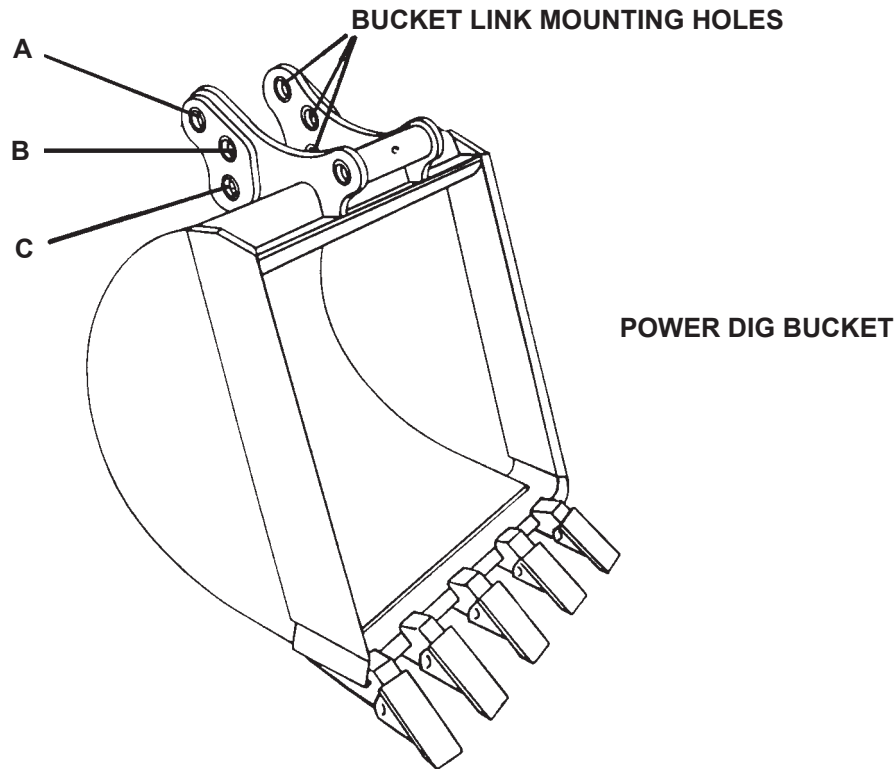


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MAINTENANCE AND SERVICE

DIGGING POSITIONS

Power dig buckets may be installed in any one of three different digging positions. By using the different pairs of bucket link mounting holes, digging characteristics of the backhoe can be changed to suit the working conditions.



"A" Position A is the power digging position for maximum digging force in hard ground. This position will give you a 20 percent increase in digging power over the standard position.

"B" Position B is the truck loading position. It gives greater ease of spoil removal with a higher dump height than the standard or power dig position.

"C" Position C is the standard digging position. When the bucket is mounted in this position, it will have 180° of rotation.

Digging positions are easily changed by removing the bucket link pivot pin from the bucket. Realign the hole in the bucket link with the correct holes in the bucket for the desired results. Install the pivot pin and secure it with the original washers and cotter pins and you're ready to go.

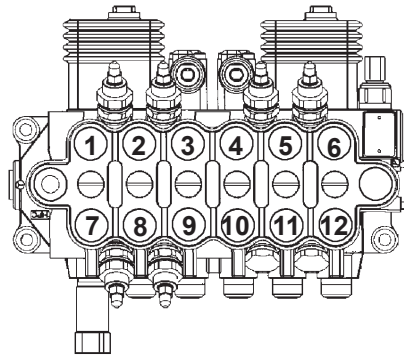
A special bell hole link is required to achieve a true bell hole position. This part is available from your dealer.

MAINTENANCE AND SERVICE

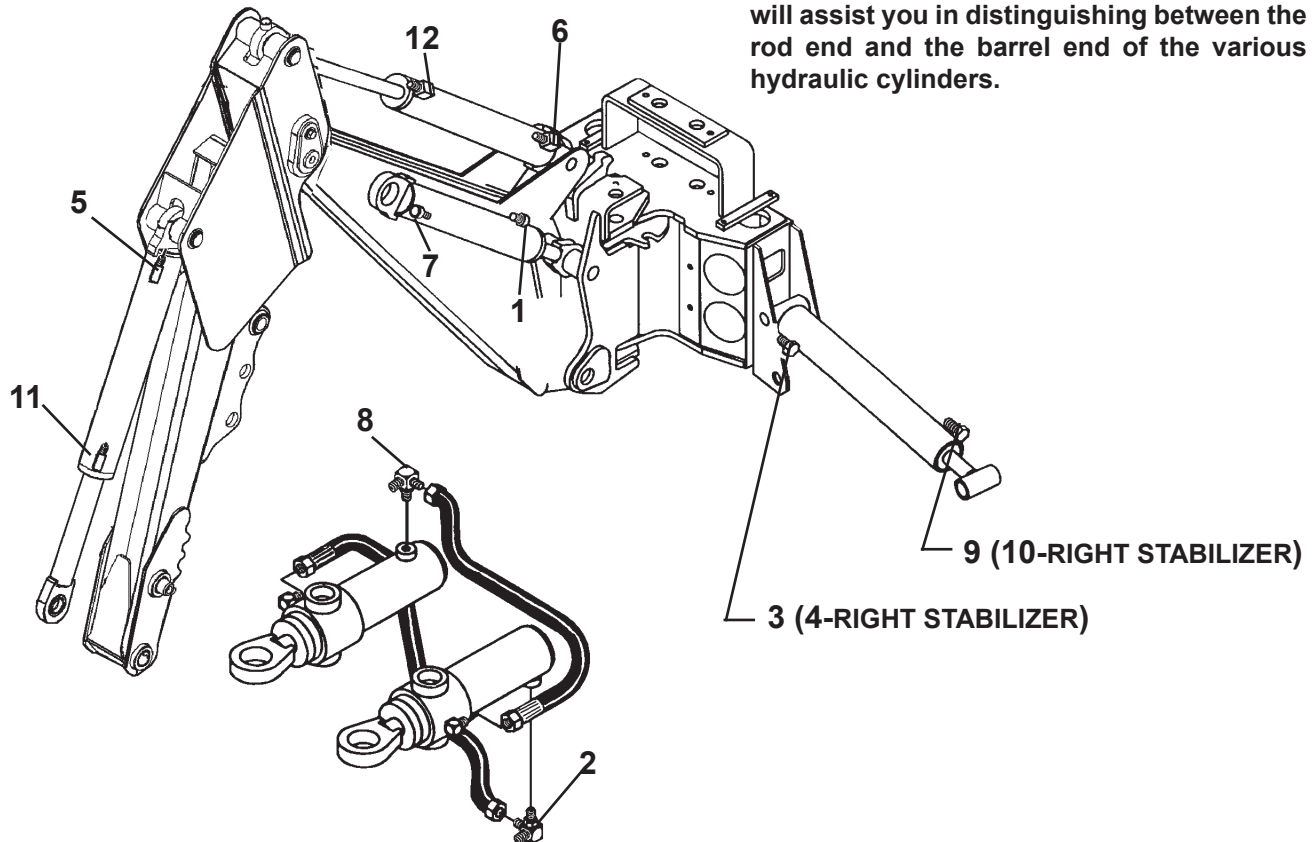
GENERAL INFORMATION

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).

CONTROL VALVE



BACKHOE CYLINDERS



MAINTENANCE AND SERVICE

CYLINDER SEAL REPLACEMENT

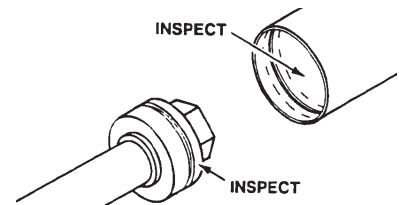
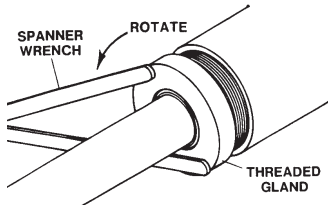
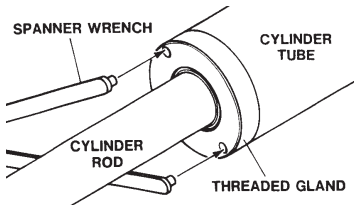
The following information is provided to assist you in the event you should need to repair or rebuild a hydraulic cylinder. When working on hydraulic cylinders, make sure that the work area and tools are clean and free of dirt to prevent contamination of the hydraulic system and damage to the hydraulic 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

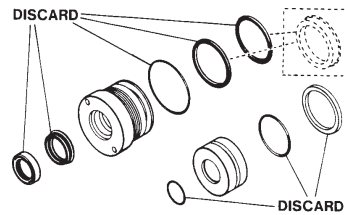
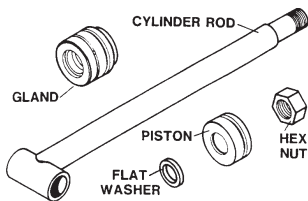
IMPORTANT: Do not contact the active surface of the cylinder rod with the vise. Damage to the rod could result.

THREADED TYPE GLAND

1. Rotate the gland with a spanner wrench counterclockwise until the gland is free of the cylinder tube.
2. Pull the cylinder rod from the cylinder tube and inspect the piston and the bore of the cylinder tube for deep scratches or galling. If damaged, the piston AND the cylinder tube must be replaced.



3. 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.
4. Remove and discard all the old seals.

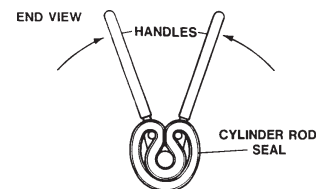
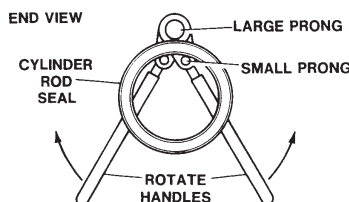
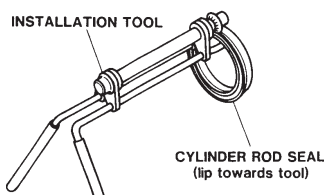


ASSEMBLY PROCEDURE

IMPORTANT: Replace all seals even if they do not appear to be damaged. Failure to replace all seals may result in premature cylinder failure. **NOTE:** Seal kits will service most cylinders of similar bore size and rod diameter.

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.

NOTE: A special installation tool (Part #65349) 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.



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

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MAINTENANCE AND SERVICE

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.

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.

3. After installing the rod seal inside the gland, as shown in step #1, 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.

4. 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.
5. 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).

Thread Diameter	POUNDS - FEET
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.	

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

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

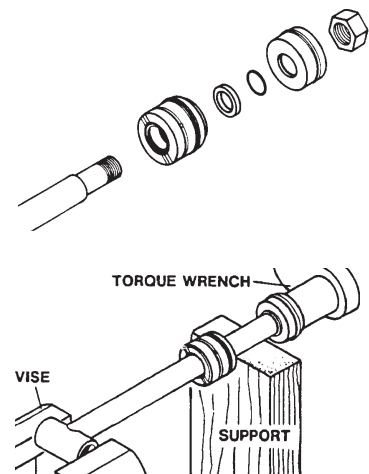
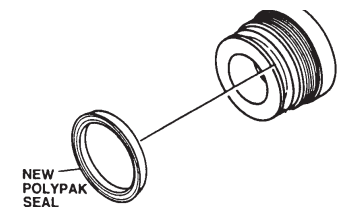
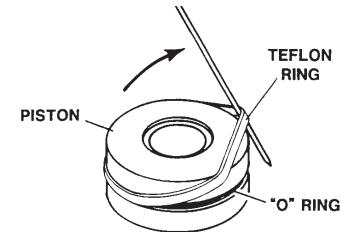
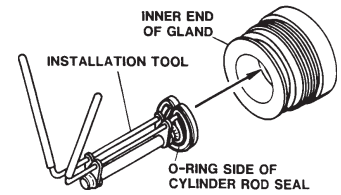
IMPORTANT: Ensure that the piston ring fits squarely into the cylinder tube and piston groove, otherwise the ring may be damaged and a leak will occur.

7. 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.

WARNING!



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



MAINTENANCE AND SERVICE

CYLINDER SEAL REPLACEMENT

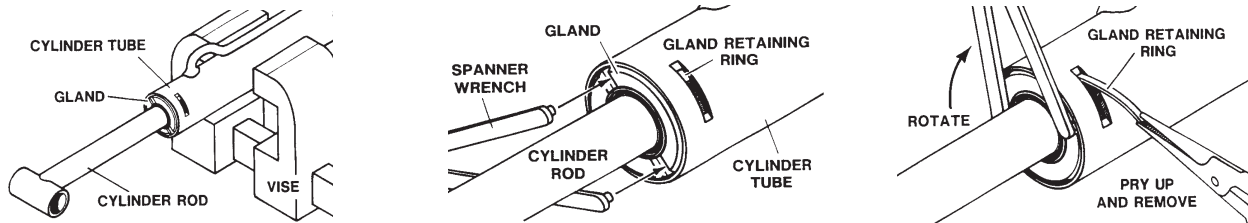
The following information is provided to assist you in the event you should need to repair or rebuild a hydraulic cylinder. When working on hydraulic cylinders, make sure that the work area and tools are clean and free of dirt to prevent contamination of the hydraulic system and damage to the hydraulic 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.

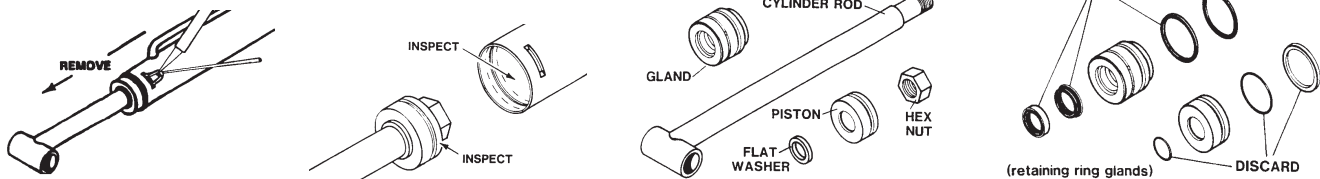
RETAINING RING TYPE GLAND

1. Mount the cylinder tube securely in a vise. **NOTICE:** 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:** 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.

3. Pull the cylinder rod from the cylinder tube.

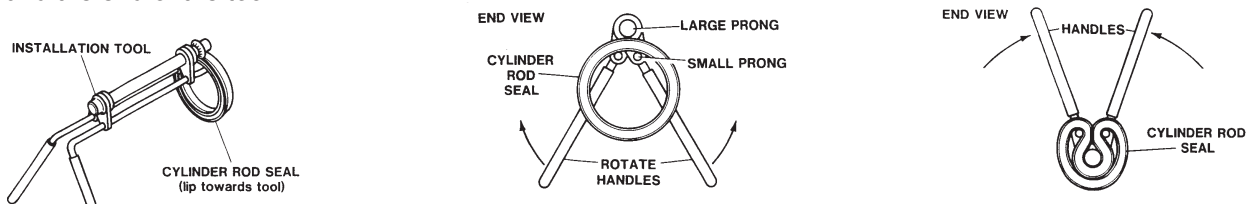


4. Inspect the piston and the bore of the cylinder tube for deep scratches or galling. If damaged, the piston and cylinder tube must be replaced.
5. Remove the hex nut, piston, flat washer or spacer tube (if so equipped), and gland from the cylinder rod. If the cylinder rod is rusty, scratched, or bent, it must be replaced.
6. Remove and discard all old seals.

ASSEMBLY PROCEDURE

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.



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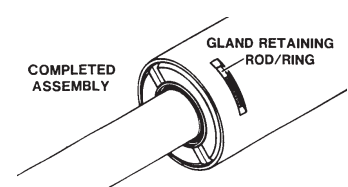
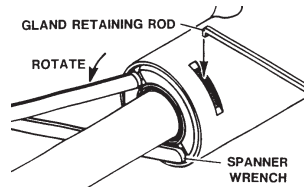
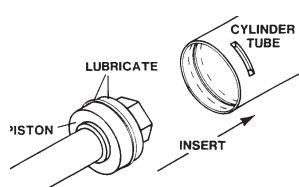
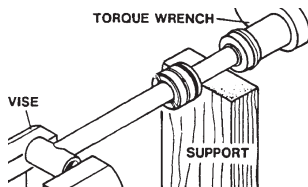
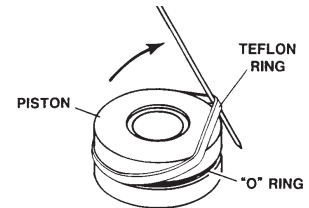
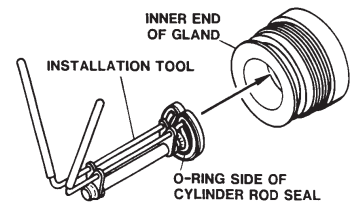
MAINTENANCE AND SERVICE

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 in diagram for reference only.

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

Thread Diameter	POUNDS - FEET
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.	



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

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. Apply a lubricant (such as Lubriplate #105) to the piston and teflon ring. Insert the cylinder rod assembly into the cylinder tube.
6. 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.

WARNING!



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

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Backhoe fails to lift or swing	Low oil supply	Add oil
	Improper hose hookup	Check hydraulic diagram; reinstall properly
	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
	Swing speed control completely closed	Open swing speed control valve
Backhoe lifting or swinging too slowly	Cold oil	Warm oil with engine at idle speed
	Engine speed too slow	Open throttle
	Oil leaking past control valve	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	POSSIBLE SOLUTION
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	Repair worn section
	Faulty relief valve	Clean or replace
<hr/>		
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

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
External leakage	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	Inspect and replace spool, or entire valve
	Control linkage misaligned	Correct misalignment
	Return spring binding broken	Replace spring
	Foreign matter in spool bore	Clean valve

SPECIFICATIONS

3511B 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.....	70 - 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:

PALADIN 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 PALADIN 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.

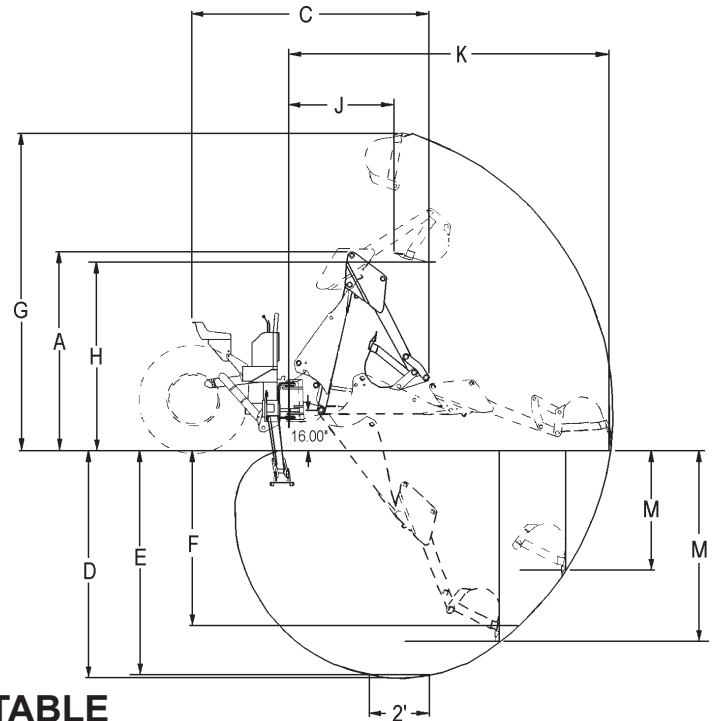
PALADIN also manufactures solid 4-point mounting kits for many models of tractors. These kits do NOT mount to the 3-point hitch. If in doubt about your hitch compatibility, solid 4-point mounting type kit and backhoe should be used.

SPECIFICATIONS

3511B BACKHOES

BACKHOE DIMENSIONS

SPECIFICATIONS AND DESIGN ARE SUBJECT TO CHANGE WITHOUT NOTICE AND WITHOUT LIABILITY THEREFORE. WHENEVER APPLICABLE SPECIFICATIONS ARE IN ACCORDANCE WITH SAE STANDARDS.



BACKHOE SPECIFICATIONS TABLE

DESCRIPTION	3511
TRANSPORT	
A. Transport Height (with boom fully retracted)	8'10"
Transport Width (with stabilizers up)	5'0"
B. Ground Clearance	11"
C. Overall Length	7'9"
Boom Pivot Height	16"
Operating Weight w/12" Bucket	1594#
OPERATIONAL	
D. Digging Depth Maximum	11'1"
E. Digging Depth (2 Ft.) Flat Bottom	11'0"
F. Digging Depth (8 Ft.) Flat Bottom	9'11"
G. Overall Operating Height - Fully Raised.....	14'5"
H. Loading Height	8'0"
J. Loading Reach.....	5'0"
K. Reach From Swing Post	14'5"
M. Straight Wall Digging Depth.....	8'2"
Stabilizer Spread Operating Position	7'11"
Stabilizer Down Below Grade.....	16"
System Relief Valve Setting.....	2100PSI
Digging Force - Bucket Cylinder.....	4768#
Digging Force - Dipper Cylinder	2567#
Bucket Rotation	180°
Swing Arc	180°
*All Specifications with Boom Pivot 16" Above Ground.	

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SPECIFICATIONS

3511B BACKHOES

CYLINDER SPECIFICATION TABLE

CYLINDER		3511B	
BUCKET CYLINDER			
Cylinder #	.....	87718	
Bore	.....	3.00"	
Stroke	.....	18.38"	
Rod Diameter	.....	2.00"	
DIPPER CYLINDER			
Cylinder #	.....	87737	
Bore	.....	3.00"	
Stroke	.....	27.00"	
Rod Diameter	.....	1.75"	
BOOM CYLINDER			
Cylinder #	.....	87736	
Bore	.....	3.00"	
Stroke	.....	24.83"	
Rod Diameter	.....	1.50"	
SWING CYLINDER			
Cylinder #	.....	81827	
Bore	.....	2.50"	
Stroke	.....	7.65"	
Rod Diameter	.....	1.25"	
STABILIZER CYLINDER			
Cylinder #	.....	86605	
Bore	.....	2.50"	
Stroke	.....	16.43"	
Rod Diameter	.....	1.50"	
BUCKETS AND CAPACITIES			
Bucket	Rated	Weight	Number
Size	Cap. Ft. ³	Lbs.	Of Teeth
12"	1.25	125	3
16"	1.72	148	4
18"	1.95	156	4
20"	2.81	165	4
24"	2.65	180	4
34"	3.82	238	7
36"	4.05	246	7
38"	4.28	255	7

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BOLT TORQUE SPECIFICATIONS

GENERAL TORQUE SPECIFICATION TABLES


Use the following charts when determining bolt torque specifications when special torques are not given. Always use grade 5 or better when replacing bolts.

SAE BOLT TORQUE SPECIFICATIONS




NOTE: The following torque values are for use with extreme pressure lubricants, plating or hard washer applications. Increase torque 15% when using hardware that is unplated and either dry or lubricated with engine oil.

Bolt Size		SAE GRADE 5 TORQUE				SAE GRADE 8 TORQUE				Bolt head identification marks as per grade. NOTE: Manufacturing Marks Will Vary
		Pounds Feet		Newton-Meters		Pounds Feet		Newton-Meters		
Inches	Millimeters	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	
1/4	6.35	8	9	11	12	10	13	14	18	
5/16	7.94	14	17	19	23	20	25	27	34	
3/8	9.53	30	36	41	49	38	46	52	62	
7/16	11.11	46	54	62	73	60	71	81	96	
1/2	12.70	68	82	92	111	94	112	127	152	
9/16	14.29	94	112	127	152	136	163	184	221	
5/8	15.88	128	153	174	207	187	224	254	304	
3/4	19.05	230	275	312	373	323	395	438	536	
7/8	22.23	340	408	461	553	510	612	691	830	
1	25.40	493	592	668	803	765	918	1037	1245	
1-1/8	25.58	680	748	922	1014	1088	1224	1475	1660	
1-1/4	31.75	952	1054	1291	1429	1547	1700	2097	2305	
1-3/8	34.93	1241	1428	1683	1936	2023	2312	2743	3135	
1-1/2	38.10	1649	1870	2236	2535	2686	3026	3642	4103	




GRADE 2



GRADE 5






GRADE 8



METRIC BOLT TORQUE SPECIFICATIONS

NOTE: The following torque values are for use with metric hardware that is unplated and either dry or lubricated with engine oil. Reduce torque 15% when using hardware that has extreme pressure lubricants, plating or hard washer applications.

Bolt head identification marks as per grade.		
		

Size of Bolt	Grade No.	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		5.8-4	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

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.

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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