



OPERATOR'S AND PARTS MANUAL

330 TRENCHER CAT. I 3-POINT HITCH



PALADIN LIGHT CONSTRUCTION



SERIAL NUMBER: _____

MODEL NUMBER: _____

Manual Number: OM749
Part Number: 75649
Rev.

TABLE OF CONTENTS

PREFACE	3
SAFETY PRECAUTIONS	
SAFETY STATEMENTS.....	5
GENERAL SAFETY PRECAUTIONS.....	5-7
EQUIPMENT SAFETY PRECAUTIONS.....	8-9
DECALS	
DECAL PLACEMENT.....	10
DECALS.....	11-12
PREOPERATION	
HYDRAULICS.....	13
PREPARING THE TRACTOR.....	13
OPTIONS.....	13
NOMENCLATURE.....	14
INSTALLATION	
MOUNTING INSTRUCTIONS.....	15-17
WEIGHT AND BALANCE.....	17
POWER (PTO) SHAFT ADJUSTMENT.....	18
OPERATING INSTRUCTIONS	
CONTROLS.....	19-21
OPERATION.....	22-29
DIGGING CHAIN OPTIONS	31-43
MAINTENANCE AND SERVICE	
LUBRICATION.....	44
HYDRAULIC SYSTEM.....	45
DRIVE CHAIN ADJUSTMENT.....	45
DIGGING CHAIN REMOVAL.....	46
HEADSHAFT ASSEMBLY SERVICE.....	47-48
GEARBOX SERVICE.....	48
BOOM END IDLER REMOVAL.....	48
PTO DRIVE ASSEMBLY SERVICE.....	49
CYLINDER SEAL REPLACEMENT.....	50-51
REMOVAL AND STORAGE	52
TROUBLESHOOTING	53-55
SPECIFICATIONS	
BOLT TORQUE SPECIFICATIONS.....	56
330 TRENCHER SPECIFICATIONS.....	57
LIMITED WARRANTY	59
PARTS	
TRENCHER ASSEMBLY.....	60-63
30" BOOM AND CRUMBER ASSEMBLY.....	64-65
36" BOOM AND CRUMBER ASSEMBLY.....	66-67
HEADSHAFT ASSEMBLY.....	68-69
OPTIONAL VALVE ASSEMBLY.....	70-71
DRIVE SHAFT ASSEMBLY - SERVICE PARTS.....	72-73
CYLINDER ASSEMBLY.....	74-75

11163 8-8-08

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.

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

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

To facilitate parts ordering, record the model and serial number of your unit in the space provided on the cover of this manual. This information may be obtained from the identification plate located on the product.

The parts department needs this information to insure that you receive the correct parts for your specific model.

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.

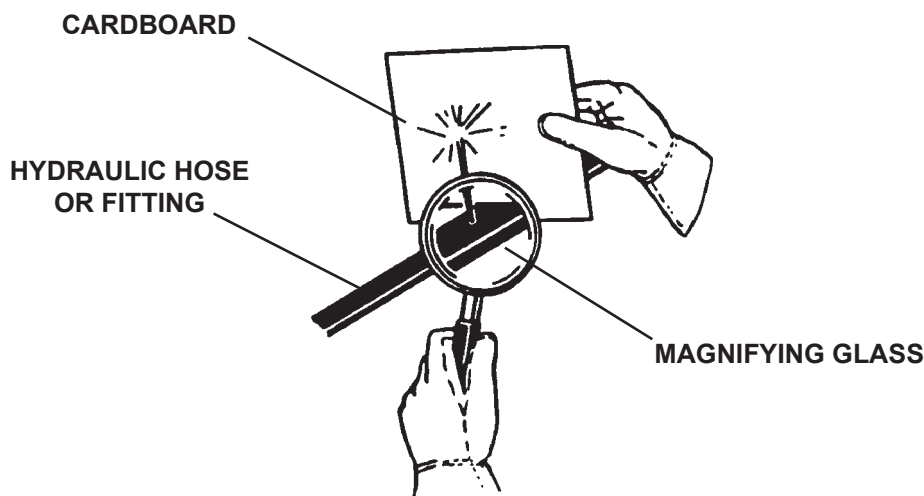
WARNING!



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.



OPERATING THE TRENCHER

- PTO Operated Attachment: Rotating driveline contact can cause death. Do not operate without all driveline, tractor and equipment shields in place. Drivelines securely attached at both ends. Driveline shields that turn freely on driveline
- Block off work area from bystanders, livestock, etc. Stop operation if bystanders or livestock enter the work area.
- Operate only from the operator's station.
- Never drop a boom with a rapidly moving digging chain on the ground. The force of the trencher may cause the vehicle to move suddenly and unexpectedly.
- Use caution when operating on slopes. The natural vibration will cause the unit to creep sideways downhill. Try to dig with trencher in a level position.
- Do not adjust relief valve settings. Incorrect valve settings could result in equipment damage and/or personal injury.
- 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 unit to the ground, turn off the prime mover's engine, remove the key and apply the brakes.
- Do not use the trencher crumber bar or chain as a step when climbing in or out of the prime mover.
- Be alert to changes in the work area. Watch out for bystanders, changes in weather and soil conditions.
- Do not make sharp turns while trenching. Trencher could become wedged in the trench and damaged.
- Keep equipment and bystanders away from the trencher after it has been dug. The weight could cause a cave in.
- If chain becomes jammed, never attempt to free it while the unit is running. Stop the unit, shut off the engine and review the situation.

11103 5-16-08

EQUIPMENT SAFETY PRECAUTIONS



TRANSPORTING THE TRENCHER

- 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.
- When transporting keep the trencher as low as the terrain will allow.



MAINTAINING THE TRENCHER

- 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 BRADCO.
- Never make hydraulic repairs while the system is under pressure. Serious personal injury or death could result.
- Never work under a raised attachment.
- Replace all safety shields and guards when done performing maintenance. Do not operate trencher with protective equipment removed.

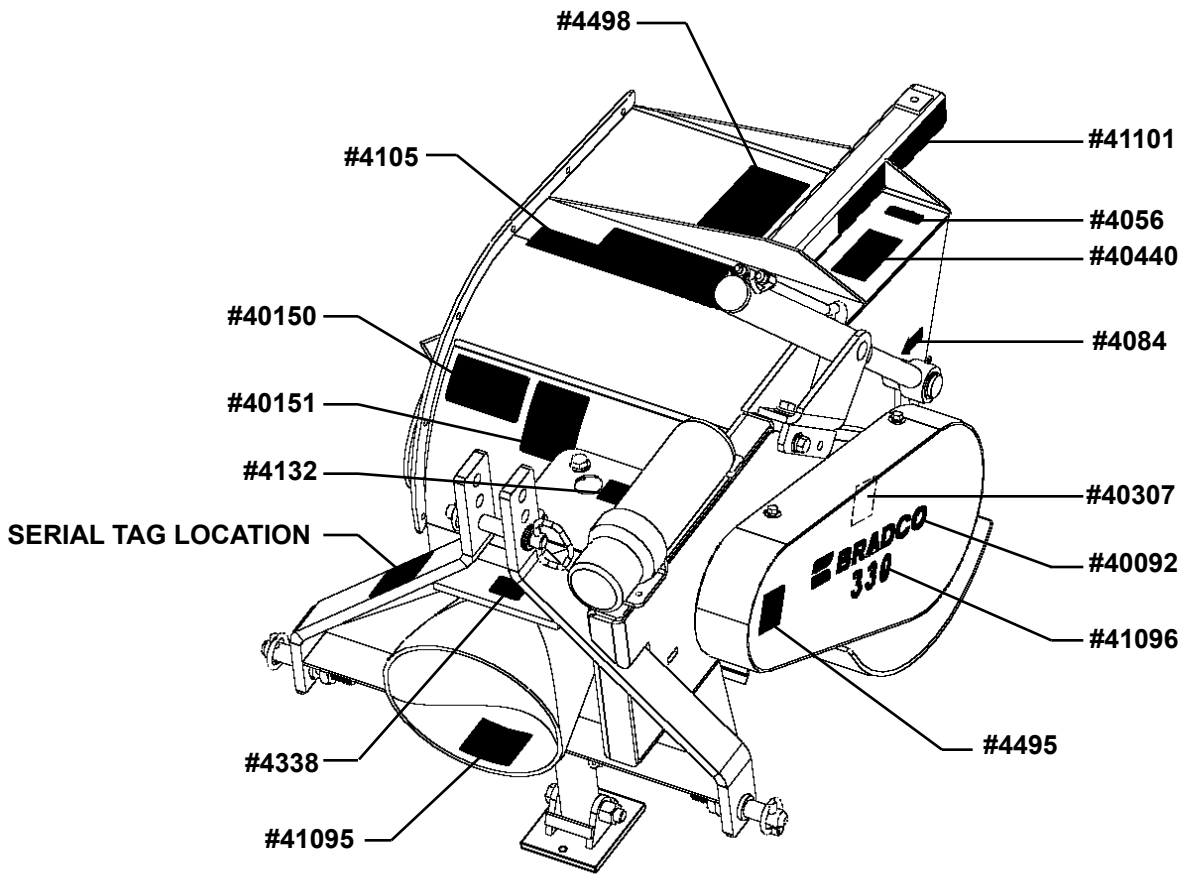
DECAL PLACEMENT

GENERAL INFORMATION

The following diagrams show the location of all the decals used on your attachment. The decals are identified by their part numbers, with the reductions of the actual deals shown on the following pages. Use this information to order replacements for lost or damaged decals. Be sure to read all decals before operating the attachment. They contain information you need to know for both safety and attachment 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.



DECALS



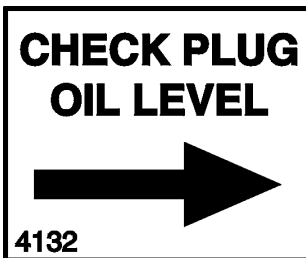
PART #4495
WARNING! GUARDS REMOVED



PART #4286
DANGER! ROTATING DRIVELINE
(LOCATED ON PTO)



PART #4285
DANGER! SHIELD MISSING
(LOCATED ON INSIDE PTO SHAFT)



PART #4132
CHECK OIL LEVEL



PART #41095
PTO SHAFT INSTALLATION

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

DANGER STAND CLEAR

PART #4105
DANGER STAND CLEAR

STAND CLEAR

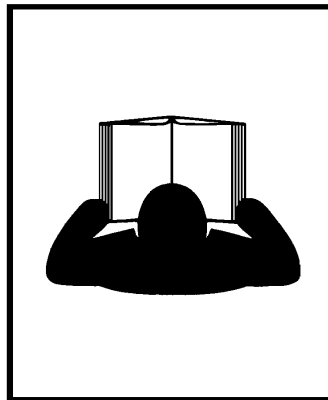
PART #41101
STAND CLEAR

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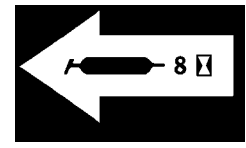
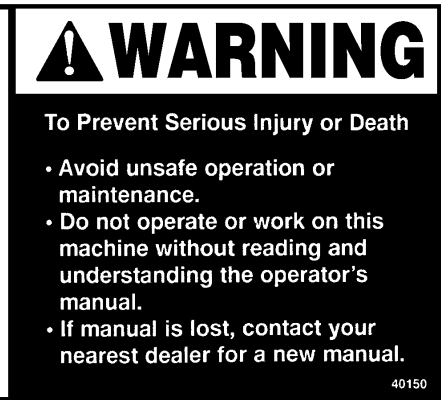
DECALS



PART #40151
WARNING! HIGH PRESSURE FLUID



PART #40150
WARNING! READ MANUAL



PART #4084
GREASE 8 HOURS



PART #4498
DANGER!



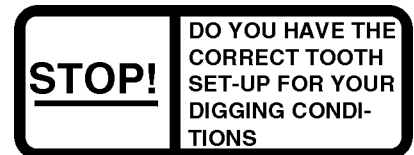
PART #4338
MADE IN USA



PART #40440
CALL BEFORE
YOU DIG



PART #40307
DANGER! GUARD MISSING



PART #4056
TOOTH SET-UP WARNING

PREOPERATION

330 TRENCHER

GENERAL INFORMATION

The 330 Trencher mounts directly to the 3-point hitch system on your tractor the same as any other 3-point hitch attachment.

HYDRAULICS

The 330 trenchers are shipped with two 48" long hoses (with 6FJX ends) for connecting to your tractor's rear remote hydraulic system. Contact your local dealer to purchase adapters and couplers to match up to your tractor's hydraulic system.

PREPARING THE TRACTOR

The 330 trenchers can be mounted on 15-30 HP tractors equipped with Cat. I three point hitch systems and rear remote hydraulics. The rear remote hydraulics must have a minimum working pressure of 2250-2500 PSI. 540 RPM and rear PTO drive are also required.

NOTE: If rear remotes are NOT AVAILABLE for you tractor, an optional valve kit (#112573) can be purchased.

Compatibility between trencher and tractor must be determined before installing the trencher onto your tractor's three point hitch system. Contact your local dealer to determine if your tractor is compatible with the 330 trencher.

A front counterweight (either weights or a front end attachment such as a loader or dozer blade) may be necessary for proper transporting and operation of the tractor and trencher. A minimum of 20% of the gross vehicle weight must be on the tractor's front axle. (See "Weight and Balance" in Trencher Installation section of this manual.)

OPTIONS

You may wish to dig a trench of a depth or width other than what your unit was originally equipped to dig. The trencher can be fitted with optional booms, digging chains, sprockets and crumpler assemblies to allow you to dig a variety of different sized trenches. The following chart will give you an idea of the different trench depths and widths a properly equipped unit is capable of digging. For more detailed information on trencher options see Digging Chain Options section of this manual.

TRENCH DEPTHS*	TRENCH WIDTHS			
30"	3.00"	4.50"	6"	8"
36"	3.00"	4.50"	6"	8"

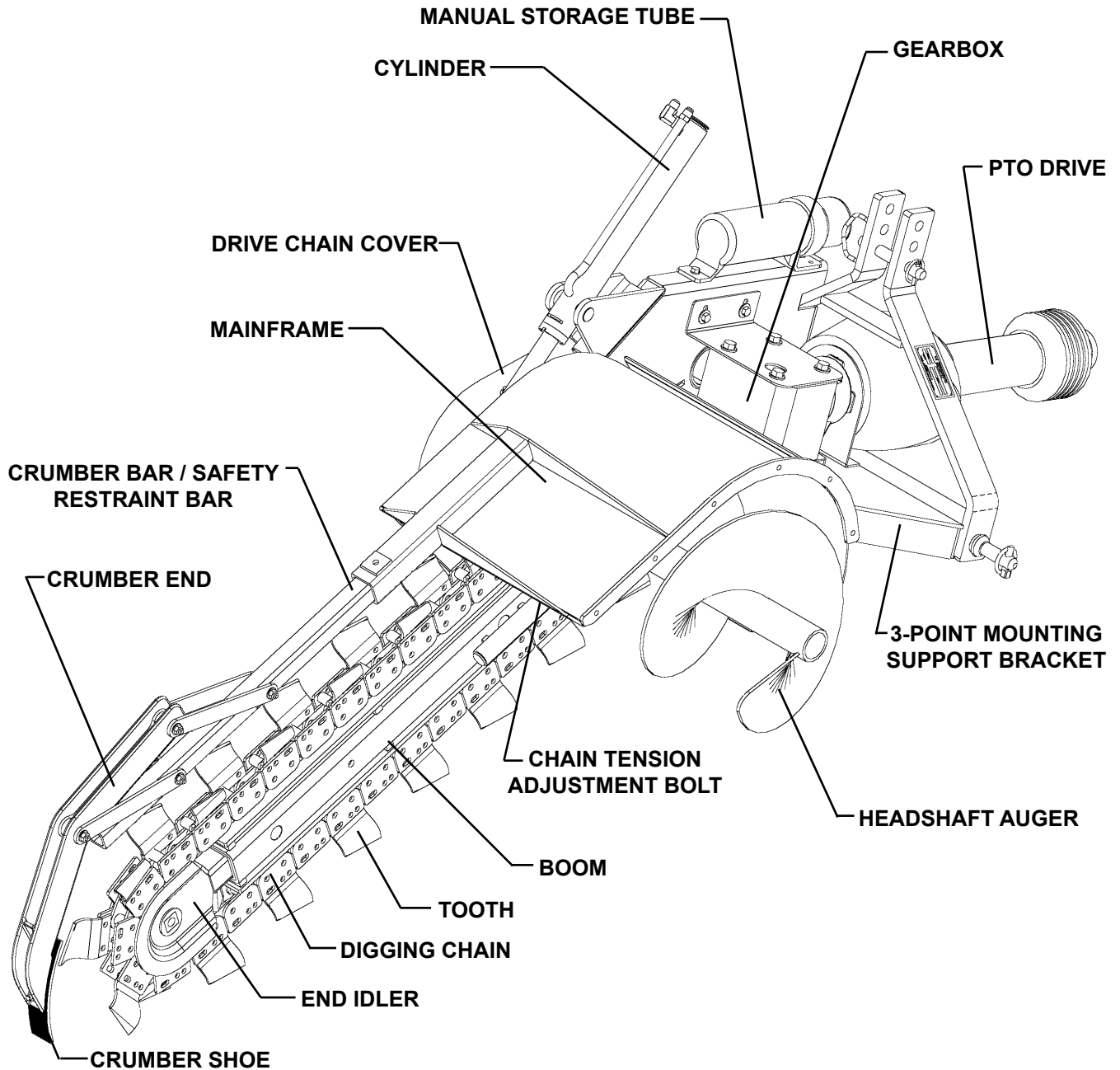
*Trencher depths are given with the digging boom at an optimum 65° digging angle and the skid shoe touching the ground. Trenches of various depths can be made by varying the digging angle and raising the trencher up higher. These methods are less efficient however.

PREOPERATION

330 TRENCHER

NOMENCLATURE

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



INSTALLATION

GENERAL INFORMATION

The following instructions will help you to mount the trencher onto your tractor. The trencher uses the 3-point hitch system for ease of installation, therefore if you have ever installed 3-point hitch equipment before, installing the trencher should prove no problem.

Your tractor must be equipped with rear remote auxiliary hydraulics for trencher operation. Prior to installing the trencher you must install the appropriate hydraulic couplers onto the trencher hoses for your application. Remember to read all safety warnings, decals, and operating instructions before operating the tractor or trencher.

IMPORTANT: A front counterweight may be necessary for proper transportation and operation of the tractor and trencher. A minimum of 20% of the gross vehicle weight must be on the tractor's front axle. (Refer to the information on Weight and Balance at the end of this section.)

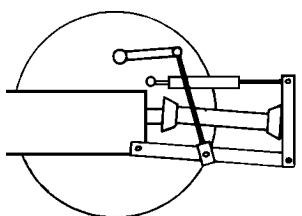
MOUNTING INSTRUCTIONS

1. If you have not done so already, remove the steel shipping banding from around the trencher and skid.
2. Install the PTO drive assembly to the trencher by sliding the clutch end of the PTO drive assembly onto the shaft.
3. Following the proper start up and backing procedures as noted in your tractor operator's manual, back the tractor up to the rear of the trencher and skid.
4. Adjust the tractor's 3-point hitch system to accept the trencher. Continue backing the tractor up to the trencher and then attach the trencher by positioning the lower links onto the trencher's hitch pins. Secure with klik pins #57496.

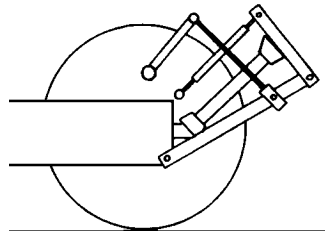
NOTE: Since the trencher is fairly heavy, we recommend you position the lift links of the lower links in the position offering the greatest lift capabilities. If there is more than one hole in the lower link, position the lift link in the rear most hole.

5. Position the top link of the tractor in place between the ears of the 3-point mounting bracket. Use the mounting hole in the linkage that will allow **ALL THREE 3-POINT LINKS TO RUN PARALLEL**. Secure the top link using the hitch pin #82963 and klik pin #21169 provided. Adjust the top link so the **3-POINT MOUNTING BRACKET REMAINS VERTICAL**, (perpendicular to the ground). See Figure #1

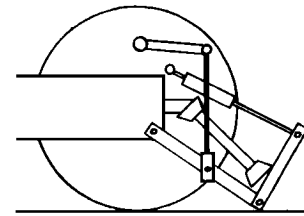
FIGURE #1



Okay for digging.



Okay for transport. Too much bend for PTO operation.



Too low. Too much bend for PTO operation.

11110 8-8-08

INSTALLATION

6. Adjust the lower link anti-sway chains and center the trencher.
7. Complete the hydraulic plumbing by connecting the hydraulic couplers together.

NOTE: The auxiliary hydraulics on your tractor operates the trencher cylinder and is used to lower the trencher into the ground or raise it up for transport.

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



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

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

NOTE: When connecting trencher to tractor, route the hydraulic hoses as far away as possible from the operator. Also use care to route away from sharp corners and from dragging on the ground. (When disconnecting trencher from tractor either plug, cap or connect hose ends to keep system free from contaminants.)

8. With the hydraulics hooked up, raise the trencher and remove the skid.

NOTE: The trencher is shipped with the stand in the lowest position to help support the trencher during shipping and to assist in installation onto the tractor. Once the trencher has been installed onto your tractor, lock the stand up (in the highest position) to prevent interference during operation.

9. Lower the trencher to the ground. Disconnect the top link from the tractor and tilt the trencher away from the tractor. (It may also be necessary to raise the trencher into the extreme UP position to gain sufficient clearance to connect PTO drive assembly to tractor.)
10. Turn the tractor engine off and set the parking brake.

NOTE: To protect PTO shaft and operator, the up travel must be limited to keep at least 3" of the two halves of the PTO shaft together. To assist the operator in maintaining this limitation measure in 3" from the telescopic tube on the trencher half of the PTO shield and make a permanent mark around the diameter. (Refer to PTO shaft adjustment.)

11. Connect the PTO drive assembly to the tractor.

INSTALLATION

12. Adjust 3-point lever upper stop to limit the travel to a point where trencher will clear the ground sufficient for transport and still keep at least 3" of shaft telescoped together.
13. Start the tractor and raise the trencher boom UP. Operate the 3-point hitch lifts to determine if its capacity is sufficient and all points work properly. Observe hydraulic hoses for correct routing as 3-point moves up and down. Adjust tractor (see tractor operator's manual) to limit rate of drop of 3-point to a safe speed.

Trencher installation is now complete. Read all safety warnings, decals, and operating instructions before operating the trencher.

WEIGHT AND BALANCE

After you have completed the mounting procedures, a very important item to complete before releasing for use is weight distribution for steering control. Tractor front attachments such as a loader or blade may be sufficient, however, you must know. Industry recommended practice states that 20% of the gross vehicle weight should remain on the front axle during transport conditions.

To perform this check, weigh the entire machine with attachments, both front and rear in transport position. Record results. Next weigh each axle separately and record results.

<u>Example A:</u>	GVW	2650	lbs
	Front	600	lbs
	Rear	2050	lbs
	$2650 \times 20\% = 530$ lbs - recommended front axle weight		

You have 600 lbs which exceeds the 530 necessary to meet industry recommended practice.

<u>Example B:</u>	GVW	3275	lbs
	Front	595	lbs
	Rear	2860	lbs
	$3275 \times 20\% = 655$ lbs - recommended front axle weight		

You have 595 which is 60 lbs less than the recommended 655 lbs. You will need to add 75 lbs to the front axle to attain the industry recommended practice weight distribution.

This is calculated as follows: Old GVW = 3275 lbs New GVW add 75 lbs = 3350
 $3350 \times 20\% = 670$ lbs - recommended front axle weight

You may use weights or tire ballast to accomplish you goal.

INSTALLATION

POWER (PTO) SHAFT ADJUSTMENT

The trencher power (PTO) drive assembly may need to be shortened to fit up to your tractor correctly and to prevent the drive assembly from “bottoming out” and causing extensive damage to the tractor PTO drive assembly.

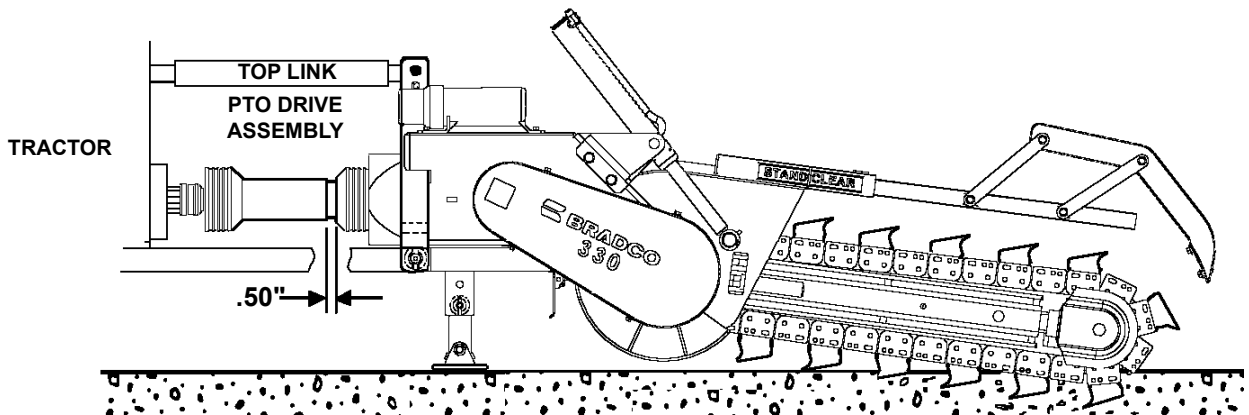


The shaft assembly is shortest when the shaft is straight in line with the trencher. There should be a minimum of .50" of free travel before the shaft is fully retracted. To check:

- Lower the trencher until the shaft is parallel to the ground and is straight in line with the trencher gearbox.
- Check to see if there is a minimum of .50" free travel.

If there is not at least .50" of free travel DO NOT OPERATE TRENCHER.

NOTICE: IF THE DRIVE SHAFT “BOTTOMS OUT” BEFORE IT IS STRAIGHT IN LINE WITH THE TRENCHER, STOP AND CALL YOUR NEAREST DEALER OR THE TRENCHER MANUFACTURER BEFORE TRENCHER OPERATION.



CAUTION



FAILURE TO HAVE THE REQUIRED DISTANCE OF CLEARANCE WILL DAMAGE THE POWER TAKE OFF (PTO) OF YOUR TRACTOR.

OPERATING INSTRUCTIONS

CONTROLS

GENERAL INFORMATION

Simplicity of operation is one of the key features of the 330 trencher. It is important to be familiar with, and know the controls and adjustments on both the trencher and the tractor. Such knowledge is crucial for safe, efficient operation of equipment. Take the time to learn how they operate now.

THE TRACTOR

Your trencher mount to the 3-point hitch system of the tractor. Due to this arrangement, thorough knowledge of the tractor and hitch controls is necessary for trencher operation. Read your tractor owner's manual for information regarding tractor operation before attempting to use the trencher.

RAISING / LOWERING THE TRENCHER

Raise / lower the trencher unit by raising / lowering the tractor 3-point hitch arms through their appropriate tractor controls.

WARNING! Become aware of any power lines, tree limbs, etc. that the raised trencher could come into contact with. Contact with electrical lines could cause electrocution and death.



TILTING THE TRENCHER

Tilt the trencher up or down by operating the rear auxiliary hydraulic controls located on the tractor to activate the trencher cylinder.

STARTING AND STOPPING THE TRENCHER

Power to the trencher is supplied by the tractor's PTO. Power is transferred from the PTO shaft, through the trencher's PTO drive shaft and gear box, and finally to the trencher's auger, drive sprocket, and digging chain. Start the digging chain by engaging the tractor PTO. Stop the digging chain by disengaging the tractor PTO.

TRENCHER SPEED CONTROL

Again it may be noted that power to the trencher is supplied by the tractor PTO. To increase trencher speed, increase the tractor PTO shaft speed. To decrease trencher speed, decrease PTO speed.

AUGER HEIGHT

The auger is fixed to the trencher mainframe and has no separate adjustment. To raise the auger, raise the trencher as previously described. This will raise the auger and thus leave the dirt or spoil closer to the trench.

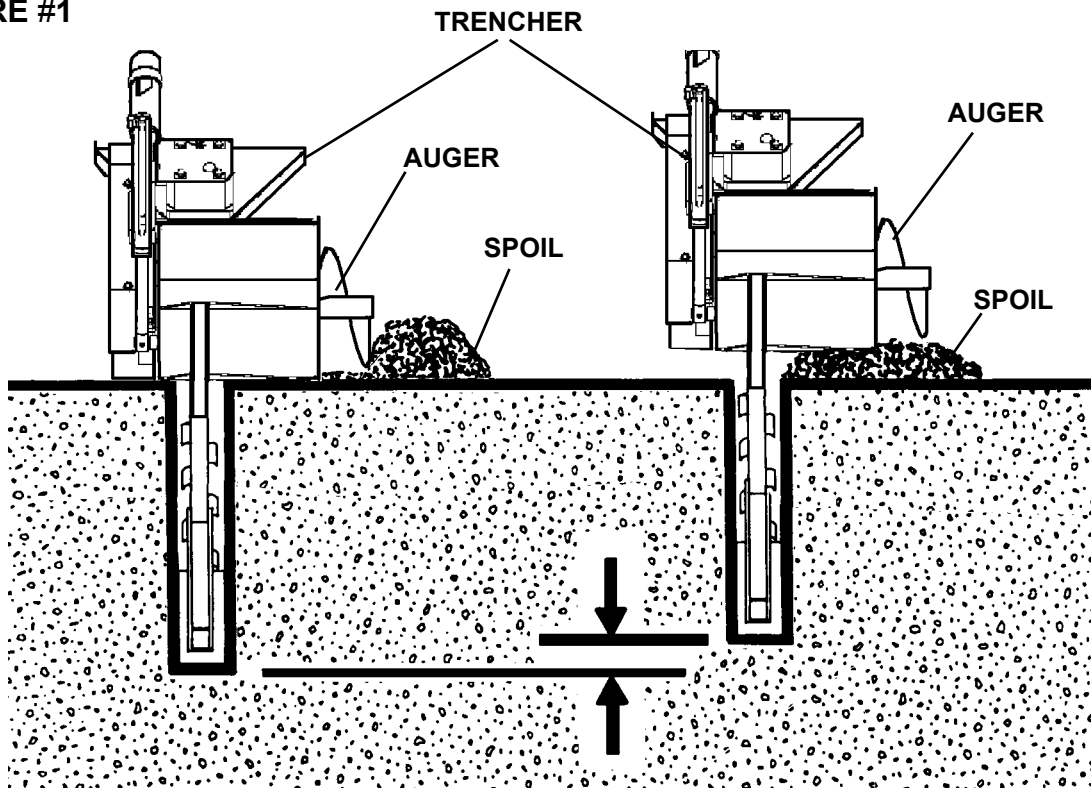
OPERATING INSTRUCTIONS

CONTROLS

Lowering the trencher will cause the auger to lower, moving the spoil away from the trench. The auger should NOT be lowered to the extent that the auger itself starts to dig in the ground. This will greatly reduce efficiency.

It should be noted that raising or lowering the trencher to change the auger height will also change the trencher depth. You will need to compensate for this by changing the tilt of the trencher down or up accordingly. See Figure #1

FIGURE #1



CRUMBER SHOE / BAR ADJUSTMENT

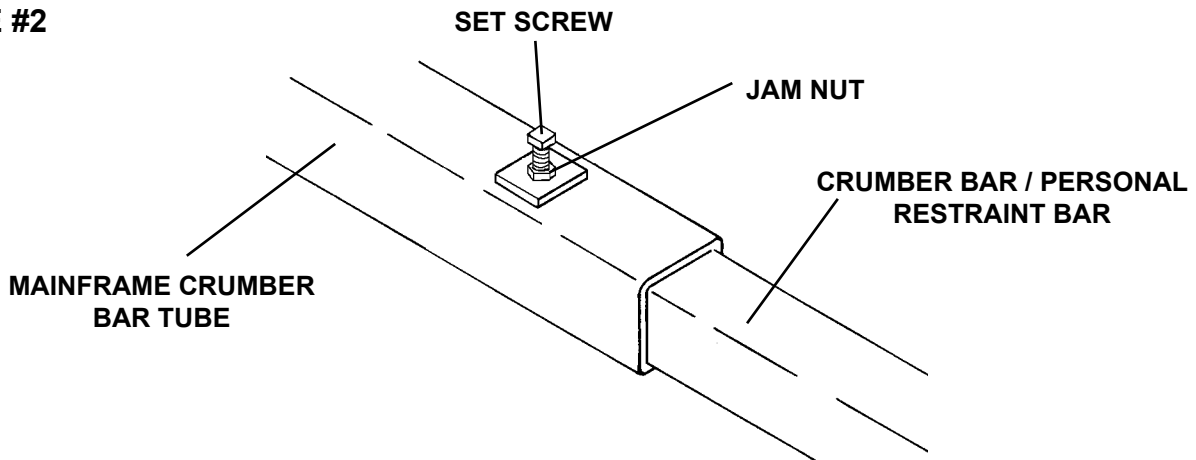
The purpose of the crumber shoe is to keep any loose dirt in the trencher close enough to the digging chain so that the digging teeth can grab it and remove it. This will give you a cleaner finished trench. Your trencher has an adjustable crumber bar / restraint bar that can be lengthened or shortened to bring the crumber shoe closer to or farther away from the digging chain.

To adjust the crumber bar length, loosen the jam nuts found at the end of the mainframe crumber bar tube. With the jam nut loose, loosen the set screw on the tube. Slide the bar in or out to achieve the desired spacing (we suggest a distance of about 4" between crumber shoe and digging teeth for best overall results). Tighten the set screw and jam nut when finished. See Figure #2

OPERATING INSTRUCTIONS

CONTROLS

FIGURE #2



CHAIN TENSION ADJUSTMENT

Chain tension is maintained by a large spring located inside the boom and adjusted by moving the boom in or out.

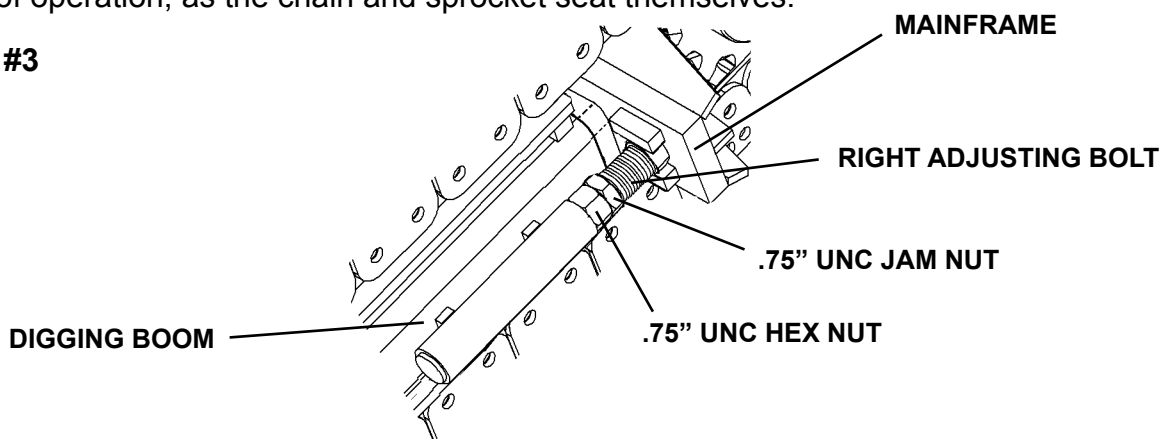
When trenching, the digging chain tension should be adjusted to that the chain is as loose as possible, without jumping off the sprocket or idler wheel.

The booms have adjusting bolts on the left and right side at the trencher end of the boom. The head of the bolts are kept from rotating by stops welded onto the mainframe. The adjusting bolts have a jam nut and a hex nut on them. To tighten the chain “back off” the jam nut from the regular nuts on the adjusting bolts. Now turn the standard hex nuts off the adjusting bolt. This will push the boom out, and thus tighten the chain. Retighten the jam nuts when finished. **NOTE: Both adjustment bolts should be adjusted at the same time and the same distance.**

To loosen the chain, follow the same procedure, except turn the hex nut onto the adjusting bolt. See Figure #3

It is common for your trencher to need its digging chain tightened after the first 10-20 minutes of operation, as the chain and sprocket seat themselves.

FIGURE #3



WARNING! NEVER WORK ON OR MAKE ADJUSTMENTS TO ANY PART OF THE TRENCHER WHILE THE UNIT IS RUNNING. YOU COULD GET CAUGHT IN THE DIGGING TEETH, WHICH COULD CAUSE SEVERE INJURY OR DEATH.



OPERATING INSTRUCTIONS

OPERATING TECHNIQUES 3-POINT HITCH TRENCHERS

GENERAL INFORMATION

The design of your trencher makes it relatively simple to use. With the help of the information in this section and a little practice you should become proficient in its operation in no time. Observe the following points to obtain the best results with the least amount of wear on the machine. Read the "Safety Precautions" Section of this manual before you begin.

CAUTION! Operate the trencher only when seated at the tractor controls.



Do Not operate the tractor without proper ROPS (Roll-Over-Protective-Structure), seat belt, and hard hat.

Pay attention to the job at hand. Be alert to the possibilities of others in the work area.

Never let anyone work around, or perform maintenance on the trencher while it is running.

BEFORE YOU START TRENCHING

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 trenching. 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.

WARNING! Check the prospective trenching area for hidden utility lines before operating the trencher. Contacting a utility line with the trencher could cause electrocution or possible explosion resulting in death. Call all utility companies and have them plot out all their lines first. If you damage a utility line, shut off the equipment at once and contact the affected utility immediately.



Once you have become familiar with the job site and understand the job requirements it is time to set up for the actual trenching. Check the soil type (hard, soft, rocky, etc.) and the trenching requirements (how deep, wide, etc.). Install the proper digging chain, boom, crum-ber boom and shoe for the job at hand.

OPERATING INSTRUCTIONS

OPERATING TECHNIQUES 3-POINT HITCH TRENCHERS

Mark off the area to be trenched out. This can be done with powdered line, chalk, or a guide string and stakes. Block off the area from others if possible.

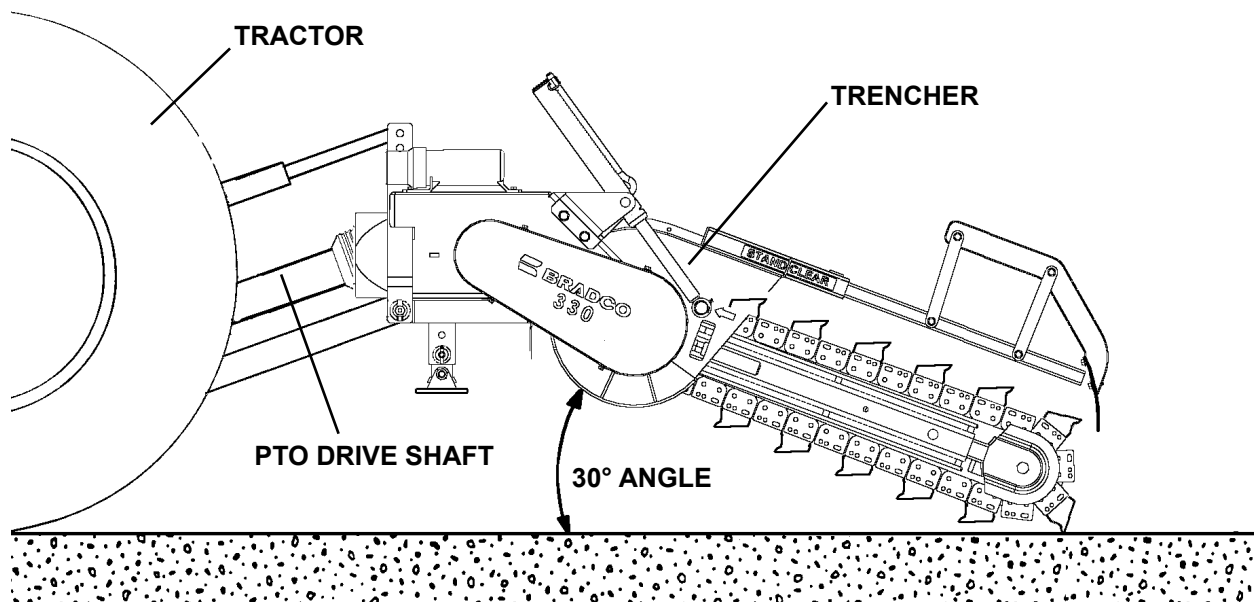
STARTING THE TRENCH

Position the tractor with the trencher boom directly over the center of the trench layout. (Be sure the trencher stand is in the UP position.) It will take about 4' of trenching before the trencher will be able to operate at the desired level, so plan for this and position the trencher about 4' behind where you want the actual trench to start. Apply the tractor foot brake. This will prevent the tractor from being pulled backward when the digging teeth contact the ground.

NOTE: The tractor is driven forward when trenching. You cannot trench driving the tractor in reverse.

Raise the trencher with the 3-point hitch arms and tilt the trencher down at a 30° angle. See Figure #6. Position the unit so that the digging teeth are just above ground level. The PTO drive shaft should be approximately level.

FIGURE #6



Set the tractor engine speed at half throttle. Engage the tractor PTO to 540 RPM to start the digging chain in motion.

CAUTION! When lowering a moving digging chain to the ground the force of the teeth grabbing the ground will try to pull the tractor suddenly backwards. **BE PREPARED.** Have the brake on the tractor set to help counteract the force.



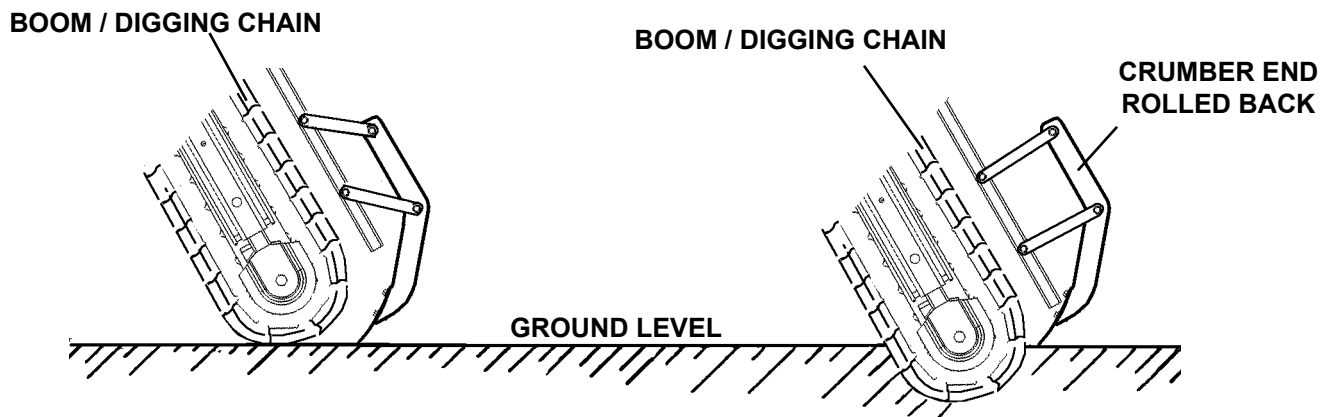
OPERATING INSTRUCTIONS

OPERATING TECHNIQUES 3-POINT HITCH TRENCHERS

Slowly lower the digging chain into the ground to start the trench. Do this by lowering the trencher with the 3-point hitch arms. To begin trenching, always lower the 3-point hitch first, followed by the trencher boom using your tractor's rear auxiliary hydraulic system. A combination of the 3-point hitch and trencher boom position will give the desired trench depth and spoil placement. Operate the PTO driveline at the correct boom approach angle. Greater angles may cause premature component failure. Continue lowering the unit until the crumber end rolls all the way back on the crumber bar. See Figure #7.

IMPORTANT: After the crumber end has rolled all the way back, do not lower the trencher any farther without engaging the tractor forward drive. Failure to do so could result in bending of the crumber bar, which is NOT covered by the warranty.

FIGURE #7



Once the crumber end has "bottomed out", engage the tractor's forward drive and begin slowly creeping the tractor forward while continuing to lower the trencher boom to the desired depth. When nearing the required depth, stop lowering and tilt the trencher to a 60° - 65° angle. A 60° - 65° angle works best for general trenching.

WARNING! Be alert to what is happening around you. Look ahead before moving the tractor to trench. Be aware of any person or thing in the path of the tractor. Observe any terrain changes such as drop-offs or soft ground.



When trenching, remember to keep in mind the spoil placement. Position the trencher so that the auger floats at ground level to move spoil away from the trench.

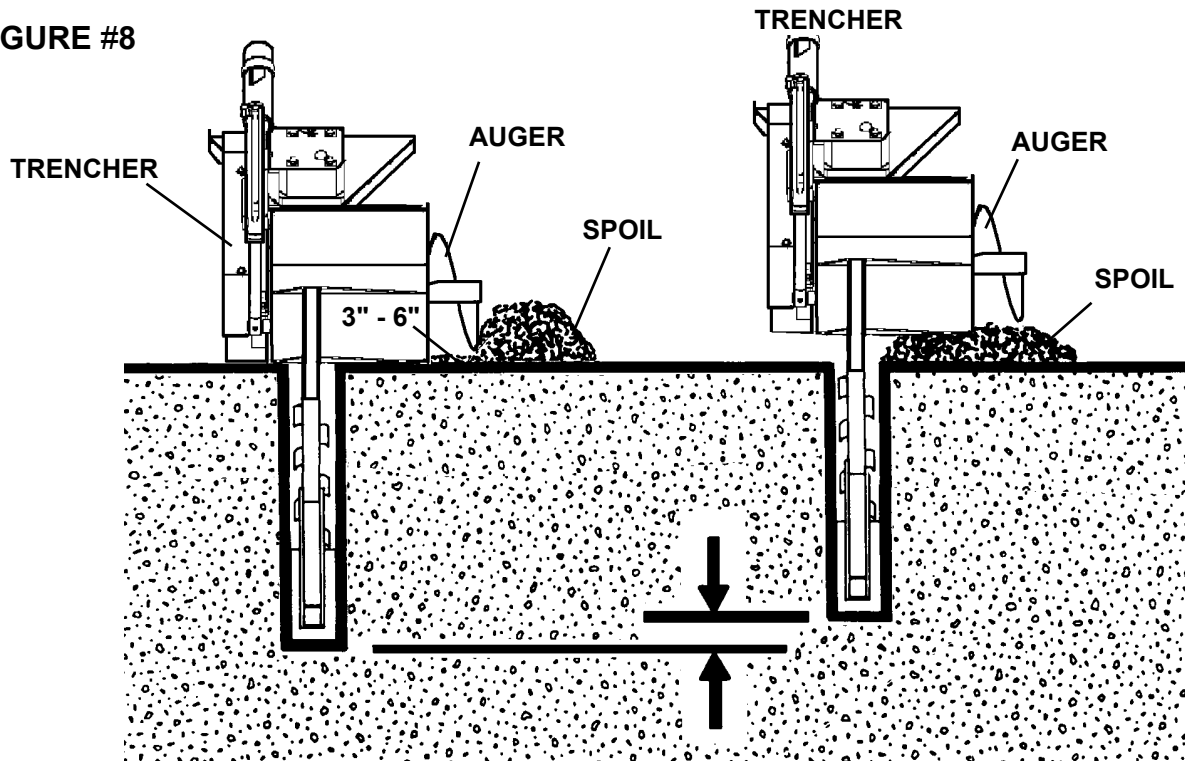
OPERATING INSTRUCTIONS

OPERATING TECHNIQUES

3-POINT HITCH TRENCHERS

Raise the trencher so that the auger rides above ground level to leave the spoil beside the trench. The higher the auger the closer to the trench the spoil will be placed. See Figure #8.

FIGURE #8



You may find that it generally takes less power to run the digging chain if the auger runs 3" - 6" (inches) off the ground, and thus increasing the potential footage of trench produced per hour. The higher you want the auger, the more vertical you will have to tilt the trencher to achieve the same trench depth.

With the desired trench depth reached, advance the tractor throttle to the desired engine RPM. Continue creeping the tractor forward.

STALLING THE TRENCHER

If the trencher stalls while digging, move the tractor backwards slightly to free the trencher.

TURNING WHILE TRENCHING

Gradual turns can be made while trenching. However the tightness of the turn is directly proportional to the angle and length of the boom. In other words, the greater the angle of the trencher boom to the ground level, the sharper the turn that can be trenched, See Figures #9 and #10.

11148 5-29-08

OPERATING INSTRUCTIONS

OPERATING TECHNIQUES 3-POINT HITCH TRENCHERS

Also the shorter the boom length the sharper the possible turn. Remember, the greater the increase in boom angle the higher the unit will have to be raised out of the trench to keep a unified trench depth. Shallow boom angles will severely limit turning ability.

IMPORTANT: Turning too tightly while trenching will cause the trencher to jam in the trench and stall. Turning too tightly can also cause the trencher boom to bend. Take it easy when turning. Proceed slowly with caution.

FIGURE #9

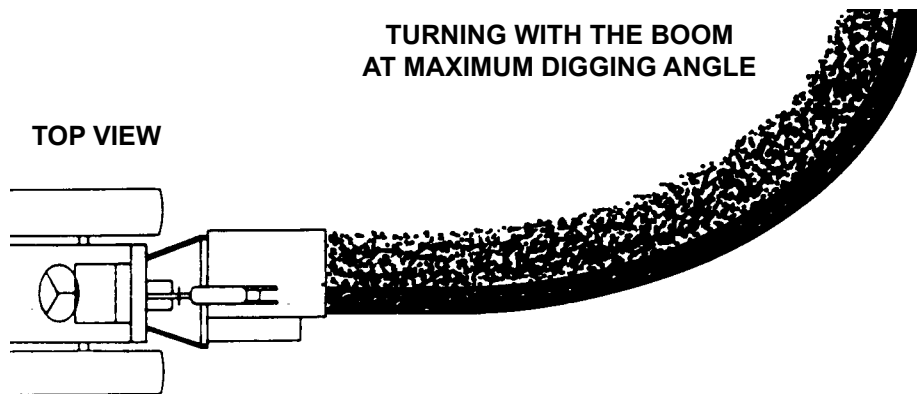
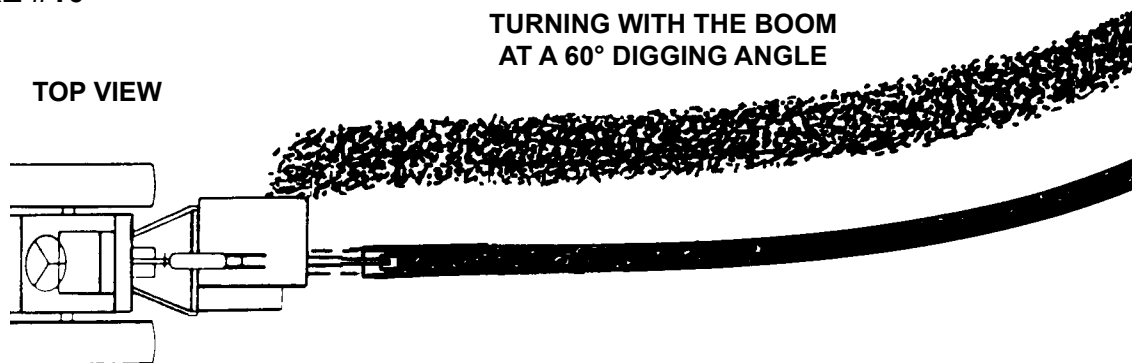


FIGURE #10



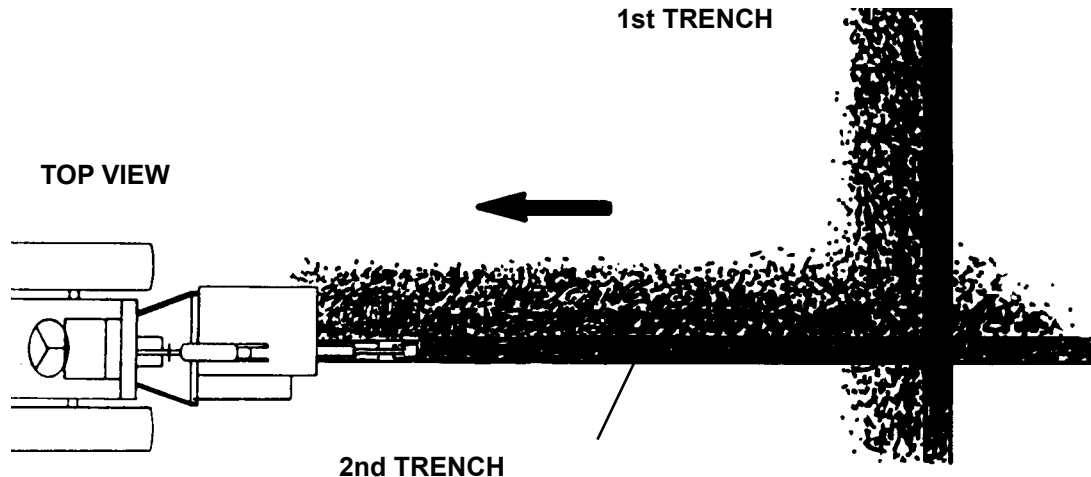
MAKING SHARP TURNS

To make sharp turns and 90° angle you will have to dig two trenches. Dig the first trench as you normally would. Then reposition the unit and dig the second trench at the appropriate angle. Be sure to take into account the extra lead-in space needed for the trencher to get down to the desired trench depth. See Figure #11.

OPERATING INSTRUCTIONS

OPERATING TECHNIQUES 3-POINT HITCH TRENCHERS

FIGURE #11



RECOMMENDED DIGGING ANGLES

A 90° digging angle is recommended for use in rock and frost conditions, and when trenching sharp corners. The 90° angle reduces excessive side pressure on the boom and digging chain when trenching corners.

A 60° - 65° digging angle is recommended for normal trenching. At this angle there will be less carryover, and a cleaner trench bottom than can be maintained at a 90° angle.

TRENCHING WITHOUT THE CRUMBER BAR / PERSONAL RESTRAINT BAR

WARNING! The crumber bar / personal restraint bar and crumber assembly are there for a reason, **YOUR SAFETY!** There are a few instances however, where removal may be necessary. In these cases operate with extreme caution. Reinstall the crumber bar / personal restraint bar and crumber assembly as soon as possible.



You can use your trencher to dig under obstacles such as sidewalks. To do so, remove the crumber bar / personal restraint bar and crumber assembly and start your trench as before within a foot of the sidewalk. With the crumber bar / personal restraint bar removed you can start the trench vertically without any lead-in space.

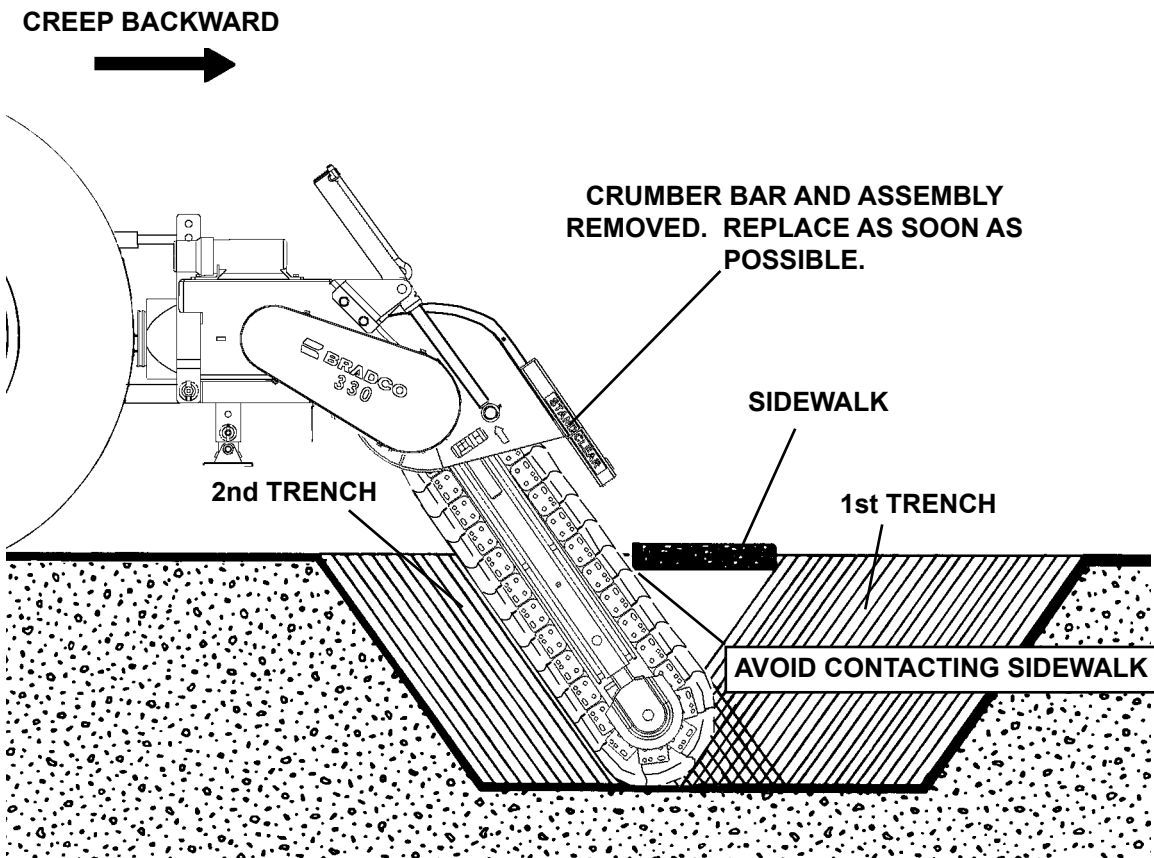
When the desired depth has been reached, tilt the trencher at 60° angle while digging, then creep the tractor backward and trench under the side walk. Be careful not to contact the edge of the sidewalk with the digging teeth.

OPERATING INSTRUCTIONS

OPERATING TECHNIQUES 3-POINT HITCH TRENCHERS

After you have gone as far as you can without contacting the sidewalk, drive the tractor forward to clear the sidewalk and remove the trencher from the trench. Line up the unit on the other side of the walk and continue to trench as described previously until the two trenches are connected. See Figure #12.

FIGURE #12



Reinstall the crumber bar / personal restraint bar and crumber assembly immediately. Some spoil will be left in the trench since the crumber was removed during the operation.

ENDING THE TRENCH

When you have dug your trench, remember that the trencher boom is at an angle, and that you must continue trenching until the end of the boom has dug past the proposed end of the trench. Once the end of the trench has been dug, keep the trencher running and lift the unit clear of the trench. When the trencher has cleared the trench, disengage the PTO to stop the trencher. Drive the tractor away from the trench.

OPERATING INSTRUCTIONS

OPERATING TECHNIQUES 3-POINT HITCH TRENCHERS

TRANSPORTING THE TRENCHER

When transporting the trencher, remember to keep the trencher as low to the ground as is practical. The lower the trencher rides, the more stable the tractor will be. You do not want the trencher so low that the digging teeth touch ground in rough terrain. Shut off the trencher before moving it away from the trench. Never transport the trencher around the job site or anywhere else while the digging chain is moving.

TRENCHER PERFORMANCE

Trencher performance is related to how well it's maintained, digging tooth wear, and type and size of digging chain, crumber boom and shoe used. If problems arise see "Trouble Shooting" Section.

DIGGING CHAIN OPTIONS

GENERAL INFORMATION

This section is devoted to digging chain options for your trencher. In it you will find a listing of all the chain options available. You will also find information on replacement parts, chain assembly, and chain conversion. These options will increase the flexibility of your equipment, and make your trenching job easier.

There is some basic information about the trencher and its digging components that you should know before you try to order any options. This information is given here for your convenience. With it you will be able to better understand the rest of this section.

CHAIN PITCH

The digging chains are divided into groups by pitch. The pitch of the chain is the distance between the centers of the holes in the chain links (See Figure 1). The word pitch can also be used to describe the length of the chain.

FIGURE #1

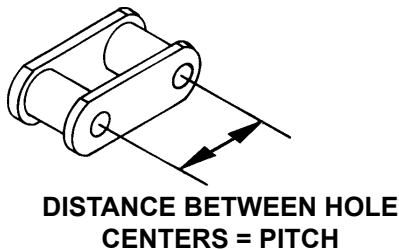
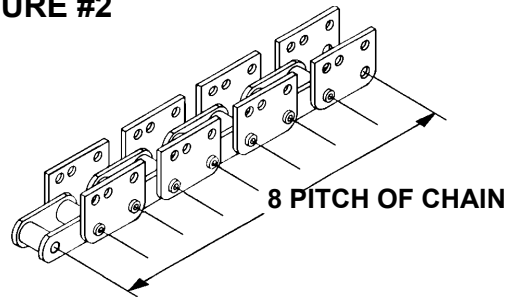


FIGURE #2

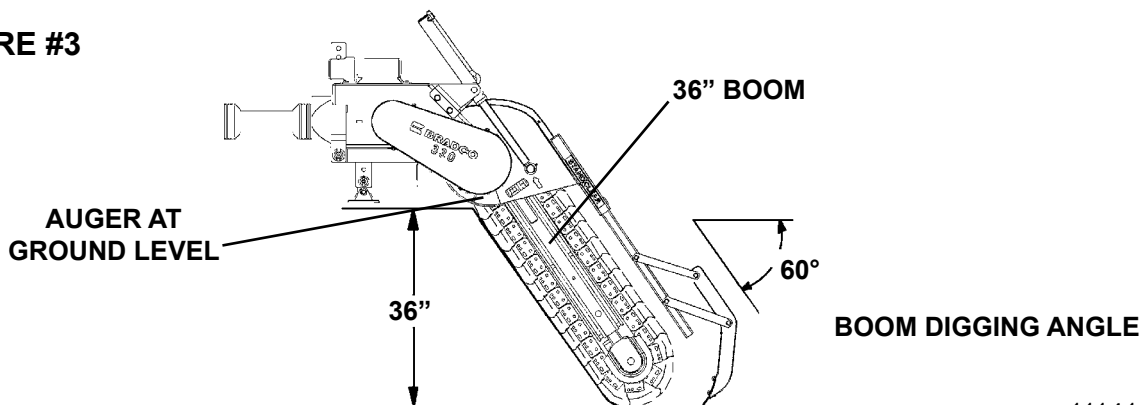


You can not intermix components of different pitches. You cannot substitute chain links of different pitches in a digging chain. Nor can you use a digging chain of one pitch, with a driver sprocket of a different pitch. Attempting to do so will cause the chain to "jump" off the sprocket continuously.

COMPONENT SIZE

The size of the digging component is based on the depth of the trench it will dig with auger at ground level and a 65° boom digging angle (See Figure 3). For example, a 36" boom is not necessarily 36" long. The 36" length means it will dig a trench 36" deep with the augers in their float position and at a 65° digging angle.

FIGURE #3

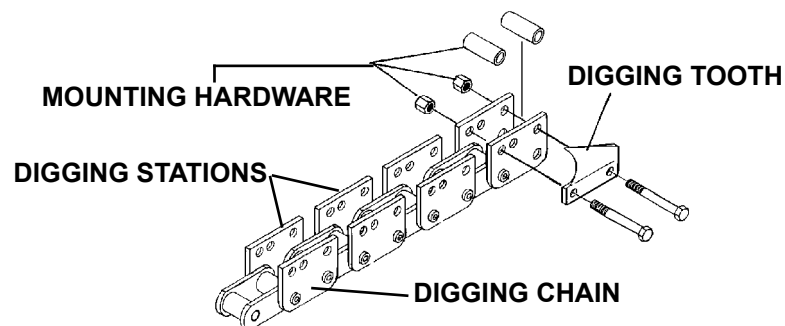


DIGGING CHAIN OPTIONS

DIGGING STATIONS

Digging chains are made up of a series of individual links pinned together. Every link has a special "Digging Station" link. These links are designed so that the digging teeth can be attached to the basic chains (See Figure 4). Digging chains may be purchased in any length, with or without teeth. All chains, teeth, spacers and assorted digging hardware may be purchased separately.

FIGURE #4



CONVERSION KITS

Digging chains can be modified to dig trenches in a variety of widths. By modifying an existing chain, it can be used to dig the width you want and thus save going the expense of a whole new digging chain assembly. This can be a considerable cost savings, however it is more work than just installing a new digging chain assembly.

Contact your nearest dealer or the manufacturer to inquire on the conversion kits available for your trencher.

It should be noted that this information only applies to modifying chains of the same length and pitch. All components must be of the same pitch. You cannot intermix components of different pitch.

This completes the basic information on digging chain options. The rest of this section contains specific information on digging chains and parts available, complete with part numbers. Again it may be noted that these options are designed to increase the flexibility of your equipment and to make your trenching jobs easier. We offer them to better serve your trenching needs.

DIGGING CHAIN OPTIONS

1.654" PITCH DIGGING CHAIN ASSEMBLIES

GENERAL INFORMATION

This page contains a listing of all of the 1.654" pitch digging chain assemblies offered for your trencher. Each chain assembly comes with all necessary teeth and spacers already installed. Just thread the chain onto the trencher and fasten the two ends together with the pin and keeper pin included in the assembly. A crumber shoe of the appropriate width is also included in the chain assembly.

Before you order a new chain, be sure to check for compatibility with corresponding components. You may need to order more than just a chain assembly. You must use a digging boom of the same digging depth as the chain. The crumber bar must also be of the same digging depth. The digging sprocket must also be of the same pitch as the chain. All of these components must match for the trencher to function properly.

Bare 1.654" pitch digging chain (without teeth, spacers, or hardware) can be ordered in any desired length under the part number #17015. Just use this number and then specify the length desired in pitches (example, 64 pitches of chain would be needed for a 330 with a 36" boom).

1.654" PITCH CUP TOOTH DIGGING CHAIN ASSEMBLIES					
Complete chain assemblies. Includes chain with all teeth and spacers attached. Also includes appropriate width crumber shoe.					
CHAIN ASSEMBLIES WITH A TOOTH EVERY STATION					
DESCRIPTION (boom used X trench width)	LENGTH OF CHAIN (in 1.654" pitches)	TENSILE STRENGTH	PART NO.		
For 30" Boom	3" Wide	58 Pitch	38,000#	112533	
For 30" Boom	4.5" Wide	58 Pitch	38,000#	16687	
For 30" Boom	6" Wide	58 Pitch	38,000#	16686	
For 30" Boom	8" Wide	58 Pitch	38,000#	16685	
For 36" Boom	3" Wide	64 Pitch	38,000#	112531	
For 36" Boom	4.5" Wide	64 Pitch	38,000#	89822	
For 36" Boom	6" Wide	64 Pitch	38,000#	89823	
For 36" Boom	8" Wide	64 Pitch	38,000#	89824	

DIGGING CHAIN OPTIONS

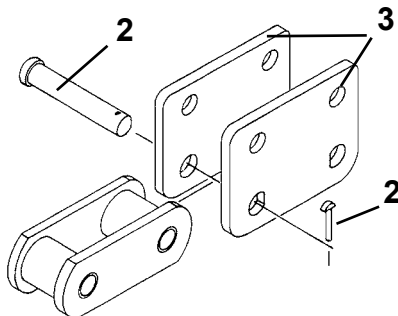
1.654" PITCH DIGGING CHAIN ASSEMBLIES

1.654" PITCH 70/30 COMBINATION DIGGING CHAIN ASSEMBLIES				
Complete chain assemblies. Includes chain with all teeth and spacers attached. Also includes appropriate width crumber shoe.				
CHAIN ASSEMBLIES WITH A TOOTH EVERY STATION				
DESCRIPTION (boom used X trench width)		LENGTH OF CHAIN (in 1.654" pitches)	TENSILE STRENGTH	PART NO.
For 30" Boom	3" Wide	58 Pitch	38,000#	112454
For 30" Boom	4.5" Wide	58 Pitch	38,000#	112462
For 30" Boom	6" Wide	58 Pitch	38,000#	18767
For 30" Boom	8" Wide	58 Pitch	38,000#	18768
For 36" Boom	3" Wide	64 Pitch	38,000#	112453
For 36" Boom	4.5" Wide	64 Pitch	38,000#	89825
For 36" Boom	6" Wide	64 Pitch	38,000#	89826
For 36" Boom	8" Wide	64 Pitch	38,000#	89827

REPLACEMENT PARTS

You can purchase individual chain links and pins for your trencher. These can be used to repair a damaged chain, or lengthen and modify an existing chain. Below is a diagram of the chain's basic components with their descriptions and corresponding part numbers. Use these numbers when ordering. You can also order a complete bare chain (without teeth and spacers) in any length desired. The chain is ordered under part number 17015 for 1.654" Pitch. Just specify the length you want in pitches.

When pinning links of chain together, first tap the pin through the connector link with the perfectly round holes and then on through the inner link. Place the second connector link in position, you will note that the end of the pin has one side flattened. Rotate the pin until its flat side lines up with the corresponding flat side of the connector link hole and tap the pin on through. Place the chain keeper pin into the hole at the end of the main pin and tap down tight. Finally, bend the end of the keeper pin over to secure it in place.



NO.	PART NO.	DESCRIPTION
1	100004	Inner Link
2	100003	Pin & Keeper
3	100005	Connector Link

DIGGING CHAIN OPTIONS

1.654 PITCH DIGGING CHAIN TOOTH STATION SEQUENCE

GENERAL INFORMATION

Every second link on a digging chain is a special link called a digging station. These digging station links are designed so that digging teeth can be bolted onto them in a variety of configurations. It is the number and the make up of these different digging stations that make each chain unique.

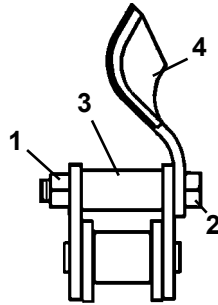
The following pages show the various chains available for the 330 trencher. The digging tooth make up of each digging station is given in code. The key to the code is listed below. Thus the chain assembly diagrams will show you the order of the digging stations on each digging chain. The actual parts break down of each digging tooth station is also shown on the following pages.

C-D	CENTER SHARK STYLE TOOTH
CL-C	CENTER LEFT CUP TOOTH
CL-D	CENTER LEFT SHARK STYLE TOOTH
CR-C	CENTER RIGHT CUP TOOTH
CR-D	CENTER RIGHT SHARK STYLE TOOTH
3L-C.....	3" LEFT CUP TOOTH
3L-D.....	3" LEFT SHARK STYLE TOOTH
3R-C	3" RIGHT CUP TOOTH
3R-D	3" RIGHT SHARK STYLE TOOTH
4L-C.....	4.5" LEFT CUP TOOTH
4L-D.....	4.5" LEFT SHARK STYLE TOOTH
4R-C	4.5" RIGHT CUP TOOTH
4R-D	4.5" RIGHT SHARK STYLE TOOTH
6L-C.....	6" LEFT CUP TOOTH
6L-D.....	6" LEFT SHARK STYLE TOOTH
6R-C	6" RIGHT CUP TOOTH
6R-D	6" RIGHT SHARK STYLE TOOTH
8-C.....	8" CUP TOOTH
8-D.....	8" SHARK STYLE TOOTH

DIGGING CHAIN OPTIONS

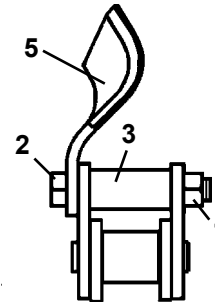
CUP TOOTH STATIONS

CL-C



CENTER LEFT - CUP

CR-C



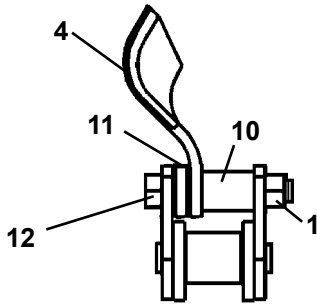
CENTER RIGHT - CUP

3L-C

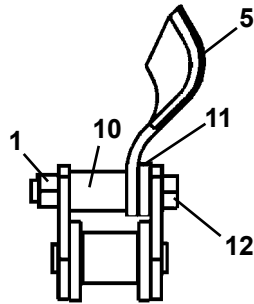
3R-C

4L-C

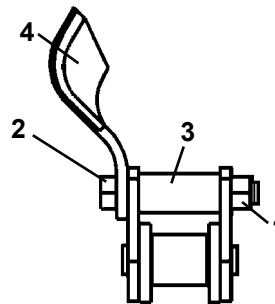
4R-C



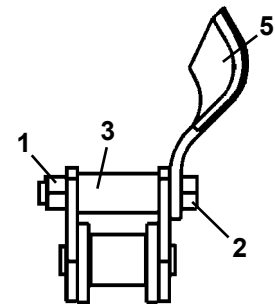
3" LEFT - CUP



3" RIGHT - CUP



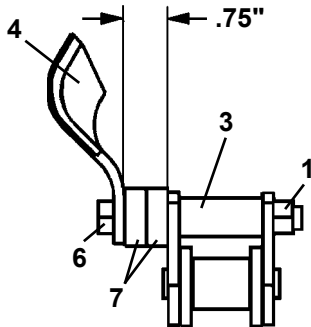
4" LEFT - CUP



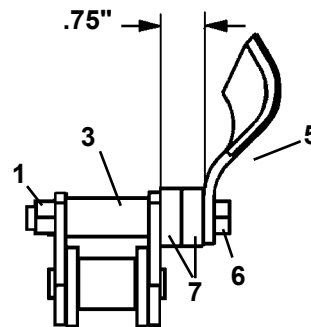
4" RIGHT - CUP

6L-C

6R-C

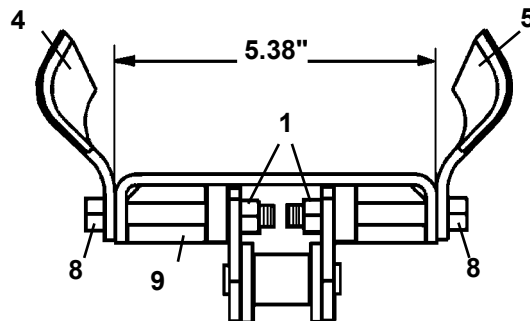


6" LEFT - CUP



6" RIGHT - CUP

8-C



8" - CUP

11137 5-28-08

DIGGING CHAIN OPTIONS

CUP TOOTH STATIONS

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1796	.38" UNF Lock Nut
2	10053	.38" UNF X 2.50" Hex Capscrew - Grade 8
3	17024	Spacer
4	31595	Left Cup Tooth
5	31596	Right Cup Tooth
6	10054	.38" UNF X 3.25" Hex Capscrew - Grade 8
7	17016	Tooth Spacer
8	10078	.38" UNF X 2.75" Hex Capscrew - Grade 8
9	17017	8" Tooth Spacer
10	112441	Tube Spacer
11	112442	Bar Spacer
12	1846	.38" UNF X 2.25" Hex Capscrew - Grade 8

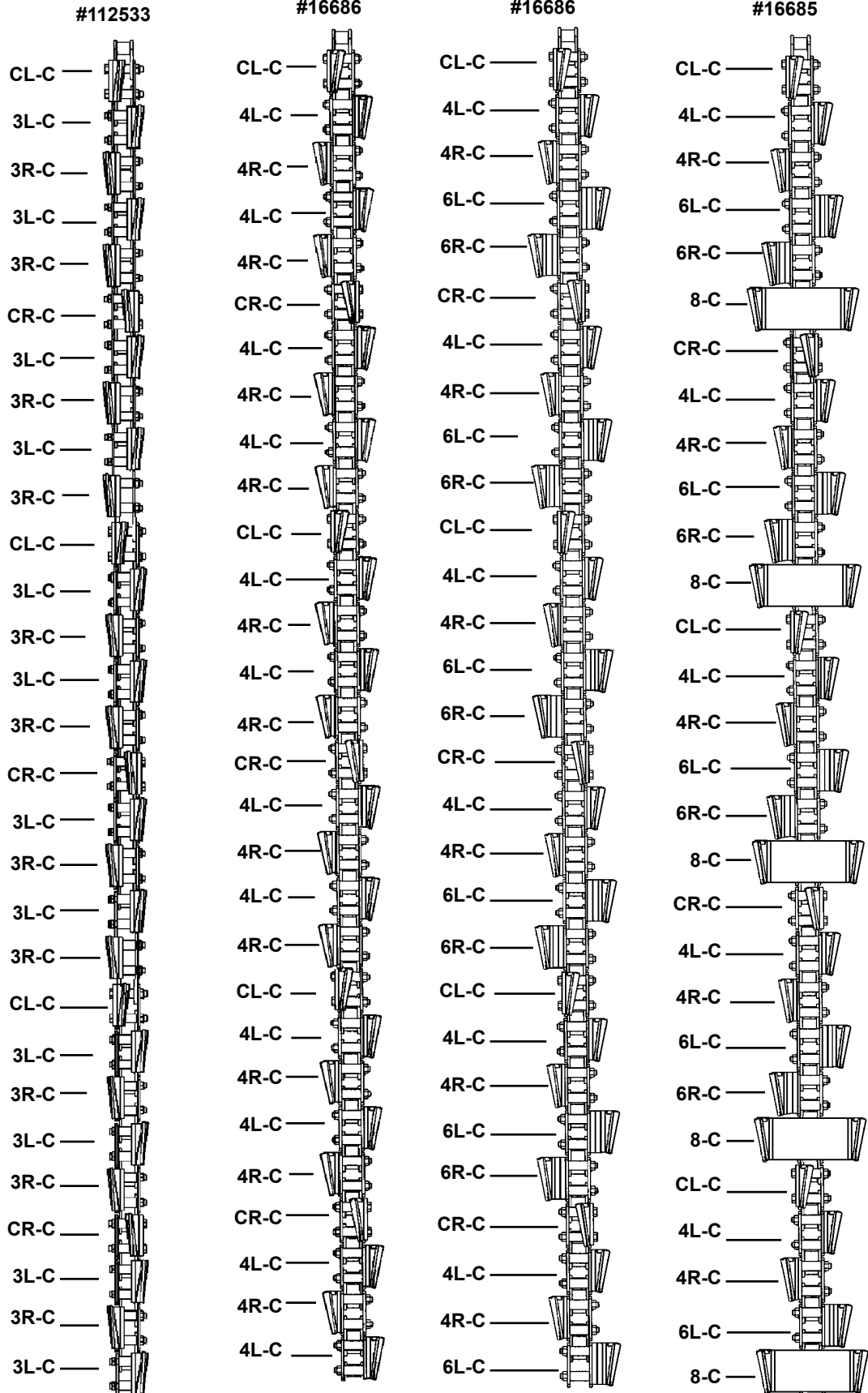
DIGGING CHAIN OPTIONS

SHARK STYLE TOOTH STATIONS

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1796	.38" UNF Lock Nut
2	10053	.38" UNF X 2.50" Hex Capscrew - Grade 8
3	17024	Spacer
(#4, #5 & #12 used on Cup Tooth Digging Stations ONLY)		
6	10054	.38" UNF X 3.25" Hex Capscrew - Grade 8
7	17016	Tooth Spacer
8	10078	.38" UNF X 2.75" Hex Capscrew - Grade 8
9	17017	8" Tooth Spacer
10	1846	.38" UNF X 2.25" Hex Capscrew - Grade 8
11	31592	Center Shark Style Tooth
13	100001	Spacer
14	100002	Spacer
15	31593	Left Shark Style Tooth
16	31594	Right Shark Style Tooth

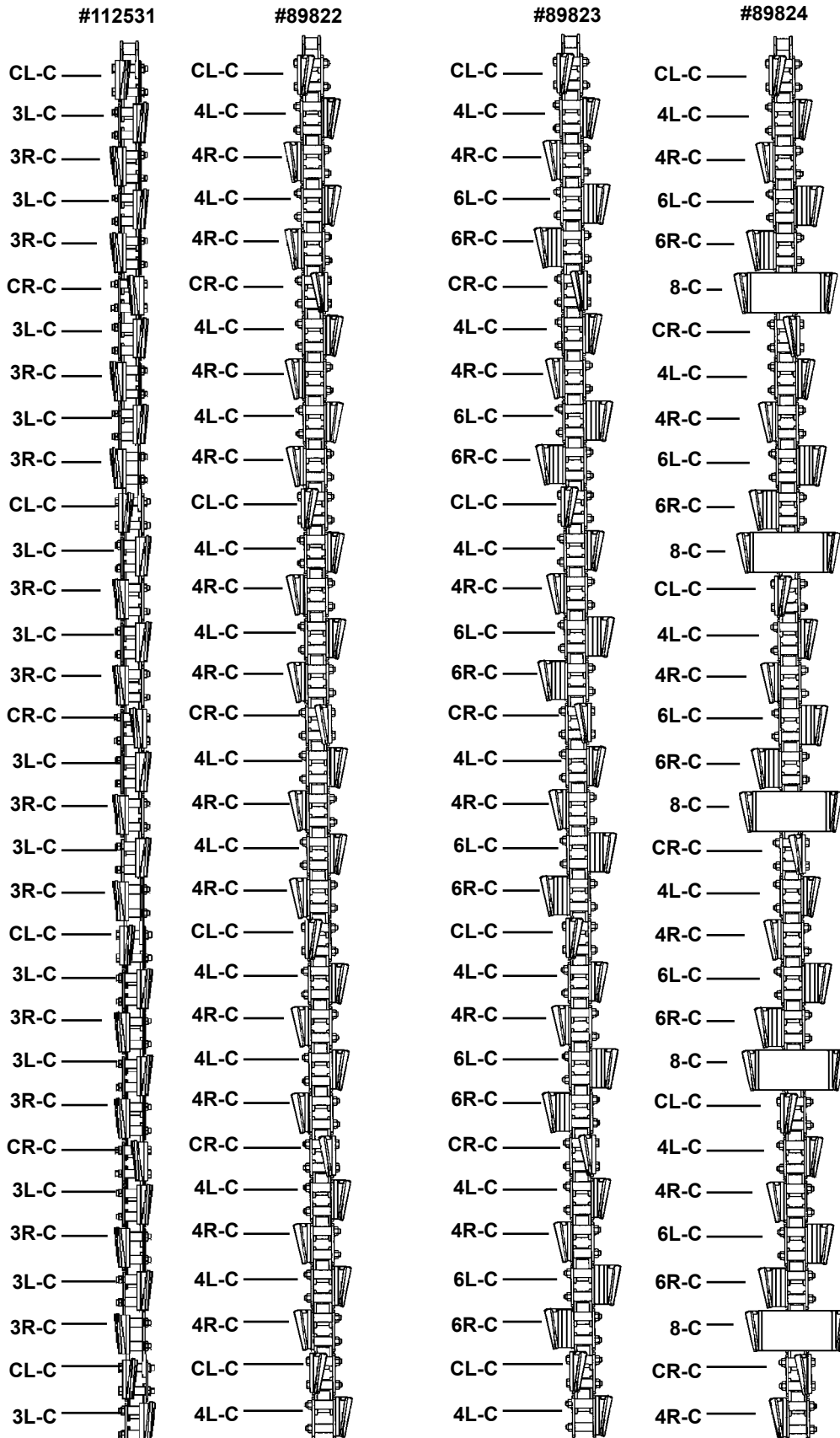
DIGGING CHAIN OPTIONS

330 TRENCHER WITH 30" BOOM AND CUP TEETH



DIGGING CHAIN OPTIONS

330 TRENCHER WITH 36" BOOM AND CUP TEETH

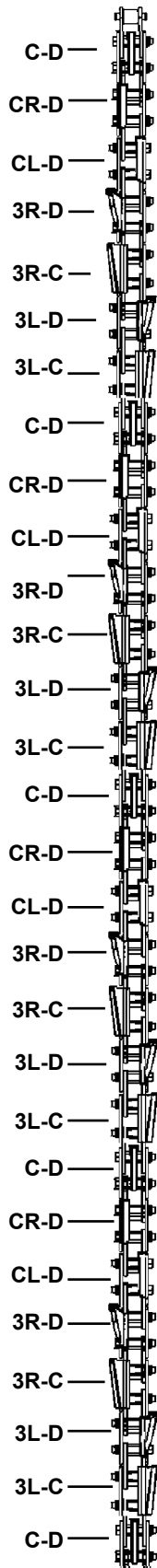


11133 5-27-08

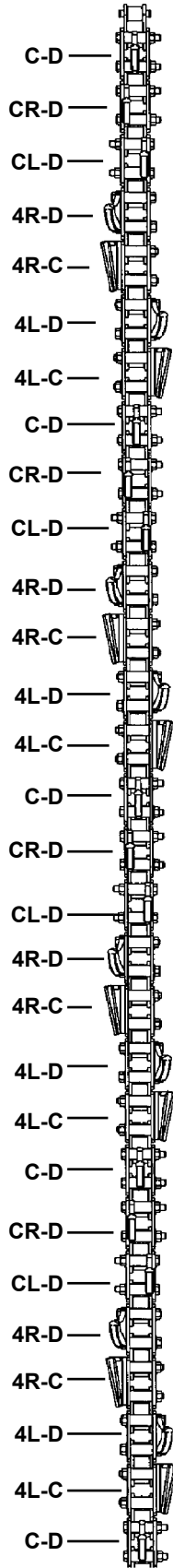
DIGGING CHAIN OPTIONS

330 TRENCHER WITH 30" BOOM AND 70/30 COMBINATION TEETH

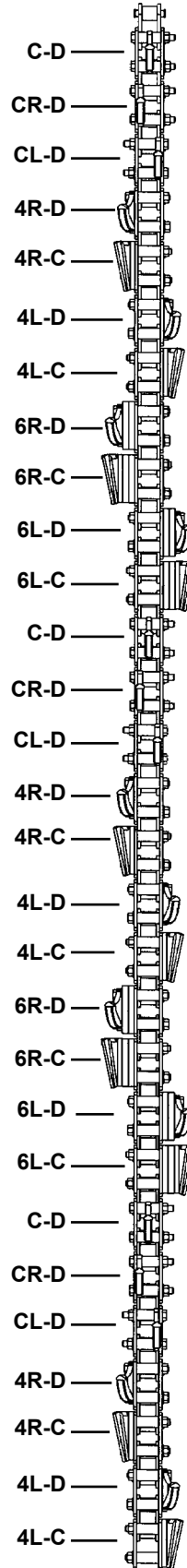
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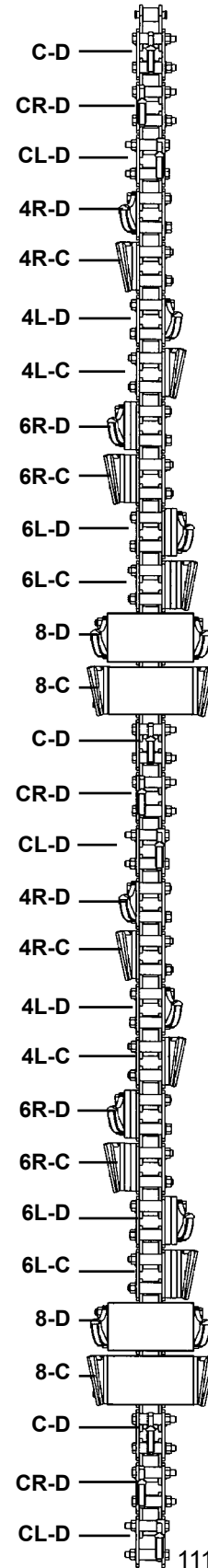
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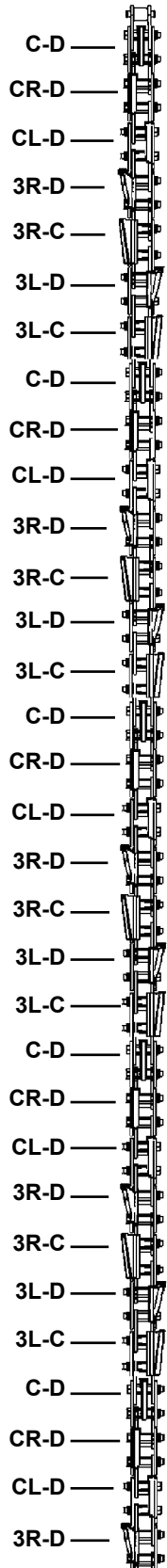


11135 5-27-08

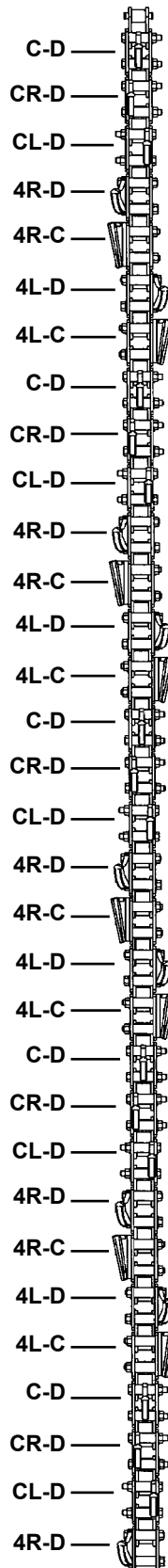
DIGGING CHAIN OPTIONS

330 TRENCHER WITH 36" BOOM AND 70/30 COMBINATION TEETH

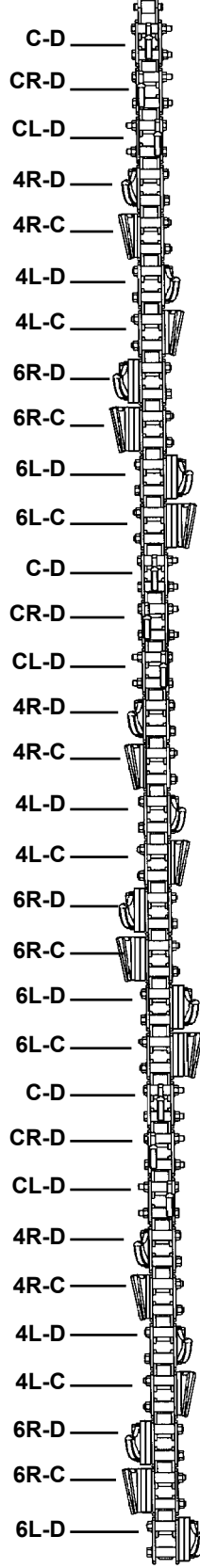
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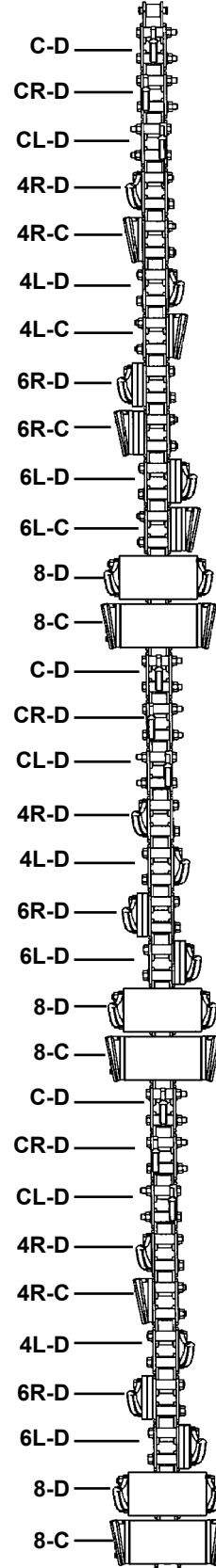
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11136 5-27-08

MAINTENANCE AND SERVICE

LUBRICATION

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.

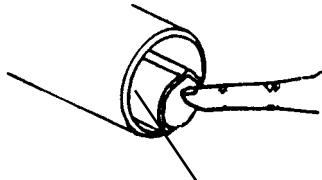
All parts provided with grease fittings should be lubricated as indicated. If any grease fittings are missing, replace them immediately. Clean all fittings thoroughly before using grease gun.

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

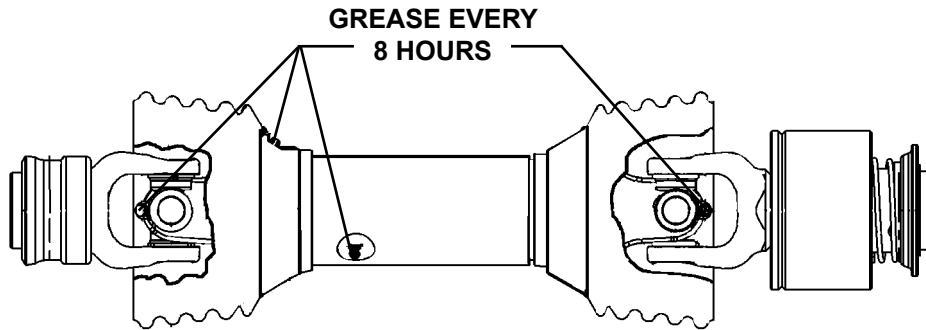
LUBRICATION

Lubricate grease fittings on cylinder and PTO shaft every (8) eight hours.

Grease PTO Drive before putting trencher into operation and at specified intervals thereafter.



GREASE INSIDE OF OUTER TELESCOPING TUBE (EVERY 20 HOURS).



*** When used in winter the outer tube must be greased to prevent it freezing solid!**

EVERY 40 HOURS OF OPERATION


The oil level in the gear box should be checked once a week. Fill as necessary with #90 transmission oil.

The previously mentioned areas are the only ones that require lubrication. No lubrication is needed on any other part of the trencher. Boom assemblies do not require any lubricating. **DO NOT** lubricate the digging chain. Lubricating the chain will only cause dirt to collect on the chain resulting in increased chain wear.

MAINTENANCE & SERVICE

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.

CAUTION!  **Always choose level and hard ground to park the tractor on and set the brake so that the tractor cannot roll. Never perform maintenance on the trencher when the tractor engine is running.**

The main part of the maintenance procedure is proper lubrication. Be sure to follow the recommended lubrication time intervals. This is crucial to your trencher's longevity.

Trenchers are subject to extreme vibration due to their very nature. Be sure to check the trencher and its mounting daily for loose bolts and hardware. Tighten according to the bolt torque specification charts found in this manual.

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.

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

The most common cause of premature wear and malfunctioning of hydraulic system components is the ingress of contaminants, incorrect pressure and pump cavitation.

Observe a high standard of cleanliness when doing hydraulic system or cylinder maintenance. During maintenance cover or plug ends of disconnected hydraulic lines to prevent contaminants from entering. Use clean oil and a clean container when adding oil for hydraulic purposes. Use the tractor manufacturer's recommended hydraulic oil.

DRIVE CHAIN ADJUSTMENT

The drive chain should be checked for proper tension after the first 8 hours of use and then at 100 hour intervals thereafter. The chain is properly adjusted when it can be moved by hand .12" either way from centerline. Improper adjustment will cause excessive wear on drive chain and sprockets. To adjust drive chain: loosen the two capscrews on the chain tension adjustment plate, apply the required tension to the drive chain and retighten the capscrews. If more adjustment is required a link in the drive chain can be removed.

MAINTENANCE & SERVICE

DIGGING CHAIN REMOVAL

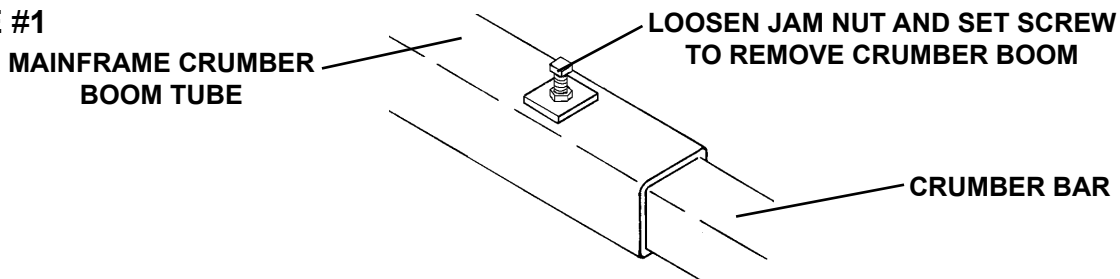
Before removing the digging chain, put the trencher stand in the lowest position to help support the trencher mainframe, and lower the trencher with the 3-point hitch arms. Turn off the prime mover, set the parking break, remove the key and disconnect hydraulic couplers to the trencher before performing any maintenance.

WARNING! When the trencher is connected to the tractor's PTO drive, do not go into the area between the tractor and the trencher. Never go underneath the trencher to perform maintenance. Serious injury or death could occur.



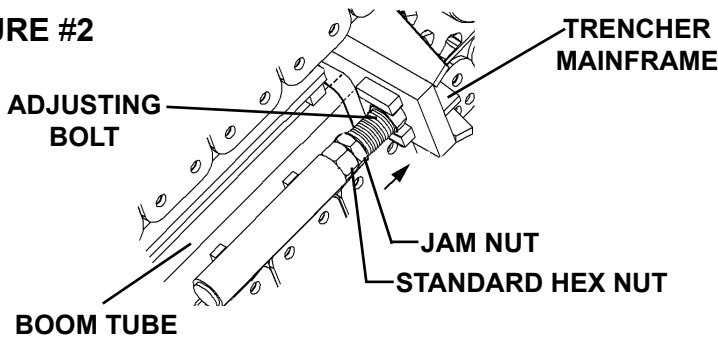
1. Remove crumber assembly by loosening the jam nut and set screw. Pull the crumber bar / personal restraint bar out of its support tube. See Figure #1

FIGURE #1



2. Relieve the chain tension. See Figure #2

FIGURE #2



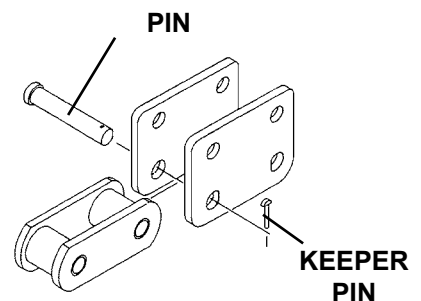
TURN THE JAM NUT "ONTO" THE ADJUSTING BOLT FOLLOWED BY THE STANDARD HEX NUT (THIS ALLOWS THE BOOM TUBE TO SLIDE - LOOSENING THE DIGGING CHAIN.)

CAUTION! Once the digging chain has been removed the boom and boom end idler are free to come off. Be careful that these components do not fall off and possibly injure you or a bystander.



3. Remove one of the chain pins by straightening the chain keeper pin and removing it with a pliers. The pin can now be pulled or driven out. See Figure #3
4. Carefully remove the digging chain from the boom end idler and drive sprocket.

FIGURE #3



REVERSE THE PROCEDURE TO REINSTALL THE DIGGING CHAIN.

MAINTENANCE & SERVICE

HEADSHAFT ASSEMBLY SERVICE

Before performing any maintenance, put the trencher stand in the lowest position to help support the trencher mainframe, and lower the trencher with the 3-point hitch arms. Turn off the prime mover, set the parking break, remove the key and disconnect hydraulic couplers to the trencher.

WARNING! When the trencher is connected to the tractor's PTO drive, do not go into the area between the tractor and the trencher.

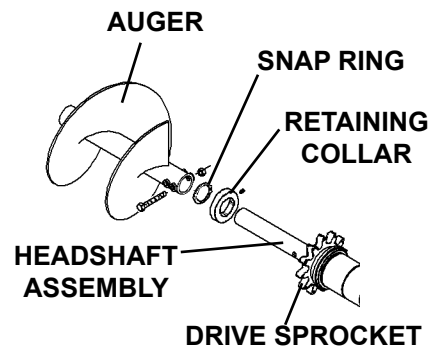


Never go underneath the trencher to perform maintenance.

Serious injury or death could occur.

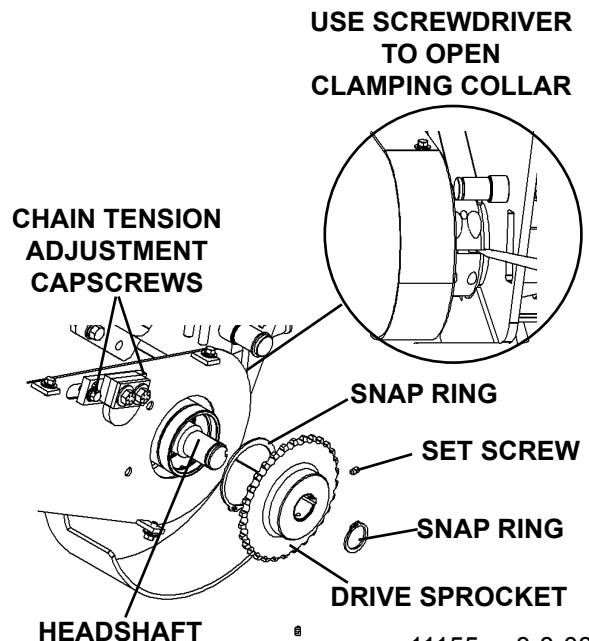
Drive Sprocket Replacement

1. To remove the headshaft drive sprocket, first remove the digging chain and boom. See "Digging Chain Removal".
2. Remove the spiral auger by removing the .50" X 3.50" capscrew and deformed lock nut securing it to the headshaft.
3. Remove snap ring #1901 from the headshaft assembly and then the retaining collar that is secured to the headshaft with a set screw.
4. Replace the drive sprocket #31597 and/or the seal protector #112495 and re-install in reverse order. **NOTE: Make sure all keys are in place during installation.**



Headshaft Assembly Replacement

1. Follow steps #1 and #2 under "Drive Sprocket Replacement".
2. To gain access to the drive chain assembly, remove the chain cover #111397. Loosen the two .38" x 1.00" capscrews on the chain tension adjustment plate to allow for removal of the drive chain.
3. Remove snap ring #1684 from the end of the headshaft and loosen the two set screws on the chain drive sprocket and remove the sprocket and #111169 snap ring.
4. Loosen the two .50" x 1.75" sockethead capscrews on the mainframe "clamping collar". (Use a wedge or screwdriver to spread the clamp for easy installation or removal.)
5. Replace the Headshaft assembly and re-install in reverse order. **NOTE: Retension the drive chain tension adjustment plate to prevent the drive chain from jumping off of the drive sprockets. There should be approximately .12" of deflection on the chain when properly tensioned.**



11155 8-8-08

MAINTENANCE & SERVICE

Bearing Replacement

1. Follow steps #1 through #4 under “Headshaft Assembly Replacement”.
2. Once the headshaft has been removed from the trencher mainframe, remove the headshaft housing from the headshaft.
3. Remove the snap rings at each end of the housing to gain access to the bearings and o’rings seals.
4. Replace the damaged bearings and seals and re-install in reverse order.

GEARBOX SERVICE

IMPORTANT: Replacing internal seals or disassembly of the gearbox will void warranty.

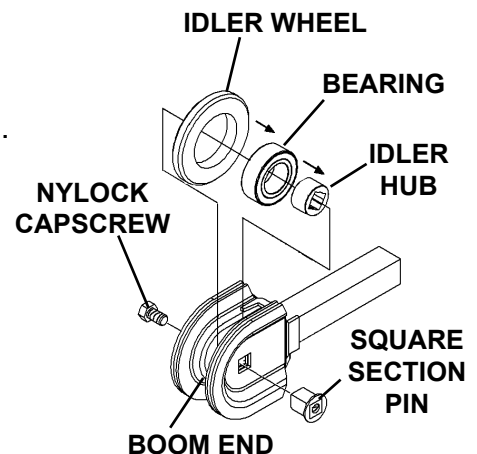
Gearbox oil should be changed after the first 50 hours and then every 600 hours or once a year thereafter with a SAE 90EP equivalent gear lube (1.22 quarts/1.15 liters). There is a drain plug on the bottom of the gearbox to assist in draining the oil and a breather plug with dipstick on the top for filling the gearbox. Besides the plugs and cap there are two dust lips #112570 that can be replaced without voiding the gearbox warranty. Contact factory for any other repairs to the gearbox.

WARNING! When the trencher is connected to the tractor’s PTO drive, do not go into the area between the tractor and the trencher. Never go underneath the trencher to perform maintenance. Serious injury or death could occur.



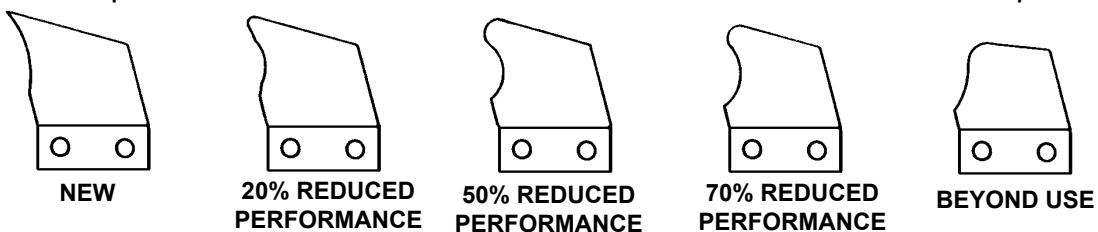
BOOM END IDLER BEARING REMOVAL

1. To remove the boom end idler bearing, first remove the digging chain and boom. See “Digging Chain Removal”.
2. Remove the nylock capscrew and the square section pin from the boom end. The bearing, idler hub and wheel will separate from the boom end when the pin is removed.
3. Press the bearing from the idler wheel and press the idler hub from the bearing.
4. Check idler wheel, bearing and hub for wear and replace as necessary.
5. Re-install in reverse order.



DIGGING TOOTH REPLACEMENT

Sharp teeth are important to good performance. Cup teeth wear on the tip and side bulge in varying amounts. Wear patterns change with different digging conditions. The following can be used as a guide to help determine your own best cost/benefit tooth replacement time. Normal replacement should be made between 30% and 60% reduction in performance.



11156 8-8-08

MAINTENANCE & SERVICE

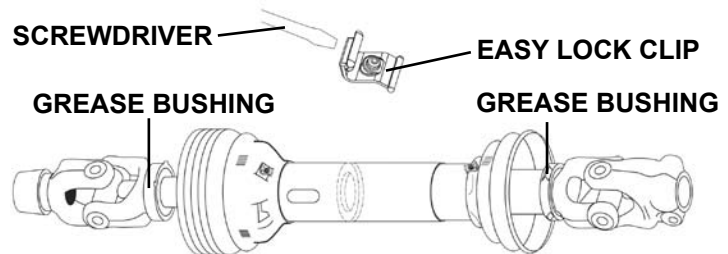
PTO DRIVE ASSEMBLY

The following instructions will assist in replacing the safety shields on your PTO drive assembly. Keep all PTO guards and shields in place at all times.

IMPORTANT: Trencher maintenance does not require you to go between the tractor and the trencher with the drive line installed. Before replacing, servicing or removing the trencher from the tractor, shut off the tractor, set the parking brake and remove the keys.

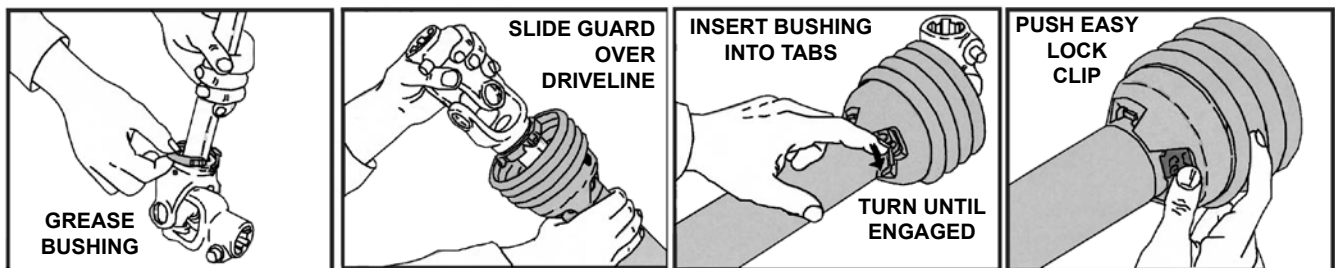
When replacing damaged or missing PTO shields, disconnect the trencher from the tractor and remove the drive line from the trencher.

1. To remove damaged guards, use a screwdriver to release the “easy lock” clip on the drive line. Turn the bushing to disengage and remove the guard.



IMPORTANT: Check that the “*Guard Missing*” decal on the steel tube under the inner guard and “*Rotating Driveline*” decal on the outer guard are both firmly affixed and legible. If not, replace them before re-connecting the driveline to the trencher.

2. Clean and grease the bushing groove before installing the bushing. Grease any remaining bushings in the guard.
3. Slide the new guard half over the driveline and insert bushing tabs into the openings in the guard.



4. Turn the bushing until it engages into the guard.
5. Push the “easy lock” clip into position. The bushing and guard are now secure.

The automatic clutch offers a level of overload protection not possible with other types of clutches. It disconnects the power source from the drivetrain when overload occurs and does not reconnect until the speed is reduced to near zero. The automatic clutch is maintenance free and since it generates no heat there is minimum down time for higher productivity.

MAINTENANCE AND SERVICE

CYLINDER SEAL REPLACEMENT

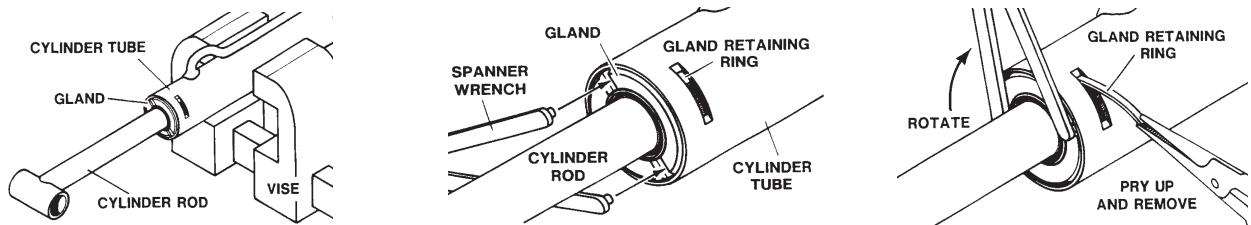
The following information is provided to assist you in the event you should need to repair or rebuild a hydraulic cylinder. When working on hydraulic cylinders, make sure that the work area and tools are clean and free of dirt to prevent contamination of the hydraulic system and damage to the hydraulic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

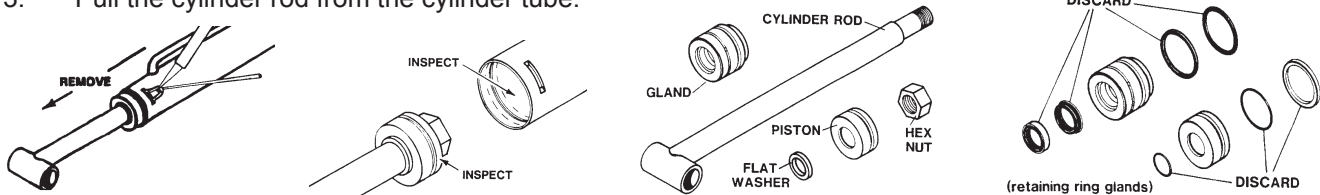
RETAINING RING TYPE GLAND

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 out through the milled slot.**

3. Pull the cylinder rod from the cylinder tube.

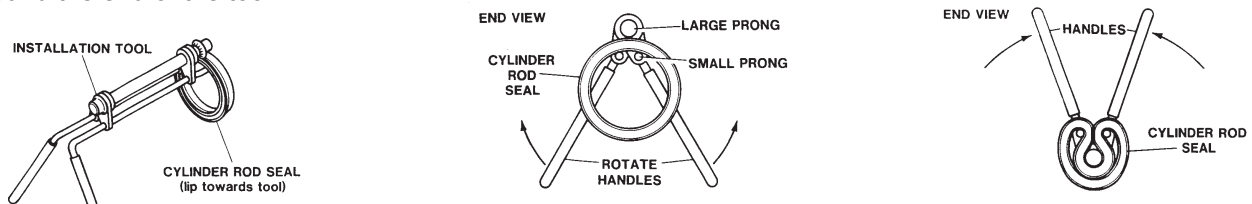


4. Inspect the piston and the bore of the cylinder tube for deep scratches or galling. If damaged, the piston and cylinder tube must be replaced.
5. Remove the hex nut, piston, flat washer or spacer tube (if so equipped), and gland from the cylinder rod. If the cylinder rod is rusty, scratched, or bent,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



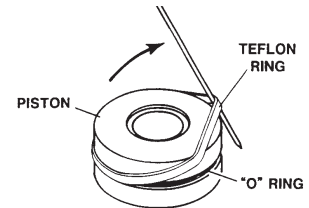
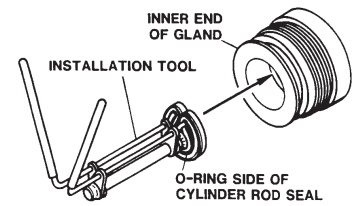
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MAINTENANCE AND SERVICE

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.

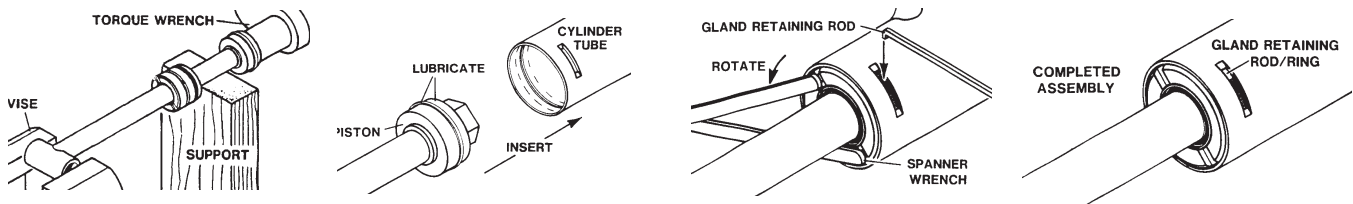
NOTE: Threaded gland is shown in diagram for reference only.

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.
2. Slide the gland onto the cylinder rod being careful not to damage the rod wiper. Then install the spacer, or flat washer (if so equipped), small O-ring, piston, and hex nut onto the end of the cylinder rod.
3. Secure the cylinder rod (mounting end) in a vise, with a support at its center. Torque the nut to the amount shown on the chart 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.

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.

4. Apply a lubricant (such as Lubriplate #105) to the piston and teflon ring. Insert the cylinder rod assembly into the cylinder tube.
5. Rotate the gland with a spanner wrench until the hole (drilled into the retaining slot of the gland) appears in the milled slot of the cylinder tube. Insert the hooked end of the gland retaining rod into the hole.

Rotate the gland until the gland retaining rod forms a ring between the gland and the cylinder tube. When complete, the bent end of the gland retainer ring should be hidden (not turned so it is exposed in the slot) to prevent it from popping out.

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.



REMOVAL AND STORAGE

TRENCHER REMOVAL

When disconnecting the trencher from the tractor it is recommended that you follow the storage procedures below to keep your trencher in top condition and also help you get off to a good start the next time your trencher is needed.

DISCONNECTING TRENCHER

1. Lower the trencher stand.
2. Lower the trencher boom to the ground and the three point arms.
3. Once the trencher is resting on the ground, shut off the tractor, set the brake and remove the key. Disconnect the power and return hoses at the tractor rear remote hydraulic couplers. Connect the couplers together to prevent contaminants from entering the hydraulic system.
4. After making sure the PTO has come to a complete stop, disconnect the PTO drive shaft and remove the pins securing the trencher to the three point hitch arms. Remove the lower link arms and top link.
5. Return to the tractor, and following all tractor safety procedures, start the tractor and slowly pull away from the trencher.

PREPARATION FOR STORAGE

1. Clean the trencher exterior thoroughly, removing all mud, dirt, and grease.
2. Tighten all loose bolts, nuts, and set screws.
3. Touch up unpainted and exposed areas with paint to prevent rust.
4. Coat the digging chain with a thin covering of oil. Operate chain for a short period to work the oil into the pins.
5. Coat exposed portions of the cylinder rod with grease.
6. Check gearbox oil level and condition. If contaminated, drain and refill. (See Gearbox service.)
7. Store the trencher in a dry and protected place. Leaving the trencher outside, exposed to the elements will materially shorten its life.
8. Inspect trencher for visible signs of wear, breakage or damage. Order any parts required and make necessary repairs to avoid delays when starting next season.
9. Replace decals if damaged or in unreadable condition.

REMOVING FROM STORAGE

1. Remove all protective coverings.
2. Check hydraulic hoses for deterioration and if necessary, replace.
3. Check gearbox oil level.
4. Tighten all loose bolts, nuts and set screws.
5. During cold weather, operate the trencher slowly for a short time before placing the unit under full load.

TROUBLESHOOTING

GENERAL INFORMATION

Your trencher was designed to be as simple and trouble free as possible. The purpose of this section is to help you in the event that a problem does develop. While we cannot possibly cover every problem that might occur, you will find that those that are most common are covered here.

PROBLEM: 3-POINT WILL NOT RAISE OR LOWER

POSSIBLE CAUSE AND REMEDY:

1. **Lift arms not parallel.** (This is critical only on small tractors with limited lift capacity.) Adjust top link length and position all three links as parallel as possible.
2. **Incorrect PTO drive installation.** Check PTO for proper length and installation. (See Installation)

PROBLEM: HYDRAULIC OIL OVERHEATING

POSSIBLE CAUSE AND REMEDY:

1. **Tractor relief valve set too low.** See tractor operator's manual and/or dealer for proper relief valve service and adjustment. Adjust relief valve to proper PSI.
2. **Quick coupler or hose restriction.** Check for dirt, rust, or other contaminants and repair or replace as needed.
4. **Creeping in other than low range in transmission.** (Hydrostatic transmissions only.) Trench only in low range of transmission.

PROBLEM: PTO SHAFT DOES NOT TURN

POSSIBLE CAUSE AND REMEDY:

1. **PTO shaft not properly installed.** Check shaft for proper installation.
2. **PTO in tractor not properly engaged.** Engage PTO properly or repair tractor.

TROUBLESHOOTING

PROBLEM: HEADSHAFT AND AUGER TURNS - DIGGING CHAIN DOES NOT

POSSIBLE CAUSE AND REMEDY:

1. **Digging chain sprocket slipping on headshaft.** Check headshaft key and/or sprocket for damage and replace as necessary.

PROBLEM: PTO TURNS - DIGGING CHAIN \ AUGERS DO NOT TURN

POSSIBLE CAUSE AND REMEDY:

1. **Digging chain bound up.** Check chain for dirt build up and/or rocks in chain. Remove foreign material.
2. **Headshaft Bearings damaged and binding on headshaft.** Remove shaft and replace bearings.
3. **Broken chain or sprocket slipping inside of chain cover.** Remove cover and check chain and sprocket. Repair or replace as necessary.
4. **Damaged gearbox.** Inspect gearbox. Contact Factory for Service NOTE: Disassembling gearbox or replacing internal components will void warranty.

PROBLEM: GEARBOX LEAKING OIL

POSSIBLE CAUSE AND REMEDY:

1. **Oil level too high.** Drain and fill to proper level.
2. **Plugged or wrong vent plug.** Clean or replace with correct vent plug.
3. **Seals worn or defective.** Inspect seals, bearing and housing. Contact Factory for Service. NOTE: Disassembling gearbox or replacing internal components will void warranty.

PROBLEM: POOR TRENCH PRODUCTION

POSSIBLE CAUSE AND REMEDY:

1. **Digging teeth worn or missing.** See maintenance section. Inspect teeth and replace as needed. (Excessively worn teeth can cut a trench that is too narrow for boom end to slide through.)

TROUBLESHOOTING

PROBLEM: POOR TRENCH PRODUCTION (Continued)

2. **Augers running on ground.** Raise headshaft to keep auger off ground.
3. **Incorrect tooth style or spacing for digging conditions.** Consult manual for correct tooth style and spacing. Left/right must be balanced to within one tooth difference.
4. **Turning too short of radius with tractor.** Make wider turns or remove trencher from the ditch and reposition. See "Operating Instructions" section of this manual.
5. **Trenching on uneven terrain.** Level trench path before trenching.
6. **Digging chain too tight.** Adjust to proper tension. Digging chain should be tight enough to remain on sprockets while turning under load. There should be some sag in the chain. If too tight, loosen chain by the adjusting nut(s) on the boom.
7. **Trenching uphill.** Trench downhill whenever possible.
8. **Incorrect boom angle for trenching conditions.** Trench at recommended angle. Refer to "Operating Instructions" section of this manual.
9. **Trencher not setting level.** Adjust leveling lift linkage.




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	<p>GRADE 2</p>  <p>GRADE 5</p>  <p>GRADE 8</p> 
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	

METRIC BOLT TORQUE SPECIFICATIONS

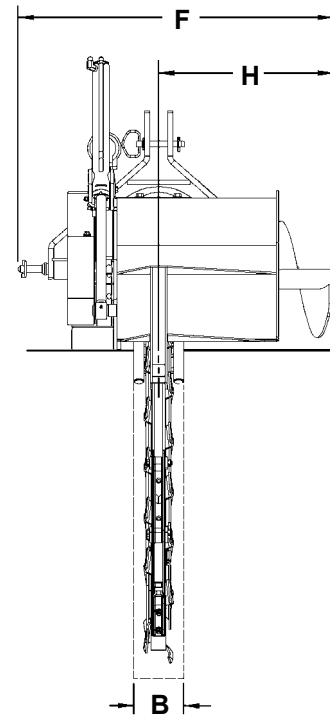
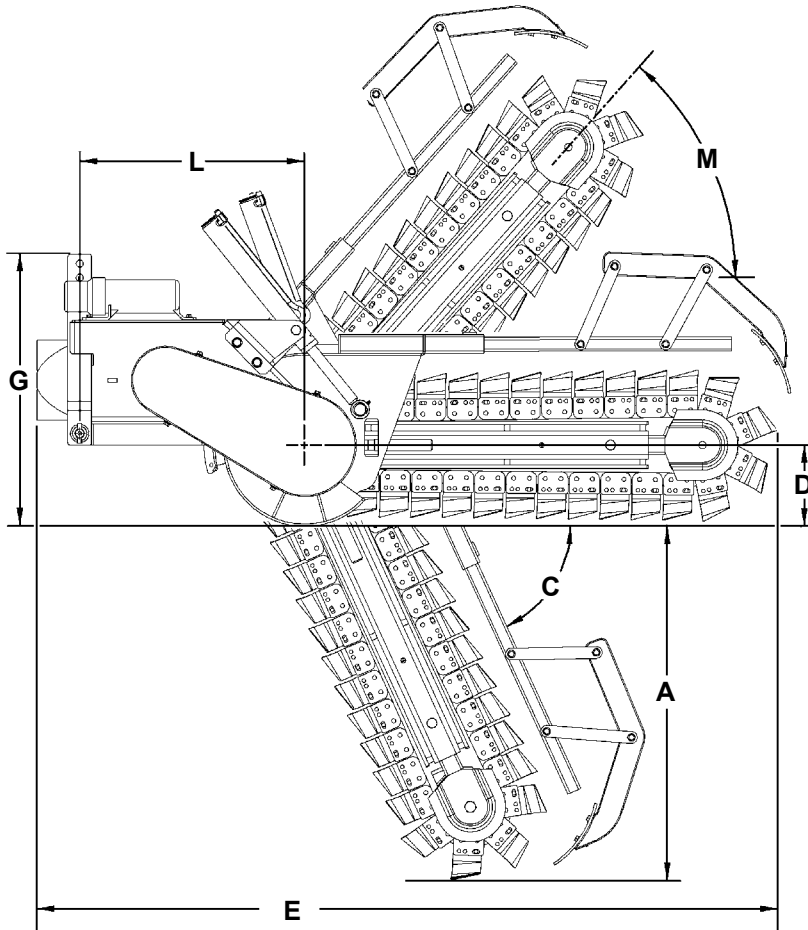
NOTE: The following torque values are for use with metric hardware that is unplated and either dry or lubricated with engine oil. Reduce torque 15% when using hardware that has extreme pressure lubricants, plating or hard washer applications.

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

SPECIFICATIONS

330 TRENCHER



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

DESCRIPTION	BOOM SIZE	
	30"	36"
A. Trench Depth w/Auger at 65° Digging Angle.....	30"	36"
B. Chain Width.....	3"	3"
	4.5"	4.5"
	6"	6"
	8"	8"
C. Recommended Trenching Angle.....	65°	65°
D. Headshaft Height (Auger Touching Ground).....	8.5"	8.5"
E. Overall Length.....	73"	79"
F. Overall Width.....	38"	38"
G. Overall Height.....	29"	29"
H. Spoil Discharge Reach.....	21"	21"
L. Length from 3-Point to Headshaft (center of gravity).....	24"	24"
M. Transport Angle.....	48°	48°
Hydraulic System		
Operating Hydraulic Pressure.....	2000-2500 PSI	
Rear PTO RPM Rating.....	540 RPM	
Rear PTO HP Rating.....	15-30 HP	

11159 6-17-08

LIMITED WARRANTY

All new Bradco products are warranted to be free from defects in materials or workmanship which may cause failure under normal usage and service when used for the purpose intended.

In the event of failure within twenty four (24) months from initial retail sale, lease or rental date (excluding cable, ground engaging parts such as sprockets, digging chain, bearings, teeth, tamping and demolition heads, blade cutting edges, pilot bits, auger teeth, auger heads & broom bristles), if after examination, Bradco determines failure was due to defective material and/or workmanship, parts will be repaired or replaced. Bradco may request defective part or parts be returned prepaid to them for inspection at their place of business at Delhi, Iowa, or to a location specified by Bradco.

Any claims under this warranty must be made within fifteen (15) days after the Buyer learns of the facts upon which such claim is based. All claims not made in writing and received by Bradco within the time period specified above shall be deemed waived.

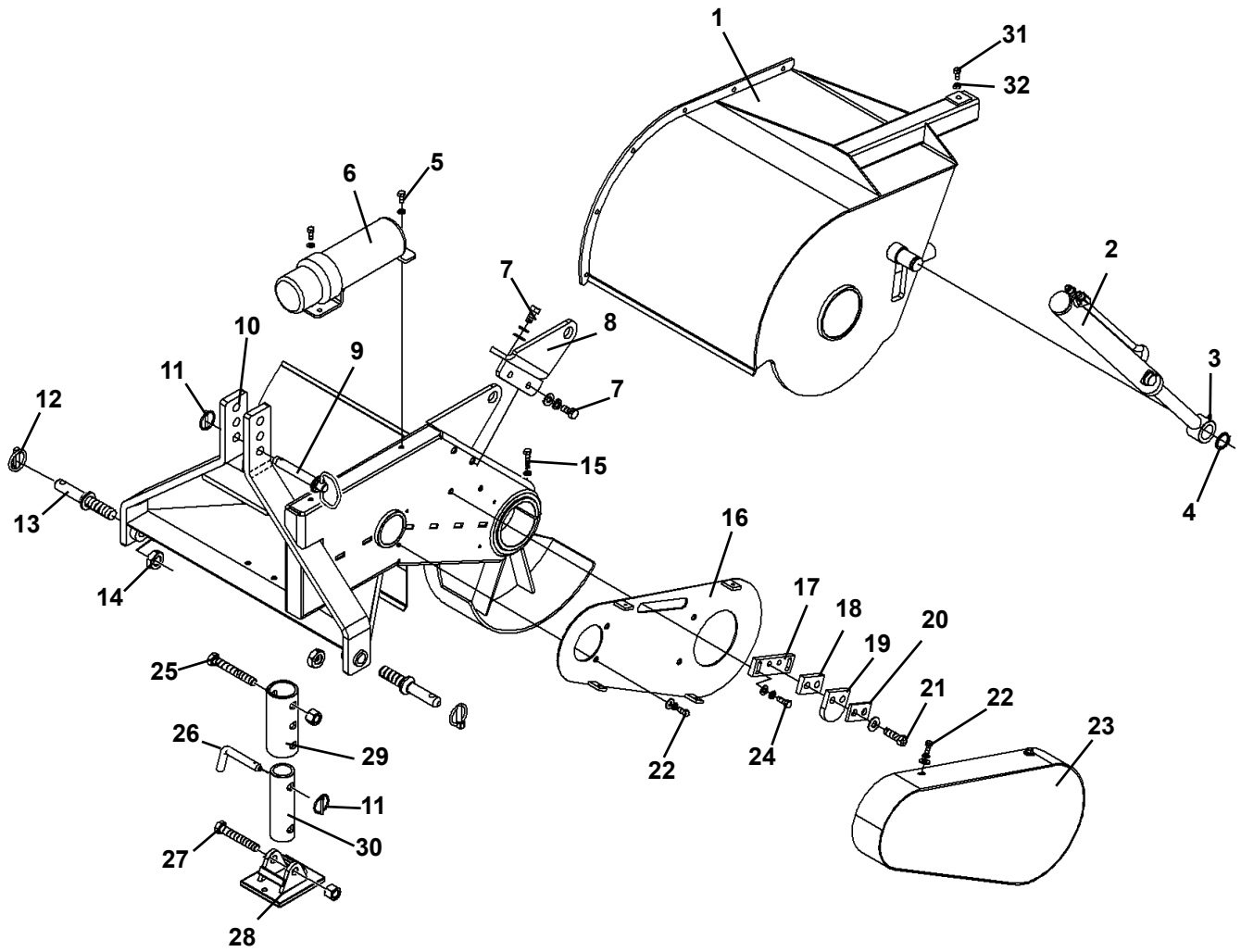
THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED AND THERE ARE NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL BRADCO BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGE.

BRADCO'S LIABILITY FOR ANY AND ALL LOSSES AND DAMAGES TO BUYER, RESULTING FROM ANY CAUSE WHATSOEVER, INCLUDING BRADCO'S NEGLIGENCE, IRRESPECTIVE OF WHETHER SUCH DEFECTS ARE DISCOVERABLE OR LATENT, SHALL IN NO EVENT EXCEED THE PURCHASE PRICE OF THE PARTICULAR PRODUCTS WITH RESPECT TO WHICH LOSSES OR DAMAGES ARE CLAIMED, OR, AT THE ELECTION OF BRADCO, THE REPAIR OR REPLACEMENT OF DEFECTIVE OR DAMAGED PRODUCTS.

TRENCHER ASSEMBLY

ASSEMBLY #111135

DIAGRAM 1 OF 2



TRENCHER ASSEMBLY

ASSEMBLY #111135

LIST 1 OF 2

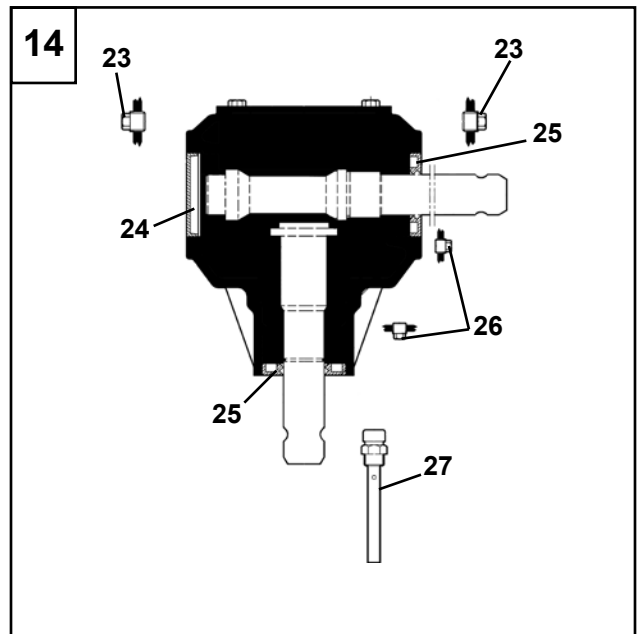
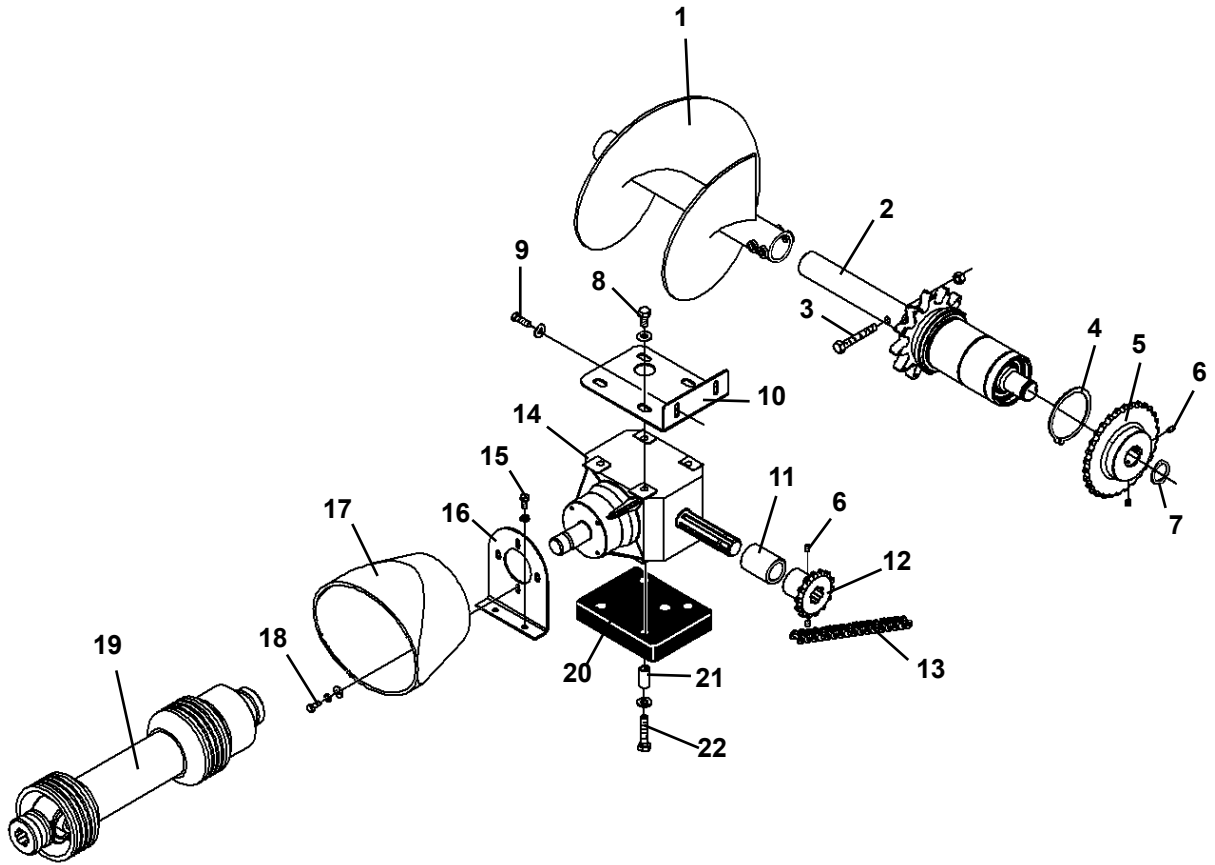
<u>ITEM</u>	<u>REQ'D</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	111150	Mainframe
2	1	111389	Cylinder Assembly
3	1	6616	Grease Fitting
4	1	1652	Snap Ring
5	2	1021	.31" UNC X .75" Hex Capscrew
	2	1502	.31" Lock Washer
6	1	25453	Manual Storage Tube
7	4	1088	.50" UNC X 1.00" Hex Capscrew
	4	1505	.50" Lock Washer
	4	1646	.50" Hard Flat Washer
8	1	112186	Cylinder Mounting Ear
9	1	82963	Hitch Pin
10	1	111136	3-Point Mounting Support Bracket
11	2	21169	Klik Pin
12	2	57496	Klik Pin
13	2	111140	Lift Pin
14	2	1496	.88" UNF Hex Jam Nut
15	2	10065	.50" UNC X 1.75" Sockethead Capscrew
	2	1646	.50" Hard Flat Wasehr
16	1	111174	Inside Drive Chain Cover
17	1	112184	Chain Tension Adjustment Plate
18	1	59982	Spacer Plate
19	1	58784	Chain Tension Wearplate
20	1	8564	Clamp Plate
21	2	1964	.50" UNC X 1.75" Hex Capscrew - Grade 8
	2	1516	.50" Flat Washer
22	8	1021	.31" UNC X .75" Hex Capscrew
	8	1502	.31" Lock Washer
	8	1513	.31" Flat Washer
23	1	111397	Chain Cover
24	2	1043	.38" UNC X 1.00" Hex Capscrew
	2	1503	.38" Lock Washer
	2	1800	.38" Hard Flat Washer
25	1	1125	.62" UNC X 4.50" Hex Capscrew
	1	1642	.62" UNC Nylock Nut
26	1	89951	Hitch Pin
27	1	1124	.62" UNC X 4.00" Hex Capscrew
	1	1642	.62" UNC Nylock Nut
28	1	112212	Trencher Stand Base
29	1	112207	Outside Tube - Trencher Stand
30	1	112208	Inside Tube - Trencher Stand
31	1	1769	.50" UNC X 1.00" Square Head Set Screw
32	1	1242	.50" UNC Jam Nut

11115 5-27-08

TRENCHER ASSEMBLY

ASSEMBLY #111135

DIAGRAM 2 OF 2



11116 5-21-08

TRENCHER ASSEMBLY

ASSEMBLY #111135

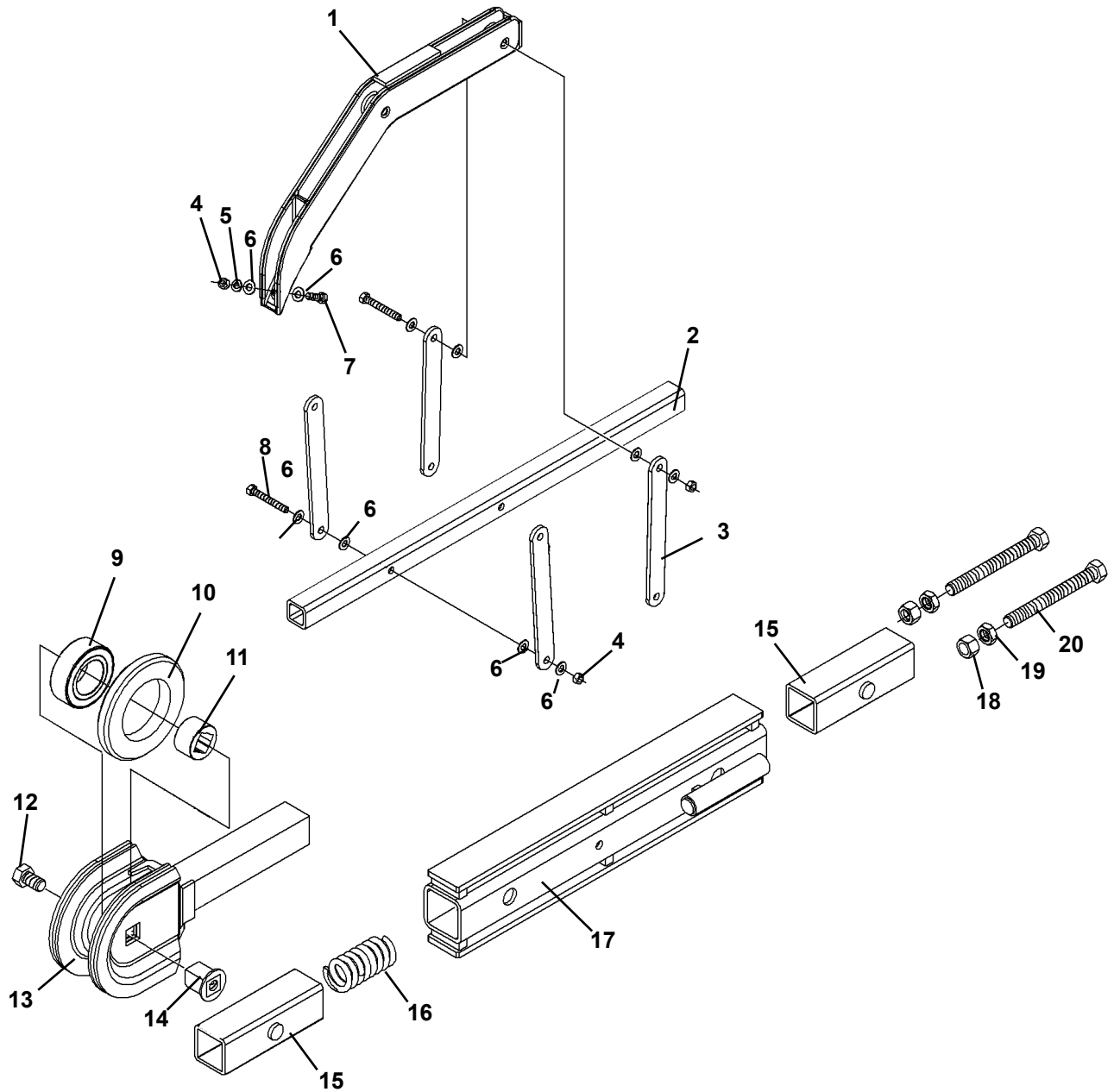
LIST 2 OF 2

<u>ITEM</u>	<u>REQ'D</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	111162	Auger Flighting
2	1	111165	Headshaft Assembly
3	1	1098	.50" UNC X 3.50" Hex Capscrew
	1	1841	.50" UNC Deformed Lock Nut
4	1	111169	Snap Ring
5	1	111172	Sprocket - 30 Tooth
6	4	1589	Set Screw
7	1	1684	Snap Ring
8	4	1088	.50" UNC X 1.00" Hex Capscrew
	4	1646	.50" Hard Flat Washer
9	2	1044	.38" UNC X 1.25" Hex Capscrew
	2	1514	.38" Flat Washer
	2	10141	.38" Rivet Nut
10	1	111170	Top Gearbox Cover Plate
11	1	111404	Spacer
12	1	111173	Sprocket - 14 Tooth
13	1	111177	Drive Chain - 65 Pitch No. 60 Heavy Chain
14	1	111168	Gearbox - 1.35:1 Reduction Ratio
15	2	1042	.38" UNC X .75" Hex Capscrew
	2	1503	.38" Lock Washer
16	1	111160	PTO Guard Mounting
17	1	78851	PTO Guard
18	4	1021	.31" UNC X .75" Hex Capscrew
	4	1502	.31" Lock Washer
	4	1513	.31" Flat Washer
19	1	111179	Drive Shaft Assembly
20	1	111178	Plastic Spacer
21	4	112185	Spacer
22	4	1965	.50" UNC X 2.50" Hex Capscrew - Grade 8
	4	1646	.50" Hard Flat Washer
23	2	3181	Replacement .38" Gas Plug
24	1	112569	Replacement Cap
25	2	112570	Replacement Dust Lip
26	2	3156	Replacement .25" Solid Gas Plug
27	1	112571	Replacement Breather Plug with Dipstick

11117 8-8-08

30" BOOM AND CRUMBER ASSEMBLY

ASSEMBLY #111385



30" BOOM AND CRUMBER ASSEMBLY

ASSEMBLY #111385

<u>ITEM</u>	<u>REQ'D</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
Crumber Assembly #111377 (Includes Items #1 through #8)			
1	1	112443	Crumber End
2	1	111378	Crumber Bar / Restraint Bar
3	4	112214	Lever Arm
4	6	1837	.38" UNC Deformed Lock Nut
5	2	1503	.38" Lock Washer
6	20	1800	.38" Hard Flat Washer
7	2	1044	.38" UNC X 1.25" Hex Capscrew
8	4	1050	.38" UNC X 2.75" Hex Capscrew

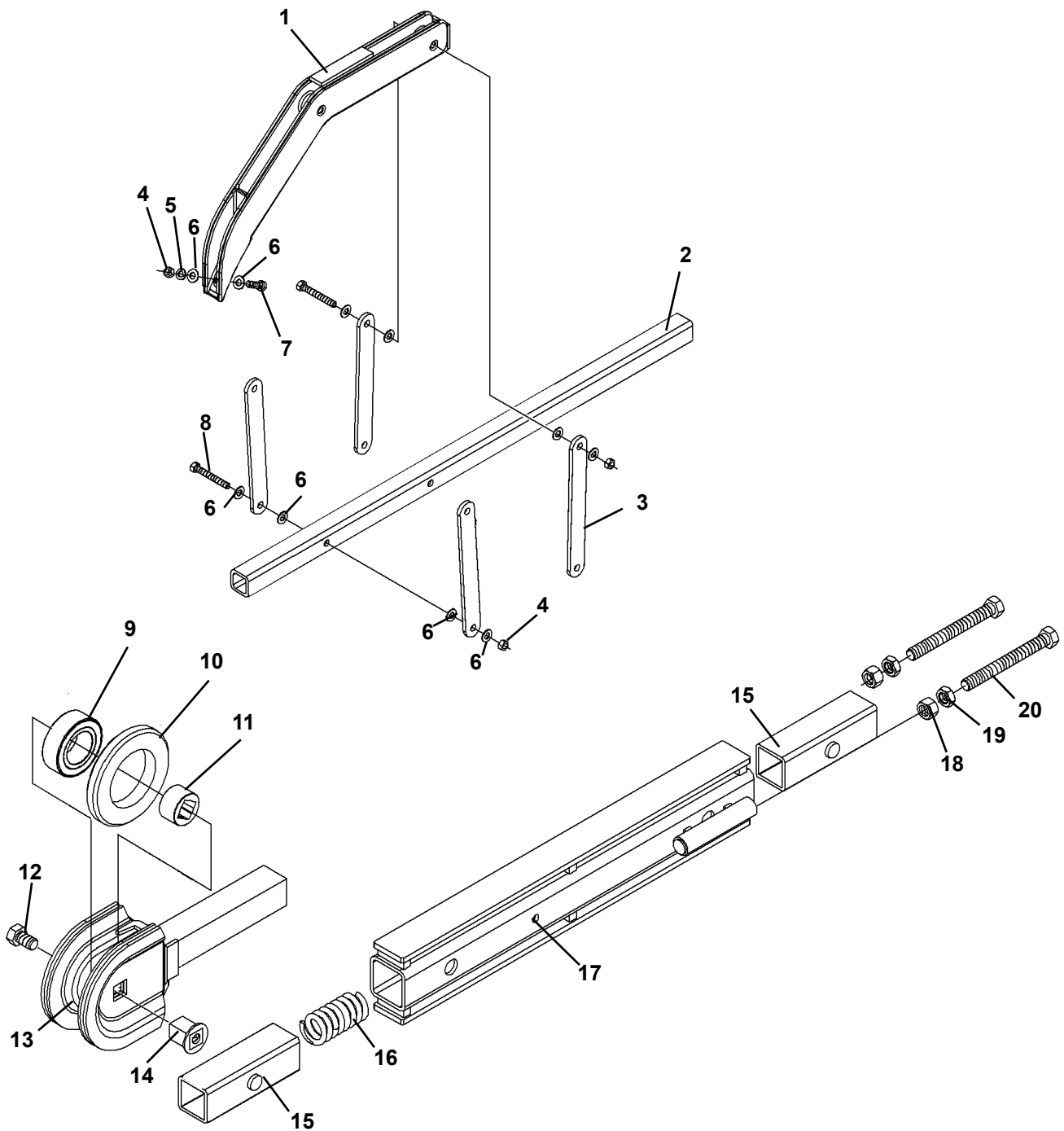
Boom Assembly 111384 (Includes Items #9 through #17)

9	1	8085*	Bearing
10	1	62718*	Idler Wheel
11	1	53988*	Idler Hub
12	1	1548	.75" UNC X 1.25" Nylock Capscrew
13	1	112180	End Idler
14	1	112215	1.12" Square Pin
15	2	53138	Boom Bushing
16	1	112558	Compression Spring
17	1	111382	30" Boom
18	2	1231	.75" UNC Hex Nut
19	2	1245	.75" UNC Hex Jam Nut
20	2	62702	.75" UNC X 7.00" Bolt

* NOTE: Idler Roller Assembly Repair Kit #111161 includes all parts marked with an asterisk (*).

36" BOOM AND CRUMBER ASSEMBLY

ASSEMBLY #111374



36" BOOM AND CRUMBER ASSEMBLY

ASSEMBLY #111374

<u>ITEM</u>	<u>REQ'D</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
Crumber Assembly #111377 (Includes Items #1 through #8)			
1	1	112443	Crumber End
2	1	111378	Crumber Bar / Restraint Bar
3	4	112214	Lever Arm
4	6	1837	.38" UNC Deformed Lock Nut
5	2	1503	.38" Lock Washer
6	20	1800	.38" Hard Flat Washer
7	2	1044	.38" UNC X 1.25" Hex Capscrew
8	4	1050	.38" UNC X 2.75" Hex Capscrew

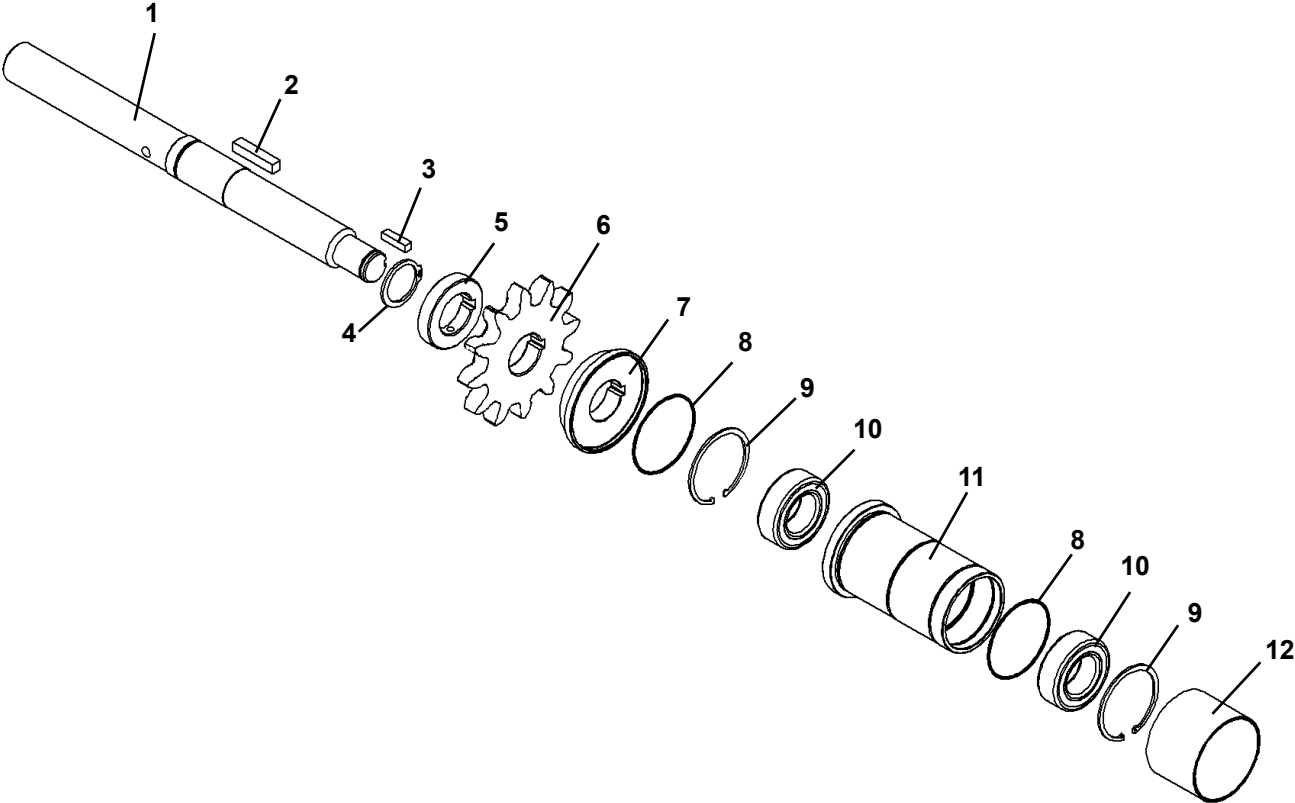
Boom Assembly 111379 (Includes Items #9 through #17)

9	1	8085*	Bearing
10	1	62718*	Idler Wheel
11	1	53988*	Idler Hub
12	1	1548	.75" UNC X 1.25" Nylock Capscrew
13	1	112180	End Idler
14	1	112215	1.12" Square Pin
15	2	53138	Boom Bushing
16	1	112558	Compression Spring
17	1	111375	36" Boom
18	2	1231	.75" UNC Hex Nut
19	2	1245	.75" UNC Hex Jam Nut
20	2	62702	.75" UNC X 7.00" Bolt

* NOTE: Idler Roller Assembly Repair Kit #111161 includes all parts marked with an asterisk (*).

HEADSHAFT ASSEMBLY

ASSEMBLY #111165



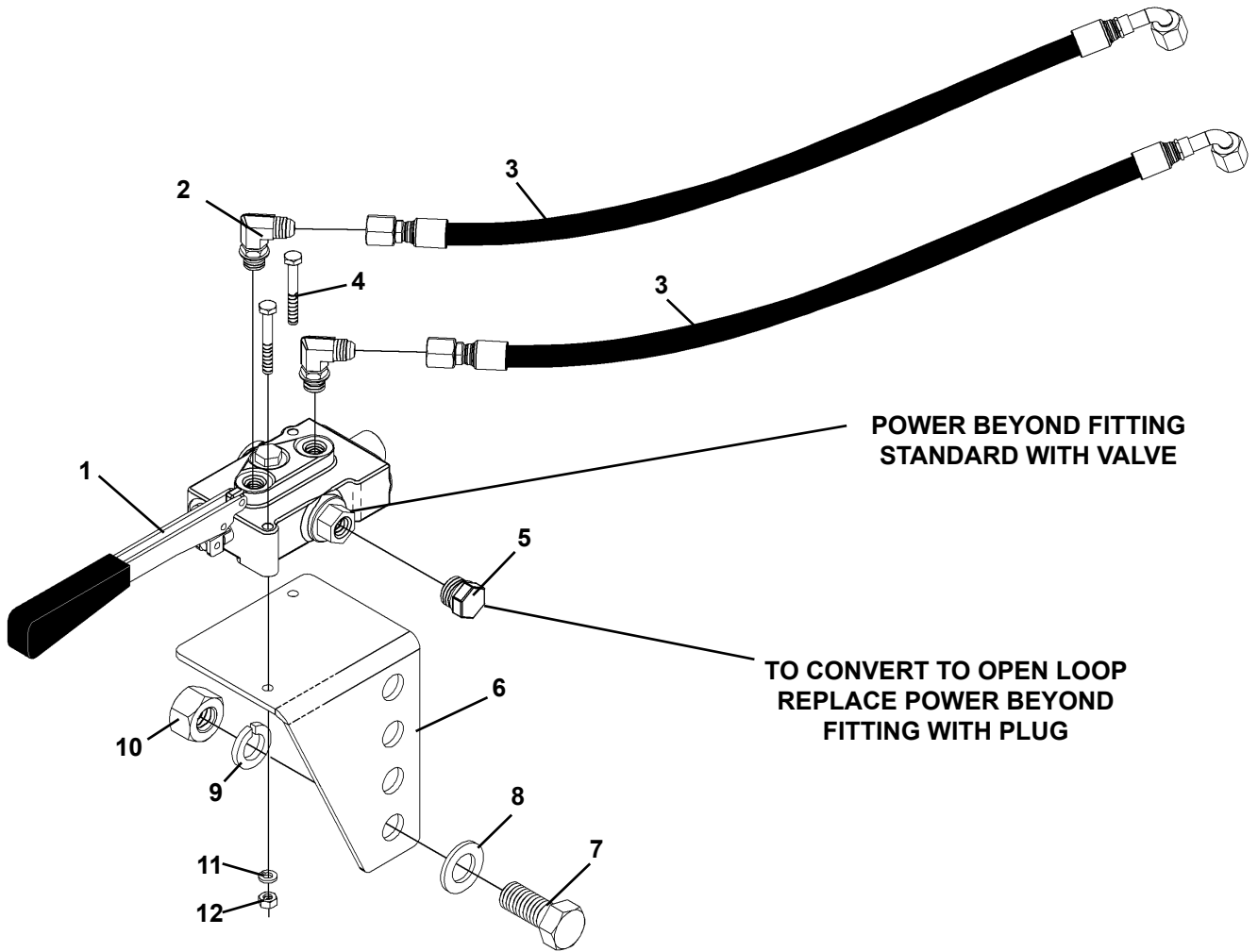
HEADSHAFT ASSEMBLY

ASSEMBLY #111165

<u>ITEM</u>	<u>REQ'D</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	111166	Headshaft
2	1	53780	Key
3	1	32903	Key
4	1	1901	External Snap Ring
5	1	112496	Retaining Collar
6	1	31597	Drive Sprocket
7	1	112495	Seal Protector
8	2	45413	O'Ring
9	2	1681	Internal Snap Ring
10	2	78841	Bearing - Sealed
11	1	111167	Headshaft Housing
12	1	112559	Bearing - Self Lubricating

OPTIONAL VALVE ASSEMBLY

ASSEMBLY #112573



OPTIONAL VALVE ASSEMBLY

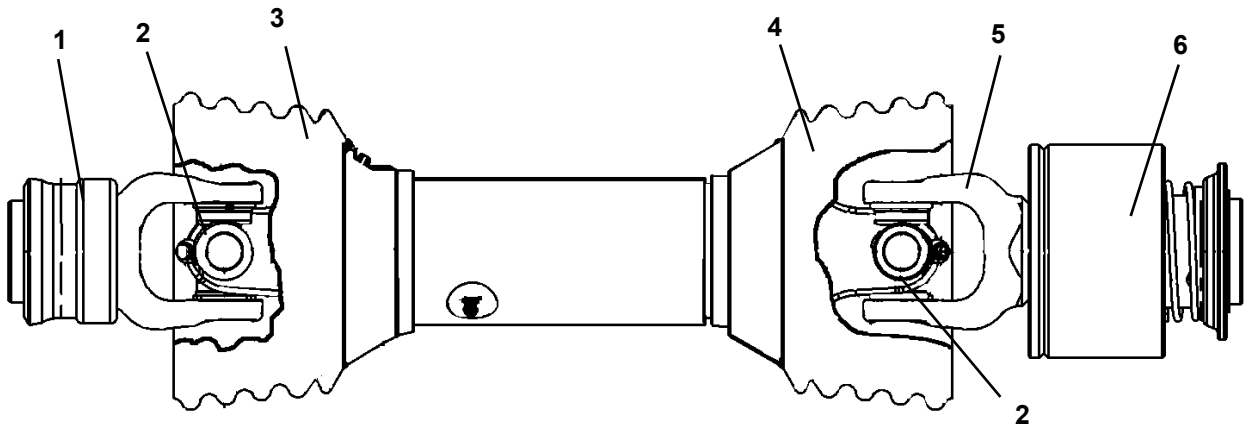
ASSEMBLY #112573

<u>ITEM</u>	<u>REQ'D</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	62090	Valve
2	2	3434	90° Elbow 6MJ-6MBo
3	2	37868	Hose Assembly .25" X 27" 6FJX-6FJX 90°
4	2	1006	.25" UNC X 1.75" Hex Capscrew
5	1	3341	Plug 6MBo
6	1	112572	Valve Mounting Bracket
7	1	1138	.75" UNC X 1.75" Hex Capscrew
8	1	1649	.75" Hard Flat Washer
9	1	1507	.75" Lock Washer
10	1	1534	.75" UNC Nylock Hex Nut
11	2	1501	.25" Lock Washer
12	2	1224	.25" UNC Hex Nut

11271 8-7-08

DRIVE SHAFT ASSEMBLY

ASSEMBLY #111179 - SERVICE PARTS

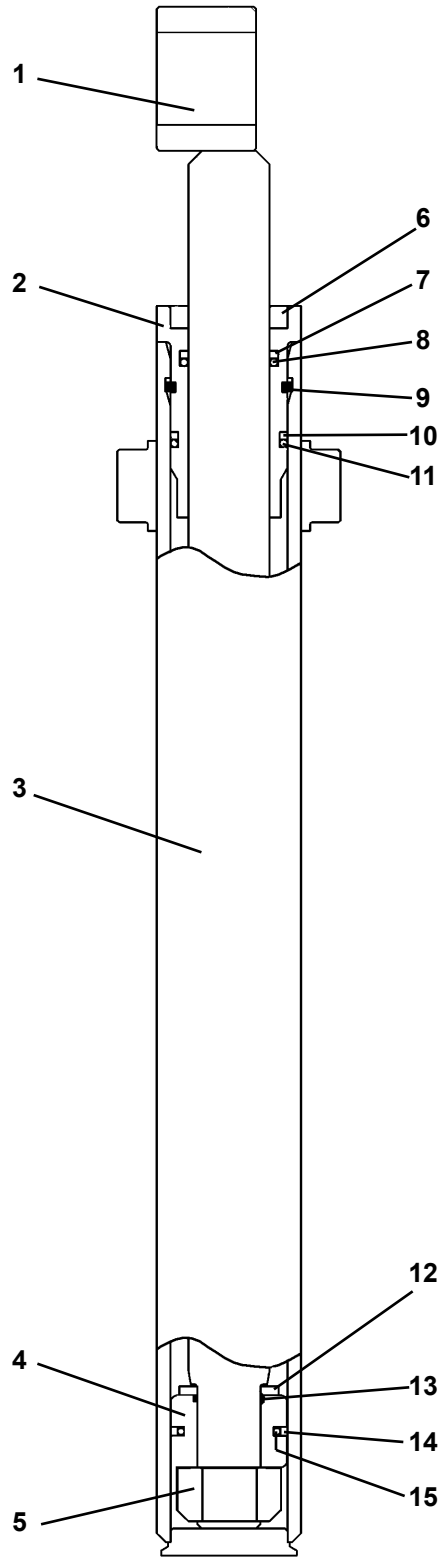


DRIVE SHAFT ASSEMBLY
ASSEMBLY #111179 - SERVICE PARTS

<u>ITEM</u>	<u>REQ'D</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	112563	Front "Tractor" Half Shaft Assembly (Includes Shaft, Joint and Guard)
2	2	112565	Cross & Bearing Kit
3	1	112566	Front "Tractor" Outer Guard
4	1	112567	Rear "Trencher" Inner Guard
5	1	112564	Rear "Trencher" Half Shaft Assembly (Includes Shaft, Joint and Guard)
6	1	112568	Compact Automatic Clutch

CYLINDER ASSEMBLY

ASSEMBLY #111389



CYLINDER ASSEMBLY

ASSEMBLY #111389

<u>ITEM</u>	<u>REQ'D</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	111393	Cylinder Rod
2	1	50547	Cylinder Gland
3	1	111390	Cylinder Tube
4	1	50546	Piston
5	1	1482	Hex Nut (Torque to 150-200 ft. lbs.)
6	1	4981*	Rod Wiper
7	1	4579*	Back-Up Washer
8	1	4580*	O'Ring
9	1	8177*	Gland Retaining Rod/Ring
10	1	4988*	Back-Up Washer
11	1	4987*	O'Ring
12	1	52644	Washer
13	1	4635*	O'Ring
14	1	4984*	Piston Ring
15	1	4985*	O'Ring

NOTE: Seal Kit #4990 includes all parts marked with an asterisk (*). Parts are not sold separately.

11127 5-22-08