BRADCO
BY PALADIN

OPERATOR'S AND PARTS MANUAL

TREE SPADE
2415, 3215 & 4415

FOR
SKID STEER LOADERS

SERIAL NUMBER: _____

MODEL NUMBER: _____

Manual Number: OM632
Part Number: 75532
Rev. 4

800-456-7100 I www.paladinattachments.com 503 Gay Street, Delhi, IA 52223, United States of America

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

PRE-OPERATION 13

INSTALLATION 14-15

OPERATING INSTRUCTIONS
- CONTROLS 16-17
- BALL SIZE GUIDLINES 17-18
- ADJUSTING LEG HEIGHT 19
- BALLED AND BURLAPPED TREES 20-21
- DIRECT TRANSPLANTING 21-22
- STORAGE & TRANSPORTING 23
- LIFT & TIE DOWN POINTS 24

MAINTENANCE AND SERVICE
- LUBRICATION 25
- ROUTINE MAINTENANCE 26
- BLADE MAINTENANCE AND SHARPENING 27
- REPLACING BUSHINGS 27-28
- SIDE CHANNEL ADJUSTMENT 28-29
- CYLINDER SEAL REPLACEMENT 30-31

TROUBLESHOOTING 32-33

SPECIFICATIONS
- TREE SPADE SPECIFICATIONS 34
- BOLT TORQUE SPECIFICATIONS 35

LIMITED WARRANTY 37

PARTS

2415 TREE SPADE ASSEMBLY 38-41
2415 HYDRAULIC CIRCUITS (POWER & RETURN, BLADE, GATE, UNDERCUTTER) 42-49
3215 TREE SPADE ASSEMBLY 50-53
3215 HYDRAULIC CIRCUITS (POWER & RETURN (INCLUDES 4415), BLADE, GATE, UNDERCUTTER) 54-61
4415 TREE SPADE ASSEMBLY 62-65
4415 HYDRAULIC CIRCUITS (BLADE, GATE, UNDERCUTTER) 66-71
CYLINDER ASSEMBLIES 72-85
ELECTRICAL ASSEMBLY 86-87
VALVE ASSEMBLY 88-89
SOLENOID VALVE REPLACEMENT PARTS 90-91
JOYSTICK AND WIRE HARNESS ASSEMBLY REPLACEMENT PARTS 92-93
WIRING SCHEMATICS FOR DEUTSCH CONNECTORS 94-95
BLADE SETS 96-97

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PREFACE

GENERAL COMMENTS

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

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

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

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

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

BEFORE OPERATION

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

SAFETY ALERT SYMBOL

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

SERVICE

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

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

SOUND AND VIBRATION

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

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

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

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

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SAFETY STATEMENTS

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

DANGER — **THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.**

WARNING — **THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.**

CAUTION — **THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN MINOR OR MODERATE INJURY.**

NOTICE — **NOTICE IS USED TO ADDRESS PRACTICES NOT RELATED TO PHYSICAL INJURY.**

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.

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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.

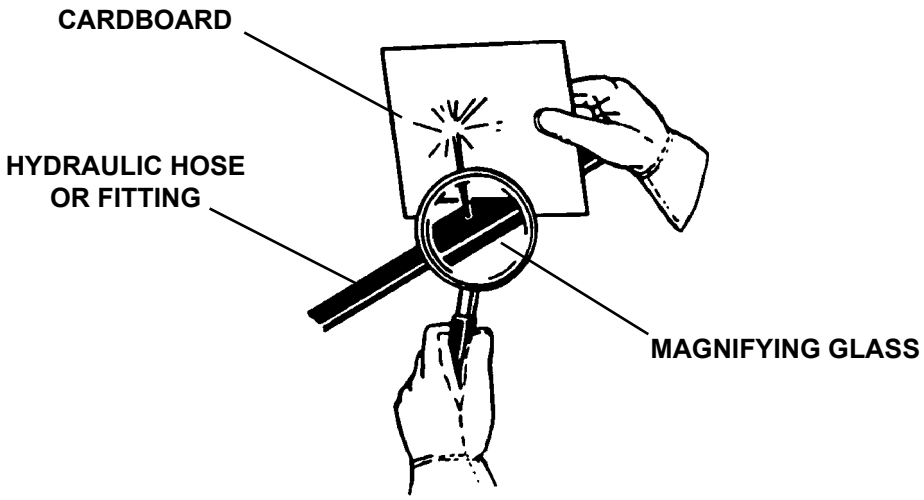
WARNING! LOWER OR SUPPORT RAISED EQUIPMENT

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.**



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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 Protective 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.

WARNING!

CALIFORNIA PROPOSITION 65 WARNING

This product may contain a chemical known to the state of California to cause cancer, or birth defects or other reproductive harm. www.P65Warnings.ca.gov

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EQUIPMENT SAFETY PRECAUTIONS

WARNING!

KNOW WHERE UTILITIES ARE

Observe overhead electrical and other utility lines. Be sure equipment will clear them. When digging, call your local utilities for location of buried utility lines, gas, water, and sewer, as well as any other hazard you may encounter.

WARNING!

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

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

WARNING!

REMOVE PAINT BEFORE WELDING OR HEATING

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

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

WARNING!

END OF LIFE DISPOSAL

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

OPERATING THE TREE SPADE

- Block off work area from bystanders, livestock, etc.
- Operate only from the operator's station.
- Do not lift loads in excess of the capacity of the prime mover.
- When operating on slopes, drive up and down, not across. Avoid steep hillside operation, which could cause the prime mover to overturn.
- Reduce speed when driving over rough terrain, on a slope, or turning, to avoid overturning the vehicle.
- 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 attachment to the ground, turn off the prime mover's engine, remove the key and apply the brakes.

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EQUIPMENT SAFETY PRECAUTIONS

TRANSPORTING THE TREE SPADE

- Travel only with the attachment in a safe transport position to prevent uncontrolled movement. Drive slowly over rough ground and on slopes.
- When driving on public roads use safety lights, reflectors, Slow Moving Vehicle signs etc., to prevent accidents. Check local government regulations that may affect you.
- Do not drive close to ditches, excavations, etc., cave in could result.
- Do not smoke when refueling the prime mover. Allow room in the gas tank for expansion. Wipe up any spilled fuel. Secure cap tightly when done.
- Use extra care when loading onto or unloading the machine from a trailer or truck

MAINTAINING THE TREE SPADE

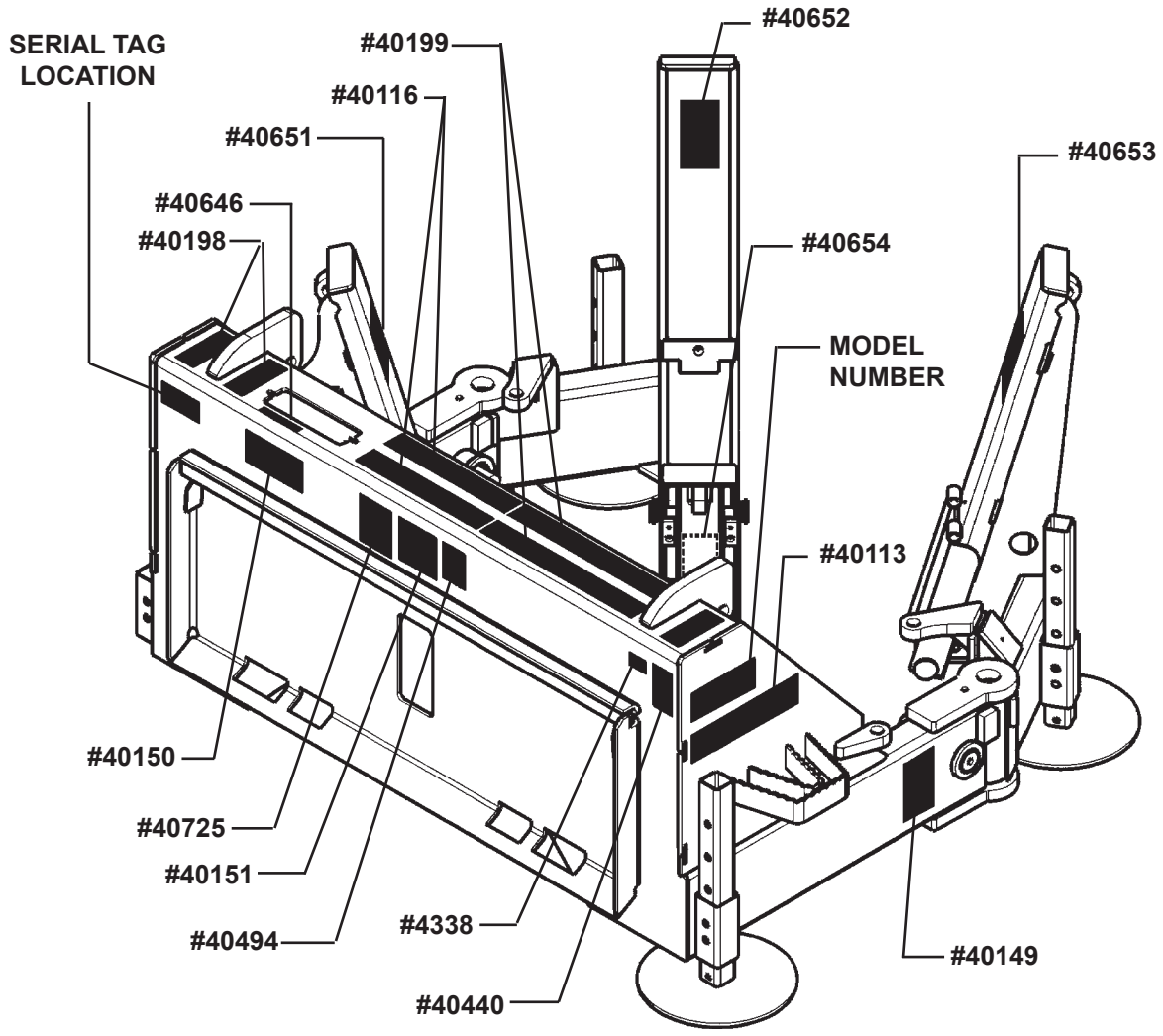
- Before performing maintenance, lower the attachment to the ground, turn off the engine, remove the key and apply the brakes.
- Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manual's before any repair is made. After completing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

DECALS

DECAL PLACEMENT

GENERAL INFORMATION

The diagram on this page shows the location of the decals used on the BRADCO Tree Spades. The decals are identified by their part numbers, with reductions of the actual decals located on the following pages. Use this information to order replacements for lost or damaged decals. Be sure to read all decals before operating the tree spade. 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 above and smooth out any bubbles.

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DECALS

USE NUMBER DECALS FOR BLADE NUMBER AND IN MODEL NUMBER (IF REQUIRED)

1 2 3 4 5

NUMBER "1"
PART #40651

NUMBER "2"
PART #40652

NUMBER "3"
PART #40653

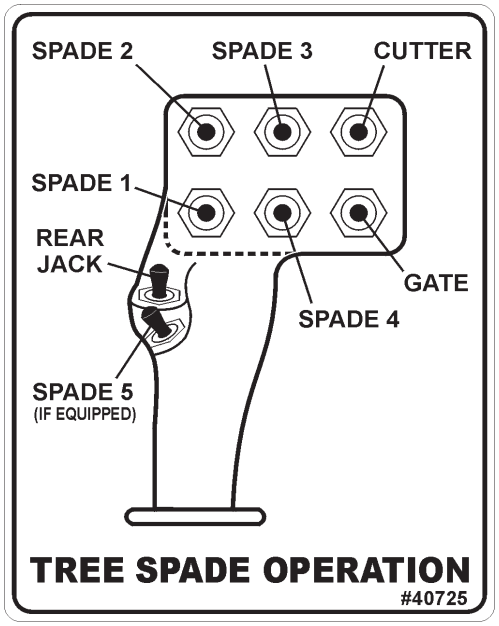
NUMBER "4"
PART #40654

NUMBER "5"
PART #40655

REAR STABILIZER
#40646

REAR STABILIZER
PART #40646

MADE IN U.S.A.
PART #4338



OPERATION DECAL
PART #40725

NON-SLIP SURFACE 2X6
PART #40198

NON-SLIP SURFACE 2X13
PART #40116

NON-SLIP SURFACE 2X15
PART #40199

BRADCO
BY PALADIN

BRADCO
PART #40113

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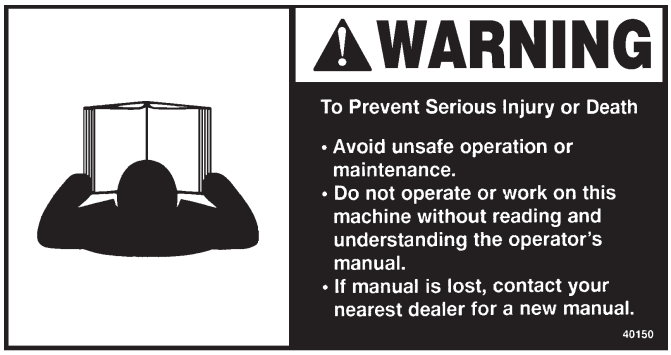
DECALS

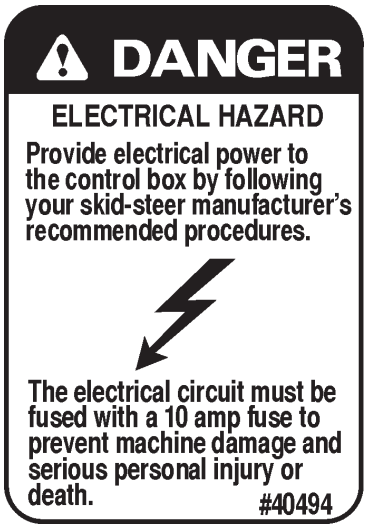
DANGER! PINCH POINT
PART #40149

WARNING! HIGH PRESSURE FLUID
PART #40151



WARNING! READ MANUAL
PART #40150

CALL BEFORE YOU DIG
PART #40440



DANGER! ELECTRICAL HAZARD
PART #40494

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PRE-OPERATION

BLADE PREPARATION

The blades are shipped with a graphite coating and should be rubbed very lightly with a fine steel wool before using. This coating prevents earth from sticking to the blades and aids in the digging operation. The words "Blade" and "Spade" are used interchangeably throughout this manual.

SKID STEER OR OTHER HOST MACHINE

The BRADCO Tree Spades mount to various host machines such as but not limited to skid steers, loaders, tractors and excavator's. Due to the quantity of skid steer applications we will be referring to the host machine as a skid steer loader or prime mover throughout this manual.

The skid steer must have front auxiliary hydraulics and a 12 Volt DC electrical power source available for spade operation. The **BRADCO** Tree Spades are NOT designed for use on high flow skid-steers.

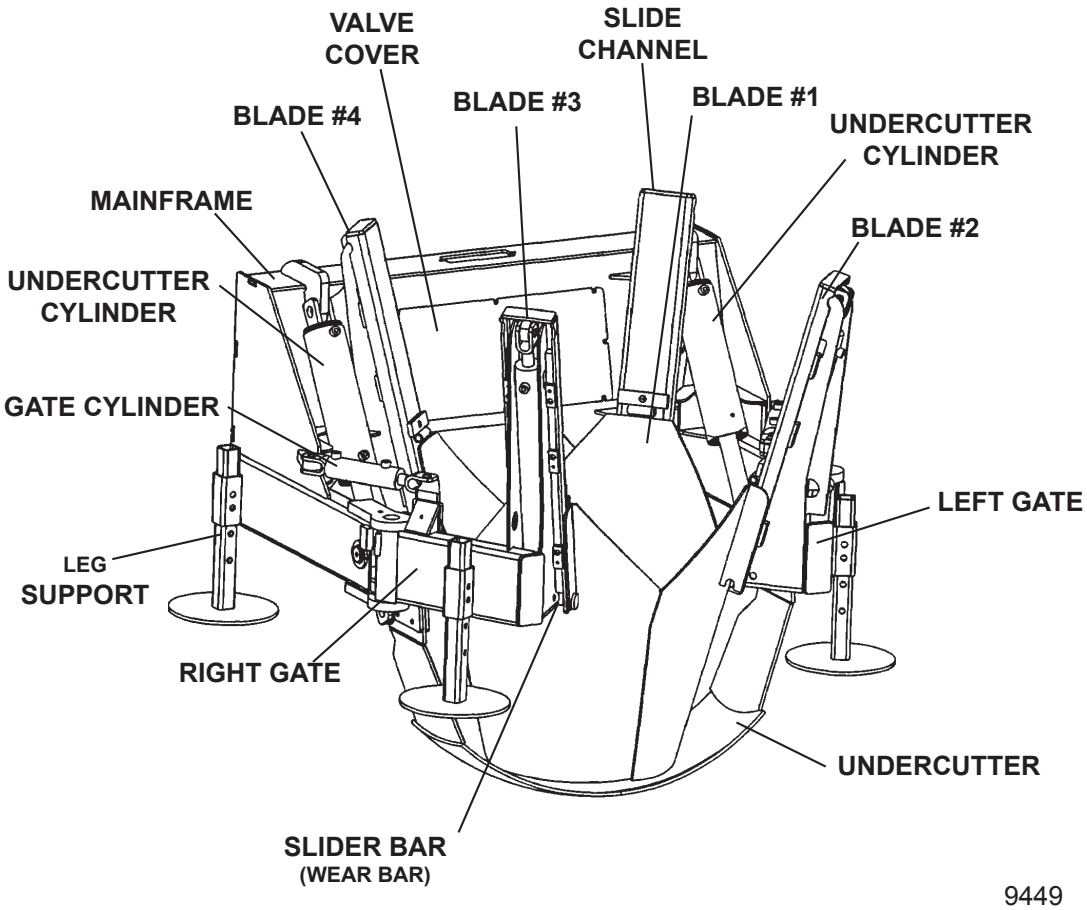
Rear stabilizers are recommended to get the maximum performance of your tree spade. The rear stabilizers allow as much weight as possible to be transferred to the front of the skid steer and therefore to the tree spade for maximum digging ability.

MAJOR NOMENCLATURE

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

The blades are identified in a clockwise direction starting with the left rear spade.

Model 3215 Tree Spade shown



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INSTALLATION INSTRUCTIONS

GENERAL INFORMATION

The following instructions will assist you in mounting your tree spade onto your prime mover. The tree spade uses the quick attach mechanism for ease of installation. Therefore, if you know how to attach the loader bucket, attaching the tree spade should prove no problem.

NOTE: For mounting to other host machines see the specific mounting instructions that are supplied separately.

Remember to read all safety warnings, decals and operating instructions before operating the prime mover or tree spade.

MOUNTING INSTRUCTIONS

1. Remove any attachment from the front of the loader.
2. Following all standard safety practices and the instructions for installing an attachment in your prime mover operator's manual, install the attachment onto your loader.

WARNING! **To avoid serious personal injury, make sure the attachment is securely latched to the attachment mechanism of your unit. Failure to do so could result in separation of the attachment from the prime mover.**

3. Lower the unit to the ground and relieve pressure to the auxiliary hydraulic lines.
4. Following the safety shut down procedure for your prime mover, shut down and exit the prime mover.
5. After making sure that the hydraulic couplers are free from any foreign material or contaminants, connect the couplers to the auxiliary hydraulic system of your prime mover.
6. Install your rear stabilizers (if so equipped) by following the instructions that were supplied with the rear stabilizers for your unit.
7. Connect the power and return hoses for the rear stabilizers to the two bulkhead fittings on the top of the mainframe (directly beside the power and return hoses for the tree spade).
8. Connect the cord assembly (with joystick) to the control cord from the tree spade. Connect the power cord from the joystick control to a power source on the prime mover. **NOTE: Some host machines have an auxiliary electrical outlet to plug in the control cord and then use their own joystick controls.**

DANGER! **ELECTROCUTION HAZARD**

Provide electrical power to the joystick by following your prime mover manufacturer's recommended procedures. The electrical circuit must be fused with a 10 amp fuse to prevent machine damage and serious personal injury or death.

9. The length of control cord extending from the tree spade mainframe to the skid steer can be adjusted to suit the reach required for your application. (To adjust: Loosen the nut on the strain relief fitting to release the grip of the grommet and either push or pull on the cord to obtained your desired length. Tighten the nut by hand to secure the cord in place. Use plastic ties to secure the control cord to the hydraulic hoses to help keep it from interfering with operation of the tree spade and also to assist in keeping it free from pinching or chafing.)
10. Following the standard start up procedure for your prime mover, start the loader and run all cylinders on the attachment to purge any air from the system. Check for proper hydraulic connection, hose routing and hose length.
11. Attachment installation is complete.

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INSTALLATION INSTRUCTIONS

DETACHING

1. Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine, and remove the key.
2. Follow prime mover operator's manual to relieve pressure in the hydraulic lines.
3. Disconnect couplers and connect them together or install dust caps and plugs to prevent contaminants from entering the hydraulic system. Store hoses on attachment, off the ground.
4. Disconnect the electrical power cord to the control box and store the control box in a dry and suitable location.
5. Follow your prime mover operator's manual for detaching (removing) an attachment.

OPERATING INSTRUCTIONS

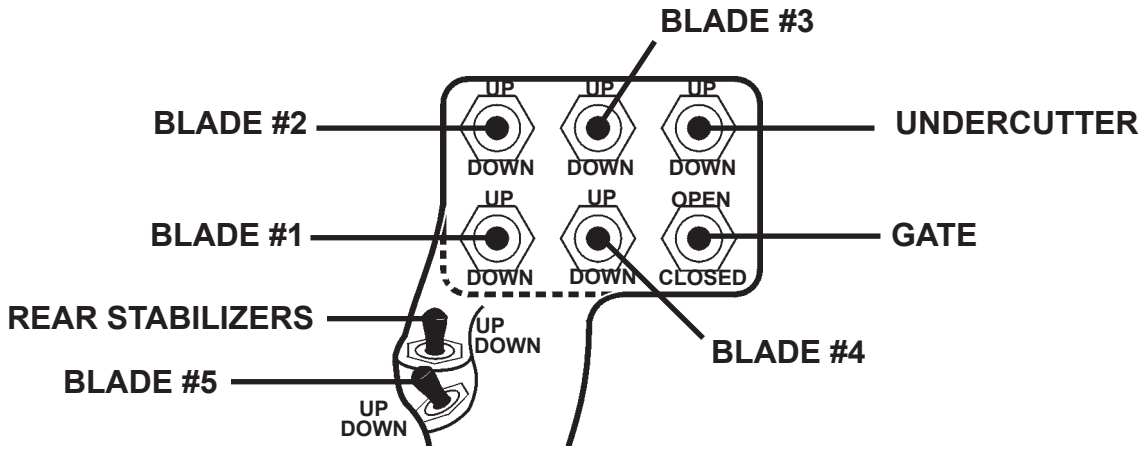
CONTROLS

GENERAL INFORMATION

Your tree spade is controlled by a joystick and an electrical valve assembly. Although BRADCO does offer various options for connecting to existing electrical joystick controls we will be covering the BRADCO operating controls in these instructions. The joystick control consists of 8 momentary toggle switches and is equipped to handle up to five blades, the undercutter, gate and rear stabilizers (if equipped).

BLADE CONTROLS

The joystick control can accommodate up to five blades and is wired for the number of blades on the tree spade you have purchased. Pushing the toggle switch up will raise that specific blade up and pushing the toggle switch down will lower that blade. When the toggle switch is released all movement will stop. If you have purchased a Model 2415, the switches for blades number 4 and 5 will be "inoperable". The blade controls are located in the same pattern as the blades on the unit with blade number 1 being the closest blade to the operator on the left hand side (left rear blade).



UNDERCUTTER CONTROL

The undercutter control operates in the same fashion as the blade controls. Pushing the toggle switch up will raise undercutter up and to the rear of the unit and pushing the toggle switch down will lower the undercutter, therefore cutting the roots under the tree or shrub. When the toggle switch is released all movement will stop. The undercutter is a very important feature of the BRADCO Tree Spades. Using the undercutter will cut the roots at the bottom of the ball instead of stretching and then snapping them. Cutting the roots will enhance regrowth and eliminate the need to prune the root ends. The undercutter also limits compaction of the ball and adds support under the ball for transporting or when digging in looser sandy soil.

GATE CONTROL

The gate control operates in the same fashion as the blade controls. Pushing the toggle switch up will open the gates (left and right arms) and pushing the toggle switch down will close the gate. When the toggle switch is released all movement will stop.

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OPERATING INSTRUCTIONS

CONTROLS

REAR "JACK" STABILIZER CONTROL

The rear stabilizer control operates in the same fashion as the other controls. Pushing the toggle switch up will raise the left and right stabilizers and pushing the toggle switch down will lower the left and right stabilizer. When the toggle switch is released all movement will stop.

Rear stabilizer kits are available from your BRADCO dealer for fitup to various skid steer loaders. The rear stabilizer hoses connect to the tree spade control valve and are therefore controlled by the operating control switch on the joystick.

Rear stabilizers are recommended to get the maximum performance from your tree spade. The rear stabilizers allow as much weight as possible to be transferred to the front of the skid-steer and therefore to the tree spade for maximum digging ability.

GENERAL INFORMATION

The following information will assist you in determining the size of ball needed for the job at hand. These charts *(taken from the American Standard for Nursery Stock - ANSI Z60.1-1996)* are to be used as a guideline only and you should contact your local nursery for more detailed instructions.

Multi-Stem Trees or Shrubs

Height	Min. Dia. Ball
4'	14"
5'	16"
6'	18"
7'	20"
8'	22"
10'	24"
12'	28"
14'	32"
16'	38"
18'	42"

Deciduous Shrubs

Height	Min. Dia. Ball
12"	8"
18"	9"
2'	10"
3'	12"
4'	14"
5'	16"
6'	18"
7'	20"
8'	22"
9'	24"
10'	26"

Shade Trees

Caliper	Min. Dia. Ball
1/2"	12"
3/4"	14"
1"	16"
1-1/4"	18"
1-1/2"	20"
1-3/4"	22"
2"	24"
2-1/2"	28"
3"	32"
3-1/2"	38"
4"	42"

Small Trees
(Ht. up to 6' / Caliper 6' & over)

Ht./Caliper	Min. Dia. Ball
2'	10"
3'	12"
4'	14"
5'	16"
3/4"	16"
1"	18"
1-1/2"	20"
1-3/4"	22"
2"	24"
2-1/2"	28"
3"	32"
3-1/2"	38"
4"	42"

Coniferous Evergreens
Spreading/Semi-Spreading/Globe/Dwarf

Spread	Min. Dia. Ball
9"	8"
12"	8"
15"	10"
18"	10"
2'	12"
2-1/2'	14"
3'	16"
3-1/2'	18"
4'	21"
5'	24"
6'	28"
7'	32"
8'	36"

Coniferous Evergreens
Conical & Broad Uprights

Height	Min. Dia. Ball
12"	10"
18"	10"
2'	12"
3'	14"
4'	16"
5'	20"
6'	22"
7'	24"
8'	27"
9'	30"
10'	34"
12'	34"
14'	42"

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OPERATING INSTRUCTIONS

Columnar Coniferous Evergreens Regular Growing

Height	Min. Dia. Ball
12"	10"
18"	10"
2'	12"
3'	13"
4'	14"
5'	16"
6'	18"
7'	20"
8'	22"
9'	24"
10'	27"
12'	30"
14'	33"
16'	36"
18'	40"

Columnar Coniferous Evergreens Rapid Growing

Height	Min. Dia. Ball
12"	8"
2'	9"
3'	11"
4'	12"
5'	14"
6'	16"

Broadleaf Evergreen Cone and Upright

Height	Min. Dia. Ball
18"	10"
2'	12"
3'	14"
4'	16"
5'	20"
6'	22"
7'	24"
8'	27"
9'	30"
10'	34"
12'	38"
14'	42"

Broadleaf Evergreen Spreading/Semi-Spreading/ Globe/Dwarf

Spread	Min. Dia. Ball
18"	10"
2'	12"
2-1/2'	14"
3'	16"
3-1/2'	18"
4'	21"

Processed Balled Fruit Trees

Caliper	Min. Dia. Ball
1/4"	8"
5/16"	8"
3/8"	10"
31/2"	10"
5/8"	10"
3/4"	12"
1" & UP	12"

In sizing shade trees, caliper shall take precedence over height. In size grading small and flowering trees, height shall take precedence up to 6 feet; thereafter, caliper takes precedence.

Caliper of the trunk shall be taken 6 inches above the ground up to and including 4 inch caliper size, and 12 inches above the ground for larger sizes. (Seldom are tree trunks perfectly round. Caliper measurement may be taken with "slot" type caliper, "pincer" type calipers or diameter tape.)

The diameter of the ball is determined by the blade size or the digging depth. Each blade is changed by removing one pin. The ball depth is determined by the position of the adjustable legs.

On larger bushy trees the branches may have to be tied up so the blades do not cut off the lower branches.

On some types of trees it is recommended for best results that transplanting take place while the tree is dormant. Contact your local nursery for the specifications on the type of tree you are transplanting.

9457 6-3-14-2

OPERATING INSTRUCTIONS

INTENDED USE: This unit is designed for removing or transplanting trees and shrubs. Use in any other way is considered contrary to the intended use.

The BRADCO Tree Spades are designed to meet the needs of the professional nurseryman. The machine has proven capable of continuous digging with a minimum of maintenance. It is used extensively for removing trees for burlapping and for transplanting and rearranging nursery rows.

NOTE: These instructions include the use of rear "jack" stabilizers. Rear stabilizer kits are available from your BRADCO dealer for fitup to various loaders. The rear stabilizer hoses connect to the tree spade control valve and are therefore controlled by the operating control switch on the joystick. Rear stabilizers are recommended to get the maximum performance from your tree spade. The rear stabilizers allow as much weight as possible to be transferred to the front of the prime mover and therefore to the tree spade for maximum digging ability.

IMPORTANT: Always follow the instructions in your prime mover operators manual for operating the auxiliary hydraulic controls and follow the Safety Shutdown Procedure whenever leaving the operator's station.

After the tree spade has been properly attached, raise the unit above the ground approximately 2 feet. Acquaint yourself with the various control levers. After becoming familiar with the controls it is advisable to dig in soil without a tree. This will provide an opportunity to check ball size as well as attachment operation.

The blades on the tree spade are number 1, 2, 3 and 4 (if so equipped). The two forward blades open when the gate control is pushed forward. The gates will open and close together.

Soil condition and type affect how the tree spade operates. In firm soil the blades may only travel one-third of the way down on the first stroke and in loose or sandy soil the blades may penetrate completely in one stroke.

The amount of root ball needed will vary per the diameter of the tree trunk, the height of the tree or the type of tree. Refer to the charts at the beginning of this section. A general rule of thumb is every one inch of tree diameter requires a minimum of ten inch ball diameter.

Adjusting Leg Height

The tree spades are equipped with adjustable legs that are used for adjusting the ball size. With the legs fully raised the ball size will be the rated size of your tree spade. Moving the legs down will decrease the ball size approximately 1.50" for each adjustment hole. If the legs are removed completely the tree spade will dig a slightly larger hole than rated size.

Lift and block the spade before making any leg adjustment.

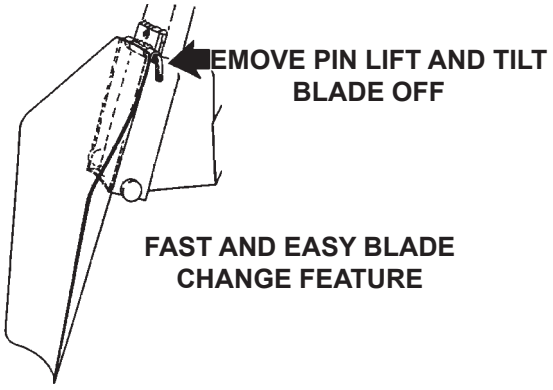
9458 6-3-14-2

OPERATING INSTRUCTIONS

Balled and Burlapped Trees (with or without Wire Basket)

NOTE: There is a wide range of presewn burlap bags, wire baskets and containers available from reputable manufacturers for the BRADCO Tree Spade.

Determine the size of ball required for the type and size of tree. Install the correct blades and adjust the legs to achieve the desired ball size.



1. With the gates open and the blades in the up position, center the tree in the tree spade from left to right. Positioning the spade front to back can be accomplished by aligning the tree with the undercutter pivot pin which is at the center of the ball. **NOTE: It is CRITICAL that the tree is centered in the ball. Therefore it is advisable to have someone on the ground to aid in the alignment process.**
2. Close the gate.
3. Lower the loader arms, therefore raising the front wheels off the ground.
4. Lower the rear stabilizers (if so equipped) until the loader feels level.

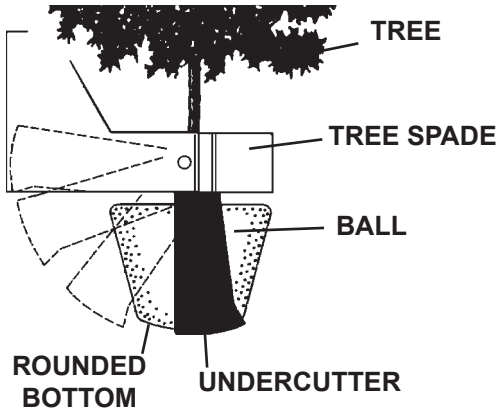
NOTE: Raising the loader until the wheels are only slightly off the ground transfers the weight to the tree spade for maximum digging power. Lifting the loader too high may cause an unstable condition.

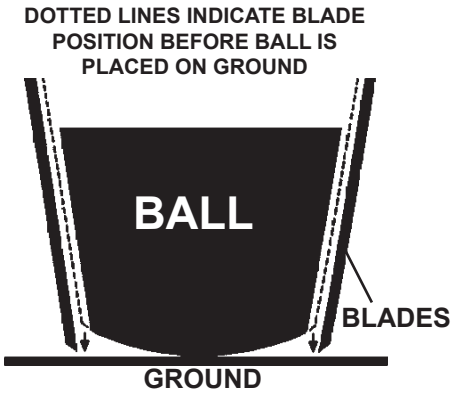
5. Tilt the tree spade until it is level.
6. Once the tree spade is level, the loader raised slightly and the gate closed, it is time to start lowering the blades. Using the joystick control, lower "Blade 1" as far as it will go into the soil. (Due to the different soil conditions the blade may go all the way into the ground or only slightly.)
7. As soon as the blade starts to tilt the attachment, stop movement and raise the blade slightly to remove some of the down pressure. (This will assist in digging the maximum ball size and prevent digging an angled hole.)
8. Using the joystick control, lower "Blade 2" as far as it will go into the soil. As soon as the blade starts to tilt the attachment, stop movement and raise the blade slightly to remove some of the down pressure.
9. Repeat step #8 for "Blade 3" and "Blade 4" (if so equipped).

OPERATING INSTRUCTIONS

10. If the blades failed to lower completely due to the soil conditions, repeat Steps #6 thru #9 until all the blades are completely lowered into the soil.

11. Activate the undercutter which will pass beneath the blades, cutting all roots and therefore completely freeing the ball and producing a slightly rounded bottom.
12. Retract the undercutter to the center position of the ball before lifting. This will assist in maintaining the ball in some soil types.
13. Raise the rear stabilizers (if so equipped).
14. Raise the loader arms until the wheels are fully on the ground.
15. Lift the tree out of the hole.
16. Placing the burlap on the ground or in the wire basket, position the tree in the center of the burlap. **NOTE: Carry the tree as low as possible when transporting.**
17. Raise the undercutter and while keeping the tree trunk as vertical as possible, lower the tree. Due to the curved bottom, the ball appears to "push up," separating itself from the blades without disturbing the smooth sides of the ball.





18. Release the ball by first raising "Blade 4" and continue to raise the blades in reverse order 3, 2, & 1. **NOTE: If the tree ball sticks to the blades, use a shovel to press down on the tree ball to loosen it from the blades.**
19. Lift the tree spade slightly and open the gates. Back the loader away from the tree. The ball is ready for covering with no additional shaping necessary.
20. Finish wrapping the tree.

Direct Transplanting

1. Determine the size of hole needed for the tree you are transplanting. Install the correct blades and adjust the legs to achieve the desired hole size.

OPERATING INSTRUCTIONS

2. Raise the blades and drive the skid steer to the location that the tree will be planted and position the skid steer so the loader is as level as possible. Follow Steps 2 thru 14 in the previous instructions (Balled and Burlapped Trees) to dig a spot for the tree..
3. Lift the dirt ball out of the ground and move out of the way for tree transplanting. Set the tree spade on the ground and raise the blades to release the dirt ball. The blades should be raised in reverse order 4, 3, 2 and 1. Open gates.
4. See Steps 1 thru 15 in the previous instructions (Balled and Burlapped Trees) to dig up the desired tree for transplanting.
5. Position the tree over the previously dug hole, raise the undercutter and while keeping the tree trunk as vertical as possible, lower the tree. Due to the curved bottom, the ball appears to "push up," separating itself from the blades without disturbing the smooth sides of the ball.
6. Release the ball by first raising "Blade 4" and continue to raise the blades in reverse order 3, 2, & 1. **NOTE: If the tree ball sticks to the blades, use a shovel to press down on the tree ball to loosen it from the blades.**
7. Lift the tree spade slightly and open the gates. Back the loader away from the tree. NOTE: Follow any specific transplanting instructions, such as watering and mulching etc., for the type of tree you are transplanting.

OPERATING INSTRUCTIONS

GENERAL INFORMATION

The following storage procedure will help you to keep your attachment in top condition. It will also help you get off to a good start the next time your tree spade is needed. We therefore, strongly recommend that you take the extra time to follow these procedures whenever your attachment will not be used for an extended period of time.

PREPARATION FOR STORAGE

1. Clean the exterior thoroughly removing all mud, dirt and grease.
2. Inspect the unit for visible signs of wear. Order any parts required and make any necessary repairs to avoid delays when starting next season.
3. Inspect the graphite coating on the blades. Repaint as needed.
4. Check the blades for wear. If sharpening is required use a hand grinder.
5. Tighten all loose nuts and capscrews.
6. Grease all grease fittings.
7. Coat the exposed portions of the cylinder rods with grease.
8. Seal hydraulic system from contaminants and secure all hydraulic hoses off the ground to help prevent damage.(Connect the hydraulic couplers together and cap the fittings for the rear stabilizers.)
9. Replace decals if damaged or in unreadable condition.
10. Store the unit in a dry and protected place. Leaving the unit outside will materially shorten its life.

REMOVING FROM STORAGE

1. Remove all protective coverings.
2. Check hydraulic hoses for deterioration and replace if necessary.

TRANSPORTING

1. Follow all federal, state and local regulations when transporting the unit on public roads.
2. Use extra care when loading or unloading the machine onto a trailer or truck.
3. Before transporting, raise the blades and keep the unit as close to the ground as possible.

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

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

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

10518 6-4-14-2

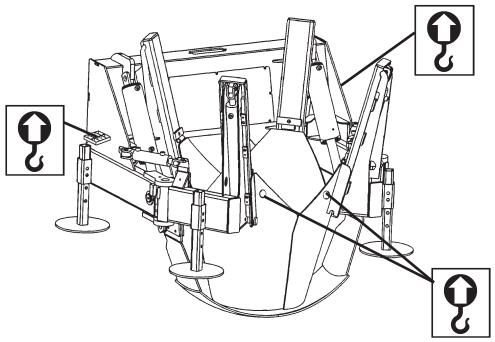
OPERATING INSTRUCTIONS

LIFT POINTS

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

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

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



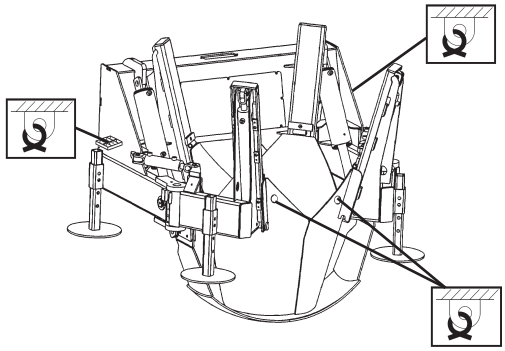
15 SERIES
4 POINTS - ONE ON EACH OUTSIDE BLADE, ONE ON EACH SIDE STEP

TIE DOWN POINTS

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

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

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



15 SERIES
4 POINTS - ONE ON EACH OUTSIDE BLADE, ONE EACH SIDE STEP

12801 6-3-14

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, wear, breakdown and needless replacement of parts. 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.

EVERY FOUR HOURS OF OPERATION OR AS NEEDED

2) Fittings on the back of each Slider "wear" Bar. (20) 4415, (16) 3215, (12) 2415)
1) Fitting on the front of each Slide Channel. (5) 4415, (4) 3215, (3) 2415)

NOTE: A scraping sound during blade operation is an indication that the slide channel and slider bars require lubricating.

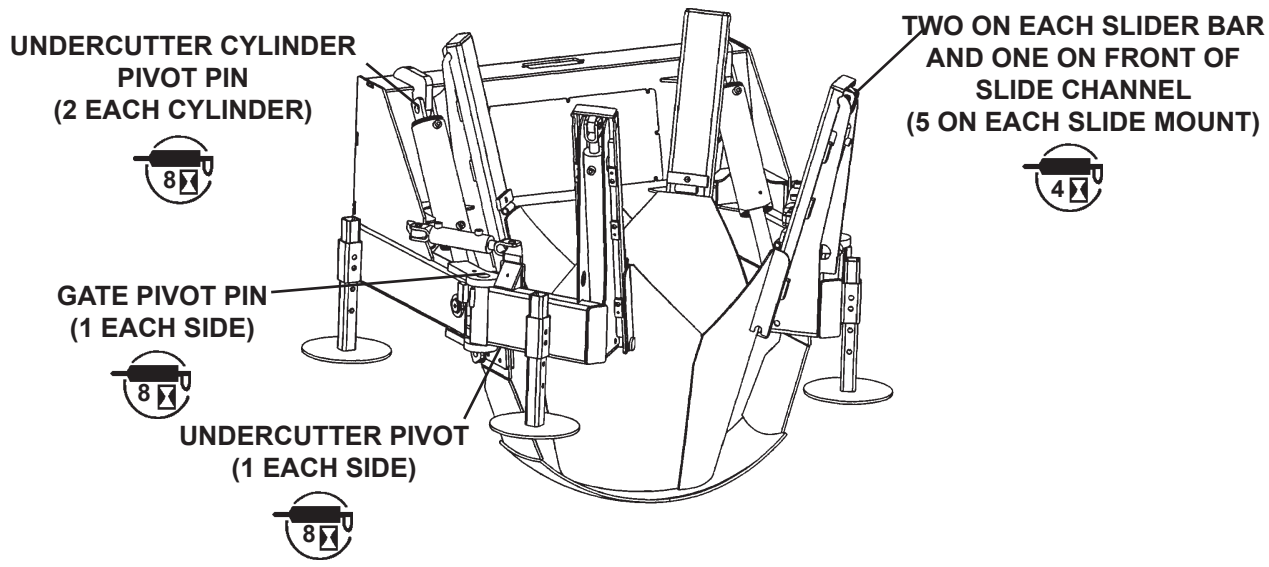
EVERY EIGHT HOURS OF OPERATION

1) Fitting on Left Undercutter Pivot.
1) Fitting on Right Undercutter Pivot.
1) Fitting on each Gate Pivot Pins. (2)
1) Fitting on each Undercutter Cylinder Pivot Pin. (4)

LUBRICATION SYMBOLS

Lubricate twice daily or every 4 hours of operation with SAE Multi-Purpose Lubricant or an equivalent SAE Multi-Purpose type grease.

Lubricate daily or every 8 hours of operation with SAE Multi-Purpose Lubricant or an equivalent SAE Multi-Purpose type grease.



9450 6-9-14-2

MAINTENANCE AND 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.

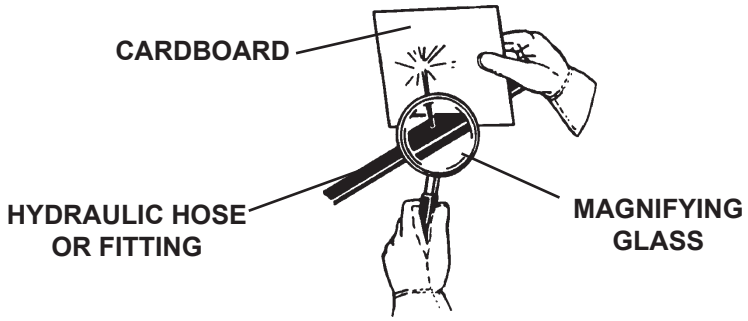
Procedure	Daily	Every 40 Hours
Check all bolts and nuts for tightness.	✔	
Replace any missing bolts or nuts with approved replacement parts.	✔	
Check hydraulic system for hydraulic oil leaks. See procedure below.	✔	
Visually inspect the machine for worn parts or cracked welds, and repair as necessary.	✔	
Check for missing or illegible Safety / Warning Decals.	✔	
Lubricate all grease fittings.		✔

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

Stop the engine and relieve pressure before connecting or disconnecting lines.

Tighten all connections before starting engine or pressurizing lines.



9451 2-14-13-3

MAINTENANCE & SERVICE

WARNING! Be sure to follow Safety Shutdown Procedures before performing any maintenance on attachment.

BLADE MAINTENANCE

Maintaining the condition of the blades will result in a cleaner ball and a smoother digging operation. The blades are painted with a graphite coating before shipping and should be rubbed lightly with fine steel wool before using. This coating prevents the earth from sticking to the blades and aids in the digging operation. The life of the coating is affected by soil conditions and can be repainted with Slip Plate #1, manufactured by Acrotech Industries Inc. One gallon of Slip Plate #1 is supplied with all new units and can be purchased from BRADCO under part #25154. It is important that oil not be used on the blades as long as the graphite coating remains.

SHARPENING BLADES AND UNDERCUTTER

Although the blades and the undercutter should remain in good condition for a long time, extensive use and rocky soil conditions may dull portions of the blades or the undercutter. If sharpening is required use a hand grinder and sharpen the blades or undercutter surface in an even pattern.

REPLACING BUSHINGS

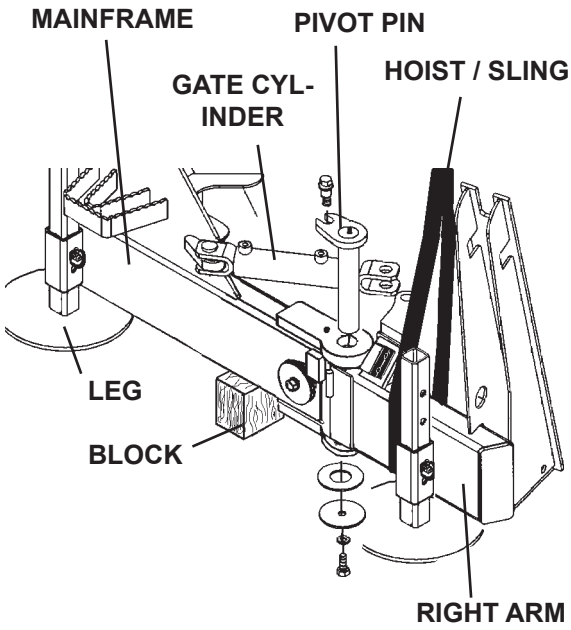
To Replace Left and Right Arm Bushings:

1. Lower the mainframe onto the rear legs as close to the ground as possible and block up the front of the mainframe to keep it level.
2. Remove Blades #2 and #3.
3. Disconnect the gate cylinders at the arm weldments.
4. Attach a hoist to the left arm to prevent it from falling and causing personal injury or undue stress to the hoses when it is disconnected from the mainframe.

NOTE: If you are removing the arm completely for bushing replacement the blade cylinder hoses will need to be tagged and removed.

5. With the arm supported remove the pivot pin securing the left arm to the mainframe. While continuing to support the arm, press out the top and bottom bushing and replace with new.
6. Position the arm and replace the pivot pin.
7. Connect the gate cylinder to the arm weldment.
8. Repeat steps #3 through #7 for the right arm.
9. Reinstall Blades #2 and #3.

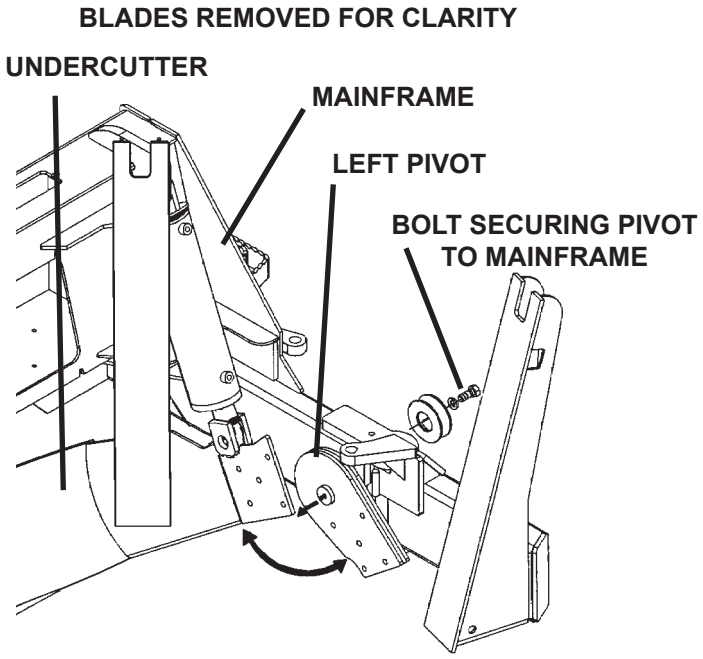
Bushing replacement is complete.



9452 6-9-14-2

To Replace Left and Right Undercutter Pivot Bushings:

1. With the undercutter completely raised and all legs in their top position, lower the mainframe onto the legs to support it for maintenance.
2. With the mainframe supported by the legs lower the undercutter until it is resting on the ground.



3. Unbolt the left and right pivots from the undercutter blade and mainframe.
4. Rotate pivots forward. Using a hoist rotate the undercutter up until the left and right pivots can be removed from the mainframe.
5. Press the bushings out of the mainframe and replace with new.
6. Reinstall the left and right pivots into the mainframe.
7. Rotate the pivots and the undercutter until the attaching holes are aligned and install the existing hardware.

Bushing replacement is complete.

SLIDE CHANNEL ADJUSTMENT

The slide channels are field adjustable to maintain a snug fit between the blade mounting channel and the blade rail. This will control both the side to side and the in and out play of the blade. The adjustments can be made with minimum tools and time and with no cutting or welding. **NOTE: It is recommended that the blade be removed for convenience.**

To Adjust Side/Side Movement:

1. Using a 6" snap ring pliers, remove the pivot pin securing the top of the blade cylinder to the slide channel to gain access to the adjustment window in the slide rail tower.
2. Use a hex key wrench to turn the setscrews (#1573) clockwise to draw the slide bars on each side against the blade rail plates. Once the setscrews have been tightened back off 3/4 turn.
3. Using a hoist, raise the slide channel to gain access to the middle set of setscrews. Repeat Step #2.

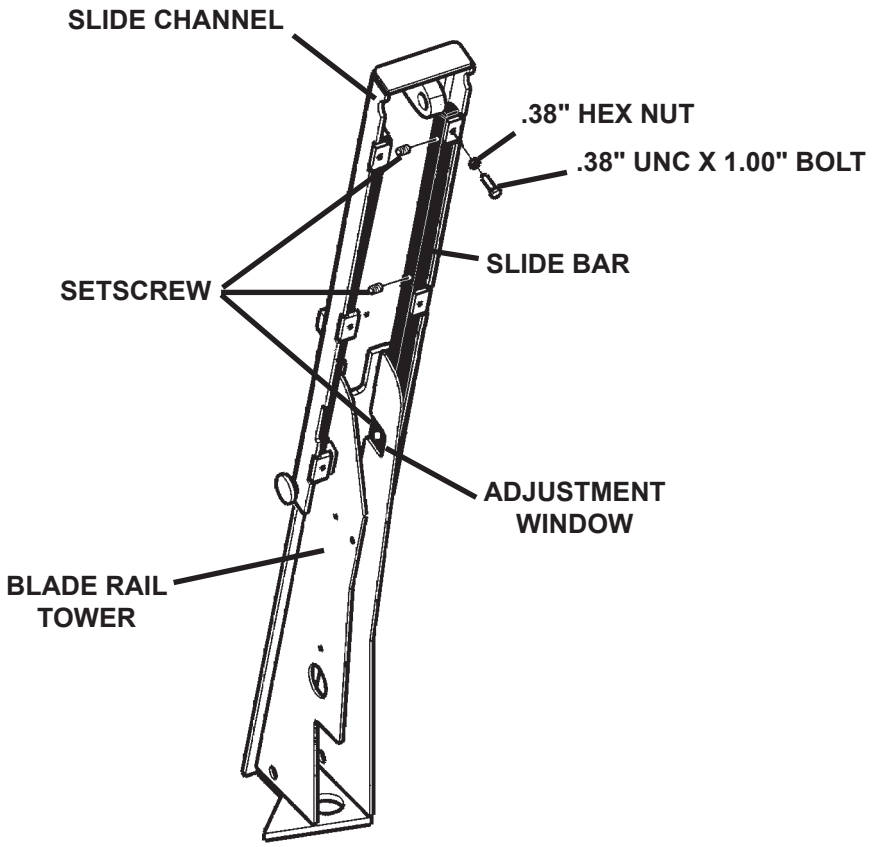
9453 6-9-14-2

4. Using the hoist, raise the slide channel to access the third and final set of setscrews and repeat Step #2.
5. Slide the channel up and down to locate any binding. Readjust if necessary.
6. Position the blade cylinder and reinstall the pivot pin.

To Adjust In/Out Movement:

1. Position the slide channel completely down on the blade rail towers.
2. Loosen the hex nuts (#1226) located on the .38" UNC X 1.00" bolts (#1043) on the back of the slide channels.
3. Adjust the bolts clockwise to tighten the slide bar against the back side of the blade rail towers. Once the bolts have been tightened back off 3/4 turn and slide the channel up and down to locate any binding. Readjust if necessary.
4. When adjustment is completed, tighten the hex nut to lock the bolts in position.

NOTE: There will be extra play in the slide channels when they are in the uppermost position.



9454 6-9-14-2

MAINTENANCE AND SERVICE

CYLINDER SEAL REPLACEMENT

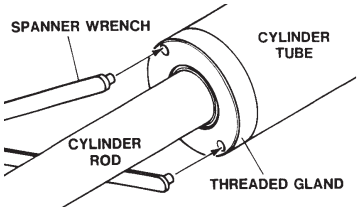
The following information is provided to assist you in the event you should need to repair or rebuild a hydraulic cylinder. When working on hydraulic cylinders, make sure that the work area and tools are clean and free of dirt to prevent contamination of the hydraulic system and damage to the hydraulic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

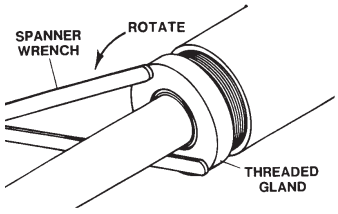
DISASSEMBLY PROCEDURE

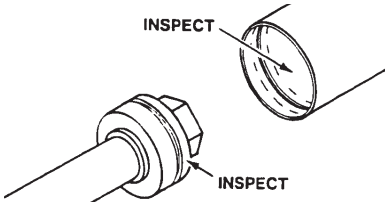
IMPORTANT: Do not contact the active surface of the cylinder rod with the vise. Damage to the rod could result.

THREADED TYPE GLAND

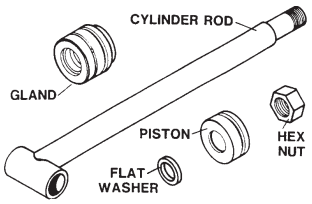
1. Rotate the gland with a spanner wrench counterclockwise until the gland is free of the cylinder tube.
2. Pull the cylinder rod from the cylinder tube and inspect the piston and the bore of the cylinder tube for deep scratches or galling. If damaged, the piston AND the cylinder tube must be replaced.

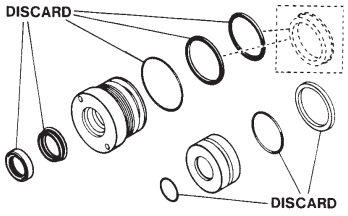






3. Remove the hex nut, piston, flat washer or spacer tube (if so equipped), and gland from the cylinder rod. If the cylinder rod is rusty, scratched, or bent, it must be replaced.
4. Remove and discard all the old seals.



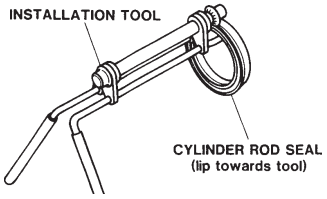


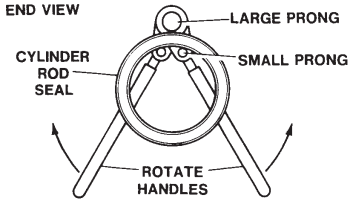
ASSEMBLY PROCEDURE

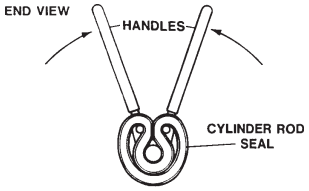
IMPORTANT: Replace all seals even if they do not appear to be damaged. Failure to replace all seals may result in premature cylinder failure. NOTE: Seal kits will service most cylinders of similar bore size and rod diameter.

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

NOTE: A special installation tool (Part #65349) is available to help with installing the seal. Simply fit the end of the tool over the seal so that the large prong of the tool is on the outside of the seal, and the two smaller prongs on the inside. The lip of the seal should be facing towards the tool. Rotate the handles on the tool around to wrap the seal around the end of the tool.







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

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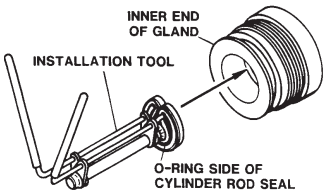
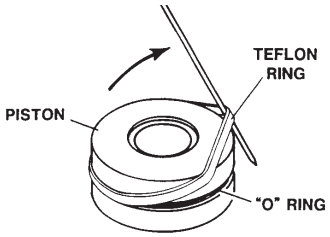
Now insert the seal into the gland from the inner end. Position the seal in its groove, and release and remove the tool. Press the seal into its seat the rest of the way by hand.



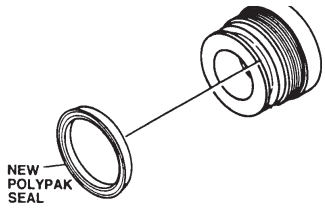
2. Install the new piston ring, rod wiper, O-rings and backup washers, if applicable, on the piston.

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



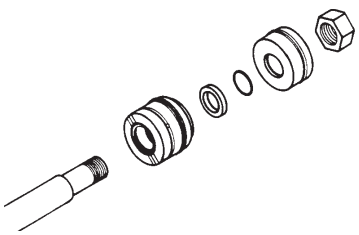
3. After installing the rod seal inside the gland, as shown in step #1, install the external seal.

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



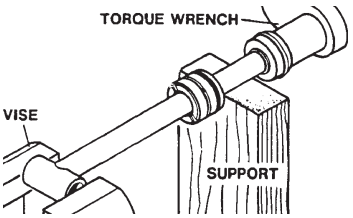
4. Slide the gland onto the cylinder rod, being careful not to damage the rod wiper. Then install the spacer, or flat washer (if so equipped), small o-ring, piston, and hex nut onto the end of the cylinder rod.

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



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

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



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

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

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

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

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

10357 10-13-05

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Tree Spade will not operate.	Auxiliary hoses not hooked up to the prime mover.	Engage Couplers
	Obstruction in hydraulic lines.	Remove obstruction and replace if necessary.
	Prime mover auxiliary valve not engaged.	Engage auxiliary valve.
	Loss of electrical power to joystick control.	Check electrical connection and circuit fuse.
Blades activate sluggishly.	Insufficient hydraulic flow from the prime mover.	Refer to prime mover's owners manual.
	Damaged quick coupler.	Replace if necessary.
	Oil filter on prime mover is dirty.	Refer to prime mover's owners manual.
Leaking Oil.	Loose or damaged hydraulic line.	Tighten or replace.
	O-Rings on fittings damaged.	Replace if necessary.
	Fittings loose or damaged.	Tighten or replace.
	Cylinder seals damaged.	Replace cylinder seals.
Insufficient power.	Insufficient hydraulic flow from the prime mover.	Refer to prime mover's owners manual.
	Relief valve setting adjusted too low.	Refer to prime mover's owners manual.
	Oil filter on prime mover is dirty.	Refer to prime mover's owners manual.
	Blades or Undercutter worn or chipped.	Sharpen as needed.
Cylinders operate in the wrong direction.	Hoses from the valve to the prime mover incorrectly connected.	Switch couplers at the skid steer end.
	Incorrect wiring from the joystick control.	Check wiring diagram and correct.

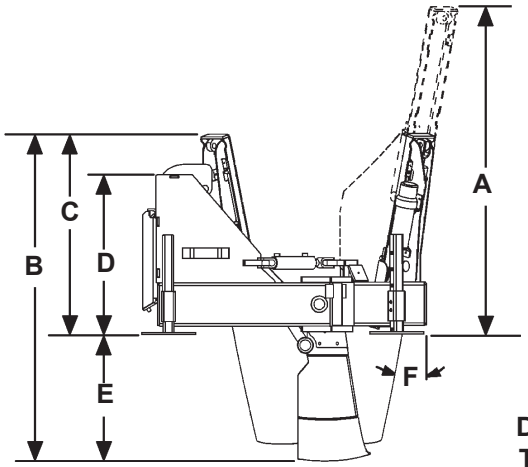
9465 6-4-14-2

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Excessive oil temperature.	Hydraulic oil level too low.	Refer to prime mover's owners manual
	Obstruction in hydraulic lines.	Remove obstruction and replace if necessary.
	Hydraulic oil or oil filter in prime mover is dirty.	Refer to prime mover's owners manual.
	Relief valve setting adjusted too low.	Refer to prime mover's owners manual.
	Couplers not engaged.	Engage couplers.
A hydraulic cylinder not operating.	Insufficient hydraulic flow from the prime mover.	Refer to prime mover's owners manual.
	Cylinder rod bent.	Visually inspect the cylinder for damage.
	Cylinder seals damaged.	Replace cylinder seals.
	Obstruction in hydraulic lines.	Remove obstruction and replace if necessary.
	An electrical coil not functioning at valve.	Check voltage readings at valve and replace coil if necessary.
All hydraulic cylinders not functioning.	Blown fuse on prime mover.	Refer to prime mover's owners manual.
	Damaged electrical wiring.	Test and replace if necessary.
	Loss of hydraulic power.	Check hydraulic circuit.
	Electrical power connected to wrong polarity.	Reverse red and black wires.
Hydraulic cylinders only operating in one direction.	Contaminants in the hydraulic system and solenoid valve.	Remove spool from solenoid valve and check for foreign material. Clean or replace.
		Remove spool from solenoid valve and check seals for damage. Replace if necessary.
	Damaged electrical wiring.	Test and replace if necessary.
	Bad electrical connection at Reversing valve.	Check connections and correct.
	Coil or spool damaged in reversing valve.	Replace as necessary.

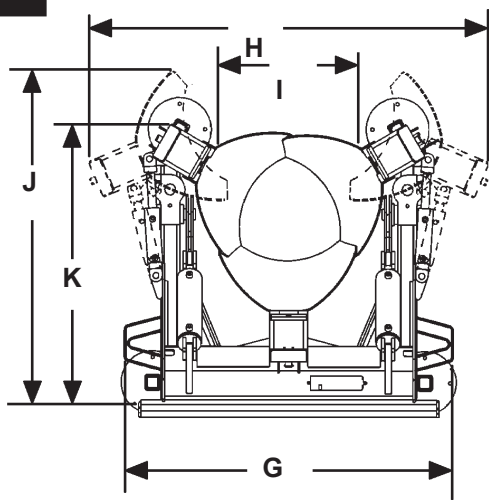
9466 6-4-14-3

SPECIFICATIONS

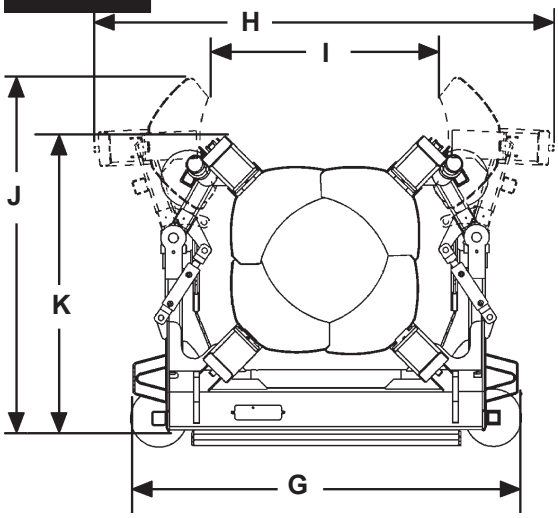


SPECIFICATION AND DESIGN ARE SUBJECT TO CHANGE WITHOUT NOTICE AND WITHOUT LIABILITY THEREFORE.

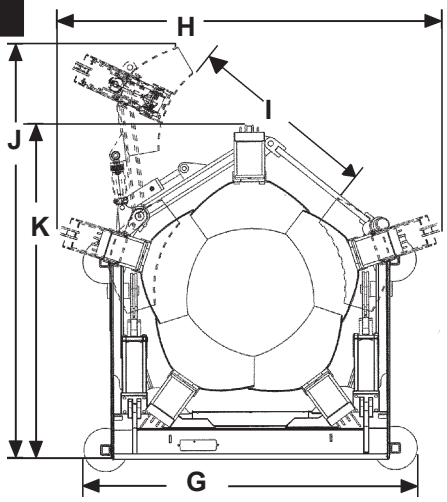
2415



3215



4415



DESCRIPTION	2415	3215	4415
A. Overall Height - Blades Up (Open)	52.00"	60.00"	72.00"
B. Overall Height - Blades Down (Closed)	51.75"	61.00"	76.25"
C. Shipping Height - (Blades Removed)	33.00"	37.00"	44.38"
D. Frame Height	29.50"	29.50"	29.50"
E. Digging Depth	20.00"	24.00"	32.00"
F. Cutting Angle	15°	15°	15°
G. Overall Transport Width (Gate Closed)	52.00"	68.00"	76.25"
H. Overall Width (Gate Open)	63.00"	81.00"	87.00"
I. Maximum Gate Opening	21.50"	41.00"	44.00"
J. Overall Length (Gate Open)	52.00"	61.50"	94.25"
K. Overall Transport Length (Gate Closed)	47.50"	51.50"	76.00"
Number of Blades	3	4	5
Blade Sizes Available (Ball Diameter)	16"-20"-24"	20"-24"-28"-32"	32"-36"-44"
Tree Diameter	1.50"-2.50"	2.00"-3.5"	3.00"-4.50"
Ball Weight (LBS)	200#-400#	300#-900#	1000#-2000#
Flow Requirements (GPM)	10	10	10
Recommended Operating Pressure (PSI)	2250	2250	2250
Weight (LBS)	1200#	1600#	3000#

9376 6-9-14-2

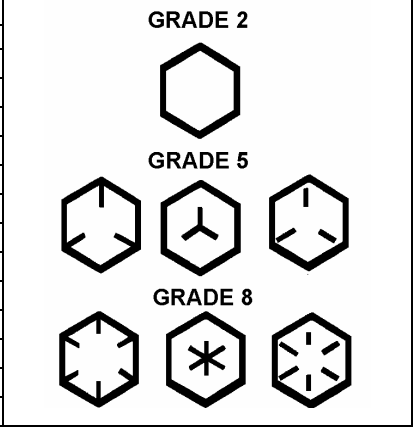
BOLT TORQUE SPECIFICATIONS

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

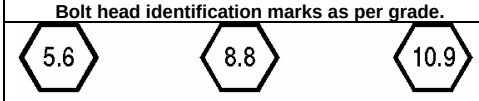
NOTE: The following torque values are for use with extreme pressure lubricants, plating or hard washer applications Increase torque 15% when using hardware that is unplated and either dry or lubricated with engine oil.

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

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

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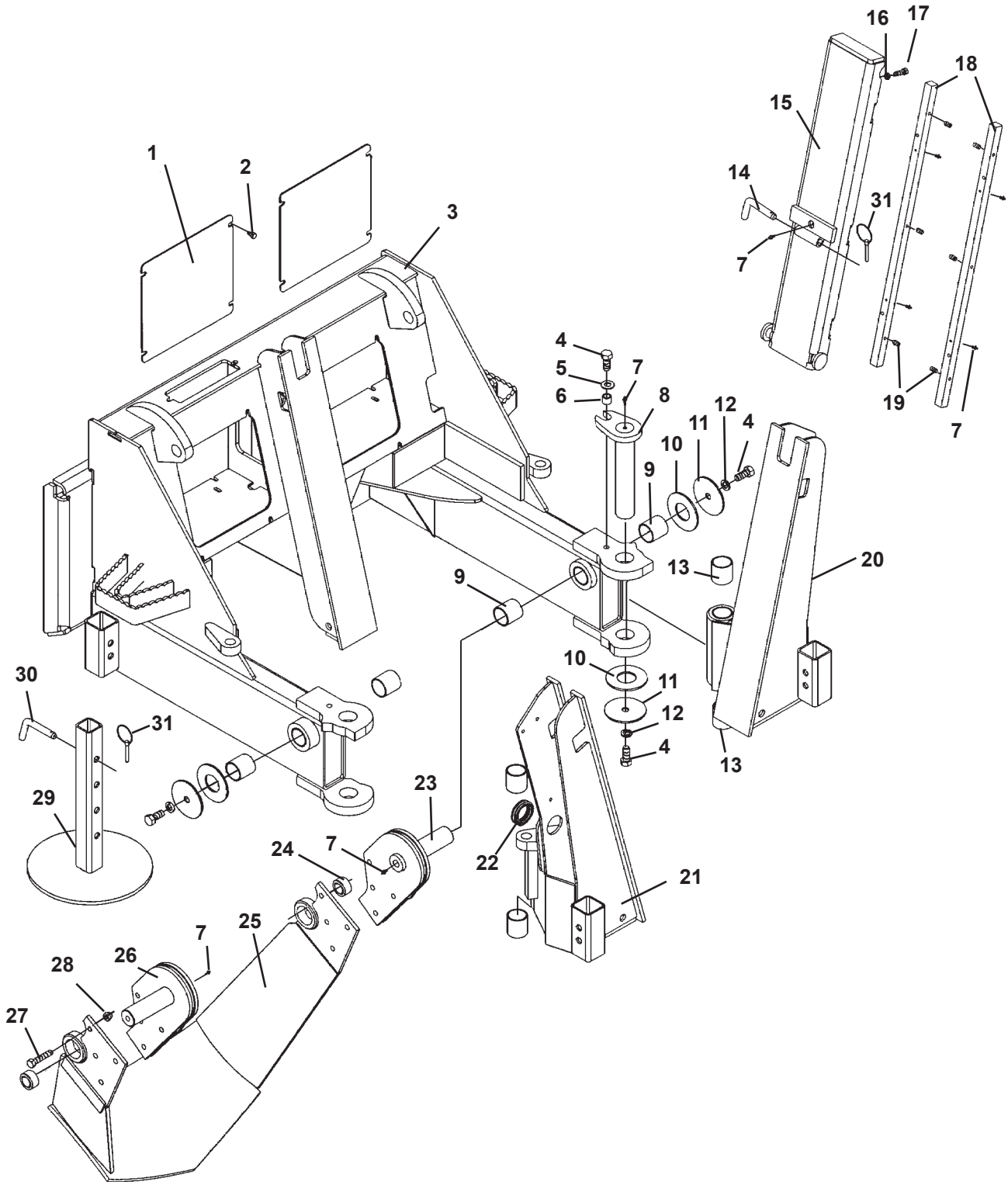
LIMITED WARRANTY

In order to provide you with the most UP-TO-DATE Warranty information, Paladin Warranty Statement and Warranty Procedures along with Warranty Registration and Claim Forms have been moved to our website at ***www.paladinattachments.com***.

2415 TREE SPADE

MAINFRAME ASSEMBLY #25245



9428 6-9-14-2

2415 TREE SPADE

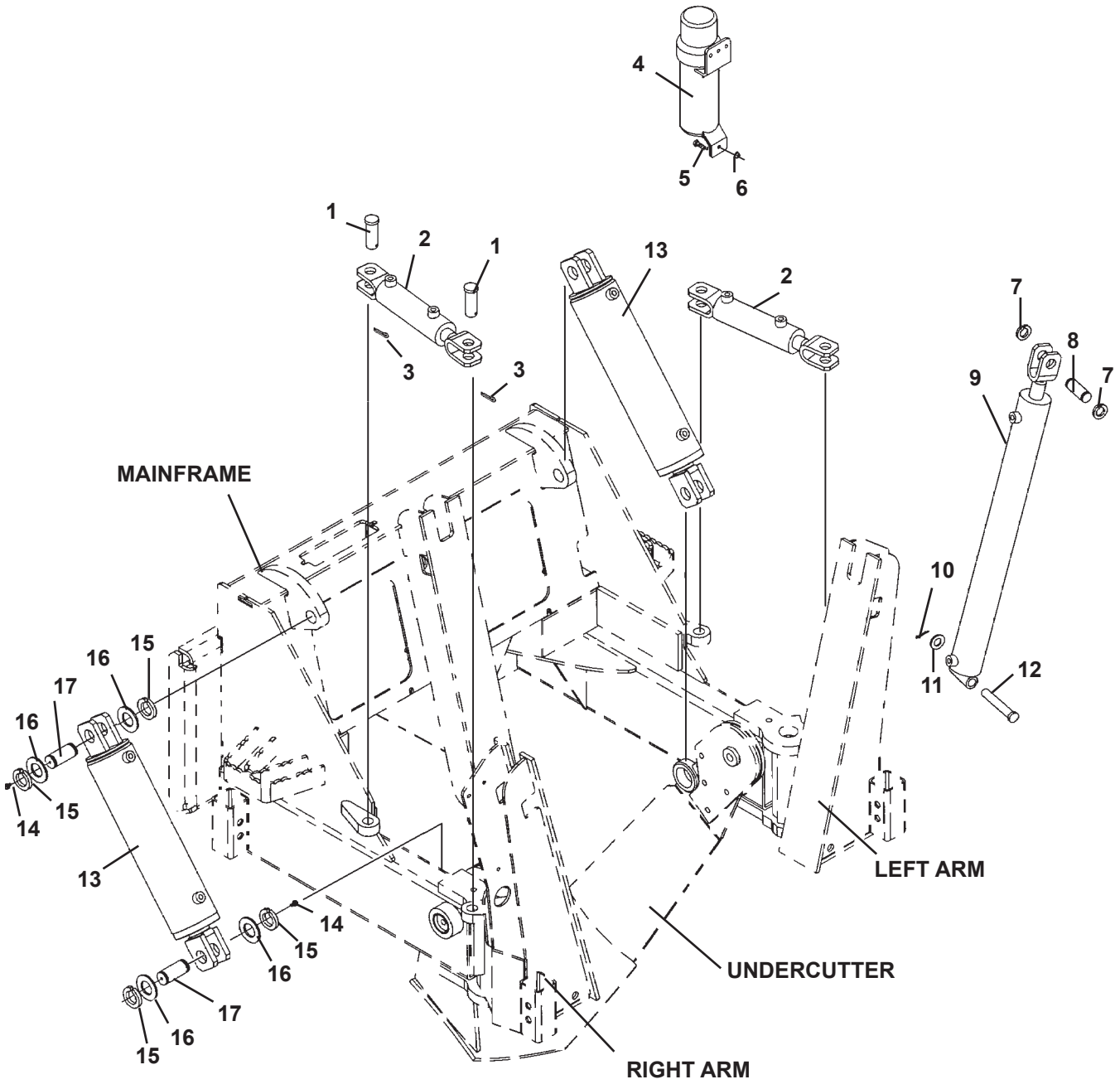
MAINFRAME ASSEMBLY #25245

ITEM	REQ'D	PART NO.	DESCRIPTION
1	2	25282	Valve Cover
2	10	1953	.38" UNC X .75" Hex Screw
3	1	25293	Mainframe with Universal Hitch
	-	88987	Replacement Universal Hitch Plate (Weld-On)
4	6	1114	.62" UNC X 1.50" Hex Capscrew
5	2	1627	.62" Hard Flat Washer
6	2	25075	Spacer Tube
7	19	6616	Grease Fitting
8	2	25065	Pivot Pin
9	-	6356	Replacement Bushing (Included with Mainframe)
10	As Req'd	6622	Thrust Washer
11	4	25132	Special Washer (.69" x 2.50" x .38")
12	4	1506	.62" Lock Washer
13	-	6356	Replacement Bushing (Included with Left and Right Arm Weldments)
14	3	25118	Hitch Pin
15	3	25291	Slide Channel
16	18	1226	.38" UNC Hex Nut
17	18	1043	.38" UNC X 1.00" Hex Capscrew
18	6	25281	Slider Bar
19	18	1573	.38" UNC X .75" Set Screw
20	1	25256	Left Arm
21	1	25255	Right Arm
22	2	89088	Grommet
23	1	25275	Left Pivot
24	2	62523	Bushing
25	1	25270	Undercutter Blade
26	1	25276	Right Pivot
27	8	1965	.50" UNC X 2.50" Hex Capscrew - Grade 8
28	8	1841	.50" UNC Deformed Lock Nut
29	4	25144	Leg
30	4	89951	Hitch Pin
31	7	21169	Klik Pin

9429 6-9-14-2

2415 TREE SPADE

MAINFRAME ASSEMBLY #25245



9430 6-9-14-2

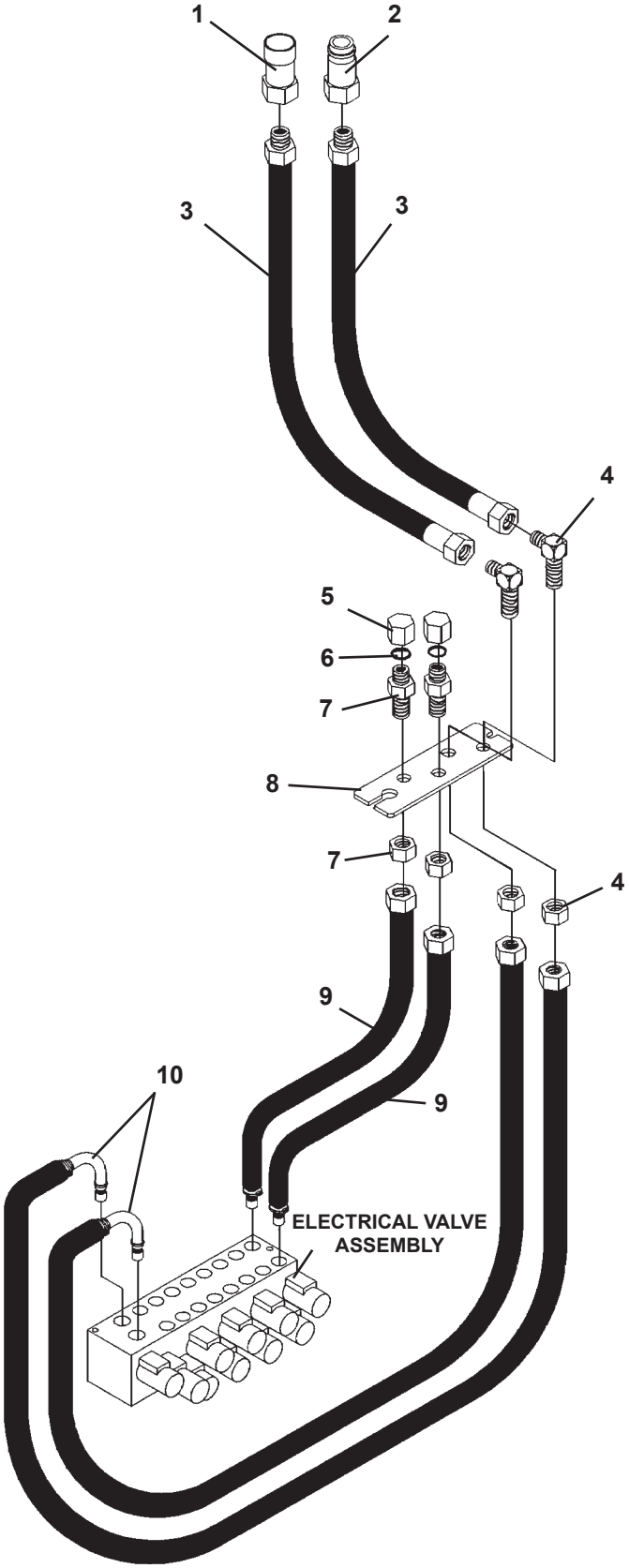
2415 TREE SPADE

MAINFRAME ASSEMBLY #25245

ITEM	REQ'D	PART NO.	DESCRIPTION
1	4	5097	Cylinder Pivot Pin
2	2	25005	Cylinder Assembly - Gate
3	4	1793	Cotter Pin
4	1	25453	Manual Storage Tube
5	3	1022	.31" UNC X 1.00" Hex Capscrew
6	3	1753	.31" UNC NyLock Nut
7	6	6612	Snap Ring
8	3	63302	Cylinder Pivot Pin
9	3	25247	Cylinder Assembly - Blades
10	3	1611	Cotter Pin
11	3	1649	.75" Hard Flat Washer
12	3	22260	Cylinder Pivot Pin
13	2	25240	Cylinder Assembly - Undercutter
14	4	6616	Grease Fitting
15	8	1652	Snap Ring
16	8	57693	Thrust Washer
17	4	25067	Cylinder Pivot Pin

MOUNTING KIT INSTALLATION

2415 HYDRAULIC ASSEMBLY #25430
POWER AND RETURN CIRCUIT



9491 6-9-14-2

MOUNTING KIT INSTALLATION

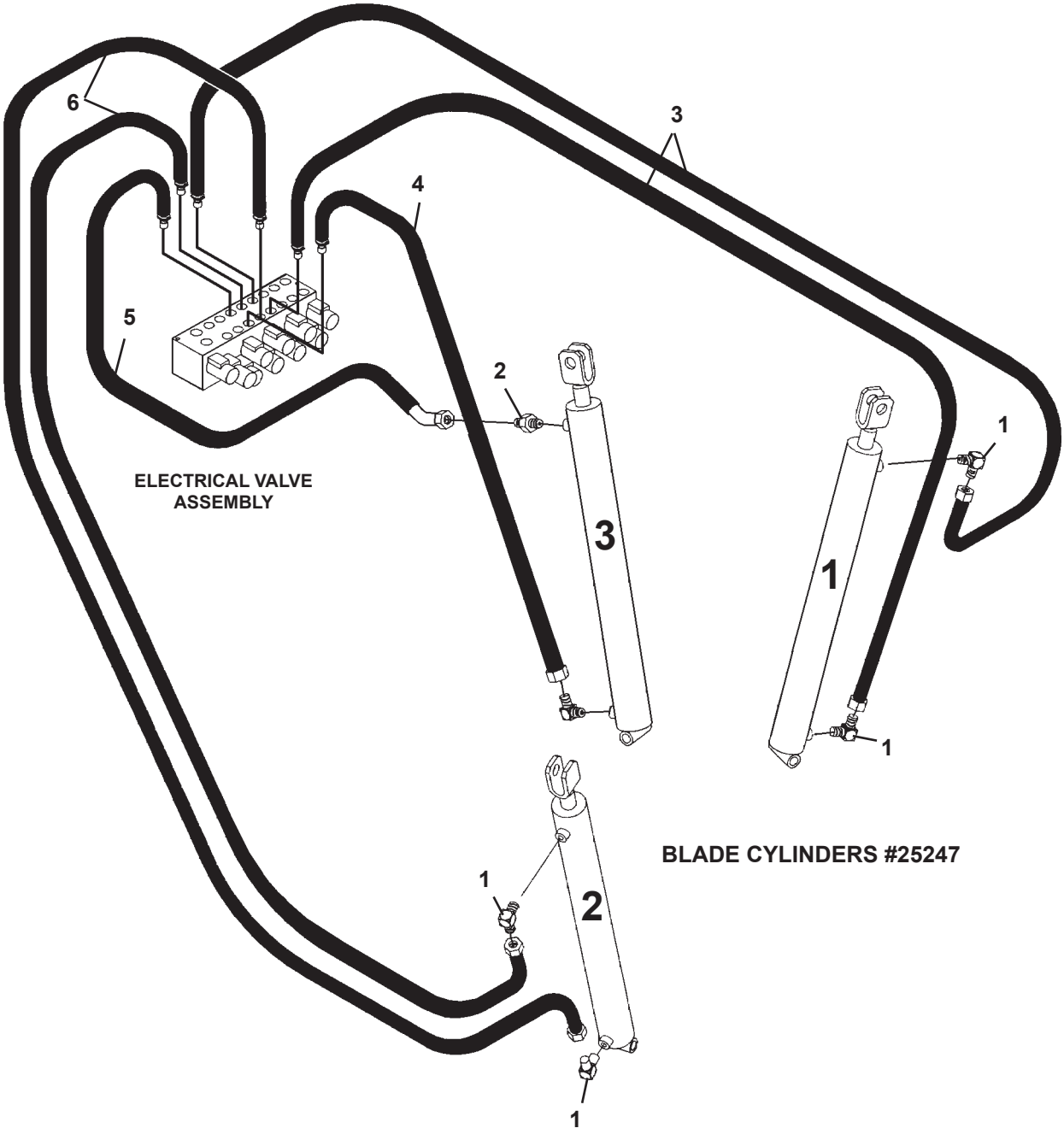
2415 HYDRAULIC ASSEMBLY #25430
POWER AND RETURN CIRCUIT

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	14175	Female Coupler
2	1	14176	Male Coupler
3	2	35847	Hose .50" X 60" 8MBo-8FJX
4	2	3382	90° Bulkhead Elbow 8MJ-8MJ (Includes Nut)
5	2	3105	Cap
6	2	3306	O-Ring
7	2	3275	Straight Bulkhead Connector 8MJ-8MJ (Includes Nut)
8	1	25448	Bulkhead Mounting Plate
9	2	38210	Hose .38" X 32" 8FJX -. 38 WEO
10	2	38209	Hose .50" X 21" 8FJX -. 50 WEO 90°

MOUNTING KIT INSTALLATION

2415 HYDRAULIC ASSEMBLY #25430

BLADE CIRCUIT



9493 6-9-14-2

MOUNTING KIT INSTALLATION

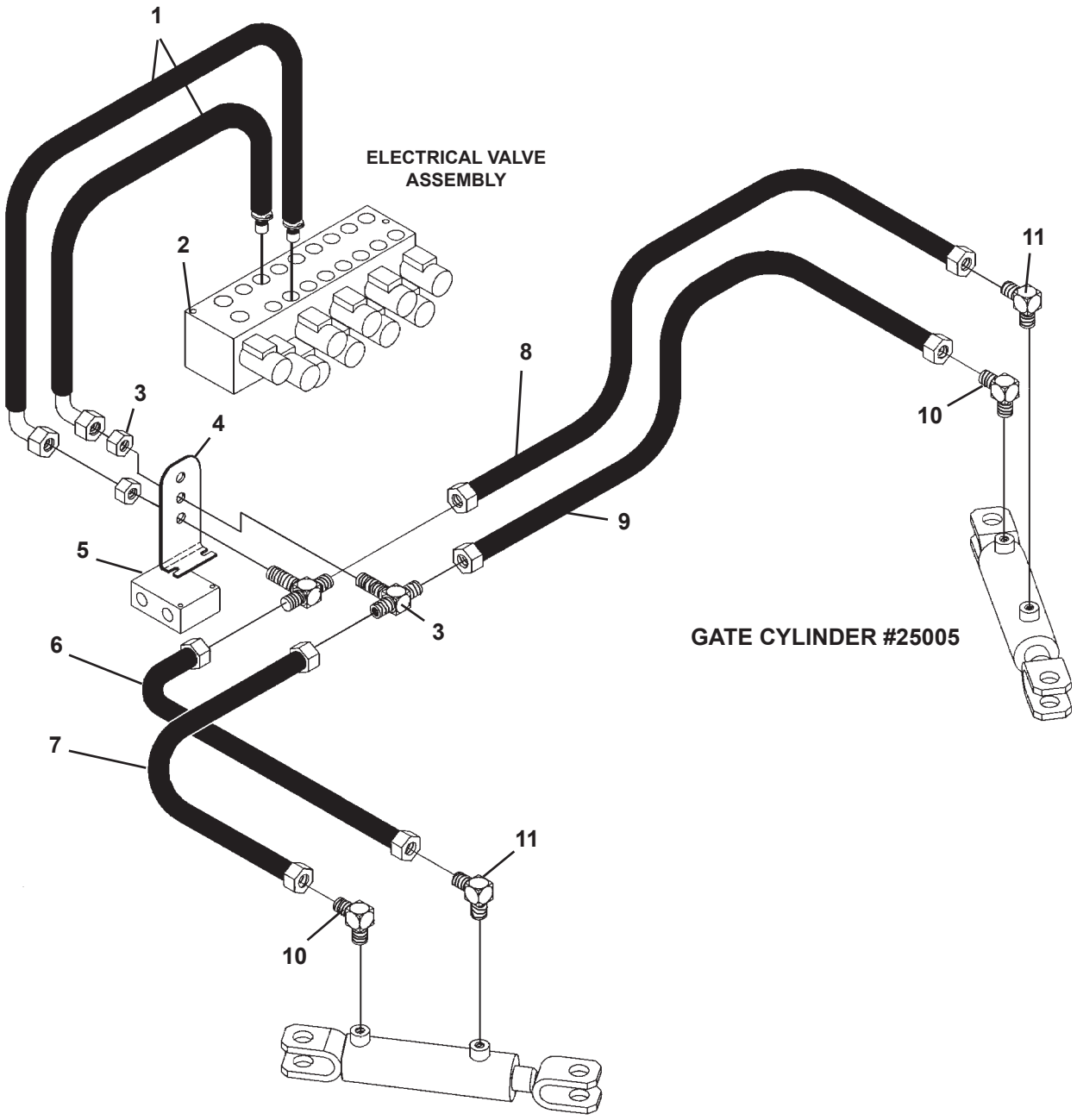
2415 HYDRAULIC ASSEMBLY #25430
BLADE CIRCUIT

ITEM	REQ'D	PART NO.	DESCRIPTION
1	5	3434	90° Elbow 6MBo-6MJ
2	1	3457	Straight Adapter 6MBo-6MJ
3	2	38211	Hose .25" X 62" 6FJX -. 38 WEO
4	1	38213	Hose .25" X 36" 6FJX -. 38 WEO
5	1	38214	Hose .25" X 19" 6FJX -. 38 WEO
6	2	38212	Hose .25" X 85" 6FJX -. 38 WEO

MOUNTING KIT INSTALLATION

2415 HYDRAULIC ASSEMBLY #25430

GATE CIRCUIT



9495 6-9-14-2

MOUNTING KIT INSTALLATION

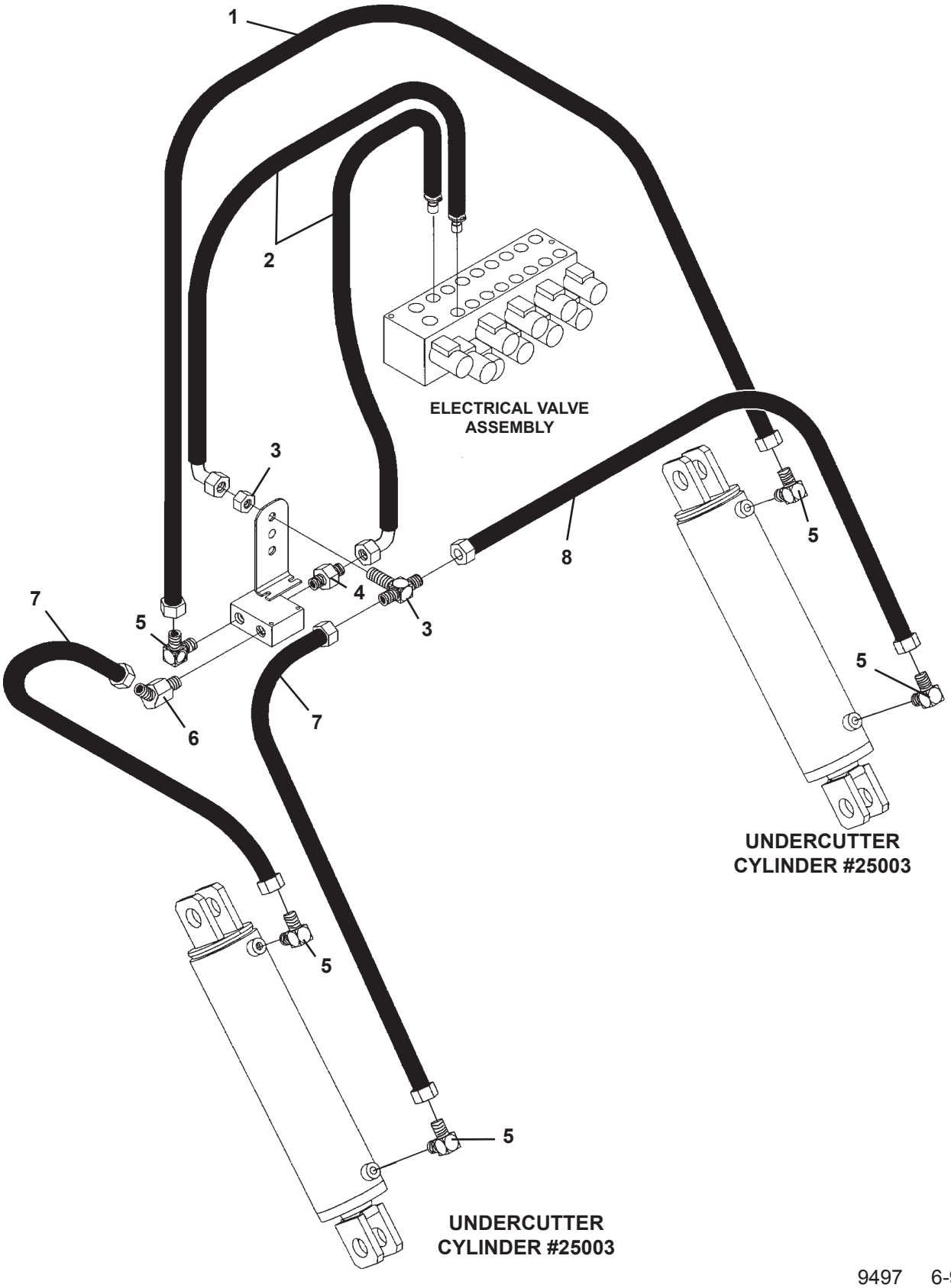
2415 HYDRAULIC ASSEMBLY #25430
GATE CIRCUIT

ITEM	REQ'D	PART NO.	DESCRIPTION
1	2	38216	Hose .25" X 28" 6FJX 90° - .38 WEO
2	2	1035	.31" UNC X 4.50" Hex Capscrew
	2	1513	.31" Flat Washer
	2	1753	.31" UNC Nylock Nut
3	2	3498	Bulkhead Tee 6MJ-6MJ-6MJ
4	1	25454	Bulkhead Mounting Plate
	2	1007	.25" UNC X 2.00" Hex Capscrew
	2	1512	.25" Flat Washer
	2	1629	.25" UNC Nylock Nut
5	1	25153	Flow Divider
6	1	35694	Hose .25" X 34" 6FJX - 6FJX
7	1	38217	Hose .25" X 27" 6FJX - 6FJX
8	1	37440	Hose .25" X 55" 6FJX - 6FJX
9	1	35807	Hose .25" X 50" 6FJX - 6FJX
10	2	3434	90° Elbow 6MBo-6MJ
11	2	30259	90° Elbow 6MBo-6MJ with .060 Orifice

9496 6-9-14-2

MOUNTING KIT INSTALLATION

2415 HYDRAULIC ASSEMBLY #25430
UNDERCUTTER CIRCUIT



9497 6-9-14-2

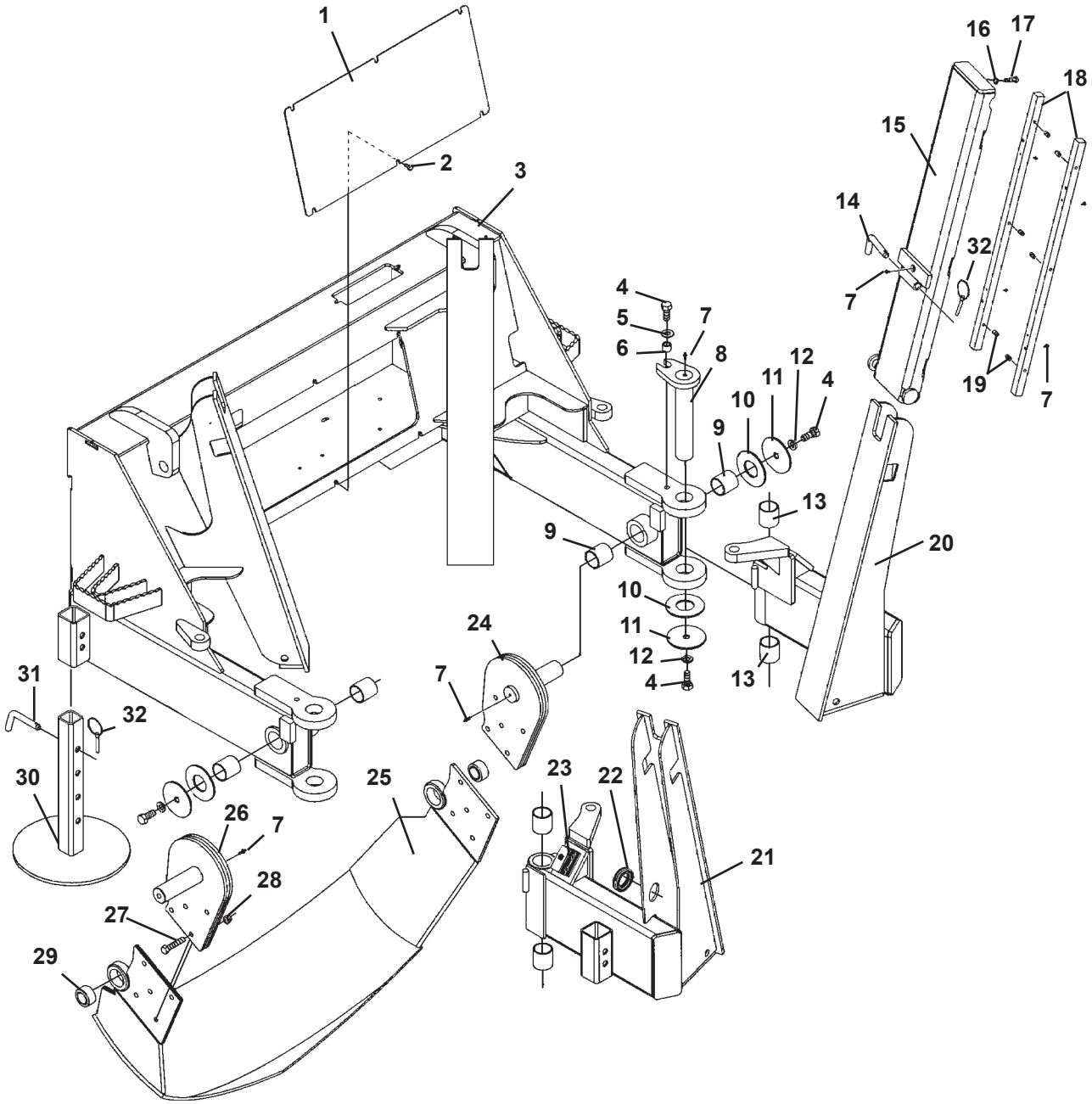
MOUNTING KIT INSTALLATION

2415 HYDRAULIC ASSEMBLY #25430
UNDERCUTTER CIRCUIT

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	37575	Hose .25" X 53" 6FJX - 6FJX
2	2	38215	Hose .38" X 26" 6FJX 90° - .38 WEO
3	1	3498	Bulkhead Tee 6MJ-6MJ-6MJ
4	1	3269	Straight Connector 8MBo-6MJ
5	5	3434	90° Elbow 6MBo-6MJ
6	1	30313	45° Elbow 6MBo-6MJ
7	2	38184	Hose .25" X 30" 6FJX - 6FJX
8	1	35807	Hose .25" X 50" 6FJX - 6FJX

3215 TREE SPADE

MAINFRAME ASSEMBLY #25151



9424 6-9-14-2

3215 TREE SPADE

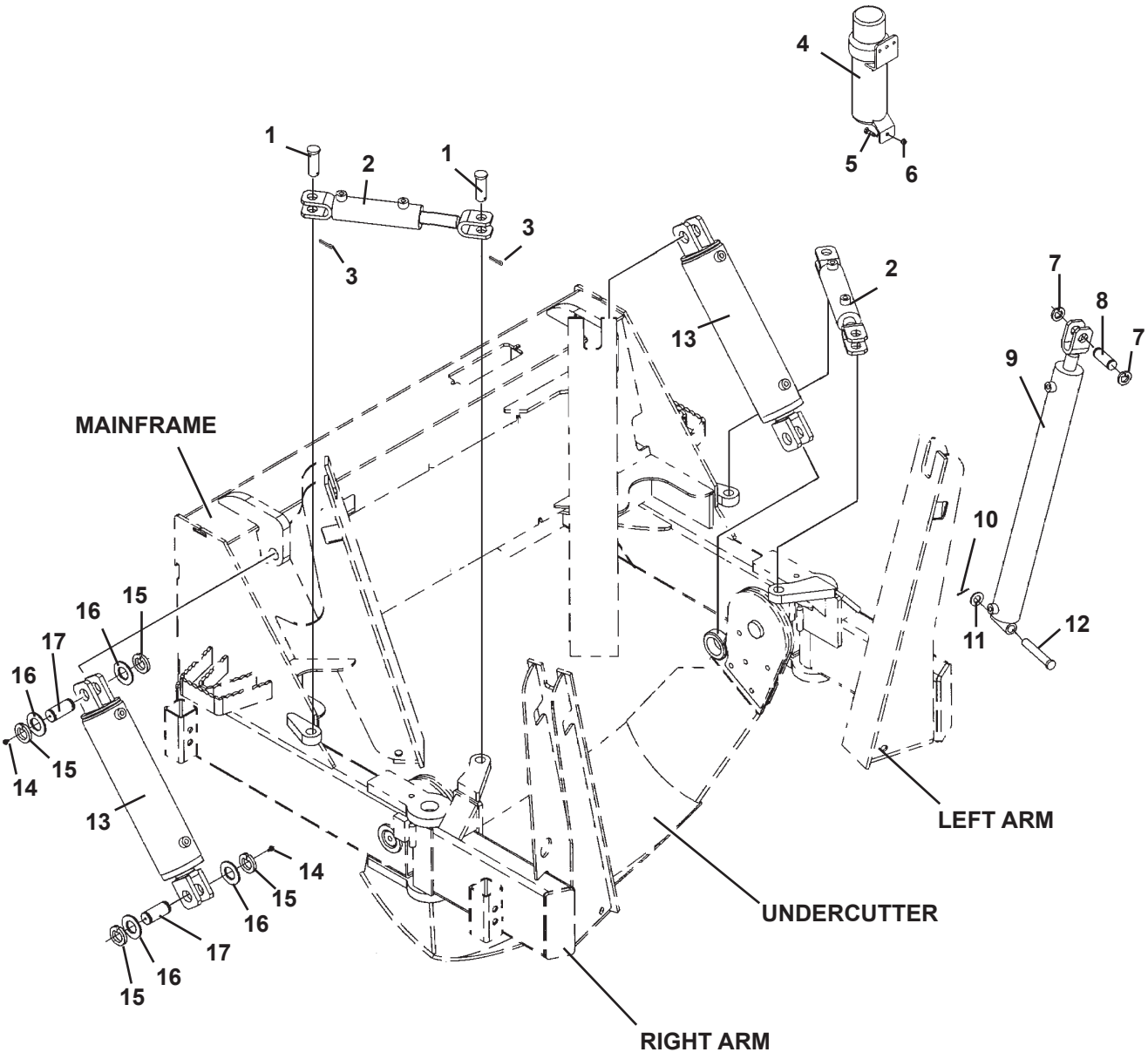
MAINFRAME ASSEMBLY #25151

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25131	Valve Cover
2	8	1953	.38" UNC X .75" Hex Screw
3	1	25246	Mainframe with Universal Hitch
	-	88987	Replacement Universal Hitch Plate (Weld-On)
4	6	1114	.62" UNC X 1.50" Hex Capscrew
5	2	1627	.62" Hard Flat Washer
6	2	25075	Spacer Tube
7	24	6616	Grease Fitting
8	2	25065	Pivot Pin
9	-	6356	Replacement Bushing (Included with Mainframe)
10	As Req'd	6622	Thrust Washer
11	4	25132	Special Washer (.69" x 2.50" x .38")
12	4	1506	.62" Lock Washer
13	-	6356	Replacement Bushing (Included with Left and Right Arm Weldments)
14	4	25118	Hitch Pin
15	4	25051	Slide Channel
16	24	1226	.38" UNC Hex Nut
17	24	1043	.38" UNC X 1.00" Hex Capscrew
18	8	25233	Slider Bar
19	24	1573	.38" UNC X .75" Set Screw
20	1	25076	Left Arm
21	1	25077	Right Arm
22	2	89088	Grommet
23	-	81358	Replacement Hose Clamp (Included with Left and Right Arm Weldments)
24	1	25133	Left Pivot
25	1	25139	Undercutter Blade
26	1	25134	Right Pivot
27	10	1965	.50" UNC X 2.50" Hex Capscrew - Grade 8
28	10	1841	.50" UNC Deformed Lock Nut
29	2	62523	Bushing
30	4	25144	Leg
31	4	89951	Hitch Pin
32	8	21169	Klik Pin

9425 6-9-14-2

3215 TREE SPADE

MAINFRAME ASSEMBLY #25151



9426 6-9-14-2

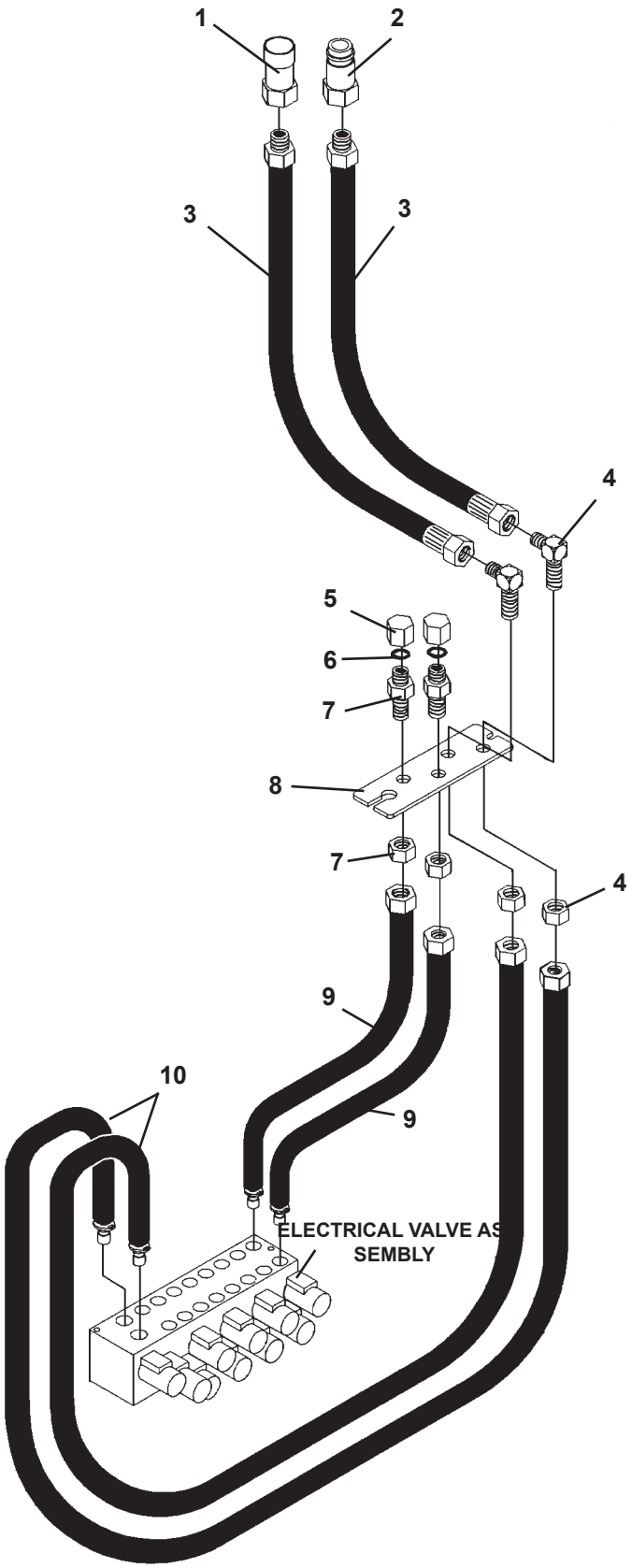
3215 TREE SPADE

MAINFRAME ASSEMBLY #25151

ITEM	REQ'D	PART NO.	DESCRIPTION
1	4	5097	Cylinder Pivot Pin
2	2	25005	Cylinder Assembly - Gate
3	4	1793	Cotter Pin
4	1	25453	Manual Storage Tube
5	3	1022	.31" UNC X 1.00" Hex Capscrew
6	3	1753	.31" UNC NyLock Nut
7	8	6612	Snap Ring
8	4	63302	Cylinder Pivot Pin
9	4	25004	Cylinder Assembly - Blades
10	4	1611	Cotter Pin
11	4	1649	.75" Hard Flat Washer
12	4	22260	Cylinder Pivot Pin
13	2	25003	Cylinder Assembly - Undercutter
14	4	6616	Grease Fitting
15	8	1652	Snap Ring
16	8	57693	Thrust Washer
17	4	25067	Cylinder Pivot Pin

MOUNTING KIT INSTALLATION

3515 HYDRAULIC ASSEMBLY #25424
4415 HYDRAULIC ASSEMBLY #25812
POWER AND RETURN CIRCUIT



9432 6-9-14-2

MOUNTING KIT INSTALLATION

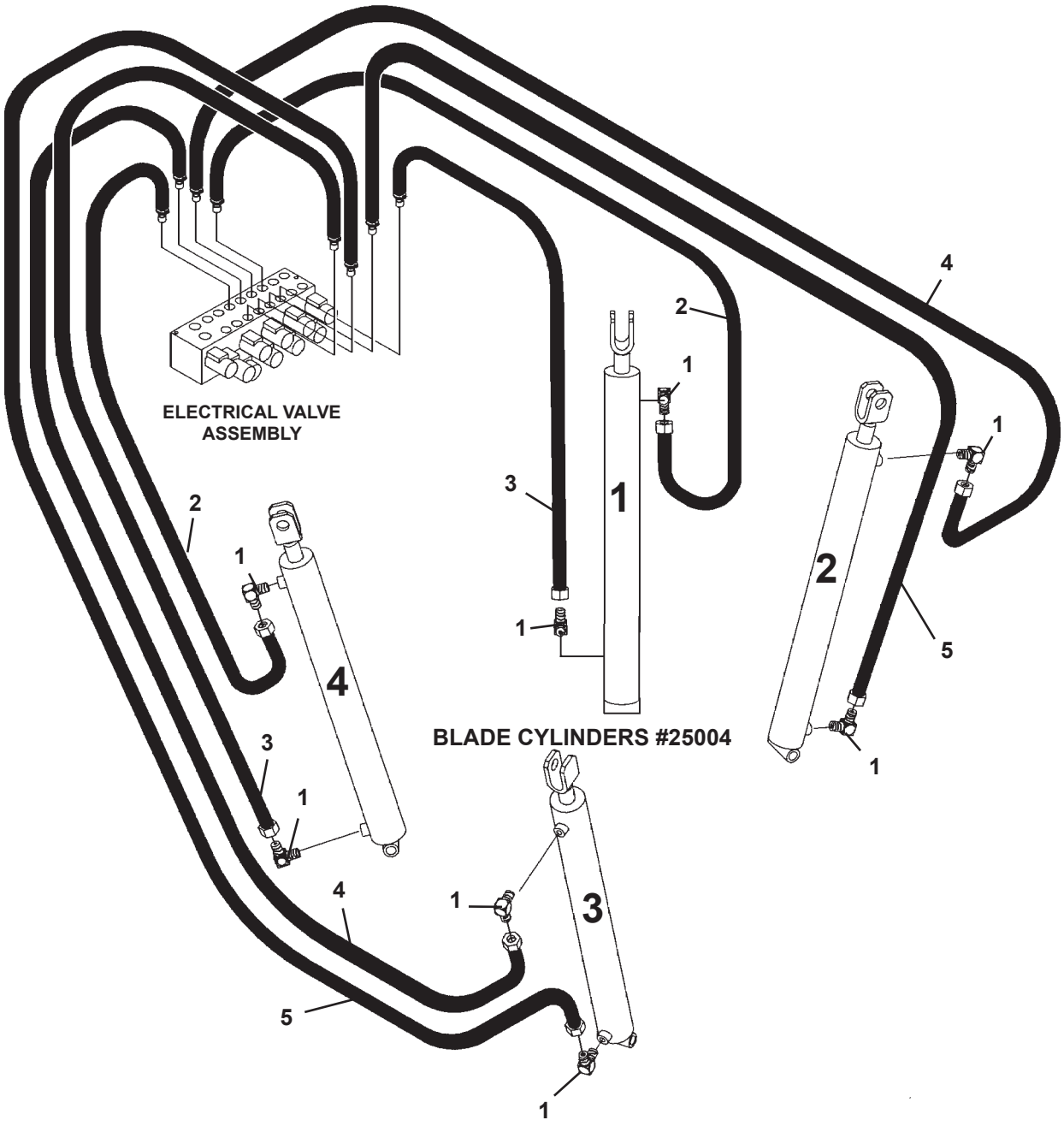
3515 HYDRAULIC ASSEMBLY #25424
4415 HYDRAULIC ASSEMBLY #25812
POWER AND RETURN CIRCUIT

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	14175	Female Coupler
2	1	14176	Male Coupler
3	2	35847	Hose .50" X 60" 8MBo-8FJX
4	2	3382	90° Bulkhead Elbow 8MJ-8MJ (Includes Nut)
5	2	3105	Cap
6	2	3306	O-Ring
7	2	3275	Straight Bulkhead Connector 8MJ-8MJ (Includes Nut)
8	1	25448	Bulkhead Mounting Plate
9	2	38180	Hose .38" X 30" 8FJX -. 38 WEO
10	2	38181	Hose .50" X 34" 8FJX -. 50 WEO

MOUNTING KIT INSTALLATION

3515 HYDRAULIC ASSEMBLY #25424

BLADE CIRCUIT



9434 6-9-14-2

MOUNTING KIT INSTALLATION

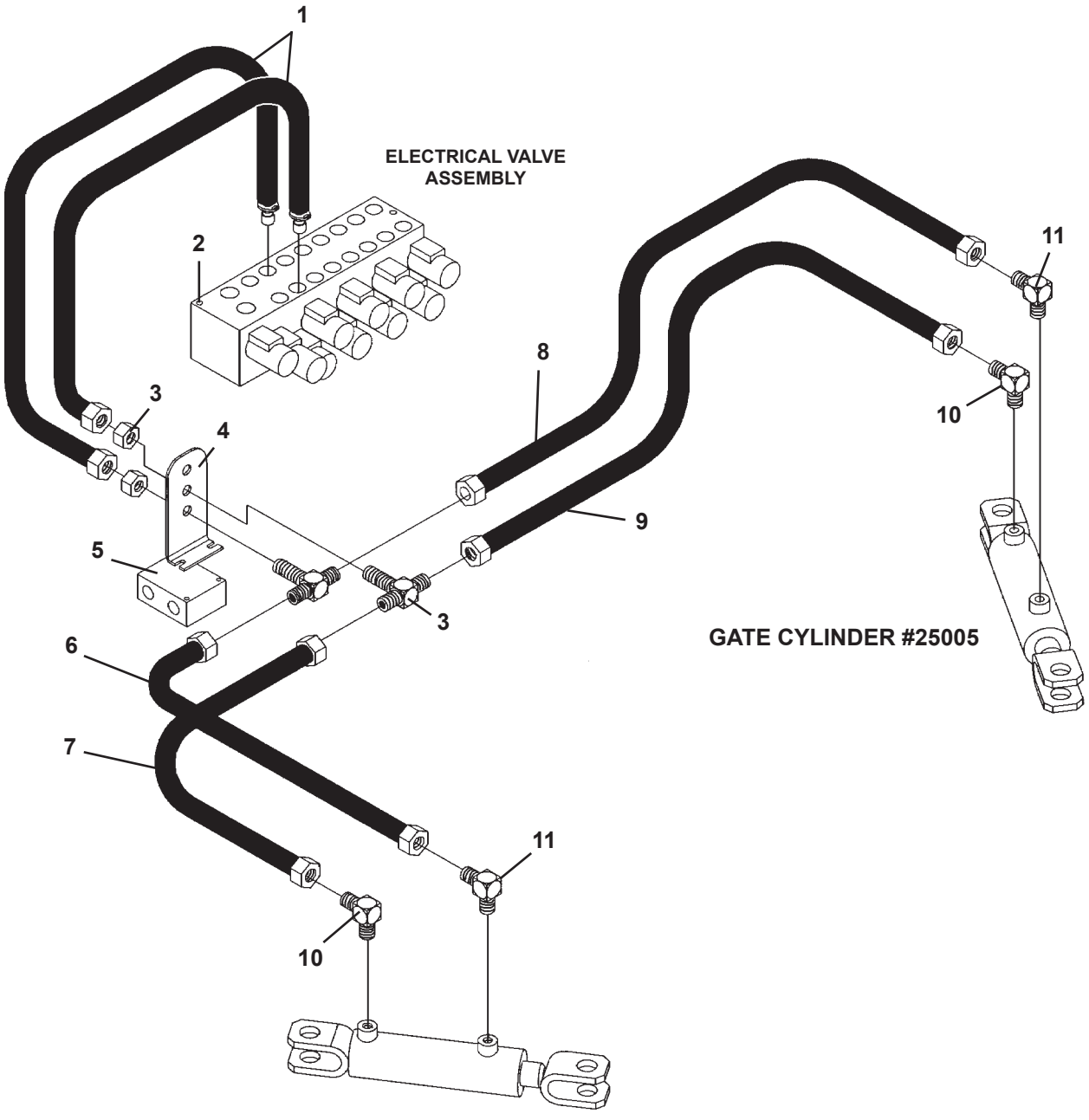
3515 HYDRAULIC ASSEMBLY #25424
BLADE CIRCUIT

ITEM	REQ'D	PART NO.	DESCRIPTION
1	8	3434	90° Elbow 6MBo-6MJ
2	2	38183	Hose .38" X 62" 6FJX -. 38 WEO
3	2	38222	Hose .38" X 84" 6FJX -. 38 WEO
4	2	38178	Hose .38" X 96" 6FJX -. 38 WEO
5	2	38179	Hose .38" X 88" 6FJX -. 38 WEO

MOUNTING KIT INSTALLATION

3215 HYDRAULIC ASSEMBLY #25424

GATE CIRCUIT



9436 6-9-14-2

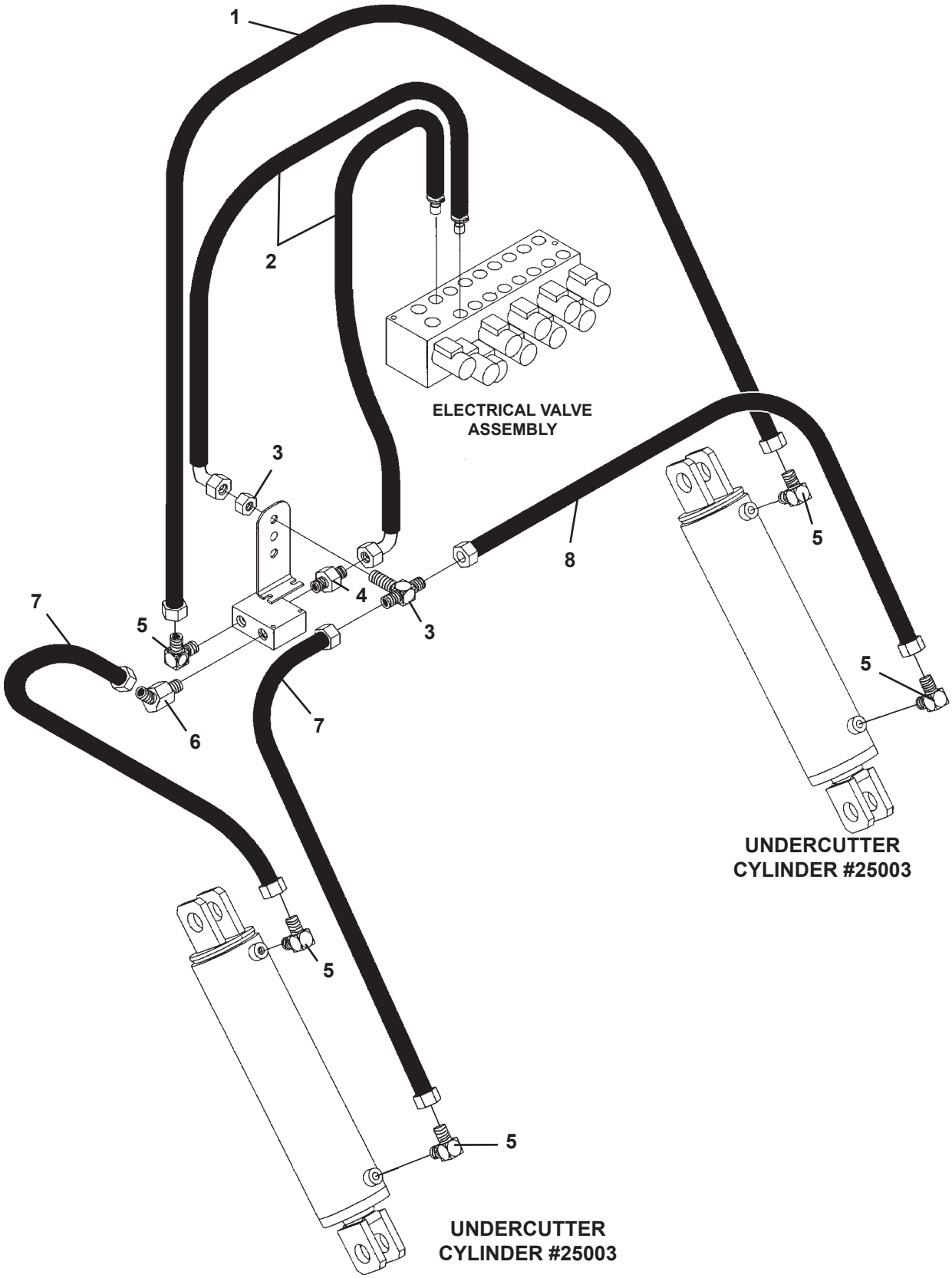
MOUNTING KIT INSTALLATION

3215 HYDRAULIC ASSEMBLY #25424
GATE CIRCUIT

ITEM	REQ'D	PART NO.	DESCRIPTION
1	2	38177	Hose .25" X 22" 6FJX - .38 WEO
2	2	1035	.31" UNC X 4.50" Hex Capscrew
	2	1513	.31" Flat Washer
	2	1753	.31" UNC Nylock Nut
3	2	3498	Bulkhead Tee 6MJ-6MJ-6MJ
4	1	25454	Bulkhead Mounting Plate
	2	1007	.25" UNC X 2.00" Hex Capscrew
	2	1512	.25" Flat Washer
	2	1629	.25" UNC Nylock Nut
5	1	25153	Flow Divider
6	1	37916	Hose .25" X 40" 6FJX - 6FJX
7	1	35694	Hose .25" X 34" 6FJX - 6FJX
8	1	35829	Hose .25" X 60" 6FJX - 6FJX
9	1	37440	Hose .25" X 55" 6FJX - 6FJX
10	2	3434	90° Elbow 6MBo-6MJ
11	2	30259	90° Elbow 6MBo-6MJ with .060 Orifice

MOUNTING KIT INSTALLATION

3215 HYDRAULIC ASSEMBLY #25424
UNDERCUTTER CIRCUIT



9438 6-9-14-2

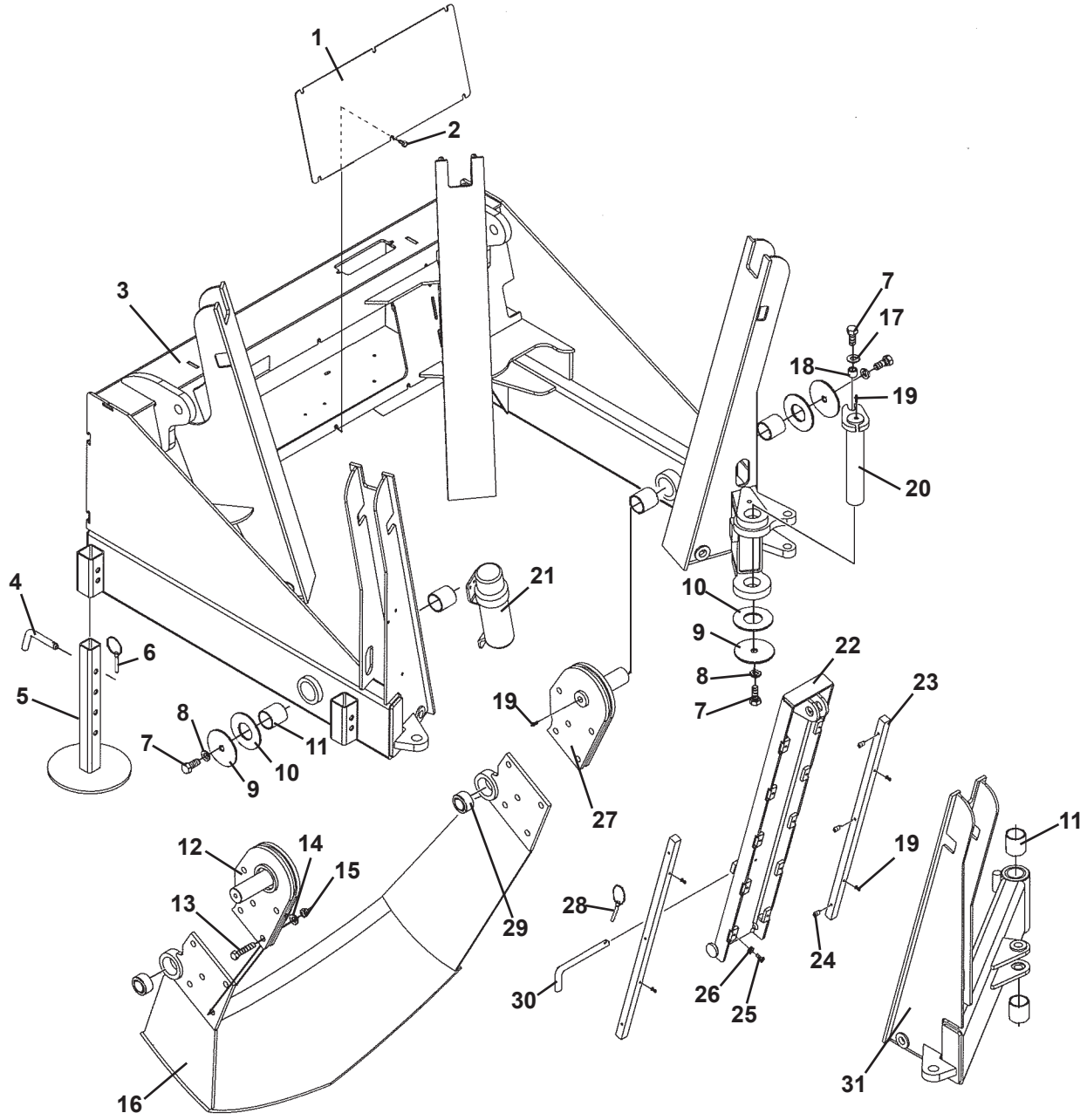
MOUNTING KIT INSTALLATION

3215 HYDRAULIC ASSEMBLY #25424
UNDERCUTTER CIRCUIT

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	35829	Hose .25" X 60" 6FJX - 6FJX
2	2	38176	Hose .38" X 20" 6FJX - 90° .38 WEO
3	1	3498	Bulkhead Tee 6MJ-6MJ-6MJ
4	1	3269	Straight Connector 8MBo-6MJ
5	5	3434	90° Elbow 6MBo-6MJ
6	1	30313	45° Elbow 6MBo-6MJ
7	2	35694	Hose .25" X 34" 6FJX - 6FJX
8	1	37440	Hose .25" X 55" 6FJX - 6FJX

4415 TREE SPADE

MAINFRAME ASSEMBLY #25695



12805 6-5-14

4415 TREE SPADE

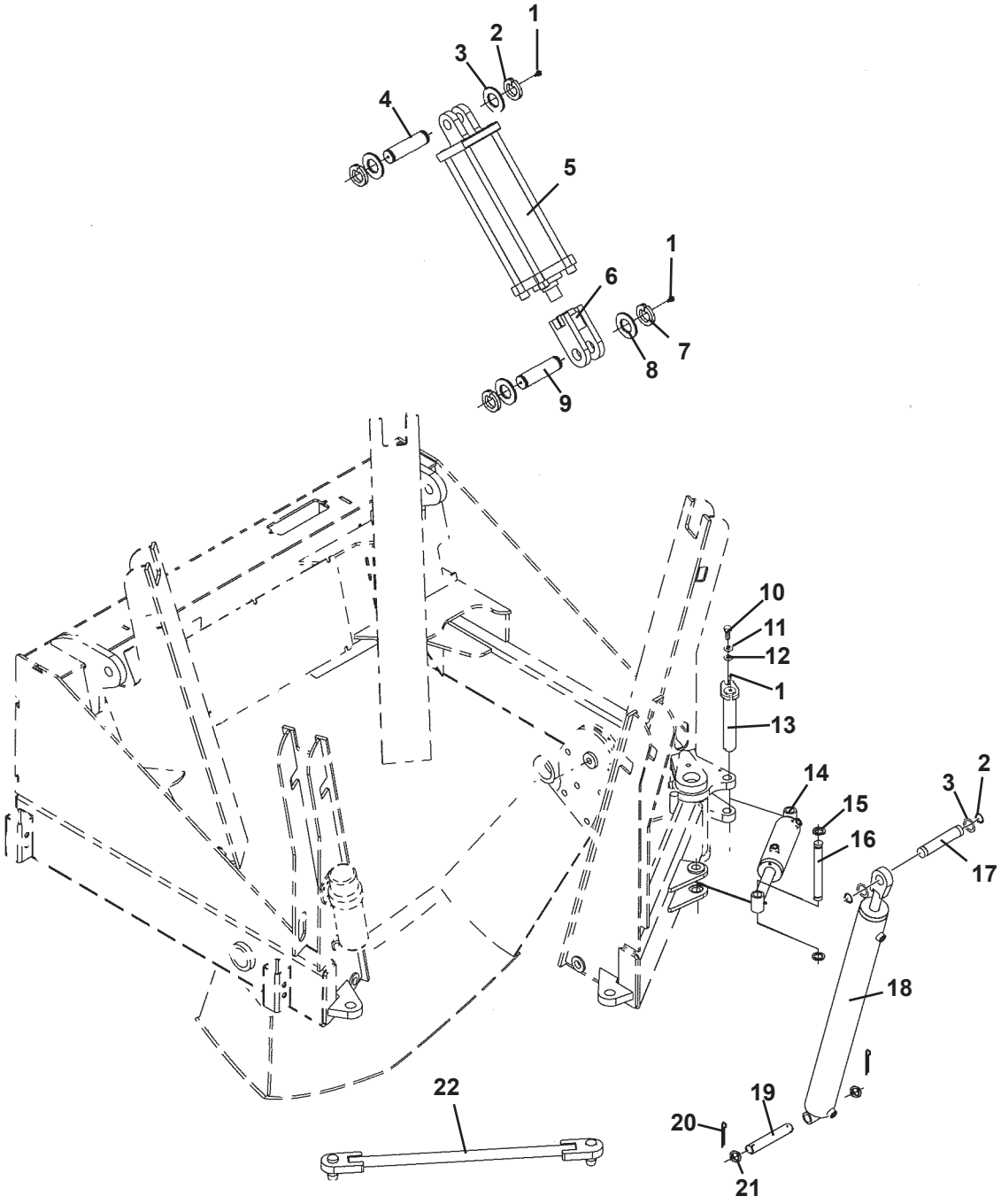
MAINFRAME ASSEMBLY #25695

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25131	Valve Cover
2	8	1953	.38" UNC X .75" Hex Screw
3	1	25631	Mainframe (without Mount)
	~	88987	Replacement Universal Hitch Plate (Weld-On)
4	4	89951	Hitch Pin
5	4	25144	Leg
6	4	1860	Hair Pin
7	3	1114	.62" UNC X 1.50" Hex Capscrew
8	3	1506	.62" Lock Washer
9	3	84725	Washer
10	6	82611	Thrust Washer 2.75" x 2.00" x .030"
11	~	31122	Replacement Bushing (4-Included in Mainframe and 2-Included in Arm)
12	1	25782	Right Pivot
13	10	10060	.75" UNC X 3.00" Hex Capscrew - Grade 8
14	10	1649	.75" Hard Flat Washer
15	10	1936	.75" UNC Deformed Lock Nut
16	1	25783	Undercutter Blade
17	3	1627	.62" Hard Flat Washer
18	1	25075	Spacer
19	23	6616	Grease Fitting
20	1	25754	Pivot Pin 2" x 11.31"
21	1	25453	Manual Storage Tube
	3	1022	.31" UNC X 1.00" Hex Capscrew
	3	1513	.31" Flat Washer
	3	1753	.31" UNC Nylock Nut
22	5	25624	Slide Channel
23	10	25630	Slider Bar
24	30	1573	.38" UNC X .75" Set Screw
25	50	1043	.38" UNC X 1.00 Hex Capscrew
26	50	1226	.38" UNC Hex Nut
27	1	25781	Left Pivot
28	5	21169	Klik Pin
29	2	68721	Self Aligning Bushing
30	5	25808	Hitch Pin
31	1	25751	Arm

12806 6-5-14

4415 TREE SPADE

MAINFRAME ASSEMBLY #25695



12807 6-5-14

4415 TREE SPADE

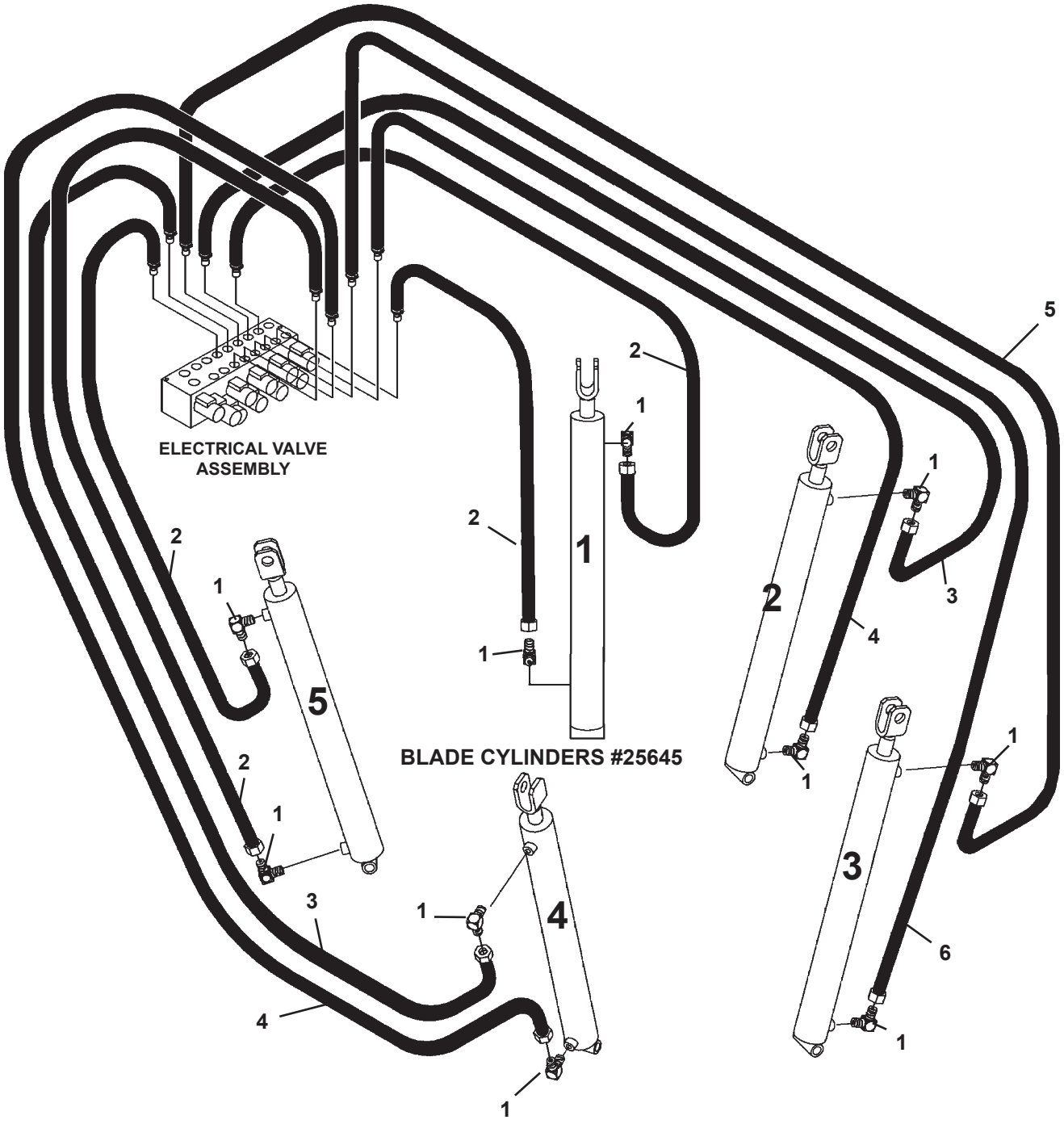
MAINFRAME ASSEMBLY #25695

ITEM	REQ'D	PART NO.	DESCRIPTION
1	5	6616	Grease Fitting
2	14	1652	Snap Ring
3	14	58693	Thrust Washer 2.00" X 1.25" X .06"
4	2	16703	Cylinder Pin 1.25" X 3.44"
5	2	25637	Cylinder Assembly - Undercutter
6	2	25800	Clevis
7	4	1684	Snap Ring
8	4	68057	Thrust Washer 2.25" X 1.50" X .071"
9	2	25807	Cylinder Pin 1.50" X 3.25"
10	1	1043	.38" UNC X 1.00" Hex Capscrew
11	1	1503	.38" Lock Washer
12	1	1800	.38" Hard Flat Washer
13	1	18589	Cylinder Pin 1.00" X 5.81"
14	1	25571	Cylinder Assembly - Gate
15	2	6612	Snap Ring
16	1	87805	Cylinder Pin 1.00" X 3.50"
17	5	25067	Cylinder Pin 1.25" X 2.38"
18	5	25645	Cylinder Assembly - Blades
19	5	22254	Cylinder Pin 1.00" X 5.00"
20	10	1614	Cotter Pin
21	10	58462	Thrust Washer 1.50" X 1.00" X .06"
22	1	25652	Gate Locking Link

MOUNTING KIT INSTALLATION

4415 HYDRAULIC ASSEMBLY #25812

BLADE CIRCUIT



12809 6-9-14

MOUNTING KIT INSTALLATION

4415 HYDRAULIC ASSEMBLY #25812
BLADE CIRCUIT

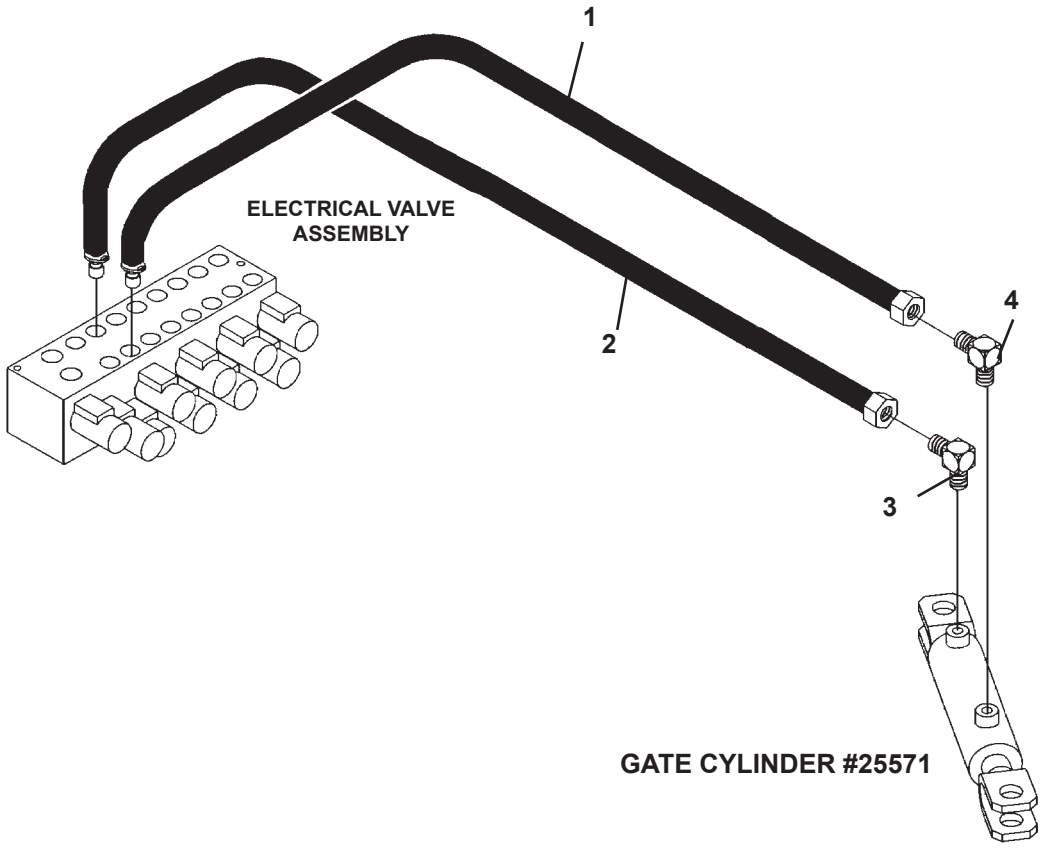
ITEM	REQ'D	PART NO.	DESCRIPTION
1	10	3434	90° Elbow 6MBo-6MJ
2	4	38301	Hose .38" X 68" 6FJX -. 38 WEO
3	2	38303	Hose .38" X 103" 6FJX -. 38 WEO
4	2	38302	Hose .38" X 93" 6FJX -. 38 WEO
5	1	38305	Hose .38" X 140" 6FJX -. 38 WEO
6	1	38304	Hose .38" X 125" 6FJX -. 38 WEO

12810 6-9-14

MOUNTING KIT INSTALLATION

4415 HYDRAULIC ASSEMBLY #25812

GATE CIRCUIT



12811 6-9-14

MOUNTING KIT INSTALLATION

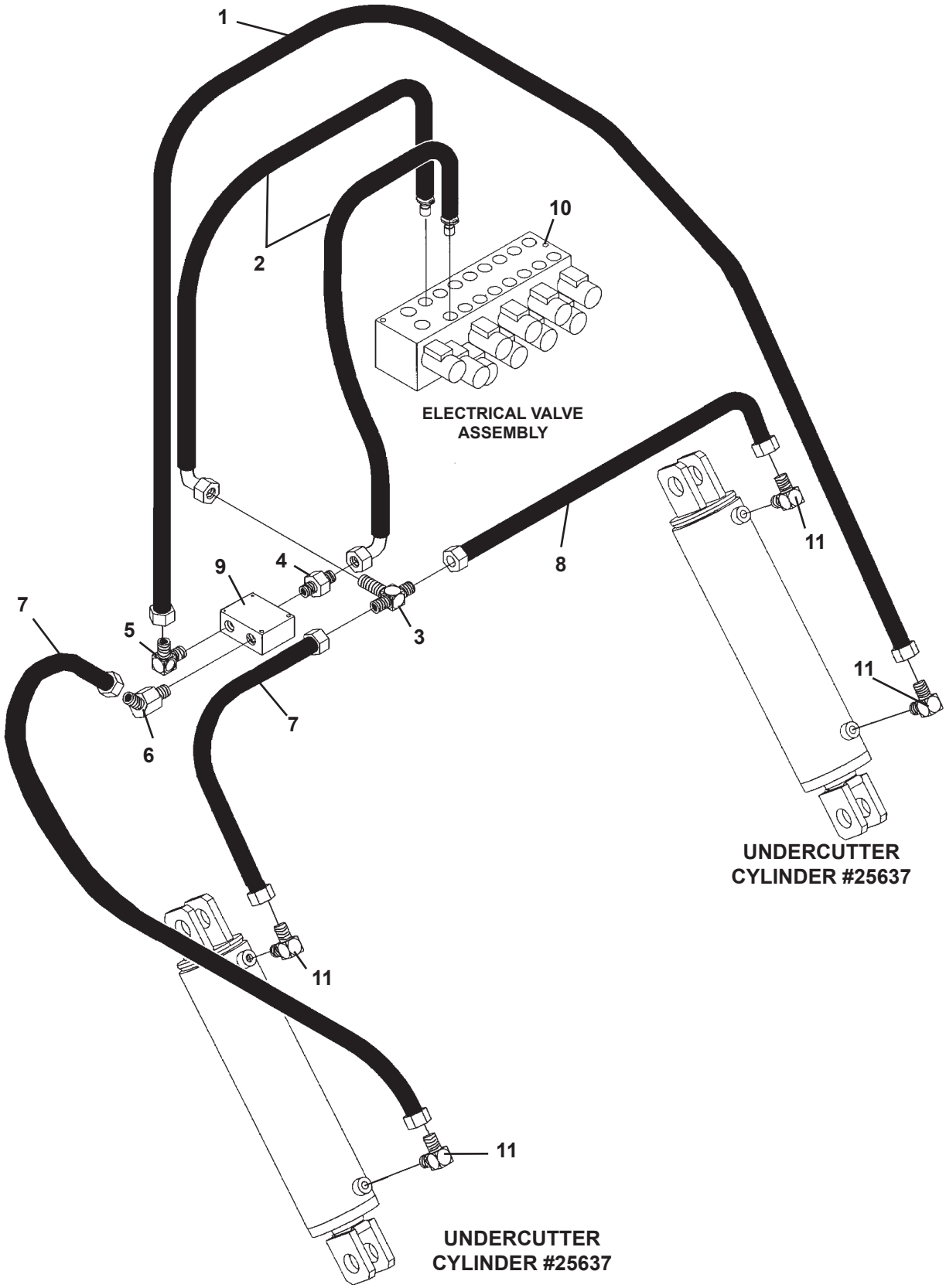
4415 HYDRAULIC ASSEMBLY #25812
GATE CIRCUIT

ITEM	REQ'D	PART NO.	DESCRIPTION
1	2	38300	Hose .25" X 100" 6FJX - .38 WEO
2	2	38299	Hose .25" X 94" 6FJX - .38 WEO
3	2	3434	90° Elbow 6MBo-6MJ
4	2	30259	90° Elbow 6MBo-6MJ with .060 Orifice

12812 6-9-14

MOUNTING KIT INSTALLATION

4415 HYDRAULIC ASSEMBLY #25812
UNDERCUTTER CIRCUIT



12813 6-9-14

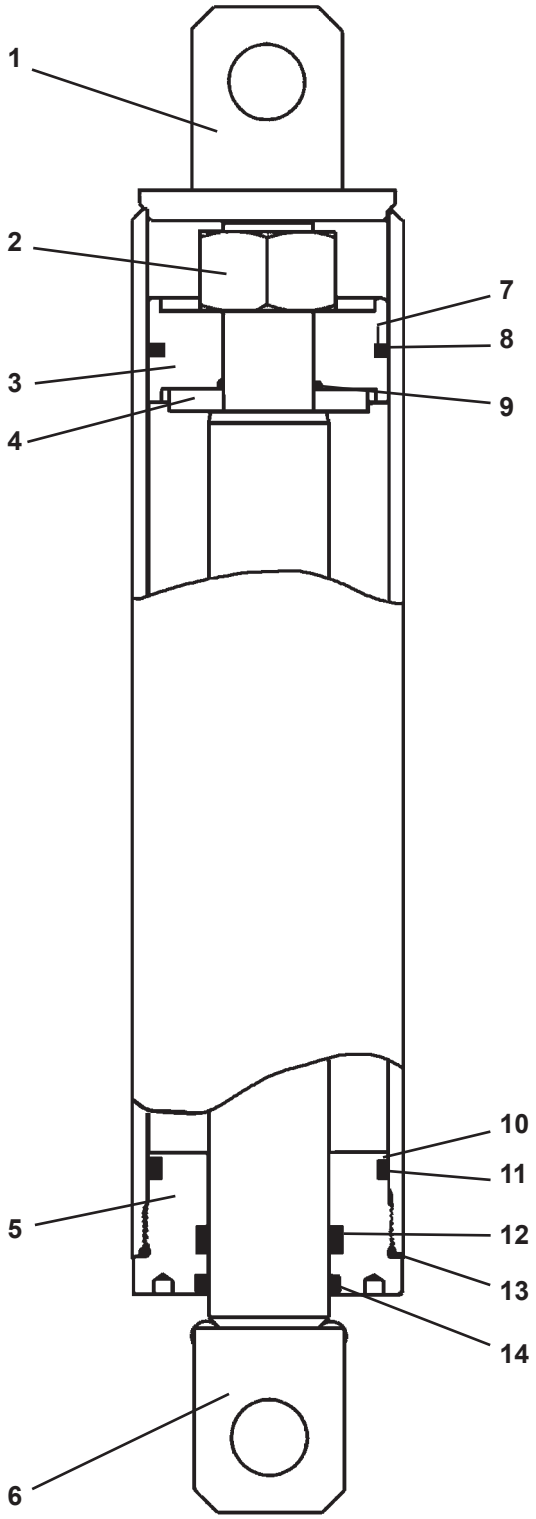
MOUNTING KIT INSTALLATION

4415 HYDRAULIC ASSEMBLY #25812
UNDERCUTTER CIRCUIT

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	37857	Hose .38" X 80.50" 6FJX- 6FJX
2	2	38176	Hose .38" X 20" 6FJX - 90° .38 WEO
3	1	3314	Tee 6MJ-6MJ-6MJ
4	1	3269	Straight Connector 8MBo-6MJ
5	5	3434	90° Elbow 6MBo-6MJ
6	1	30313	45° Elbow 6MBo-6MJ
7	2	38407	Hose .25" X 44" 6FJX - 6FJX
8	1	37887	Hose .25" X 64" 6FJX - 6FJX
9	1	25153	Flow Divider
	2	1006	.25" UNC X 1.75" Hex Capscrew
	4	1512	.25" Flat Washer
	2	1629	.25" UNC Nylock Nut
10	1	25427	Electrical Valve and Wire Harness Assembly
	2	1035	.31" UNC X 4.50" Hex Capscrew
	2	1513	.31" Flat Washer
	2	1753	.31" UNC Nylock Nut
11	4	30143	90° Elbow 10MBo-6MJ

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25003



9442 6-9-14-2

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25003

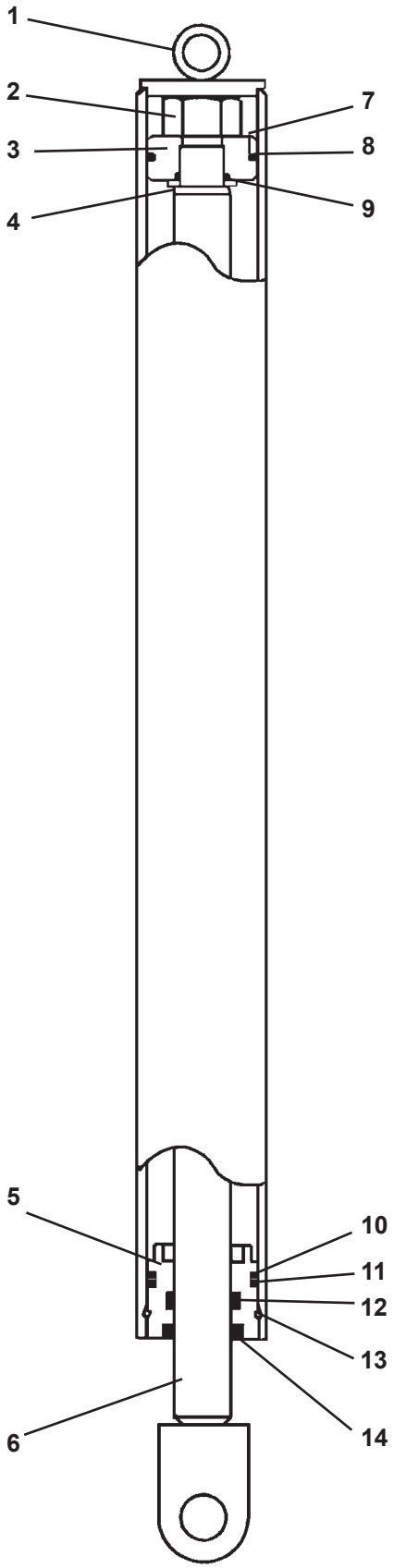
ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25020	Cylinder Tube
2	1	1487	Hex Nut
3	1	73834	Piston
4	1	54958	Washer
5	1	77455	Cylinder Gland
6	1	25018	Cylinder Rod
7	1	45509*	O'Ring
8	1	4816*	Piston Ring
9	1	45109*	O'Ring
10	1	45516*	O'Ring
11	1	45515*	Back-Up Washer
12	1	45117*	PolyPak Seal
13	1	45519*	O'Ring
14	1	45364*	Rod Wiper

NOTE: Seal Kit #45813 includes all parts marked with an asterisk (*). parts are not sold separately.

9443 6-9-14-2

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25004



9444 6-9-14-2

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25004

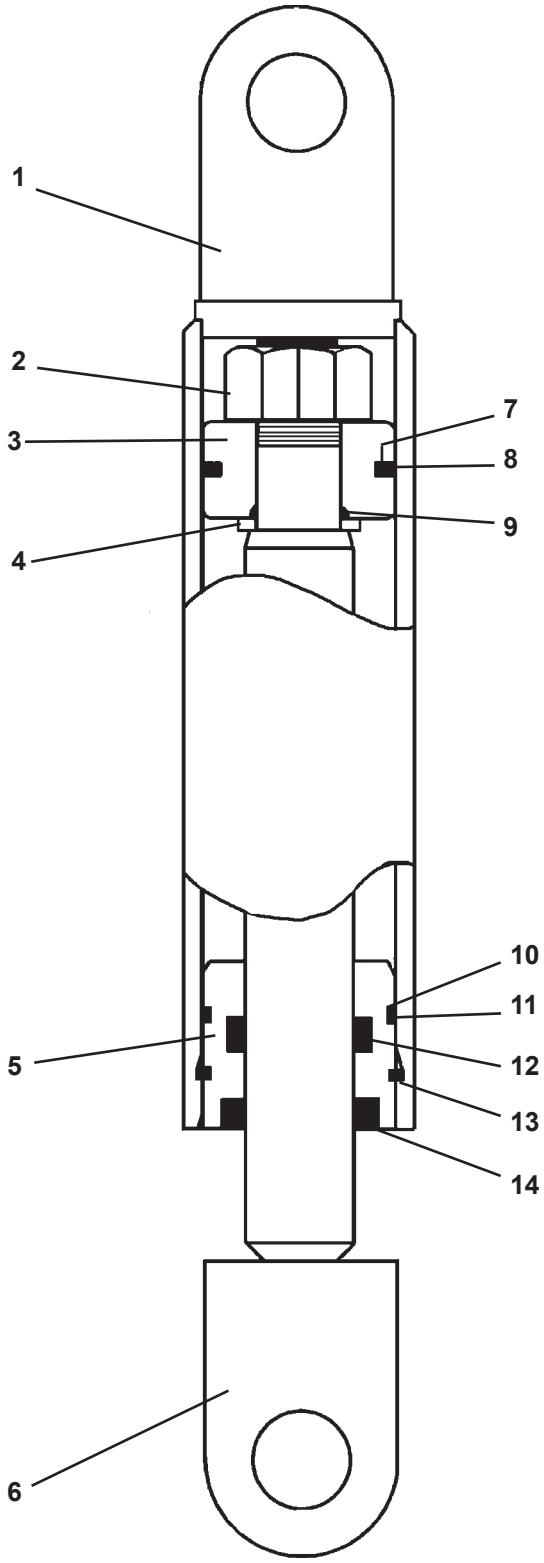
ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25014	Cylinder Tube
2	1	1483	Hex Nut
3	1	50252	Piston
4	1	5421	Washer
5	1	62770	Cylinder Gland
6	1	25012	Cylinder Rod
7	1	4645*	O'Ring
8	1	4644*	Piston Ring
9	1	4641*	O'Ring
10	1	4509*	O'Ring
11	1	4510*	Back-Up Washer
12	1	45219*	PolyPak Seal
13	1	7165*	Cylinder Gland Retaining Ring
14	1	4974*	Rod Wiper

NOTE: Seal Kit #45258 includes all parts marked with an asterisk (*). parts are not sold separately.

9445 6-9-14-2

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25005



9446 6-9-14-2

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25005

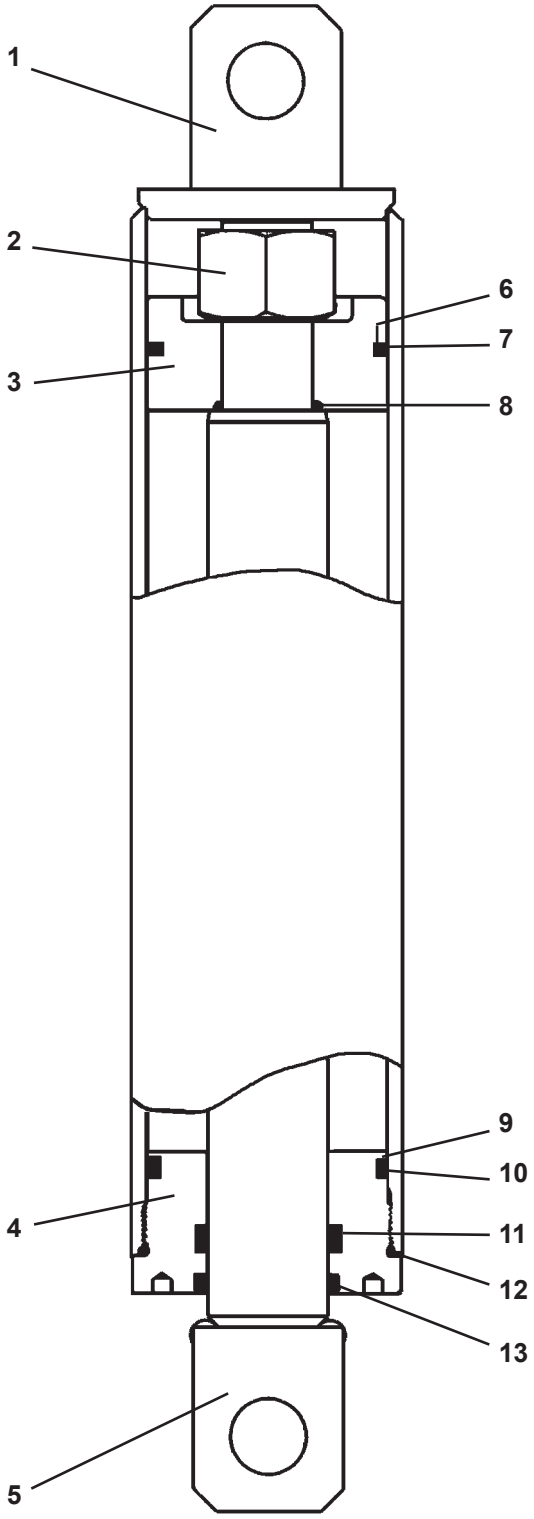
ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25010	Cylinder Tube
2	1	1482	Hex Nut
3	1	6992	Piston
4	1	52644	Washer
5	1	64891	Cylinder Gland
6	1	25008	Cylinder Rod
7	1	4637*	O'Ring
8	1	4636*	Piston Ring
9	1	4635*	O'Ring
10	1	4633*	O'Ring
11	1	4634*	Back-Up Washer
12	1	45262*	PolyPak Seal
13	1	7164*	Cylinder Gland Retaining Ring
14	1	4981*	Rod Wiper

NOTE: Seal Kit #45581 includes all parts marked with an asterisk (*). parts are not sold separately.

9447 6-9-14-2

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25240



9482 6-9-14-2

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25240

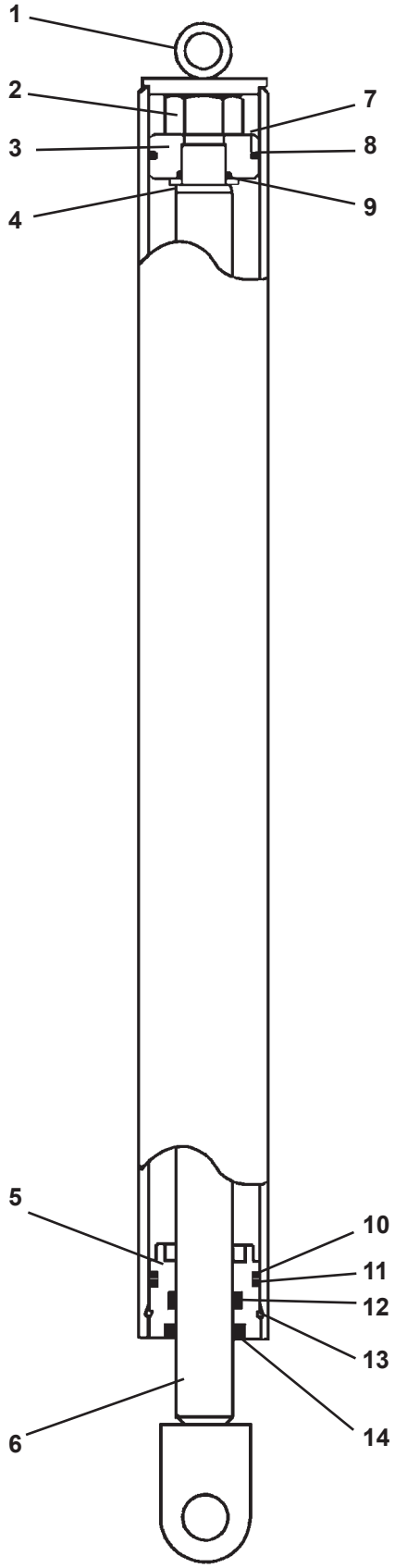
ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25241	Cylinder Tube
2	1	1483	Hex Nut
3	1	18440	Piston
4	1	77451	Cylinder Gland
5	1	25242	Cylinder Rod
6	1	45245*	O'Ring
7	1	45244*	Piston Ring
8	1	4641*	O'Ring
9	1	45242*	O'Ring
10	1	45243*	Back-Up Washer
11	1	45119*	PolyPak Seal
12	1	45412*	O'Ring
13	1	45370*	Rod Wiper

NOTE: Seal Kit #45415 includes all parts marked with an asterisk (*). parts are not sold separately.

9483 6-9-14-2

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25247



9484 6-9-14-2

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25247

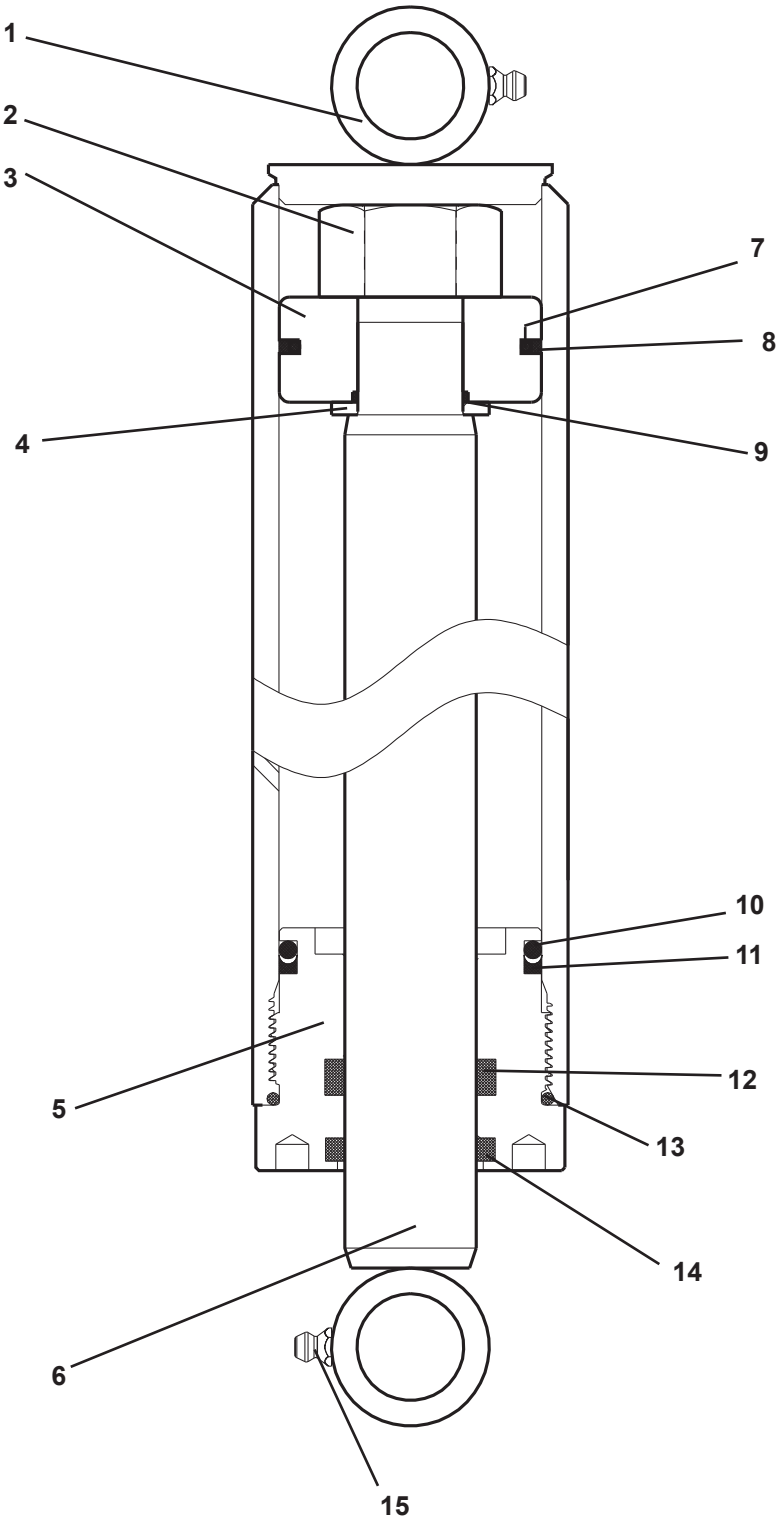
ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25248	Cylinder Tube
2	1	1483	Hex Nut
3	1	50252	Piston
4	1	5421	Washer
5	1	62770	Cylinder Gland
6	1	25251	Cylinder Rod
7	1	4645*	O'Ring
8	1	4644*	Piston Ring
9	1	4641*	O'Ring
10	1	4509*	O'Ring
11	1	4510*	Back-Up Washer
12	1	45219*	PolyPak Seal
13	1	7165*	Cylinder Gland Retaining Ring
14	1	4974*	Rod Wiper

NOTE: Seal Kit #45258 includes all parts marked with an asterisk (*). parts are not sold separately.

9485 6-9-14-2

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25571



12815 6-10-14

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25571

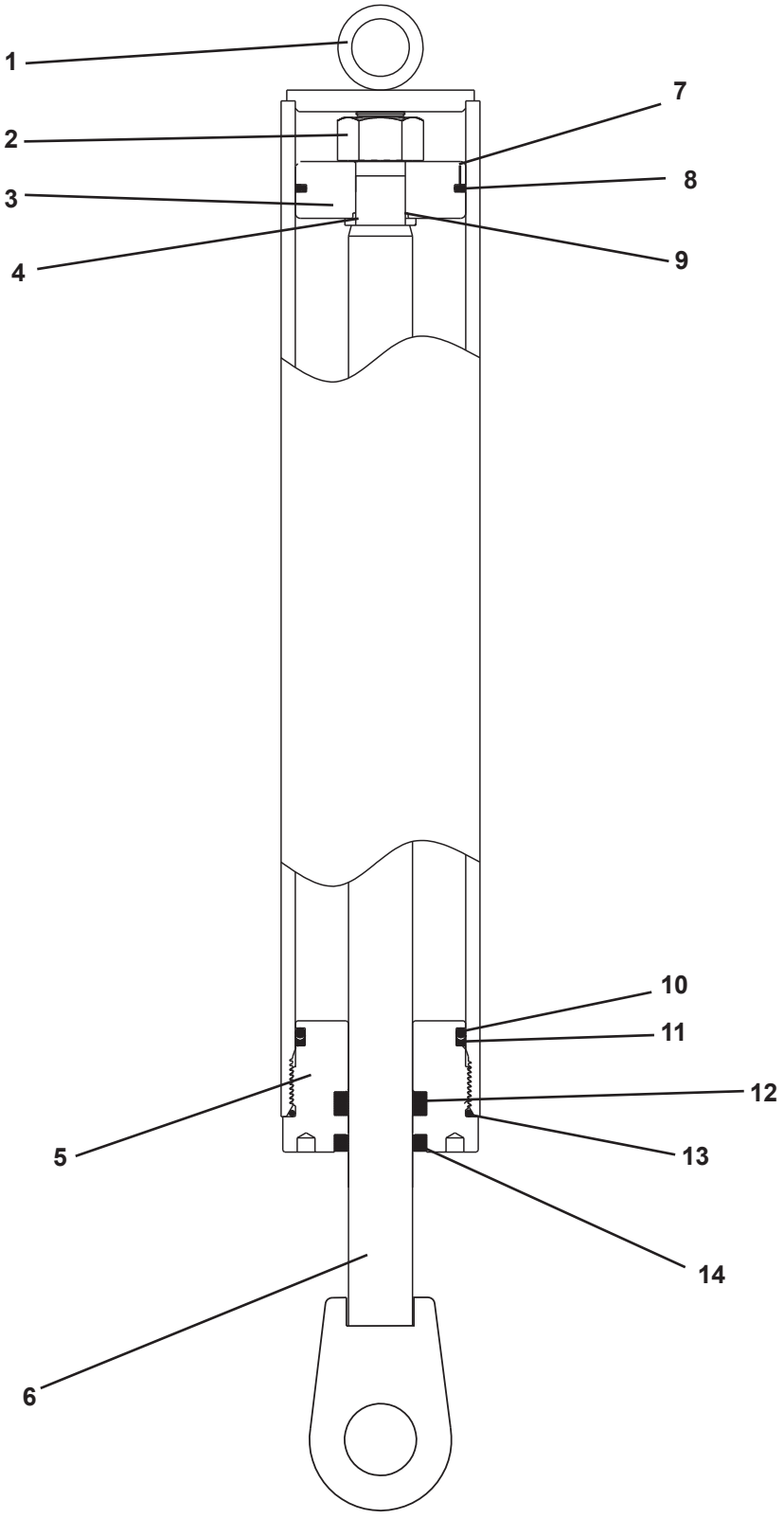
ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25572	Cylinder Tube
2	1	1483	Hex Nut (Torque to 230-250 ft. lbs.)
3	1	50252	Piston
4	1	5421	Washer
5	1	77458	Cylinder Gland
6	1	25397	Cylinder Rod
7	1	4645*	O'Ring
8	1	4644*	Piston Ring
9	1	4641*	O'Ring
10	1	4509*	O'Ring
11	1	4510*	Back-Up Washer
12	1	45219*	PolyPak Seal
13	1	45250*	O'Ring
14	1	45389*	Rod Wiper
15	2	6616	Grease Fitting

NOTE: Seal Kit #45617 includes all parts marked with an asterisk (*). parts are not sold separately.

12816 6-10-14

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25645



12817 6-10-14

MOUNTING KIT INSTALLATION

CYLINDER ASSEMBLY #25645

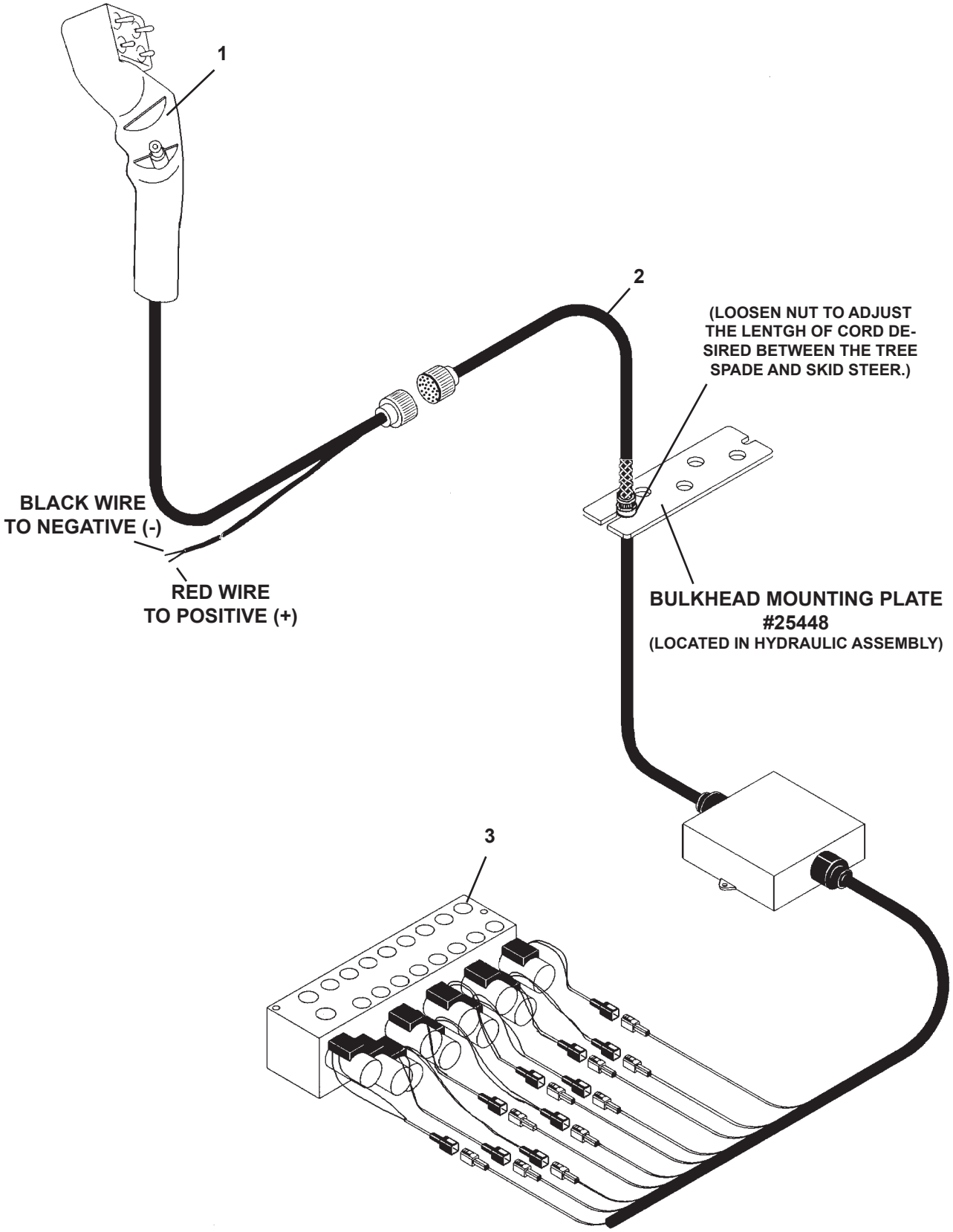
ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25649	Cylinder Tube
2	1	1482	Hex Nut (Torque to 150-200 ft. lbs.)
3	1	25402	Piston
4	1	52644	Washer
5	1	25394	Cylinder Gland
6	1	25646	Cylinder Rod
7	1	4570*	O'Ring
8	1	4569*	Piston Ring
9	1	4635*	O'Ring
10	1	45555*	O'Ring
11	1	4631*	Back-Up Washer
12	1	45262*	PolyPak Seal
13	1	4908*	O'Ring
14	1	4981*	Rod Wiper

NOTE: Seal Kit #45838 includes all parts marked with an asterisk (*). parts are not sold separately.

12818 6-10-14

MOUNTING KIT INSTALLATION

ELECTRICAL ASSEMBLY #25427



9440 6-9-14-3

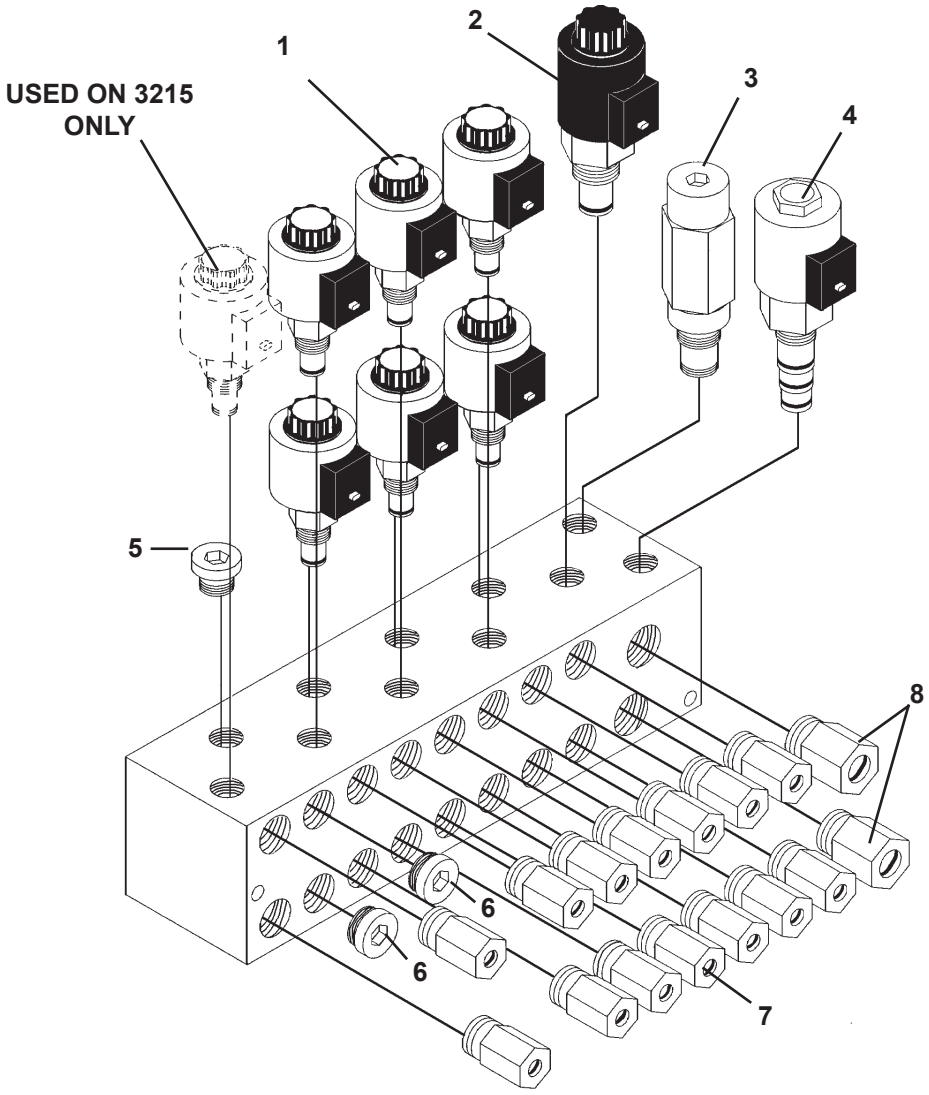
MOUNTING KIT INSTALLATION

ELECTRICAL ASSEMBLY #25427

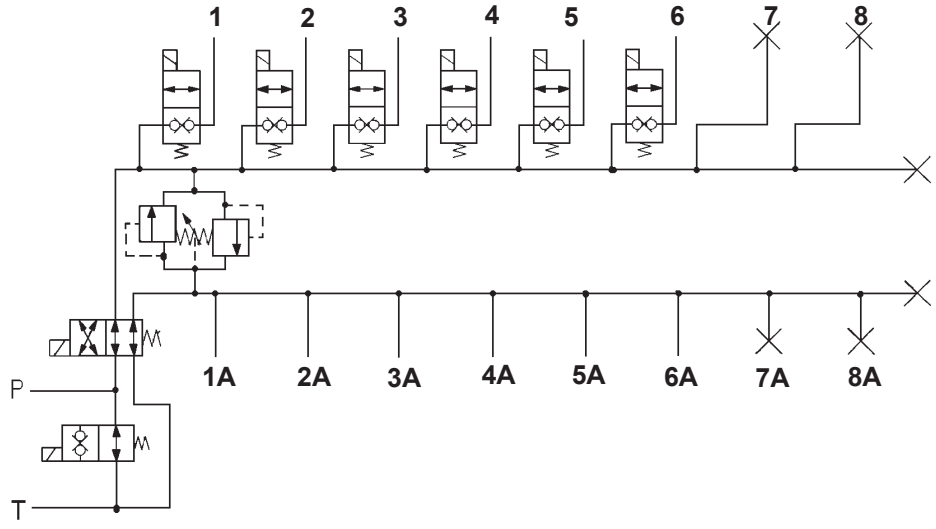
ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25425	Joystick Assembly Includes Power Cord, Connector and Joystick
2	1	25455	Wire Harness Assembly Includes Power Cord, Connector and Junction Box
3	1	25456	Valve Assembly Includes Six Circuit Valve with #6 O'ring Ports, 26 GPM BiDirectional Unloader, 2200 PSI BiDirectional Relief Valve and Deutsch Connectors on Coils

VALVE ASSEMBLY

VALVE ASSEMBLY #25456



HYDRAULIC SCHEMATIC



9476 6-4-14-3

VALVE ASSEMBLY

VALVE ASSEMBLY #25456

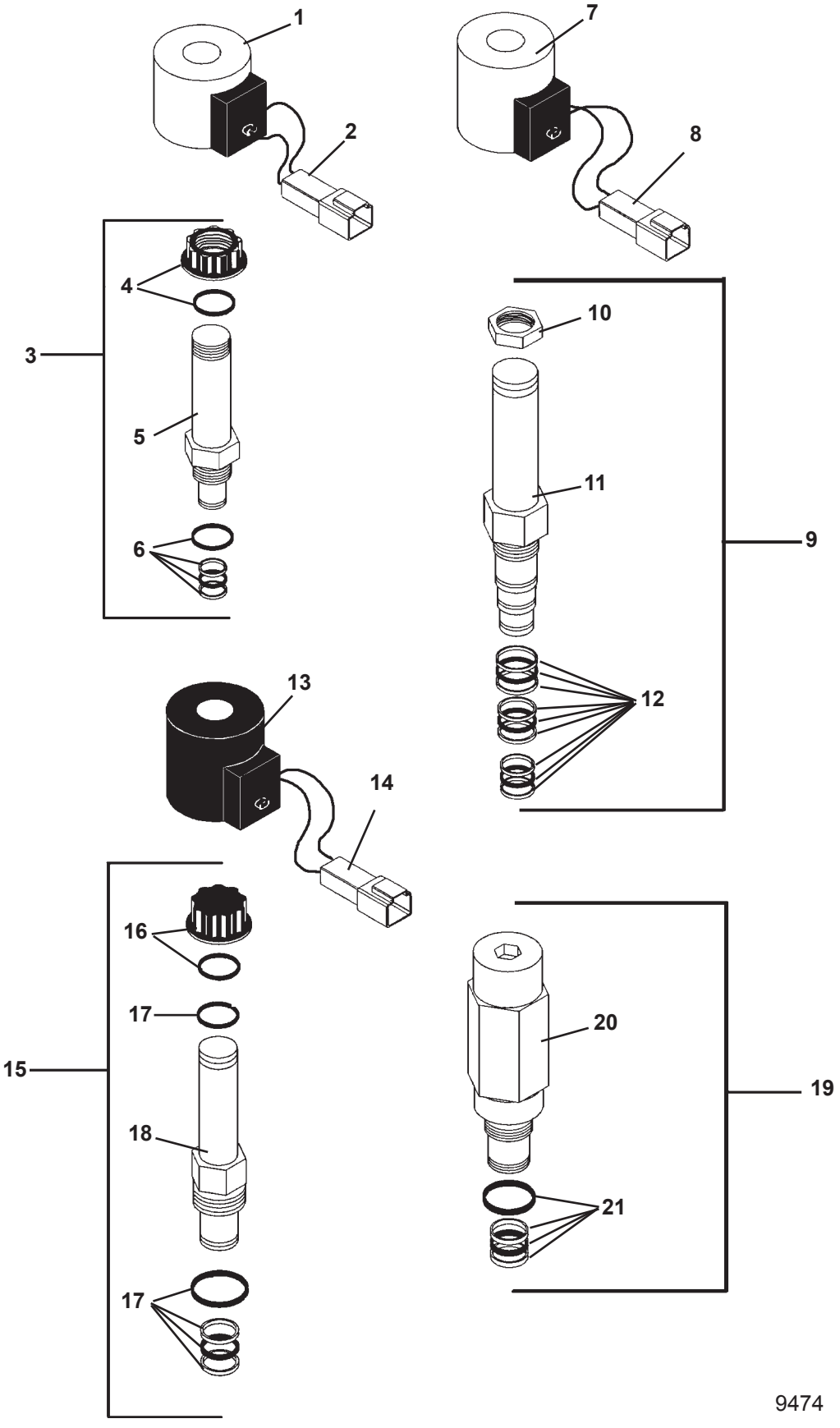
ITEM	REQ'D	PART NO.	DESCRIPTION
1	6	45865	Circuit Control Spool Assembly - 2415
	6	45871	Coil Assembly
	7	45865	Circuit Control Spool Assembly - 3215
	7	45871	Coil Assembly
2	1	45867	Unloader Spool Assembly
	1	45872	Coil Assembly
3	1	45868	Relief Valve
4	1	45866	Reverse Spool Assembly
	1	45873	Coil Assembly
5	2	3341	Plug - 2415
	1	3341	Plug - 3215
6	4	3311	Plug - 2415
	2	3311	Plug - 3215
7	12	30348	Adapter - 2415
	14	30348	Adapter - 3215
8	2	30349	Adapter

FUNCTION	WIRE COLOR
FLOW REVERSER	BLACK / WHITE
UNLOADER	GREEN
REAR STABILIZER	ORANGE
BLADE #1	BLUE
BLADE #2	BLUE / BLACK
BLADE #3	ORANGE / BLACK
BLADE #4 (if equipped)	WHITE / BLACK
BLADE #5 (if equipped)	WHITE
GATE	RED / BLACK
UNDERCUTTER (if equipped)	GREEN / BLACK

9477 6-4-14-4

SOLENOID VALVES

REPLACEMENT PARTS



9474 6-4-14-3

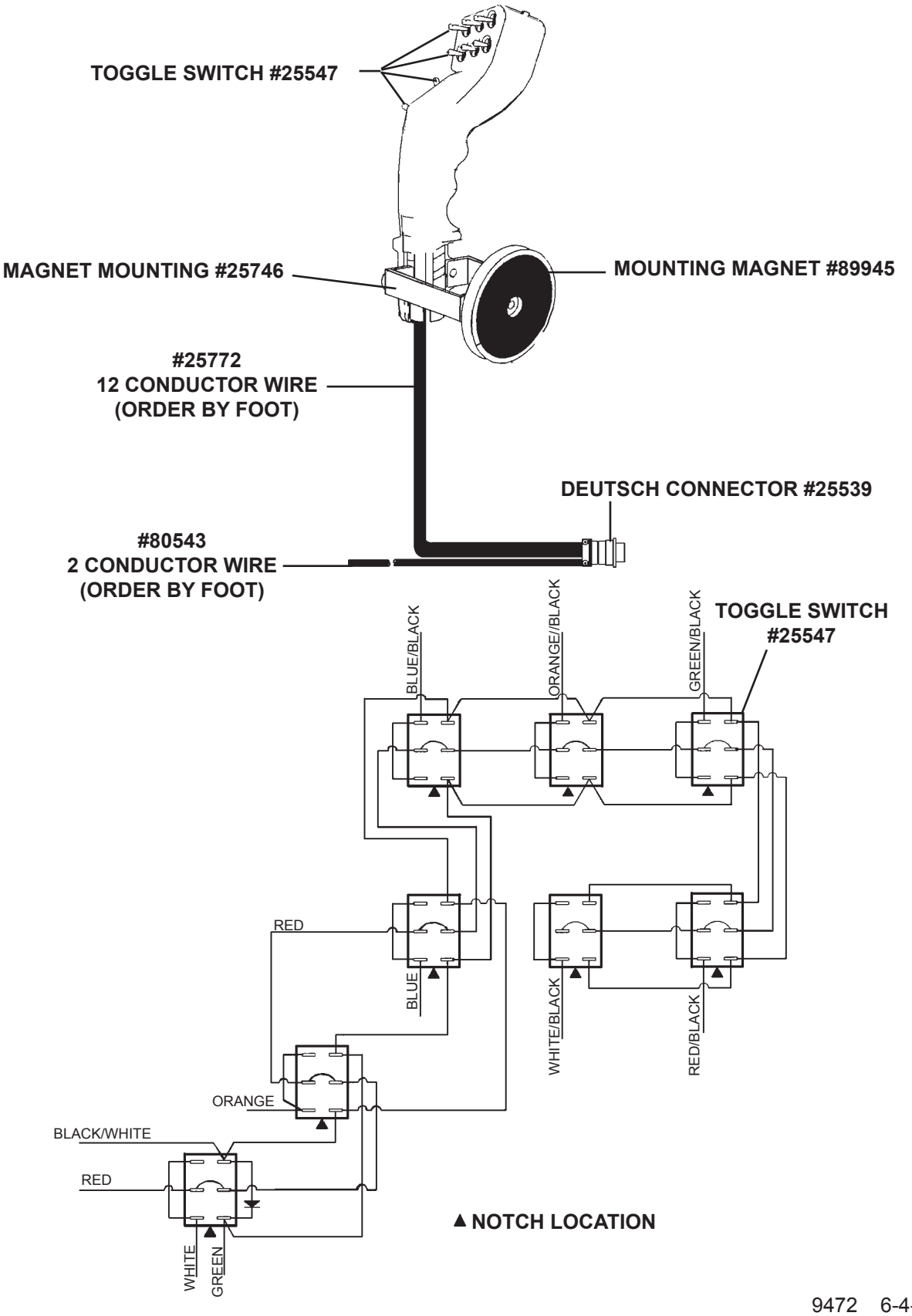
SOLENOID VALVES

REPLACEMENT PARTS

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	45871	Coil (Includes #2)
2	1	25550	Wire Terminal Connector
3	Varies	45865	Circuit Control Spool Assembly (Includes items #4, #5 & #6)
4	1	45869	Nut Assembly (Includes O'Ring)
5	-	-----	Spool (Not Sold Separately)
6	1	45874	Replacement Seal Kit
7	1	45873	Coil (Includes #8)
8	1	25550	Wire Terminal Connector
9	1	45866	Reverse Valve Spool Assembly (Includes items #10, #11 & #12)
10	1	45830	Nut
11	-	-----	Spool (Not Sold Separately)
12	1	45875	Replacement Seal Kit
13	1	45872	Coil (Includes #14)
14	1	25550	Wire Terminal Connector
15	1	45867	Unloader Spool Assembly (Includes items #16, #17 & #18)
16	1	45870	Nut Assembly (Includes O'Ring)
17	1	45876	Replacement Seal Kit
18	-	-----	Spool (Not Sold Separately)
19	1	45868	Relief Valve (Includes items #20 & #21)
20	-	----	Relief Valve (Not Sold Separately)
21	1	45877	Replacement Seal Kit

WIRING SCHEMATIC

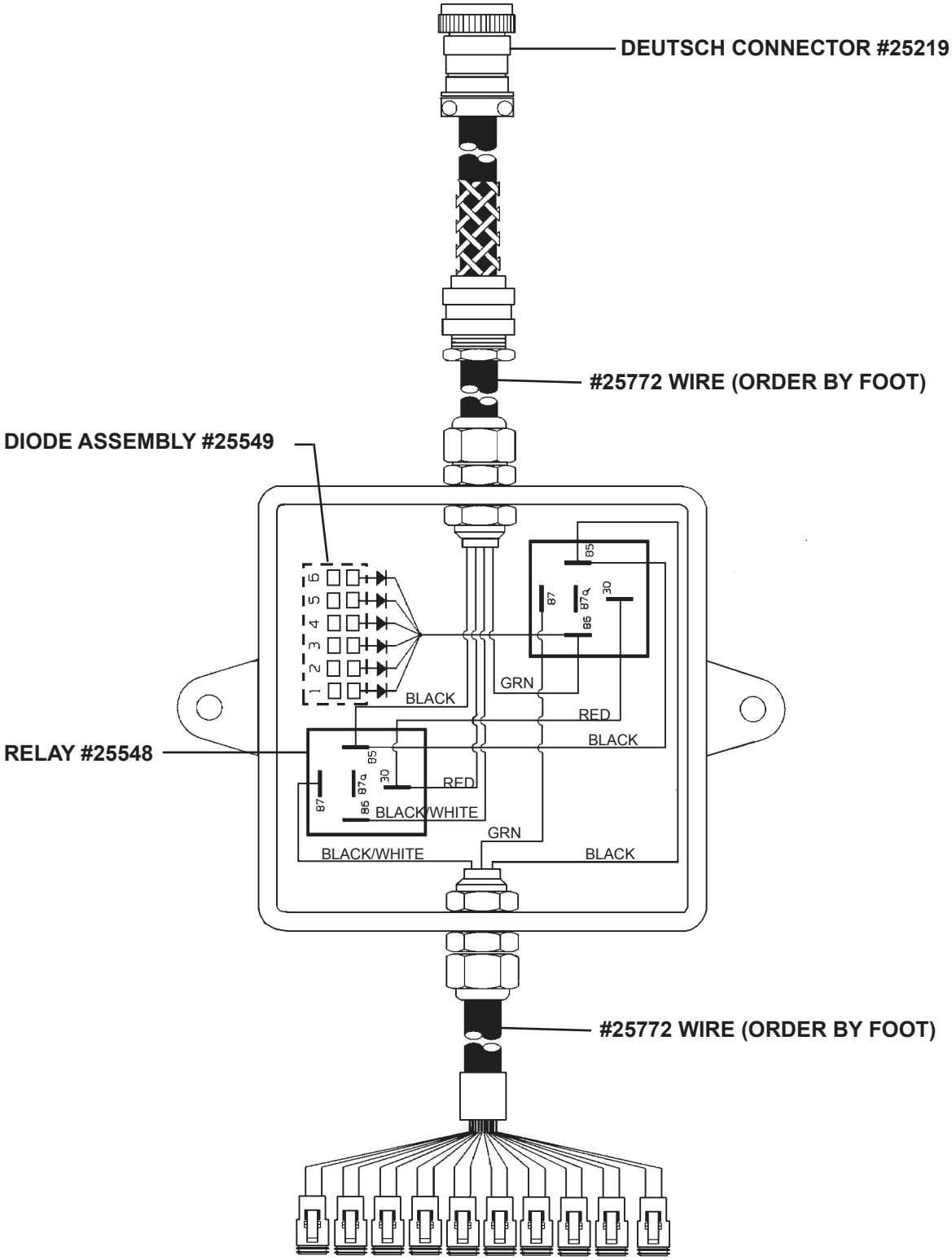
REPLACEMENT PARTS FOR JOYSTICK ASSEMBLY #25425



9472 6-4-14-3

WIRING SCHEMATIC

REPLACEMENT PARTS FOR WIRE HARNESS ASSEMBLY #25455

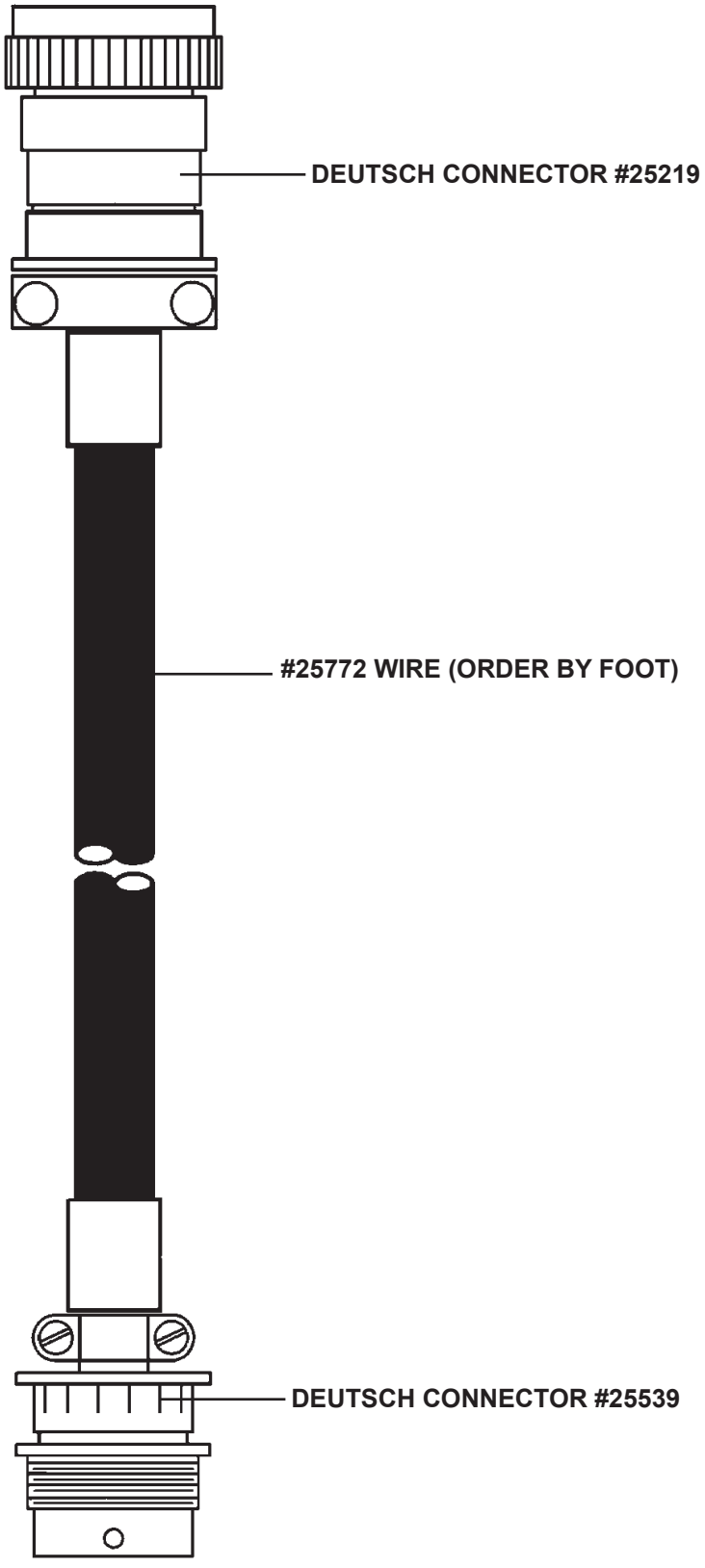


WIRE TERMINAL PLUG #25551
(INCLUDES: (2) SOCKETS, (1) PLUG & (1) WEDGE LOCK)

9470 6-4-14-3

WIRING SCHEMATIC

12’ EXTENSION CABLE ASSEMBLY #25519

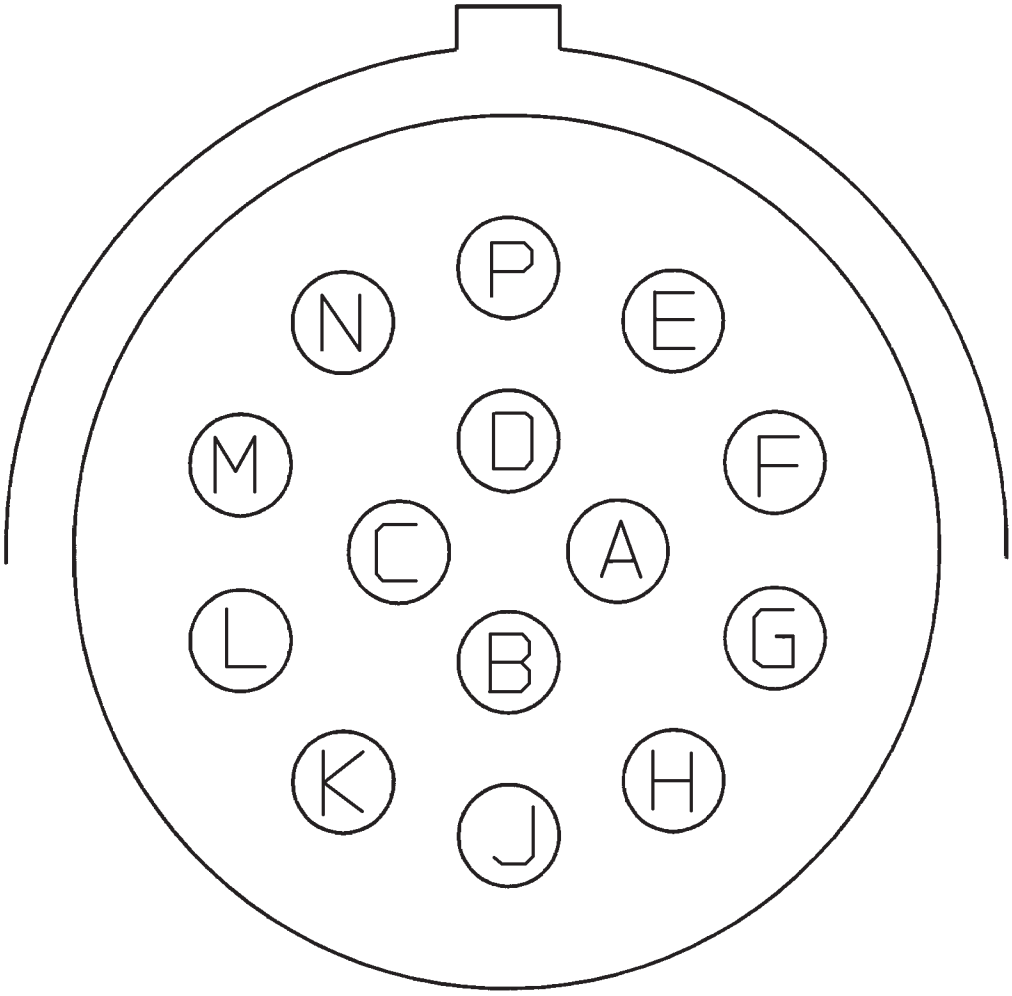


9471 6-4-14-3

WIRING SCHEMATIC

DEUTSCH CONNECTORS

PIN OUT DETAIL



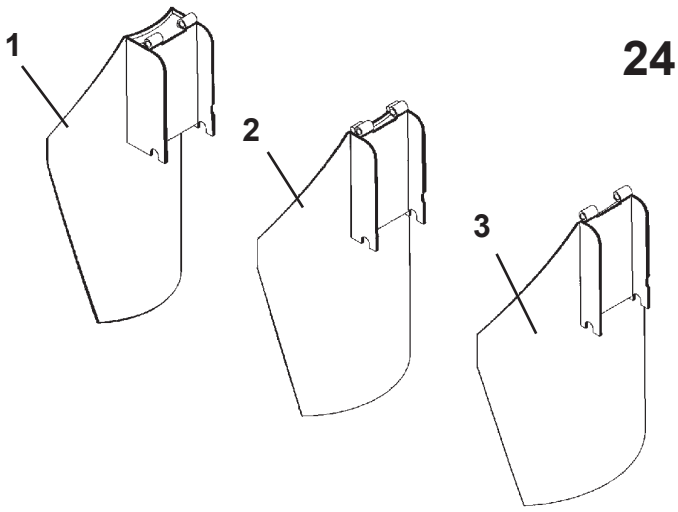
A = GREEN
B = BLACK
C = RED/BLACK
D = GREEN/BLACK
E = BLUE/BLACK
F = BLUE
G = WHITE/BLACK
H = ORANGE/BLACK
J = BLACK/WHITE
K = RED
L = ORANGE
M = WHITE
N = NOT USED
P = NOT USED

9473 6-4-14-2

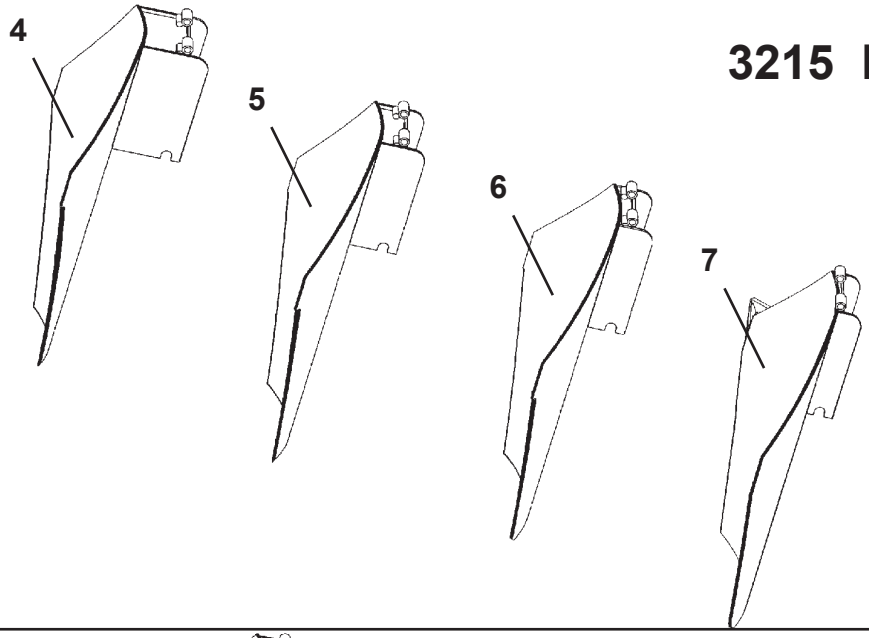
BLADE SETS

OPTIONAL BLADE KITS

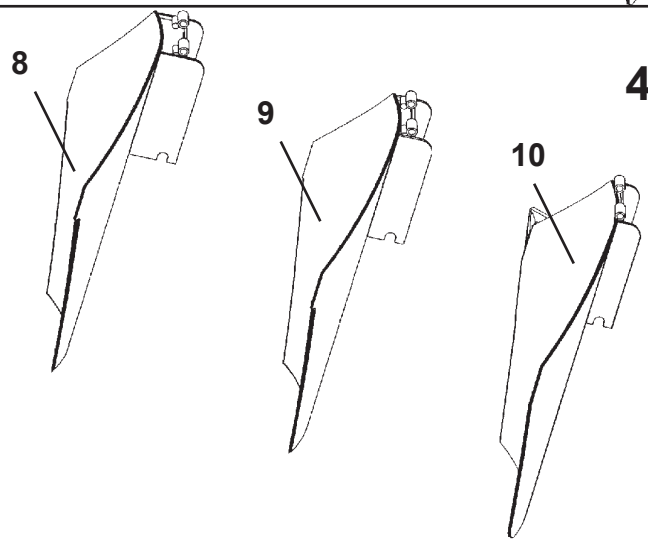
2415 BLADES



3215 BLADES



4415 BLADES



9478 6-9-14-2

BLADE SETS

OPTIONAL BLADE KITS

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	25294	16" Blade Kit - 2415 Tree Spade (Includes 3 Blades)
	-	25297	16" Replacement Blade
2	1	25295	20" Blade Kit - 2415 Tree Spade (Includes 3 Blades)
	-	25298	20" Replacement Blade
3	1	25296	24" Blade Kit - 2415 Tree Spade (Includes 3 Blades)
	-	25299	24" Replacement Blade
4	1	25045	20" Blade Kit - 3215 Tree Spade (Includes 4 Blades)
	-	25024	20" Replacement Blade
5	1	25044	24" Blade Kit - 3215 Tree Spade (Includes 4 Blades)
	-	25023	24" Replacement Blade
6	1	25043	28" Blade Kit - 3215 Tree Spade (Includes 4 Blades)
	-	25022	28" Replacement Blade
7	1	25042	32" Blade Kit - 3215 Tree Spade (Includes 4 Blades)
	-	25021	32" Replacement Blade
8	1	25692	32" Blade Kit - 4415 Tree Spade (Includes 5 Blades)
	-	25596	32" Replacement Blade
9	1	25693	36" Blade Kit - 4415 Tree Spade (Includes 5 Blades)
	-	25420	36" Replacement Blade
10	1	25694	44" Blade Kit - 4415 Tree Spade (Includes 5 Blades)
	-	25698	44" Replacement Blade