

BUSH HOG®

3000 SERIES

Rotary Cutters

Models 3209, 3210, 3414

Operator's Manual



ASSEMBLY ● OPERATION ● MAINTENANCE

CONGRATULATIONS!

You have invested in the best implement of its type on the market today.

The care you give your Bush Hog implement will greatly determine your satisfaction with its performance and its service life. We urge a careful study of this manual to provide you with a thorough understanding of your new implement before operating, as well as suggestions for operation and maintenance.

If your manual should become lost or destroyed, Bush Hog will be glad to provide you with a new copy. Order from Bush Hog, 2501 Griffin Ave., Selma, Alabama, 36703. Most of our manuals can also be downloaded from our website at www.bushhog.com.

As an authorized Bush Hog dealer, we stock genuine Bush Hog parts which are manufactured with the same precision and skill as our original equipment. Our trained service personnel are well informed on methods required to service Bush Hog equipment, and are ready and able to help you.

Should you require additional information or assistance, please contact us.

YOUR AUTHORIZED
BUSH HOG DEALER

BECAUSE BUSH HOG MAINTAINS AN ON GOING PROGRAM OF PRODUCT IMPROVEMENT, WE RESERVE THE RIGHT TO MAKE IMPROVEMENTS IN DESIGN OR CHANGES IN SPECIFICATIONS WITHOUT INCURRING ANY OBLIGATION TO INSTALL THEM ON UNITS PREVIOUSLY SOLD.

BECAUSE OF THE POSSIBILITY THAT SOME PHOTOGRAPHS IN THIS MANUAL WERE TAKEN OF PROTOTYPE MODELS, PRODUCTION MODELS MAY VARY IN SOME DETAIL. IN ADDITION, SOME PHOTOGRAPHS MAY SHOW SHIELDS REMOVED FOR PURPOSES OF CLARITY. **NEVER OPERATE THIS IMPLEMENT WITHOUT ALL SHIELDS IN PLACE.**

3000 SERIES ROTARY CUTTERS

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RETAIL CUSTOMER'S RESPONSIBILITY UNDER THE BUSH HOG WARRANTY

It is the Retail Customer and/or Operator's responsibility to read the Operator's Manual, to operate, lubricate, maintain and store the product in accordance with all instructions and safety procedures. Failure of the operator to read the Operator's Manual is a misuse of this equipment.

It is the Retail Customer and/or Operator's responsibility to inspect the product and to have any part(s) repaired or replaced when continued operation would cause damage or excessive wear to other parts or cause a safety hazard.

It is the Retail Customer's responsibility to deliver the product to the authorized Bush Hog Dealer, from whom he purchased it, for service or replacement of defective parts which are covered by warranty. Repairs to be submitted for warranty consideration must be made within forty-five (45) days of failure.

It is the Retail Customer's responsibility for any cost incurred by the Dealer for traveling to or hauling of the product for the purpose of performing a warranty obligation or inspection.



LIMITED WARRANTY



Bush Hog warrants to the original purchaser of any new Bush Hog equipment, purchased from an authorized Bush Hog dealer, that the equipment be free from defects in material and workmanship for a period of one (1) year for non-commercial, state, and municipalities' use and ninety (90) days for commercial use from date of retail sale. The obligation of Bush Hog to the purchaser under this warranty is limited to the repair or replacement of defective parts.

Replacement or repair parts installed in the equipment covered by this limited warranty are warranted for ninety (90) days from the date of purchase of such part or to the expiration of the applicable new equipment warranty period, whichever occurs later. Warranted parts shall be provided at no cost to the user at an authorized Bush Hog dealer during regular working hours. Bush Hog reserves the right to inspect any equipment or parts which are claimed to have been defective in material or workmanship.

DISCLAIMER OF IMPLIED WARRANTIES & CONSEQUENTIAL DAMAGES

Bush Hog's obligation under this limited warranty, to the extent allowed by law, is in lieu of all warranties, implied or expressed, **INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE** and any liability for incidental and consequential damages with respect to the sale or use of the items warranted. Such incidental and consequential damages shall include but not be limited to: transportation charges other than normal freight charges; cost of installation other than cost approved by Bush Hog; duty; taxes; charges for normal service or adjustment; loss of crops or any other loss of income; rental of substitute equipment, expenses due to loss, damage, detention or delay in the delivery of equipment or parts resulting from acts beyond the control of Bush Hog.

THIS LIMITED WARRANTY SHALL NOT APPLY:

1. To vendor items which carry their own warranties, such as engines, tires, and tubes.
2. If the unit has been subjected to misapplication, abuse, misuse, negligence, fire or other accident.
3. If parts not made or supplied by Bush Hog have been used in connection with the unit, if, in the sole judgement of Bush Hog such use affects its performance, stability or reliability.
4. If the unit has been altered or repaired outside of an authorized Bush Hog dealership in a manner which, in the sole judgement of Bush Hog, affects its performance, stability or reliability.
5. To normal maintenance service and normal replacement items such as gearbox lubricant, hydraulic fluid, worn blades, or to normal deterioration of such things as belts and exterior finish due to use or exposure.
6. To expendable or wear items such as teeth, chains, sprockets, belts, springs and any other items that in the company's sole judgement is a wear item.

NO EMPLOYEE OR REPRESENTATIVE OF BUSH HOG IS AUTHORIZED TO CHANGE THIS LIMITED WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY UNLESS SUCH CHANGE IS MADE IN WRITING AND SIGNED BY BUSH HOG'S SERVICE MANAGER, 2501 GRIFFIN AVE., SELMA, ALABAMA 36703.



Record the model number, serial number and date purchased. This information will be helpful to your dealer if parts or service are required.

MAKE CERTAIN THE WARRANTY HAS BEEN FILED WITH BUSH HOG / SELMA, ALABAMA .

MODEL NUMBER _____

SERIAL NUMBER _____

DATE OF RETAIL SALE _____

DEALER PREPARATION CHECK LIST

3000 SERIES ROTARY CUTTERS

BEFORE DELIVERING MACHINE — The following check list should be completed.
Use the Operator's Manual as a guide.

- 1. Assembly completed.
- 2. Gearbox filled with oil.
- 3. All fittings lubricated.
- 4. All shields in place and in good condition.
- 5. All fasteners torqued to specifications given in Torque Chart.
- 6. Slip clutches have been checked for proper operation.
- 7. All decals in place and readable. (See decal page.)
- 8. Overall condition good (i.e. paint, welds)
- 9. Operators manual has been delivered to owner and he has been instructed on the safe and proper use of the cutter.
- 10. Warranty information registered with Bush Hog.
- 11. Purchaser or dealer elects to delete deflectors. (front chains)

Explanation: _____

WARNING

For Non-Agricultural use, OSHA, ASAE, SAE and ANSI standards require the use of Chain Guards or other protective guards at all times. Bush Hog strongly recommends the use of such guards for Agricultural uses as well, to reduce the risk of property damage, serious bodily injury or even death from objects thrown out by or from contact with the cutting blades.

Dealer's
Signature _____

Purchaser's
Signature _____

THIS CHECKLIST TO REMAIN IN OWNER'S MANUAL
It is the responsibility of the dealer to complete the procedures listed
above before delivery of this implement to the customer.

IMPORTANT SAFETY PRECAUTIONS

This symbol is used to call attention to safety precautions that should be followed by the operator to avoid accidents. When you see this symbol, carefully read the message that follows and heed its advice. Failure to comply with safety precautions could result in serious bodily injury.



In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel in the operation, transport, maintenance and storage of equipment. Lack of attention to safety can result in accident, personal injury, reduction of efficiency and worst of all—loss of life. Watch for safety hazards and correct deficiencies promptly. Use the following safety precautions as a general guide to safe operations when using this machine. Additional safety precautions are used throughout this manual for specific operating and maintenance procedures. Read this manual and review the safety precautions often until you know the limitations.

1. Read the Operator's Manual. Failure to read the Operator's Manual is considered a misuse of this equipment.
2. Become familiar with all the machine's controls and all the caution, warning and danger decals affixed to the machine before attempting to start or operate.
3. Before starting or operating the machine, make a walk around inspection and check for obvious defects such as loose mounting bolts and damaged components. Correct any deficiency before starting.
4. Do not allow children to operate the cutter. Do not allow adults to operate it without proper instruction.
5. Do not carry passengers.
6. Keep the area of operation clear of all persons, particularly small children and pets. The operator should cease mowing whenever anyone comes within the operating area.
7. Clear the work area of objects which might be picked up and thrown.
8. Use a piece of cardboard or wood rather than hands to search for hydraulic leaks. Escaping hydraulic oil under pressure can penetrate skin. If fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.
9. Do not operate without all guards and shields in place and in good condition.
10. Lower implement to ground, stop tractor engine, apply parking brake, and allow blades to completely stop before leaving the tractor.
11. Keep hands and feet away from blades.
12. This cutter is not to be operated along highways or in any area where people may be present unless all sides of the unit are enclosed by permanent bands, safety chains or other factory approved safety shields that are in good repair.
13. Wear personal protective equipment such as, but not limited to, protection for eyes, ears, feet, hands and head when operating or repairing the equipment. Do not wear loose clothing or jewelry that may catch on equipment moving parts.
14. When performing adjustments or maintenance on the cutter, first lower it to the ground or block it securely at a workable height.
15. Never stand between tractor and cutter while tractor is being backed to the cutter hitch.
16. Reduce speed when transporting cutter to avoid bouncing and momentary loss of steering.
17. Use tractor flashing warning lights, day or night, when transporting cutter on road or highways unless prohibited by law.
18. In the event that someone other than yourself will operate this equipment we firmly suggest that all SAFETY references be discussed prior to operation.
19. It is recommended that tractor be equipped with Rollover Protective System (ROPS) and seat belt be used in all mowing operations.

IMPORTANT FEDERAL LAWS AND REGULATIONS* CONCERNING EMPLOYERS, EMPLOYEES AND OPERATIONS.

*(This section is intended to explain in broad terms the concept and effect of the following federal laws and regulations. It is not intended as a legal interpretation of the laws and should not be considered as such).

U.S. Public Law 91-596 (The Williams-Steiger Occupational and Health Act of 1970) OSHA

This Act Seeks:

"...to assure so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources..."

DUTIES

Sec. 5 (a) Each employer—

- (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;
- (2) shall comply with occupational safety and health standards promulgated under this Act.
 - (b) Each employee shall comply with occupational safety and health standards and all rules, regulations and orders issued pursuant to this Act which are applicable to his own actions and conduct.

OSHA Regulations

Current OSHA regulations state in part: "At the time of initial assignment and at least annually thereafter, the employer shall instruct every employee in the safe operation and servicing of all equipment with which the employee is, or will be involved." These will include (but are not limited to) instructions to:

Keep all guards in place when the machine is in operation;

Permit no riders on equipment;

Stop engine, disconnect the power source, and wait for all machine movement to stop before servicing, adjusting, cleaning or unclogging the equipment, except where the machine must be running to be properly serviced or maintained, in which case the employer shall instruct employees as to all steps and procedures which are necessary to safely service or maintain the equipment.

Make sure everyone is clear of machinery before starting the engine, engaging power, or operating the machine.

EMPLOYEE TRACTOR OPERATING INSTRUCTIONS:

1. Securely fasten your seat belt if the tractor has a ROPS.
2. Where possible, avoid operating the tractor near ditches, embankments, and holes.
3. Reduce speed when turning, crossing slopes, and on rough, slick, or muddy surfaces.
4. Stay off slopes too steep for safe operation.
5. Watch where you are going, especially at row ends, on roads, and around trees.
6. Do not permit others to ride.
7. Operate the tractor smoothly - no jerky turns, starts, or stops.
8. Hitch only to the drawbar and hitch points recommended by tractor manufacturers.
9. When tractor is stopped, set brakes securely and use park lock if available.

Child Labor Under 16 Years Old

Some regulations specify that no one under the age of 16 may operate power machinery. It is your responsibility to know what these regulations are in your own area or situation. (Refer to U.S. Dept. of Labor, Employment Standard Administration, Wage & Home Division, Child Labor Bulletin #102.)

SECTION I INTRODUCTION AND DESCRIPTION

1-1 INTRODUCTION

We are pleased to have you as a Bush Hog customer. Your 3200 Series Rotary Cutter has been carefully designed to give maximum service with minimum down time. This manual is provided to give you the necessary operating and maintenance instructions for keeping your rotary cutter in top operating condition. Please read this manual thoroughly. Understand what each control is for and how to use it. Observe all safety precautions decaled on the machine and noted throughout the manual for safe operation of implement. If any assistance or additional information is needed, contact your authorized Bush Hog dealer.

NOTE

All references made to right, left, front, rear, top or bottom is as viewed facing the direction of travel with implement properly attached to tractor.

1-2 DESCRIPTION

The 3200 Series Rotary Cutters, Figure 1-1, are designed for medium duty applications, cutting grass, stalks and brush up to 2" (51mm) in diameter. Free swinging blades provide a smooth, even cut and will swing back when a stationary object is hit. A slip clutch on the input driveline and rubber couplings on the cross shafts also dampen the impact of

the blades hitting a stationary object. Shock absorbing rubber cushions are mounted between the axle arm and axle arm mounting bracket to reduce shock loads during operation and transporting. Standard equipment includes driveline shields, clutch shield, and a front discharge shield (deflector). (Note: Dealer or purchaser may elect to delete at their option.) These cutters are available with either pull, semi-mount, or three point hitches. An optional rear mounted drawbar can be used on 3414 cutters equipped with a pull hitch to pull a light tandem disc harrow (up to 14 ft.) or other implement with a maximum draft load of 2800 lbs.

1-3 ROW CROP USE (Model 3414 Only)

With the installation of the shredding attachment (optional), the model 3414 cutter can be used to shred crop stalks on 30" or 38-40" row spacings. The shredding attachment consists of single stationary blades mounted to the cutter frame, double free-swinging blades mounted on a straight blade bar, and baffles. During operation, one free-swinging blade passes above and one passes below the stationary blade to thoroughly shred material. Baffles cause the shredded material to be evenly distributed behind the cutter.

NOTE

The OPTIONAL SHREDDING ATTACHMENT IS FOR ROW CROP USE ONLY and will perform poorly if used in other applications.

Figure 1-1 Major Components
Pull Type

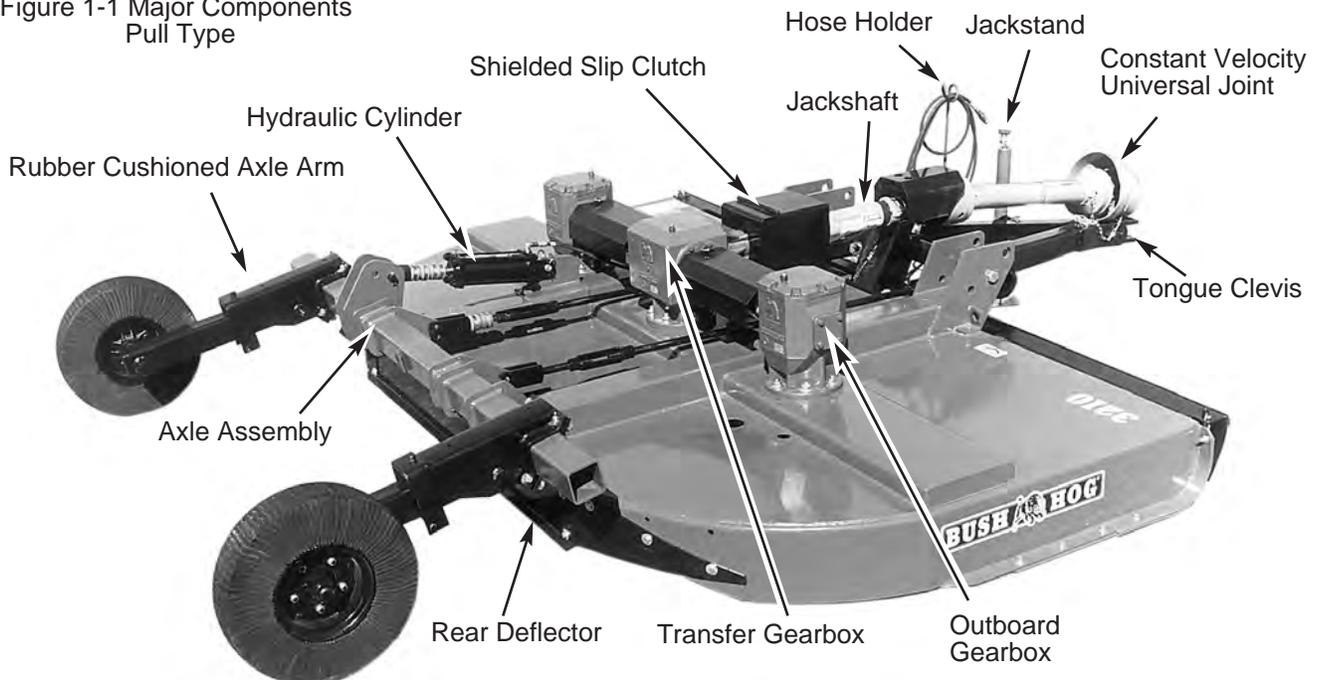


Table 1-1 Technical Specifications

SPECIFICATIONS	MODEL 3209	MODEL 3210	MODEL 3414
Cutting Width	108"	126"	168"
Transport Width	114-1/2"	133"	175"
Cutting Height	2" - 12"	2" - 12"	2" - 12"
Cutting Capacity	2"	2"	2"
Blades	1/2 x 4" Uplift	1/2" x 4" Uplift	1/2" x 4" Uplift
Blade Overlap	3"	3"	3"
Blade Tip Speed	15,200 ft./min.	16,900 ft./min.	15,200 ft./min.
Required Tractor HP	40 Pull, 50 Lift	50 Pull, 60 Lift	65 Pull, 70 Lift

SECTION II PREPARATION FOR USE

2-1 ATTACHING TO TRACTOR (Pull Models)

IMPORTANT

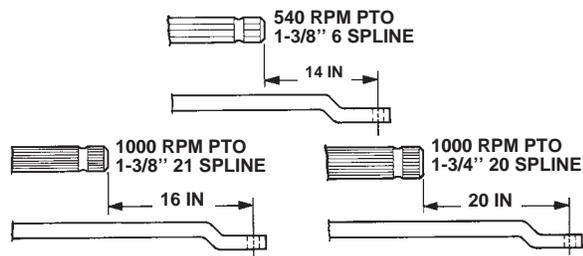
The minimum required PTO horsepower for cutters equipped with a pull hitch is 40 hp for Model 3209, 50 hp for Model 3210 and 65 hp for Model 3414.

WARNING

NEVER STAND BETWEEN TRACTOR AND CUTTER WHILE TRACTOR IS BEING BACKED TO HITCH.

A. Adjust tractor drawbar length to dimension shown in Figure 2-1. Incorrect drawbar length will change angle of driveline causing possible damage to constant velocity joint. See tractor operator's manual for drawbar adjustment procedure.

Figure 2-1 Tractor Drawbar Adjustment



B. Raise rear of cutter approximately 1-2 inches (25-51mm) off ground. **Block securely in position.**

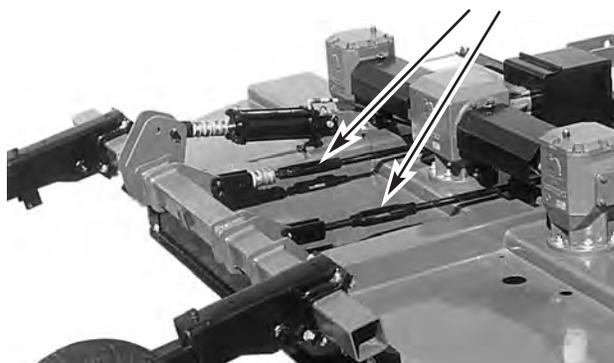
C. Attach jackstand to tongue of cutter. Extend jackstand to support weight of tongue.

D. Connect clevis hitch to tractor drawbar using a 1 inch (25mm) diameter approved pin with linch pin retainer or equivalent.

E. Adjust leveling rod in or out as necessary to connect to tongue. Tighten jamnut securely against turnbuckle. (Figure 2-2)

F. If equipped with optional hydraulic cylinder, route hydraulic line through hose holder rod and connect to tractor remote hydraulic quick couplers. Make certain hydraulic line is not twisted or kinked.

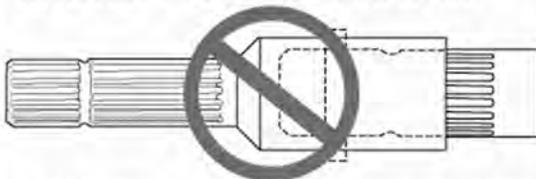
Figure 2-2 Leveling Rod Adjustment Turnbuckles



G. Attach driveline to tractor and cutter. Pull on each driveline section to be sure yokes lock into place. Make certain driveline shielding is in place and in good condition.

DANGER

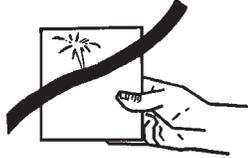
• PTO ADAPTERS SHOULD NOT BE USED WITH ANY BUSH HOG EQUIPMENT



- The PTO adapter length will cause an unshielded shaft area between the tractor master shield and the driveline shield.
- Contact with and entanglement in the unshielded rotating PTO adaptor area can cause serious injury or death.
- The use of a PTO adapter can cause equipment overspeed, driveline failures and damage to tractor and implement.

⚠ WARNING

USE A PIECE OF CARDBOARD OR WOOD RATHER THAN HANDS AND WEAR EYE PROTECTION WHEN SEARCHING FOR HYDRAULIC LEAKS. ESCAPING HYDRAULIC OIL UNDER PRESSURE CAN PENETRATE SKIN. IF OIL IS INJECTED INTO SKIN, IT MUST BE SURGICALLY REMOVED WITHIN A FEW HOURS OR GANGRENE MAY RESULT.



2-2 ATTACHING TO TRACTOR
(Lift and Semi-Mount Models)

IMPORTANT

The minimum required PTO horsepower for cutters equipped with a 3-point or semi-mount hitch is 50 hp for Model 3209, 60 hp for Model 3210 and 70 hp for Model 3414.

⚠ WARNING

NEVER STAND BETWEEN TRACTOR AND CUTTER WHILE TRACTOR IS BEING BACKED TO HITCH.

⚠ WARNING

ADDITIONAL TRACTOR FRONT BALLAST MAY BE NEEDED FOR STABLE OPERATION AND TRANSPORT OF THE 3-POINT HITCH MOUNTED CUTTER. SEE TRACTOR OPERATORS MANUAL FOR RECOMMENDED WEIGHTS.

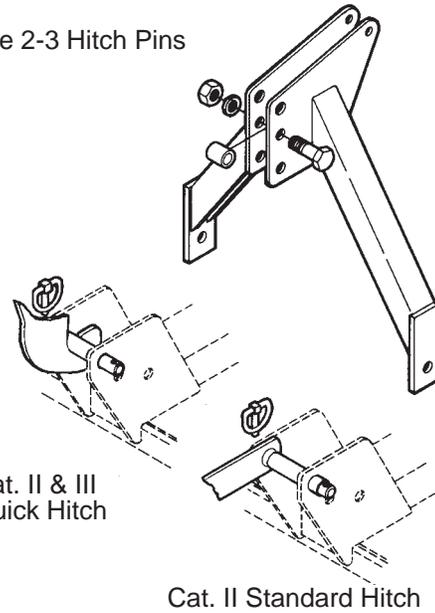
- A. Set implement hitch pins to match your tractor 3-point hitch. (Figure 2-3)
- B. Attach cutter to tractor 3-point hitch.

NOTE

Due to the many variations in tractor/implement hitch points and corresponding differences in distances between tractor PTO shafts and implement gearbox input shafts, drivelines may need to be shortened as described in the following steps:

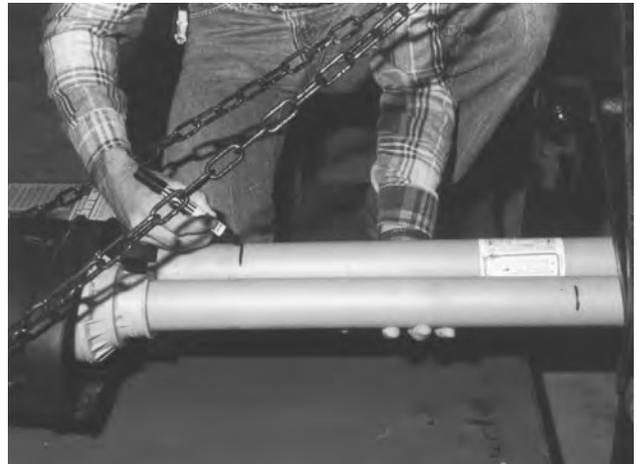
- C. Raise and lower cutter to determine position with shortest distance between the tractor PTO shaft and gearbox input shaft. Shut down tractor leaving cutter in position of shortest distance. **Securely block cutter in position.**
- D. Pull driveline apart. Attach outer (female) section to tractor PTO shaft. Pull on driveline section to be sure that yoke locks into place.

Figure 2-3 Hitch Pins



- E. Hold driveline sections parallel to each other to determine if too long. Each section should end approximately 3 inches (76mm) short of reaching universal joint shield on opposite section. If too long, measure 3 inches (76mm) back from universal joint shield and mark on opposite section. (Figure 2-4). Do this for both sections.

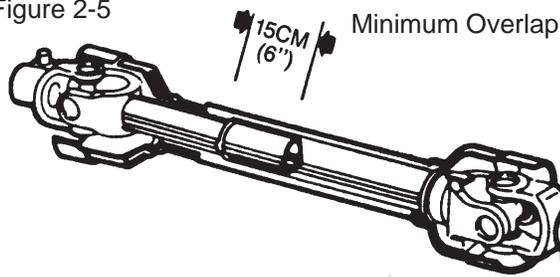
Figure 2-4



- F. Raise and lower cutter to determine position with greatest distance between PTO shaft and gearbox input shaft. Shut down tractor leaving cutter in position of greatest distance. **Securely block cutter in position.**

- G. Hold driveline sections parallel to each other and check for minimum 6 inches (15cm) overlap. (Figure 2-5). If driveline has been marked for cutting, overlap will be the distance between two marks. If driveline has less than minimum overlap, Do not use. Contact authorized Bush Hog dealer.

Figure 2-5

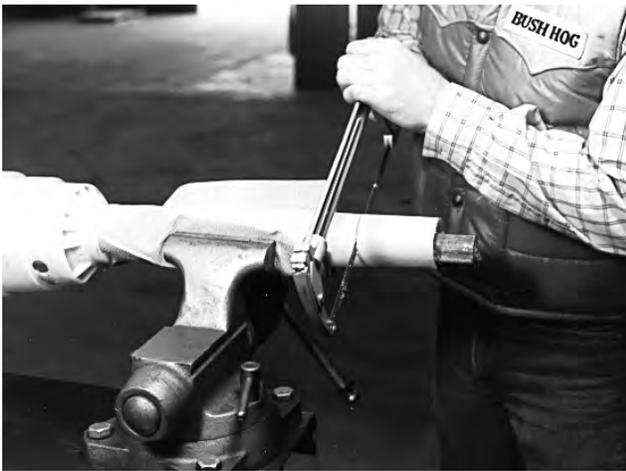


NOTE

If driveline is the correct length, omit the following steps "H" through "K" and proceed to step "L".

H. Clamp driveline in a well padded vice to prevent damage to the shield. Cut off shield where marked. (Figure 2-6)

Figure 2-6



I. Using cut off section of shield as a guide, cut shaft the same amount. (Figure 2-7)

Figure 2-7



J. Repeat steps "H" and "I" to other driveline section.

K. Deburr ends of driveline sections and clean away all chips and filings. (Figure 2-8)

L. Apply multi-purpose grease to inside of outer (female) driveline section. Assemble driveline and install on tractor and cutter. Pull on each driveline section to be sure yokes lock into place. Make certain driveline shielding is in place and in good condition.

M. Adjust lower lift arm to level cutter right to left. Refer to tractor operator's manual for instructions.

N. Connect and/or adjust stabilizer bars, sway blocks, sway chains or equivalent to prevent side sway. Refer to tractor operator's manual for instructions.

O. Install tractor front end weights as recommended by tractor manufacturer to provide ample stability during operation.

Figure 2-8



SECTION III OPERATING INSTRUCTIONS

3-1 GENERAL SAFETY

Only qualified people familiar with this manual should operate this machine. Operator should wear hard hat, safety glasses and safety shoes. It is recommended that tractor be equipped with Rollover Protective System (ROPS), enclosed cab, and a seat belt be used. Before beginning operation, clear work area of objects that may be picked up and thrown. Check for ditches, stumps, holes or other obstacles that could upset tractor. Turn off tractor engine, set parking brake, and allow cutter blades to come to a complete stop before dismounting tractor.

3-2 TRANSPORTING

When implement is transported on road or highway, day or night, use tractor flashing lights unless prohibited by law. A slow moving vehicle (SMV) sign must be visible from the rear by approaching vehicles. A bracket for SMV sign is provided on the axle. Do not exceed transport speed recommended by the tractor manufacturer.

3-3 ADJUSTING CUTTING HEIGHT

For cutting grass and brush, the cutter should be operated at the highest position which will give desired cutting results. This will help prevent blades from striking ground, reducing blade wear and undue strain on the machine. For best results under heavier cutting conditions, Always tilt cutter approximately 2 inches (51mm) lower in the front. This tilt decreases horsepower requirements and increases potential ground speed.

For optimum performance shredding row crop stalks, set the cutting height at approximately 3-4 inches above the row and maintain a level cutter deck front to rear. This will give a clean cut and even material distribution.

Two methods of height adjustment are available—a hydraulic cylinder or a ratchet. Stop collars are supplied with the hydraulic cylinder. These are used to stop cylinder at desired cutting height.

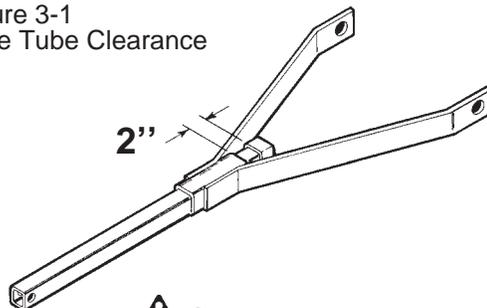
3-3.1 Pull Models

When cutting height is adjusted on pull-type cutters, the self-leveling linkage will adjust tongue height automatically. The front to rear slope of cutter deck can be changed by adjusting tongue height with the leveling rods. To adjust, disconnect cutter from tractor and steps "C" through "F" in paragraph 2-1.

3-3.2 Three-Point Lift Models

Tractor top link must be adjusted to give the minimum clearance shown in Figure 3-1. Clearance should be checked with tractor PTO drive disengaged and cutter positioned for work. This clearance is necessary for proper casting of the wheels.

Figure 3-1
Slide Tube Clearance



⚠ CAUTION

IT IS POSSIBLE TO EXTEND TRACTOR TOP LINK ENOUGH TO CAUSE INTERFERENCE BETWEEN THE DRIVELINE AND CUTTER FOR TRANSPORT. RAISE CUTTER SLOWLY AND CHECK DRIVE LINE CLEARANCE AFTER EACH TOP LINK ADJUSTMENT.

⚠ CAUTION

USE EXTREME CARE WHEN RAISING TRACTOR LIFT ARMS WHEN ATTACHED TO SEMI-MOUNT MODELS. DRIVELINE WILL BE DESTROYED IF CONTACT IS MADE WITH CUTTER DECK.

3-4 OPERATION

- Perform BEFORE EACH USE maintenance listed in paragraph 4-1.
- Make certain jackstand is stored on deck. (Pull Models Only)
- Start tractor per tractor operator's manual.
- Adjust cutter to working position.
- With tractor at idle speed, engage PTO drive.

⚠ DANGER

ROTATING CUTTER BLADES AND DRIVELINE. STAND CLEAR UNTIL MOTION HAS STOPPED. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

- Place tractor in gear and proceed forward. Advance tractor throttle to proper PTO speed (540 or 1000 rpm) for implement. Tractor forward speed should be controlled by gear selection, not engine speed. For maximum cutting efficiency, forward speed should allow cutter to maintain a constant, maximum blade speed. Do not exceed 8 mph

working speed. If PTO drive is disengaged due to cutter stalling or tractor engine bogging, cutter must be moved to a "cut" area and tractor throttle reduced to idle before re-engaging. Select lower tractor gear and/or increase cutting height if cutter stalls continuously. Always cut up and down the face of slopes, never across.

Shredding row crop stalks should be done with the optional shredder attachment installed. Operate tractor at 3-6 mph. Cutter must be aligned on 30 inch or 38-40 inch rows as shown in Figure 3-2. Tractor should be driven in a straight line to prevent tires from pressing stalks to the ground. Note that stalks shred better when green.

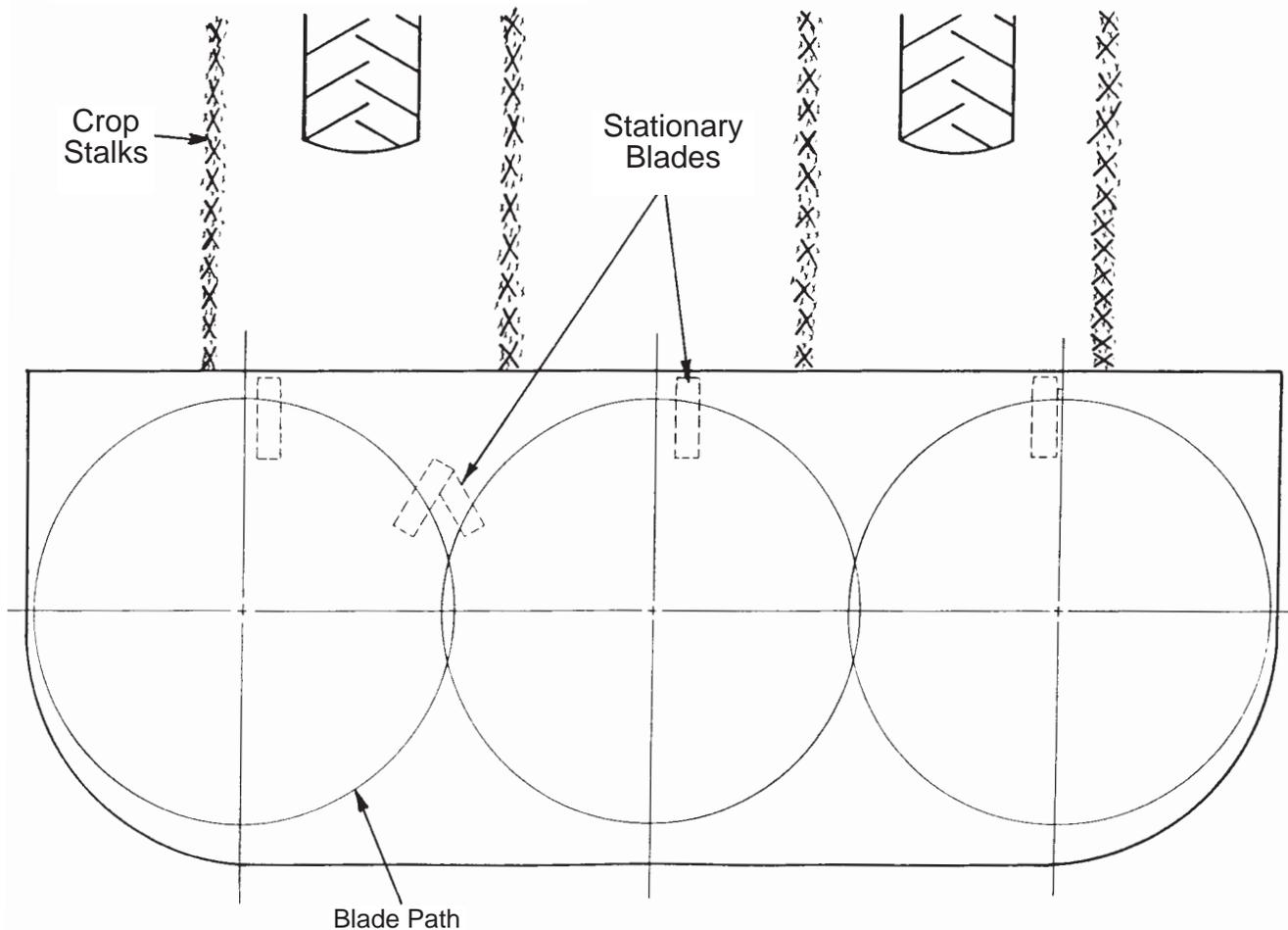
⚠ WARNING

ALL ROTARY CUTTERS HAVE THE ABILITY TO DISCHARGE OBJECTS AT HIGH SPEEDS WHICH COULD RESULT IN SERIOUS INJURY TO BYSTANDERS OR PASSERS-BY.

DO NOT OPERATE CUTTER IN VICINITY OF OTHER PERSONS. CEASE MOWING WHENEVER ANYONE COMES WITHIN THE OPERATING AREA.

KEEP ENCLOSED SIDES, PERMANENT BANDS, BELTING, HIGHWAY CHAINS, OR OTHER FACTORY APPROVED DISCHARGE SHIELDS IN PLACE AND IN GOOD CONDITION.

Figure 3-2
540 RPM Model, 38-40" Row Spacing Shown



SECTION IV MAINTENANCE

4-1 MAINTENANCE CHECK LIST

Perform scheduled maintenance as outlined below. Lower machine to ground, turn off tractor, and set parking brake before doing maintenance inspections or work. If inspection requires raising machine off ground, support securely with blocks. All bolts should be torqued as recommended in Torque Chart on page 27 unless otherwise indicated.

WARNING

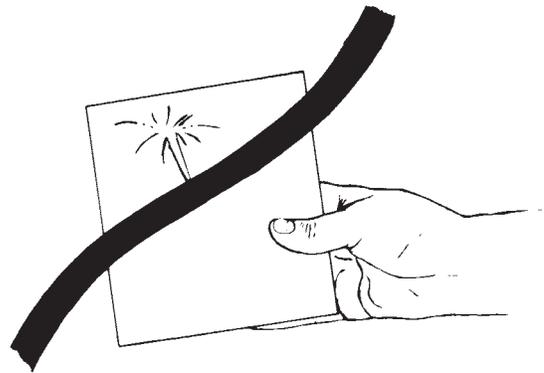
THE CUTTER CAN FALL FROM HYDRAULIC SYSTEM FAILURE. TO AVOID SERIOUS INJURY OR DEATH, SECURELY SUPPORT CUTTER BEFORE WORKING UNDERNEATH.

BEFORE EACH USE

1. Check tractor tire air pressure. Refer to tractor operator's manual.
2. Check blades and spindles to be sure that no foreign objects such as wire or steel strapping bands are wrapped around them.
3. Check blade bolts for tightness. Tighten 1-1/8" blade bolts to 450 ft./lbs.
4. Inspect blades for wear. Replace if necessary per paragraph 4-5. Always replace both blades on spindle with two blades equal in weight. Use only genuine Bush Hog replacement parts.
5. Make certain deflector shields (chains, bands, etc.) are in good repair to minimize injuries to persons by the discharge of high speed thrown objects.
6. Make certain driveline shields are in place and in good repair to minimize entanglement injuries to persons by rotating drivelines.
7. Inspect wheel(s) for wear, damage, or foreign objects. Repair or replace if necessary.
8. Inspect skid shoes for wear. Repair/replace if necessary.
9. Inspect hydraulic lines and fittings for wear or leaks. Repair or replace if needed.
10. Perform BEFORE EACH USE lubrication per paragraph 4.2
11. During operation, listen for abnormal sounds which might indicate loose parts, damaged bearings or other damage.

WARNING

USE A PIECE OF CARDBOARD OR WOOD RATHER THAN HANDS AND WEAR EYE PROTECTION WHEN SEARCHING FOR HYDRAULIC LEAKS. ESCAPING HYDRAULIC OIL UNDER PRESSURE CAN PENETRATE THE SKIN. IF OIL IS INJECTED INTO THE SKIN, IT MUST BE SURGICALLY REMOVED WITHIN A FEW HOURS BY A DOCTOR OR GANGRENE MAY RESULT.



AFTER EACH USE

1. Clean all debris from machine especially underside of deck and affixed safety decals. Replace any missing or illegible decals.
2. Inspect cutter for worn or damaged components. Repair or replace before next use. Any replacement components installed during repair shall include the components current safety decals specified by the manufacturer to be affixed to the component.
3. Store cutter in a dry place.

4-2 LUBRICATION (Figure 4-1)

NOTE

The multipurpose grease referenced in this section is an NLGI Grade 2 type grease.

BEFORE EACH USE

1. Driveline Universal Joints — Apply multi-purpose grease with grease gun.
2. Driveline Guard — Apply 2-3 shots of multi-purpose grease with grease gun to plastic fitting.
3. Driveline — Disconnect PTO driveline, pull two sections apart, and apply thin coat of multi-purpose grease to inside of outer (female) section. Reassemble sections and install. Pull each section to be sure driveline is securely connected. Make certain PTO shielding is in good condition.
4. Wheel Pivots (3-Point Hitch Models) — Apply multi-purpose grease with grease gun.
5. Constant Velocity (CV) Joint - Position CV joint as straight as possible to be sure grease will penetrate to ball joint. Lubricate the central body with a minimum of 30 shots of grease every 8 hours. Lubricate telescoping members with 10 shots every 8 hours and clean telescoping members every 40 hours and completely coat with grease.

6. CV Driveline—Apply 8-10 shots of multi-purpose grease to grease fitting accessible behind U-joint cross, on end of shaft.
7. Gearboxes — Remove check plug. Add EP80W-90 gear oil as necessary to bring oil level to check plug hole in blade gearboxes. Check oil level in transfer gearbox by observing dipstick attached to filler plug. Allow time for oil to seep through bearings into lower housing. Capacity is shown in Table 4-1.

80 HOURS

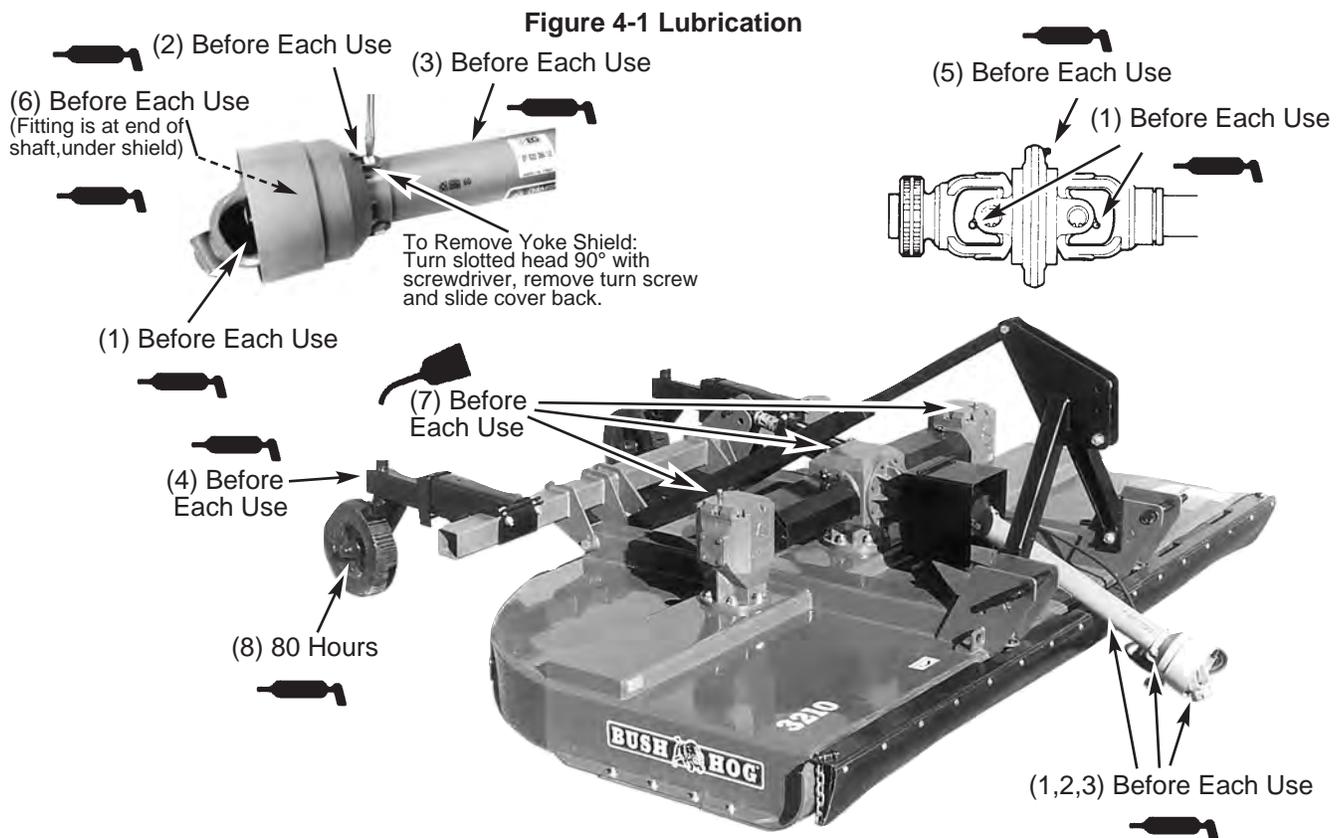
8. Wheel Bearings — Apply multi-purpose grease with grease gun until grease purges from around seals.

Table 4-1 Gearbox Oil Capacity

Model Number**	Oil Capacity Quarts (liters)		
	Left	Center	Right*
3209	5.9 (5.6)	8.7 (8.2)	5.9 (5.6)
13209	5.9 (5.6)	8.7 (8.2)	5.9 (5.6)
3209-O	8.0 (7.6)	—	5.9 (5.6)
3210	5.9 (5.6)	8.7 (8.2)	5.9 (5.6)
13210	5.9 (5.6)	8.7 (8.2)	5.9 (5.6)
3210-O	8.0 (7.6)	—	5.9 (5.6)
3214	5.9 (5.6)	8.0 (7.6)	5.9 (5.6)
13214	5.9 (5.6)	8.0 (7.6)	5.9 (5.6)

*As viewed from rear of machine.

**Shown on machine serial number plate.



4-3 GEARBOX REMOVAL

⚠ WARNING

THE CUTTER CAN FALL FROM HYDRAULIC SYSTEM FAILURE. TO AVOID SERIOUS INJURY OR DEATH, SECURELY SUPPORT CUTTER BEFORE WORKING UNDERNEATH.

A. (If applicable) Remove cotter pin and lower shaft nut. Wearing heavy gloves, grasp blade holder assembly and pull off shaft. If stuck, align blade bolt with access hole in top of cutter deck and drive off with hammer and pipe. Care should be taken not to damage threads.

B. Remove metal driveline shields.

C. Disconnect driveline(s) from gearbox.

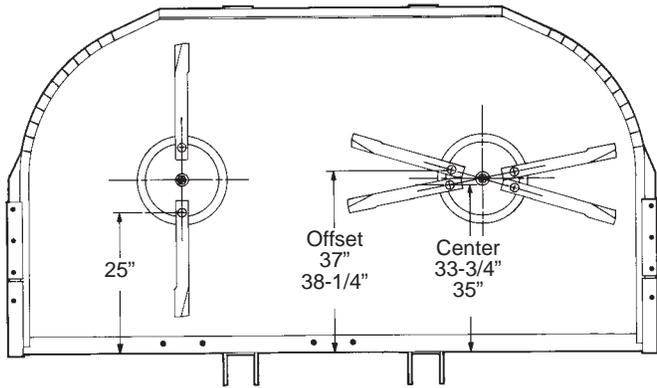
D. Remove nuts securing gearbox to cutter.

Remove gearbox from cutter.

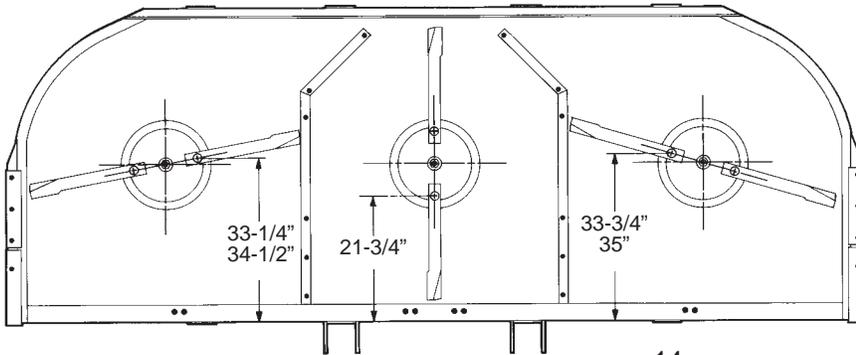
NOTE: (Models 3209 & 3210 Center Mount Only) If a cross shaft needs to be removed, first remove metal shield and gearbox as explained above. Press Q.D. pin and remove cross shaft. Reassembly is in the reverse order. Recheck blade timing as shown in Figure 4-2 and torque gearbox mounting bolts to 250 ft. lbs.

Figure 4-2 Timing Instructions

**3210 TIMING INSTRUCTIONS
BOTTOM VIEW**



**3414 TIMING INSTRUCTIONS
BOTTOM VIEW**



4-4 GEARBOX INSTALLATION

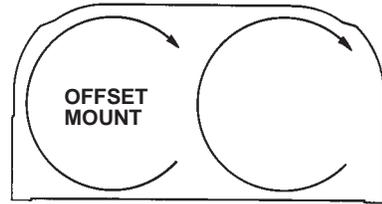
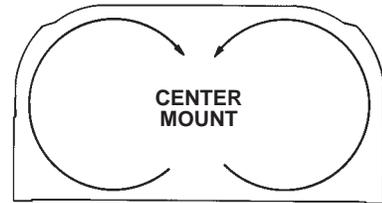
⚠ WARNING

THE CUTTER CAN FALL FROM HYDRAULIC SYSTEM FAILURE. TO AVOID SERIOUS INJURY OR DEATH, SECURELY SUPPORT CUTTER BEFORE WORKING UNDERNEATH.

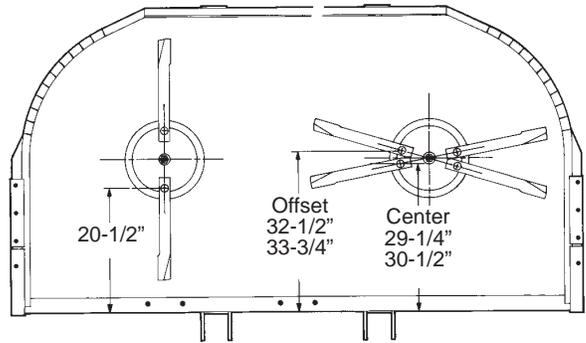
A. Set gearbox on cutter. Attach driveline and blade pan to gearbox, timing the blade pan to measurements shown in Figure 4-2. When replacing pan, torque nut, using 2" socket, to 450 ft. lbs. Strike blade bar with sledge hammer at the blade bolt area. This will help seat the bar to gearbox shaft. Retorque gearbox shaft nut to 450 ft.lbs. Install cotter pin in castle nut.

B. Fasten gearbox to deck, torquing mounting bolts to 250 ft. lbs. Install shields.

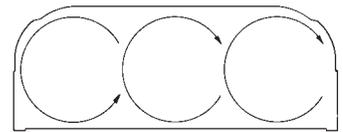
**BLADE ROTATION - 3209, 3210
BOTTOM VIEW**



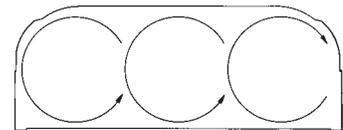
**3209 TIMING INSTRUCTIONS
BOTTOM VIEW**



**BLADE ROTATION - 3414 (540 RPM)
BOTTOM VIEW**



BLADE ROTATION - 3414 (1000 RPM)



4-5 BLADE REPLACEMENT (Standard)

It is not necessary to remove the complete blade holder assembly to replace the blades. Blade bolts are accessible through a hole in the top of the cutter deck. Always replace both blades on a spindle using two blades having the same weight. Use only genuine Bush Hog replacement blades.

- A. Remove nuts from blade bolts.
- B. Inspect blade bolt shoulder for wear. Replace if necessary.
- C. Assemble new blades to blade holder using blade bolts, nuts and lockwashers. Tighten nuts to 450 ft./lbs. (609.7 Nm)
- D. Check to be sure blades swing 360° freely. If blades will not swing freely, remove, locate problem, and repair. Operating cutter when blades will not swing freely will cause excessive vibration, damaging implement.

4-6 BLADE REPLACEMENT (Shredder Attachment)

It is not necessary to remove the complete blade holder assembly to replace the blades. Blade bolts are accessible through a hole in the top of the cutter deck. Always replace both the upper blades and lower blades on each spindle with a matched pair having the same weight. Use only genuine Bush Hog replacement blades.



WARNING

THE CUTTER CAN FALL FROM HYDRAULIC SYSTEM FAILURE. TO AVOID SERIOUS INJURY OR DEATH, SECURELY SUPPORT CUTTER BEFORE WORKING UNDERNEATH.

- A. Remove nuts from blade bolts.
- B. Discard old blade bolts. Inspect bushings for wear, replace if necessary.
- C. Assemble new blades to blade holder using new blade bolts, bushings, lockwashers and nuts. Tighten nuts to 450 ft. lbs. Install cotter pin.
- D. Check to be sure blades swing 360° freely. If blades will not swing freely, remove, locate problem, and repair. Operating cutter when blades will not

swing freely will cause excessive vibration, damaging implement.

4-7 SLIP CLUTCH OPERATIONAL CHECK

After implement has been stored for 30 days or more, perform the following operational check:

- A. Loosen eight nuts retaining clutch springs 1/3 turn or until spring can be turned with fingers.
- B. With tractor at idle speed, engage tractor PTO drive for 2-3 seconds. Clutch should slip without turning blades. If clutch does not slip, contact your authorized Bush Hog dealer.
- C. Retighten nuts to within 1/64" of original position. Initial spring length is shown in Figure 4-3.



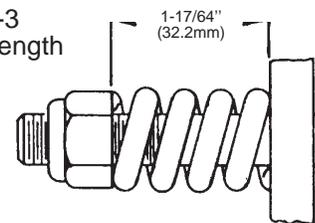
WARNING

FAILURE TO RETIGHTEN SPRING NUTS TO ORIGINAL POSITION MAY CAUSE DAMAGE TO IMPLEMENT AND/OR TRACTOR DUE TO IMPROPER SLIP CLUTCH TORQUE SETTING.

4-8 SLIP CLUTCH

The slip clutch is factory preset to the correct torque for protecting implement and tractor. Periodic adjustment is recommend; refer to section 4-7. Should adjustment be needed, first check to be sure all spring lengths are the same. Initial spring length is shown in Figure 4-3. If necessary, adjust nut on any spring that is unequal. Adjust all eight spring retaining nuts 1/3 of a turn (2 flats on a nut) and check clutch slippage. If further adjustment is necessary, do so in 1/3 turn increments. Adjust only to provide sufficient torque to prevent slippage under normal conditions. Occasional slippage is normal for drivetrain protection. If satisfactory results cannot be obtained consult your Bush Hog dealer.

Figure 4-3
Spring Length



4-9 TROUBLESHOOTING

Troubleshooting procedures are listed in Tables 4-2 and 4-3. If the problem cannot be solved or replacement parts are necessary, contact your authorized Bush Hog dealer. Please have ready your machine name, model number, serial number, purchase date and exact cause of description of problem.

Table 4-2 Troubleshooting (General)

PROBLEM	PROBABLE CAUSE	REMEDY
Uneven cut	Cutter not level side to side or front to rear	Refer to SECTION II
	Worn or bent blades	Replace blades per para. 4-5
Stripping or Windrowing	Possible build up of material under cutter	Clean cutter
	Cutter not level Worn blades	Refer to SECTION II Replace per para. 4-5

Table 4-2 Troubleshooting (Continued)

PROBLEM	PROBABLE CAUSE	REMEDY
Noisy cutter	Loose components Low oil in gearboxes Blades out of time	Check all bolts for tightness. Check for proper oil level. Refer to para. 4-2 Time as shown in Fig. 4-2
Rapid blade wear (cutting edge)	Blade contacting the ground	Adjust to operate at a height that will eliminate ground contact
Rapid Blade Wear (bolt hole)	Cutter not being operated at rated RPM speed	Reduce ground speed Set tractor throttle to maintain proper PTO speed during operation
Poor cutting job	Incorrect deck tilt Excessive ground speed Worn blades Cutter not being operated at rated RPM speed	Adjust per para. 3-2 Reduce ground speed Replace blades per para. 4-5 Reduce ground speed
Cutter vibration	Blades not synchronized Cutter not being operated at rated RPM speed	See para. 4-4 Set tractor throttle to maintain proper PTO speed during operation
Blades out of time	Timed incorrectly Cross shaft rubber element failed Twisted gearbox shaft	See Fig. 4-2 Replace rubber element assy. Replace shaft
Blades bending or breaking	Cutter not being operated at rated RPM speed	Reduce ground speed Set tractor throttle to maintain proper PTO speed during operation

Table 4-3 Troubleshooting (Shredding)

Streaking or poor shredding	Not driving straight down row Cutter not being operated at rated RPM speed	Drive straight Reduce ground speed Set tractor throttle to maintain proper speed during operation
	Tractor ground speed too fast Not cutting full four rows Row spacing other than 30" or 38-40" Material hanging underneath cutter Blades worn Blades installed incorrectly	Reduce speed to 3-6 mph Cut four 38-40" spaced row each pass Check row spacing Clean material from underneath cutter Replace blades Install properly
Windrowing	Baffles damaged or not installed Fixed blades missing or not installed properly Row spacing other than 30" or 38-40"	Repair/reinstall baffles Replace/reinstall blades Check row spacing
	Uplift worn off blades	Replace blades
Noisy cutter	Shredding attachments assembled wrong Blade bent	Assemble correctly per para. 5-7 Replace blade

SECTION V ASSEMBLY



CAUTION

THE FOLLOWING SAFETY PRECAUTIONS SHOULD BE THOROUGHLY UNDERSTOOD BEFORE ATTEMPTING MACHINE ASSEMBLY.

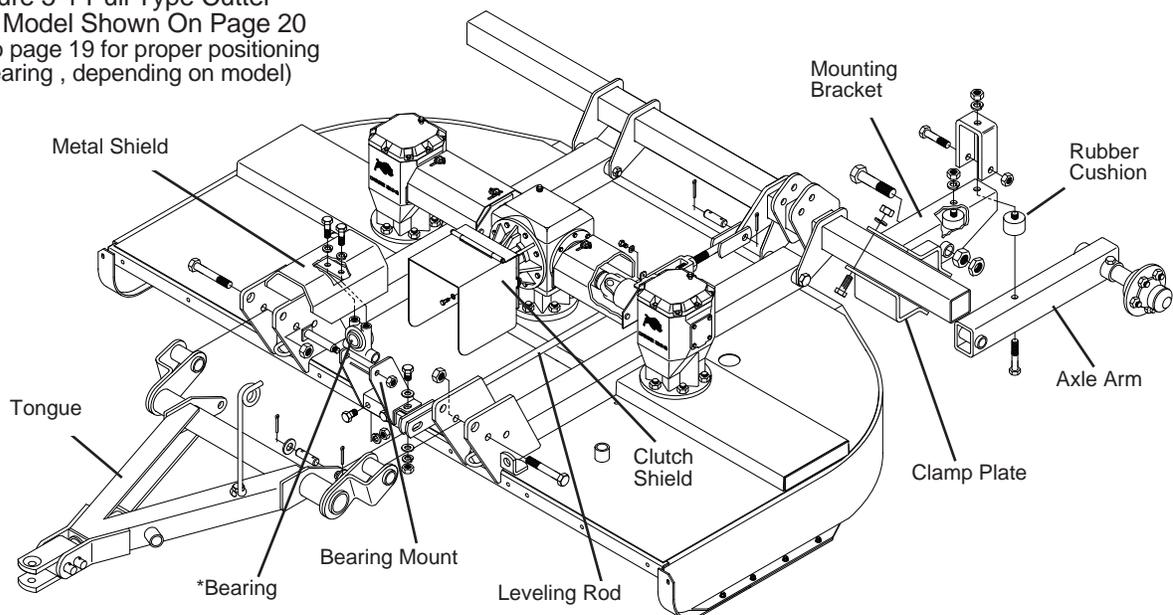
1. Wear personal protective equipment such as, but not limited to protection for eyes, ears, feet, hands, lungs and head when assembling the equipment. Do not wear loose clothing or jewelry that may catch on equipment moving parts.
2. Do not lift heavy parts or assemblies. Use crane, jack, tackle, fork trucks or other mechanical devices.
3. Select an area for assembly that is clean and free of any debris which might cause persons working on the assembly to trip.
4. Arrange parts to be assembled neatly in the work area and have tools or other mechanical assisting devices in easy reach.
5. Inspect all parts and assemblies thoroughly and remove any sharp edges, grease, oil or dirt which might cause pieces to slip when handling.
6. Preview the assembly instructions in your operator's manual before proceeding further.
7. If the assembly instructions call for parts or assemblies to be blocked up, use only blocking material that is in good condition and is capable of handling the weight of the assembly to be blocked. Also, insure that the blocking material is on a clean, dry surface.
8. Never put hands or any other part of body under blocked up assemblies if at all possible.
9. Always wear goggles or safety glasses when hammering, grinding, or drilling metal parts.
10. If the assembly calls for welding or cutting, be sure that there are no flammable materials close at hand and that bystanders have taken necessary precautions.

AFTER COMPLETING ANY ASSEMBLY STEP, THOROUGHLY READ THE NEXT STEP IN THE ASSEMBLY INSTRUCTIONS BEFORE PROCEEDING WITH THAT STEP.

11. After completing assembly, thoroughly inspect the machine to be sure that all nuts, bolts, hydraulic fittings or any other fastened assemblies have been thoroughly tightened.
12. After completing assembly, be sure that all safety locking devices or guards are in place.
13. Before operating the machine, thoroughly read the operation section of this manual.
14. Before operating the machine, read the maintenance section of this manual to be sure that any parts requiring lubrication such as gearboxes are full to avoid any possible damage.

BEFORE OPERATING THE EQUIPMENT, IF YOU HAVE ANY QUESTIONS REGARDING THE PROPER ASSEMBLY OR OPERATION, CONTACT YOUR AUTHORIZED BUSH HOG DEALER OR REPRESENTATIVE.

Figure 5-1 Pull Type Cutter
Offset Model Shown On Page 20
(Refer to page 19 for proper positioning
of *bearing , depending on model)



5-1 PULL HITCH MODELS (Figure 5-1)

A. Two types of wheels are available for this machine, each requiring the axle arm to be mounted with a different side up. Determine type of wheels by comparing to Figure 5-2. Now determine how axle arm is to be mounted by looking at Figure 5-3. This is to compensate for the difference in wheel height.

NOTE

When using laminated tires, the flat side of the lug nut should be against the rim. When using automotive rims, the tapered side of the lug nut should be against the rim.

Figure 5-2 Types of Wheels

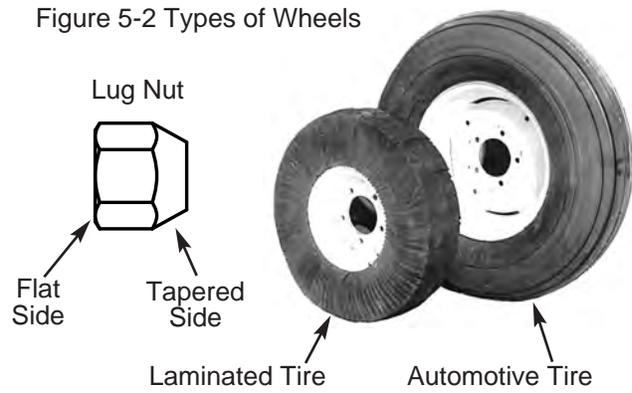


Figure 5-3 Axle Arm Mounting
(See Page 29 For Additional Tailwheel Information)

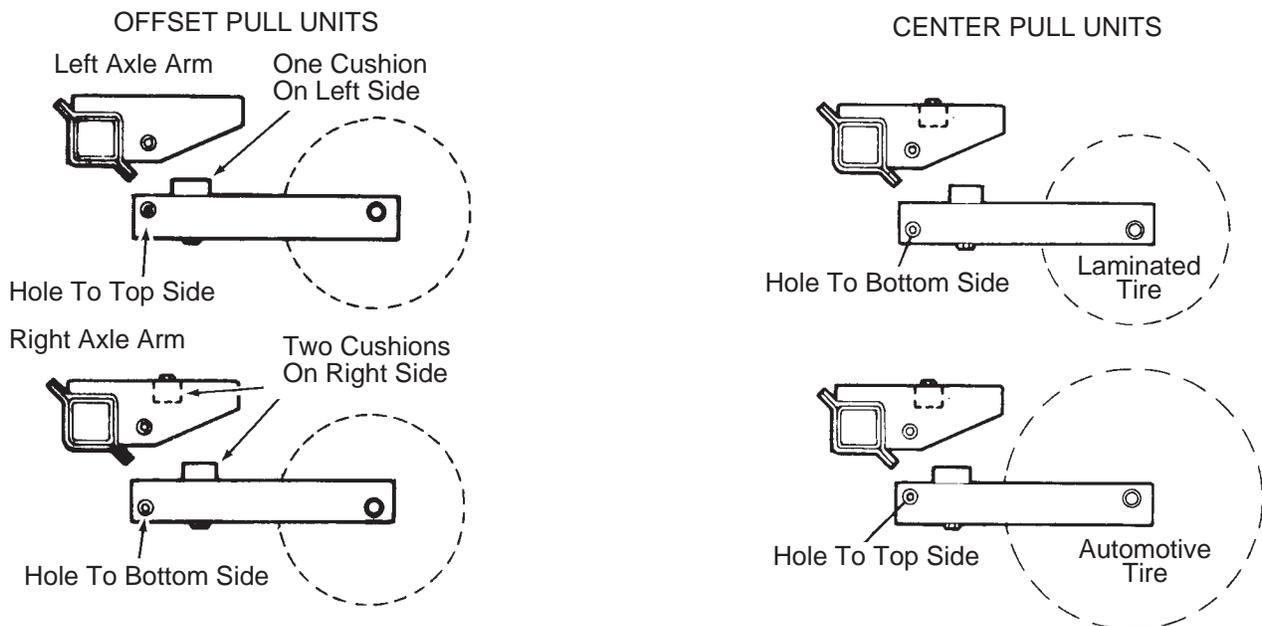
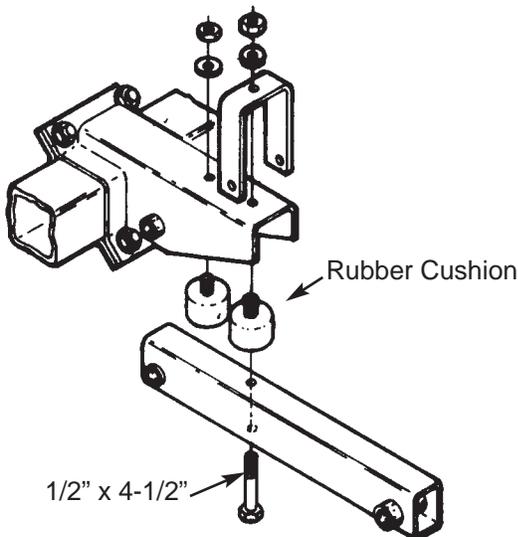
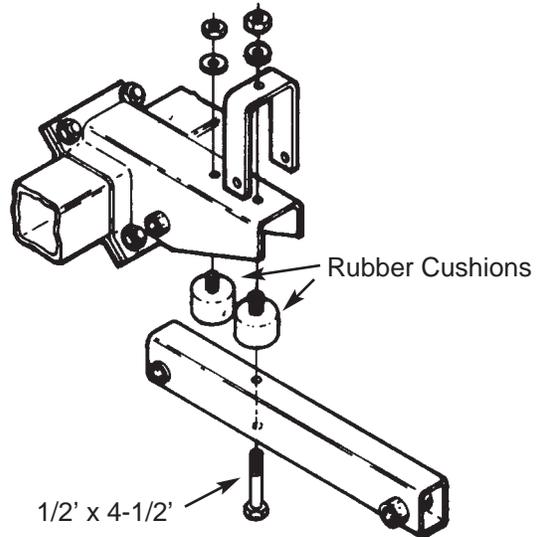


Figure 5-4 Rubber Cushion Installation

Model 3209, 3210 Offset (Left Axle Arm)



Model 3209, 3210, 3414 (Lift, Pull, or Semi-Mount)
Model 3209, 3210 Offset (Right Axle Arm)



B. Install one rubber cushion on each axle arm using a 1/2 x 4-1/2" bolt. (Figure 5-4)

C. Attach rubber cushion to axle arm mounting bracket securing with nut and lockwasher.

D. Attach rubber cushion on axle arms to axle arm mounting brackets using 1/2" lockwasher and nut. Install bolt through axle arm stop and mounting bracket into rubber cushion.

E. Install 1 x 7-1/2" axle arm pivot bolt through mounting brackets.

F. If equipped with single wheel assemblies, install wheel assemblies to axle arms using two 1/2 x 3" bolts, nuts and lockwashers per assembly.

G. Insert 1/2 x 5-3/4" bolt through axle arm stop securing with locknut. Do not bend axle arm stop when tightening nut.

H. Attach axle arm assemblies to axle using one clamp plate and four 3/4 x 2" bolts, nuts and lockwashers per assembly. (Figure 5-5)

Figure 5-5 Axle Axle Arm Assembly



I. Attach tongue assembly to deck lugs with 1 x 8-1/2" bolts, bushings and locknuts. (Figure 5-6)

J. Connect leveling rod and slotted clevis to tongue weldment. Secure with a 1 x 3-3/8" pin, flatwasher and cotter pins.

K. Connect opposite end of leveling rod to axle securing with 1 x 3-3/8" pin and cotter pins.

L. Attach bearing mount to top of deck with 5/8 x 4" bolts and locknuts. Fasten to front of deck with 5/8 x 5" bolts and locknuts.

M. Pin rod end of cylinder, or either end of ratchet jack (whichever supplied), to front hole in leveling link and opposite end to cutter deck. Rod end uses 1 x 5-3/8" pin and two presto pins.

N. Install shield onto front of center gearbox using four 10mm x 20mm bolts and lockwashers.

O. Install clutch end of jackshaft onto center gearbox input shaft. Pull on shaft to be sure it is securely locked in place.

P. Slide pillow block bearing onto jackshaft. Align pillow block bearing housing between lugs on bearing mount and fasten with pin weldment and locknut. Note the orientation of the pillow block bearing on 3414.

Q. Slide lock collar up to bearing and turn in the direction of shaft rotation until it slips over the inner ring extension. (Figure 5-7) Turn collar quickly in the direction of shaft rotation (approx. 1/4 turn) to tighten.

R. Place punch in blind hole in collar. Strike punch sharply with hammer in the direction of shaft rotation to lock collar tightly against inner ring extension. (Figure 5-8) Tighten set screw to 20 ft./lbs. (27 Nm).

Figure 5-6 Tongue Bearing Mount



NOTE: When mounting on 3414 Models the pillow block bearing should be placed on the jackshaft with the lock collar facing the gearbox.

Figure 5-7 Bearing

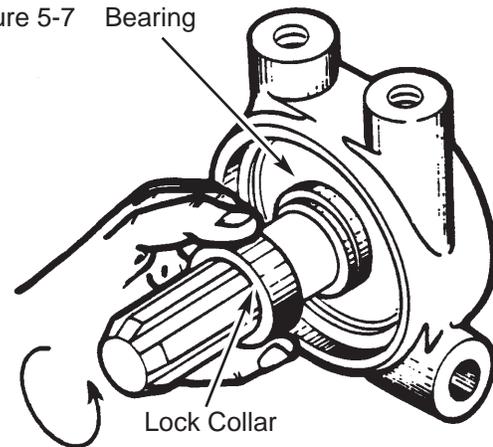
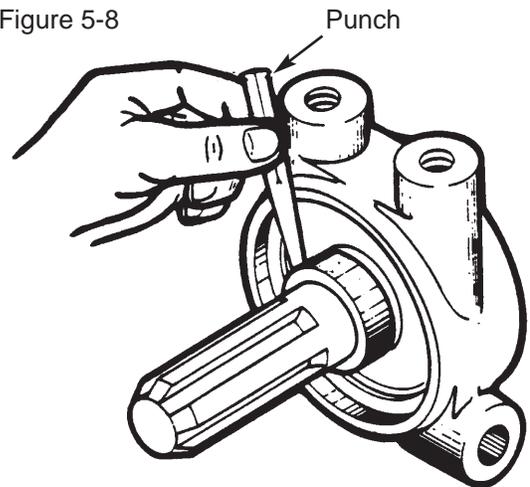


Figure 5-8 Punch



S. Attach bearing shield, beveled end forward, to top of pillow block bearing using 1/2 x 1-1/4" bolts and lockwashers.

T. Attach driveline to jackshaft.

U. Attach hose holder rod to tongue using 5/8 x 2" bolt, flatwasher, lockwasher and nut. Plumb hydraulic cylinder as shown in Figure 5-9. (If applicable) Install stop collars on cylinder. Extra collars may be placed on leveling rod.

V. Install jackstand on tongue or store it on cutter deck.

W. Fill gearboxes with EP80W-90 gear oil. Allow time for oil to seep through bearings into lower housing before checking oil level. Capacity is shown in Table 4-1. Replace temporary fill plugs in blade gearboxes with vented plugs included in Operator's Manual Packet. A dipstick plug is provided for use in the transfer gearbox.

X. Insert a left and right mounting bracket pin into cross shaft shield. Attach shield assembly to gearbox using four 10mm x 20mm bolts and flatwashers at each end. Hinge should be to the front of cutter. Repeat for other shield. (Figure 5-10)

NOTE
COMPLETE THE FOLLOWING STEPS
PRIOR TO DELIVERY

Y. Loosen eight nuts retaining clutch springs 1/3 turn or until spring can be turned with fingers.

Z. With tractor at idle speed, engage tractor PTO drive for 2-3 seconds. Clutch should slip without turning blades. If clutch does not slip, contact the Bush Hog Service Department.

A.A. Retighten nuts to within 1/64" of original position. Initial spring length is shown at right.

CAUTION

FAILURE TO RETIGHTEN SPRING NUTS TO ORIGINAL POSITION MAY CAUSE DAMAGE TO IMPLEMENT AND/OR TRACTOR DUE TO IMPROPER SLIP CLUTCH TORQUE SETTING.

Figure 5-9 Plumbing Diagram

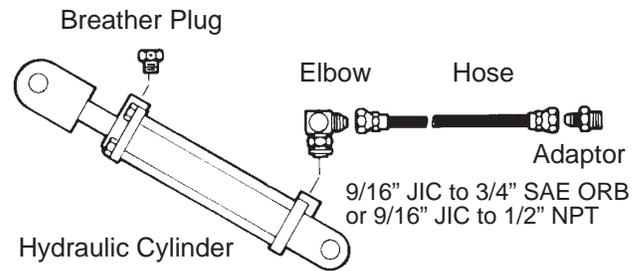
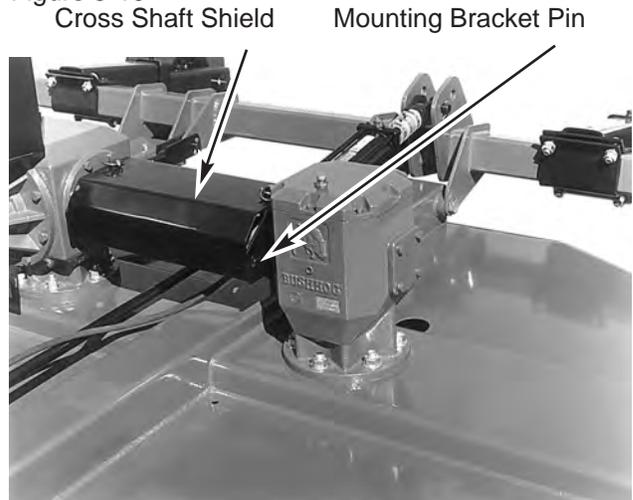
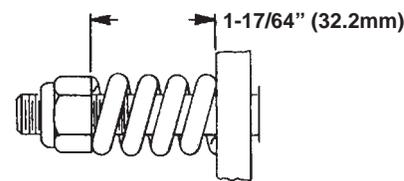


Figure 5-10



Spring Length



Offset Pull Type Cutter

This "Double" Cushion Used On Right Hand Axle Of Offset Pull Type Cutters. Shown Here For Assembly Purposes Only.

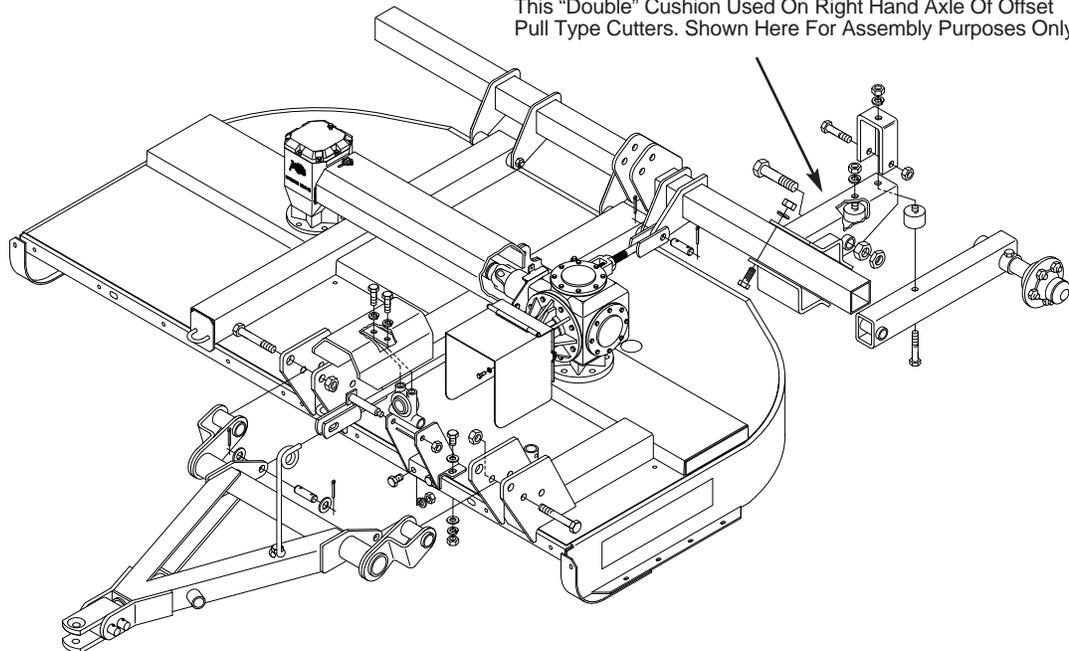
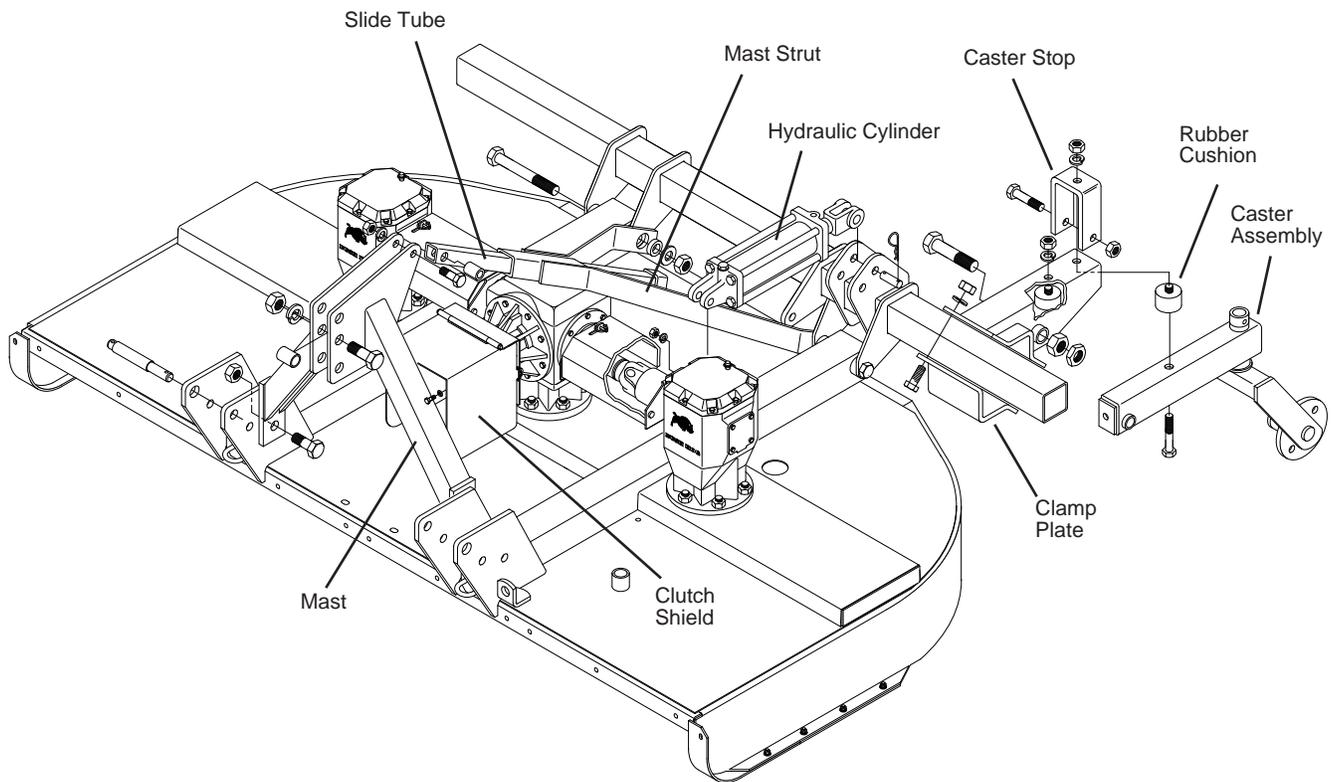


Figure 5-11 Three-Point Hitch Model



5-2 THREE-POINT HITCH MODELS

(Figure 5-11)

A. Mount wheels to caster assemblies. Tighten lugs to 85 ft. lbs.

B. Attach rubber cushion to each caster assembly using 1/2 x 4-1/2" bolt.

C. Attach rubber cushion on caster assembly to caster assembly mounting bracket using a lockwasher and nut. Install stud through caster arm stop and mounting bracket.

D. Install 1 x 7-1/2" caster arm pivot bolt through mounting bracket and axle arm securing with nut. Install jam nut on pivot bolt.

E. Attach caster assembly to axle using clamp plate, four 3/4 x 2" bolts, nuts and lockwashers.

F. Insert 1/2 x 5-3/4" bolt through caster arm stop and secure with locknut. Do not bend caster arm stop when tightening nut.

G. Pin rod end of cylinder or either end of ratchet jack (whichever supplied) to rear hole in leveling link and opposite end to cutter deck. Rod end uses 1 x 5-3/8" pin and two presto pins.

H. Attach mast to cutter deck using two 1 x 2-1/2" nuts.

I. Assemble mast halves (if required), using bushing, 1 x 5" bolt, lockwasher and nut.

J. Insert slide tube through mast strut. Attach slide tube to mast using a 3/4 x 4-1/2" bolt, nut and lockwasher.

K. Remove left axle pivot bolt (left center on Model 3414). Install 1-1/2 x 1/2" bushing to inside of strongback and attach left mast strut to axle using a 3" flatwasher, lockwasher, and nut.

NOTE

Make certain existing bushing remains in axle support tube during steps "J" and "K".

L. Remove right axle pivot bolt (right center on Model 3414). Install 3" flatwasher, 1-1/2" x 1/2" bushing and lockwasher, attach right mast strut.

M. Install shield to input side of center gearbox using four 10mm x 20mm bolts and flatwashers.

N. Connect clutch end of driveline to center gearbox. Pull on driveline to make certain it is securely attached.

O. Fill gearboxes with EP80W-90 gear oil. Allow time for oil to seep through bearings into lower housing before checking oil level. Capacity is shown in Table 4-1. Replace temporary fill plug with vented plug included in Owners Manual Packet.

P. Insert a left and right mounting bracket pin into cross shaft shield. Attach shield assembly to gearbox using four 10mm x 20mm bolts and flatwashers at each end. Hinge should be to the front of cutter. Repeat for other shield. (Figure 5-10)

NOTE

COMPLETE THE FOLLOWING STEPS PRIOR TO DELIVERY:

Q. Loosen eight nuts retaining clutch springs 1/3 turn or until spring can be turned with fingers.

R. With tractor at idle speed, engage tractor PTO drive for 2-3 seconds. Clutch should slip without turning blades. If clutch does not slip, contact Bush Hog service department.

S. Retighten nuts to within 1/64" of original position. Initial spring length is 1-17/64" (32.2mm).

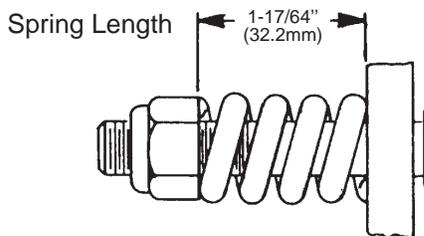
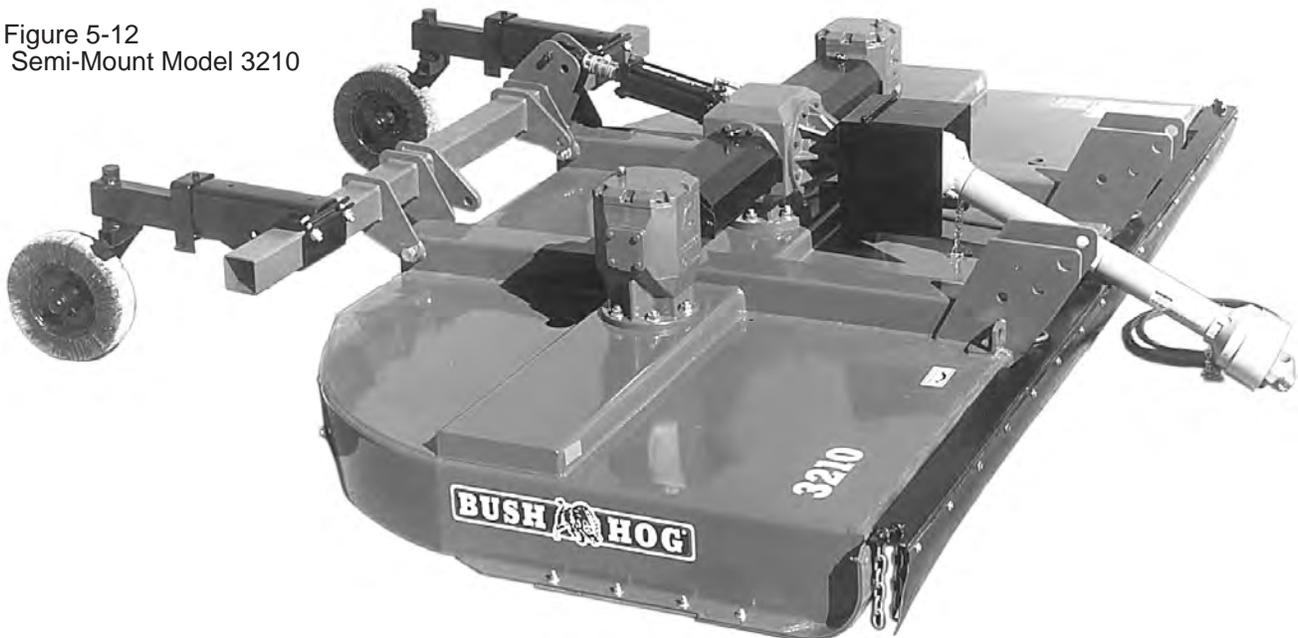


Figure 5-12
Semi-Mount Model 3210



CAUTION

FAILURE TO RETIGHTEN SPRING NUTS TO ORIGINAL POSITION MAY CAUSE DAMAGE TO IMPLEMENT AND/OR TRACTOR DUE TO IMPROPER SLIP CLUTCH TORQUE SETTING.

5-3 SEMI-MOUNT HITCH MODELS (Figure 5-12)

- A. Perform steps "A" through "F" in paragraph 5-2.
- B. Install hitch pins into hitch brackets as shown in Figure 5-12.
- C. Perform steps "L" through "R" in paragraph 5-2.

WARNING

FOR NON-AGRICULTURAL USE, OSHA, ASAE, SAE AND ANSI STANDARDS REQUIRE THE USE OF CHAIN GUARDS OR OTHER PROTECTIVE GUARDS AT ALL TIMES. BUSH HOG STRONGLY RECOMMENDS THE USE OF SUCH GUARDS FOR AGRICULTURAL USES AS WELL, TO REDUCE THE RISK OF PROPERTY DAMAGE, SERIOUS BODILY INJURY, OR EVEN DEATH FROM OBJECTS THROWN OUT BY OR FROM CONTACT WITH THE CUTTING BLADES.

5-4 REAR METAL AND FLEXIBLE BAND INSTALLATION

- A. Raise cutter off ground and block securely in position.
- B. Align holes on center band with those on cutter deck. Install 1/2 x 1-1/4" bolts, flatwashers, lockwashers and nuts. NOTE: Model 3414 requires 1/2 x 4-1/2" bolts on the center band and 1/2 x 1-1/4" bolts on the outside band.
- C. Attach end plates to center band and cutter side bands.
- D. Tighten all nuts.

5-5 FRONT FLEXIBLE BAND INSTALLATION (Standard)

- A. Raise cutter off ground and block securely in position.
- B. Align holes on band assembly with those on cutter deck. Install 1/2 x 4-1/2" bolts, flatwashers, lockwashers and nuts.
- C. Tighten all fasteners.

5-6 REAR CHAIN INSTALLATION

- A. Compare each chain assembly to Figure 5-13 to determine location for installation.
- B. Align holes on chain assembly with those on cutter deck. Install 1/2x 1-1/4" bolts, flatwashers, lockwashers and nuts. NOTE: Model 3414 requires 1/2 x 4-1/2" bolts on the center section and 1/2 x 1-1/4" bolts on the side sections.
- C. Bolt each end assembly to the side band.
- D. Tighten all nuts.

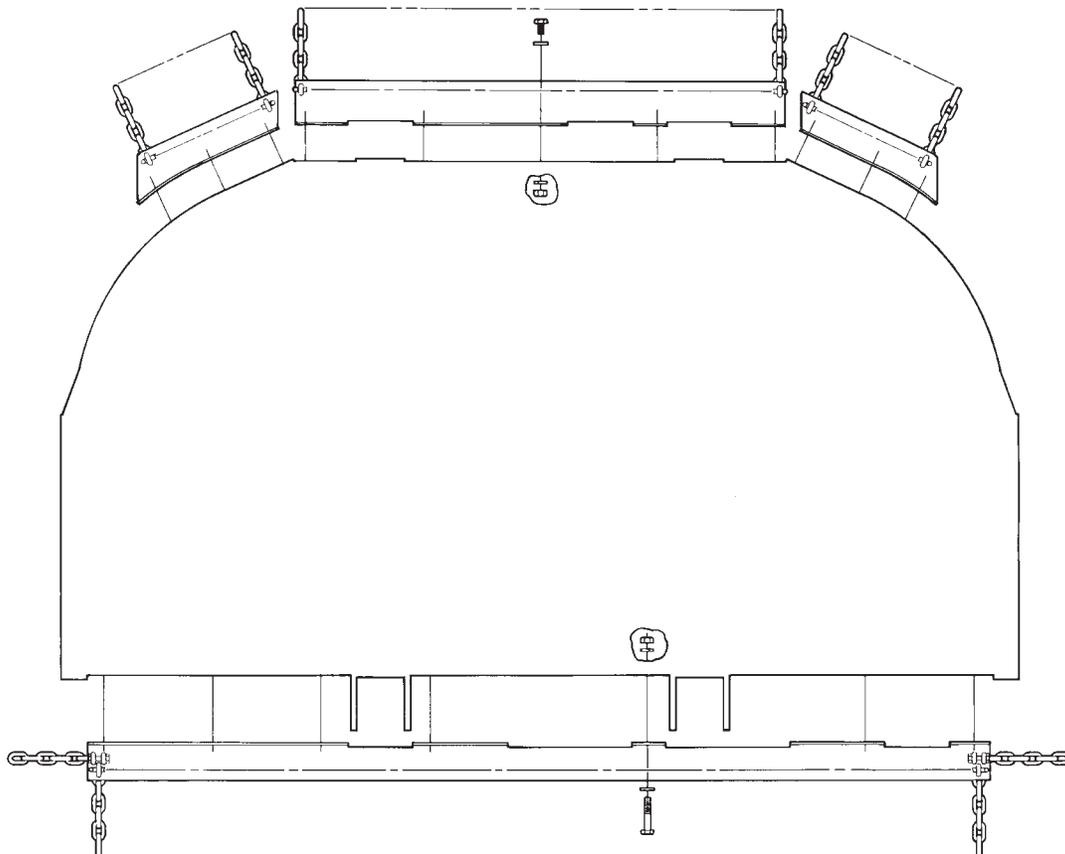
5-7 FRONT CHAIN INSTALLATION

- A. Compare each chain assembly to Figure 5-13 to determine location for installation.
- B. Fasten chain assemblies to deck using 1/2 x 4-1/2" flatwashers, lockwashers and nuts. Tighten all nuts. NOTE: Model 3414 uses two chain sections across the front of coueter.

Figure 5-13 Chain Installation

NOTE

Chain assemblies should not be used with shredding attachments as this will adversely affect shredding performances.



5-8 FRONT FLEXIBLE BAND INSTALLATION (Shredder)

- A. Raise cutter off ground and block securely in position.
- B. Align holes in bands with holes in cutter deck as shown in Figure 5-14.
- C. Fasten bands to deck using 1/2 x 4-1/2" bolts, flatwashers, lockwashers and nuts. Tighten all nuts.
- D. Cut belting to fit row spacing.

NOTE

FLEXIBLE BANDS ARE ALSO RECOMMENDED FOR THE REAR OF SHREDDER MODELS. REFER TO SECTION 5-4.

5-9 SHREDDER ATTACHMENT INSTALLATION (Model 3414 Only)

NOTE: Must have straight blade bars.

- A. Remove existing baffles from underneath cutter. Retain for cutting without shredder attachment.
- B. Remove existing blades and retain for use without shredder attachment.
- C. Install blades onto blade bars placing double

edge blade on top and uplift blade on bottom. Secure with blade bolt, bushings, castle nut and cotter pin. Torque nut to 450 ft. lbs. (Figure 5-15)

D. Install V-baffle onto rear of cutter using 1/2 x 1-3/4" bolts, flatwashers, lockwashers and nuts. Note that baffle mounts in a different place for a 540 rpm machine than for a 1000rpm machine. (Figure 5-16).

E. Mount the left front baffle on 1000 rpm cutter or right front baffle on 540 rpm cutter using 1/2 x 1-3/4" bolts, flatwashers, lockwashers and nuts. Baffle should be offset to the inside (center) of cutter to clear blades. Check to be sure blades clear baffle.

F. Mount stationary blades to cutter deck front lip angle using 5/8 x 6-1/2" bolts, support plates, mounting brackets and locknuts. (38-40" row spacing models require three blades; 30" row spacing models require five blades) Note that center blade should be mounted to the right of center for 540 rpm machines and left of center for 1000 rpm machines. Center stationary knife must use hole in bearing housing assembly.

G. Attach stationary blade mounting bracket to deck on opposite front baffle using 1/2 x 1-3/4" bolts, support plate and locknuts. Mount stationary blades to bracket using 5/8 x 2" bolts and locknuts.

Figure 5-14 Front Flexible Band and Rear Metal Bands Installation

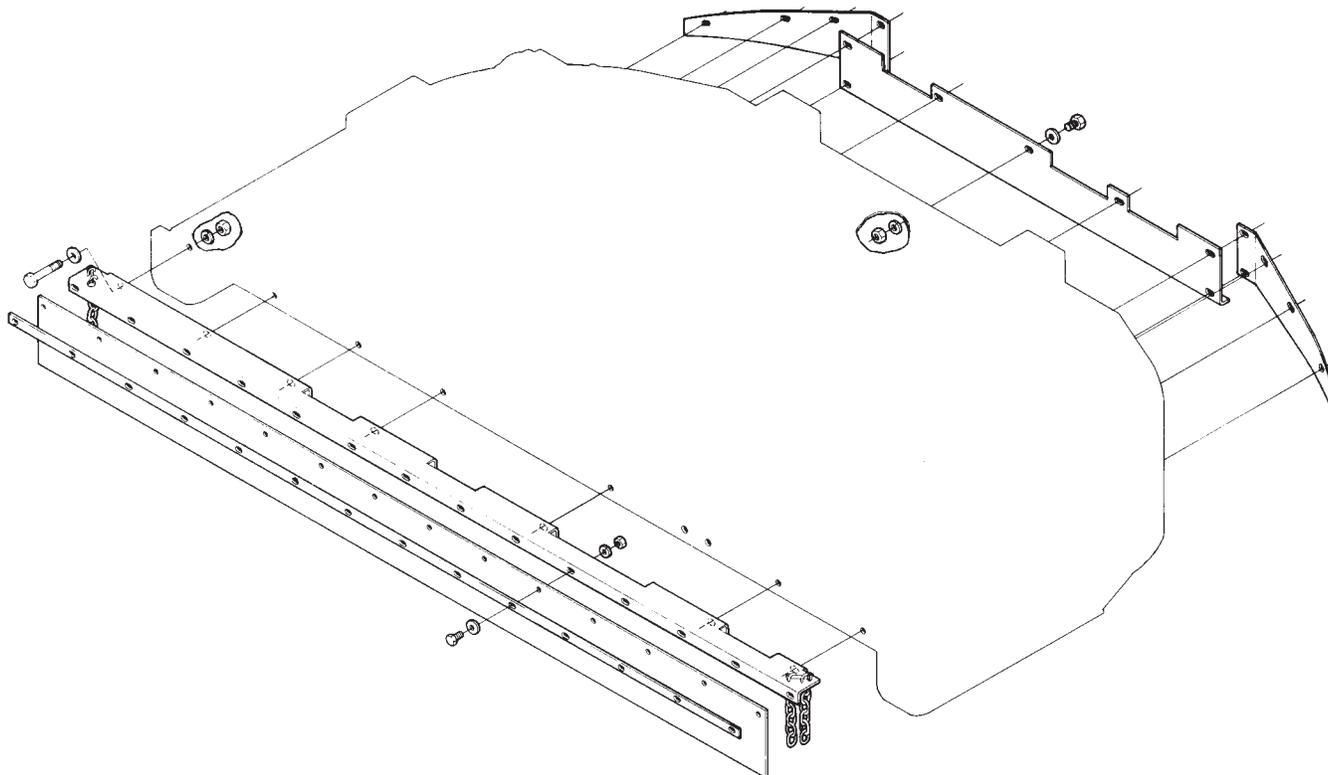


Figure 5-15
1000 RPM, 38-40" Row Spacing Shown
(Refer To Fig. 5-16 For All Models)

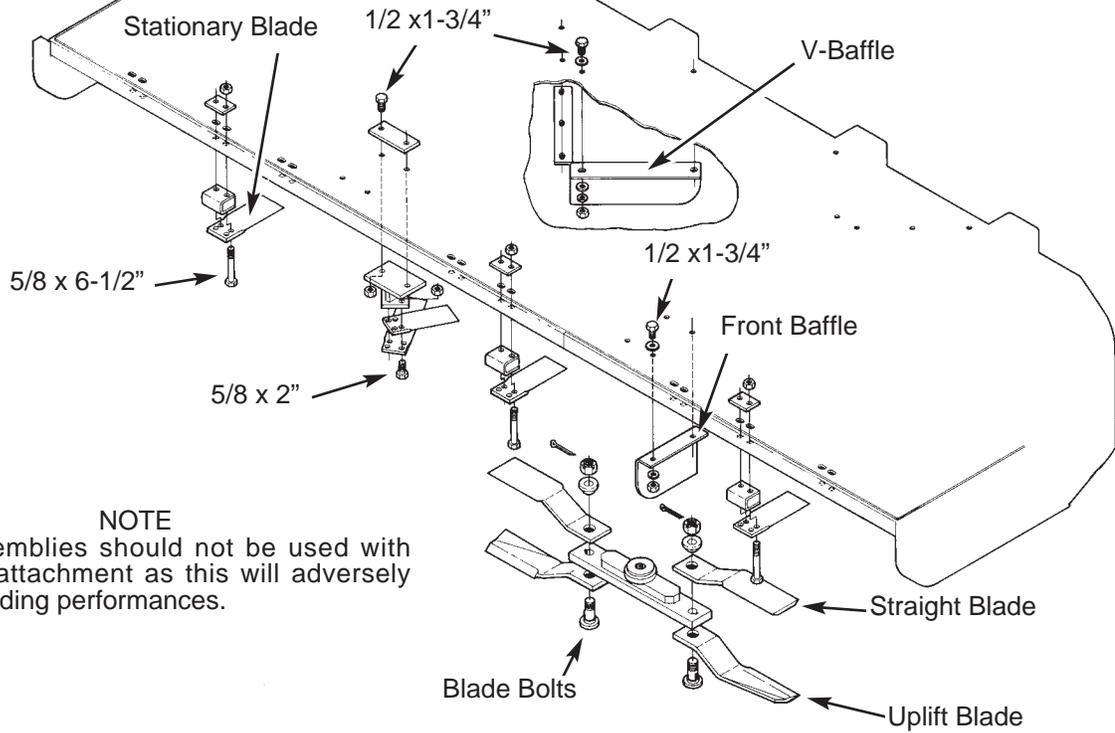
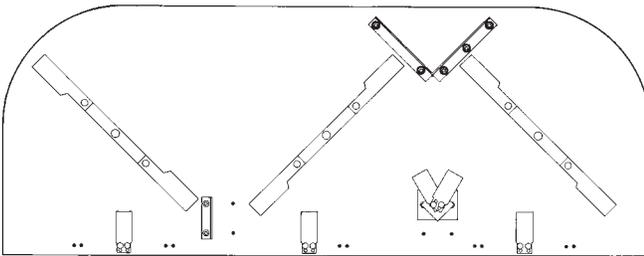
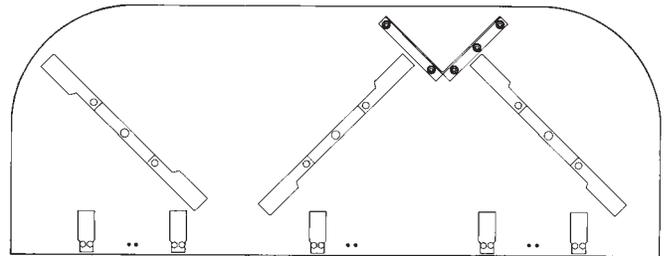


Figure 5-16 Shredder Component Locations
(Bottom Views)

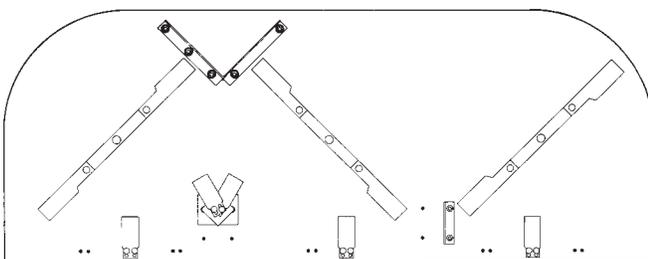
38-40", 1000 RPM Model



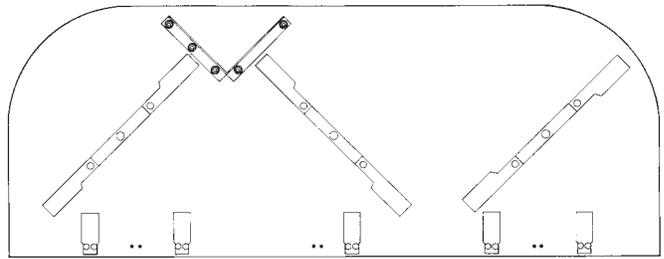
30", 1000 RPM Model



38-40", 540 RPM Model



30", 540 RPM Model



SAFETY DECALS

To promote safe operation, Bush Hog supplies safety decals on all products manufactured. Because damage can occur to safety decals either through shipment, use or reconditioning, Bush Hog will, upon request, provide safety decals for any of our products in the field at no charge. Contact your authorized Bush Hog dealer for more information.

⚠ DANGER

		
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KEEP AWAY - ROTATING BLADES

TO AVOID SERIOUS INJURY OR DEATH FROM BLADE CONTACT:

- LOWER IMPLEMENT, STOP ENGINE AND PTO, ALLOW ALL MOVING PARTS TO STOP, AND REMOVE KEY BEFORE DISMOUNTING FROM TRACTOR.
- ALLOW NO RIDERS ON TRACTOR OR MOWER.
- KEEP ALL PERSONS CLEAR OF OPERATING MOWER AND MOWING AREA.
- KEEP CLEAR OF ROTATING BLADES, PARTS, AND DRIVELINES.

		
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PREVENT FALL OFF INTO ROTATING BLADES

TO PREVENT ACCIDENTAL FALL OFF FROM TRACTOR AND SERIOUS INJURY OR DEATH FROM RUN OVER OR ROLLOVER BY TRACTOR OR MOWER:

- USE ROPS (ROLLOVER PROTECTIVE STRUCTURES) AND SEAT BELT EQUIPPED TRACTORS FOR MOWING OPERATIONS.
- BUCKLE UP SEAT BELT.
- KEEP ALERT FOR STUMPS, HOLES, RUTS AND UNEVEN TERRAIN.

⚠ DANGER

		
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KEEP AWAY - ROTATING BLADES

TO AVOID SERIOUS INJURY OR DEATH FROM BLADE CONTACT:

- LOWER IMPLEMENT, STOP ENGINE AND PTO, ALLOW ALL MOVING PARTS TO STOP, AND REMOVE KEY BEFORE DISMOUNTING FROM TRACTOR.
- ALLOW NO RIDERS ON TRACTOR OR MOWER.
- KEEP ALL PERSONS CLEAR OF OPERATING MOWER AND MOWING AREA.
- KEEP CLEAR OF ROTATING BLADES, PARTS, AND DRIVELINES.

		
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PREVENT FALL OFF INTO ROTATING BLADES

TO PREVENT ACCIDENTAL FALL OFF FROM TRACTOR AND SERIOUS INJURY OR DEATH FROM RUN OVER OR ROLLOVER BY TRACTOR OR MOWER:

- USE ROPS (ROLLOVER PROTECTIVE STRUCTURES) AND SEAT BELT EQUIPPED TRACTORS FOR MOWING OPERATIONS.
- BUCKLE UP SEAT BELT.
- KEEP ALERT FOR STUMPS, HOLES, RUTS AND UNEVEN TERRAIN.

⚠ WARNING

	
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ROTARY CUTTERS CAN DISCHARGE OBJECTS SEVERAL HUNDREDS OF FEET. TO AVOID SERIOUS INJURY OR DEATH TO BYSTANDERS FROM THROWN OBJECTS:

- CLEAR MOWING AREA OF VISIBLE DEBRIS AND USE EXTRA CAUTION WHERE ROCKS OR DEBRIS MAY BE PRESENT.
- DO NOT OPERATE CUTTER ALONG ROADWAYS OR IN THE VICINITY OF OTHER PERSONS WITHOUT ENCLOSED SIDES, PERMANENT BANDS, BELTING, HIGHWAY CHAINS OR OTHER FACTORY APPROVED DISCHARGE SHIELDS IN PLACE AND IN GOOD WORKING ORDER.
- KEEP ALL PERSONS WELL CLEAR OF MOWER WHEN IN OPERATION.

⚠ WARNING

	
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ROTARY CUTTERS CAN DISCHARGE OBJECTS SEVERAL HUNDREDS OF FEET. TO AVOID SERIOUS INJURY OR DEATH TO BYSTANDERS FROM THROWN OBJECTS:

- CLEAR MOWING AREA OF VISIBLE DEBRIS AND USE EXTRA CAUTION WHERE ROCKS OR DEBRIS MAY BE PRESENT.
- DO NOT OPERATE CUTTER ALONG ROADWAYS OR IN THE VICINITY OF OTHER PERSONS WITHOUT ENCLOSED SIDES, PERMANENT BANDS, BELTING, HIGHWAY CHAINS OR OTHER FACTORY APPROVED DISCHARGE SHIELDS IN PLACE AND IN GOOD WORKING ORDER.
- KEEP ALL PERSONS WELL CLEAR OF MOWER WHEN IN OPERATION.

⚠ CAUTION

THIS IMPLEMENT IS DESIGNED TO OPERATE AT 540 RPM MAXIMUM TRACTOR PTO SPEED.

ALL DRIVE LINE SHIELDS MUST BE KEPT IN PLACE.

50029417

⚠ CAUTION

THIS IMPLEMENT IS DESIGNED TO OPERATE AT 1000 RPM MAXIMUM TRACTOR PTO SPEED.

ALL DRIVE LINE SHIELDS MUST BE KEPT IN PLACE.

50029418

50029417

50029418

⚠ WARNING



TO AVOID SERIOUS INJURY OR DEATH:

- READ OPERATOR'S MANUAL BEFORE OPERATING AND FOLLOW ALL PRECAUTIONS. (CONTACT DEALER FOR MANUAL)
- KEEP SHIELDS AND GUARDS IN PLACE. KEEP CLEAR OF DRIVES AND BELTS.
- LOWER IMPLEMENT, STOP ENGINE AND PTO, ALLOW ALL MOVING PARTS TO STOP, AND REMOVE KEY BEFORE DISMOUNTING FROM TRACTOR.
- KNOW HOW TO STOP TRACTOR AND EQUIPMENT QUICKLY IN AN EMERGENCY.
- ALLOW NO CHILDREN OR UNQUALIFIED PERSONS TO OPERATE EQUIPMENT.
- BE CAREFUL ON UNEVEN TERRAIN. DECREASE SPEED WHEN TURNING.
- DO NOT OPERATE MOWER IN TRANSPORT POSITION.

⚠ WARNING



IMPLEMENT CAN FALL FROM HYDRAULIC SYSTEM FAILURE. TO AVOID SERIOUS INJURY OR DEATH:

- SHUT OFF TRACTOR ENGINE, REMOVE KEY, SECURE TRACTOR PARKING BRAKE AND BLOCK UP OR SECURELY SUPPORT IMPLEMENT BEFORE WORKING UNDERNEATH.
- PURGE ALL AIR FROM HYDRAULIC SYSTEM BEFORE ATTEMPTING TO RAISE OR LOWER THIS IMPLEMENT.
- STAND CLEAR IF LOWERING OR RAISING IMPLEMENT.
- DO NOT USE HAND OR SKIN TO CHECK FOR HYDRAULIC LEAKS. USE CARDBOARD OR WOOD.
- HIGH PRESSURE OIL LEAKS CAN PENETRATE SKIN CAUSING SERIOUS INJURY AND GANGRENE. CONSULT A PHYSICIAN IMMEDIATELY.
- LOWER THE IMPLEMENT AND RELEASE HYDRAULIC PRESSURE BEFORE LOOSENING FITTINGS.
- REFER TO OWNER'S MANUAL FOR DETAILS.

50029419

⚠ DANGER

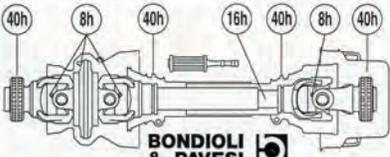


**ROTATING DRIVELINE CONTACT CAN CAUSE DEATH
KEEP AWAY!**

DO NOT OPERATE WITHOUT -

- ALL DRIVELINE GUARDS, TRACTOR AND EQUIPMENT SHIELDS IN PLACE
- DRIVELINES SECURELY ATTACHED AT BOTH ENDS
- DRIVELINE GUARDS THAT TURN FREELY ON DRIVELINE

399141000



BONDIOLI & PAVESI

MADE IN ITALY

399143000

⚠ DANGER



**GUARD MISSING
DO NOT OPERATE**

399143000

⚠ DANGER



**GUARD MISSING
DO NOT OPERATE**

399143000

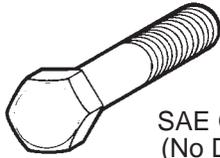
⚠ DANGER

MADE IN ITALY

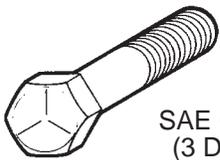
TORQUE SPECIFICATIONS

Proper torque for American fasteners used on Bush Hog equipment.
Recommended Torque in Foot Pounds (Newton Meters).*

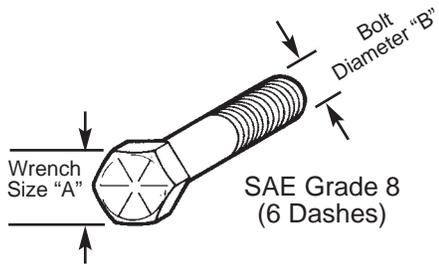
AMERICAN Bolt Head Markings



SAE Grade 2
(No Dashes)



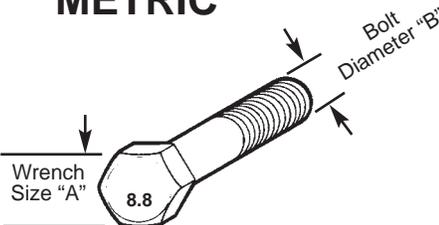
SAE Grade 5
(3 Dashes)



SAE Grade 8
(6 Dashes)

WRENCH SIZE (IN.) "A"	BOLT DIAMETER (IN.) "B" AND THREAD SIZE	SAE GRADE 2	SAE GRADE 5	SAE GRADE 8
7/16	1/4 - 20 UNC	6 (7)	8 (11)	12 (16)
7/16	1/4 - 28 UNF	6 (8)	10 (13)	14 (18)
1/2	5/16 - 18 UNC	11 (15)	17 (23)	25 (33)
1/2	5/16 - 24 UNF	13 (17)	19 (26)	27 (37)
9/16	3/8 - 16 UNC	20 (27)	31 (42)	44 (60)
9/16	3/8 - 24 UNF	23 (31)	35 (47)	49 (66)
5/8	7/16 - 14 UNC	32 (43)	49 (66)	70 (95)
5/8	7/16 - 20 UNF	36 (49)	55 (75)	78 (106)
3/4	1/2 - 13 UNC	49 (66)	76 (103)	106 (144)
3/4	1/2 - 20 UNF	55 (75)	85 (115)	120 (163)
7/8	9/16 - 12 UNC	70 (95)	109 (148)	153 (207)
7/8	9/16 - 18 UNF	79 (107)	122 (165)	172 (233)
15/16	5/8 - 11 UNC	97 (131)	150 (203)	212 (287)
15/16	5/8 - 18 UNF	110 (149)	170 (230)	240 (325)
1-1/8	3/4 - 10 UNC	144 (195)	266 (360)	376 (509)
1-1/8	3/4 - 16 UNF	192 (260)	297 (402)	420 (569)
1-5/16	7/8 - 9 UNC	166 (225)	430 (583)	606 (821)
1-5/16	7/8 - 14 UNF	184 (249)	474 (642)	668 (905)
1-1/2	1 - 8 UNC	250 (339)	644 (873)	909 (1232)
1-1/2	1 - 12 UNF	274 (371)	705 (955)	995 (1348)
1-1/2	1 - 14 UNF	280 (379)	721 (977)	1019 (1381)
1-11/16	1-1/8 - 7 UNC	354 (480)	795 (1077)	1288(1745)
1-11/16	1-1/8 - 12 UNF	397 (538)	890 (1206)	1444 (1957)
1-7/8	1-1/4 - 7 UNC	500 (678)	1120 (1518)	1817 (2462)
1-7/8	1-1/4 - 12 UNF	553 (749)	1241 (1682)	2013 (2728)
2-1/16	1-3/8 - 6 UNC	655 (887)	1470 (1992)	2382 (3228)
2-1/16	1-3/8 - 12 UNF	746 (1011)	1672 (2266)	2712 (3675)
2-1/4	1-1/2 - 6 UNC	870 (1179)	1950 (2642)	3161 (4283)
2-1/4	1-1/2 - 12 UNF	979 (1327)	2194 (2973)	3557 (4820)

METRIC



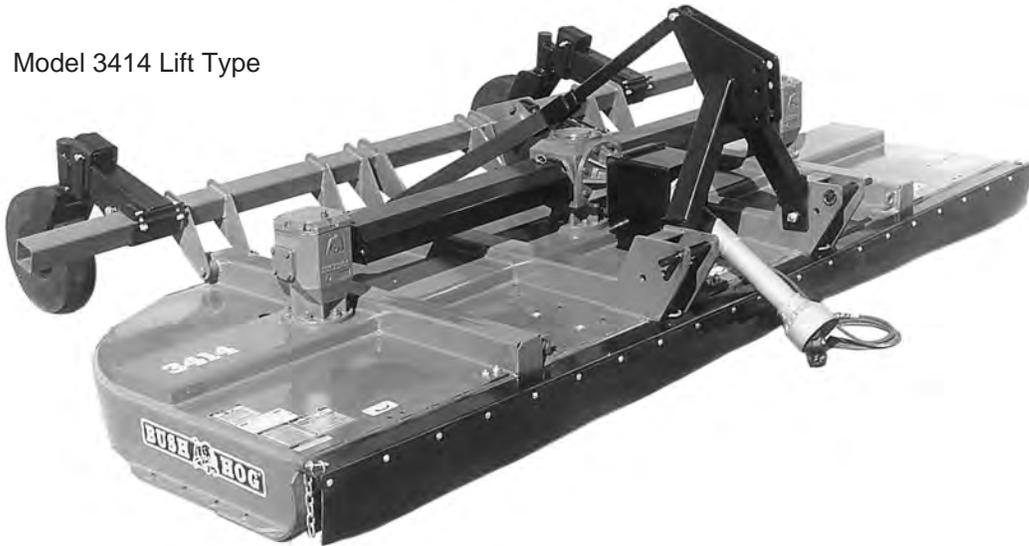
Numbers appearing on bolt heads indicate ASTM class.

Proper torque for metric fasteners used on Bush Hog equipment.
Recommended torque in foot pounds (newton Meters).*

WRENCH SIZE (mm) "A"	BOLT DIA. (mm) "B"	ASTM 4.6	ASTM 8.8	ASTM 9.8	ASTM 10.9
8	5	1.8 (2.4)		5.1 (6.9)	6.5 (8.8)
10	6	3 (4)		8.7 (12)	11.1 (15)
13	8	7.3 (10)		21.1 (29)	27 (37)
16	10	14.5 (20)		42 (57)	53 (72)
18	12	25 (34)	74 (100)	73 (99)	93 (126)
21	14	40 (54)	118 (160)	116 (157)	148 (201)
24	16	62 (84)	167 (226)	181 (245)	230 (312)
30	20	122 (165)	325 (440)		449 (608)
33	22		443 (600)		611 (828)
36	24	211 (286)	563 (763)		778 (1054)
41	27		821 (1112)		1138 (1542)
46	30	418 (566)	1119 (1516)		1547 (2096)

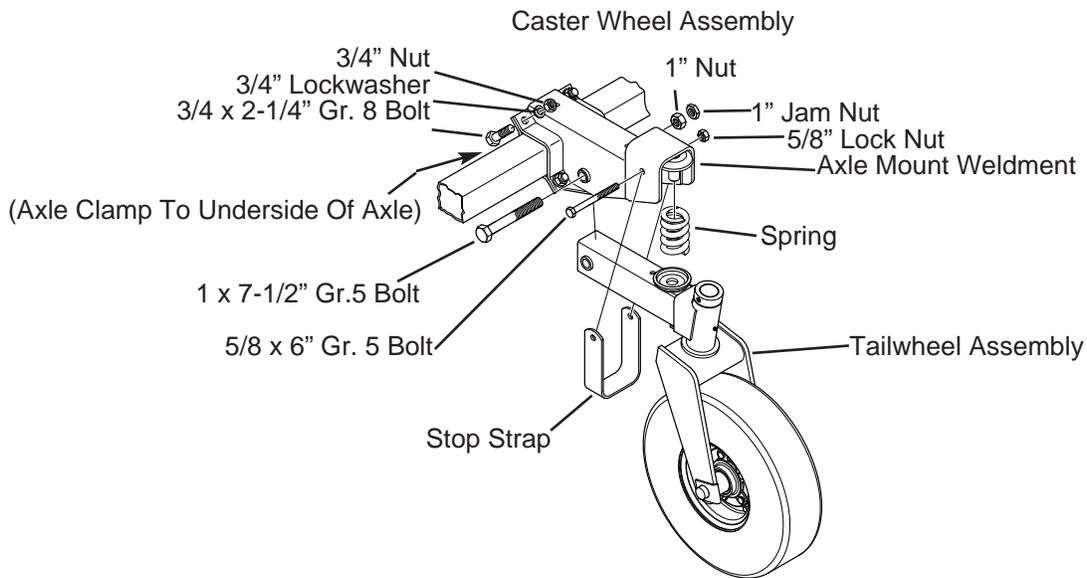
*Use 75% of the specified torque value for plated fasteners. Use 85% of the specified torque values for lubricated fasteners.

Model 3414 Lift Type

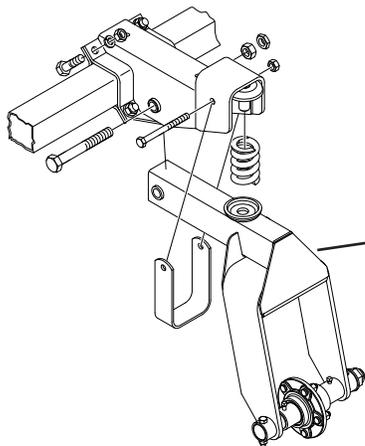


AVAILABLE TAILWHEELS

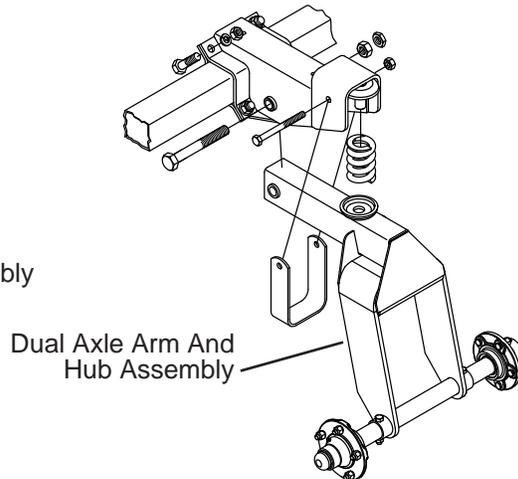
The following tailwheels are standard equipment on the Model 3414.



Single Wheel Pull Type Assembly



Dual Wheel Pull Type Assembly





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