INTERSTATER™
FLAIL MOWER

PRODUCT SERVICE MANUAL

Publish Date 03-06 **Manual P/N 803213S**

An operator's manual, parts manual was shipped with the unit shipped from the factory. There may also be other information on this product available, assembly manual, insert sheets and/or special instruction sheets. This manual is designed to be used in conjunction with these other manuals and/or instruction sheets. This manual is not designed to replace any of the other manual. The information is as of the published date, changes may be made to unit without prior notice and/or changes to the tractors which will affect the mounting. Alamo Industrial will not be responsible for the changes that may affect the unit. If manuals are needed contact your local dealer oar Alamo Industrial.

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MEMBER OF THE ALAMO GROUP
ALWAYS ON THE CUTTING EDGE®

2006 Edition

TO THE OWNER/OPERATOR/DEALER

All implements with moving parts are potentially hazardous. There is no substitute for a cautious, safe-minded operator who recognizes the potential hazards and follows reasonable safety practices. The manufacturer has designed this implement to be used with all its safety equipment properly attached to minimize the chance of accidents.

BEFORE YOU START!! Read the safety messages on the implement and shown in your manual. Observe the rules of safety and common sense!

WARRANTY INFORMATION:

Read and understand the complete Warranty Statement found in this Manual. Fill out the Warranty Registration Form in full and return it to within 30 Days. Make certain the Serial Number of the Machine is recorded on the Warranty Card and on the Warranty Form that you retain.

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ABOUT THIS MANUAL:

The intent of this publications to provide the competent technician with the information necessary to perform the CORRECT repairs to the Alamo Industrial Product. This will, in turn provide for complete customer satisfaction

It is hoped that the information contained in this and other Manuals will provide enough detail to eliminate the need for contact of the Alamo Industrial Technical Service Dept. However, it should be understood that many instances may arrive wherein correspondence with the Manufacturer is necessary.

CONTACTING MANUFACTURER: (Please help us Help You! Before You Call!)

Alamo Industrial Service Staff Members are dedicated to helping you solve yours or your customer's service problem as quickly and efficiently as possible. Unfortunately, we receive entirely to many calls with only a minimum amount of information. In some cases, the correspondent has never gone out to look at the equipment and merely calls inquiring of the problems described to him by the operator or customer.

PART NUMBERS: Part numbers listed in this manual are subject to change without notice as designs are made to adapter to the tractor or for a design improvement. Before ordering parts ALWAYS Measure old part to make certain that is the one you will need. This manual is designed to be used along with the Parts and Operators Manual. Most calls received by Alamo Industrial Service can be classified into approx. 6 general categories.

1. Hydraulic or Mechanical Trouble Shooting.
2. Request for Technical Information or Specifications.
3. Mounting or Fitting Problem.
4. Special Service Problem.
5. Equipment Application Problems.
6. Tractor Problem Inquiries.

HOW YOU CAN HELP:

1. Make sure the call is necessary! Most of the calls received may not be necessary if the Dealer Service Technician would do the following.

2. Check the Service Information at your Dealership provided by Alamo Industrial, This would include, Service Bulletins, Information Bulletins, Parts Manuals, Operators Manuals or Service Manuals, many of these are available via the Alamo Industrial Internet site (Alamo - Industrial. Com). Attempt to diagnose or repair problem before calling.

3. If a call to Alamo Industrial is needed, Certain Information should be available and ready for the Alamo Industrial Service Staff. Such information as, Machine Model, Serial Number, Your Dealer Name, Your Account Number and Any other information that will be useful. This information is vital for the development of a prompt and correct solution to the problem. This will also help to develop a database of problems and related solutions, which will expedite a solution to future problems of a similar nature.

4. The technician may be asked to provide detailed information about the problem including the results of any required trouble shooting techniques. If the information is not available, The technician may be asked to get the information and call back. Most recommendations for repairs will be based on the procedures listed in the Service Manual / Trouble Shooting Guide.

CONTACT ALAMO INDUSTRIAL:

Alamo Industrial, 1502 E. Walnut St. Seguin TX. 78155,
Technical Service Dept. PH: 830-379-1480

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Section 1

Interstater

SERVICE MANUAL

Introduction To Repairs

This section is the Introduction to making repairs on Interstater model. Recommended procedures & tools recommended .

INTRODUCTION TO REPAIRS

GENERALREPAIR / REPLACEMENT INFORMATION:

A. To disassemble / repair your INTERSTATER this manual is designed to assist you with drawings, instructions and information. This manual is designed to be used in conjunction with the parts manual, operators manual and the assembly manuals. If additional information or clarification is needed contact your Alamo Industrial factory representative.

B. Some of these instructions are general information and not specifically for your tractor, but in connection with our drawings, they may not show the exact application and tractor you have. In many cases to assembly manual for your mower to tractor application will clarify some clarity to exact applications.

C. This section covers the removal, repair and reinstallation of the hydraulic pump procedure for the Alamo Industrial Interstater mower, it also includes instruction for driveshaft, hoses, and miscellaneous parts to be attached the hydraulic pumps to the tractor.

D. These instructions are for working on the pumps used to power wing mower/mowers, right side mower, and left side mower units if dual wing model. For mounting one mower side only, disregard information concerning the opposite side. Hardware quantities shown are for both sides.

E. The Auxiliary pump is used to supply the lift and tilt hydraulic cylinder circuit. This auxiliary pump will not be used on all units, some will use the tractor hydraulic system to supply cylinder circuit.

F. Reference to the left or right side of the Interstater is determined while facing the front of the tractor from the drivers seat.

G. The part quantities shown for an illustration pertain only to that phase of repair. The quantity given corresponds to the number of parts needed. When repairing a single-sided model based on a dual-sided model, the quantity furnished will usually be half the quantity listed.

H. Large parts may not always be listed next to an illustration because they are usually easy to identify them from name or description.

I. This manual makes reference to individual component parts, some of which may have been pre-assembled at the factory.

Abbreviation of Parts Terminology :

Whenever reference is made to parts, listed for an illustration or elsewhere in this manual, the following abbreviations may be used:

1. ASY - Assembly	2. ASSY - Assembly	3. AUX - Auxiliary
4. BRG - Bearing	5. BRKT - Bracket	6 CYL - Cylinder
7. CW - Clockwise	8. CCW - Counter Clockwise	7. EXT - Extreme
8. EXT'N - Extend / Extension	9. F/ - For or From	10. FM - Female Boss
11. FP - Female Pipe	12. FSTNR - Fastener	13. FT - Foot / Feet
14. GB - G/B - Gearbox	15. GR - Grade	16. HD - Heavy Duty
17. HHCS - Hex Head Capscrew	18. HRDND - Hardened	19. HYD - Hydraulic
20. IN - Inch	21. LB - Pound	22. LH - Left Hand
23. LW - Lock Washer	24. M - Metric	25. MB - Male Boss
26. MM - Millimeters	27. MNT - Mount	28. MP - Male Pipe
29. MTR - Motor	30. N/A - Not Applicable	31. NC - National Coarse
32. NF - National Fine	33. NLA - No Longer Available	34. NLF - No Longer Furnished
35. NPT - National Pipe Thread	36. P1.5 - Thread Pitch	37. P2.0 - Thread Pitch
38. P2.5 - Thread Pitch	39. PL - Plated	40. PLT - Plate
41. PMP - Pump	42. PTO - Power Take Off	43. PW- Plain Washer
44. REV - Reverse	45. RH - Right Hand	46. ROT - Rotation
47. RPM - Revolutions Per Minute	48. SCKT - Socket	49. SD - Severe Duty
50. SRV - Service	51. STD - Standard	52. SVR - Severe
53. W/ - With	54. W/O - With Out	55. WLDMNT - Weldment

When installing fasteners, PW and LW (generally installed in that order) are usually on the side of the fixture or part being fastened that the hex/lock nut is on. When only HHCS, LW and/or PW are required, they are generally installed in that order. Some parts do not require a PW or LW. Refer to illustrations for exceptions. Fasteners should be installed so they cause the least interference with other parts. When securing driveshaft pulley to hub, tighten fasteners to 9 lb-ft torque.

INTRODUCTION TO REPAIRS

INTRODUCTION:

In Most diagrams there are no Component Part Numbers Listed, Only Item numbers and Descriptions, This is because most parts shown as breakdown in drawings are for location & identification only and if available as replacement parts will be listed in the Parts/Operators Manual. NO Dirt at all should be around Parts during repairs.

BEFORE STARTING REPAIRS: Service Rules (READ THIS)

1. Remove Front Cover. Clean Pump and surrounding area completely before removing any connec tions or Lines. NO DIRT OR DEBRIS CAN BE ALLOWED ON OR NEAR HYDRAULIC SYSTEM IF IT IS BEING WORKED ON, ANY DIRT OR CONTAMINANTS IN SYSTEM NO MATTER HOW SMALL WILL DAMAGE SYSTEM!
2. After cleaning around all connections thoroughly, Disconnect all connections, Lines, Hoses, Wiring and Remove the Pump Completely from the Tractor. Plug all hoses and Lines on Tractor and on Pump, DO NOT leave any open Lines. NO Contamination Should be allowed into system at all.
3. Clean Area, Clean all Tools, Pans etc. The cleaning of Area and Tools MUST be done before moving (Cleaned) Pump there. Drain Oil from Pump, Recheck outside of Pump to Make Sure it is Clean
4. After disassembly of Pump wash all metal components in clean solvent.
5. Use compressed Air to dry parts after washing (Compressed air must be filtered and moisture free). DO NOT wipe them dry with Paper Towels or Cloth as these will leave lint and/or dust contamination. DO NOT USE Compressed Air to spin any component (Such as Bearings or Plates) as this will damage them and could be dangerous.
6. Always use new Seals when reassembling Hydraulic Pumps, Lubricate the new rubber Seals with a Petroleum Jelly, (Vaseline) before installing them.
7. DO NOT reinstall worn/damaged Parts in Pump, DO NOT Use a worn/damaged Pump Housing.
8. Torque all Bolts over Gasketed Joints. Then repeat the Torque sequence to make sure Bolts are tight, some times Gaskets can give a Torque reading that is OK but is not, so always recheck Torque.
9. Verifying the accuracy of Pump Repairs on an authorized test stand is essential.

RECOMMENDED TOOLS:

1. Hex Allen Wrench (Qty 5) (9/16", 5/32", 5/16", 3/32", 5/64"
2. Retaining Ring Pliers (Qty 3), 1 each of Internal (Straight .070 tip) internal (Straight .090 tip) & 1 each External (Straight 0.90 tip)
3. Retaining E-Ring Applicator (Qty 2), 1 each 9/32" & 1 each 1/2".
4. O-Ring Pick (Qty 1)
5. End Wrench (Qty 4), 1 each of 7/16", 9/16", 3/4", 1"
6. Torque Wrench (Qty 1), 0 to 100 ft. lbs. (135.6 nm) capacity
7. Hammer, Soft Face (Qty 1)
8. Seal Driver Set (Qty 1)
9. Arbor Press (Qty 1)
10. Sockets (Qty 3) 7/16", 9/16", 3/4" , Drive Size should match Torque Wrench Drive)
11. Light Petroleum Jelly (Vaseline)
12. Locktite, # 222 and #277 or equivalent (Qty 1 tube each)

RECOMMENDED GAUGES FOR DIAGNOSTICS:

1. Inlet Vacuum: 30 PSI to 30 in Mercury (207 bar to 0 bar)
2. System Pressure Gauge: 6,000 PSI (700 bar)
3. Charge Pressure Gauge: 0 to 500 PSI (0 to 25 bar)

INTRODUCTION TO REPAIRS

PUMP TYPES USED:

There are different configurations of pump used depending on how mower unit was ordered and how it is being used on the tractor. All Below will used the same hydraulic tank which means not all ports on hydraulic tank will be used, some will remained plugged. The connections on the tank will remain the same for the connections needed, leave all ports plugged until ready to connect the fittings.

1. Tandem Pump with Auxiliary Hydraulic Pump, The Tandem Pump is used for the dual wing model mower and the auxiliary pump is used to supply the hydraulic cylinders and cylinder control valve. (See Figure 1)

2. Tandem Pump without Auxiliary Hydraulic Pump, The Tandem Pump is used for the dual wing model mower and the tractors hydraulics are used to supply the hydraulic cylinders and cylinder control valve. (See Figure 2)

3. Single Pump with Auxiliary Hydraulic Pump, The Single Pump is used for the Single wing model mower and the auxiliary pump is used to supply the hydraulic cylinders and cylinder control valve. (See Figure 3)

4. Single Pump without Auxiliary Hydraulic Pump, The Single Pump is used for the dual wing model mower and the tractors hydraulics are used to supply the hydraulic cylinders and cylinder control valve. (See Figure 4)

PUMP DRIVE TYPES USED:

The pump drives system is basically the same on on most interstater mowers. The part numbers will vary some from tractor types used. The size and/or part sizes will vary. The best way to determine which drive component you have for your tractor model is consult the interstater assembly manual for the tractor used.

1. Tandem Pump with Auxiliary Hydraulic Pump, The Tandem Pump is used for the dual wing model mower and the auxiliary pump is used to supply the hydraulic cylinders and cylinder control valve. (See Figure 1)

2. Tandem Pump without Auxiliary Hydraulic Pump, The Tandem Pump is used for the dual wing model mower and the tractors hydraulics are used to supply the hydraulic cylinders and cylinder control valve. (See Figure 2)

Test Equpment Recommented:

1. Flow Meter, The Flow meter should have components to measure:
- **A.** Guage to Measure the Oil Temperature.
- **B.** Gauge to Measure Oil Pressure PSI (Load and No Load).
- **C.** Gauge to Measure Oil Flow in G.P.M.
- **D.** A Valve to load system to check operating Pressure (PSI).
- **E.** Assortment of Connections to connect to Hydraulic System.

2. Electrical Volt Meter with variable settings and Ohm Meter.
3. Electrical Test Light.
4. Wrenches, Torque Wrench, Socket Wrenches, Open and Boxed End Wrenches.

Section 2

Interstater

SERVICE MANUAL

Trouble Shooting Information

This section list possible failures, causes and solutions. All possible failures cannot be listed, only some of the most common problems.

Possible Failure / Cause / Solution

MOWER FUNCTION TROUBLE SHOOTING:

1 - Possible Failure..... Mower will note rotate

Cause..... 1-A. Inline fuse on Wire harness failed.
Solution..... 1-A. Replace fuse as required.

Cause..... 1-B. Magnetic Safety Switch not making contact.
Solution..... 1-B. Adjust or replace switch as required.

Cause..... 1-C. Broken or worn drive belts.
Solution..... 1-C. Replace drive belts as needed.

Cause..... 1-D. ON / OFF Switch defective or broken
Solution..... 1-D. Inspect, test switch and replace as required.

Cause..... 1-E. Insufficient Voltage through solenoid.
Solution..... 1-E. Check solenoid coil and wiring, replace/ repair as needed.

Cause..... 1-F. Solenoid Spool will not shift completely
Solution..... 1-F. Clean or replace solenoid cartridge

2 - Possible Failure..... Mower will not stop

Cause..... 2-A. Solenoid Spool will not shift
Solution..... 2-A. Clean or replace solenoid cartridge

3 - Possible Failure..... Intermittent mowing power

Cause..... 3-A. Safety switch maladjustment
Solution..... 3-A. Adjust safety switch

Cause..... 3-B. Electrical Malfunction
Solution..... 3-B. Check electric circuit, magnetic switches and push pull switch.

Cause..... 3-C. Bad Solenoid
Solution..... 3-C. Check solenoid, replace as needed.

4 - Possible Failure..... Insufficient cutting power or low cutter shaft speed.

Cause..... 4-A. Drive belts slipping.
Solution..... 4-A. Check for correct belts, condition of belts, check idler pulley and spring tension system for idler pulley, replace and / or repair as needed.

Cause..... 4-B. Bound cutter shaft.
Solution..... 4-B. Free up cutter shaft.

Cause..... 4-C. Hydraulic Pressure relief stuck open or setting to low.
Solution..... 4-C. Check setting and condition of hydraulic relief valve. Repair / replace as needed.

Cause..... 4-D. Solenoid Spool will not shift completely.
Solution..... 4-D. Replace solenoid valve cartridge.

Cause..... 4-E. Worn Pump or Motor
Solution..... 4-E. Check pump and motor, repair or replace as needed.

MOWER FUNCTION TROUBLE SHOOTING: (Continued)

5 - Possible Failure..... Hydraulic oil over heating, mower free to rotate

Cause..... 5-A. Low oil level in hydraulic system.
Solution..... 5-A. fill to proper oil level.

Cause..... 5-B. Relief valve setting too high.
Solution..... 5-B. Check relief valve setting, repair and /or replace as needed.

Cause..... 5-C. Obstruction in power circuit, extra or wrong parts installed in pump or motor
Solution..... 5-C. Find and remove obstruction. Check if components have been reassembled lately, if they have check for being assembled wrong, re- installed wrong or wrong parts used. Make certain the correct and standard parts were used as replacement parts.

6 - Possible Failure..... Pump making load noise

Cause..... 6-A. Low oil level in hydraulic system.
Solution..... 6-A. fill to proper oil level.

Cause..... 6-B. Vacuum in Reservoir
Solution..... 6-B. Check, Clean or replace reservoir vent plug.

Cause..... 6-C. Clogged oil filter or wrong filter installed.
Solution..... 6-C. Check filter for condition and type, replace as needed with original type and size filter.

Cause..... 6-D. Worn or damaged pump
Solution..... 6-D. Check Pump condition and operation, repair / replace as needed.

7 - Possible Failure..... Mower will not raise or raises slowly (Wing Mowers)

Cause..... 7-A. Slow gear pump speed
Solution..... 7-A. Check gear pump speed, pulleys, belts and adjustments.

Cause..... 7-B. Relief valve setting to low or stuck open.
Solution..... 7-B. Check relief valve setting, repair or replace as needed.

Cause..... 7-C. Worn Gear Pump.
Solution..... 7-C. Check pump pressure and flow, repair or replace as needed.

Cause..... 7-D. Worn or damaged cylinder.
Solution..... 7-D. Check cylinder, repair or replace as needed.

Cause..... 7-E. Worn or damaged control valve.
Solution..... 7-E. Check valve sections and repair or replace as needed.

Possible Failure / Cause / Solution

MOTOR CIRCUIT TROUBLE SHOOTING:

1 - Possible Failure..... Motor turns but in wrong direction

Cause..... Motor manifold block is installed wrong on motor
Solution..... Motor manifold block must be refitted to motor to achieve correct rotation, See motor change rotation page 7-22 in mower repair section.

2 - Possible Failure..... Motor fails to engage when electric switch activated.

Cause..... Electrical connection failure Switch, solenoid or wire harness
Solution..... Test Switch for current and activation, test solenoid coil for current and activation.

Cause..... Pump driveshaft malfunction.
Solution..... Inspect pump driveshaft for damage to splines or drive components. Make certain pump is turning, if not inspect splined coupler at pump and drive shaft. Repair as required.

Cause..... Lack of sufficient hydraulic pressure and volume.
Solution..... Perform a pressure and flow test on hydraulic system

3 - Possible Failure..... Motor turns but cutter shaft will not.

Cause..... Broken drive belts, pulley keys or pulley retaining hardware
Solution..... Inspect belts, keys, pulley and mounting hardware, replace / repair as required.

4 - Possible Failure..... Motor turns if unloaded, slows down or stops as load is applied.

Cause..... A. Scored back plate.
Solution..... A. Remove back plate and examine surface condition of flat area; if scored, replace back plate. DO NOT LAP back plate.

Cause..... B. Scored or worn piston shoes.
Solution..... B. Disassemble motor, examine condition of shoes on pistons; replace pistons as a complete set if necessary. DO NOT LAP.

Cause..... C. Low relief valve pressure.
Solution..... C. Check relief valve for proper pressure setting; adjust or replace relief valve.

5 - Possible Failure..... Motor will not turn

Cause..... A. Severely scored back plate.
Solution..... A. Disassemble motor completely. Inspect all parts, clean all parts, replace all worn parts and flush hydraulic system.

6 - Possible Failure..... Motor free wheels

Cause..... A. Oil-flow and pressure shut off going to motor.
Solution..... A. When the hydraulic system is shut off, either by shutting off the engine on a closed loop system or returning the control valve spool to neutral on an open center system, the motor will free wheel after it has leaked off. This is inherent in the design. On a closed loop or propulsion system, the motor will not free wheel as long as charge pressure is maintained to and from the motor.

7 - Possible Failure..... Excessive case drain flow.

Cause..... A. Excessive internal wear in motor.
Solution..... A. Disassemble motor, inspect parts and replace as necessary. Case drain flow should not exceed 1.5 GPM at full pressure.

Possible Failure / Cause / Solution

MOTOR CIRCUIT TROUBLE SHOOTING: (Continued)

8 - Possible Failure..... System will not operate in either direction.

Cause..... A. Oil supply low.
Solution..... A. Check oil level and fill as needed

Cause..... B. Oil filter clogged
Solution..... B. Replace filter element

Cause..... C. Oil too heavy
Solution..... C. Use proper viscosity oil

Cause..... D. Drive coupling broken
Solution..... D. Inspect coupling for sheared spline or key.

9 - Possible Failure..... System noisy.

Cause..... A. Air in system due to low oil level
Solution..... A. Fill in reservoir to sight glass

Cause..... B. Loose suction line
Solution..... B. Tighten fittings

Cause..... C. Clogged suction filter
Solution..... C. Replace filter element

Cause..... D. Internal pump or motor damage
Solution..... D. Disassemble, inspect, and repair

10 - Possible Failure..... Sluggish response to acceleration or deceleration.

Cause..... A. Air in system
Solution..... A. Check oil level and fill. Check for loose suction line and or fittings. Check for clogged suction filter and replace as needed. Oil to heavy, change to proper viscosity oil.

Cause..... B. Internal pump or motor wear or damage
Solution..... B. Disassemble, inspect, and repair

NOTES

Section 3

Interstater

General Specifications

READ THIS BEFORE BEGINNING ASSEMBLY, REPAIRS OR TESTING:

The Interstater has electric components:. The electric components can be damaged if care is not taken when performing repairs, testing and/or during assembly.

DO NOT

1. **DO NOT** short any wires across or allow them to be shorted out.

2. **DO NOT** attempt to jump across any wires or supply them with alternate power source.

3. **DO NOT** install higher rated fuses than are recommended by manufacturer.

4. **DO NOT** do any welding on unit unless the computer modules are unplugged first (If equipped with electronics), this is to prevent a power surge going into modules (THIS IS VERY IMPORTANT). This could also apply to the tractor components. Check Tractors repair guide for specific instruction about tractor model and type.

5. **DO NOT** attempt to repair or adjust a component that is not intended to be repaired, example sealed components as there are no serviceable components inside.

6. **DO NOT** let anyone attempt any testing or repairs unless they are an experienced and qualified technician. Technicians must have proper tools, gauges, meters etc. to perform proper diagnosis and/or repairs.

7. **DO NOT** perform any repairs with dirty tools or in dirty area. When working on hydraulic components, keeping system clean and free of contamination is important.

8. **DO NOT** start or engage system if the oil level is not at the proper level or condition. Never start or run unit low or out of oil.

9. **DO NOT** install / add any oil unless you know it is the correct type and the container is clean. Make certain the oil is not contaminated with dirt or any liquid.

10. **DO NOT** Operate any mowers that have a vibration when running, cause of vibration must be fond and repaired before running. Vibrating Flail Mower running will damage them!

SPECIFICATIONS - INTERSTATER

Standard Equipment and Specifications

1. BASE UNIT SPECIFICATIONS:

Overal Cutting Width	16'5",18'5", or 20'9" Overal Cutting Widths
Frame Construction	Full-Length Welded Tubular Frame With Transport Lock
Reservoir Capacity	19-Gallon Reservoir with 12 Micron Filtration
Pump Type & Rating. (Dual Wing Interstater)	Tandem Piston Pumps Rated @ 48 GPM @ 3800 PSI
(Single Wing Interstater)	Tandem Piston Pump Rated @ 24 GPM @ 3800 PSI
Cylinder Control Valve (Dual Wing Interstater)	4-Spool Valve with Detent Position
(Single Wing Interstater)	2-Spool Valve with Detent Position

2. WING MOWER SPECIFICATIONS:

Wing Mower cutting Width Options	62". 74", or 88" Cutting Widths
Cutter Housing Construction	10 Guage Unitized Cutter Housing
Deck End Plates	1/2" Inboard & 5/16" Outboard Thick Side Plates
Skid Shoe Type	Bolt On Replaceable Skid Shoes
Cuttershaft Size	4-1/2" x 5/16" Wall Cuttershaft
Bearing Size & Type	1-5/16" Bore Greasable, Self-Aligning Cuttershaft Bearings
Motor Tpe & Size	53 HP Piston Motor
Cuttershaft Drive	Belt Drive F/Motor to Cuttershaft w/ Automatic Spring Tension
Cutter Shaft Drive Belt	V-Belt w/ Kevlar Construction
Rear Roller Type	Steel Tube Construction w/ Bell Ends & Hex Shaft
Rear Roller Bearings	Greasable, Sealed w/ Housing and Hex ID
Rear Roller Adjustment	6" Adjustable Rear Roller
Cutting Height Adjustment	1/2" Down to 6" Up Cutting Height (Rear Roller)
Knife Options	Available in Fine or Coarse-Cut
Safety Deflectors	Front and Rear Safety Deflectors Standard
Wing Motor Cut-Switch	Automatic Cut-Off Switch When Wings Raised
Lift Cylinder Capacity	Lift Cylinder Capable of 14" Vertical Lift
Tilt Cylinder Capacity	Tilt Cylinder Capable of 45 Degrees Down & 90 Degrees Up

3. REAR MOWER SPECIFICATIONS:

Rear Mower cutting Width Options	88" or 96" Cutting Width (Depending on tctr mnt. kit)
Cutter Housing Construction	10-Guage Unitized Cutter Housing
Deck End Plates	5/16" Thick Side Plates Both Ends
Skid Shoe Type	Bolt On Replaceable Skid Shoes
Cuttershaft Size	4-1/2" x 5/16" Wall Cuttershaft
Cuttershaft Drive	Belt Drive f/Gearbox to Cuttershaft w/ Automatic Spring Tension
Cutter Shaft Drive Belt	V-Belt w/ Kevlar Construction
Bearing Size & Type	1-5/16" Bore Greasable, Self-Aligning Cuttershaft Bearings
Cuttershaft Drive	60 HP Gearbox, Shielded Driveline Driven
Gearbox Drive	Cat IV Shielded Driveline, PTO Driven
Gearbox Driveline Connection	Adjustable Torque Limiter Clutch
Rear Roller Type	Steel Tube Construction w/ Bell Ends & Hex Shaft
Rear Roller Bearings	Greasable, Sealed w/ Housing and Hex ID
Rear Roller Adjustment	6" Adjustable Rear Roller
Cutting Height Adjustment	1/2" Down to 6" Up Cutting Height (Rear Roller)
Knife Options	Available in Fine or Coarse-Cut
Safety Deflectors	Front and Rear Safety Deflectors Standard
Rear Mower Cut-Off	Tractor PTO Controls, Controled By Tractor Operator
Reat Mower to Tractor Connection	CAT I or CAT II Three Point Hitch

4. TRACTOR REQUIREMENTS:

The tractor used to operate the mower must have the power, capacity and required equipment to safely operate the mower at a ground speed between 2 and 5 MPH. Operating the mower with a tractor that does not meet the following requirements may cause tractor or mower damage and could be a potential danger to the operator and passersby.

Tractor Requirements and Capabilities

- ASAE approved Roll-Over Protective Structure ..... (ROPS) or ROPS cab and seat belt.
- Tractor Safety Devices..... Slow Moving Vehicle (SMV) emblem, lighting, PTO master shield
- Tractor Horsepower -Minimum ..... Rear INT 88" 60hp, Rear INT 96" 60 hp
- Drawbar..... 14" length-measured from end of PTO shaft to hitch pin hole, rated to carry mower tongue weight, safety chain attachment point
- Hydraulics..... 4-Spool Valve & 2-Spool Valve with Detent Position
- Front End Weights..... As needed to maintain 20% weight on tractor front axle
- Power Take Off..... 540 RPM

5. ROPS and Seatbelt:

A Roll-Over-Protective-Structure (ROPS) and seat belt are essential to protect the operator from falling off the tractor, especially during a roll over where the driver could be crushed and killed. The ROPS and seat belt must be used in conjunction with one another. Only operate the tractor with the ROPS in the raised position and seat belt fastened. Tractor models not equipped with a ROPS and seat belt should have these life saving features installed by an authorized dealer.

WARNING!

Operate this Equipment only with a Tractor equipped with an approved roll-over-protective system (ROPS). Always wear seat belts. Serious injury or even death could result from falling off the Tractor--particularly during a turnover when the operator could be pinned under the ROPS. (SG-7)

6. TRACTOR SAFETY DEVICES:

If transporting or operating the tractor and mower near a public roadway, the tractor must be equipped with proper warning lighting and a Slow Moving Vehicle (SMV) emblem which are clearly visible from the rear of the unit. Lights and a SMV emblem must be equipped directly on implements if the visibility of the tractor warning signals are obscured.

Maintain all manufacturer equipped safety shields and guards. Always replace shields and guards that were removed for access to connect, service, or repair the tractor or mower. Never operate the tractor PTO with the PTO master shield missing or in the raised position.

7. TRACTOR HORSEPOWER REQUIREMENTS:

The horsepower required to operate the mower depends on many factors including the vegetation to be cut, terrain condition, operator experience, and condition of the mower and tractor. For most mowing condition, the Rear INT 88" & 96"mowers require a tractor with at least 60HP. Operating the mower with a tractor that does not have adequate power may damage the tractor engine.

8. TRACTOR 3-POINT HITCH REQUIREMENTS:

The tractor 3-point hitch must be rated to lift at least 1035 lbs. if attaching a INT 88", and 1170lbs. if attaching a INT 96" flail.

Interstater mowers can attach to tractor's with either a CAT I or II hitch. Refer to the tractor operator's manual for the category of the tractor used. If the hitch does not conform to ASAE Cat I or II dimensions, the mower may not

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fit or raise properly. Consult an authorized dealer for possible modification procedures to mount nonconforming hitches.

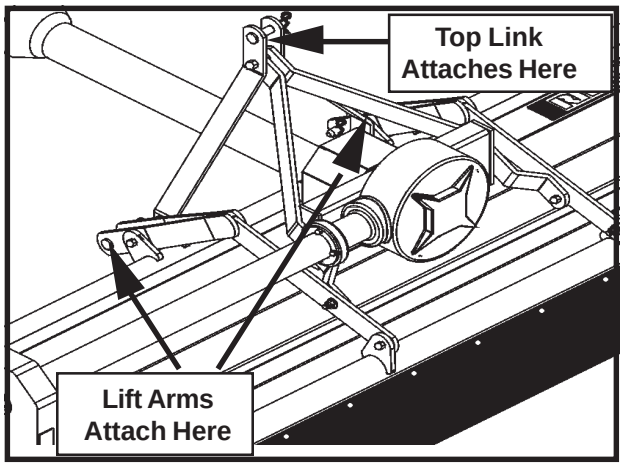
Use the correct hitch pins for the hitch category being used. For a Cat I hitch, 7/8" lower and 3/4" upper diameter hitch pins are used and Cat II hitches require 1-1/8" lower and 1" upper diameter hitch pins.

CAT I Implement / Hitch Specification

Width from outside to outside A-frame ..... 26-7/8"
Quick Hitch width inside lug to lug ..... 27-1/8"
Height from bottom hitch pin to top pin ..... 18"
Lower pin diameter ..... 7/8"
Upper pin diameter ..... 3/4"
Linch pin diameter ..... 15/32"

CAT II Implement / Hitch Specification

Width from outside to outside A-frame ..... 32-3/8"
Quick Hitch width inside lug to lug ..... 33-5/8"

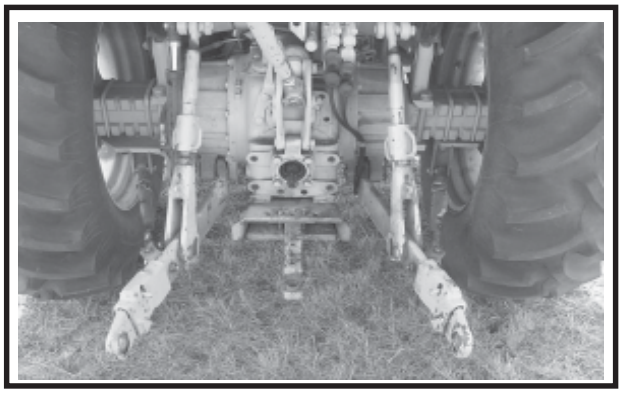


Height from bottom hitch pin to top pin ..... 19"
Lower pin diameter ..... 1-1/8"
Upper pin diameter ..... 1"
Linch pin diameter ..... 15/32"

9. CONNECTING REAR MOWER TO TRACTOR:

Use extreme caution when connecting the mower to the tractor. The mower should be securely resting at ground level or on blocks. Place a block in front of and behind the tires to prevent the mower from moving. Keep hands and feet out from under the mower and clear of pinch points between the tractor and mower.

A. Make sure the tractor is equipped with the correct PTO shaft. Change shafts if needed.
B. Shorten or remove the tractor drawbar to avoid interference when raising and lowering the mower.
C. Board the tractor and start the engine. Position the tractor to the mower with the 3-point lift arms positioned between the respective set of mower A-frame lift lugs. Note: Set the 3-point lift control to "Position Control" so that the lift arms maintain a constant height when attaching the mower. See the tractor Operator's Manual for correct settings when attaching 3-point equipment.
D. Turn off the tractor engine and dismount.
E. One lift arm at a time, align arm end hole between the set of A-frame lift lugs. Insert hitch pin through the lug and arm holes and insert retaining pin into hitch pin.
F. Walk around to opposite side and repeat procedure for remaining lift arm and hitch pin.
G. Extend or retract 3-point top link to align its end hole with the holes of the mower's top link. Insert the top link hitch pin and insert retaining pin into hitch pin.
H. Adjust any lower link check chains, guide blocks, or sway blocks to prevent the mower from swaying side to side and possible contact with tractor rear tires.



10. LEVELING REAR MOWER:

To Facilitate a safe and efficient mowing operation, the mower should be operated parrallel to the ground at all times. Never operate if front or rear of mower is tilted upward. Objects may be discharged at high speeds causing possible injury or even death.

Adjust Top Link to level mower roller adjustment. Side Skid Shoes should always be parallel to ground throughout the full adjustment range. Adjust cutting height of machine by raising or lowering rear roller as specified in Operation Section.

11. TRACTOR HYDRAULICS:

The wing mowers are raised and lowered with 2 hydraulic cylinders,a till and lift cylinders, for each wing section. Hydraulic lines are plumbed together and controlled by a 4-spool or 2 spool control valve. The tractor must be equipped with either a 4-spool valve or 2-spool valve,open center system, with main pressure relief and detent position. During operation, the tractor hydraulics must be set in the float detent to enable the mower sections to follow the contour of the terrain. The oil returning from the cutter unit motor flows through the oil cooler tubes. Under normal mowing conditions, the knives blow air against the cooling tubes to maintain oil temperature approximately 60 deg. above ambient temperature. Should the cutter unit become overloaded, the oil temperature will rise very quickly. Under no circumstances should the unit be operated if the oil temperature is above 180 deg.F. If the oil reaches this temperature, raise the mower and let the tractor run without the cutter load.

12. FRONT END WEIGHT:

Maintain a minimum of 20% total tractor weight on the tractor front end at all times. Front end weight is critical to maintain steering ability and to prevent the front end from rearing up. Consult your authorized tractor dealer for front weights and carriers.

13. TRACTOR POWER TAKE OFF (PTO):

Only operate the mower on a tractor equipped to operate at 540 rpm PTO speed. Tractors operating at 540 rpm will have a 1-3/8" diameter 6-spline PTO shaft stub. Refer to the tractor operator's manual for operating the PTO at the proper speed.

If operating an older model tractor where the tractor's transmission and PTO utilize one master clutch, an over-running clutch must be used between the PTO output shaft and the driveline of the mower. Consult an authorized tractor dealer to purchase and install an over-running clutch if needed.

14. SETTING MOWER CUTTING HEIGHT:

Properly setting the cutting height is essential for efficient and safe operation. A properly set mower makes a more uniform cut, distributes clippings more evenly, increases tractor efficiency, and follows the contour of uneven terrain. Note: Avoid very low cutting heights, striking the ground with the blades gives the most damaging shock loads and will cause damage to the mower and drive. Blades contacting the ground may cause objects to be thrown out from under the mower deck.

DANGER!

Never work under the Implement, the framework, or any lifted component unless the Implement is securely supported or blocked up to prevent sudden or inadvertent falling which could cause serious injury or even death. (SG-14)

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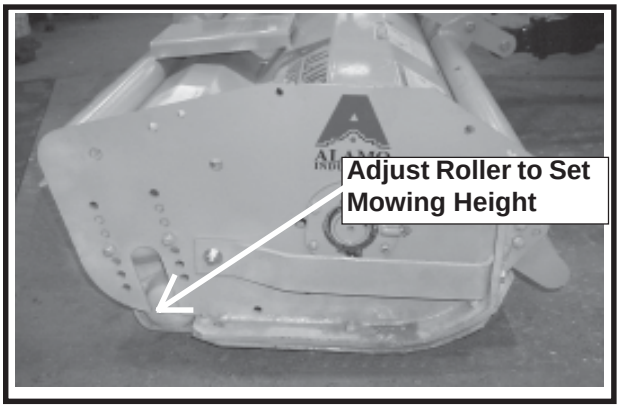
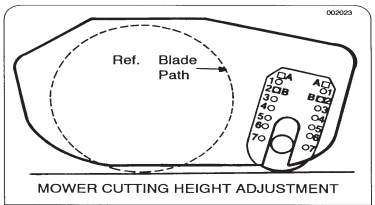
Roller Height Adjustment

The mower's cutting height is set by positioning the roller assembly for each mower section. Each section must be set at the same height to ensure an even cut across the entire width of the mower.

A. Place the tractor and mower on a level surface and completely lower the mower to the ground.
B. Shut down the tractor, place the transmission in park, and set the parking brake before dismounting.
C. One section at a time, place lifting device (scissors jack or hydraulic jack) under center of cutter housing.
D. Remove hex nuts, washers and carriage bolts from bracket at each end of roller. Make certain that roller bracket is free to move once the fasteners are removed. A stuck roller could drop unexpectedly and cause injury.
E. Use lifting device to reposition cutter housing to desired cutting height. Align bracket holes with cutter housing, then reinstall hardware.
F. Lower cutter housing to the ground and remove lifting device.
G. Set cutting height according to procedures above for remaining two cutter sections. Make sure that all three rollers are set at the same height to ensure a even cut across the entire width of the mower.





MOWER CUTTING HEIGHT ADJUSTMENT

DESIRED CUTTING HEIGHT (INCHES)	ADJUSTMENT BRACKET HOLE	MOWER END PLATE HOLE
1/2	B	2
1	A	1
1-1/2	B	3
2	A	2
2-1/2	B	4
3	A	3
3-1/2	B	5
4	A	4
4-1/2	B	6
5	A	5
5-1/2	B	7
6	A	6

15. DRIVELINE ATTACHMENT:

The driveline yoke and tractor PTO shaft must be dirt free and greased for easy and secure attachment.

To connect the mower driveline to the tractor PTO output shaft, pull the driveline yoke collar back and align the grooves and splines of the yoke with those of the PTO shaft. Push the driveline yoke onto the PTO shaft, release the locking collar, and position the yoke until the locking collar is securely attached to the PTO shaft. Push and pull the driveline back and forth several times to ensure a secure attachment.

WARNING!

Do not let the Blades turn when the Mower Deck is raised for any reason, including clearance or for turning. Raising the Mower deck exposes the Cutting Blades which creates a potentially serious hazard and could cause serious injury or even death from objects thrown from the Blades. (SRM-7)

WARNING!

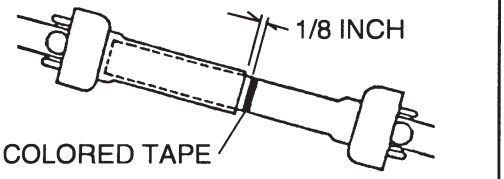
When attaching the Implement input driveline to the Tractor PTO, it is important that the connecting yoke spring activated locking collar slides freely and the locking balls are seated securely in the groove on the Tractor PTO shaft. A driveline not attached correctly to the Tractor PTO shaft could come loose and result in personal injury and damage to the Implement. (S3PT-17)

16. DRIVELINE LENGTH CHECK:

WARNING!

Before operating the Mower, check to make sure the Implement input driveline will not bottom out or become disengaged. Bottoming out occurs when the inner shaft penetrates the outer housing until the assembly becomes solid-it can shorten no more. Bottoming out can cause serious damage to the Tractor PTO by pushing the PTO into the Tractor and through the support bearings or downward onto the PTO shaft, breaking it off. A broken drive line can cause personal injury. (S3PT-18)

When fitting the mower to the tractor, the telescoping driveline must be inspected to ensure that at its most compressed position, the profiles do not "bottom out", and when at its farthest extended position, there is sufficient engagement between the profiles to operate safely. At its shortest length, there must be at least a 1" clearance between each profile end and opposite profile universal joint. At its farthest operating extension, a minimum profile engagement of 12" must be maintained.



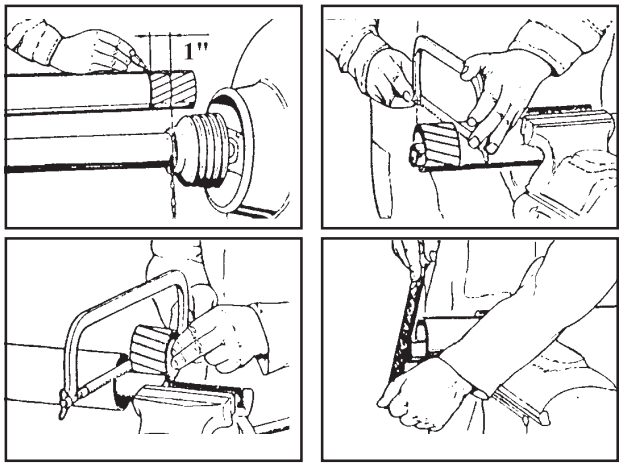
Driveline in maximum compressed position.

"Bottoming Out" Check Procedure:

A. Disconnect driveline from the tractor and slide the profiles together until fully compressed.
B. Place a mark on the inner shield 1/8" from the end of the outer shield and reattach the driveline to the PTO shaft.
C. With the ***PTO NOT TURNING***, slowly drive the tractor with mower attached through the sharpest turn possible and watch shaft movement. With the ***PTO NOT TURNING***, slowly drive the tractor with the mower attached through the most severe terrain conditions expected and watch shaft movement.
D. If the distance between the mark and the outer shield becomes less than 2" at any point there is a potential problem bottoming out the driveline and the driveline should be shortened.

"Shorten" the driveline profiles as follows:

A. Remove the driveline from the tractor.
B. Position the mower to the point with the shortest distance between the tractor PTO shaft and cutter gearbox. Shut down the tractor and securely block the mower in this position.
C. Pull driveline apart and reattach yoke to PTO shaft.
D. Hold driveline sections parallel to one another and measure back 1" from yoke of each shaft and place mark on opposite section. Cut this length off with a saw.
E. Round off all sharp edges and debur.
F. Thoroughly grease then reinstall the driveline.
G. Recheck for proper operation.



"Engagement" Check Procedure"

A. With the driveline attached, position the mower to the point where the telescoping driveline is at its maximum extension. Completely shut down the tractor and secure in position.
B. Mark the inner driveline shield 1/8" from the end of the outer shield.
C. Disconnect the driveline from the tractor and separate the two driveline halves.
D. Measure the distance from the mark to the end of the inner profile. This length is the amount the driveline profiles were engaged.
E. If the engaged length is less than 12", the shaft is considered too short and should be replaced with a longer shaft. Consult an authorized dealer to purchase the required driveline length.

NOTE: If the driveline cannot be shortened and still maintain the required profile engagement, the operator must be made aware of terrain conditions and avoid situations which pose a potential problem to avoid damaging the driveline.

17. HOSE END FITTING TORQUE SPECIFICATION:

Hose End Type: 37 Degree Angle End Steel Hose End Fittings*

Dash Size	Nominal Cyl. Size (in.)	Torque in. lbs.	Torque ft .lbs.
-4	1/4"	140	12
-6	3/8"	230	19
-8	1/2"	450	38
-10	5/8"	650	54
-12	3/4"	900	75
-16	1"	1200	100
-20	1-1/4"	1600	133
-24	1-1/2"	2000	167
-32	2"	2800	233

* Straight Threads do not always seal better when higher torgues are used. Too much torque causes distortion and may lead to leakage. DO NOT over torque fittings and DO NOT allow any contaminants to enter system through fittings when installing them.

18. TORQUE VALUES - BOLTS:

Maximum Torque per Bolt Size and Grade, Ft lbs & (Nm)

IMPORTANT ! Listed below IS BOLT TORQUE and NOT APPLICATION TORQUE, Component Application Torque will vary dependimg on what is bolted down and the type material (Metal) that is being bolted together. Thread condition and lubrication will vary Torque settings.

Inche Sizes

Bolt Dia. inch	2 (B) Plain Head	5 (D) 3 Dashes	8 (F) 6 Dashes
1/4	Not Used	10 (14)	14 (19)
5/16	Not Used	20 (27)	30 (41)
3/8	Not Used	35 (47)	50 (68)
7/16	35 (47)	55 (75)	80 (108)
1/2	55 (75)	85 (115)	120 (163)
9/16	75 (102)	130 (176)	175 (230)
5/8	105 (142)	170 (230)	240 (325)
3/4	185 (251)	300 (407)	425 (576)
7/8	160 (217)	445 (603)	685 (929)
1	250 (339)	670 (908)	1030 (1396)
1-1/8	330 (447)	910 (1234)	1460 (1979)
1-1/4	480 (651)	1250 (1695)	2060 (2793)

ALWAYS CHECK MARKINGS ON TOP OF BOLT HEAD OR OTHER BOLT DESCRIP-TIONS

Metric Sizes

Bolt Dia. mm	4.8	8.8	10.8
6	5	7	12
8	11	20	25
10	20	40	58
12	37	70	105
14	60	100	140
16	92	155	200
18	118	216	280
20	160	270	355
22	215	330	430
24	285	500	700
27	450	875	1000
30	600	1200	1700
33	800	1600	2300
36	900	2100	3000

How To Compute Torque When Using An Adapter

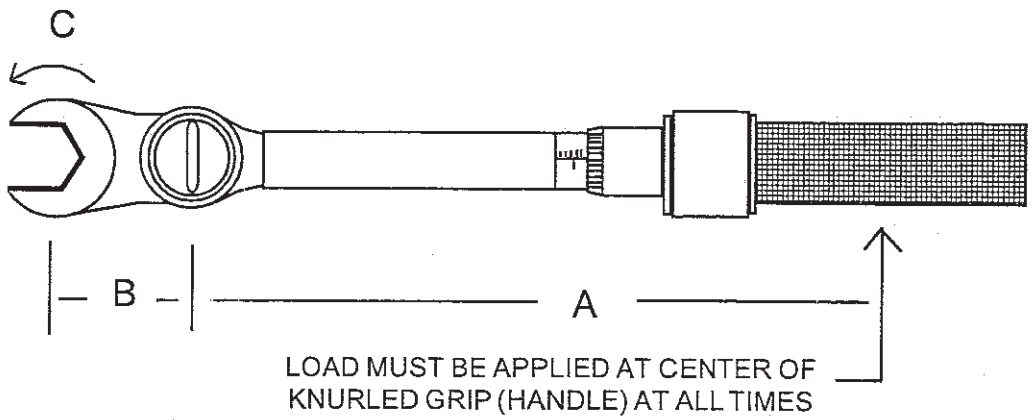


Figure 1 Typical Torque Wrench Shown

If an adapter is attached to the drive of a torque wrench, the wrench will not give actual torque indicated by the setting of the handle. A simple formula however, allows you to figure out what the setting should be to deliver a predetermined amount of torque at the end of any adapter to the fastener.

The following letters are defined as:

A = Length of the torque wrench when set at the middle scale setting (inches).
B = Length of adapter (inches from center hex bolt to center of torque wrench square shaft.
C = Desired torque at end of extrusion
D = Setting for accuracy within + or - 6%.

Here is a typical problem. You have an adapter that adds 10.0 inches to a torque wrench length (dimension B) What should the setting be to obtain 320 ft. lbs. of torque at the end of the adapter.

A = 22.57 inches (length from adapter mounting point torque wrench to center of grip / handle)
B = 10.0 inches (Length from adapter mounting point of torque wrench to center of hex slot).
C = 320 ft. lbs. torque (desired torque at end of extension).
D = Unknown (setting you need to set torque wrench to = 320 ft. lbs for accuracy).

$$C = \frac{(A)}{(A+B)} \text{ or } 320 \frac{(22.57)}{(22.57+10.0)} = 320 \frac{(22.57)}{(32.57)} = 320 \times 222 \text{ ft. lbs.}$$

Your Answer (D) is a setting of 222 ft. lbs. on the torque wrench will give 320 ft. lbs. of torque at the bolt. By using the above formula an accuracy of + or - 6 % of the desired torque will result at the end of the adapter due to length change during grip adjustment.

Recommended Start-up procedure for New or Rebuilt Pump: Before Installing a New or Rebuilt Pump

A. Connect your Flow Meter in Line to test Pressure as unit is started; this is in case the Relief Valve is malfunctioning or has been tampered with. If this is not done you could damage the replacement Pump because you would not Know it till Pump failed from excessive pressure.

B. Before connecting any lines to Pump, fill all Ports with clean Oil to provide initial Lubrication. This is especially important is Pump is located at a higher level than Oil Reservoir.

C. Check Oil level in reservoir, fill to full level if needed, Reservoir must have more Oil than the Pump GPM capacity.

D. After connecting the Lines and mounting the replacement Pump, make sure that Oil is not warmer than Pump temperature. If Oil is warmer than pump run Pump at short intervals till Pump and Oil temperature is equalized. Hot Oil must not be fed into cold Pump.

E. Operate the Pump for at least two minutes at no load and at low RPM (400 RPM min and 1400 RPM max.). Watch Flow Meter Pressure (or Pressure Gauge). During this break-in period, the unit should run free and not develop an excessive amount of heat. Heat should not exceed 100 deg F. above ambient Temperature. If the unit operates properly, speed and pressure can then be increased to normal operating settings. Increase Pressure in 500 Lbs. PSI increments from start, this should take 4 to 5 minutes to max. PSI allowing 1 minute between increases to check Oil Pressure and Temperature.

F. If normal Pressure and Heat readings are seen then the New or Rebuilt Pump installation should be done, remove Flow Meter (Pressure Gauge) from line, reconnect Line and check all connections.

Test Equpment Needed:

1. Flow Meter, The Flow meter should have components to measure:
- **A.** Guage to Measure the Oil Temperature.
- **B.** Gauge to Measure Oil Pressure PSI (Load and No Load).
- **C.** Gauge to Measure Oil Flow in G.P.M.
- **D.** A Valve to load system to check operating Pressure (PSI).
- **E.** Assortment of Connections to connect to Hydraulic System.

2. Electrical Volt Meter with variable settings and Ohm Meter.
3. Electrical Test Light.
4. Wrenches, Torque Wrench, Socket Wrenches, Open and Boxed End Wrenches.

NOTES

Section 4

Interstater

SERVICE MANUAL

Hydraulic & Electrical Schematics

This section shows the Schematics for the hydraulic system of the pump, motor and cylinder circuit. The Schematic for the electrical Wing Motor Shut Off System

Hyd Schematic W/ Aux Pump (RH Wing)

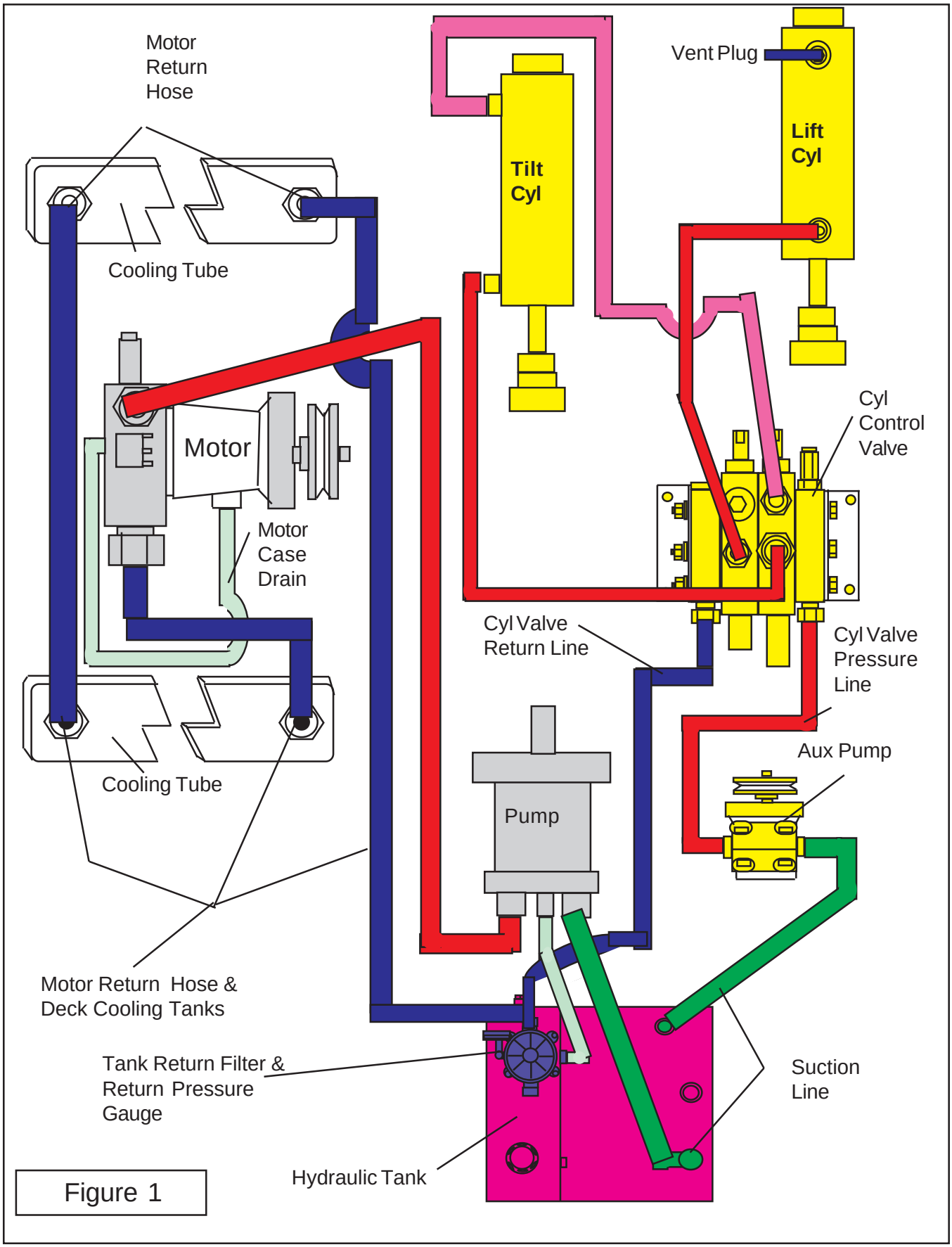


Figure 1

Hyd Schematic W/ Aux Pump (Dual Wing)

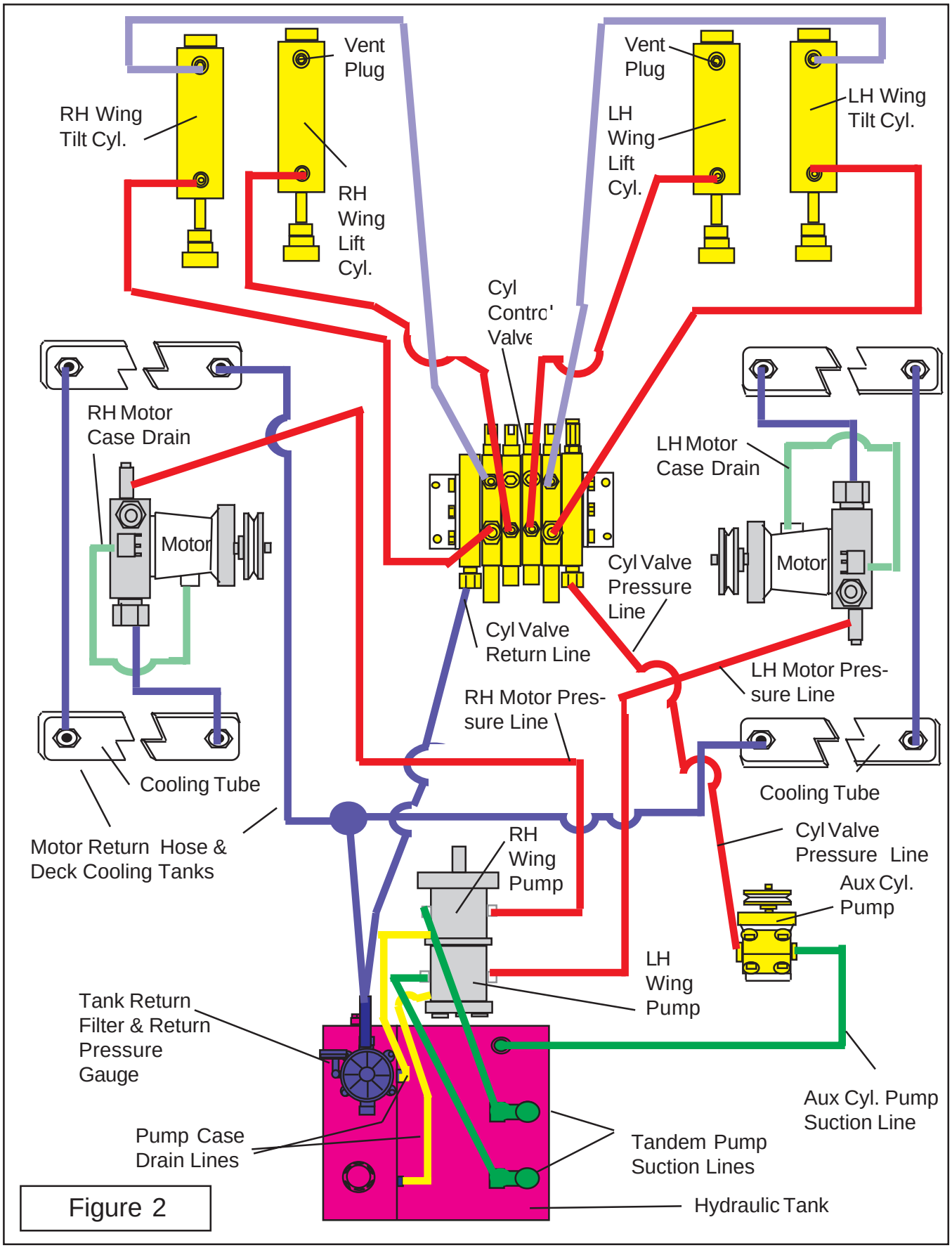


Figure 2

Hyd Schematic W/O Aux Pump (RH Wing)

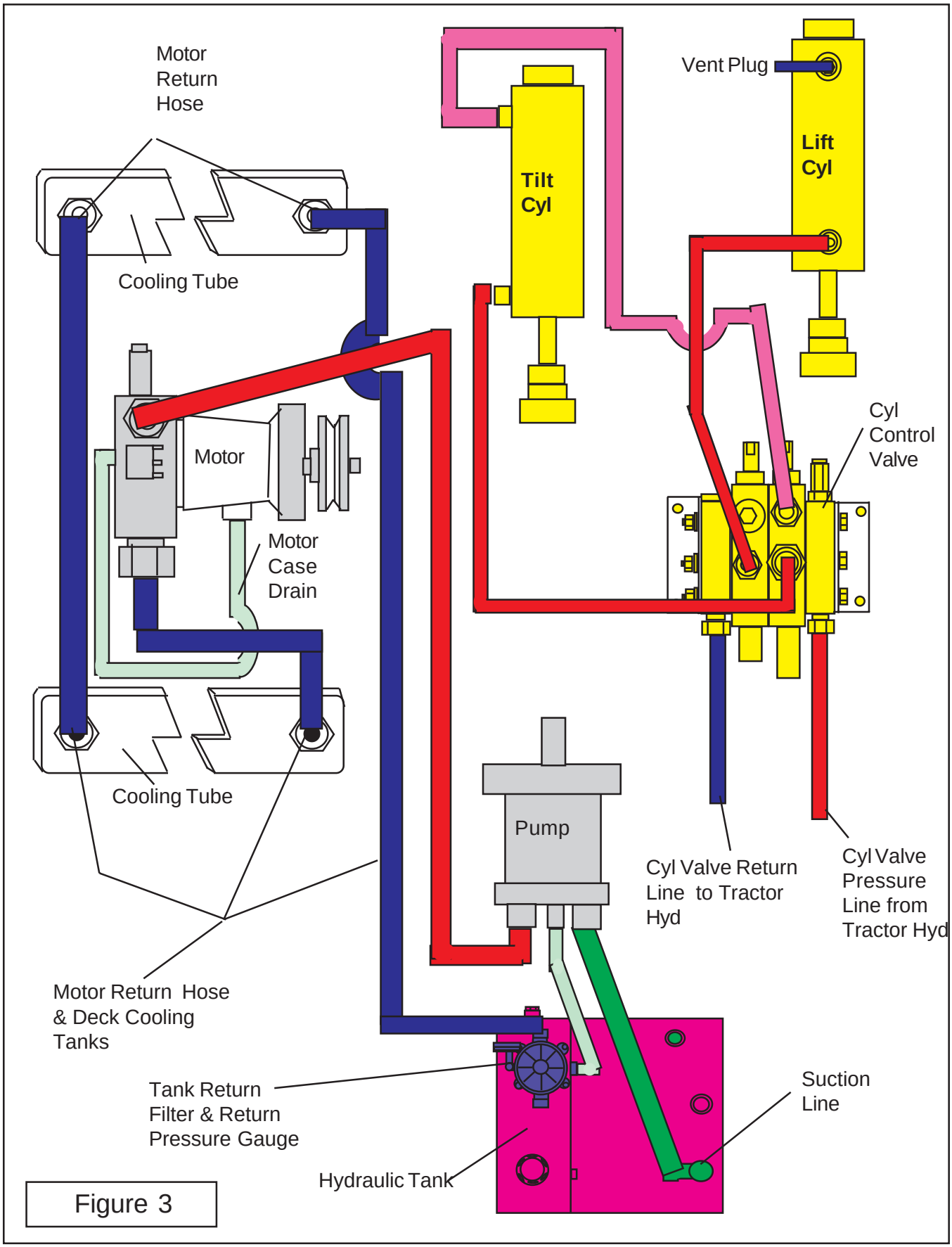


Figure 3

Hyd Schematic W/O Aux Pump (Dual Wing)

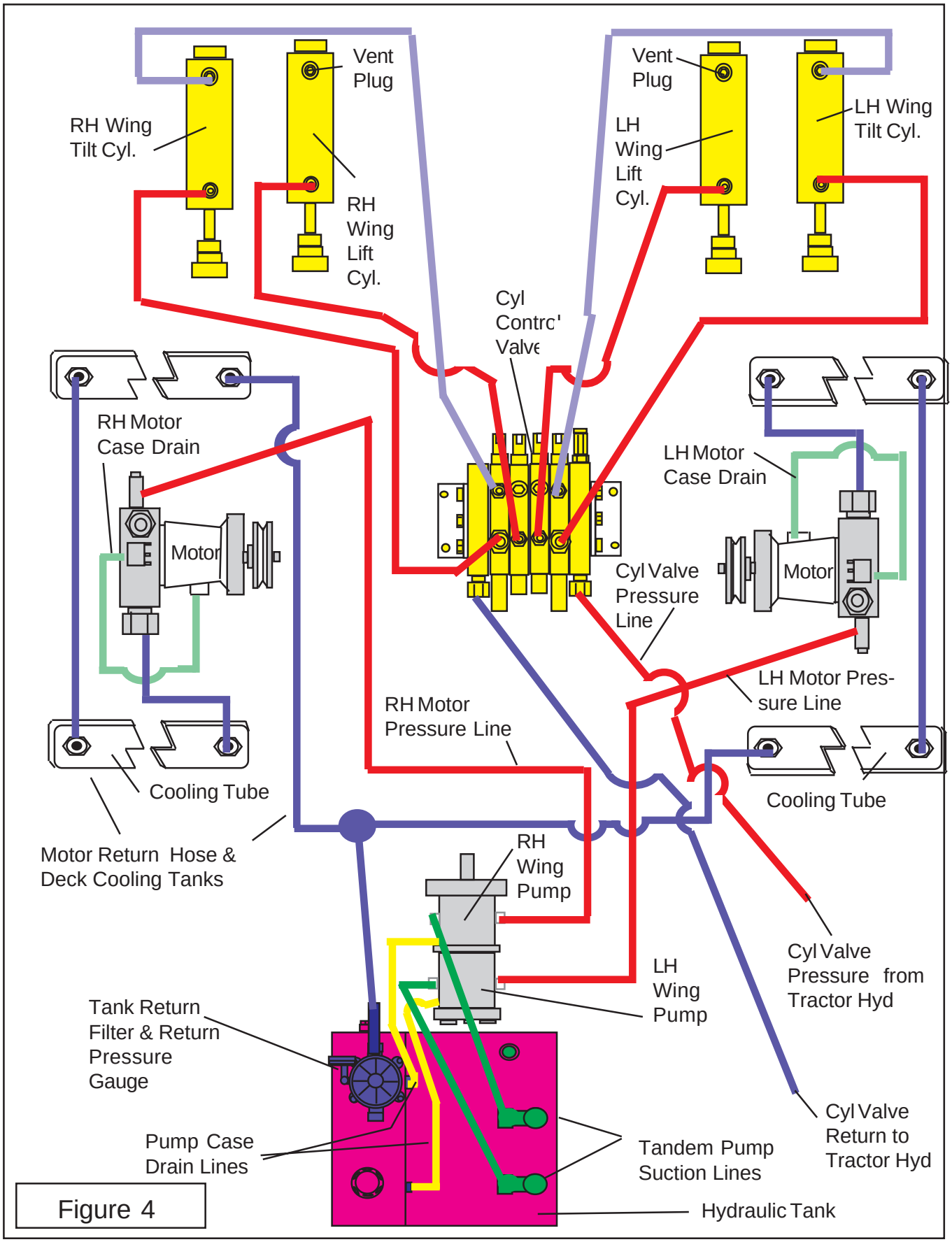


Figure 4

Valve to Cylinder Hose Connections (Cab & ROPS)

Figure 5

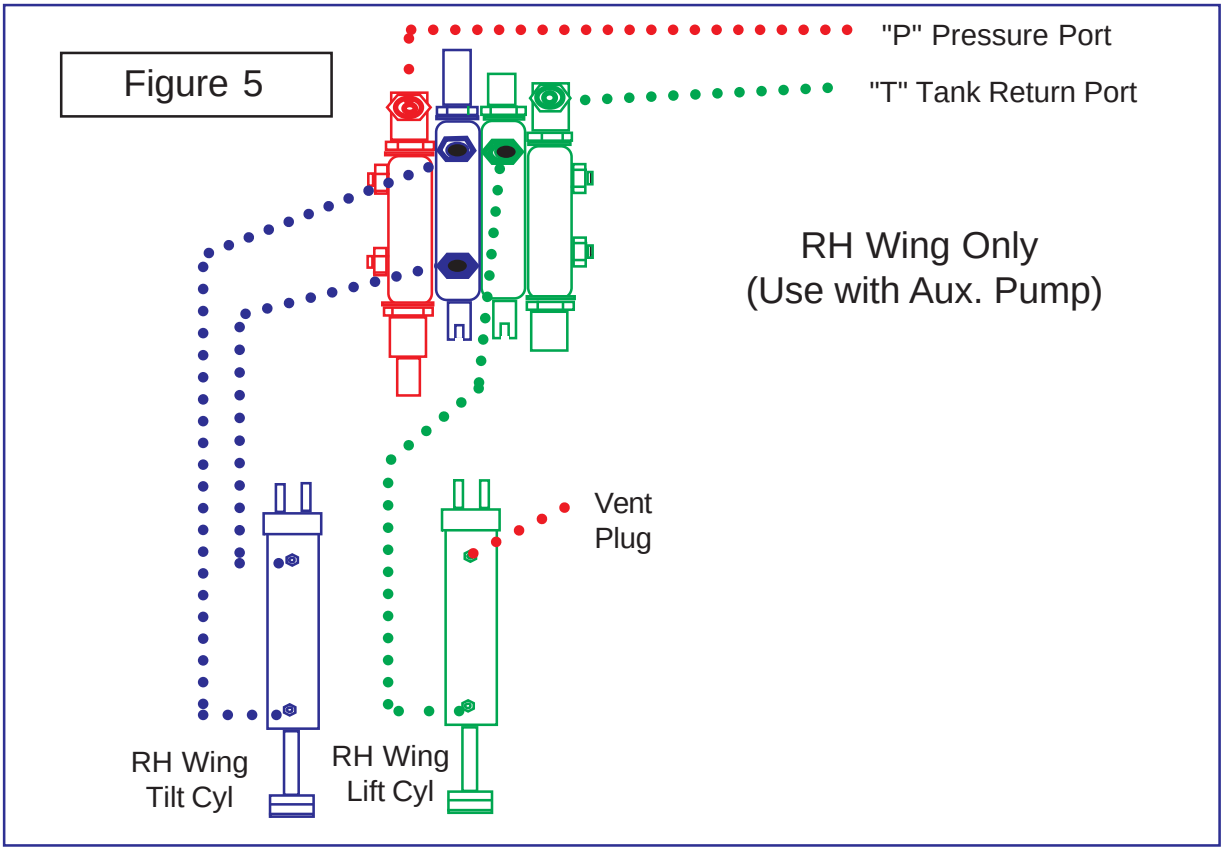
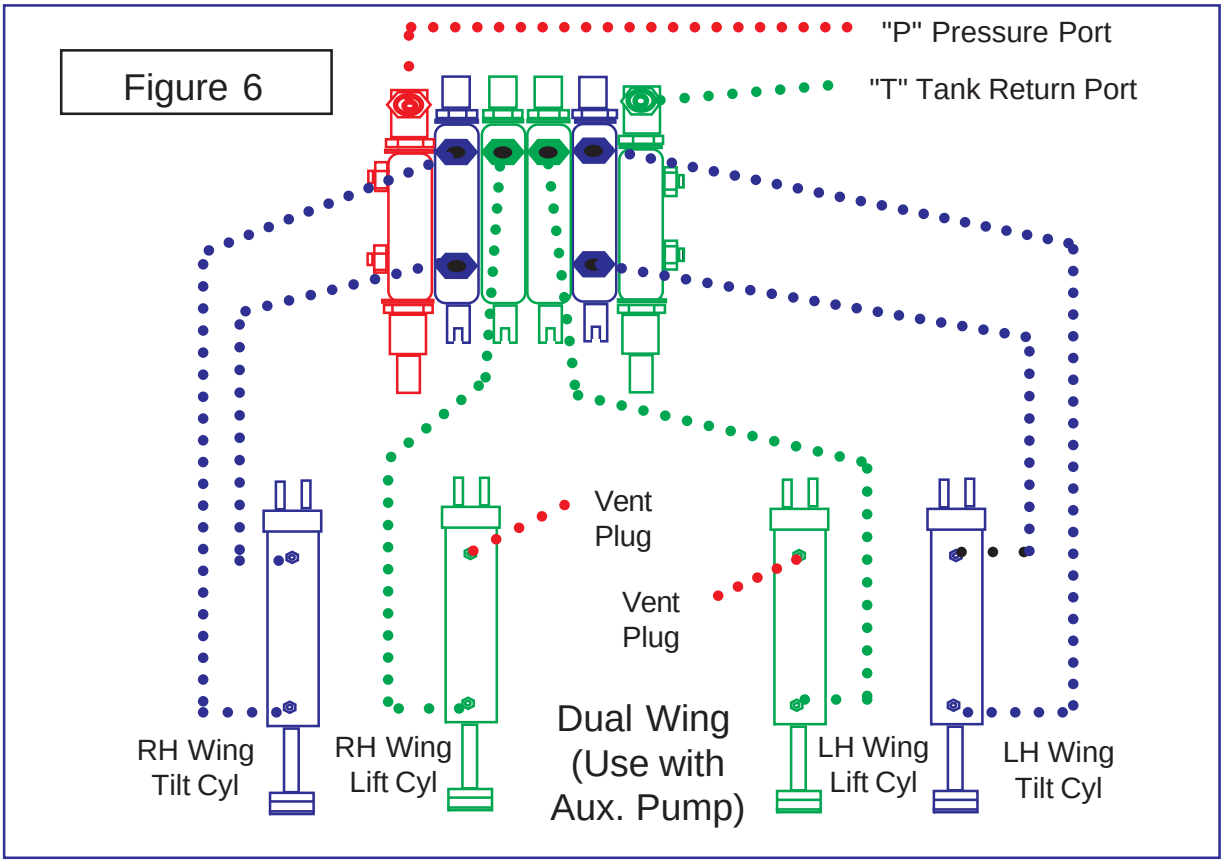


Figure 6



Wire Harness Connections (CAB & ROPS)

Wire Harness Connections:

1. Connect Wire Harness to Tractor Starter Activation Wires. The wires to the starter from the motor control switches will need to be connected to the tractor near the ignition switch connections. Or they can be connected near the starter solenoid, this is something the technician will need todecide as they assemble the unit. Alamo Industrial recommends connecting the wires at thetractor ignition switch

(See Figure 7 thru 9). Also see the wire / harness schematic on the following pages. Consult Tractor
Repair Manual for wiring schematic of Tractor to determine what wire is what on the tractor ignition switch.

2. Connect Power Supply for Motor Control Switches. **Make certain the battery is disconnected before connecting wires.** The power supply wire must be connected to a wire that only has current when the tractors ignition switch is in the "ON" position. **If the supply wire is connected to a constant active wire and the notor control switchs are left on when tractor is parked they will run the battery down**.

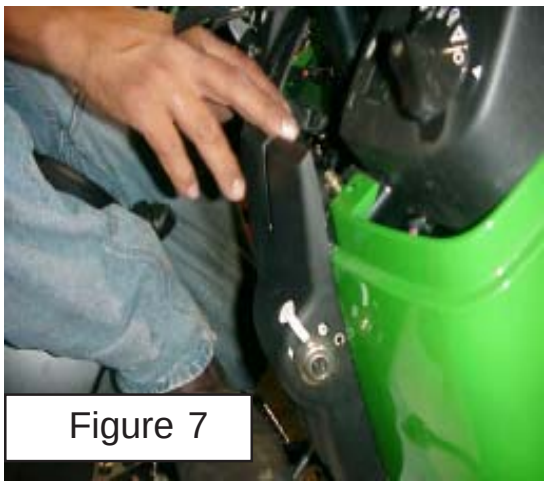


Figure 7


Figure 8


Figure 9

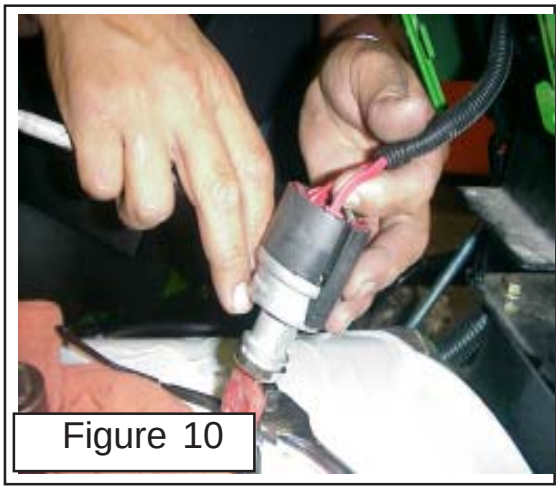


Figure 10

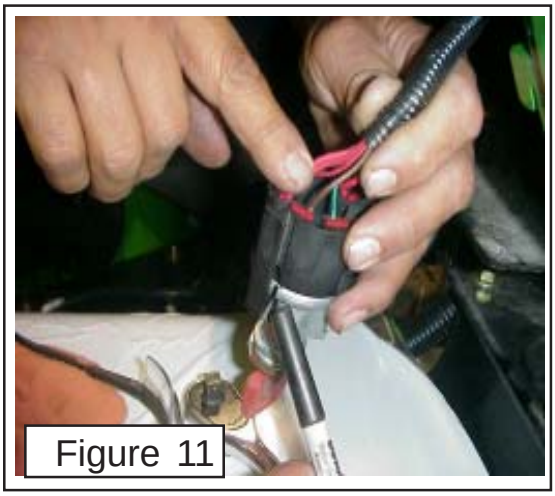


Figure 11

Wire Harness Connections (CAB & ROPS)

3. Check all Wire Harness Routing. Inspect all of the wire harness before connecting them. Make certain that all portions of wire harness that have been installed is tied up and out of the way folding components or any thing that may damage them (See Figure 7 thru 9).

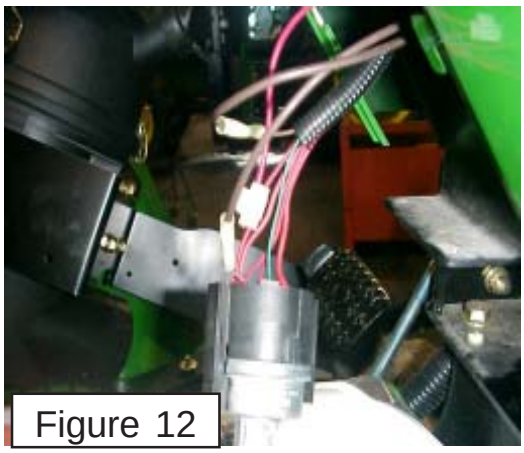


Figure 12

Figure 13

4. Wires from the safety switch must be routed close to cutter housing side sheet and lift frame pivot points. This will prevent wires from being stretched and broken when cutter housing is raised or lowered to maximum positions (See Figure 13)

5. Route Wires for Cut Off Switches. The wire harnes for the magnetic cut off switches mounted on the wing hinges will be ran through a piece of square tubing welded to the lift frame, this is to protect the wires from be hung up on object while mowing.

6. Wire Harness Components. The wire harness will be received in sections. The main wire harness (Single or dual wings) and the wing harness, a RH harness and a LH harness. The RH and LH harness will both be used for a dual wing unit. and only the RH harness for a single wing unit.

NOTE: Route wires in such a manner to prevent interference with the operation of tractor or INTERSTATER. Ensure that wires DO NOT lay against anything which could wear through insulation and cause a short circuit.

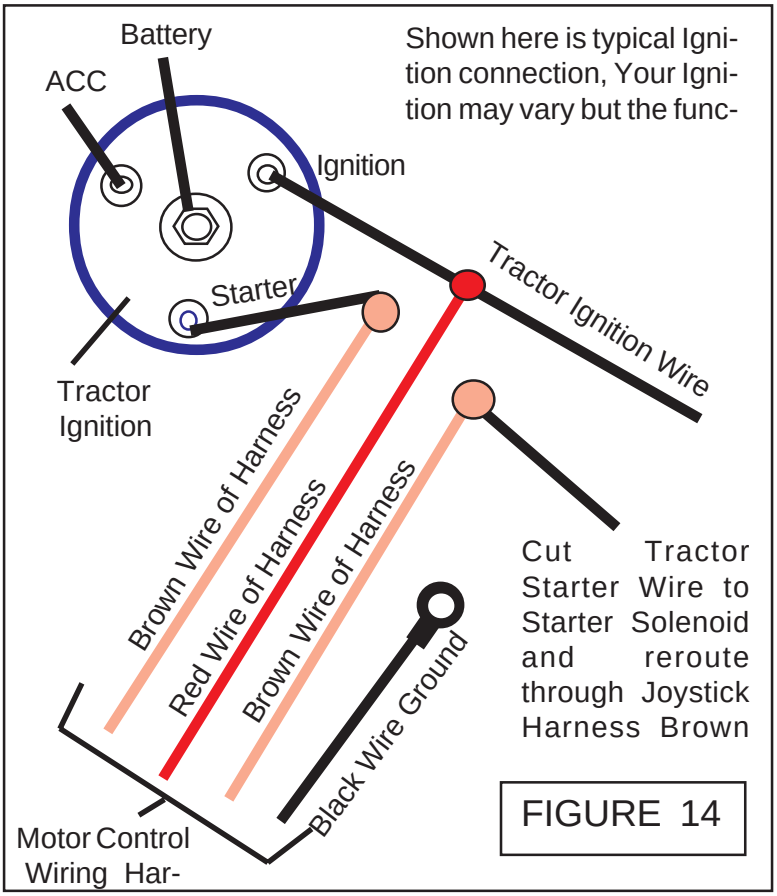
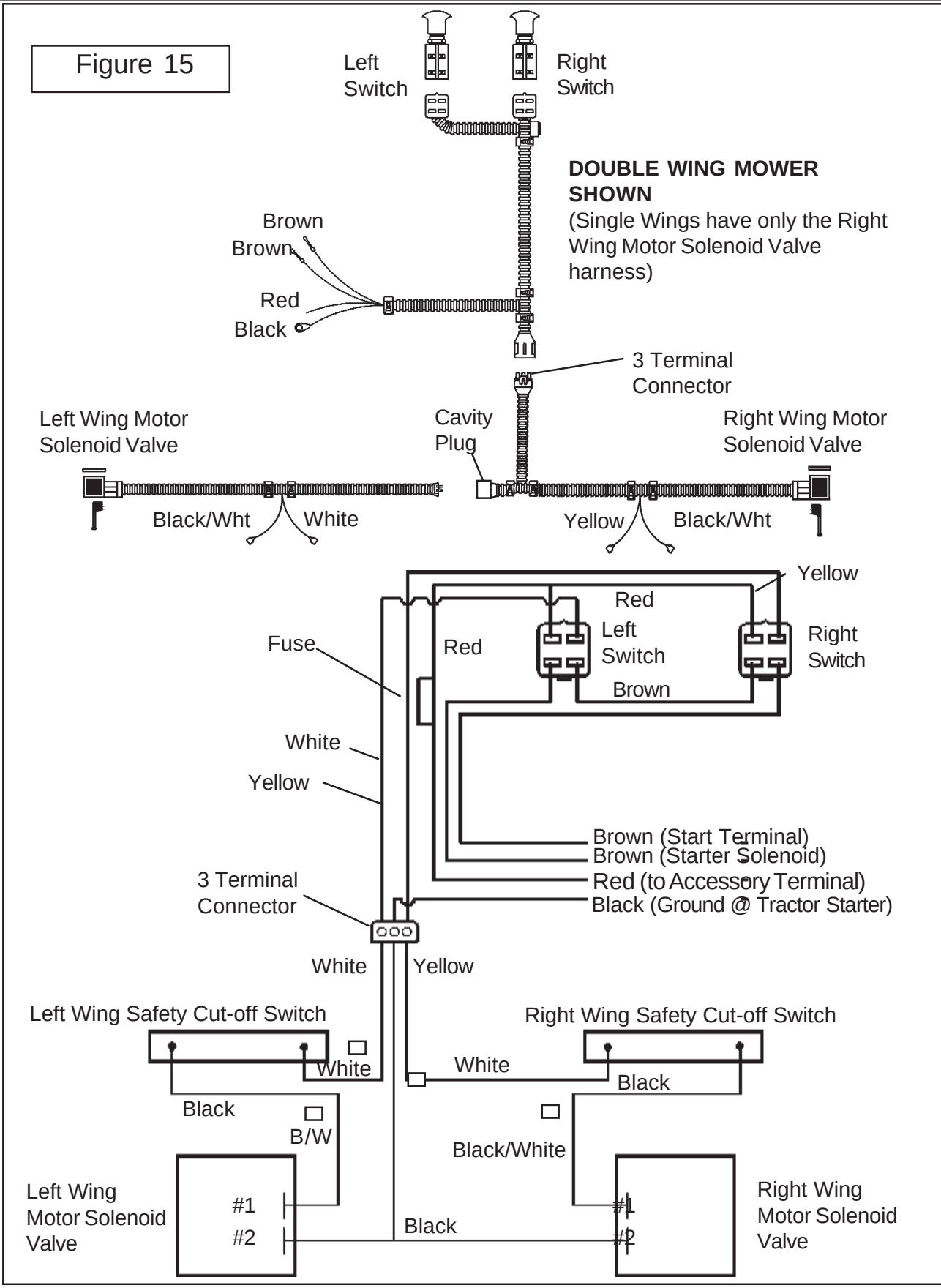


FIGURE 14

After connecting all wires, wrap wires with flex guard tubing. Neatly gather hydraulic hoses and flex guard tubing and strap together using plastic ties.

Wiring Harness Schematic (CAB & ROPS)

Figure 15



Motor Control Switch - Dual Wing

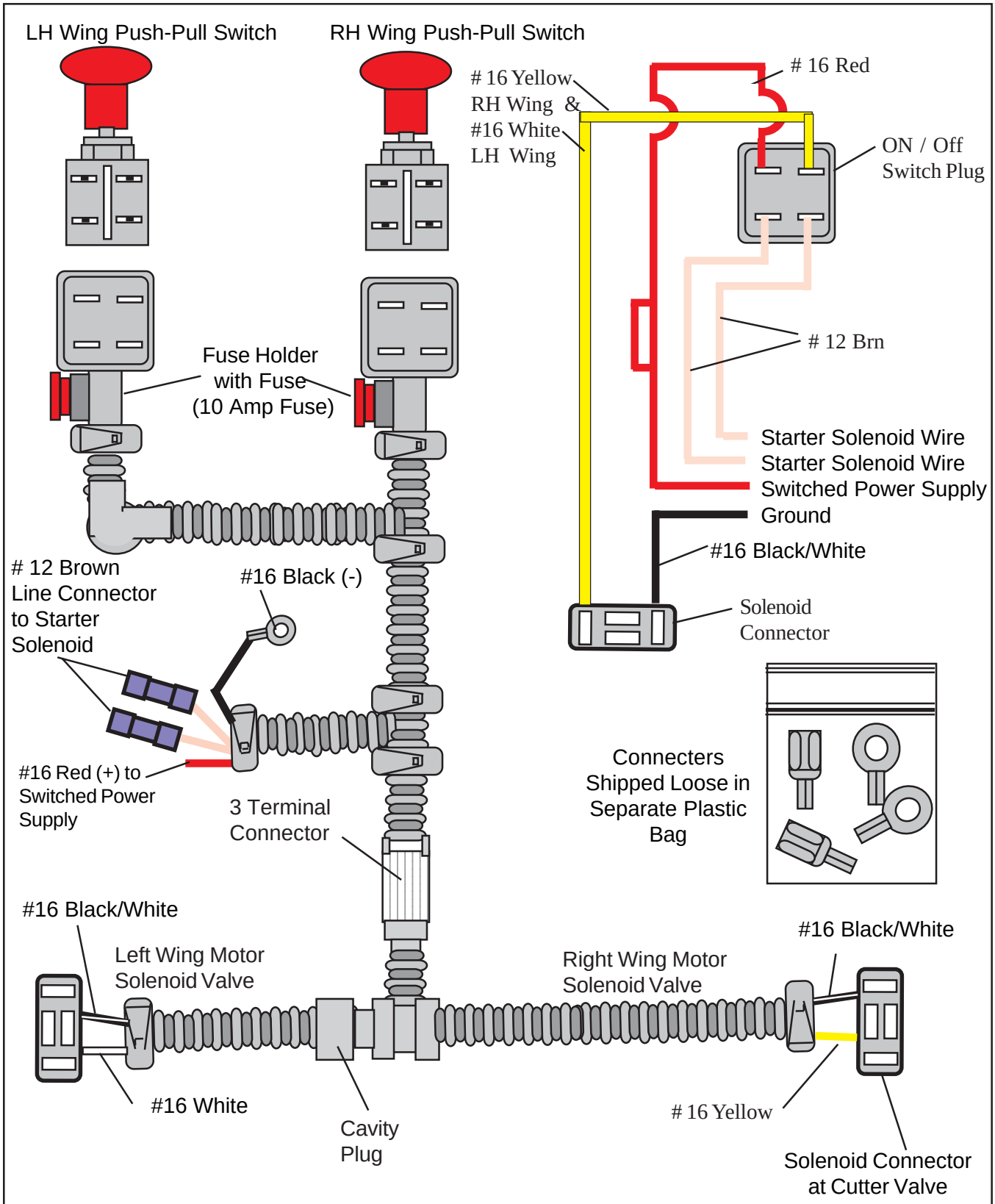


Figure 16

Motor Control Switch - RH Wing Only

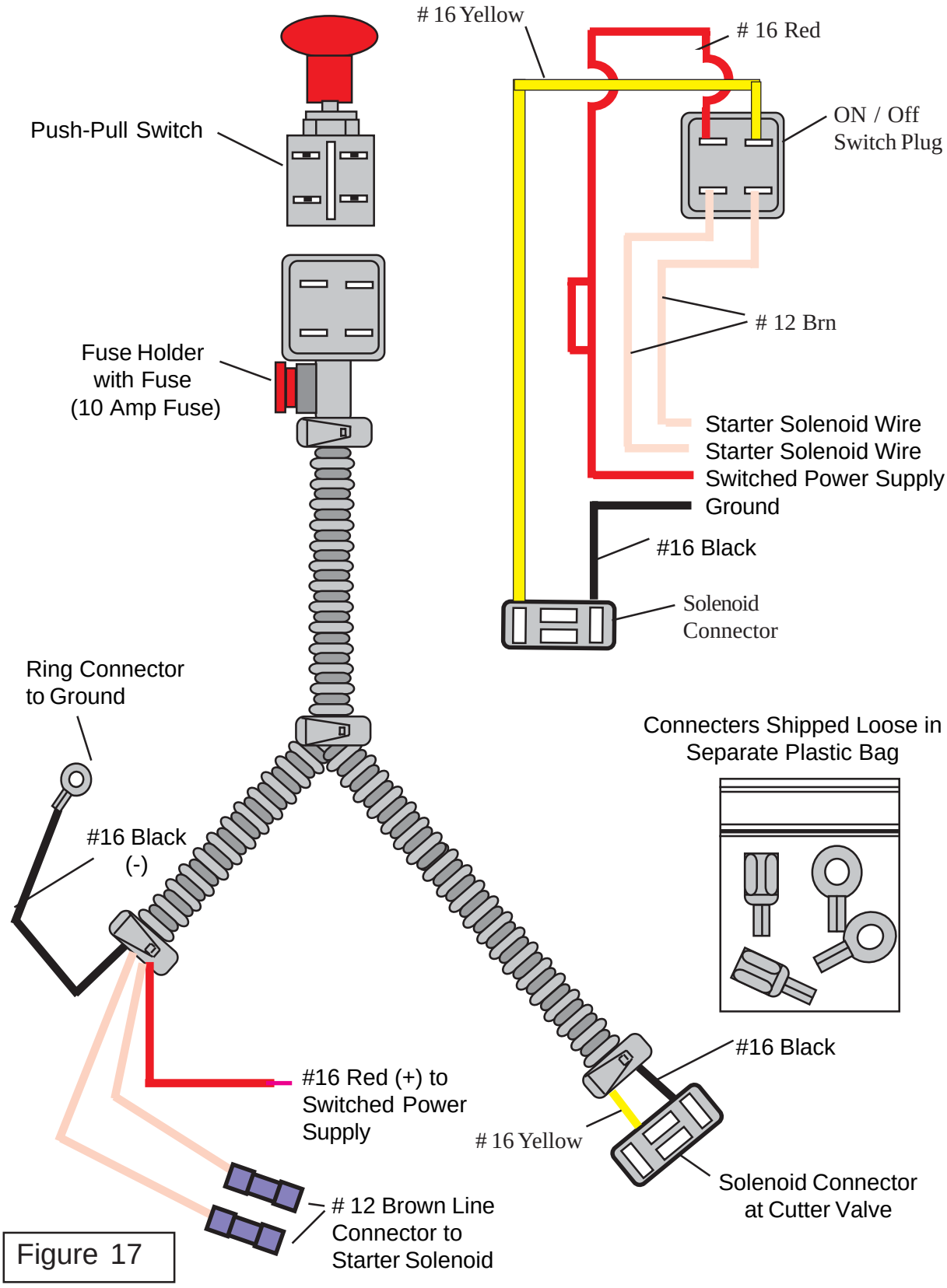


Figure 17

Wing Wire Harness - R-Wing (Single Wing)

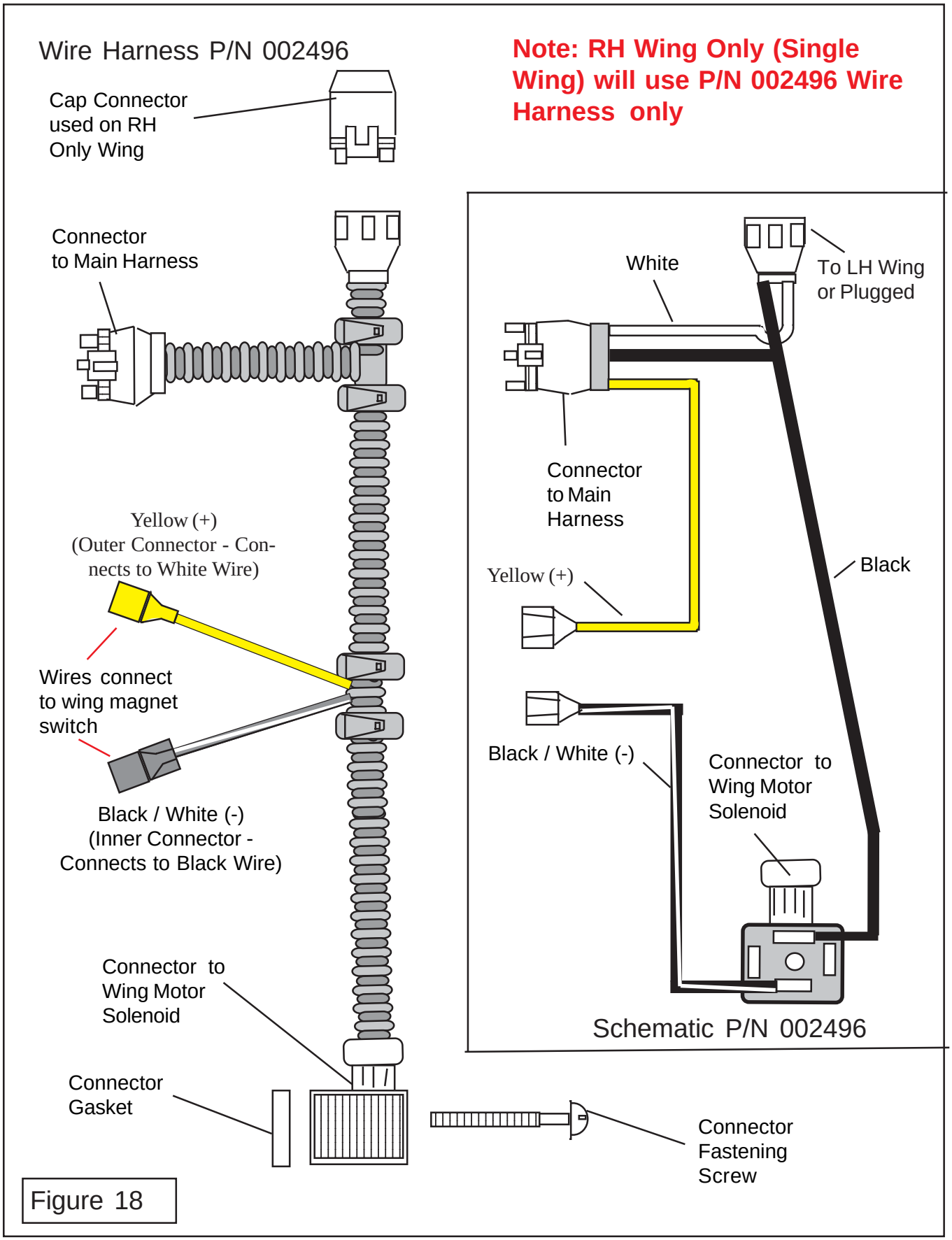


Figure 18

Wing Wire Harness - L & R-Wing (Dual Wing)

Wire Harness P/N 002497

Note: Dual Wing will use both P/N 002496 & P/N 002497 Wire Harness

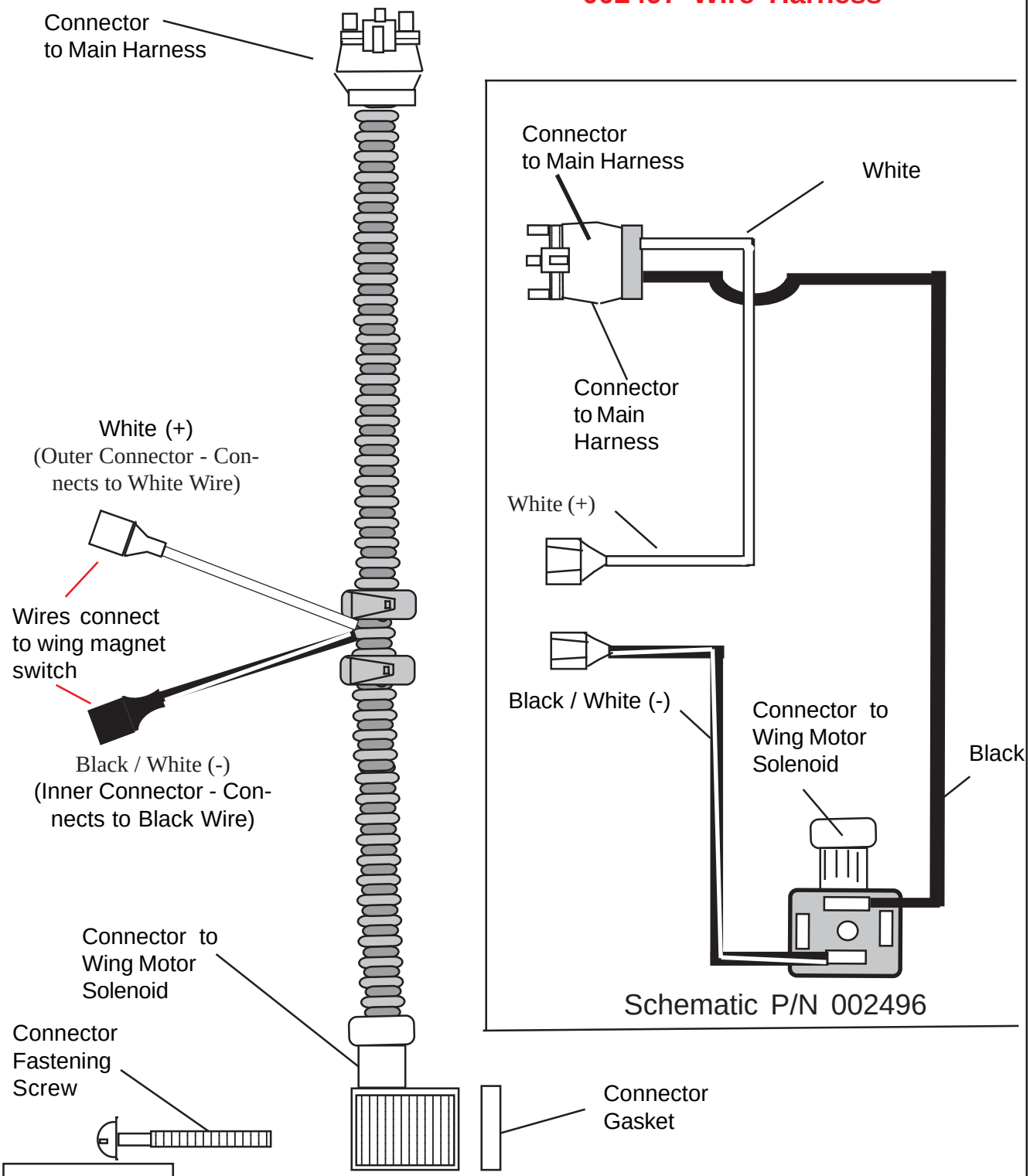
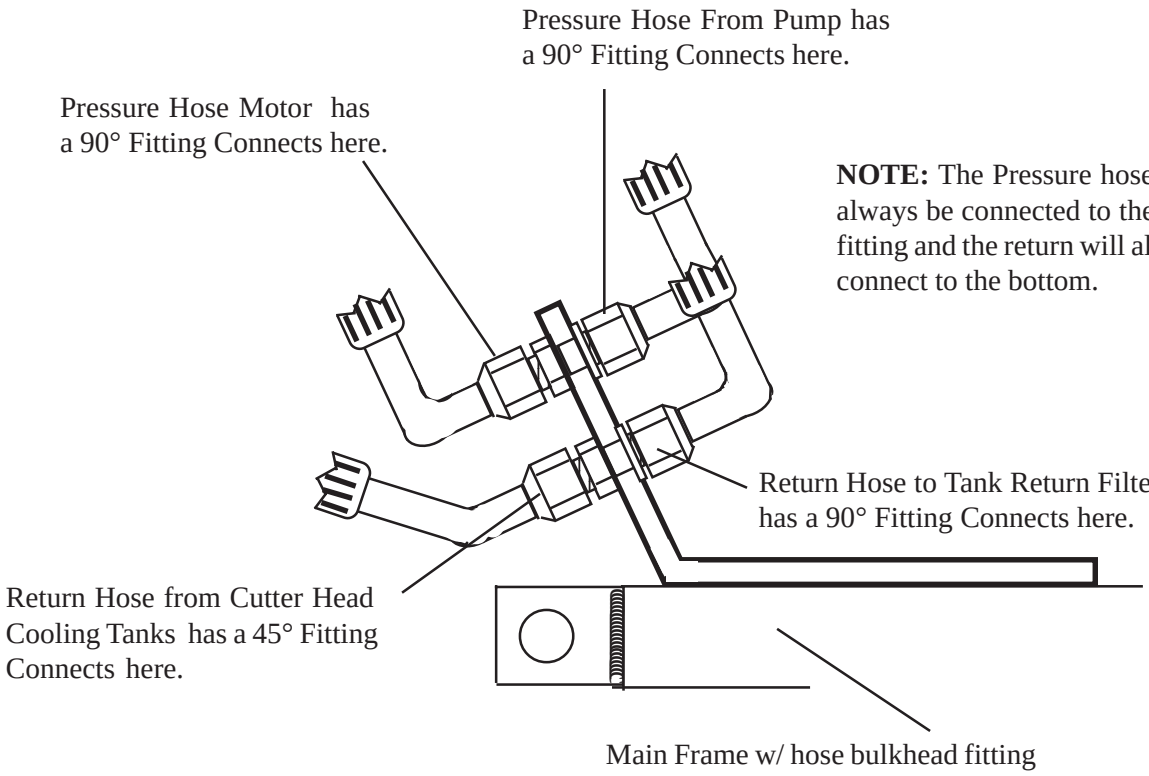


Figure 19

Pump & Motor Hydraulic Schematic (RH Wing Only)



RH side of tractor looking from front to rear of tractor

Single Wing Shown, Dual Wing has metal cross over pipe with a Tee in it for the return.

Figure 40

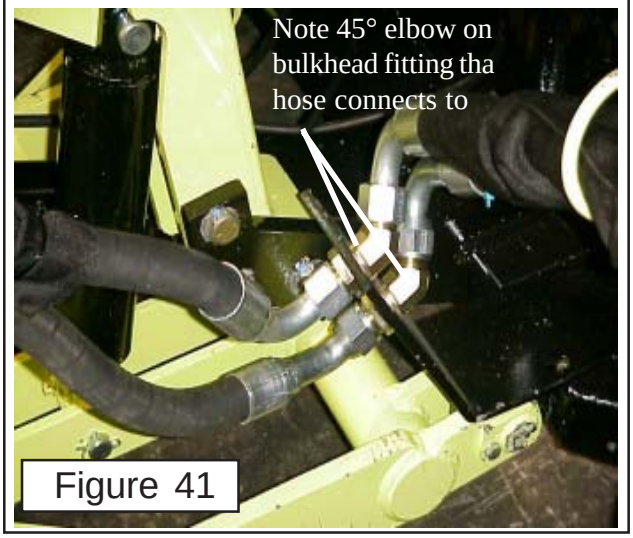


Figure 41

Pump & Motor Hydraulic Schematic (Dual Wing)

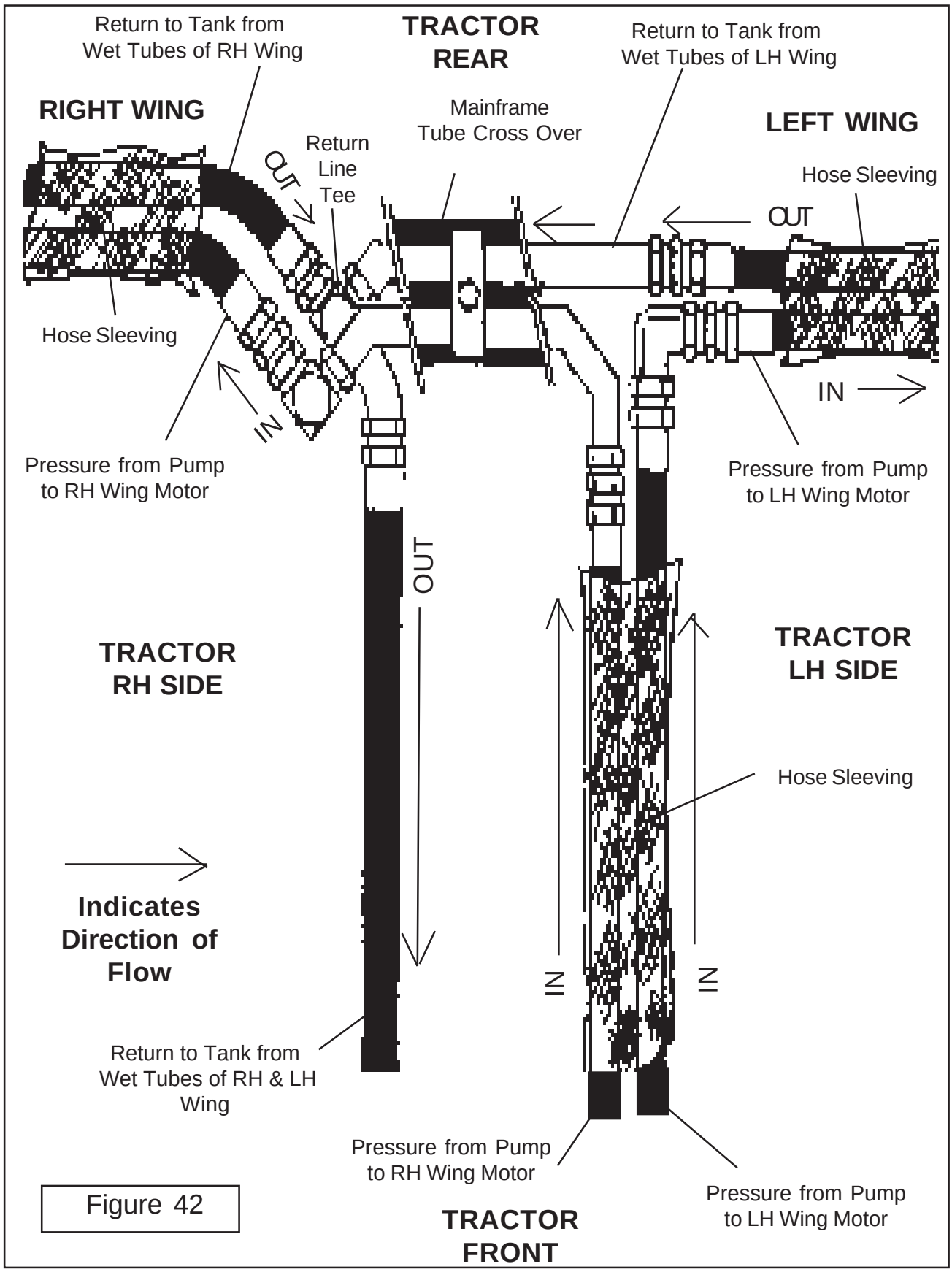


Figure 42

Pump & Motor Hydraulic Schematic

RH WING ONLY HYDRAULIC MOTOR SHOWN

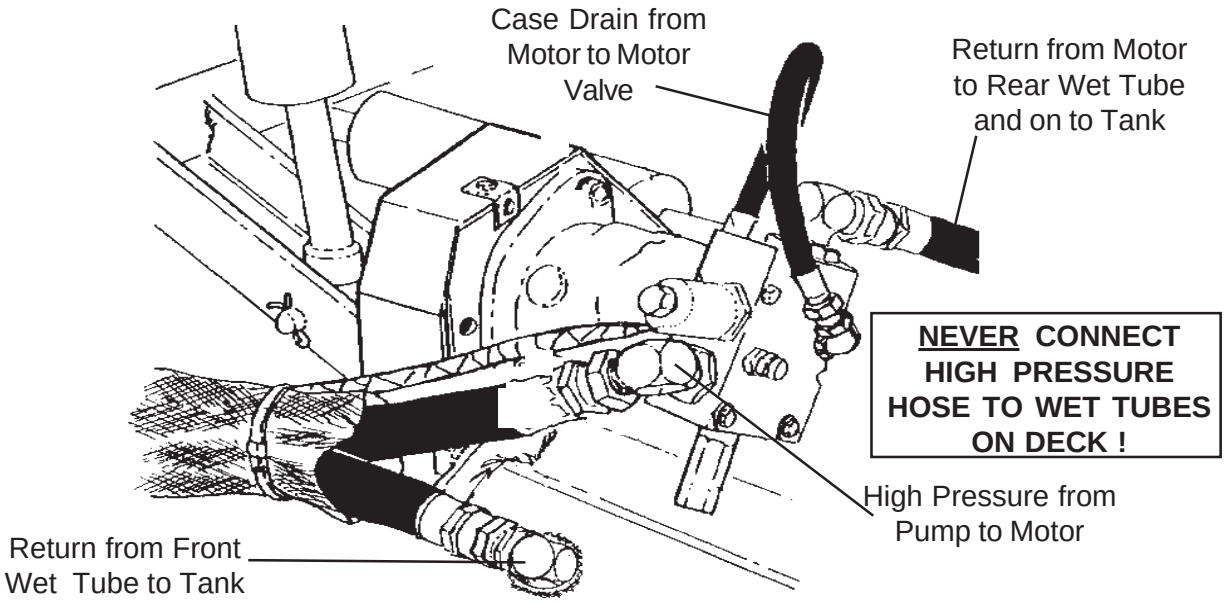


Figure 43

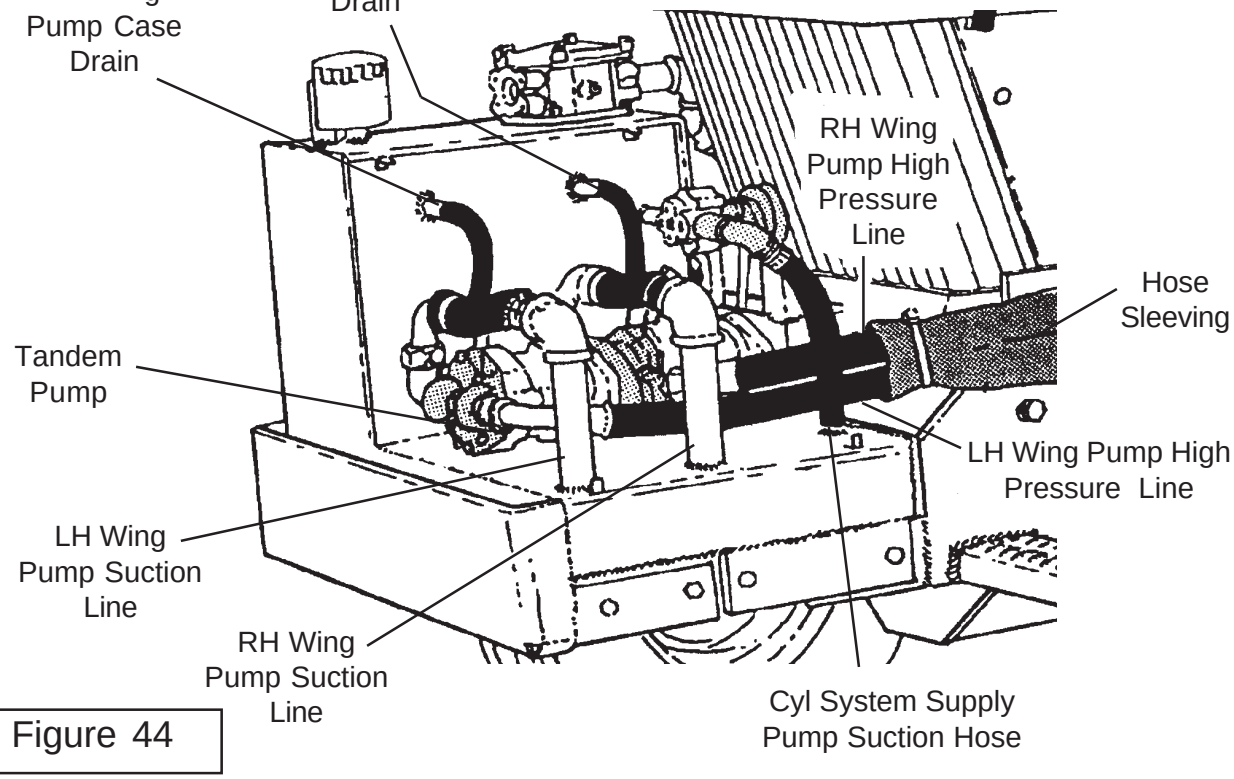


Figure 44

Pump & Motor Hydraulic Schematic

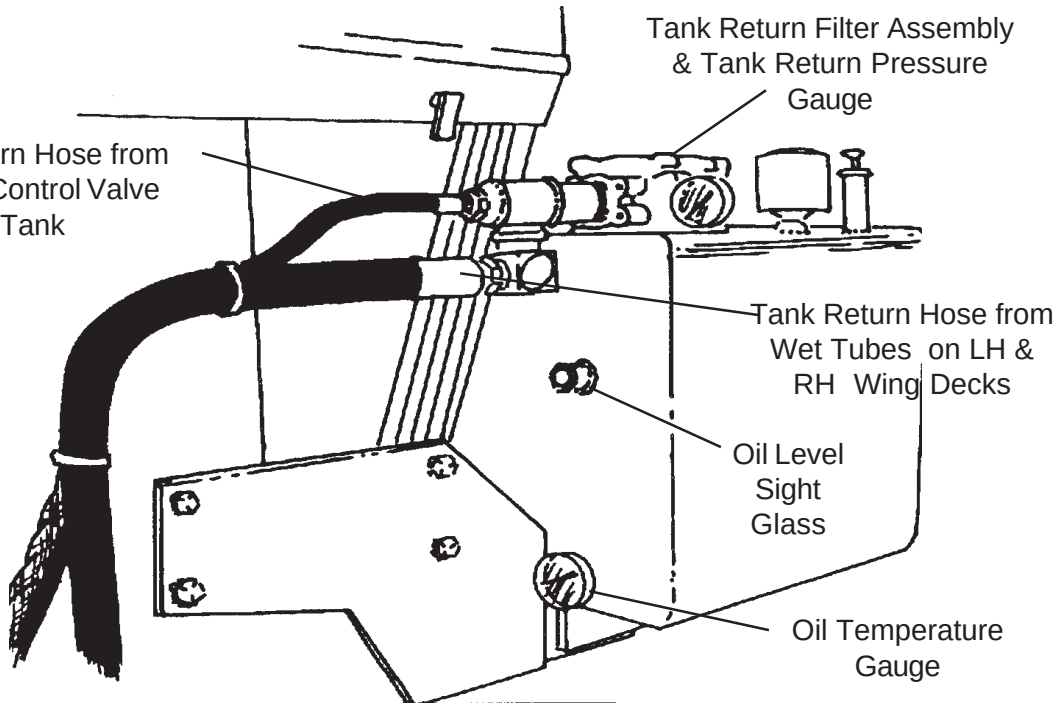


Figure 45

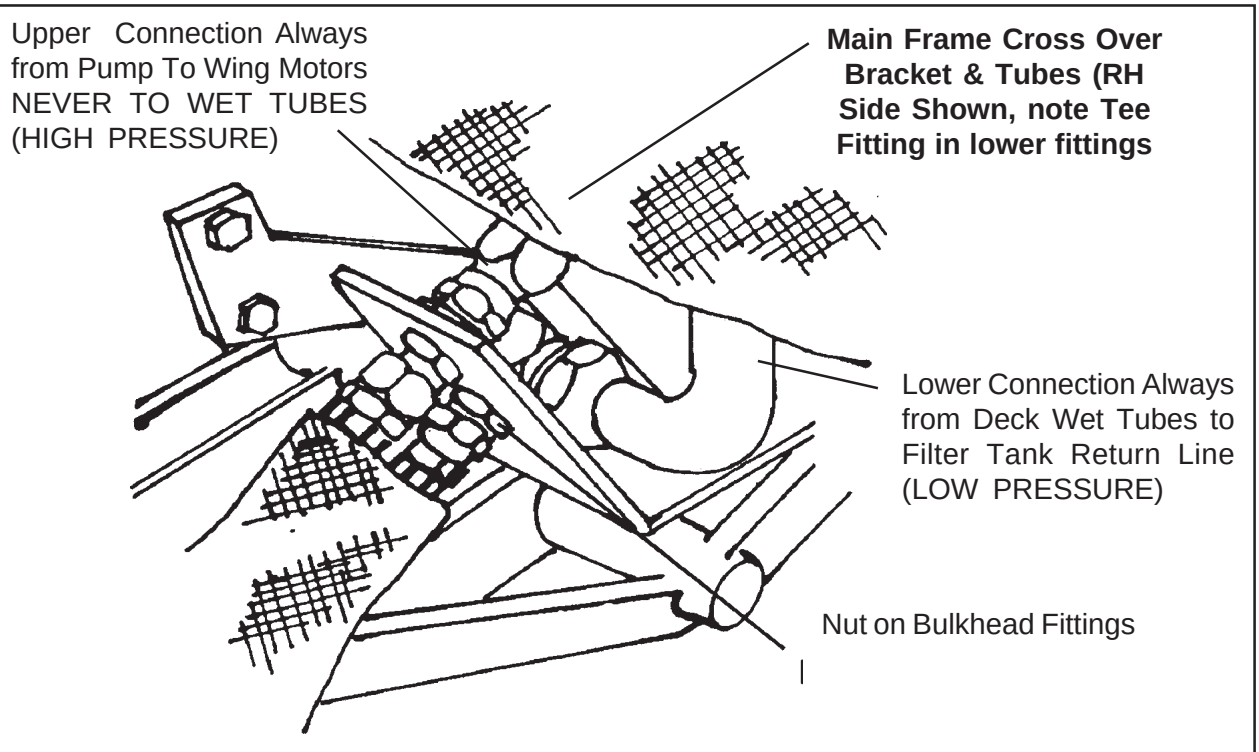
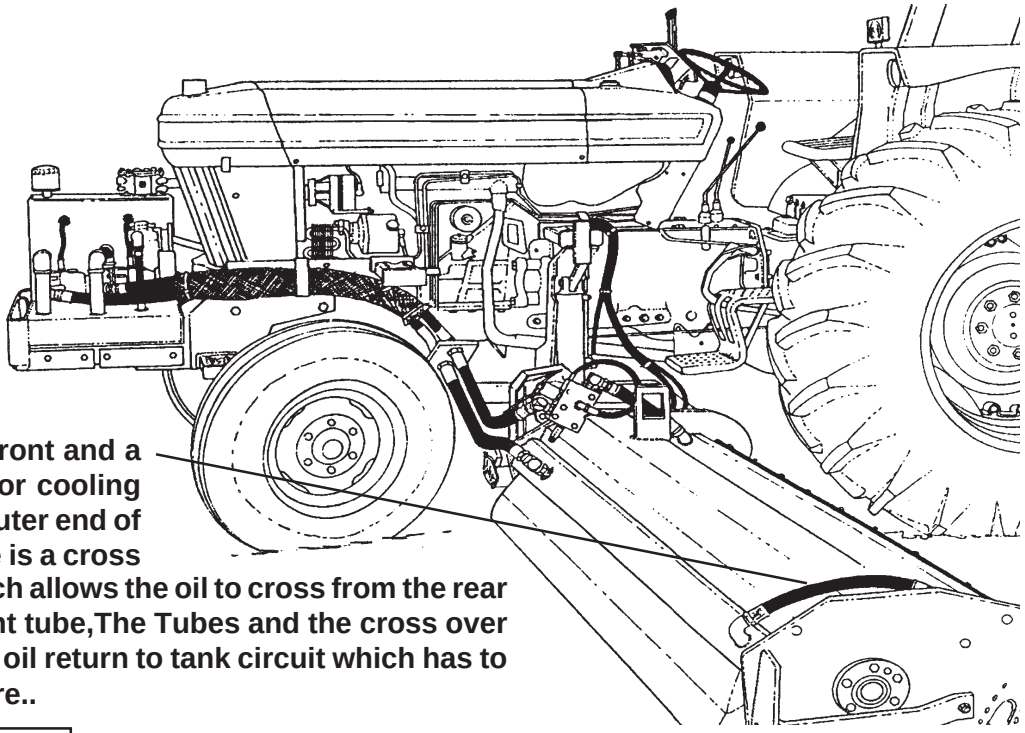


Figure 46

Pump & Motor Hydraulic Schematic



Wings have a front and a rear wet tube for cooling the oil. At the outer end of the decks there is a cross over hose which allows the oil to cross from the rear tube to the front tube,The Tubes and the cross over hose are in the oil return to tank circuit which has to be low pressure..

Figure 47

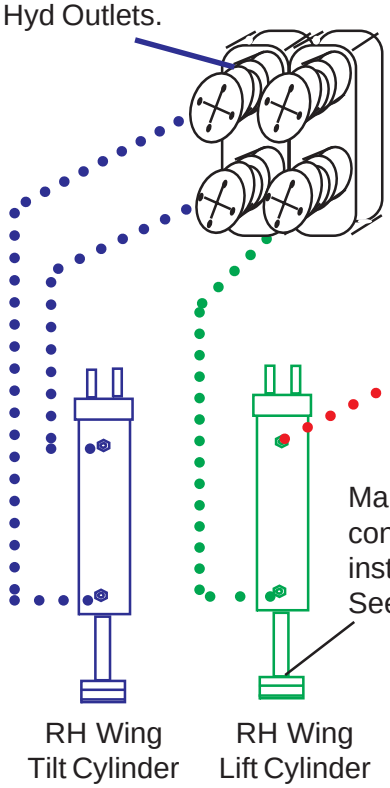


Figure 48

Connecting Cylinders To Tractor Control Valve for Hydraulic Supply.

When the tractor hydraulics are used to supply and operate the cylinders there will not be a control valve shipped with the mower. The hydraulic cylinders will connect direct to the tractors remote outlets and the tractor controls will be used (See Figure 14).

When using the Auxiliary front pump for the cylinder hydraulic system there will be a control valve and components shipped. See the section for installing the auxiliary pump and control valve.

Section 5

Interstater

SERVICE MANUAL

Hydraulic Pumps

Tandem - Single - Auxiliary

Remove - Repair - Replace

Tandem & Single Pump Removal

GENERAL PUMP REPAIR / REPLACEMENT INFORMATION:

A. To disassemble / repair your INTERSTATER this manual is designed to assist you with drawings, instructions and information. This manual is designed to be used in conjunction with the parts manual, operators manual and the assembly manuals. If additional information or clarification is needed contact your Alamo Industrial factory representative.

B. Some of these instructions are general information and not specifically for your tractor, but in connection with our drawings, they may not show the exact application and tractor you have. In many cases to assembly manual for your mower to tractor application will clarify some clarity to exact applications.

C. This section covers the removal, repair and reinstallation of the hydraulic pump procedure for the Alamo Industrial Interstater mower, it also includes instruction for driveshaft, hoses, and miscellaneous parts to be attached the hydraulic pumps to the tractor.

D. These instructions are for working on the pumps used to power wing mower/mowers, right side mower, and left side mower units if dual wing model. For mounting one mower side only, disregard information concerning the opposite side. Hardware quantities shown are for both sides.

E. The Auxiliary pump is used to supply the lift and tilt hydraulic cylinder circuit. This auxiliary pump will not be used on all units, some will use the tractor hydraulic system to supply cylinder circuit.

F. Reference to the left or right side of the Interstater is determined while facing the front of the tractor from the drivers seat.

G. The part quantities shown for an illustration pertain only to that phase of repair. The quantity given corresponds to the number of parts needed. When repairing a single-sided model based on a dual-sided model, the quantity furnished will usually be half the quantity listed.

H. Large parts may not always be listed next to an illustration because they are usually easy to identify them from name or description.

I. This manual makes reference to individual component parts, some of which may have been pre-assembled at the factory.

Abbreviation of Parts Terminology :

Whenever reference is made to parts, listed for an illustration or elsewhere in this manual, the following abbreviations may be used:

1. ASY - Assembly	2. ASSY - Assembly	3. AUX - Auxiliary
4. BRG - Bearing	5. BRKT - Bracket	6 CYL - Cylinder
7. CW - Clockwise	8. CCW - Counter Clockwise	7. EXT - Extreme
8. EXT'N - Extend / Extension	9. F/ - For or From	10. FM - Female Boss
11. FP - Female Pipe	12. FSTNR - Fastener	13. FT - Foot / Feet
14. GB - G/B - Gearbox	15. GR - Grade	16. HD - Heavy Duty
17. HHCS - Hex Head Capscrew	18. HRDND - Hardened	19. HYD - Hydraulic
20. IN - Inch	21. LB - Pound	22. LH - Left Hand
23. LW - Lock Washer	24. M - Metric	25. MB - Male Boss
26. MM - Millimeters	27. MNT - Mount	28. MP - Male Pipe
29. MTR - Motor	30. N/A - Not Applicable	31. NC - National Coarse
32. NF - National Fine	33. NLA - No Longer Available	34. NLF - No Longer Furnished
35. NPT - National Pipe Thread	36. P1.5 - Thread Pitch	37. P2.0 - Thread Pitch
38. P2.5 - Thread Pitch	39. PL - Plated	40. PLT - Plate
41. PMP - Pump	42. PTO - Power Take Off	43. PW- Plain Washer
44. REV - Reverse	45. RH - Right Hand	46. ROT - Rotation
47. RPM - Revolutions Per Minute	48. SCKT - Socket	49. SD - Severe Duty
50. SRV - Service	51. STD - Standard	52. SVR - Severe
53. W/ - With	54. W/O - With Out	55. WLDMNT - Weldment

When installing fasteners, PW and LW (generally installed in that order) are usually on the side of the fixture or part being fastened that the hex/lock nut is on. When only HHCS, LW and/or PW are required, they are generally installed in that order. Some parts do not require a PW or LW. Refer to illustrations for exceptions. Fasteners should be installed so they cause the least interference with other parts. When securing driveshaft pulley to hub, tighten fasteners to 9 lb-ft torque.

Tandem & Single Pump Removal

1. INTRODUCTION:

In Most diagrams there are no Component Part Numbers Listed, Only Item numbers and Descriptions, This is because most parts shown as breakdown in drawings are for location, identification or if available as parts. Replacement parts will be listed in the Parts/Operators/ Asy Manual. This Manual is designed to be used with these other manuals.

2. BEFORE STARTING REPAIRS: Service Rules (READ THIS)

A. Remove Front Cover. Clean Pump and surrounding area completely before removing any connections or Lines. NO DIRT OR DEBRIS CAN BE ALLOWED ON OR NEAR HYDRAULIC SYSTEM IF IT IS BEING WORKED ON, ANY DIRT OR CONTAMINANTS IN SYSTEM NO MATTER HOW SMALL WILL DAM AGE SYSTEM! The hydraulic system must be kept "SURGICALLY CLEAN" to ensure proper operation and long life of the pumps, motors, and valves. All components must have protective caps over openings connected to internal spaces to prevent contamination. It is important that care be taken during unpacking parts and assemblies to make certain no other contaminants which will damage parts are introduced to hydraulic system.

B. After cleaning around all connections thoroughly, Disconnect all connections, Lines, Hoses, Wiring and Remove the Pump Completely from the Tractor.

C. Clean all Tools, Pans etc. The cleaning of Area and Tools MUST be done before moving (Cleaned) Pump there. Drain Oil from Pump, Recheck outside of Pump to Make Sure it is Clean before disassembly.

D. After disassembly of Pump wash all metal components in clean solvent.

E. Use compressed Air to dry parts after washing (Compressed air must be filtered and moisture free). DO NOT wipe them dry with Paper Towels or Cloth as these will leave lint and/or dust contamination. DO NOT USE Compressed Air to spin any component (Such as Bearings or Plates) as this will damage them and could be dangerous.

F. Always use new Seals when reassembling Hydraulic Pumps, Lubricate the new rubber Seals with a Petroleum Jelly, (Vaseline) which will hold them in place during assembly.

G. DO NOT reinstall worn/damaged Parts in Pump, DO NOT Use a worn/damaged Pump Housing.

H. Torque all Bolts over Gasketed Joints. Then repeat the Torque sequence to make sure Bolts are tight, some times Gaskets can give a Torque reading that is OK but is not, so always recheck Torque.

I. Verifying the accuracy of Pump Repairs on an authorized test stand is essential.

J. DO NOT start the tractor unless the hydraulic system is filled with hydraulic oil, all components have been connected and all safety equipment hase been reinstalled. Running without oil will damage the pumps and hydraulic system. Check the oil level in the reservoir before start-up after repair.

K.. Care should be taken when filling the reservoir to prevent contamination of the hydraulic system. Always use new hydraulic fluid when filling the system. USE ONLY APPROVED HYDRAULIC OIL IN THE HYDRAULIC SYSTEM.

3. RECOMMENDED TOOLS:

A. Hex Allen Wrench (Qty 5) (9/16", 5/32", 5/16", 3/32", 5/64"

B. Retaining Ring Pliers (Qty 3), 1 each of Internal (Straight .070 tip) internal (Straight .090 tip) & 1 each External (Straight 0.90 tip)

C. Retaining E-Ring Applicator (Qty 2), 1 each 9/32" & 1 each 1/2".

D. O-Ring Pick (Qty 1)

E. End Wrench (Qty 4), 1 each of 7/16", 9/16", 3/4", 1"

F. Torque Wrench (Qty 1), 0 to 100 ft. lbs. (135.6 nm) capacity

G. Hammer, Soft Face (Qty 1)

H. Seal Driver Set (Qty 1)

I. Arbor Press (Qty 1)

J. Sockets (Qty 3) 7/16", 9/16", 3/4" , Drive Size should match Torque Wrench Drive)

K. Light Petroleum Jelly (Vaseline)

L.. Locktite, # 222 and #277 or equivalent (Qty 1 tube each)

M. Petroluim Jelly (Vasoline) Samll Jar

3A. SPECIAL TOOLS AVAILABLE:

Special tools, for installing and servicing INTERSTATER kits, are illustrated on the below. Drawings for these tools are available on request. If desired, tools may be obtained from Alamo on a made to order basis. Prices will be furnished on request."

Item	Part No.	Code	Description
1	701628	S	Lift Frame Asy Suspension Chain
2	701627	A	Cuttershaft Brg Puller
3	104764	A	Lift Frame Alignment Pin (2)
4	104768	A	Rubber Bushing Support Base
5	104767	A	Rubber Bushing Compression Ring
6	104765	A	Rubber Bushing Expander (f/ Ford & Kubota Tractor)
7	104766	A	Rubber Bushing Expander (f/ Case I.H., MF & Case Tractors)
8	104769	A	Drive Shaft Installation Collar
9	104770	A	Rubber Bushing Installation Plug
10	103741	A	Seal Installation & Seating Tool
-	000802	S	Hyd. Pressure Gauge, 3000 PSI

A - Denotes special tools designed by Alamo.
S - Denotes std tools / equipment available on market

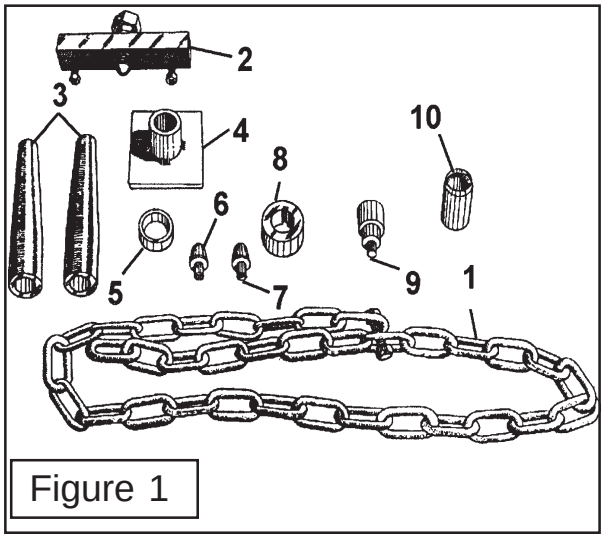


Figure 1

4. RECOMMENDED GAUGES FOR DIAGNOSTICS:

A. Inlet Vacuum: 30 PSI to 30 in Mercury (207 bar to 0 bar)
B. System Pressure Gauge: 6,000 PSI (700 bar)
C. Charge Pressure Gauge: 0 to 500 PSI (0 to 25 bar)

5. POWER CIRCUIT:

The pump unit assembly is made up of the oil reservoir, and hydraulic pump. The pump is driven by the engine crankshaft through a drive shaft. Therefore, oil is being pumped whenever the engine is running. When the mower is off, oil is directed to the reservoir by the solenoid motor control valve and does not flow to the cutter motor. Cooling is provided by patented in frame cooling tubes in the wing mowers.

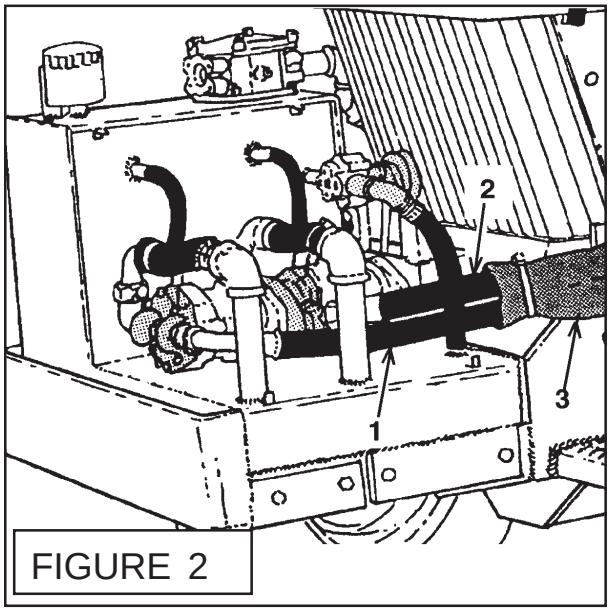


FIGURE 2

6. PUMP TYPE:

The pump unit for the wing mower rotorshaft drivepower circuit is a piston fixed displacement pump (see pump repair) and is engine driven. It is mounted on the front of the tractor above the hydraulic reservoir. There is a separate pump for each wing. By following the hose routing, the operator can determine each wing mower's supply source. Each pump has a case drain to eliminate excessive fluid in the pump. All excess fluid in the pump is routed back to the hydraulic reservoir through the case drain.

Hydraulic reservoir: There is a separate pump for each wing, Tandem for dual wings and single pump for single wings.. By following the hose routing, the operator can determine each wing mower's supply source. Each pump has a case drain to eliminate excessive fluid in the pump. All excess fluid in the pumps is routed back to the reservoir through the case drain.

7. TYPE PUMP CONFIGURATIONS USED:

There are different configurations of pumps used depending on how mower unit was ordered and how it is being used on the tractor as weel as which tractor. All Below will used the same hydraulic tank which means not all ports on hydraulic tank will be used, some will remained plugged. The connections on the tank will remain the same for the connections needed, leave all ports plugged until ready to connect the fittings.

A. Tandem Pump with Auxiliary Hydraulic Pump. The Tandem Pump is used for the dual wing model mower and the auxiliary pump is used to supply the hydraulic cylinders and cylinder control valve. (See Hydraulic Schematic at end of this section)

B. Tandem Pump without Auxiliary Hydraulic Pump. The Tandem Pump is used for the dual wing model mower and the tractors hydraulics are used to supply the hydraulic cylinders and cylinder control valve. (See Hydraulic Schematic at end of this section)

C. Single Pump with Auxiliary Hydraulic Pump. The Single Pump is used for the Single wing model mower and the auxiliary pump is used to supply the hydraulic cylinders and cylinder control valve. (See Hydraulic Schematic at end of this section)

D. Single Pump without Auxiliary Hydraulic Pump. The Single Pump is used for the dual wing model mower and the tractors hydraulics are used to supply the hydraulic cylinders and cylinder control valve.(See Hydraulic Schematic at end of this section)

E. Pumps with different Cubic Inch Displacement (CID). There are two size pumps used a 2.28 CID pump and a 2.77 CID pump. The Higher 2.77 CID pump is used on tractors that operate with a lower RPM engine speed (2000 RPM and below) to acheave PTO Speed, Tractor using 2000 RPM and above use the larger 2.77 CID Pump are tractor that use a High Engine RPM (above 2000 RPM) to achieve the PTO Speed will us the lower 2.28 CID pump. DO NOT use the 2.77 CID pump on tractors with higher than 2000 RPM engine speed. (See Below for ID numbers that will be stamped on pump flange).

Flange No.	=	Asy No.	Description
73498-LAA-01	=	001840	Inner Pump Section 2.77 CID (Closest to Engine)
73425-LAA-01	=	001734	Inner Pump Section 2.28 CID (Closest to Engine)
73428-LAG	=	001841	Outer Pump Section 2.77 CID (Furthermost from Engine)
73425-LAB-01	=	001733	Outer Pump Section 2.28 CID (Furthermost from Engine)
73428-LAF	=	00755650	Single Pump 2.77 CID
73425-LAC	=	001827	Single Pump 2.28 CID

8. TYPE HYDRAULIC RESERVOIR USED: The Hydraulic reservoir for the Interstater is the same for the Tandem Pump (Dual Wing Model) or the Single Pump (Single Wing Model) . When the Single Pump is being used some of the ports on the tank are not used and will remained plugged.

9. DRAIN HYDRAULIC RESERVOIR:

Secure Tractor so it cannot be started while repairing the pump. It will require the oil to be drained form the system and the tractor MUST NEVER be started without proper level of oil in the system

To drain the tank it is recommended that only a filter buggy be used if you intend on reusing the oil. Filter buggies or carts are commercially available for hydraulic system clean-up. These consist of a high-efficiency, high-capacity filter, a circulating pump, a drive motor, and hoses for connecting the overhauled machine's hydraulic system (See Figure 3)

When disposing of or storing removed oil make certain oil to be used is properly stored to keep it clean and in a clean container. Make certain Oil that is to be disposed of is done by following your local regulations and laws

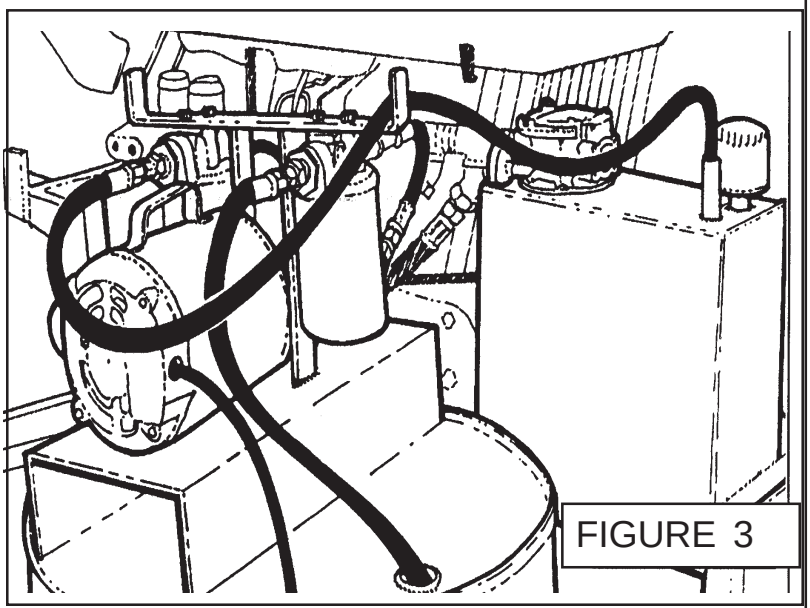
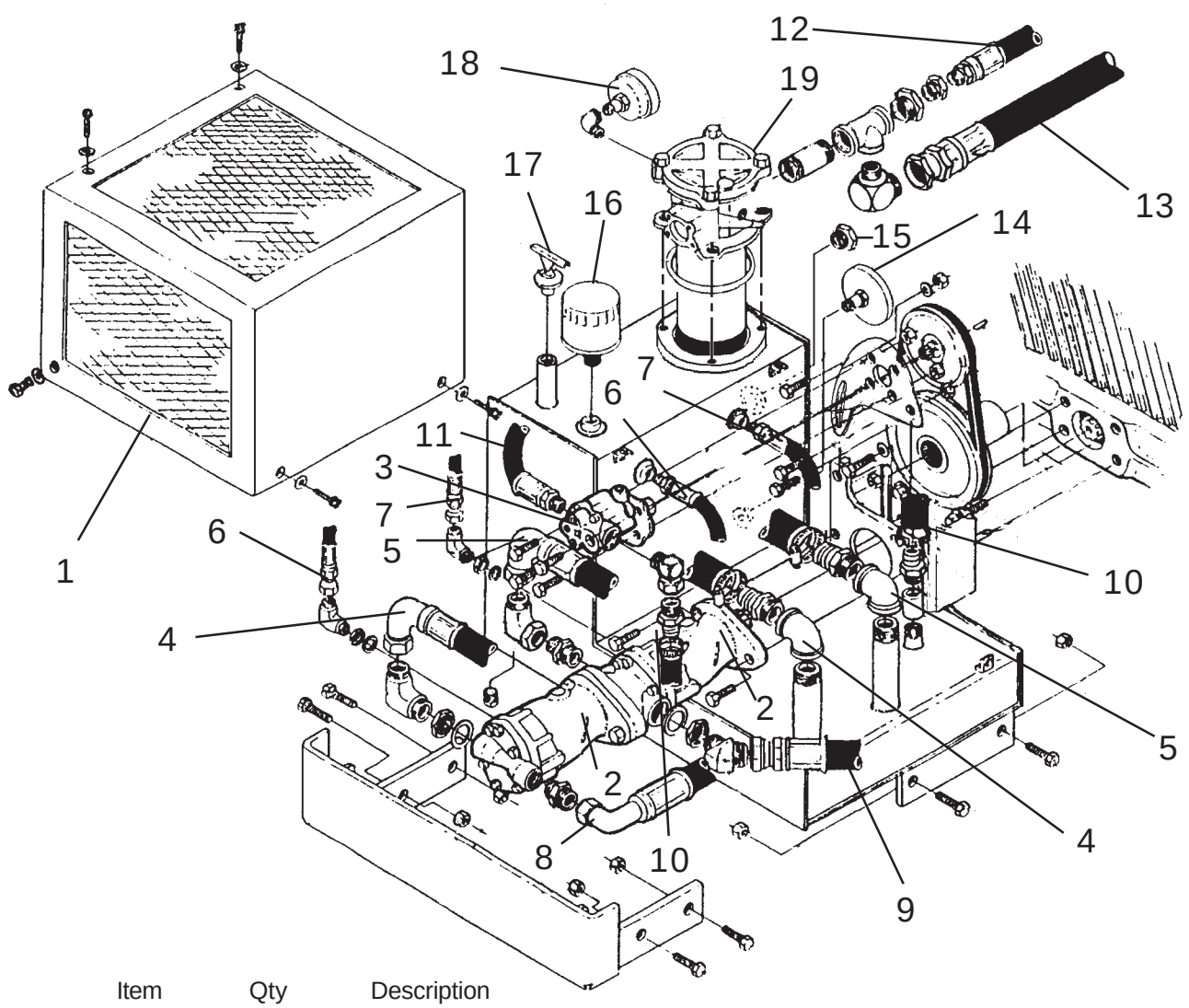


FIGURE 3

10. REMOVE PUMP COVER:

Remove the Pump Cover by unscrewing the four thumb screws which hold it in place, lift cover upward and off. If the area under this cover is dirty it must be cleaned before any dissembling starts, this will include all metal surfaces, hoses and hose fittings. (See Figure 2)

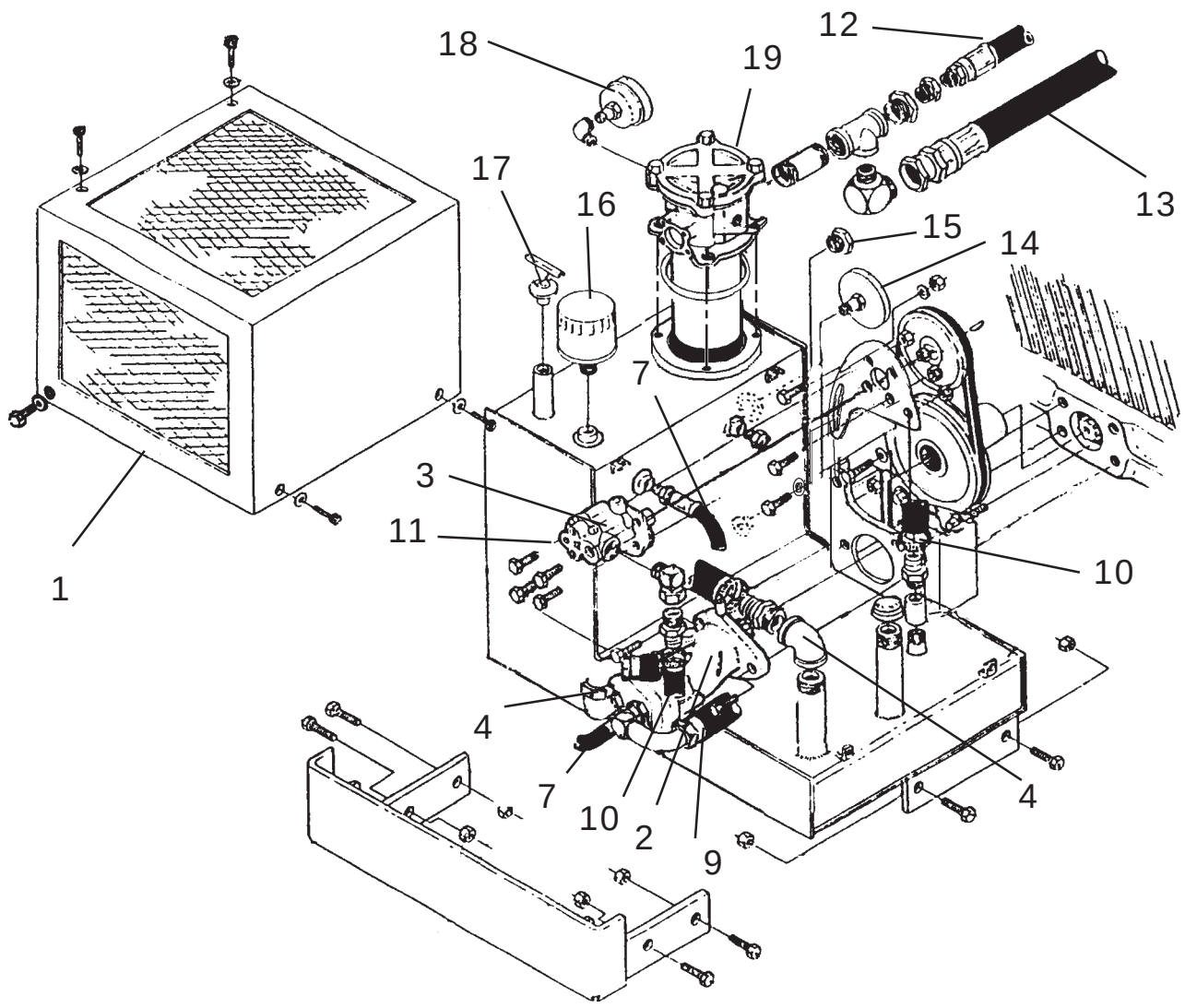
Tandem Pump w/ Tank & Aux Pump



Item	Qty	Description
1	1	Hydraulic Tank and Pump Cover Weldment
2	1	Tandem Pump Asy, Outer Half LH Wing, Inner Half RH Wing
3	1	Auxillary Pump Asy
4	1	Suction Hose F/ Tank to LH Wing Pump
5	1	Suction Hose F/ Tank to RH Wing Pump
6	1	Case Drain Hose F/ LH Wing Pump to Tank
7	1	Case Drain Hose F/ RH Wing Pump to Tank
8	1	Pressure Hose to LH Wing Motor
9	1	Pressure Hose to RH Wing Motor
10	1	Suction Hose to Auxilliary Pump
11	1	Pressure Hose F/ Auxillairy Pump to Cyl Control Valve
12	1	Return Hose F/ Cylinder Control valve to Tank Return Filter
13	1	Return Hose F/ Wing Motors to Tank Return Filter
14	1	Hydraulic Tank Temperature Gauge
15	1	Hydraulic Oil Level Sight Glass
16	1	Hydraulic Tank Breather Filler Cap
17	1	Hydraulic Tank Filler Cap
18	1	Hydraulic Oil Return Pressure Gauge
19	1	Hydraulic Oil Return Filter Asy.

Figure 4

Single Pump w/ Tank & Aux Pump



Item	Qty	Description
1	1	Hydraulic Tank and Pump Cover Weldment
2	1	Single Pump Asy, RH Wing
3	1	Auxillary Pump Asy
4	1	Suction Hose F/ Tank to RH Wing Pump
7	1	Case Drain Hose F/ RH Wing Pump to Tank
9	1	Pressure Hose to RH Wing Motor
10	1	Suction Hose to Auxilliary Pump
11	1	Pressure Hose F/ Auxillairy Pump to Cyl Control Valve
12	1	Return Hose F/ Cylinder Control valve to Tank Return Filter
13	1	Return Hose F/ Wing Motors to Tank Return Filter
14	1	Hydraulic Tank Temperature Gauge
15	1	Hydraulic Oil Level Sight Glass
16	1	Hydraulic Tank Breather Filler Cap
17	1	Hydraulic Tank Filler Cap
18	1	Hydraulic Oil Return Pressure Gauge
19	1	Hydraulic Oil Return Filter Asy.

Figure 5

Tandem Pump & Driveshaft Asy w/ Aux Pump

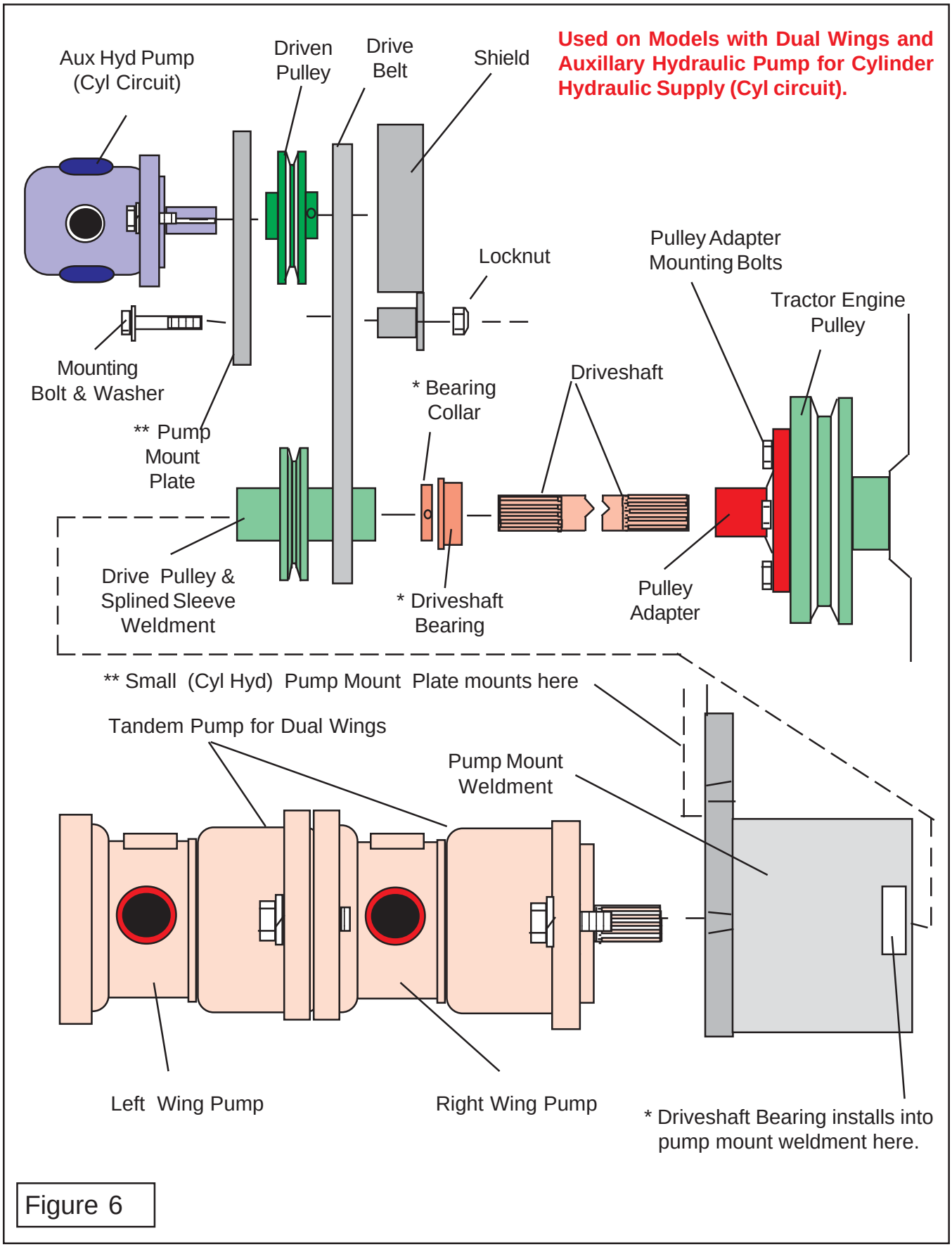


Figure 6

Tandem Pump & Driveshaft Asy w/o Aux Pump

Used on Models with Dual Wings Hydraulic Supply. Tractor hydraulic supply used for cylinders and cylinder control valve (Cyl circuit).

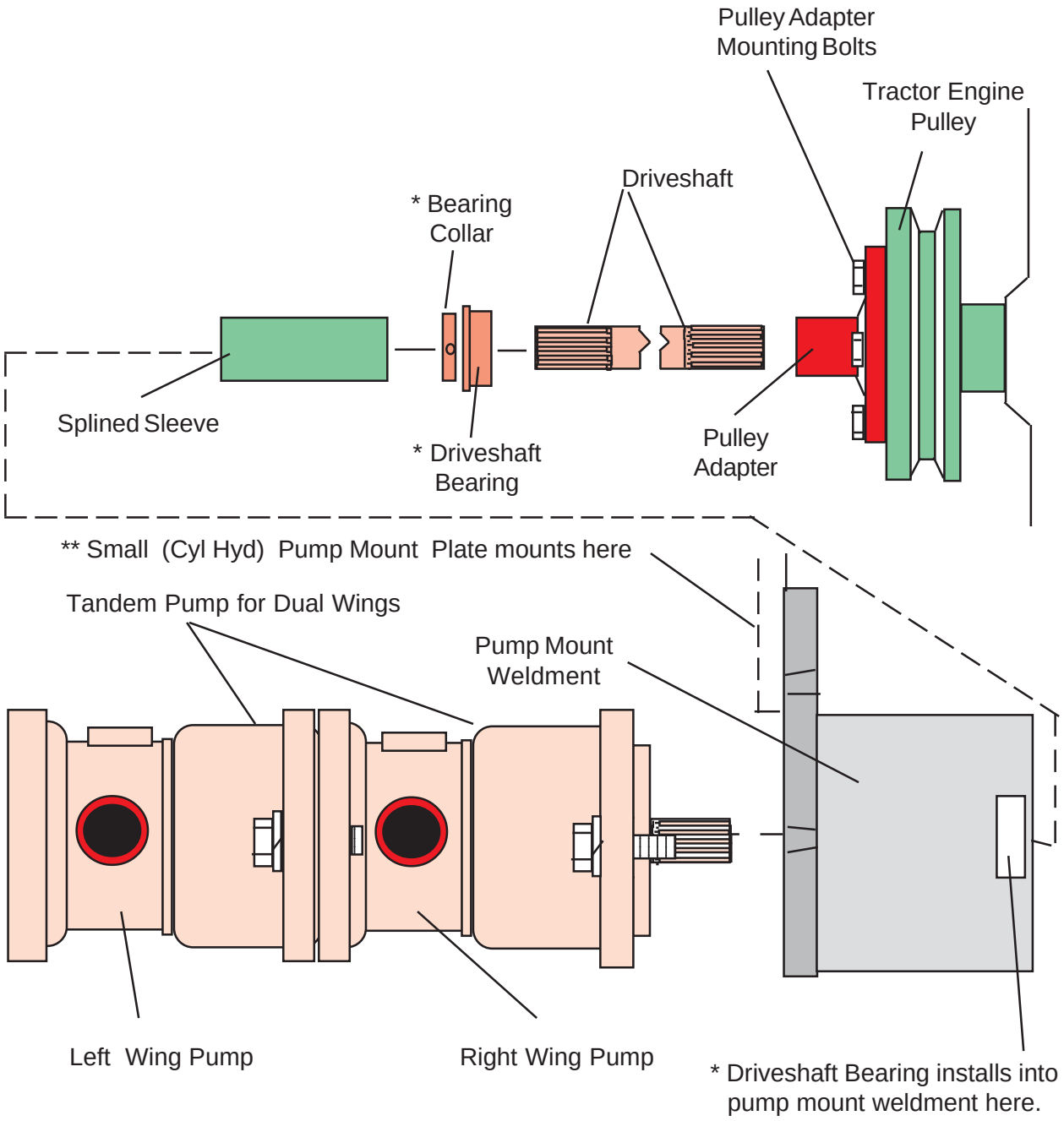


Figure 7

Single Pump & Driveshaft Asy w/ Aux Pump

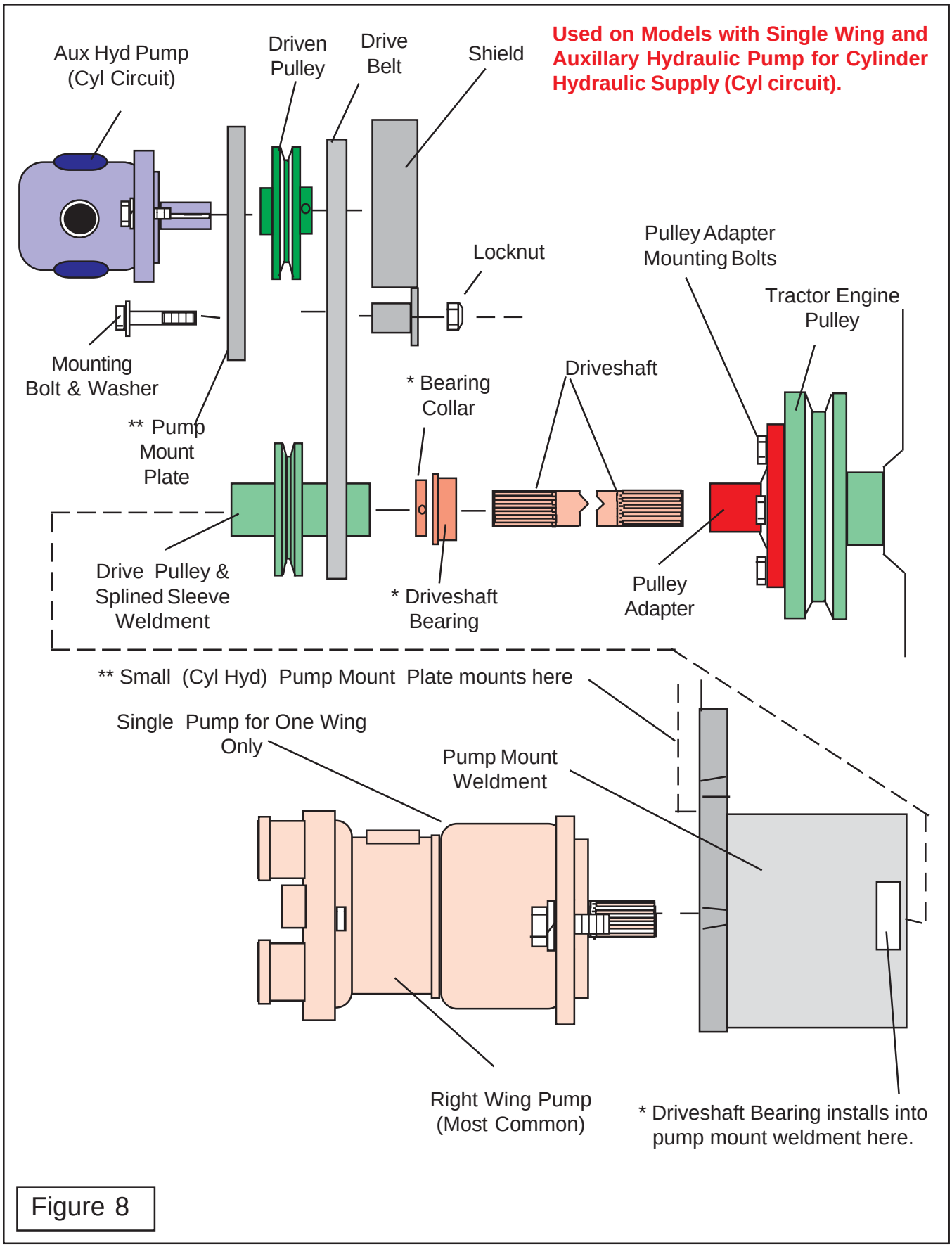
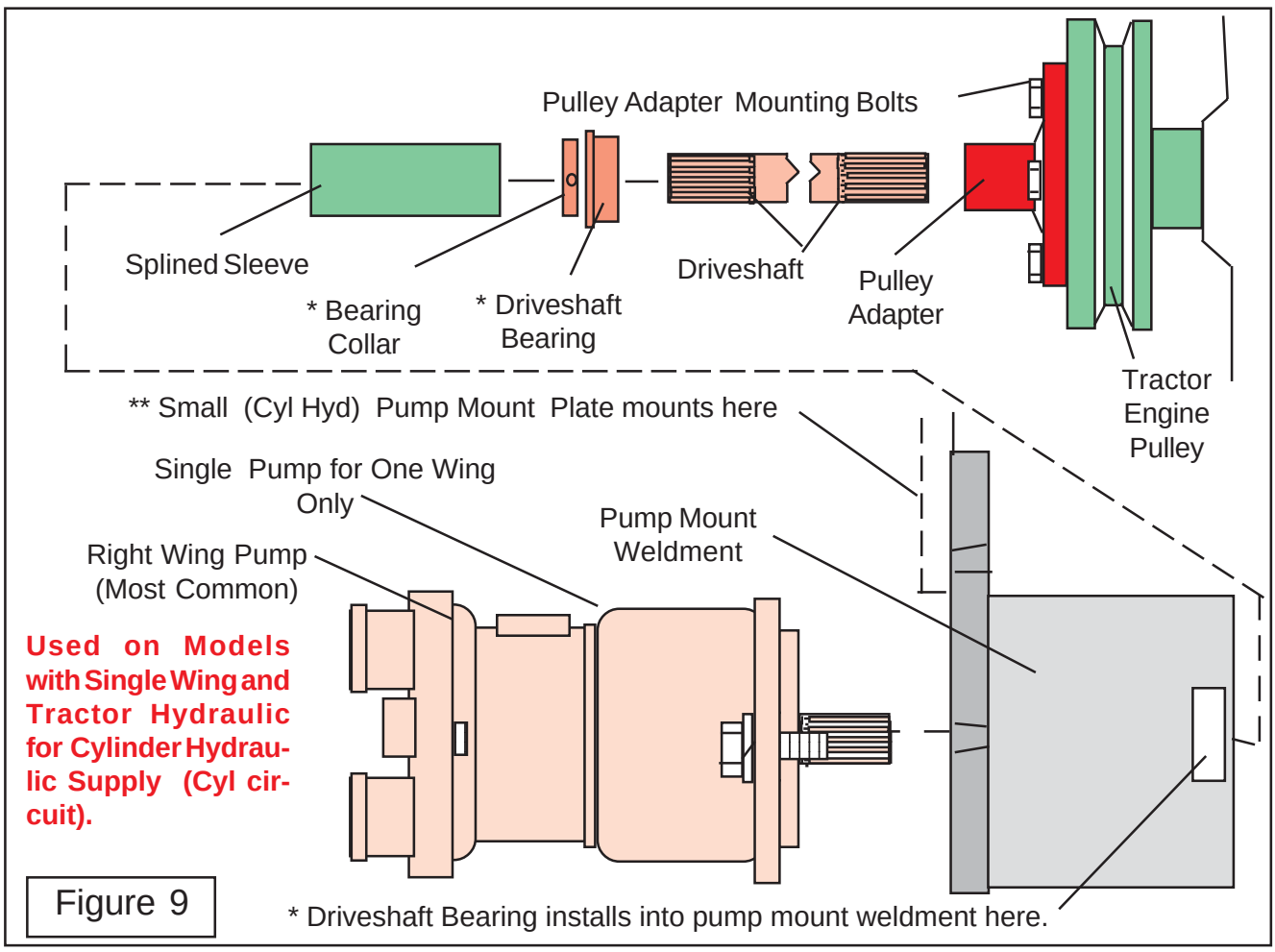


Figure 8

Single Pump & Driveshaft Asy w/o Aux Pump



Used on Models with Single Wing and Tractor Hydraulic for Cylinder Hydraulic Supply (Cyl circuit).

Figure 9

Tandem & Single Pump Remove / Replace

IMPORTANT WARNING !

Once the pump removal process is started tractor CANNOT be started unless both pumps and pump driveshaft is removed. It is the responsibilty of the repair technician to secure the tractor to where is safely secure before beginning any repairs. It is recommended that the battery cables be disconnected and a note "DO NOT START" be place in the tractor operators compartment to prevent others from stating it. IF the tractor is started with pumps patially disconnected or drive shaft left in the tractor when tractor is started it will damage the tractor and/or other components.

11. REMOVE PUMP (Pump For Motor Supply): (See Figure 4 through 16)

If both pumps are to be removed for this repair, remove both pumps together and disassemble them on the work bench is best. If only the outer pump is to be removed it can be removed and the inner pump left mounted. **NOTE: When Unit was originally assembled the technician may have used a pipe sealer in the NPT fitting, Use caution when removing these that the sealer doesn't fall into the hydraulic system or any of it ports. Clean all oil spills at once. Cap all hoses immediately to prevent contamination of the hydraulic system.**

Remove Outer & Inner Pump From Mower / Tractor:

A. Disconnect the outer Pump Suction Hose (item 4 Figure 4), this hose is retained with hose clamps. It is easier to remove the fitting at the pump than the hose clamp. Cap all hoses and pump ports immediately.

B. Disconnect the Outer Pump Case Drain Hose (item 6 Figure 4) at the pump fittings. . Cap all hoses and pump ports immediately.

C. Disconnect the Outer Pump pressure hose (item 8 Figure 4) at the pump. . Cap all hoses and pump ports immediately.

D. Remove the two bolts which attach the outer pump (item 2 figure 4) to the inner pump flange, Remove the outer pump by pulling outward on it. Once outer pump is removed cover the opening between the two pumps to keep it clean.

E. If repairing pump go to pump repair section for pump repair procedures. If installing a new pump or rebuilt pump, lightly oil new "O" Ring and place on inner pump flange. Install the new pump / rebuilt pump with the pump drain ports facing Hydraulic Tank (Right hand side of tractor). With your hands push the outer pump into the inner pump until the two pump flanges are touching, align the two flange bolt holes and install the retaining bolts. CAUTION: When working with aluminum castings DO NOT force these pumps together with the bolt, it will damage the pumps.

F. Reinstall hydraulic hoses (item 4, 6 & 8 Figure 4). Tighten hose fittings to their proper torque. Refer to Torque Chart. in specifications section.

G. If only the outer pump is being replace or repaired fill system with proper type and amount of oil. Run Unit and check for leaks. Reinstall Pump Cover and tighten the four thumb screws securely.

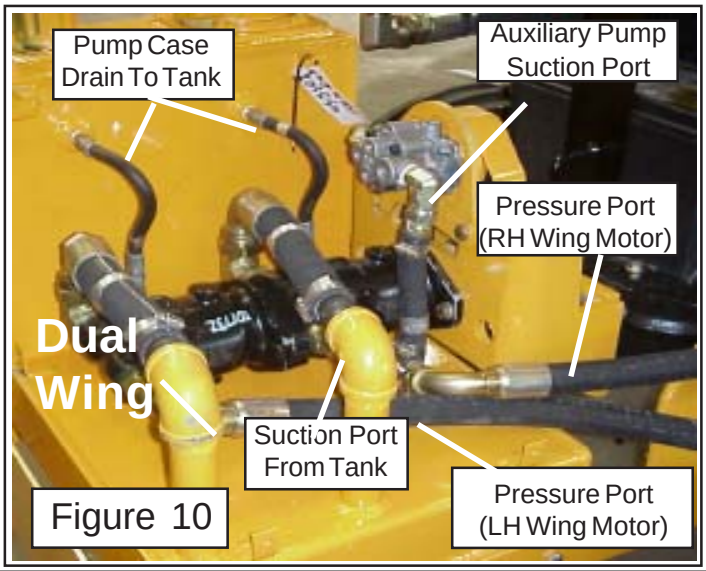


Figure 10

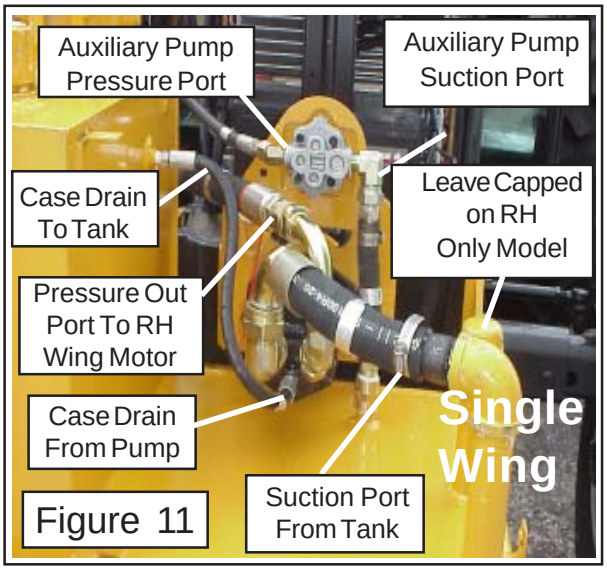


Figure 11

Tandem & Single Pump Remove / Replace

Replace Outer & Inner Pump to Mower / Tractor: (See Figure 4 through 16)

A. To replace or rebuild inner pump, both inner and outer pumps must be removed from tractor. Follow same procedure as for outer pump above plus instruction for inner pump below. NOTE: Clean spills at once. Cap all hoses immediately to prevent contamination of the hydraulic system.

B. Separate the outer pump from the inner, This is done by disconnecting hoses to inner pump (item 5, 7 and 9 Figure 4 & 5). Remove the tow bolts holding the outer pump the inner pump or they can be left together and unbolted on the work bench. Remove the two retaining bolts that mount the pump/ pumps to the pump mount plate.

C. The pump will slide out of the pump mount plate, the driveshaft may slide back with it or it may stay in tractor, the splined coupler that connects the pump to the driveshaft may stay on driveshaft or it may stay on pump.

D. Check driveshaft, crankshaft pulley adapter & splined coupler for wear and condition. If any of these parts are to be changed it is important to check the length of the new and old part to make certain they are the same. Do Not use coupler, pulley adapter or driveshaft that is worn or damaged, Do Not use driveshaft that is to long or to short.

E. Make certain that driveshaft is installed into crankshaft pulley adapter correctly. Make certain drive shaft is inserted through driveshaft bearing and lock collar correctly. Make certain spline coupler or splined coupler pulley weldment (w/ Auxiliary Pump) is installed correctly, Note: do not tighten auxiliary pump pulley to driveshaft until later.. Make certain that auxiliary pump drivebelt is installed on pulley (if Auxiliary pump is used).

F. If the pump is to be repaired see pump repair section. If pump is being replaced, bolt the inner and outer pump together on the bench or bolt inner pump to pump mount plate and then bolt the two pumps together (Dual Wings w/ Tandem Pump) Install new pump to inner pump making certain both case drain ports are facing hydraulic reservoir (RH Side of Tractor).

G. Reconnecting hoses to the two pumps (or SinglePump Single Wing). Connect the case drain hose and the pump pressure hose first. The suction hose port will have an elbow connected to it. Fill this elbow with new clean hydraulic oil before connecting the hose, this will prevent pump from starting dry when tractor is started later.

H. Fill the hydraulic system with oil to the correct level, always use a 10 micron (max) filter system to install oil. Filter buggy system are commercially available. Inspect oil sight gauge and temperature gauge to make certain they are not damaged. Start Tractor and run system checking for leaks.

I. Return Filter pressure gauge, watch the return filter gauge. When the oil is cold the gauge may show in the red and as oil gets up to normal operating temperature the gauger should drop to the green zone. If gauge pressure doesn't drop to green zone, check filter for being plugged and / or check all hoses to make certain they are not crimped shut or in a bind.

J. Re-adjust the Auxiliary pump drive belt if model uses auxiliary pump. Reinstall all guards that were removed, Do not leave guards off when running mower or tractor.

Single and Tandem Pump:

The single pump is used on single wing interstaters only. The pump can be identified by the location of the inlet and outlet port, they are located in the end plate facing outward (See Figure 10). The dual pump (inner and Outer) pump will have the inlet and outlet ports to the sides of the pump (See Figure 11). The inner pumps end plate has a flange built on to it to allow the outer pump to bolt to the inner pump. The disassembly process for the inner and outer pump is basically the same for the inner, outer tandem and the single pump. The large difference is in the end plates and the shafts for the tandem pump.

The Single and the tandem pump has two different cu. in. sizes. It will be required to know which pump before ordering parts for them, this is important as the wrong pump used will cause problems because of oil volume.

Tandem Pump Dis-Assembly & Re-Assembly

Tandem Pump (Dual Wing Model)

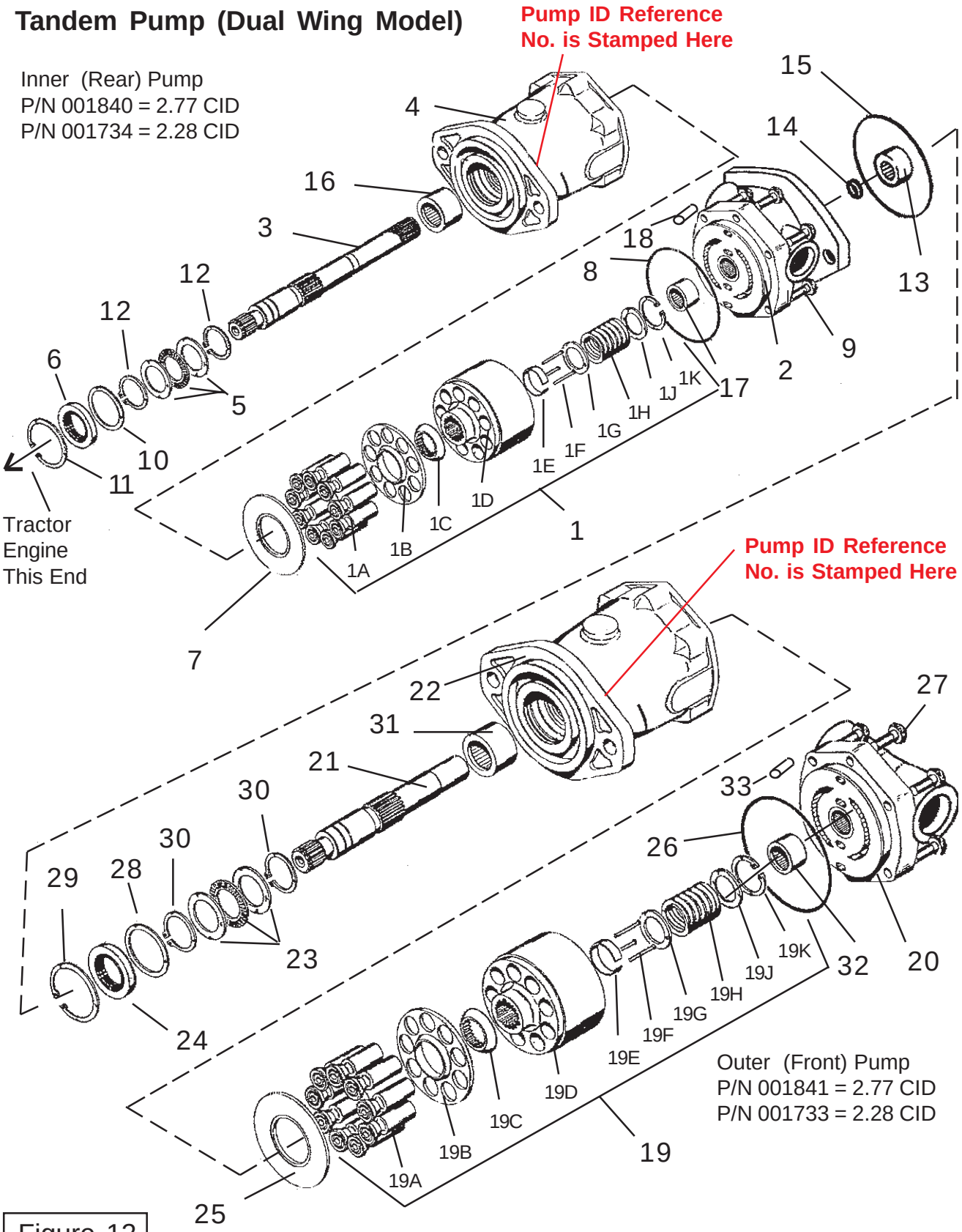


Figure 12

Tandem Pump Dis-Assembly & Re-Assembly

*** Inner (Front) Pump Assembly**
P/N 001840 - 2.77 Cu. In. Disp.
P/N 001734 - 2.28 Cu. In. Disp.
(Items 1 Thru 18)

Item	Qty	Description
1	1	Rotating Kit Asy
1A	1	Piston Asy
1B	1	Spider
1C	1	Pivot
1D	1	Piston Block
1E	1	Pin Keeper
1F	3	Pin
1G	1	Washer
1H	1	Spring
1J	1	Washer
1K	1	Snap Ring
2	1	Back-Up Plate Asy w/Brg
3	1	Driveshaft
4	1	Housing (Not Furnished as Parts)
5	1	Thrust Race & Bearing
6	1	* Shaft Seal
7	1	Cam Plate Insert
8	1	* "O" Ring
9	6	Bolt
10	1	Washer
11	1	* Retaining Ring
12	2	* Retaining Ring
13	1	Coupler
14	1	Lock Ring
15	1	"O" Ring
16	1	Bearing, Backplate
17	1	Bearing, Housing
18	1	Roll Pin
18A	1	Seal kit, Inner Pump (* in Seal Kit)

***Outer (Front) Pump Assembly**
P/N 001841 = 2.77 Cu. In. Disp.
P/N 001733 = 2.28 Cu. In. Disp.
(Items 19 Thru 33)

Item	Part No.	Qty	Description
19		1	Rotating Kit Asy
19A		1	Piston Asy
19B		1	Spider
19C		1	Pivot
19D		1	Piston Block
19E		1	Pin Keeper
19F		3	Pin
19G		1	Washer
19H		1	Spring
19J		1	Washer
19K		1	Snap Ring
20		1	Back-Up Plate Asy w/Brg
21		1	Driveshaft
22		1	Housing (Not Furnished as Parts)
23		1	Thrust Race & Bearing
24		1	* Shaft Seal
25		1	Cam Plate Insert
26		1	* "O" Ring
27		6	Bolt
28		1	Washer
29		1	* Retaining Ring
30		2	* Retaining Ring
31		1	Bearing, Backplate
32		1	Bearing, Housing
33		1	Roll Pin
33A		1	Seal kit, Outer Pump (* in Seal Kit)

*** Refer To Pump ID Numbers Stamped In Flange To Identify Pump.**

Flange No.	=	Asy No.	Description
73498-LAA-01.....	=.....	001840.....	Inner Pump Section 2.77 CID (Closest to Engine)
73425-LAA-01.....	=.....	001734.....	Inner Pump Section 2.28 CID (Closest to Engine)
73428-LAG.....	=.....	001841.....	Outer Pump Section 2.77 CID (Furthermost from Engine)
73425-LAB-01.....	=.....	001733.....	Outer Pump Section 2.28 CID (Furthermost from Engine)

NOTE; When Replaceing Pump Assembly Complete it is important to Know which Pump (CID) is being worked on, the best way to tell is look at the stamped number in the pump flange. Most of the parts on the inner and the outer pump are the same, the parts on the 2.28 CID pump and the 2.77 CID pump are the same except for item number 4 the pump housing. Item number 4 determines which CID pump you have, also item number 4 is not avalable as a replacement part. If the housing needed to be replaced it would require the pump assembly to be replace as an assembly. This is when it is so importanrt to identify the pump by checking the number stamped in the pump flange.

Tandem Pump Dis-Assembly & Re-Assembly

12. Tools Required for Pump Dis-Assembly and Re-Assembly:

1 ea. Ratchet Wrench
1 ea Torque Wrench 68 N*m (50 ft lbs)
1 ea. Internal Snap Ring Pliers (straight 2.3mm (.090 in.) Tip
1 ea. External Snap Ring Pliers (straight 1.8mm (.070 in) Tip
1 ea. 1/2" Socket
1 ea. Soft Face Hammer
1 ea. Seal driver or Similar Tool
1 ea. Petrolium Jelly (Vaseline)

13. Tandem Pump Dis-Assembly: Inner (Rear) Pump

The following instruction are based on the presumption the pumps have been disconnected from tractor unit and are ready for the work bench. All Ports and pump openings are still capped/ plugged. The Inner (Rear) pump and the Outer (Front) pump have NOT been unbolted and separated. **For Replacement Part Numbers to repair or replace these pumps see the Parts manual for the Interstater. For a Specific tractor Mounting Components see the Assembly Manual and/or the assembly instruction that were shipped with unit.**

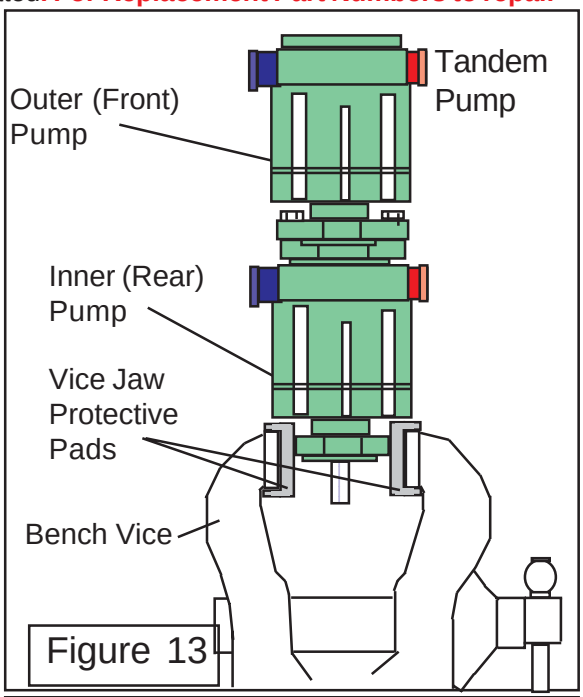


Figure 13

Unbolt Outer Pump from Inner Pump:

1. Clean the outside of pump assembly thoroughly if this was not done before it was removed from tractor. Make certain all pump openings are sealed during cleaning. Make certain work area and all tools are clean.
2. Clamp Pump in Vice with Jaw Protectors with the outer (front) pump pointing upward (See Figure 13). Remove the two connecting bolts connecting outer pump to inner pump (See Figure 14). It may require a small amount of force to free outer pump from inner pump, if needed use a soft faced hammer) to tap sides of outer pump. This will break outer pump loose from inner pump, do not hit pump with excessive force, it will damage pump housing and pump. With inner & outer pump separated set outer pump aside for now. (See Figure 14).

Dis-Assemble Inner (Rear) Pump: (For item numbers See Figure 12)

1. Clamp Inner Pump in Vice with Jaw Protectors (See Figure 14) Inner pump can be left clamped in vice for dis-assembly.
2. Remove Inner Pump to Outer Pump Coupler. Pump Shaft coupler (item 13) may have stayed on outer pump input shaft, or it may have stayed in backplate (item 2) of inner pump. Check for coupler and remove it.
3. Remove O-Ring Seal (item 15) it seals between the outer and inner pump, it will be on back plate and should be removed now.
4. Remove Lock Ring (item 14). Remove lock Ring from backplate.
5. Remove Back Plate (Item 2). The backplate is bolted on with six hex head bolts (item 9), remove these six bolts. It may require a small amount of force to free the backplate loose from pump housing. If needed use a small plastic mallet to tap the sides of the backplate. This will break the backplate loose from the pump housing, do not hit backplate with excessive force as it will damage backplate and pump housing.
6. Remove O-Ring from Backplate. Remove the O-Ring Seal (item 8) from backplate (item 2).

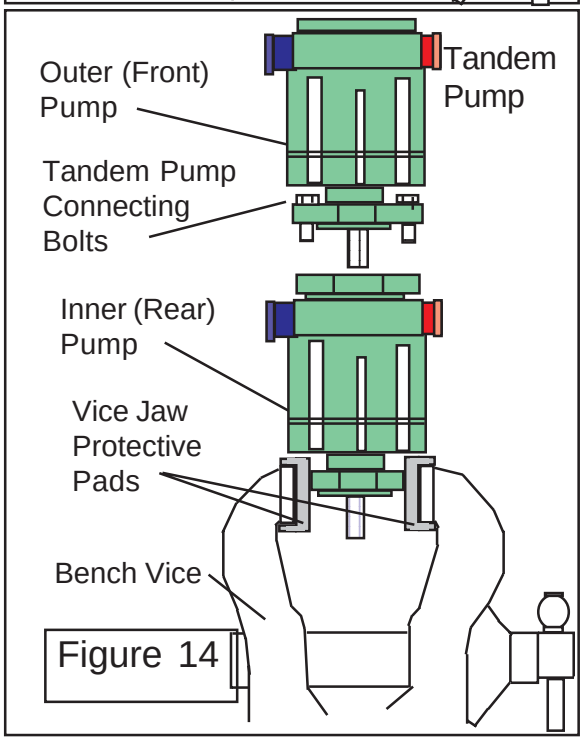


Figure 14

7. Remove Complete Piston Block Assembly (item 1) from Pump Housing (item 4). Lift the Piston Block assembly upward and out of the pump housing, It may require you to remove pump from vice and dump the Piston Block assembly out. If you do catch the block with you hand don't let it fall out on the floor or bench. DO NOT remove the spring snap Ring (item 1K) from the piston block assembly as the spring (item 1H) has compression on it, this compression will require relieving before snap ring is removed, this can be done later.
8. Remove the Piston Assembly (item 1A) from the Piston Block (item 1D). The piston assembly will pull upward and out of piston block.
9. Remove Spider (item 1B) and Pivot (item 1C) . The spider (item 1B) will be left lying on the piston block when the piston assembly is removed. the Pivot (item 1C) will also be left on the piston block and can be removed.
10. Piston Block Dis-Assembly (item 1D). The Piston block assembly need not be dis-assembled unless the pins (item 1F) or the Spring (item 1H) is damaged.
    CAUTION ! The following procedure should be used if the spring is to be removed from the piston block. The spring (item 1H) is highly compressed and the snap ring (item 1K) should NOT be removed without compressing the spring.
    The following parts will be needed to dis-assemble the piston block
    2 ea. 3/8" ID X 1-1/8" OD Flatwasher
    1 ea. 3/8"-NC X 3-1/4" Bolt, Hex Head
    1 ea. 3/8"-NC Hex Nut
    Place one of the flatwashers over the 3/8" X 3-1/4 bolt and place this through the center of the piston block. Place the other flatwasher over the bolt and let it rest on the three pins (item 1F). Screw the nut on and compress the spring inside the piston block. Use a pair of snap ring pliers and remove the internal snap ring (item 1K). Unscrew the bolt, nut and two washers, this will release pressure on spring (item 1H). Remove the spring (item 1K), the three pins (item 1F) and the pin keeper (item 1E).
11. Remove Cam Plate Insert (item 7) from housing (item 4). The cam plate (item 7) should be lying inside the housing (item 4). Reach into the housing and the cam plate (item 7) should pull out without much effort. In some cases because of the oil creating suction it may require that housing be tilted up and cam plate dumped out of housing, if this is the case catch the cam plate do not let it drop.
12. Remove Snap Ring (item 11). Using internal snap ring pliers remove internal snap ring (item 11) from front side of housing (item 4).
13. Remove Input Seal (item 6) from housing (item 4). The input seal will be remove from the housing using a seal puller. Use caution when removing the input seal so you don't scratch or damage the interior seal seat area.
14. Remove Seal Washer (item 10) which is located behind input seal. It may require to lift the housing and dump the washer out.
15. Remove Driveshaft (item 3) from housing (item 4). The driveshaft must be pulled out of housing to the front side. The driveshaft will have the retaining rings (item 12) and thrust race and bearing (item 5) still on it when it is pulled out of housing.
16. Remove Snap Ring (item 12) and Thrust Race & Bearing (item 5) from drive shaft. Use Snap Ring Pliers to remove the outer snap ring (item 12) from the end of the driveshaft. Slide the Trust Race & Bearing (item 5) from the driveshaft. Remove the second snap ring (item 12) from the driveshaft using snap ring pliers.

Inner (Rear) Pump Component Inspection: (For item numbers See Figure 12)

1. Wash All Parts. Wash all parts in suitable clean solvent. Use clean filtered compressed air to dry parts after washing. DO NOT use compressed air to spin bearing when drying parts. DO NOT use rags or towels that will leave lint to dry parts. Parts must be kept clean at all times. Work area and place parts are kept during repair process must remain clean and dust free.
2. Examine Needle Bearings (item 16 and 17). Inspect the needle bearings in the housing (item 4) and the back plate (item 2). If the needles are free of excessive play and remain in the bearing cage there is no need to replace the bearing asy.
3. Inspect thrust washers and thrust bearings (item 5). All surfaces should be free of any signs of wear or fretting. Should be no sign of distortion or flaking.
4. Inspect Spider (item 1B) and Pivot (item 1C). Conical surfaces should be free of wear and score marks.

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Tandem Pump Dis-Assembly & Re-Assembly

(Continued From Previous Page)

Inner (Rear) Pump Component Inspection: (For item numbers See Figure 12)

5. Inspect Pistons (item 1A). The O.D. surface should be smooth and free of scoring. The shoes should be snug fit to piston. The face of the shoe should be flat and free of scoring and flaking. Do Not lap piston shoes.
6. Inspect the Piston Block (item 1D). The bore should be free of scoring. The surface that contacts the back plate should be smooth and free of grooves or metal build up.
7. Inspect the Cam Plate Insert (item 7). The surface should show no signs of scoring or grooves.
8. Inspect the flat surface on the Back Plate (item 2). The back plate surface should be free of excessive scoring or metal build up.
9. Inspect the Drive Shaft (item 3). Inspect for fretting in the bearing areas. Check spline area for twisted, broken or worn splines. Check for chips and/or cracks in shaft.

Re-Assemble Inner (Rear) Pump: (For item numbers See Figure 12)

1. Coat Moving Parts for Re-Assembly. It is recommended that all moving parts be coated before and during re-assembly. If pump is to used immediately after assembly, the recommend hydraulic oil for the interstater will work. If pump is to set aside for a use at a latter date it is required that pumps moving components by coating with something that will withstand the time pump is sitting. STP or Petroleum Jelly which is vaseline (purchased from your preferred supplier) will work excellent for this as it will stick to the pump components while spare pump is sitting on parts shelf.
2. Install Snap Rings (item 12) and Thrust Race & Bearing on Driveshaft. Install the inner snap ring (item 12) onto driveshaft from the input end. Install one Thrust Race (part of item 5) onto driveshaft sliding it down against snap ring. Install the Thrust Bearing (part of item 5) onto driveshaft until it is against the Thrust race. Install Second Thrust Race (part of item 5) onto driveshaft until it is against thrust bearing. Install second snap ring (item 12) onto driveshaft until seated in snap ring groove of driveshaft and seated against thrust race.
3. Replace Needle Bearing (item 16) into Pump Housing (item 4). Install needle bearing asy into the pump housing. If necessary, install driveshaft (item 3) into pump housing (item 4) and install Washer (item 10). Coat the I.D. of Shaft Seal (item 6) and press it into the pump housing (item 4). Install the outer snap ring (item 11) into pump housing until it is seated into snap ring groove of housing.
4. Install Pin Keeper (item 1E) and Pins (item 1F) into spline area of piston block (item 1D). Compress Pin Keeper and install it in the splined area of the piston block. Install the three pins in the special grooves of the spline area of the piston block with the head end of pin toward inside of block.
5. Install Washers (item 1G & 1J) and Spring (item 1H) into Piston Block (item 1D). install Washer (item 1G or 1J are the same) into the piston block, Install Spring (item 1H) into piston block and against washer (item 1G). Install second washer (item 1J) into piston block and against spring. (CAUTION ! See Step 6 for spring compression instructions)
6. Compress Spring (item 1H) and install retaining snap ring (item 1K). CAUTION ! The following procedure should be used if the spring has been removed from the piston block. The spring (item 1H) will have to be compressed

   The following parts will be needed to assemble the piston block

   2 ea. 3/8" ID X 1-1/8" OD Flatwasher
   1 ea. 3/8"-NC X 3-1/4" Bolt, Hex Head
   1 ea. 3/8"-NC Hex Nut

   Place one of the flatwashers over the 3/8" X 3-1/4 bolt and place this through the center of the piston block. Place the other flatwasher over the bolt and let it rest on the three pins (item 1F). Screw the nut on and compress the spring inside the piston block. Use a pair of snap ring pliers and install the internal snap ring (item 1K). Install the internal snap ring (item 1K) and make certain it is seated into the snap ring groove in the piston block. Unscrew the bolt, nut and two washers, this will release pressure on spring (item 1H) and allow it seat against snap ring (item 1K). Never Remove snap ring in piston block with out compressing spring !
7. Install Pivot (item 1C), Spider (item 1B) and piston assembly (item 1A). Sit the pivot (item 1C) down onto the piston block with the taper rounded side up (See Figure 12). Sit the spider (item 1B) down over the pivot noting the concave hole in the center of the spider will sit over the rounded edge of the pivot, align the holes in the spider with the holes in the piston block. Lower the Piston assemblies (item 1A) through the spider holes and into the piston block, the piston assembly can be installed one at time

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Tandem Pump Dis-Assembly & Re-Assembly

(Continued From Previous Page)

Re-Assemble Inner (Rear) Pump: (For item numbers See Figure 12)

8. Install Cam Plate Insert (item 7). Lubricate the cam plate insert (item 7) well and install it into the pump housing (item 4) until it is seated down into the housing. This is best done with the pump housing lying on its side on the work bench.
9. Install Piston Block Assembly (item 1). The piston block assembly all assembled needs to be coated with oil. Slide the piston block assembly into the end of the pump housing aligning the ID of it over driveshaft. Push piston block assembly into housing and over driveshaft until piston shoes are in contact with the cam plate insert, it may require the driveshaft to be turned as the piston block assembly is being slid in to align the splines of the shaft with the spline of the components of the piston block assembly. DO NOT use excessive force to install piston block assembly, if it will not slide together with the force of your hand there is something wrong.
10. Install Needle Bearing (item 17) into Back Plate Asy (item 2). The needle bearings will install into the center opening of the back plate, Coat this bearing with oil as you slide it into the back plate. Install Bearings into back plate with number end of bearing up and visible. Bearing will be slightly higher (.09") than back plate.
11. Back Plate (item 2) & Sealing O-Ring (item 8). The back plate is sealed with an O-Ring that is inserted into a groove on the back plate (item 2), make certain this O-Ring is seated into this groove, lubricate the OD of the O-Ring to aid the inserting of the Back Plate into the pump housing.
12. Back Plate Asy (item 2) Roll Pin and Alignment. The backplate has a Roll Pin installed into it. This roll pin (item 18) is to align the back plate on the pump housing so front flange of housing and back plate ports will be in the correct orientation, roll pin should not be more that .173" highe than surface of back plate. This alignment is important and must be correct. Make certain the roll pin is in the back plate. Lower the Back Plate (item 2) down onto the pump Housing (item 4) aligning the back plate down over driveshaft until the sealing O-Ring (item 8) inserts into pump housing. Back plate should slide down until it is inside of pump housing, If back plate can not be pushing completely down without a lot of force, check it for something wrong. DO NOT use excessive force or use the bolts to pull back plate down.
13. Install 6 Retaining Bolts (item 9) into pump housing (item 4) to fasten back plate (item 2). Inspect bolts, make certain threads are in good condition. The bolts need to be installed in a staggered pattern alternating from one side to the other until snug. **These bolts must be TORQUED to 15 to 18 ft. lbs.** Do this in increment and staggered pattern also.
14. Install Snap Ring (item 14) and spline coupler (item 13) into Back Plate. Install the snap ring into the opening of the back plate and onto the driveshaft. This snap ring prevents the spline coupler (item 13) from moving around. This step will only apply to the tandem pump, this single pump will not use these
15. Install O-Ring (item 15) Seal into Back Plate (item 2). The O-Ring will fit into a groove cut into ID of back plate / pump mounting flange (item 2). Make certain groove is clean in back plate. Insert O-Ring (item 15) into Groove in ID of back plate. Coat O-Ring with coating of oil or vaselene.

Dis-Assemble Outer (Front) Pump: (For item numbers See Figure 12)

1. Clamp Outer (Front) Pump in Vice with Jaw Protectors. (See Figure 15) Outer (front) pump can be clamped in vice fordis-assembly, but it can also be disassembled while on the work bench.
2. Remove Back Plate (Item 20). The backplate is bolted on with six hex head bolts (item 27), remove these six bolts. It require a small amount of force to free the backplate loose from pump housing. If needed use small plastic mallet to tap the sides of the backplate. This will break the backplate loose from the pump housing, do not hit back plate with excessive force as it will damage backplate and pump housing.
3. Remove O-Ring from Backplate. Remove the O-Ring Seal (item 8) from backplate (item 26).
4. Remove Complete Piston Block Asy (item 19) f/Pump Hsg (item 22). Lift the Piston Block assembly upward and out of the pump housing, It may require you to remove pump from vice and dump the Piston Block assembly out. If you do

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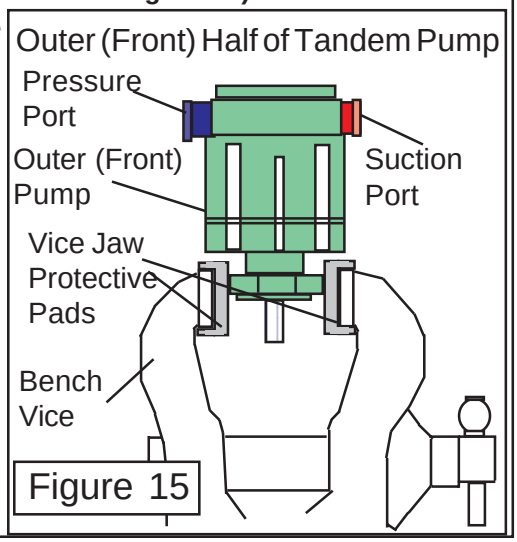

Figure 15

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Dis-Assemble Outer (Front) Pump: (For item numbers See Figure 12)

catch the block with you hand don't let it fall out on the floor or bench. DO NOT remove the spring snap Ring (item 19K) from the piston block assembly as the spring (item 19H) has compression on it, this compression will require relieving before snap ring is removed, this can be done later.

5. Remove the Piston Assembly (item 19A) from the Piston Block (item 19D). The piston assembly will pull upward and out of piston block.
6. Remove Spider (item 19B) and Pivot (item 19C) . The spider (item 19B) will be left lying on the piston block when the piston assembly is removed. The Pivot (item 19C) will also be left on the piston block and can be removed.
7. Piston Block Dis-Assembly (item 19D). The Piston block assembly need not be dis-assembled unless the pins (item 19F) or the Spring (item 19H) is damaged. CAUTION ! The following procedure should be used if the spring is to be removed from the piston block. The spring (item 19H) is highly compressed and the snap ring (item 19K) should NOT be removed without compressing the spring.

   The following parts will be needed to dis-assemble the piston block

   2 ea. 3/8" ID X 1-1/8" OD Flatwasher
   1 ea. 3/8"-NC X 3-1/4" Bolt, Hex Head
   1 ea. 3/8"-NC Hex Nut

   Place one of the flatwashers over the 3/8" X 3-1/4 bolt and place this through the center of the piston block. Place the other flatwasher over the bolt and let it rest on the three pins (item 19F). Screw the nut on and compress the spring inside the piston block. Use a pair of snap ring pliers and remove the internal snap ring (item 19K). Unscrew the bolt, nut and two washers, this will release pressure on spring (item 19H). Remove the spring (item 19K), the three pins (item 19F) and the pin keeper (item 19E).
8. Remove Cam Plate Insert (item 25) from housing (item 22). The cam plate (item 25) should be lying inside the housing (item 22). Reach into the housing and the cam plate (item 25) should pull out without much effort. In some cases because of the oil creating suction it may require that housing be tilted up and cam plate dumped out of housing, if this is the case catch the cam plate do not let it drop.
9. Remove Snap Ring (item 29). Using internal snap ring pliers remove internal snap ring (item 29) from front side of housing (item 22).
10. Remove Input Seal (item 24) from housing (item 22). The input seal will be remove from the housing using a seal puller. Use caution when removing the input seal so you don't scratch or damage the interior seal seat area.
11. Remove Seal Washer (item 28) which is located behind input seal. It may require to lift the housing and dump the washer out.
12. Remove Driveshaft (item 21) from housing (item 22). The driveshaft must be pulled out of housing to the front side. The driveshaft will have the retaining rings (item 30) and thrust race and bearing (item 23) still on it when it is pulled out of housing.
13. Remove Snap Ring (item 30) and Thrust Race & Bearing (item 23) from drive shaft. Use Snap Ring Pliers to remove the outer snap ring (item 30) from the end of the driveshaft. Slide the Trust Race & Bearing (item 23) from the driveshaft. Remove the second snap ring (item 30) from the driveshaft using snap ring pliers.

Outer (Front) Pump Component Inspection: (For item numbers See Figure 12)

1. Wash All Parts. Wash all parts in suitable clean solvent. Use clean filtered compressed air to dry parts after washing. DO NOT use compressed air to spin bearing when drying parts. DO NOT use rags or towels that will leave lint to dry parts. Parts must be kept clean at all times. Work area and place parts are kept during repair process must remain clean and dust free.
2. Examine Needle Bearings (item 31 and 32). Inspect the needle bearings in the housing (item 22) and the back plate (item 20). If the needles are free of excessive play and remain in the bearing cage there is no need to replace the bearing asy.
3. Inspect thrust washers and thrust bearings (item 23). All surfaces should be free of any signs of wear or fretting. Should be no sign of distortion or flaking.
4. Inspect Spider (item 19B) and Pivot (item 19C). Conical surfaces should be free of wear and score marks.

(Contnued Next Page)

Tandem Pump Dis-Assembly & Re-Assembly

(Continued From Previous Page)

Outer (Front) Pump Component Inspection: (For item numbers See Figure 12)

5. Inspect Pistons (item 19A). The O.D. surface should be smooth and free of scoring. The shoes should be snug fit to piston. The face of the shoe should be flat and free of scoring and flaking. Do Not lap piston shoes.
6. Inspect the Piston Block (item 19D). The bore should be free of scoring. The surface that contacts the back plate should be smooth and free of grooves or metal build up.
7. Inspect the Cam Plate Insert (item 25). The surface should show no signs of scoring or grooves.
8. Inspect the flat surface on the Back Plate (item 20). The back plate surface should be free of excessive scoring or metal build up.
9. Inspect the Drive Shaft (item 21). Inspect for fretting in the bearing areas. Check spline area for twisted, broken or worn splines. Check for chips and/or cracks in shaft.

Re-Assemble Outer (Front) Pump: (For item numbers See Figure 12)

1. Coat Moving Parts for Re-Assembly. It is recommended that all moving parts be coated before and during re-assembly. If pump is to used immediately after assembly, the recommend hydraulic oil for the interstater will work. If pump is to set aside for a use at a latter date it is required that pumps moving components by coating with something that will withstand the time pump is sitting. STP or Petroleum Jelly which is vaseline (purchased local) will work excellent for this as it will stick to the pump components while spare pump is sitting on parts shelf.
2. Install Snap Rings (item 30) and Thrust Race & Bearing on Driveshaft. Install the inner snap ring (item 30) onto driveshaft from the input end. Install one Thrust Race (part of item 23) onto driveshaft sliding it down against snap ring. Install the Thrust Bearing (part of item 23) onto driveshaft until it is against the Thrust race. Install Second Thrust Race (part of item 23) onto driveshaft until it is against thrust bearing. Install second snap ring (item 30) onto driveshaft until seated in snap ring groove of driveshaft and seated against thrust race.
3. Replace Needle Bearing (item 31) into Pump Housing (item 22). Install needle bearing asy into the pump housing. If necessary, install driveshaft (item 21) into pump housing (item 22) and install Washer (item 28). Coat the I.D. of Shaft Seal (item 24) and drive it into the pump housing (item 22). Install the outer snap ring (item 29) into pump housing until it is seated into snap ring groove of housing.
4. Install Pin Keeper (item 19E) and Pins (item 19F) into spline area of piston block (item 19D). Compress Pin Keeper and install it in the splined area of the piston block. Install the three pins in the special grooves of the spline area of the piston block with the head end of pin toward inside of block.
5. Install Washers (item 19G & 19J) and Spring (item 19H) into Piston Block (item 19D). install Washer (item 19G or 19J are the same) into the piston block, Install Spring (item 19H) into piston block and against washer (item 19G). Install second washer (item 19J) into piston block and against spring. (CAUTION ! See Step 6 for spring compression instructions)
6. Compress Spring (item 19H) and install retaining snap ring (item 19K). CAUTION ! The following procedure should be used if the spring has been removed from the piston block. The spring (item 19H) will have to be compressed

   The following parts will be needed to assemble the piston block

   2 ea. 3/8" ID X 1-1/8" OD Flatwasher
   1 ea. 3/8"-NC X 3-1/4" Bolt, Hex Head
   1 ea. 3/8"-NC Hex Nut

   Place one flatwasher over 3/8" X 3-1/4 bolt, place this through center of piston block. Place other flatwasher over bolt and let it rest on the three pins (item 19F). Screw nut on to compress spring inside piston block. Use snap ring pliers to install internal snap ring (item 1K). Install internal snap ring (item 19K) , make certain it is seated into snap ring groove in piston block. Unscrew bolt, nut and two washers, this will release pres sure on spring (item 19H) allowing it to seat against snap ring (item 19K). Never Remove snap ring in piston block without compressing spring first !
7. Install Pivot (item 19C), Spider (item 19B) and piston assembly (item 19A). Sit the pivot (item 19C) down onto the piston block with the taper rounded side up (See Figure 12). Sit the spider (item 1B) down over the pivot noting the concave hole in the center of the spider will sit over the rounded edge of the pivot, align the holes in the spider with the holes in the piston block. Lower the Piston assemblies (item 19A) through the spider holes and into the piston block, the piston assembly can be installed one at time.

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Tandem Pump Dis-Assembly & Re-Assembly

Re-Assemble Inner (Rear) Pump: (Continued From Previous Page)

8. Install Cam Plate Insert (item 25). Lubricate cam plate insert (item 25) well and install it into pump housing (item 22) until it seats down into housing. This is best done with pump housing lying on its side on work bench.
9. Install Piston Block Assembly (item 19). Coat piston block asy with oil. Slide piston block asy into end of pump housing aligning ID of it over driveshaft. Push piston block asy into housing over driveshaft until piston shoes are in contact with cam plate insert, it may require driveshaft to be turned as the piston block asy is being slid in to align splines of shaft with spline of the components of piston block asy. DO NOT use excessive force to install piston block asy, if it will not slide together with force of your hand there is something wrong.
10. Install Needle Bearing (item 32) into Back Plate Asy (item 20). The needle bearings will install into center opening of back plate, Coat this bearing with oil as you slide it into back plate. Install Bearings into back plate with number end of bearing up and visible. Bearing will be slightly higher (.09") than back plate.
11. Back Plate (item 20) & Sealing O-Ring (item 26). The back plate is sealed with an O-Ring that is inserted into a groove on back plate (item 20), make certain this O-Ring is seated into this groove, lubricate OD of O-Ring to aid the inserting of the Back Plate into the pump housing.
12. Back Plate Asy (item 2) Roll Pin and Alignment. The backplate has a Roll Pin installed into it. This roll pin (item 33) is to align the back plate on the pump housing so front flange of housing and back plate ports will be in the correct orientation, roll pin should not be more that .173" higher than surface of back plate. This alignment is important and must be correct. Make certain the roll pin is in the back plate. Lower the Back Plate (item 20) down onto the pump Housing (item 22) aligning the back plate down over driveshaft until the sealing O-Ring (item 26) inserts into pump housing. Back plate should slide down until it is inside of pump housing, If back plate can not be pushing completely down without a lot of force, check it for something wrong. DO NOT use excessive force or use the bolts to pull back plate down.
13. Install 6 Retaining Bolts (item 27) into pump housing (item 22) to fasten back plate (item 20). Inspect bolts, make certain all threads of bolts are in good condition. The bolts need to be installed in a staggered pattern alternating from side to side until snug. **These bolts must be TORQUED to 15 to 18 ft.** lbs. Do this in increment and staggered pattern also.

Bolt Inner (Rear) to Outer (Front) Pump:

1. Clamp Inner (Rear) Pump in Vice (See Figure 16) With inner (front) pump pointing down ward (See Figure 16). Make certain splined coupler (item 13) is installed into rear of the inner pump, also make certain sealing O-Ring (item 15) is installed on inside of inner pump backplate (item 2). Coat sealing o-ring with oil or vaseline. Lower outer pump down into inner pump aligning outer pump driveshaft with spline coupler (item 13). Inner and outer pump must be aligned, do this by making certain ports are aligned the same. The larger port will be suction port (See Figure 16), when tandem pumps are bolted together these. ports must be on same side. Install tandem pump connecting bolts (See Figure 16). It may require a small amount of force to push outer pump in inner pump, but no more than pushing it together with hands. If it will not push together by hand, check for alignment problem. DO NOT use bolts to force the two pump halves together, this will damage pumps. With inner & outer pump bolted together you are finished with pump rebuild / repair (See Figure 13).
2. Continued with reinstalling pump onto mower / Tractor. (See Step 14 and 15) of re-assemble tandem inner Pump.
3. Fill Pump Case with Oil when connecting rebuilt or new pump. The pump should be filled half full with oil, this can be done by pouring clean oil through the ports of pump. When Pump is installed on mower, Connect pump pressure hose, pump case drain hose and install pump suction elbow fitting into pump. Pour oil into the elbow fitting, this will put oil into pump so it will not be started dry.

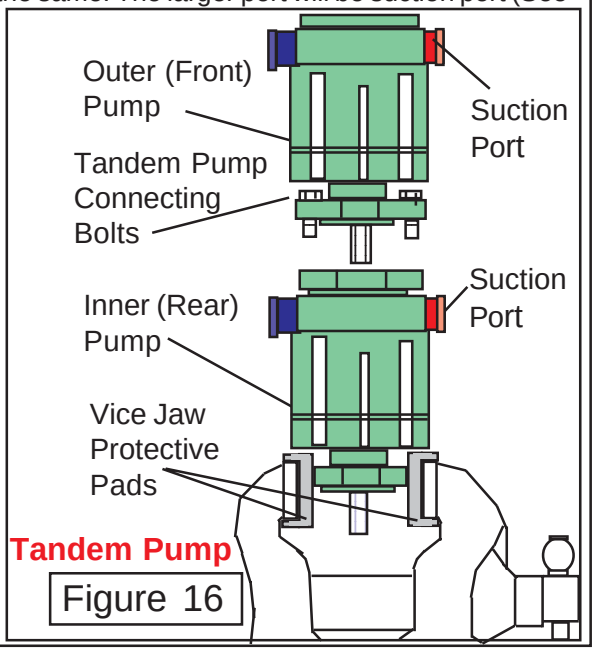


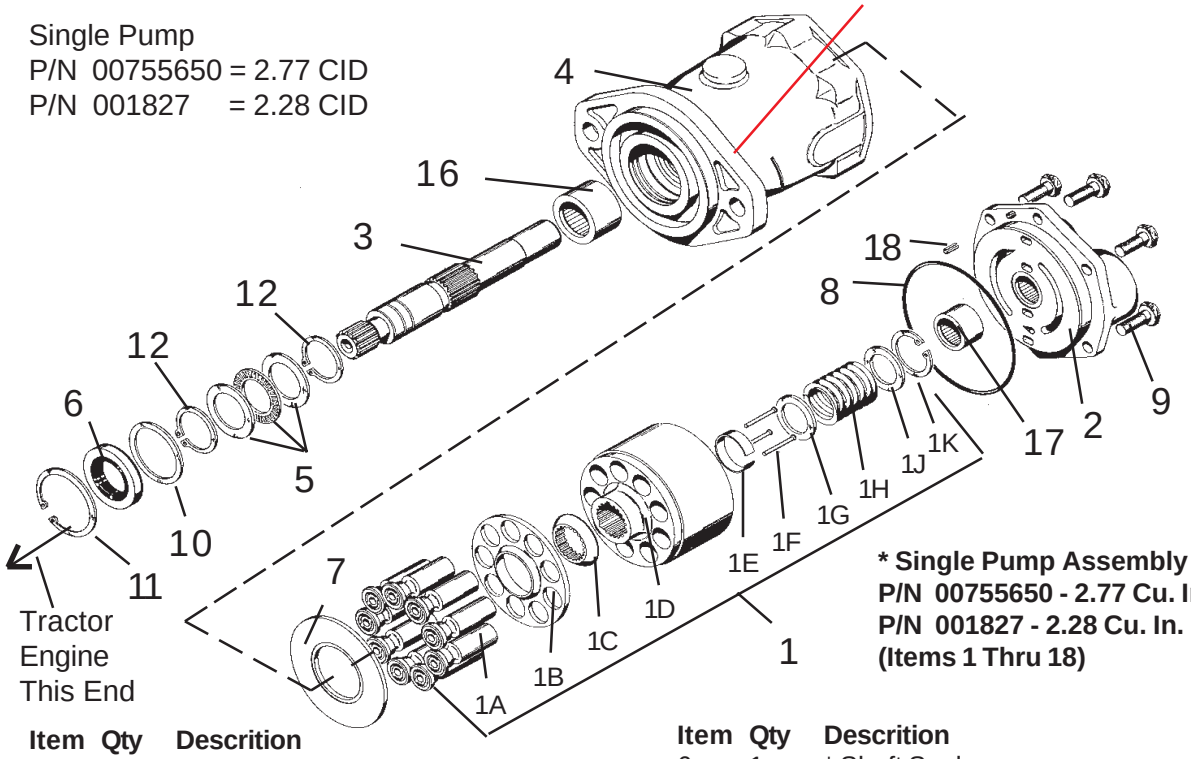
Figure 16

Single Pump Dis-Assembly & Re-Assembly

Single Pump (Single Wing Model)

Pump ID Reference No. is Stamped Here

Single Pump
P/N 00755650 = 2.77 CID
P/N 001827 = 2.28 CID



*** Single Pump Assembly**
P/N 00755650 - 2.77 Cu. In. Disp.
P/N 001827 - 2.28 Cu. In. Disp.
(Items 1 Thru 18)

Item	Qty	Description
1	1	Rotating Kit Asy
1A	1	Piston Asy
1B	1	Spider
1C	1	Pivot
1D	1	Piston Block
1E	1	Pin Keeper
1F	3	Pin
1G	1	Washer
1H	1	Spring
1J	1	Washer
1K	1	Snap Ring
2	1	Back-Up Plate Asy w/Brg
3	1	Driveshaft
4	1	Housing (Not Furnished as Parts)
5	1	Thrust Race & Bearing

Item	Qty	Description
6	1	* Shaft Seal
7	1	Cam Plate Insert
8	1	* "O" Ring
9	6	Bolt
10	1	Washer
11	1	* Retaining Ring
12	2	* Retaining Ring
14	1	Lock Ring
15	1	"O" Ring
16	1	Bearing, Backplate
17	1	Bearing, Housing
18	1	Roll Pin
18A	1	Seal kit, Inner Pump (* in Seal Kit)

*** Refer To Pump ID Numbers Stamped In Flange To Identify Pump.**

Flange No.	=	Asy No.	Description
73428-LAF.....	=.....	00755650.	Single Pump 2.77 CID
73425-LAC.....	=.....	001827.....	Single Pump 2.28 CID

NOTE; When Replaceing Pump Assembly Complete it is important to Know which Pump (CID) is being worked on, the best way to tell is look at the stamped number in the pump flange. Most of the parts on the inner and the outer pump are the same, the parts on the 2.28 CID pump and the 2.77 CID pump are the same except for item number 4 the pump housing. Item number 4 determines which CID pump you have, also item number 4 is not avalable as a replacement part. If the housing needed to be replaced it would require the pump assembly to be replace as an assembly. This is when it is so importanrt to identify the pump by checking the number stamped in the pump flange.

Figure 17

Single Pump Dis-Assembly & Re-Assembly

Dis-Assemble Single Pump: (For item numbers See Figure 17)

1. Clamp Single Pump in Vice with Jaw Protectors. (See Figure 15) Single pump can be clamped in vice or it can be disassembled while on work bench
2. Remove Back Plate (Item 2). The backplate is mounted with six hex head bolts (item 9), remove these six bolts. It will require a small amount of force to free the backplate loose from pump housing. Use soft faced hammer, tap sides of backplate. This will break the backplate loose from pump housing, do not hit back plate with excessive force it will damage backplate and pump housing.
3. Remove O-Ring from Backplate. Remove the O-Ring Seal (item 8) from backplate (item 2).
4. Remove Complete Piston Block Assembly (item 1) from Pump Housing (item 4). Lift Piston Block asy upward and out of pump housing, It will require you to remove pump from vice and dump Piston Block asy out. Catch the block with hand don't let it fall out on floor or bench. DO NOT remove the spring snap Ring (item 1K) from piston block assembly as spring (item 1H) has compression on it, this compression will require relieving before snap ring is removed, this can be done later.

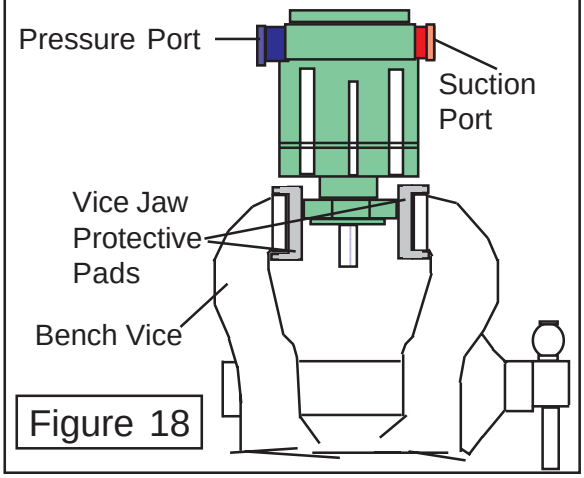


Figure 18

5. Remove the Piston Assembly (item 19A) from the Piston Block (item 1D). The piston assembly will pull upward and out of piston block.
6. Remove Spider (item 1B) and Pivot (item 1C) . The spider (item 1B) will be left lying on the piston block when the piston assembly is removed. The Pivot (item 1C) will also be left on the piston block and can be removed.
7. Piston Block Dis-Assembly (item 1D). The Piston block assembly need not be dis-assembled unless the pins (item 19F) or the Spring (item 1H) is damaged. CAUTION ! The following procedure should be used if the spring is to be removed from the piston block. The spring (item 19H) is highly compressed and the snap ring (item 1K) should NOT be removed without compressing the spring.

   The following parts will be needed to dis-assemble the piston block

   2 ea. 3/8" ID X 1-1/8" OD Flatwasher
   1 ea. 3/8"-NC X 3-1/4" Bolt, Hex Head
   1 ea. 3/8"-NC Hex Nut

   Place one flatwashers over 3/8" X 3-1/4 bolt , place this through center of piston block. Place other flatwasher over t bolt and let it rest on the three pins (item 1F). Screw the nut on and compress the spring inside piston block. Use snap ring pliers and remove the internal snap ring (item 1K). Unscrew bolt, nut and two washers, this will release pressure on spring (item 1H). Remove spring (item 1K), three pins (item 1F) and the pin keeper (item 1E).
8. Remove Cam Plate Insert (item 7) from housing (item 4). The cam plate (item 7) should be lying inside the housing (item 4). Reach into the housing and the cam plate (item 7) should pull out without much effort. In some cases because of the oil creating suction it may require that housing be tilted up and cam plate dumped out of housing, if this is the case catch the cam plate do not let it drop.
9. Remove Snap Ring (item 11). Using internal snap ring pliers remove internal snap ring (item 11) from front side of housing (item 4).
10. Remove Input Seal (item 6) from housing (item 4). The input seal will be remove from the housing using a seal puller. Use caution when removing the input seal so you don't scratch or damage the interior seal seat area.
11. Remove Seal Washer (item 10) which is located behind input seal. It may require to lift the housing and dump the washer out.
12. Remove Driveshaft (item 3) from housing (item 4). The driveshaft must be pulled out of housing to the front side. The driveshaft will have the retaining rings (item 12) and thrust race and bearing (item 5) still on it when it is pulled out of housing.
13. Remove Snap Ring (item 12) and Thrust Race & Bearing (item 5) from drive shaft. Use Snap Ring Pliers to remove the outer snap ring (item 12) from the end of the driveshaft. Slide the Trust Race & Bearing (item 5) from the driveshaft. Remove the second snap ring (item 12) from the driveshaft using snap ring pliers.

Single Pump Dis-Assembly & Re-Assembly

Single Pump Component Inspection: (For item numbers See Figure 17)

1. Wash All Parts. Wash all parts in suitable clean solvent. Use clean filtered compressed air to dry parts after washing. DO NOT use compressed air to spin bearing when drying parts. DO NOT use rags or towels that will leave lint to dry parts. Parts must be kept clean at all times. Work area and place parts are kept during repair process must remain clean and dust free.
2. Examine Needle Bearings (item 16 and 17). Inspect the needle bearings in the housing (item 4) and the back plate (item 2). If the needles are free of excessive play and remain in the bearing cage there is no need to replace the bearing asy.
3. Inspect thrust washers and thrust bearings (item 5). All surfaces should be free of any signs of wear or fretting. Should be no sign of distortion or flaking.
4. Inspect Spider (item 1B) and Pivot (item 1C). Conical surfaces should be free of wear and score marks.
5. Inspect Pistons (item 1A). The O.D. surface should be smooth and free of scoring. The shoes should be snug fit to piston. The face of the shoe should be flat and free of scoring and flaking. Do Not lap piston shoes.
6. Inspect the Piston Block (item 1D). The bore should be free of scoring. The surface that contacts the back plate should be smooth and free of grooves or metal build up.
7. Inspect the Cam Plate Insert (item 7). The surface should show no signs of scoring or grooves.
8. Inspect the flat surface on the Back Plate (item 2). The back plate surface should be free of excessive scoring or metal build up.
9. Inspect the Drive Shaft (item 3). Inspect for fretting in the bearing areas. Check spline area for twisted, broken or worn splines. Check for chips and/or cracks in shaft.

Re-Assemble Outer (Front) Pump: (For item numbers See Figure 17)

1. Coat Moving Parts for Re-Assembly. All moving parts shoulde be coated with lubricant before and during reassembly. If pump is to used immediately after assembly, the recommend hydraulic oil for interstater will work. If pump is to set aside for use at latter date, pumps moving components should be coating with something that will withstand the time pump is sitting. Petroleum Jelly (vaseline) which can be purchased local. This will work excellent for this as it will stick to the pump components while spare pump is sitting on parts shelf. If parts are to be assembled later the parts should be rewashed and cleaned.
2. Install Snap Rings (item 12) and Thrust Race & Bearing on Driveshaft. Install inner snap ring (item 12) onto driveshaft from input end. Install one Thrust Race (part of item 5) onto driveshaft sliding it down against snap ring. Install Thrust Bearing (part of item 5) onto driveshaft until it is against Thrust race. Install Second Thrust Race (part of item 5) onto driveshaft until it is against thrust bearing. Install second snap ring (item 12) onto driveshaft until seated in snap ring groove of driveshaft and seated against thrust race.
3. Replace Needle Bearing (item 16) into Pump Housing (item 4). Install needle bearing asy into the pump housing. If necessary, install driveshaft (item 3) into pump housing (item 4) and install Washer (item 10). Coat the I.D. of Shaft Seal (item 6) and press it into the pump housing (item 4). Install the outer snap ring (item 11) into pump housing until it is seated into snap ring groove of housing.
4. Install Pin Keeper (item 1E) and Pins (item 1F) into spline area of piston block (item 1D). Compress Pin Keeper and install it in the splined area of the piston block. Install the three pins in the special grooves of the spline area of the piston block with the head end of pin toward inside of block.
5. Install Washers (item 1G & 1J) and Spring (item 19H) into Piston Block (item 1D). install Washer (item 1G or 1J are the same) into the piston block, Install Spring (item 19H) into piston block and against washer (item 1G). Install second washer (item 1J) into piston block and against spring. (CAUTION ! See Step 6 for spring compression instructions)
6. Compress Spring (item 1H) and install retaining snap ring (item 1K). CAUTION ! The following procedure should be used if the spring has been removed from the piston block. The spring (item 1H) will have to be compressed

   The following parts will be needed to assemble the piston block

   2 ea. 3/8" ID X 1-1/8" OD Flatwasher
   1 ea. 3/8"-NC X 3-1/4" Bolt, Hex Head
   1 ea. 3/8"-NC Hex Nut

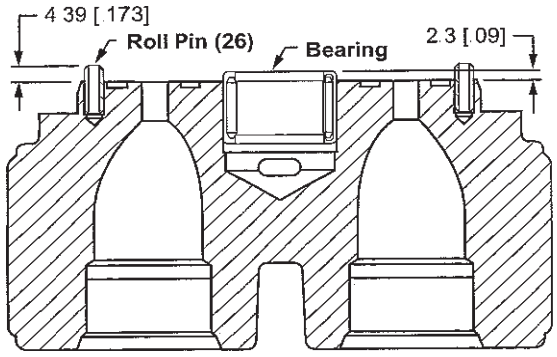
(Contnued Next Page)

Single Pump Dis-Assembly & Re-Assembly

(Continued From Previous Page

Re-Assemble Single Pump: (For item numbers See Figure 17)

6. (Continued From Previous Page) Place one flatwasher over 3/8" X 3-1/4 bolt, place this through center of piston block. Place other flatwasher over bolt and let it rest on the three pins (item 1F). Screw nut on to compress spring inside piston block. Use snap ring pliers to install internal snap ring (item 1K). Install internal snap ring (item 1K) , make certain it is seated into snap ring groove in piston block. Unscrew bolt, nut and two washers, this will release pressure on spring (item 1H) allowing it to seat against snap ring (item 1K). Never Remove snap ring in piston block with out compressing spring first !
7. Install Pivot (item 1C), Spider (item 1B) and piston assembly (item 1A). Sit pivot (item 1C) down onto piston block with taper rounded side up (See Figure 17). Sit spider (item 1B) down over pivot noting concave hole in center of spider will sit over rounded edge of pivot, align holes in the spider with holes in piston block. Lower Piston assemblies (item 1A) through spider holes and into piston block, piston assembly can be installed one at a time.
8. Install Cam Plate Insert (item 7). Lubricate cam plate insert (item 7) well and install it into pump housing (item 4) until it is seated down into housing. This is best done with pump housing lying on its side on work bench.
9. Install Piston Block Assembly (item 1). The piston block assembly all assembled needs to be coated with oil. Slide piston block assembly into end of pump housing aligning ID of it over driveshaft. Push piston block assembly into housing and over driveshaft until piston shoes are in contact with cam plate insert, it may require driveshaft to be turned as piston block assembly is being slid in to align splines of shaft with spline of the components of piston block assembly. DO NOT use excessive force to install piston block assembly, if it will not slide together with the force of your hand, there is something wrong.
10. Install Needle Bearing (item 17) into Back Plate Asy (item 2). The needle bearings will install into center opening of back plate, Coat this bearing with oil as you slide it into back plate. Install Bearings into back plate with number end of bearing up and visible. Bearing will be slightly higher (.09") than back plate. (See Figure 18A).
11. Back Plate (item 2) & Sealing O-Ring (item 8). The back plate is sealed with an O-Ring that is inserted into a groove on back plate (item 2), make certain this O-Ring is seated into this groove, lubricate the OD of O-Ring to aid inserting of Back Plate into pump housing.
12. Back Plate Asy (item 2) Roll Pin and Alignment. The backplate has a Roll Pin installed into it. This roll pin (item 18) is to align back plate on pump housing so front flange of housing and back plate ports will be in the correct orientation, roll pin should not be more that .173" higher than surface of back plate. This alignment is important and must be correct. Make certain the roll pin is in the back plate. Lower the Back Plate (item 2) down onto the pump Housing (item 4) aligning the back plate down over driveshaft until the sealing O-Ring (item 8) inserts into pump housing. Back plate should slide down until it is inside of pump housing, If back plate can not be pushing completely down without a lot of force, check it for something wrong. DO NOT use excessive force or use the bolts to pull back plate down.
13. Install 6 Retaining Bolts (item 9) into pump housing (item 4) to fasten back plate (item 2). Inspect the bolts, make certain all threads are in a The bolts need to be installed in a staggered pattern alternating from one side to the other until snug. **These bolts must be TORQUED to 15 to 18 ft.** lbs. Do this in increment and staggered pattern also.
14. Fill Pump Case with Oil when connecting rebuilt or new pump. The pump should be filled half full with oil, this can be done by pouring clean oil through the ports of pump. When Pump is installed on mower, Connect pump pressure hose, pump case drain hose and install pump suction elbow fitting into pump. Pour oil into the elbow fitting, this will put oil into pump so it will not be started dry.



Roll Pin & Bearing Installation

Figure 18A

14. SINGLE PUMP & SINGLE WING:

The Pump for the RH Wing Only (Single Pump) has one pressure hose. The Rear (closest to Tractor Engine) it the supply for the RH Wing Motor. The LH fitting is the Motor Pressure Supply. The hose for the RH Wing should be marked with a red plastic tie on it, Connect these two hoses at the pump now (See Figure 19). When single wing there will only one suction port of tank used, leave a cap on the other port (See Figure 19).

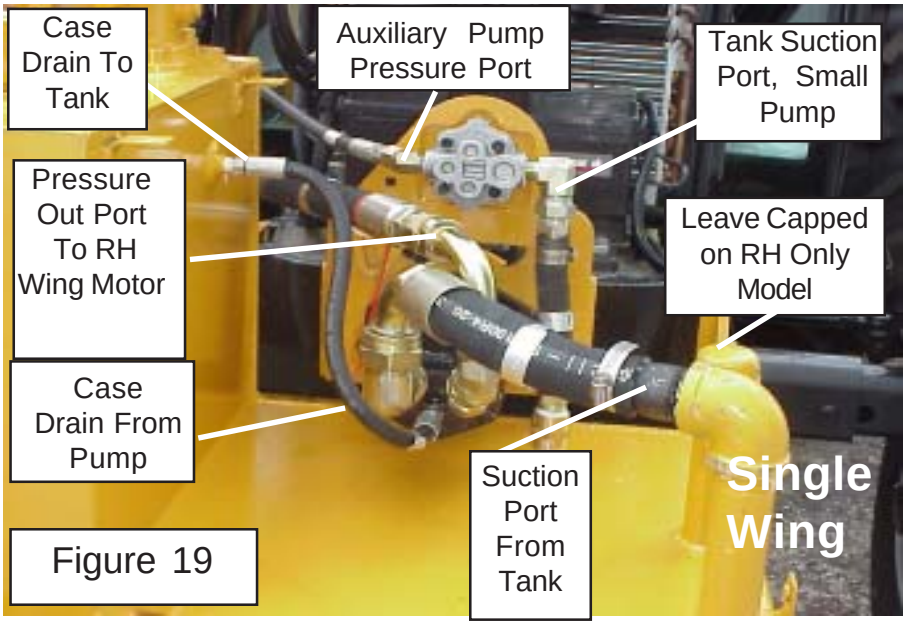


Figure 19

14A. TANDEM PUMP & DUAL WINGS

The Pump for the dual wing is a tandem pump and will be connected different than the single wing. The tandem pump has two suction hoses, two case drain hoses and two pressure hoses (See Figure 20).

15. SUCTION HOSES From/ MOTOR SUPPLY PUMPS:

The suction hose is used for each pump section , (Single or Dual as shown). When single pump is used one of the suction ports of the pump will remain plugged (See Figure 5 & 19)

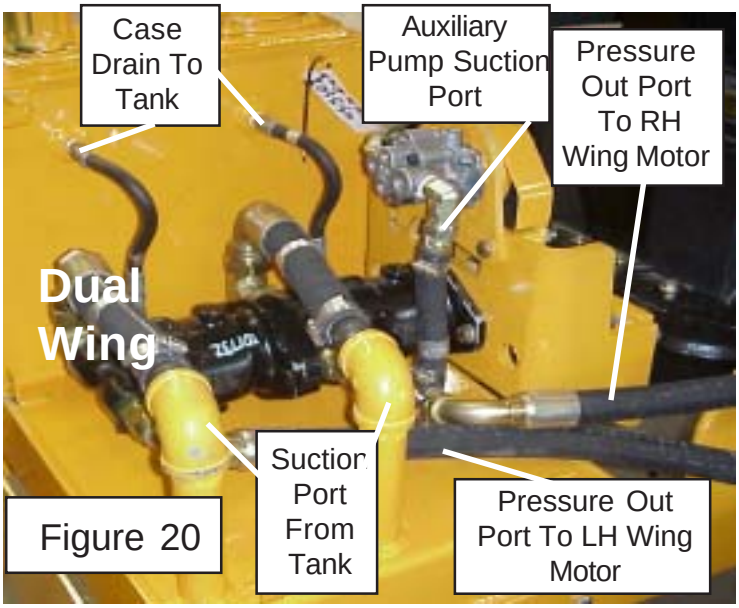


Figure 20

16. AUXILIARY PUMP OPERATION:

The AUXILIARY pump is used to supply hydraulics to the cylinder control valve. This pump is powered by the tractor engine through a pulley and belt system off of the driveshaft to the main pumps (See Figure 4, 5, 6, 8, 20 & 21). If the model you have was set up to utilize the tractor hydraulic system to operate the hydraulic cylinder circuit you will not have this pump (See Figure 7 & 9)

17. REMOVE AUXILIARY PUMP HOSES AND BELT GUARD:

Remove the Suction hose and the pressure hose from the auxiliary pump (See Figure 22), make certain to cap (plug all Hydraulic opening when hoses and fittings are disconnected. The belt guard is retained by the same bolts that retain the auxiliary pump mount plate to the main pump mount plate. There are two bolts, remove the belt adjusting bolt first, then the pump plate mounting bolt. The pump will remain bolted to the pump mounting plate (See Figure 23 & 24) Figure 24 shows the auxiliary pump with out the tank installed for illustration only, The tank will not require removal to remove the auxiliary pump. When Auxiliary pump is removed the spline drive coupler and pulley weldment will remain on the main pump driveshaft (See Figure 25 & 26).

Auxiliary Pump Remove & Replace

18. REMOVE AUXILIARY PUMP:

Remove the two auxiliary pump mount plate bolts (See Figure 24 & 25), this will release the adjustment to the V-belt. Slip the v-belt off of the auxiliary pump pulley and leave the belt hanging on the spline coupler pulley weldment (See Figure 17 & 18) below pump.The hoses for the auxiliary pump should be disconnected now if they have not been, make certain to cap all hoses and pump ports immediately when opened

Figure 21

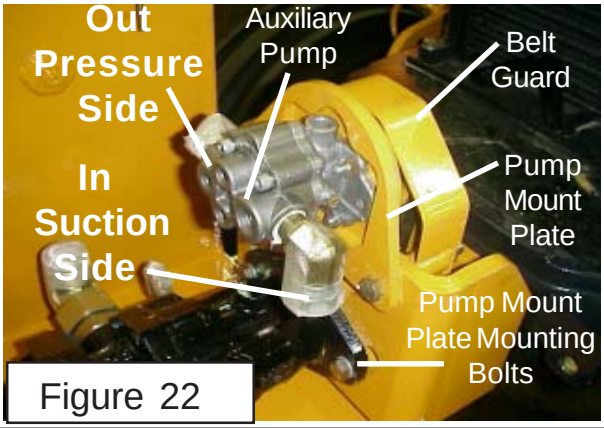


Figure 22

Figure 23

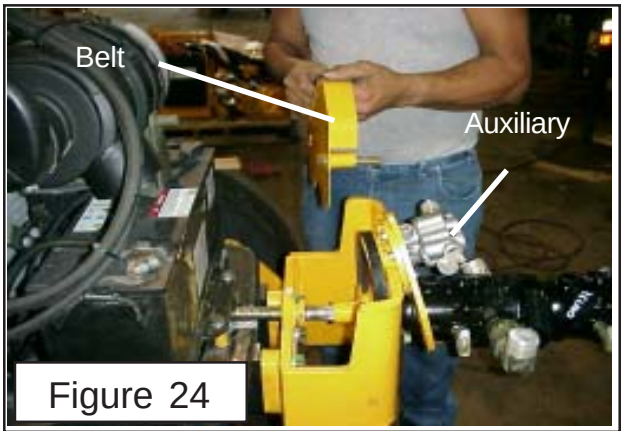


Figure 24

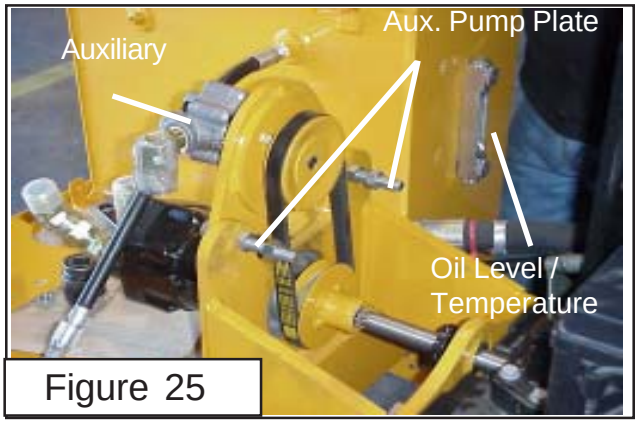


Figure 25

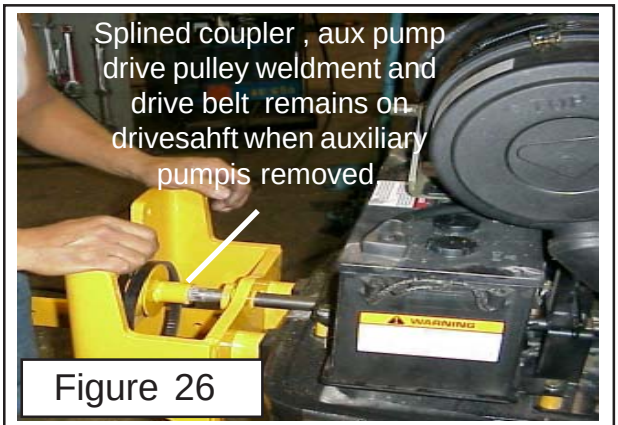


Figure 26

Auxiliary Pump Dis-Assembly

19. DISASSEMBLE AUXILIARY PUMP:

(See Figure 28 & 29)

A. Remove Auxiliary Pump Drive Pulley, loosen set screw in pulley and slide it off of pump shaft.

B. Remove Pump From Pump Mount Plate Bracket. There are two bolts that mount the pump to the mounting plate bracket, remove these two bolts.

C.. Remove Drive Key From Pump Input Shaft before beginning the disassembly of pump (See Figure 28).

D. Secure Auxiliary Pump in Vice. Clamp the pump in a vise with protective devices for the jaws. Clamp the pump in the vice at the pump mounting flange, use caution DO NOT over tighten the vice and damage pump mounting flange (See Figure 28).

E. Unbolt the pump assembly bolts that hold the two pump halves together (See Figure 28)

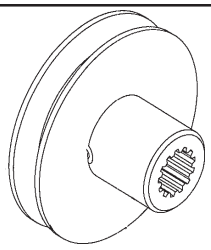
F. Remove The Cover half of the pump will lift up and off with out to much resistance, do not hammer on pump housing. Drive gear and driven gear should remain in lower pump body half. Look for any components that may stay in pump cover half or fell out onto the floor, (such as items 2, 7, 8 See Figure 29).

G. Pull the drive gear and the driven gear form pump body half (Note Gear Set is not shown). Take notice of items 3, 4, 5 when pulling gear set from pump body (See Figure 29), if item 3,4 & 5 stay in the pump body half when gear set is removed it is OK, remove them now by pulling them upwards out of pump body.

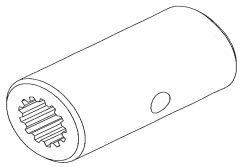
H. Remove Pump Shaft Input Seal. Using the appropriate snap ring pliers remove the seal retaining snap ring. Using a seal removing tool remove the input seal, use caution not to damage the pump body housing when removing seal.

I. Clean all pump components. Clean the pump components with clean solvent, do not use any abrasive cleaning pads or powders as these would damage pump housing components. Completely dry all pump components with clean compressed air. Do not dry parts with rags or towels that will leave lent or fuzz on components. If cleaned parts are going to be left for long period before re-assembly, parts should be coated with hydraulic oil to prevent rust and stored in such a way as not to allow dust and dirt it contaminate them. When these parts are assembled it is recommended that they be washed and cleaned again.

J. Layout Pump components for inspection. Lay all the components of the pump out on a clean dry surface, this will include all seals, gaskets, O-Rings, bolts, washer or any other component that is part of the auxiliary pump. It is very important that all components be inspected for wear and/or damage. All replacement parts should be laid out and compared to the old parts to make certain they are the same. Some components cannot be re placed as parts, they can only be replaced as complete pump assembly. Check the pump body and pump cover for wear and / or damage (this pump will not have shaft bearings that are replaceable), if shaft and/or gear wear surface is damaged or worn the pump will need to be replaced as an assembly. Check the mating edges of the pump body and cover with a straight edge to make certain the edges are flat and not warped. The gear set, the pump body and pump cover are not replaceable as parts, these will only be replaceable by replacing the complete pump assembly. The Shaft Seal, Seal Plate, O-Ring, Seal Asy, Anti-extrusion Block, Wear Plate, Gasket Insert, Bridging Insert are available as replacement parts in the form of a pump repair kit.



Splined Coupler Pulley Weldment (Use w/Aux. Hyd Pump System)



Splined Coupler Only (Use when Tractor Hyd System is used to supply cylinders)

Figure 27

Auxiliary Pump Re-Assembly

20. ASSEMBLE AUXILIARY PUMP:

(See Figure 28 & 29)

NOTE: To assemble and dis-assmble the auxilary steps are basically the same in reverse. Use Dis-assembly and Re-Assembly section.

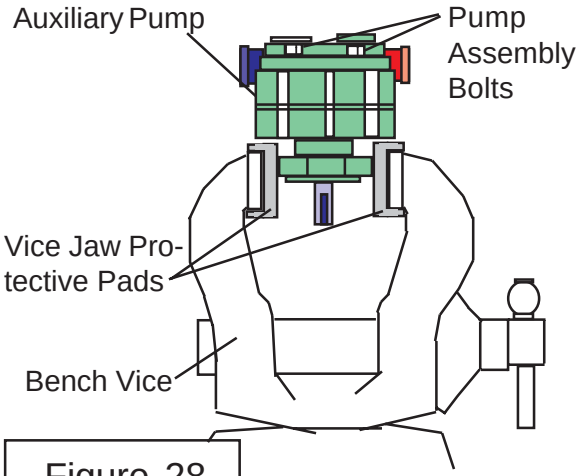


Figure 28

A. Place Pump Body into Vice. Clamp the pump body in a vise with protective devices for the jaws (See Figure 19). Clamp the pump body in the vice at the pump mounting flange, use caution DO NOT over tighten the vice and damage pump mounting flange.

B. Install Shaft Seal into Pump Body, the seal is installed with seal lip inward toward gears. Use appropriate seal driver to instal seal. Coat the seal with petroleum jelly (Vaseline) for start-up lubrication (See Figure 29).

C. Insert Snap Ring into Pump Body. Use snap ring pliers to make certain snap ring is seated into groove in pump body (See Figure 29).

D. Coat the Anti-Extrusion Block with petroleum jelly and insert it into pump body, make certain it is installed on the correct side of pump body. The Petroleum jelly will hold it in place during assembly.

E. Install Seal Asy. The seal assembly must be installed with the small hole over the Anti-Extrusion Block. The grooved side of seal must be installed to the opposite side as the anti-extrusion block (See Figure 29).

F. Install Wear Plate. The wear plate is also referred to as othe thrust plate. The wear plate will have one side that is bronze, this bronze side must face the gears for proper wear and performance. (See Figure 29)

G. Install drive gear and driven gear (Gear set). Check the input shaft of the drive gear around the keyway slot to make certain there are no burrs or sharp edges that willcut the seal. Coat the input shaft of drive gear with vaseline at seal wear area. Install the drive gear into the pump body using caution when pushing through the input seal. Install the driven gear, coat the driven gear shaft with coat of vaseline and insert the gear into the pump body. Inspect gears the upper edge of the gears should be even, if they are not check components already installed to make certain they are seated correctly. DO not attempt to continue assembly if gears are not even in height.

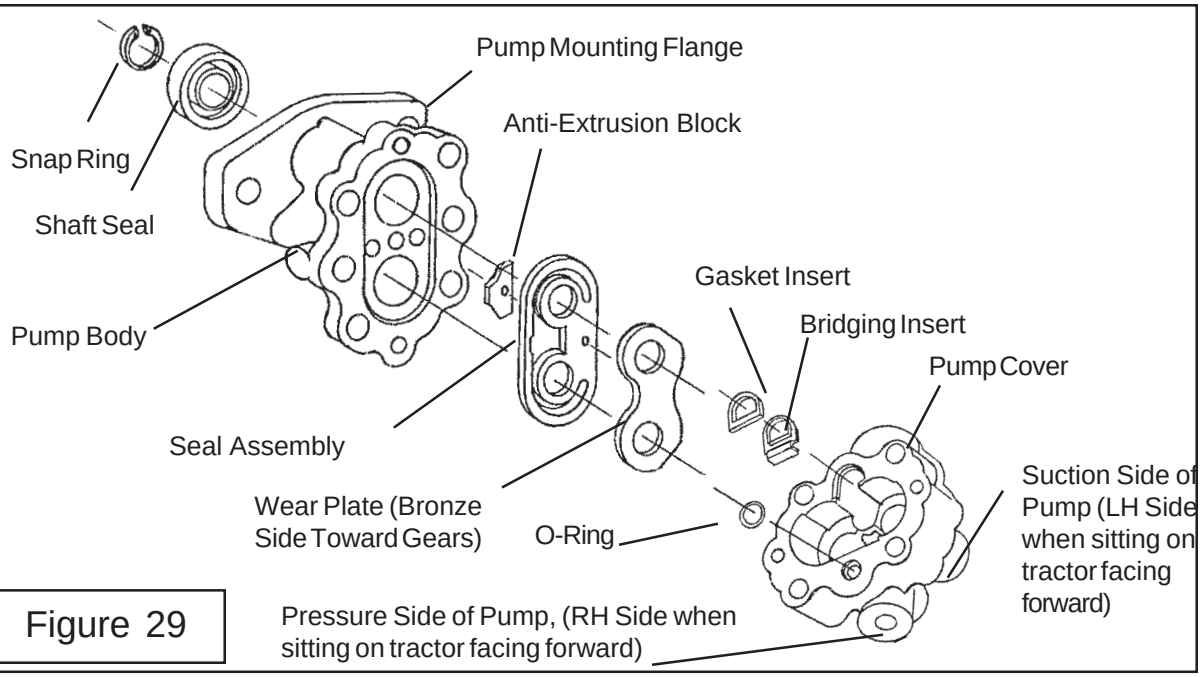


Figure 29

Auxiliary Pump Re-Assembly & Re-Install

H. Install Gasket Insert and Bridging Insert. The Pump Cover will have the Bridging insert and the gasket insert installed into it (See Figure 29). Coat the bridging insert with a coat of vaseline. Insert the bridging insert as shown in figure 29 with the lip toward cover and the square edge toward the center. Coat the gasket insert with vaseline and install it into the pump cover making certain that it seats against the bridging insert.

I. Install O-Ring into Pump Cover. Coat O-Ring with vaseline which will hold the O-Ring in the pump cover for asy. Insert it in grooved space around hole in pump cover apposite where bridging insert installs (See Figure 29).

J. Install the Pump Cover to Pump Body. Install pump cover over the gear set, make certain that the o-ring, gasket insert and bridging insert don't slip out. The pump cover should slid down over the gear set until the pump body and the pump cover are touching. If the pump cover and pump body has a gap between them there is something wrong, do not install bolts or try to force them together as it will cause damage. Recheck the assembly to see what is preventing them from sliding together (See Figure 29).

K. Bolt pump cover and pump body together. There are four bolts and lockwasher used to bolt the pump together. These bolts screw into the aluminum pump body. DO NOT over tighten these bolts.

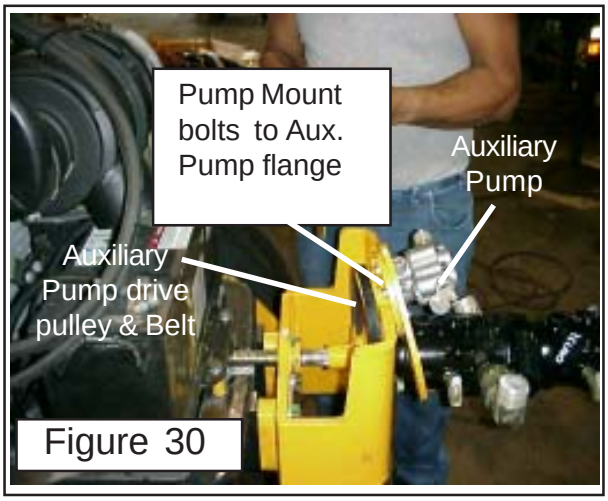


Figure 30

21. RE-INSTALL AUXILIARY PUMP:

A. Re-install Pump Mount plate. The pump mount plate will be install with the two retaining bolts through the pump mount flange that was removed during disassembly. DO NOT over tighten these bolts, they are through the aluminum pump flange and excessive tightening will damage the pump flange and pump (See Figure 30).

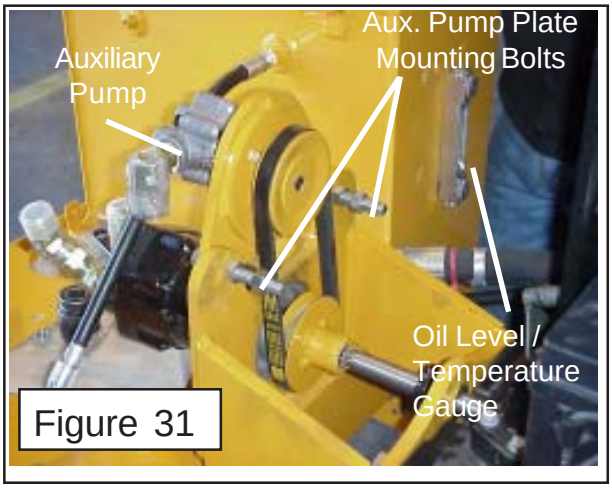


Figure 31

B. Install Aux Pump Drive Pulley. Install drive pulley on aux. pump using the key that was removed. Do Not tighten pulley onto the pump shaft as it will have to slide later to align the pump pulley with the drive shaft coupler pulley.

C. Bolt Pump Mount Plate to Main Pump Mounting Plate. The aux pump mount plate installs with two mount bolts and nuts (See Figure 31). The hole on the RH (Sitting on Tractor Seat) has a slotted hole for adjustment of the drive belt. Make certain to install a flat washer on the bolt that goes through the slotted hole (See Figure 32).

Figure 32

D. Align Aux Pump Drive Pulley. With The aux. pump mount plate firmly tightened and the drive belt on the pulley, but not adjusted tight. Slide the pump drive pulley, but not adjusted tight. Slide the pump drive pulley on the pumpshaft until the upper pulley is aligned with the lower one. once the pulleys are aligned tightren the retaining set screw in the upper pulley to secure it to the pump shaft. (See Figure 33)

E. Install Aux. Pump Belt Cover. The belt cover will mount on the same two bolts that mounts the aux pump mount plate to the main pump mount plate. Do not tighten the mount ing bolts yet. (See Figure 34).

Auxiliary Pump Removal, Repair & Replace

F. Adjust Drive Belt on Small Auxiliary Pump. The small pump mount plate has a 3/8" square hole that is designed to be used with a 3/8" drive ratchet or breaker bar to ad just the belt. Snug the pump mounting bolts and put a 3/8" drive ratchet into the hole. Pull up until belt has about the same tension as an automotive belt. Tighten the mounting / ad- justing bolts (See Figure 32 & 35).

Figure 33

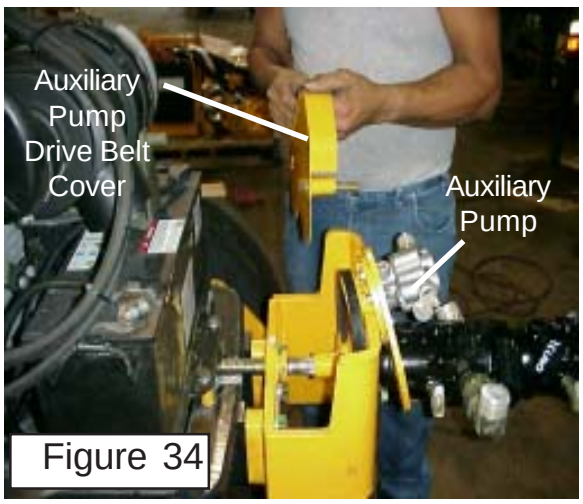


Figure 34

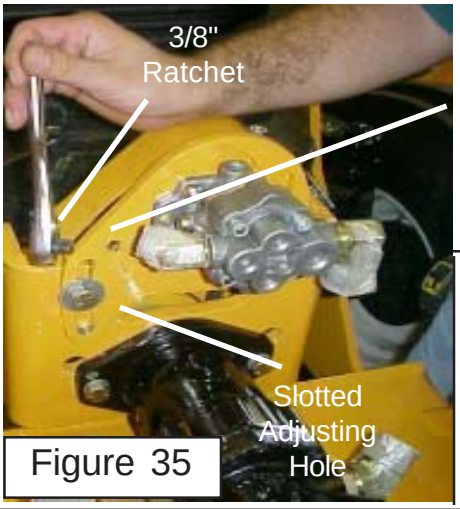


Figure 35

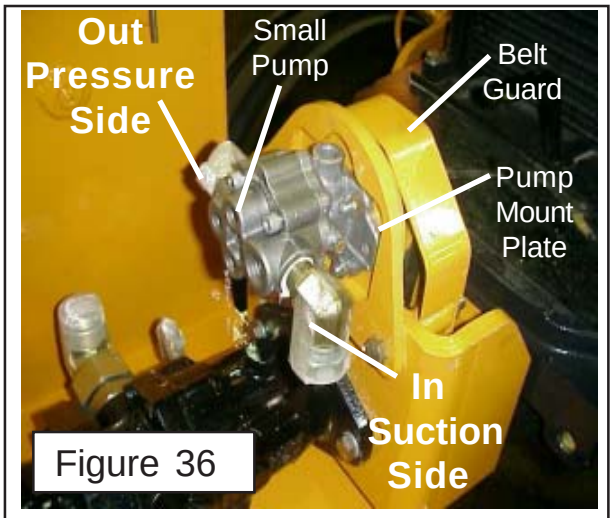


Figure 36

G. Recheck All Bolts and Components that have been installed . The bolts and components that have been installed should be checked before moving on the next step. Make certain that all bolts have been tighten. It is a good practice to mark the bolts and nuts with some mark such as a dab of paint from a paint marker or anyway that you want so you will know that bolt has been tightened.

H. The small cylinder hydraulic Supply Pump will have a short hose that connects to the small pump and to the tank suction port that is in the tank exclusively for the small pump. The suction hose will need to be cut to length. make certain suction hose is not kinked. (See Figure 37 & 38) which shows these ports. Make certain the Elbow (pressure port of outer tandem pump (See Figure 37, 38 & 39) is installed and tightened pointing to the rear of the pump, this is the pressure port to the cylinder control valve.

I. Re-install any Engine Guards and/or Screens that were removed to gain access to any component. Some tractor and/or mower models may have guards in place, replace any of these that may have been removed (See Figure 40 as example).

22. Hydraulic Schematics:

(See Hyd. & Elect. Schematic Figure 41 thru 44 on next pages)

A. Figure 41, Hyd Schematic Single Pump for single Wing with Auxiliary hydraulic pump for cylinder control
B. Figure 42 Hyd Schematic Dual Pump for Dual Wing with Auxiliary hydraulic pump for cylinder control.
C. Figure 43, Hyd Schematic Single Pump for single Wing using tractor hydraulic pump for cylinder control
D. Figure 44 Hyd Schematic Dual Pump for Dual Wing using tractor hydraulic pump for cylinder control.

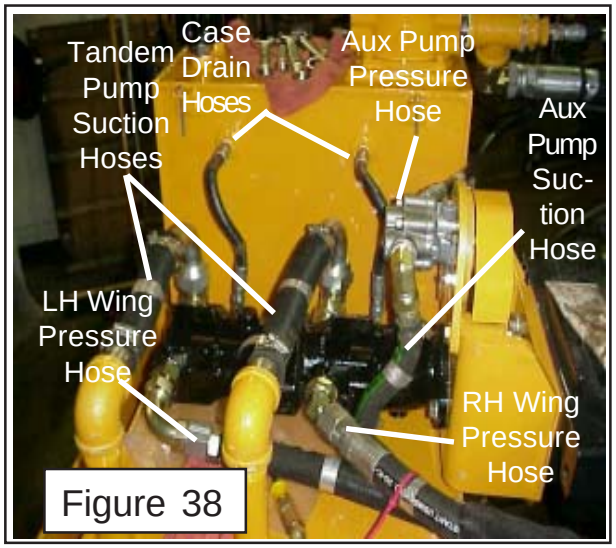


Figure 38

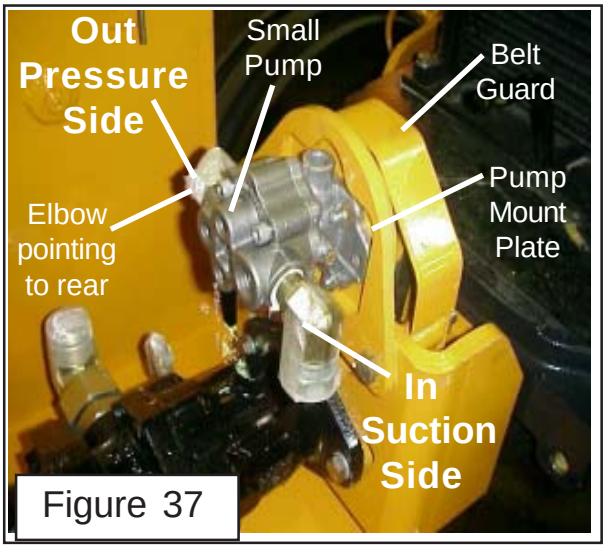


Figure 37

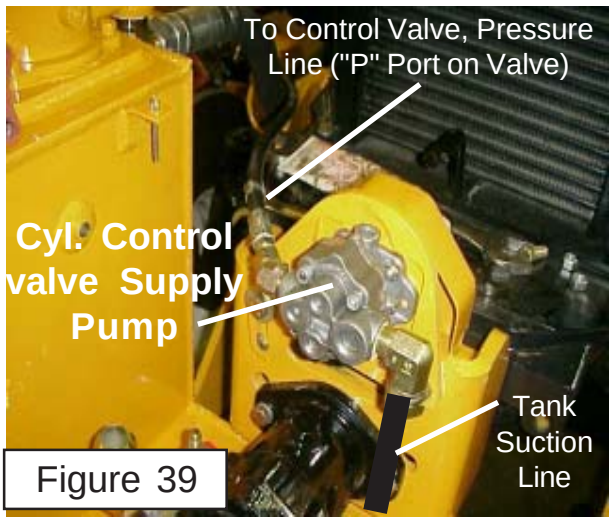


Figure 39

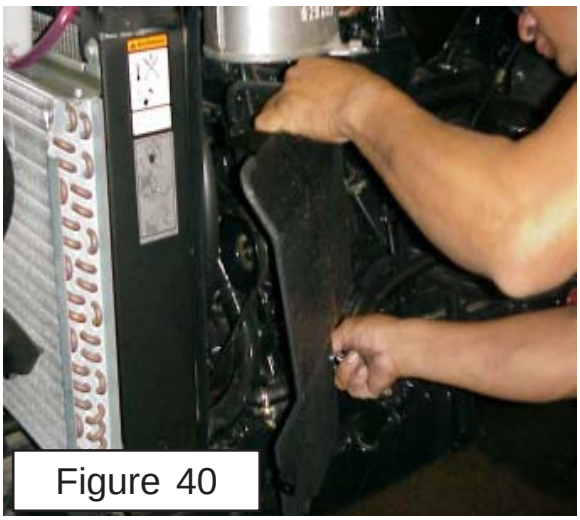


Figure 40

Hyd Schematic W/ Aux Pump (RH Wing)

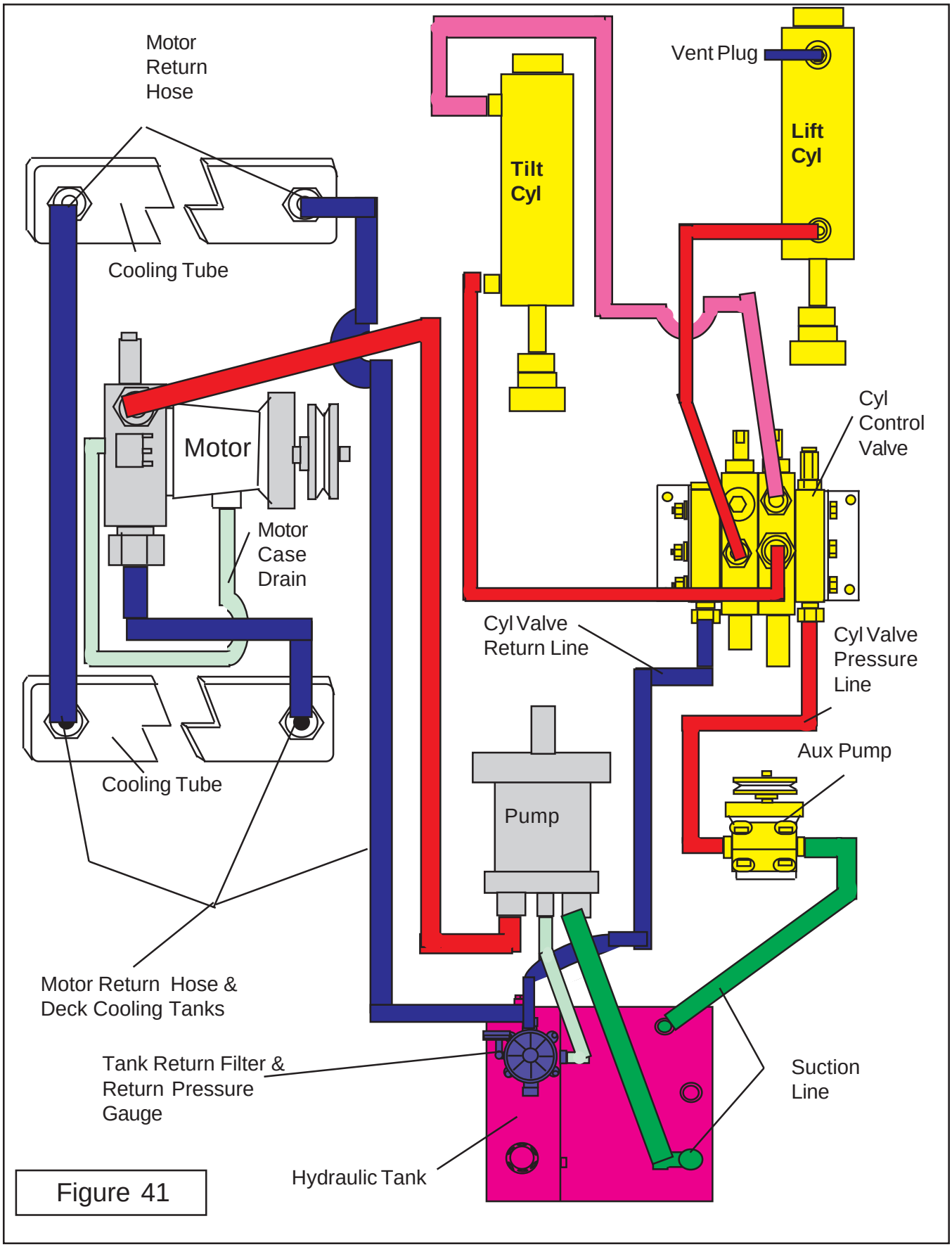


Figure 41

Hyd Schematic W/ Aux Pump (Dual Wing)

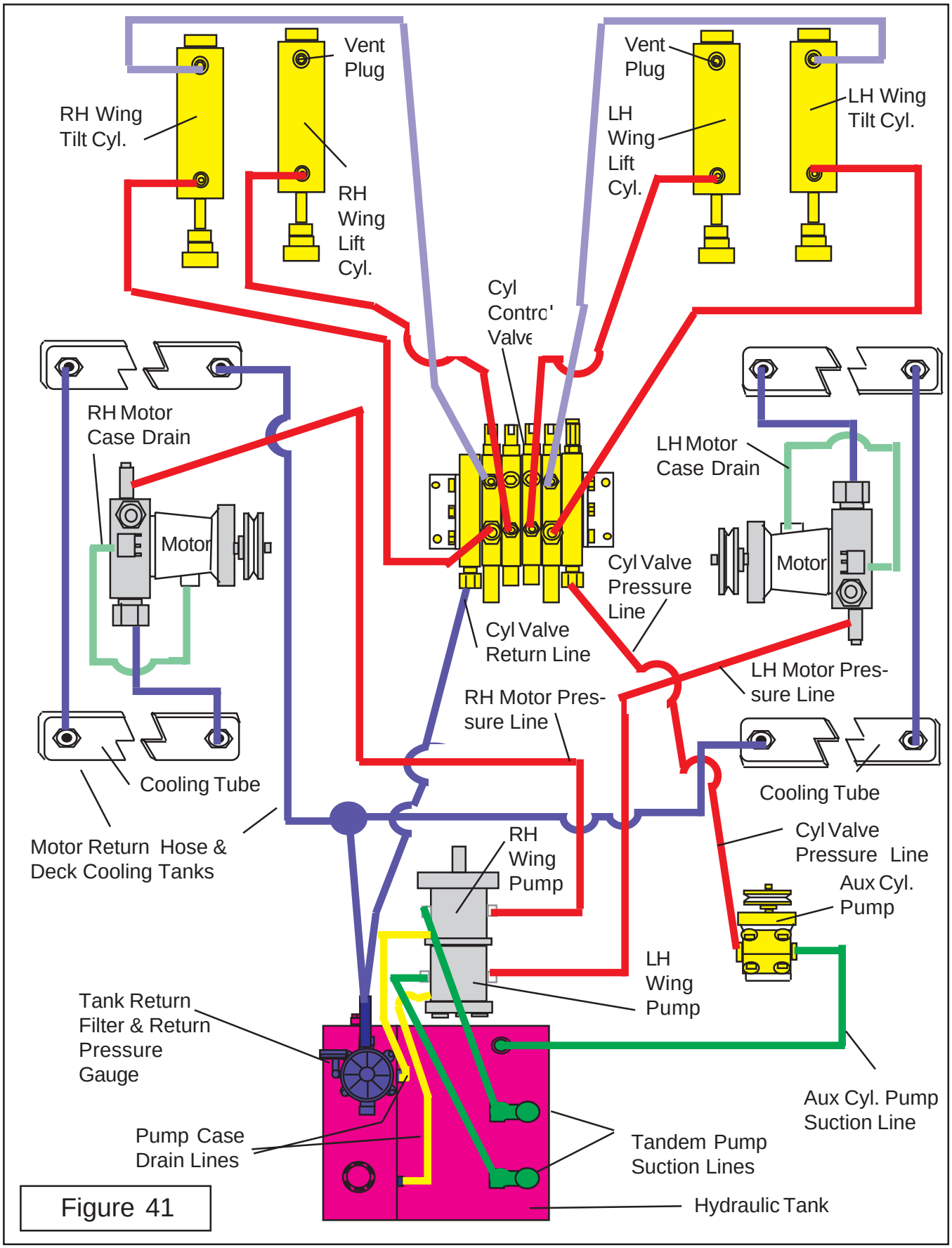


Figure 41

Hyd Schematic W/O Aux Pump (RH Wing)

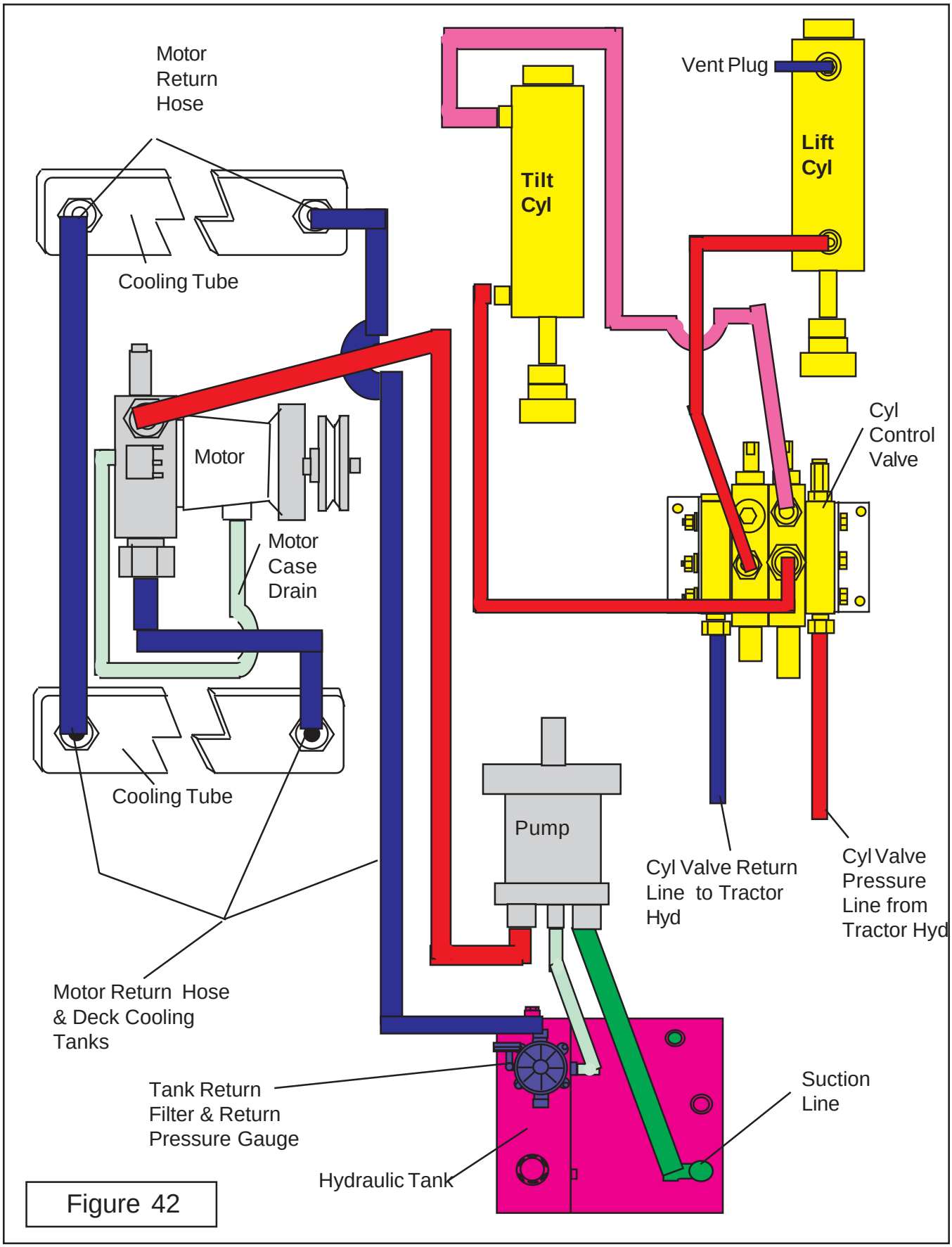


Figure 42

Hyd Schematic W/O Aux Pump (Dual Wing)

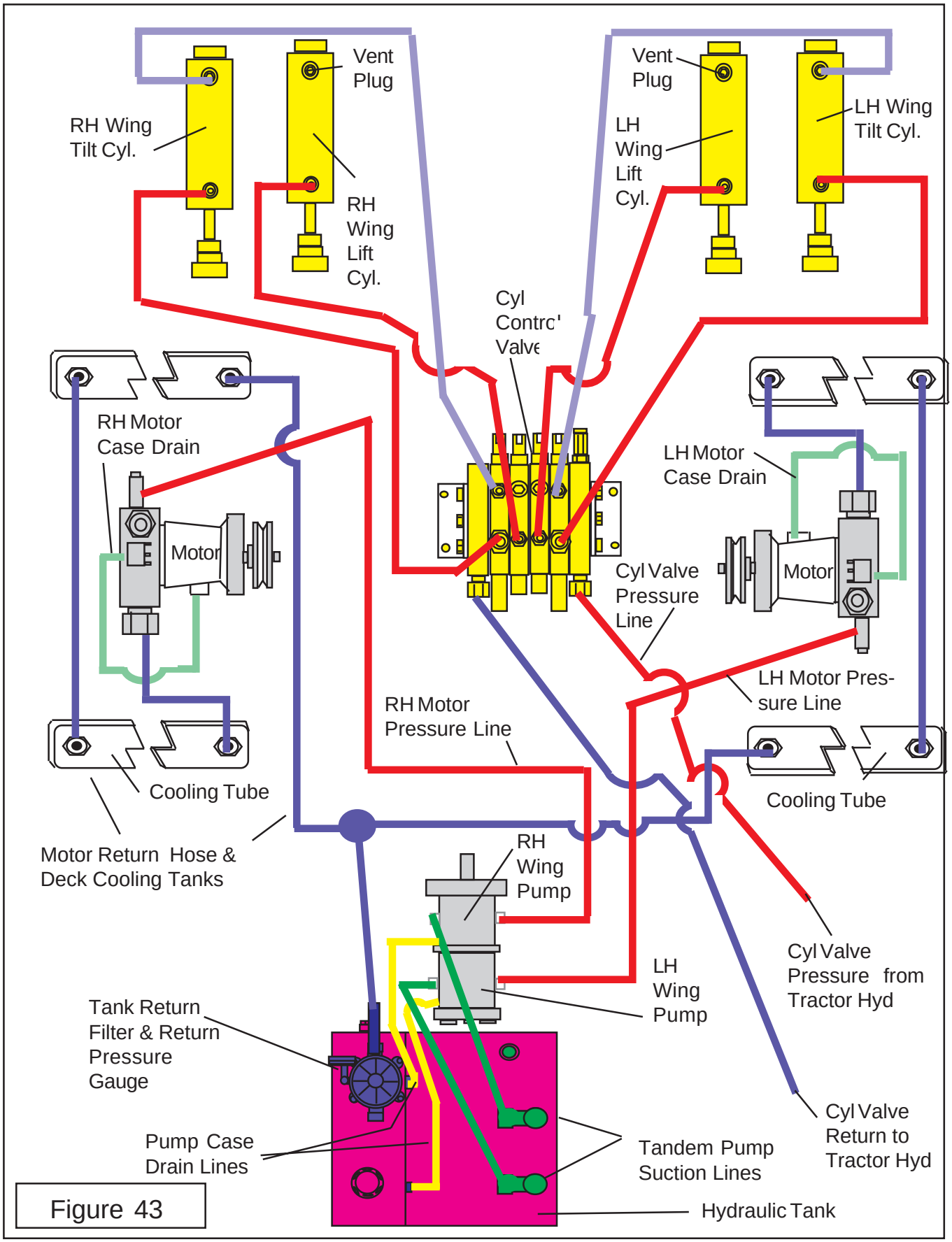


Figure 43

NOTES

Section 6

Interstater

SERVICE MANUAL

Hyd. Tank & Return Filter

Remove & Replace

Hydraulic Tank Repairs

Preparation:

1. Clean the entire area around the hydraulic tank, hoses, pumps and any other component that is going to be worked on, DO NOT disconnect any hydraulic system in any way before completely cleaning the area and all tools to be used. Keeping every thing clean, work area, tools, drain pans and components to be repaired is very important.

2. To remove the Hydraulic Tank will require the removal / disconnection of hydraulic lines and fittings. All hoses, fittings and ports must be capped (Sealed) immediately after they are disconnected. NO hydraulic component should be left open, this would allow contamination of the hydraulic system which will damage the system.

Hydraulic Tank:

1. Same hydraulic tank Used Single or Tandem Pump, The same hydraulic tank is used on the single and tandem pump models. When used with the single pump (Single Wing Model) some of the ports will remain capped. (See Figure 1 & 2)

2. There are not many repairs to the hydraulic tank that are required. Usually the tank is removed to gain access to another component of the tractor.

3. Remove Oil from Hydraulic Tank. To remove the oil from the hydraulic tank it is recommended that an oil buggy be used, these are available on the commercial market. Oil buggies use a pump to pull the oil from the tank. Most will usually have filtration system for pumping the oil out of the oil buggy system. Alamo Industrial recommends using only new oil when putting oil back into hydraulic tank.

4. Disconnect Motor Case Drain Hoses. The hoses for the motor Case drain will be disconnected at the tank but can be left attached to the motor (See Figure 1 & 2). Cap these hose after disconnecting them.

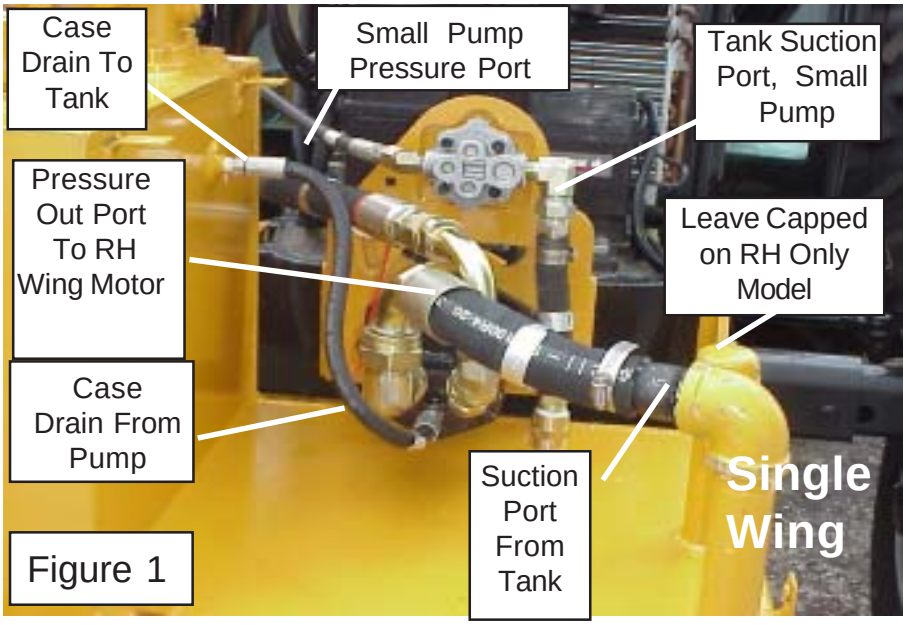


Figure 1

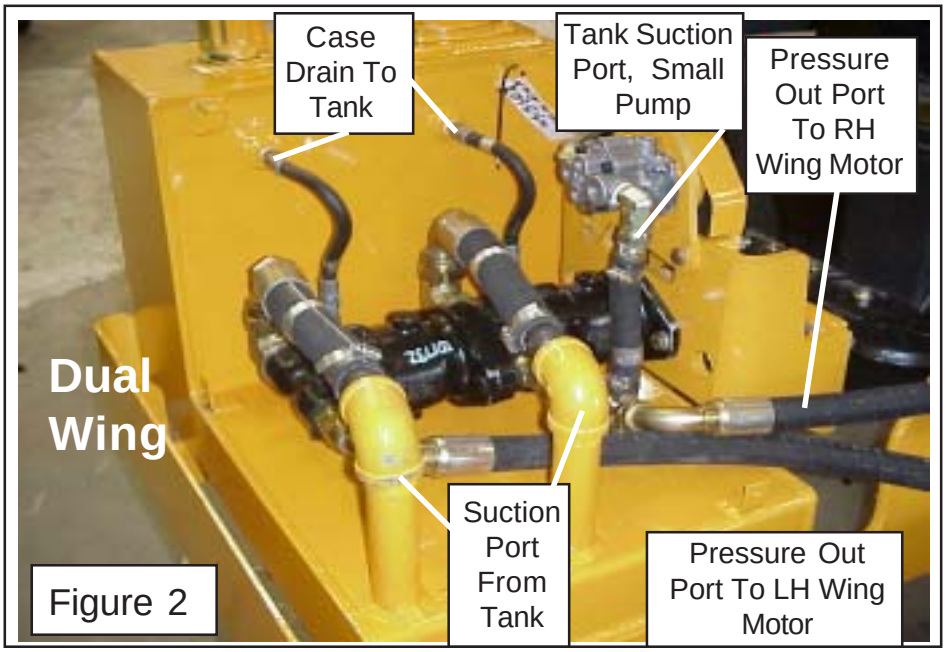


Figure 2

5. Disconnect the Pump Suction Hoses. The suction hose to the Auxiliary pump is best to remove it completely. Disconnect it at the pump end and then the tank end. Cap the pump and the tank immediately after removing hose to keep contamination out of the oil. The suction hose(s) to the Main Pump(s) remove the fitting at the pump and cap the hose(s) and the pump(s) (See Figure 1 & 2)

Hydraulic Tank Repairs

4. Disconnect Oil tank Return Hoses. The oil return hoses from the wing(s) motor(s) and the cylinder control valve system is returned on the RH side of the tractor to the front and to through the oil return filter. If the interstater was ordered as model to use the tractor hydraulic oil system for supply to the control valve for the cylinders there will be no return hose from the cylinder control valve, see the hydraulic schematic for system using tractor hydraulics (See Figure 3). The fittings at the hydraulic tank for the return hoses will not need to be removed to remove the hydraulic tank (See figure 4).

5. Remove Front Tank Bumper Weldment. The front bumper weldment bolts to the tank mounting rails (See Figure 5). Remove the front bumper.

6. Remove Tank. Use an overhead hoist to support the hydraulic tank while it is being unbolted. In figure 6 below the main and auxiliary pumps are not installed. This is for illustration only, the pumps can be left mounted to the tractor. Remove the bolts on the side of the tank on both sides (See Figure 7). With the tank supported by the overhead hoist slide the tank outward away from the pumps and then upward.

7. Replace Tank. To replace the tank reverse the disassembly procedure and hose connections. Refill hydraulic tank with new clean oil using a filtered oil buggy system is recommended.

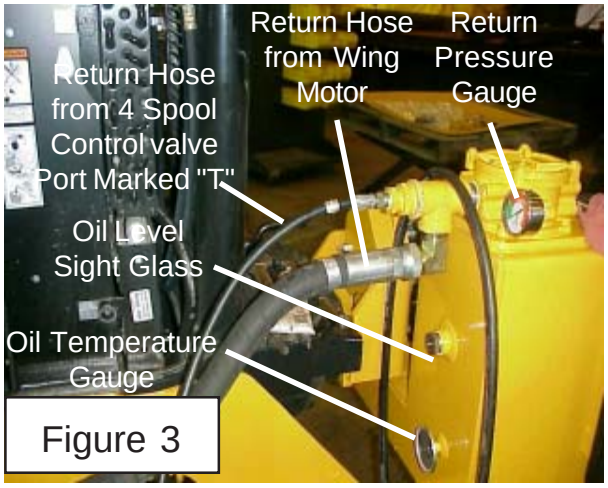


Figure 3

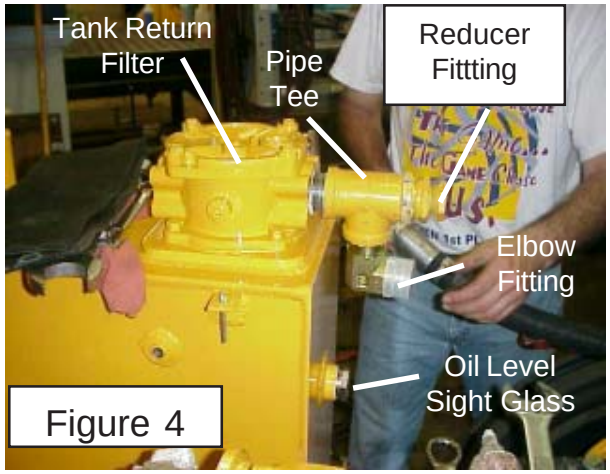


Figure 4

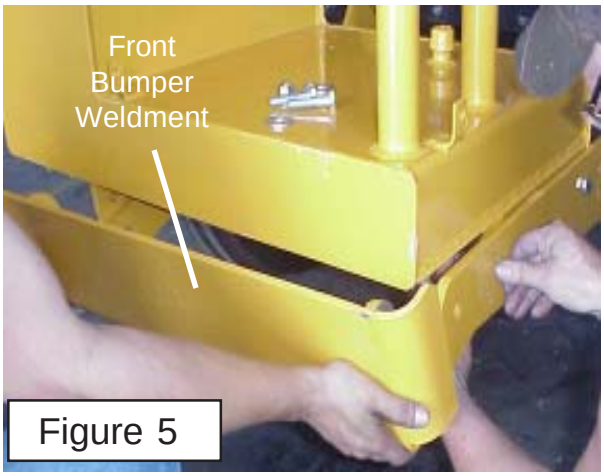


Figure 5


Figure 6


Figure 7

Hydraulic Tank Repairs

Recommended Start-up procedure for New or Rebuilt Pump or Tank Replacement:

1. Connect your Flow Meter in Line to test Pressure as unit is started; this will test the Relief Valve, this is not required this is only to test the relief valve setting. If this is not done you could damage the replacement Pump because you would what the relief is set at until Pump failed from possible excessive pressure.
2. Before connecting any lines to Pump, fill all Ports with clean Oil to provide initial Lubrication. This is especially important is Pump is located at a higher level than Oil Reservoir.
3. Check Oil level in reservoir, fill to full level if needed, Reservoir must have more Oil than the Pump GPM capacity. If system has been completely drained of oil or if it is a new system without oil circulated through it. The oil level of tank will drop from full to lower level when started and ran.
4. After connecting the Lines and mounting the replacement Pump, make sure that Oil is not warmer than Pump temperature. If Oil is warmer than pump run Pump at short intervals till Pump and Oil temperature is equalized. Hot Oil should not be fed into cold Pump. If oil is cold do not operate pump at high RPM until oil warms up.
5. Operate the Pump for at least two minutes at no load and at low RPM (400 RPM min and 1400 RPM max.). Watch Flow Meter Pressure (or Pressure Gauge). During this break-in period, The unit should run free and not develop an excessive amount of heat. Heat should not exceed 100 deg F. above ambient Temperature. If the unit operates properly, speed and pressure can then be increased to normal operating settings. Increase Pressure in 500 Lbs. PSI increments from start, this should take 4 to 5 minutes to max. PSI allowing 1 minute between increases to check Oil Pressure and Temperature.
6. If normal Pressure and Heat readings are seen then the New or Rebuilt Pump installation is ok and it is ok to run unit, remove Flow Meter (Pressure Gauge) from line, reconnect Line and check all connections for leaks. Check oil level and refill if needed. Unit is ready for service.

Replacement of Return Filter Pressure Gauge:

1. Return Filter Pressure Gauge. The Return filter pressure gauge (See Figure 8 & 9) is a Glcerin filled gauge which give it a smother movement. The gauge is color coded, Green = 0 psi. to 15 psi. Red = 16 psi. to 60 psi. The return pressure when oil is warm and at operating temperature shoild not move out of the green area. It is not unusual for pressure to be high when oil is cold. If pressure is in the read at operating temperature (100 deg. F. above ambient temperature, check the return filter it may need changing.

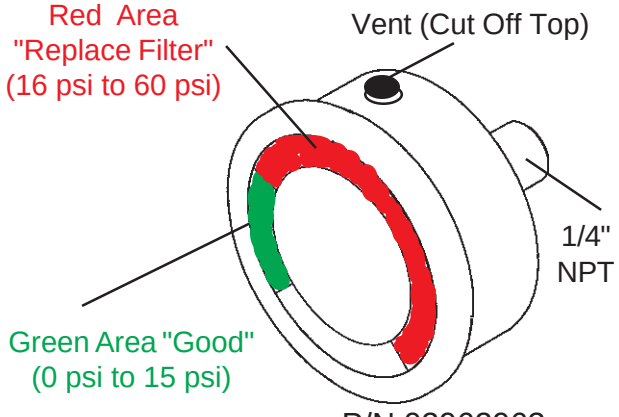


Figure 8

P/N 02962963
Return Pressure Gauge
(Glycerin Filled)

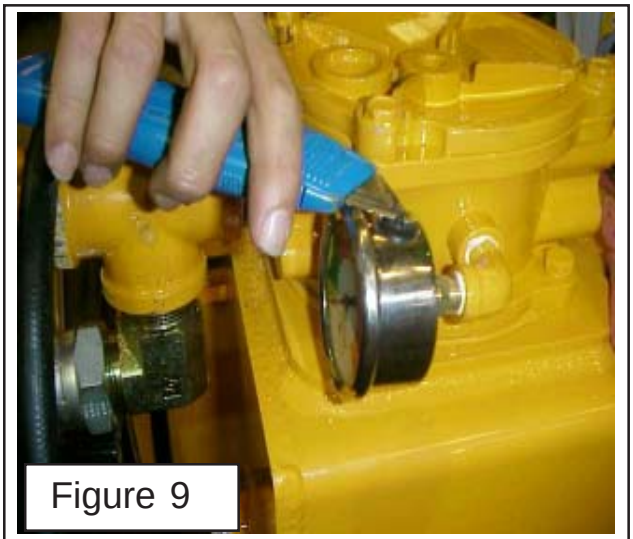


Figure 9

Hyd Tank Filter Change & Repairs

REMOVE OLD HYD SYSTEM FILTER:

1. Hyd Return Filter. A large capacity filter is located on top of the hydraulic oil reservoir Figure 2. The filter will trap particles which are .001 inch or larger. The filter needs to be changed after the first 10 hours of operation and every 200 hours thereafter.
2. Clean the filter cover and all componets around filter assembly. This is to prevent dirt or other contamination from entering filter and tank. (See Figure 10 & 11)
3. Loosen the four bolts on the filter cover. Never loosen these four bolt until you have made certain all hydraulic pressure has been relieved from system. Make certain no hydraulic cylinders are suporting any weght, work the control valves to release any pressure. Make certain tractor has been shut down and sit long enough that all pressure is relieved. Remove one bolt from the filter to aid in removing the filter cover, loosen the other three bolts. (See Figure 12 & 13)
4. Push the filter cover down and slowly twist the filter cover clockwise to lift it off and up, lift it up slowly as there is a spring under this cover (See Figure 14).
5. Remove filter spring. Pull the filter spring up out of filter housing (See Figure 15). Pull old fiter up and out of filter housing. use caution the housing may still have oil in it. (See Figure 16)

Return Filter Assembly

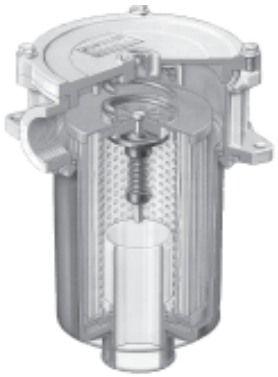


Figure 10

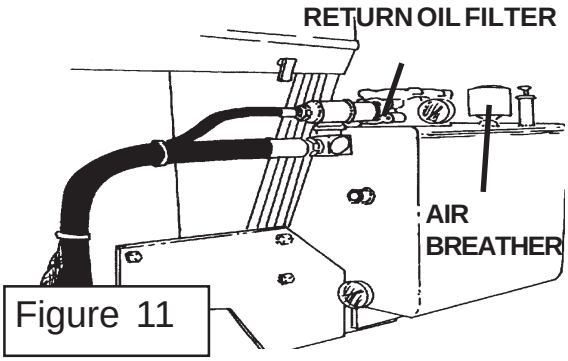


Figure 11

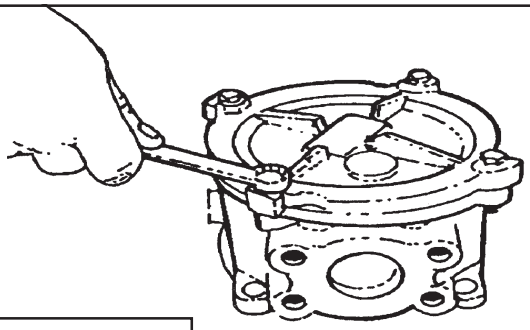


Figure 12

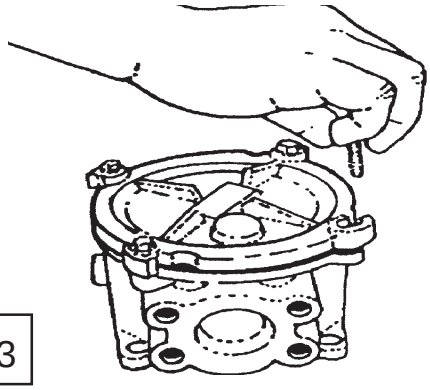


Figure 13

Figure 14

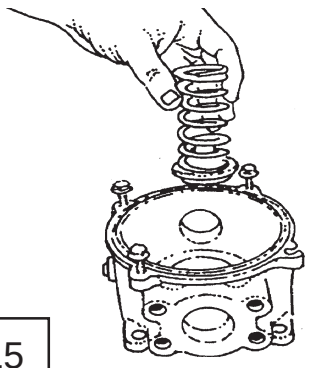


Figure 15

Hyd Tank Filter Change & Repairs

RE-INSTALL NEW HYD SYSTEM FILTER:

1. Remove filter. Inspect material trapped by the filter. It can indicate parts wear in the system (See Figure 16).
2. Clean Filter Canister. If filter cannister needs cleaning it CAN NOT be done with any type of solvent as it would run into oil tank. It cleaning is something that cannot be done with lint free towels the filter assembly will need to be removed from tank assembly for cleaning..
3. Install the new filter. Install the new filter into the filter canister (See Figure 16). It will not be required to fill filter cannister with oil as the filter is on the supply return line. DO NOT operate system with out a filter and do not operate with incorrect Filter. Use only the correct Micron Size Filter that is designed for this system (See Figure 16).
4. Reinstall filter spring and filter cover. Drop spring in on top of new filter (See Figure 17).
5. Replace Filter Cover. Sit the filter cover down onto the spring. Push cover down and turn counter clockwise until the three bolts slide into the slots. (See Figure 18).
6. Replace Bolt in filter cover and tighten the 4 bolts. Replace the one bolt that was removed previously. (See Figure 19) Tighten the four bolts in increments until the cover is seated evenly all the way around, do not force cover down with bolts if it offers resistance. Tighten the bolts in an even manner (See Figure 20).
7. Check and Fill Oil System. It is recommended that only proper type oil be added or installed and that all oil be installed using a filtered buggy system, these system are available on the market (Figure 21).

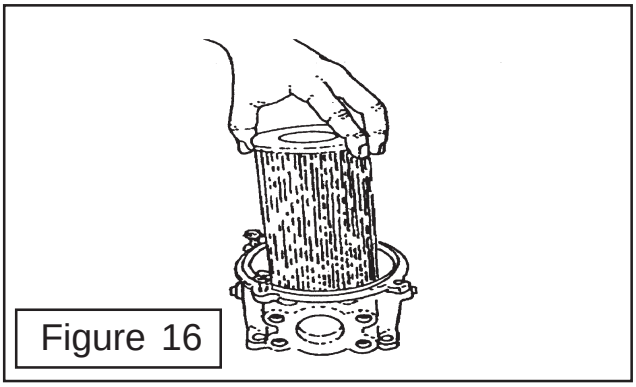


Figure 16

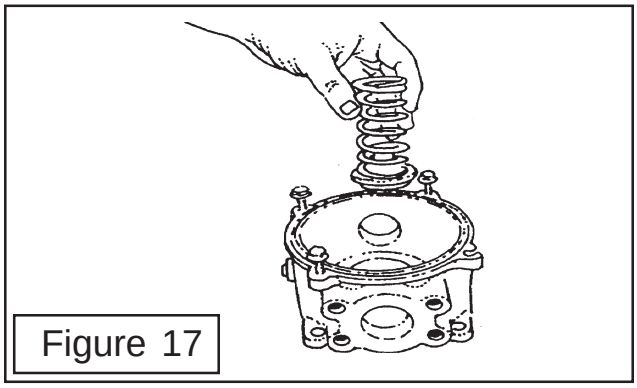


Figure 17

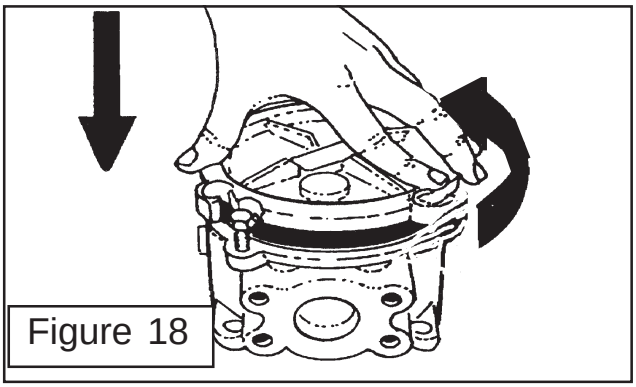


Figure 18

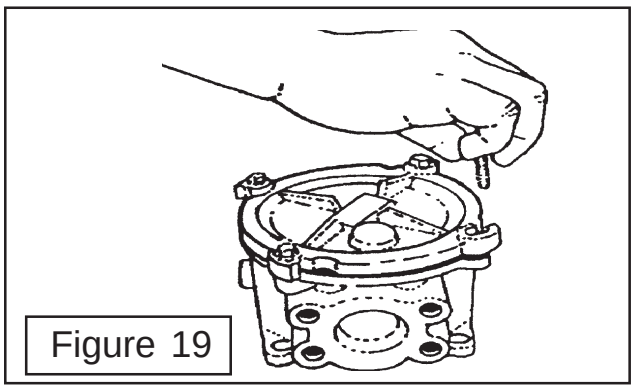


Figure 19

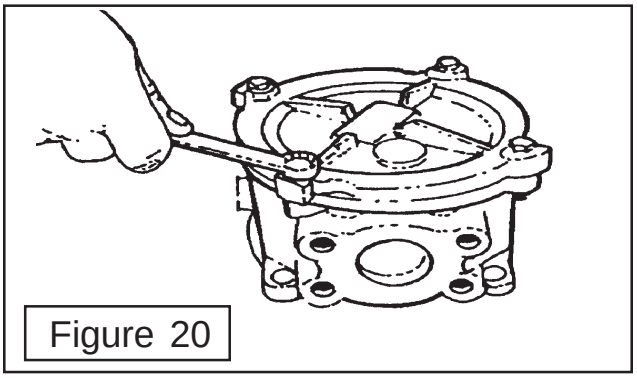


Figure 20

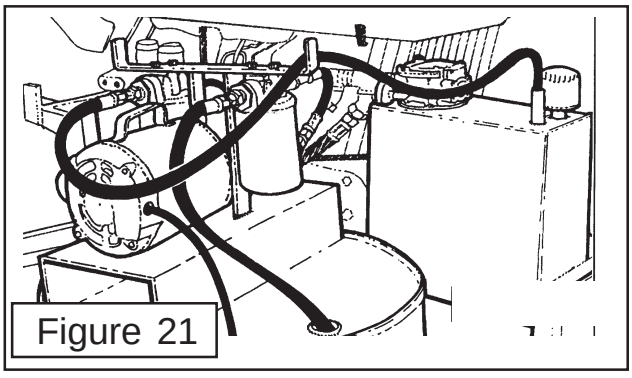


Figure 21

Section 7
Interstater

SERVICE MANUAL

Pump Mount Weldment & Driveshaft

Remove & Replace

Pump Mount Weldment Remove & Replace

Preparation:

1. Items to be removed in preparation to remove pump mount weldment, Main Pump (Single or Tandem) some hoses will need to be disconnected and/or will need to be removed in order to remove the pump(s). The pump will need to slide back away from pump mount weldment approx 2". Some hoses may not have enough length to the to allow the pumps to slide outward. See Pump Remove and Replace instruction section, if hoses are to be disconnected see tank removal and replace section. It is recommended oil be drained before disconnecting any hoses (See Tank Remove and replace section). **IMPORTANT! Cap all hydraulic components immediately after disconnecting them, DO NOT leave hydraulic system open. DO NOT work on hydraulic system under dirty conditions. Hydraulic System MUST be cleaned before disconnecting hoses and/or components. Work area and tools MUST be clean at all times. (See Figure 1 & 2)**

2. There are different models of tractors which will have varying components designs. Some may use spacers some may not. Some will use the auxiliary pump and some will not. When possible consult the assembly instructions and/or assembly manual that was shipped with the unit to match the tractor model you have.

Pump Mount Weldment Removal & Replace:

1. Hoses & Pumps The Hoses and pump will require being unbolted from the pump mount weldment, use the steps in the pump repair replacement section.

2. Pumps Removed The pumps removed the model using the auxiliary pump will have the drive pulley and belt still on the driveshaft. Model that do not have the auxiliary pump will have a spline coupler. (See Figure 3).

3. Remove Drive Pulley from Driveshaft. The drive pulley weldment or splined coupler will slide off of driveshaft through the hole for the main pump (See Figure 4)

4. Driveshaft Carrier Bearing & Lock Collar. The drive shaft has carrier bearing and locking collar on it. This locking collar locks down onto the driveshaft. To remove the pump mount weldment it will not require the removal of the bearing and collar. The driveshaft can be removed with the pump mount plate or the driveshaft can be removed now. If you are repairing the crankshaft pulley or pulley adapter you can loosen the locking collar and pull driveshaft out or you can remove the four bolts in the pump mount weldment and pull the driveshaft out with the pump mount weldment. (See Figure 5)

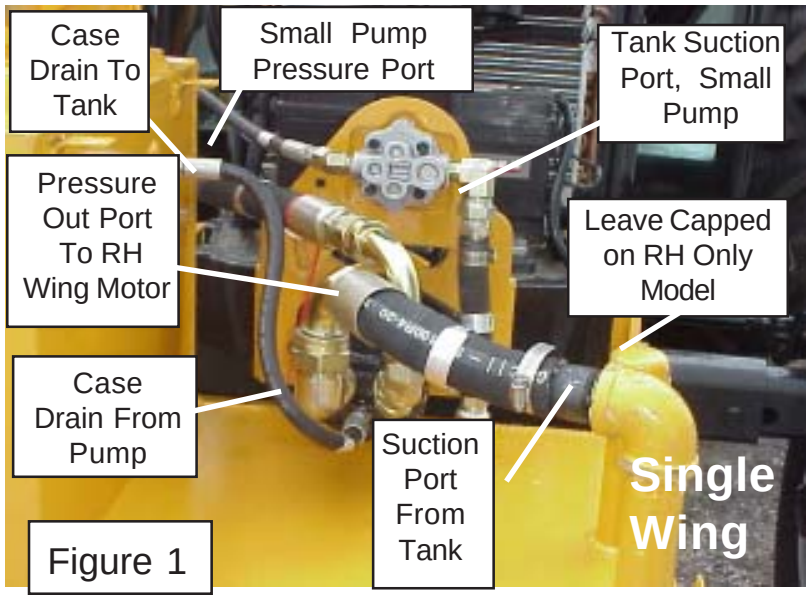


Figure 1

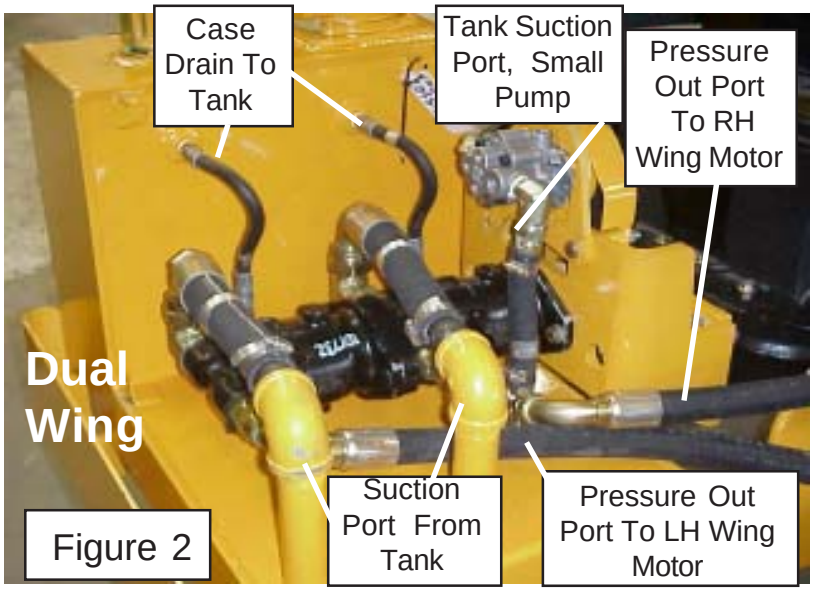


Figure 2

Pump Mount Weldment Remove & Replace

5. Remove Pump Mount Weldment. The pump mount weldment has four mounting bolts. Thes bolt screw into the front bolster of the tractor (See Figure 6 & 7). Figure 6 show with driveshaft removed and figure 7 show with driveshaft left in carrier bearing. Removal can be either way. Remove the four mounting bolts for the pump mount weldment, use caution when all bolts are removed mount weldment will drop if it is not secured. Some tractor models will have spacer blocks installed between pump mount weldment and tractor bolster. If your model has spacer blocks this should be noted and spacer blocks should be identified and marked. Pump mount weldment with spacer blocks will used longer bolts than model that do not have spacer blocks. (See Figure 7). Pull pump mount weldment away from tractor bolster. If the carrier bearing was removed the driveshaft should stay through bolster (See Figure 8 & 9).

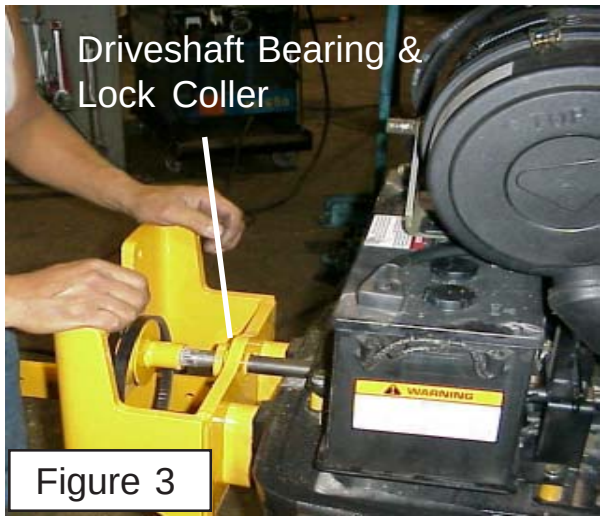


Figure 3

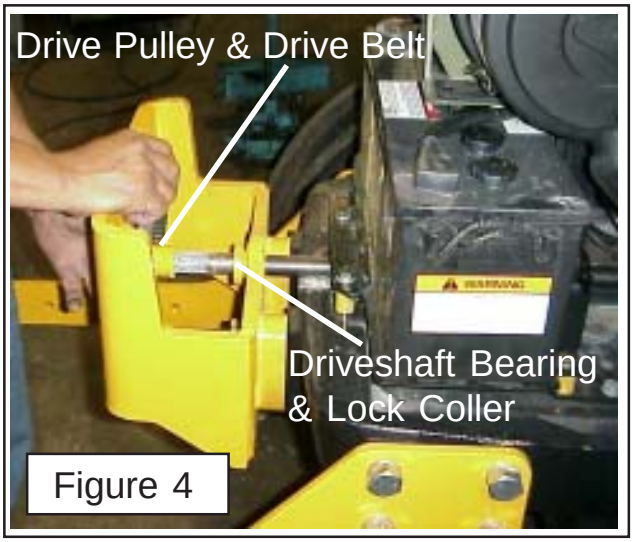


Figure 4


Figure 5

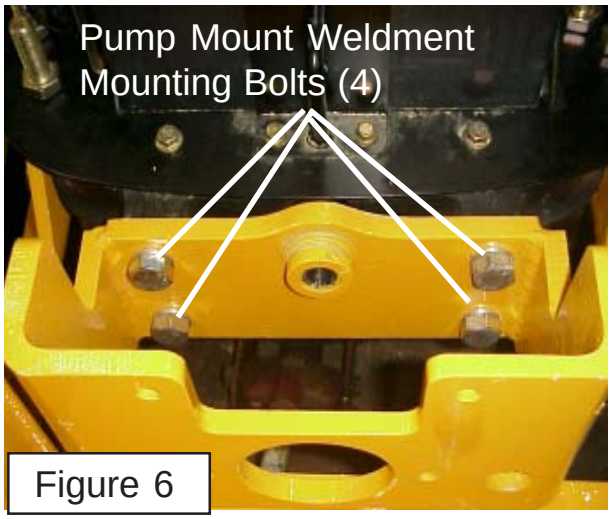


Figure 6

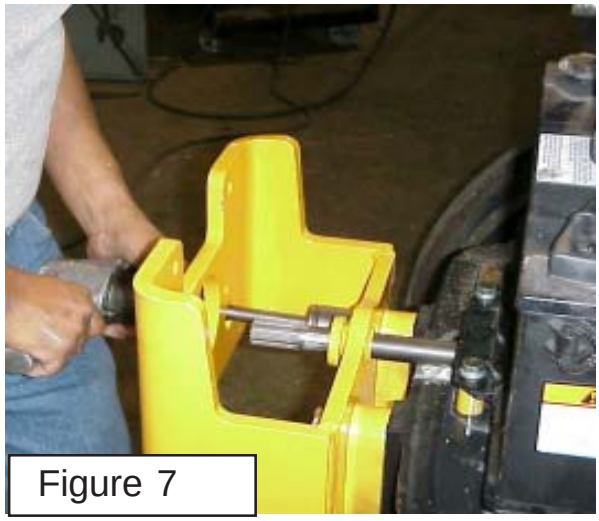


Figure 7

Pump Mount Weldment Remove & Replace

6. Pump Mount Weldment Removed. The pump mount weldment removed only the driveshaft will remain showing if it was left in bolster. below figure 9 & 10 show the pump mount plate removed. Figure 9 shows where driveshaft runs under batter through the tractors front bolster. Figure 10 shows with the battery for this model tractor removed, this is for illustration only. The battery or battery tray will not have to be removed to remove the driveshaft. Driveshaft will be sticking out under battery tray as shown in figure 9.

7. Crankshaft Pulley adapter. The crankshaft pulley will have a pulley adapter bolted to it. This adapter will have a splined center that the driveshaft will slide into. If the pulley adapter is to be removed or replace, make certain that the bolts and washers that are removed are replaced with the same length as the old ones. If longer bolts are used the crankshaft pulley as well as the tractor engine will be damaged. DO NOT modify this adapter unless instructed to do so by Alamo Industrial (See Figure 11).

8. Pump Mount Weldment Replacement. The procedure to replace the pump mount weldment will be the reverse of the disassembly procedure. Important Notes: 1. Make certain driveshaft is seated into the splined pulley adapter. 2. Coat driveshaft with anti-seize compound where it goes through the carrier bearing. 3. Make certain to install drive pulley / splined coupler weldment w/ drive belt ,(on models w/ auxiliary pump) or splined coupler on the end of driveshaft. Do these before installing pump. 4. It is recommended that the Main pump shaft and the Auxiliary pump shaft be coated with anti seize compound before installation (See Figure 12).

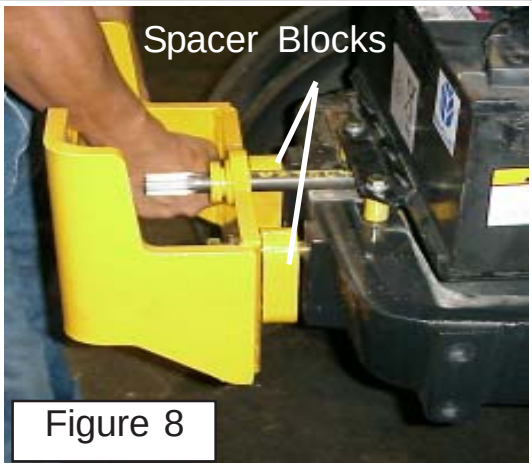


Figure 8

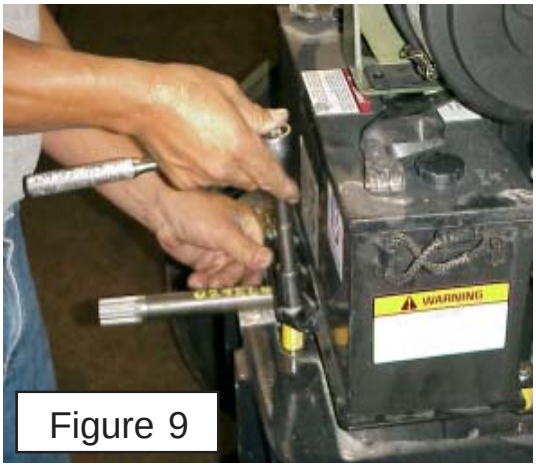


Figure 9

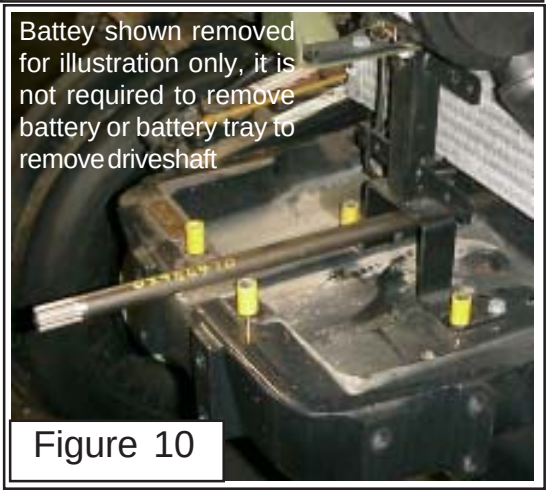


Figure 10

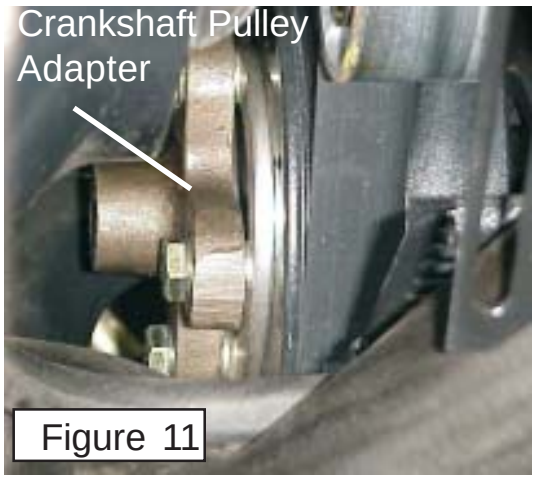


Figure 11

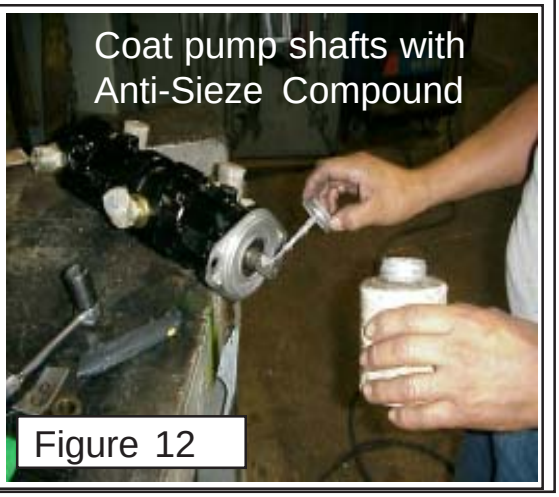


Figure 12

Section 8

Interstater

SERVICE MANUAL

Cable - Control Valve Connections

NOTE:

Shown here is a typical illustration of the way that the control valve, remote cables, cable handles and the electrical harness is connected. This is common but may not be shown on the type tractor you have. This tractor model is used for illustration only and should match your application in function and design. Some mounting components, brackets and they way they connect to the tractor may vary. Consult the instructions and/or assembly manual for the tractor model the unit is mounted on.

Joystick , Valve & Control Cables (Cab)

Control Valve & Hose Installation:

NOTE: This section only Applies if using the Auxillary Pump for cylindercontrol, if using tractor hydraulics for cylinder skip this section.

1. Remove standard control Handles. When using remote control cables and handles the standard handles must be removed and discarded. This is done by removing the C-Clips and pins that hold the handles to the valve body and the C-clips and pins that hold handles to the spools. (See Figure 1)

2. Install The Cylinder Control Valve to Valve Bracket. The control valve is mount to the valve bracket using two bolts. These two bolts is all that will be needed to mount valve to valve bracket. (See Figure 2).

3. Connect Remote Control Cables to Valve Bracket. Shown here are cables being connected t the valve mount bracket while it is lying on the bench (See Figure 3). It can be done after bolting it to the tractor as well.

4. Bolt Valve Mounting Bracket to Mainframe . The valve mounting bracket is bolted to the Right Hand side of the tractor. It is bolted to the mainframe. There are two different sets of hole in valve mounting bracket, this allows the location of the valve to be varied (See Figure 4)

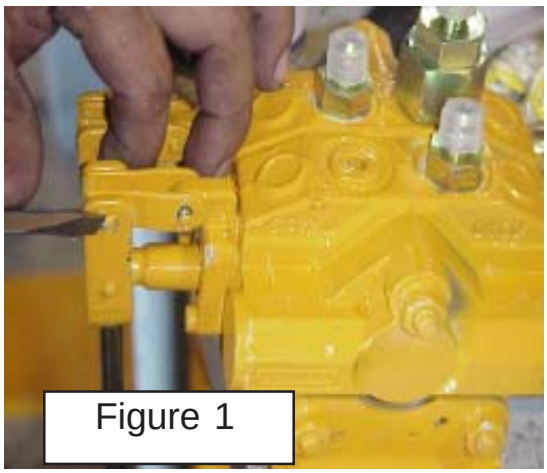


Figure 1

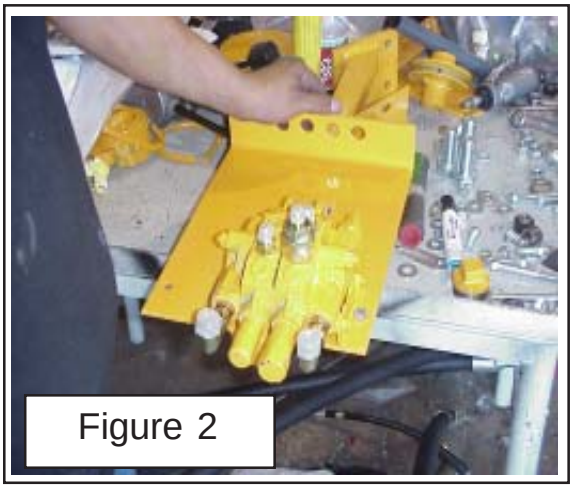


Figure 2

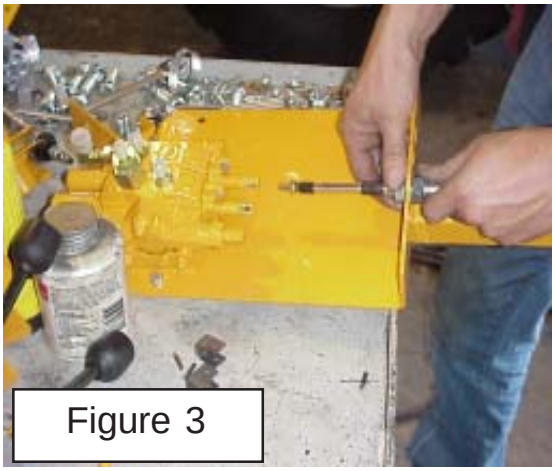


Figure 3

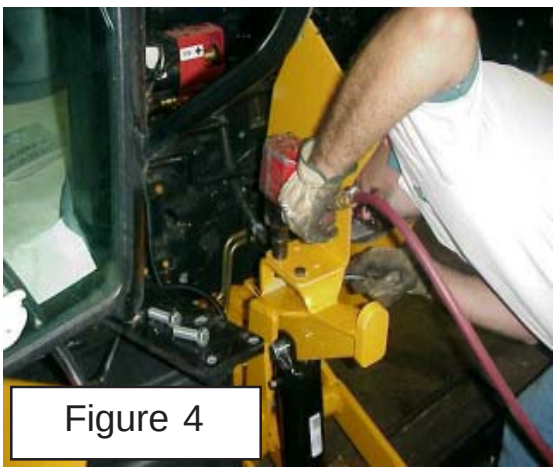


Figure 4

Figure 5

5. Install sleeving over the return hoses from heads and control valve and Control valve Pressure Hose. Slide the three hoses through the sleeving. Slide the hoses with the sleeving through the hose support ring bolted to the side of the tractor. Tie the sleeving using plastic ties around the hoses to keep it from moving (See Figure 9). Tie the sleeving with plastic ties around the pressure hose on the LH side of tractor (See Figure 9)

6. Install return hose to cross member and Hoses to Control Valve. Connect the return hose to the cross member on right hand side of main frame crossmember (See Figure 6). The other end will connect to the return filter Tee fitting (See Figure 7& 10). Note: These hose are run through a sleeving material and a hose support weldment (P/N 02978281) which bolts to the tractor bolster (See Figure 9), this must be done before hoses are connected or they will need to be removed to install them.

7. Connect Pressure & Return Hose to Cylinder Control valve. Connect the pressure hose running from the RH side of small pump to RH Top side of control valve, The port will be marked with a "P" cast into it, the other end is connected to the small supply pump (See Figure 7 & 8). Connect the return hose that is connected to the Tee Fitting of the return filter to the Return side of the control valve with a "T" cast into it (See Figure 2 & 5)

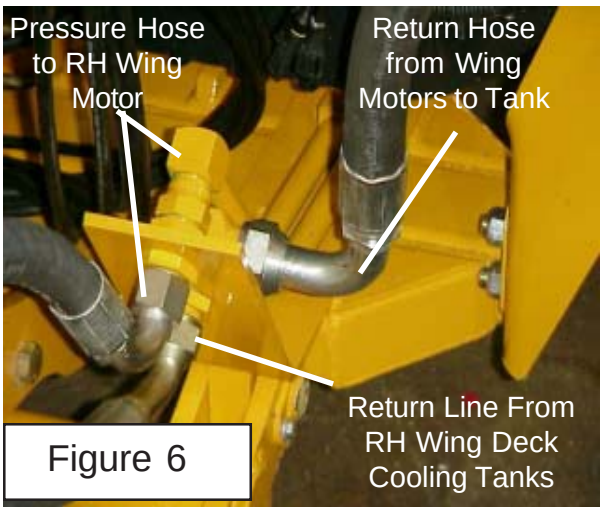


Figure 6

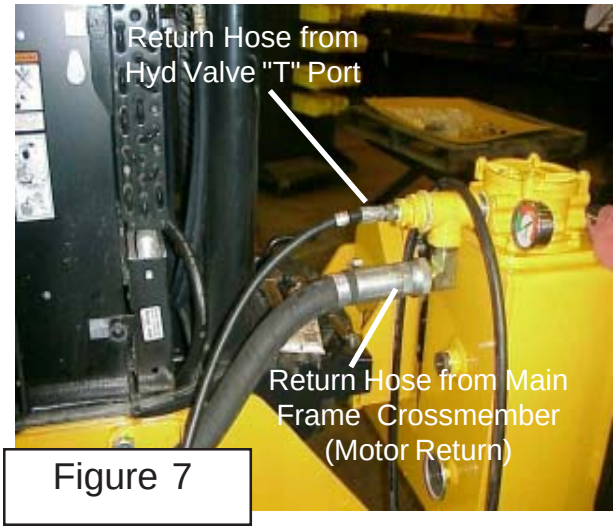


Figure 7

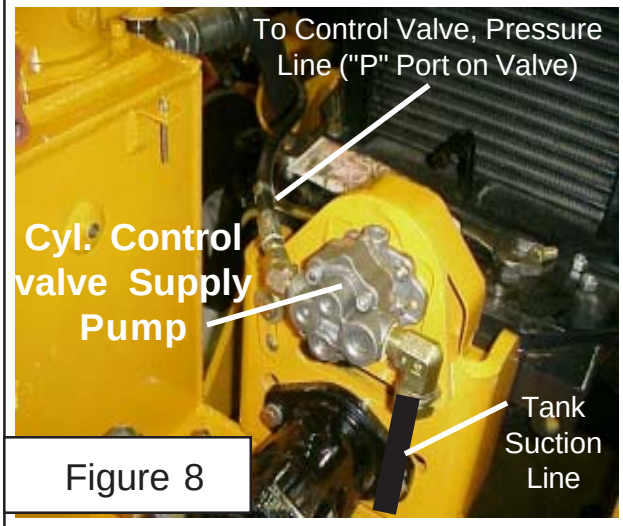


Figure 8

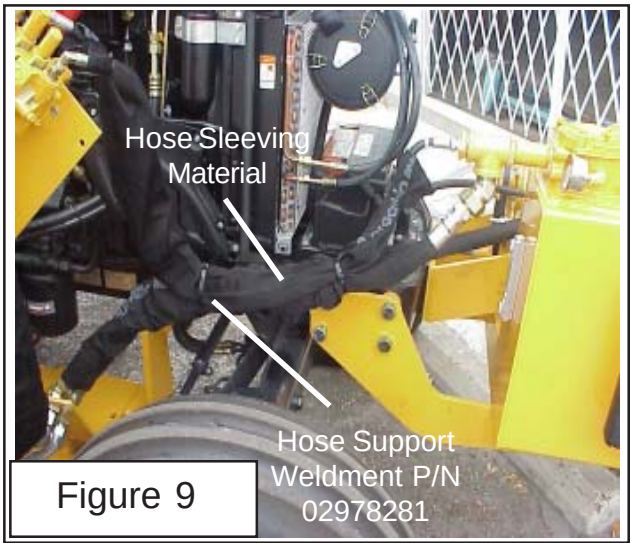


Figure 9

Joystick , Valve & Control Cables (Cab)

Remote Control Cable Connections to Control Valve - Cab Tractor:

1. Control Valve Cable Clips. Locate the four cable mounting clips and four roll pins (shown laying on muffler bracket for illustration only in Figure 10). Start the roll pins into the clips as shown through one side only (See Figure 10). Insert the Remote Cable through the Control Valve Mount Bracket (See Figure 3). Install the large cable retaining / Adjusting nut onto threaded portion of cable housing (See Figure 11). DO NOT tighten this large nut until later. On the tip of the threaded end of the cable there is a 1/4" nut. Screw this nut down onto cable. Insert the cable clip down over threaded cable end (See Figure 12). Find the four for dual wing and two for single wing 1/4" nut supplied, install one onto end of cable down into clip. This nut should be screwed onto cable at least the thickness of the nut, do not screw it on so far that it will interfere with the operation of the cable. Using the nut that was already on the cable screw the nut out until it is against the clip from the bottom side, tightening this nut against clip will lock the other nut inside of clip. (See Figure 12).

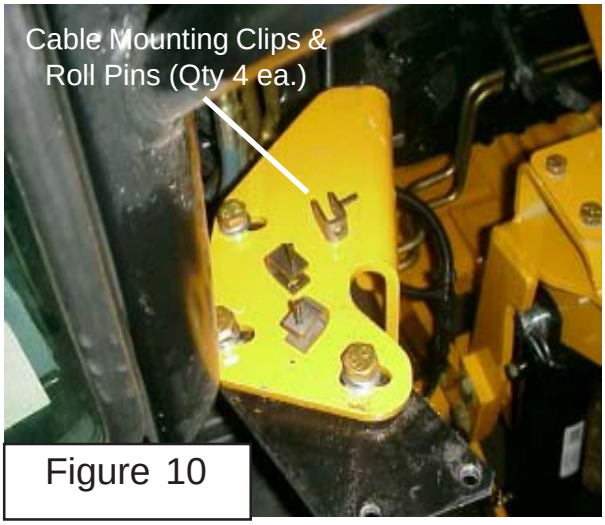


Figure 10

2. Connect Clip to Valve Spool. Turn the clip and the valve spool to where the hole in the clip and the hole in the clip are aligned. Using a hammer drive the roll pin through the hole in the spool and through the other side of clip (See Figure 13) . Make certain to keep the clip aligned when driving pin in. Turn the clip and spool as shown (See Figure 14), Continue this with the other 4 cables and clips (See Figure 15).

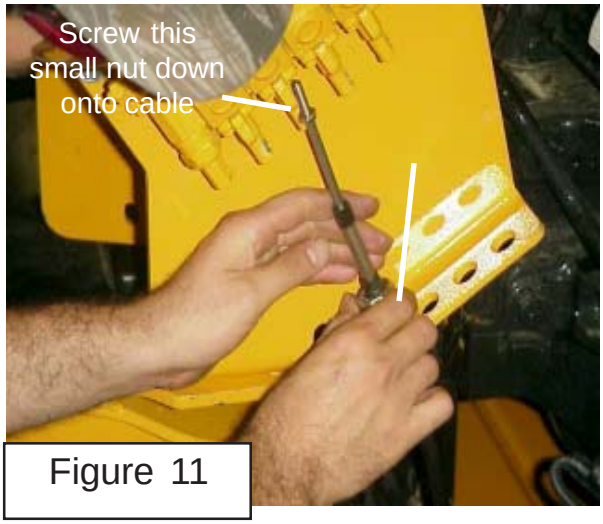


Figure 11

3. Connect Cylinder Hoses to Valve. There are six cylinder hoses for dual wing and three for single wing that connect to Control Valve. One Pressure "P" hose and one Tank "T" hose. These hoses are connected as follows (See Figure 15 , 17)

1. Tilt Cyl. Rod End RH Wing.
2. Tilt Cyl, Butt End RH Wing.
3. Lift Cyl. Rod End, RH Wing.
4. Tilt Cyl. Rod End LH Wing.
5. Tilt Cyl. Butt End LH Wing.
6. Lift Cyl. Rod End LH Wing.
7. "P" Pressure Hose from Pump
8. "T" Return Hose To Tank

Connect hoses with elbow pointing down (See Figure 16)

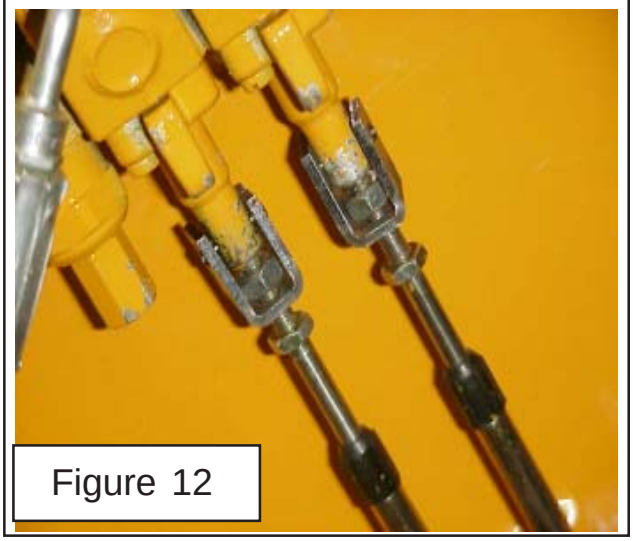


Figure 12

4. Control Valve Information. Shown Below is the valve used on the dual wing models, this is for illustration only and will not be the same as the single valve used on the RH only model, the cable connectins will connect the same. The two right sections of the valve (as shown in Figure 13 & 14) are the same as the single valve and will connect the same way (See Figure 16 and step 3).

Joystick , Valve & Control Cables (Cab)

Figure 13

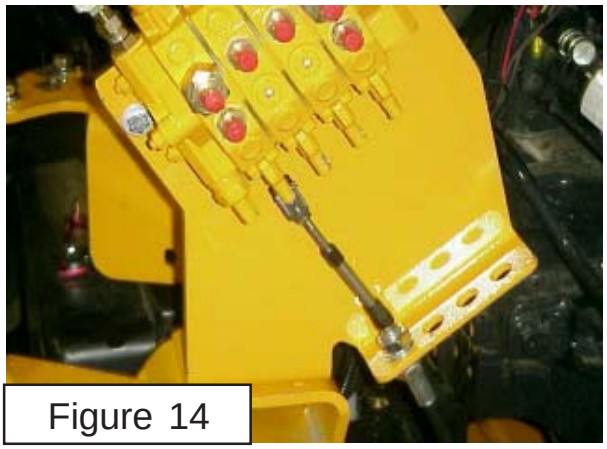


Figure 14

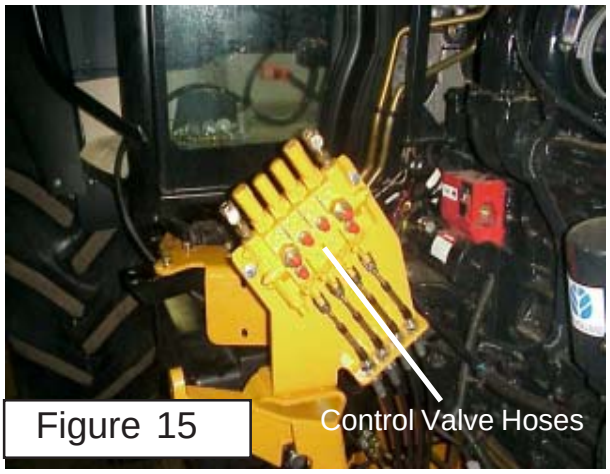


Figure 15

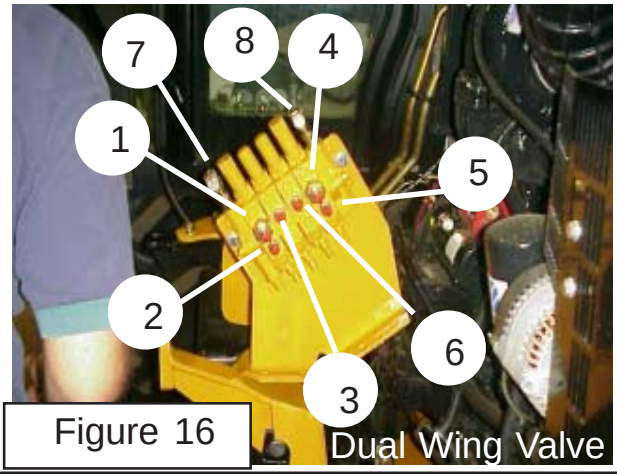


Figure 16

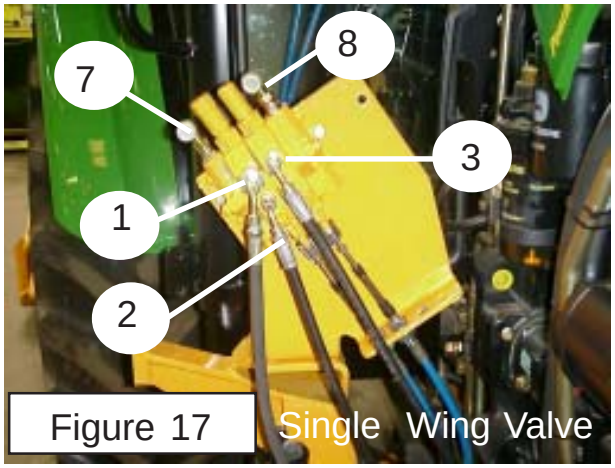


Figure 17

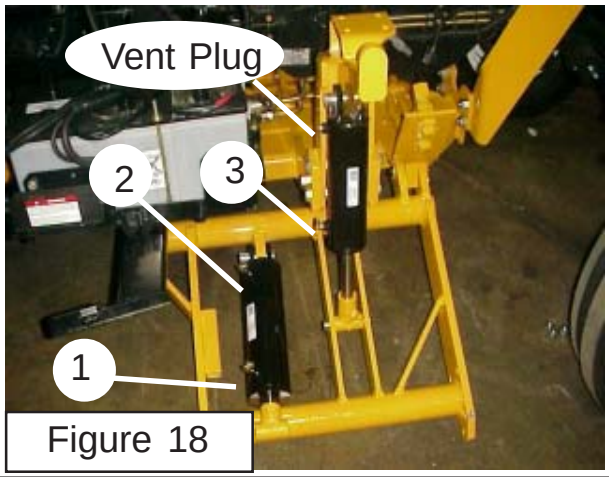


Figure 18

Joystick , Valve & Control Cables (Cab)

Remote Control Cable Connections to Control Handles - Cab Tractor:

1. Drill Hole IN Floor Mat and Cab of Tractor to Install Remote Cable Control cables and wire harness into Cab of Tractor. **IMPORTANT!** Read this complete section before drilling any holes, this will help make certain that components will be installed correctly.

There is one 1-1/2" minimum size holes that will need to be drilled into the floor mat completely through the floor of tractor (See Figure 19). This hole is best cut with round hole saw. Looking at the pictures note the location of hole as compared the ribs that run across the floor mat, this will give you indication of the location of this holes in floor mat.

IMPORTANT! The hole in figure 20 will go through floor mat and cab floor. Before drilling any holes lift floor and check to make certain there are no wires or lines that will be hit, look under cab to make certain it is clear of any that might interfere with hole.

Figure 19

2. Install Remote Control Assembly Mounting Bracket. The mounting bracket for the remote control levers will bolt to the front cab post in two existing threaded holes (See Figure 20). This bracket should be tighten before mounting anything to it.

Figure 20

3. Install Wire Harness through floor Mat. The Wire harness will come to you with the on / off switches attached, these switches will need to be removes to Push the Wire Harness up through the floor and boot cover (See Figure 19 & 21).

4. Insert Cables up through Boot Cover. Mark the cables as to which is which on the control valve as they need to be connected in the same order on the inside of the cab as they are connected to the control valve (See Figure 21).

5. Reinstall switches and Switch mounting bracket . Reconnect the switches and the mounting brackets back to the wire harness (See Figure 25, 28 & 29).

6. Mark Which Cable is Which. It is important that each cable be marked as to which one it is in relation ship to the valve. Start with the cable closest to the engine and mark it 1, next mark 2 (See Figure 22). These marked cables will make a difference when mounting the control cable handle assemblies to the mounting bracket.

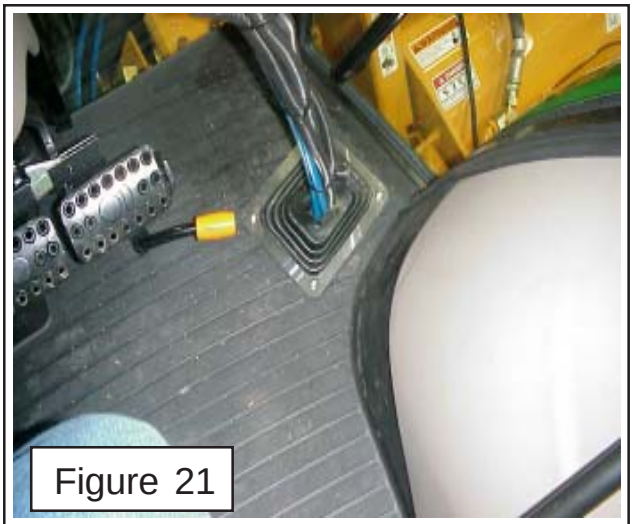


Figure 21

7. Each controller assembly comes fully assembled. All required hardware etc. is included. The control cables are not included with the control handles and should be ordered separately. The Controller must face forward as shown or controls will be backward (See Figure 23)

Joystick , Valve & Control Cables (Cab)

8. To attach the cable, manipulate the controller handle so that the attachment nut is exposed as shown. Remove the lower most nut and screw from the controller housing. Thread the cable nut into the controller attachment nut and tighten. (See Figure 24).

9. Allow the controller handle to return to neutral. Slide the cable guide tube into the control housing and reinstall and tighten the housing screw.

10. Check the operation of the spool, cable and controller. Some adjustment at the valve end may be required too ensure that the spool returns to neutral when the controlle r is in the neutral position. (See Figure 14)

11. The control lever assemblies utilizes a small **spring** to make up for free play in the cable to valve connection. The control valve spool spring provides the centering capabilities of the controller and the valve spool. **Lack of centering at the controller is normally attributed to poor adjustment at the valve to cable connection or binding of the cables due to poor routing.**

12. The control lever assemblies will bolt together to form a group of handles, there will be 4 handles bolted together along with the switch mounting brackets. (See Figure 22 & 23) The switches will mount to these brackets. Dual Wings models will have two switches. The switch for the left wing mount on the left and switch for the right wing mounts on the right (See Figure 22 & 23). The same two long bolts that go through cable control handles will go through switch brackets.

13. Install Cable control Handle Assembly. The control cable assemblies slide over the three mounting bolts that are installed through the mounting brackets . The first cable to be installed will be the Right Wing Lift Cylinder, the next controller is the Right wing tilt cylinder. The controls need to be installed this way to match the operation instruction decal (See Figure 26).

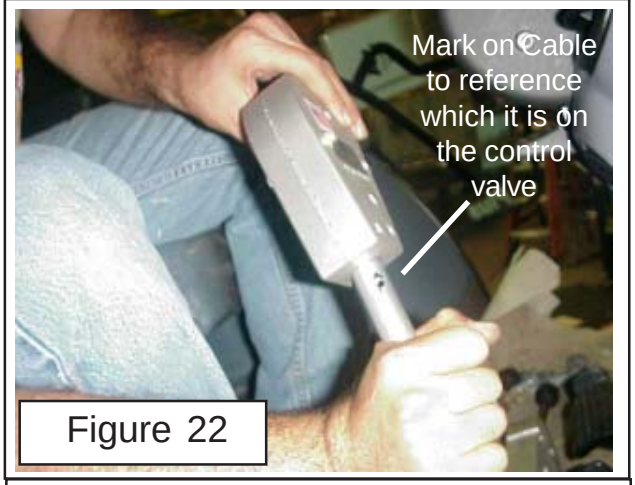


Figure 22

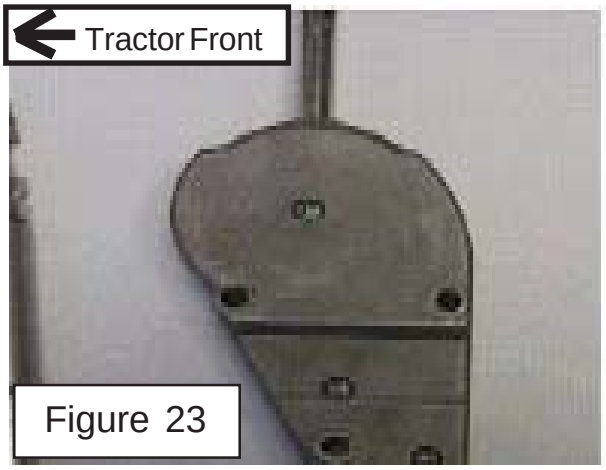


Figure 23

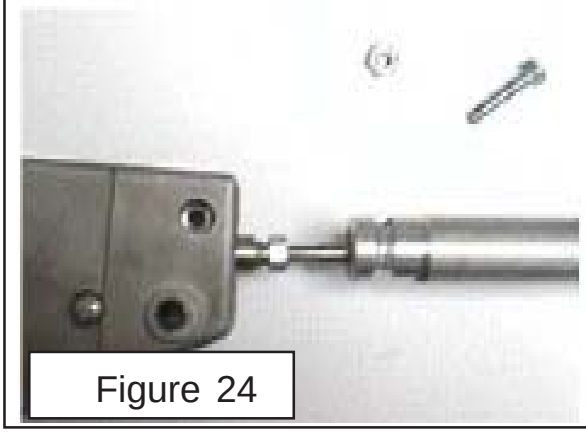


Figure 24

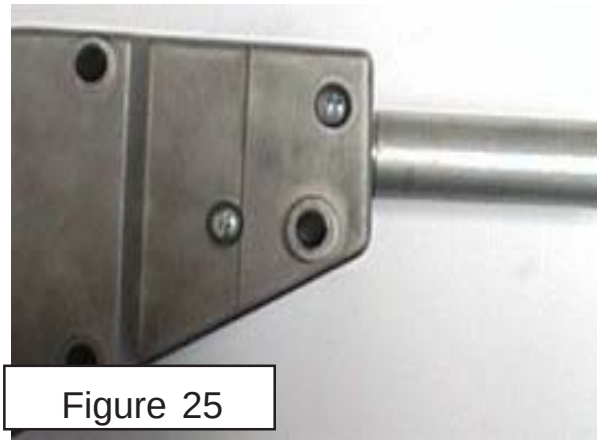


Figure 25

Joystick , Valve & Control Cables (Cab)

14. Install Electrical Control Switch. The push pull switch mounts onto the switch mount bracket and the bracket is mounted between the control cable levers (See Figure 26). Note this switch can be mount on either side of handles, it is customers choice.

15. Adjust Cable Control Handles. The handles will have some adjustment Left and Right, up and down by loosening the mounting bolts of the pivot mount. These adjustments will usually be changed after assembly to suit the individual operator. It is helpful when possible to get the operator to test fit these adjustments with you. (See Figure 26). The handles of controllers are adjusted at the valve mount plate (See Figure 14).

16. Tie Cables and Wire Harness together. Tie the cables and Wire Harness together with plastic ties inside the cab and outside the cab. This will keep them from moving around (See Figure 21).

17. Check Hydraulic Hose Routing. Shown below is the routing of the hydraulic Cylinder & Control Valve. Double check these before running Unit. (See Figure 28 & 29). The Hydraulic hoses must be connected correctly to the cylinders and the Valve or the control functions will not be correct according to the operation instruction decal (See Figure 29 & 30).

Figure 26

Figure 27

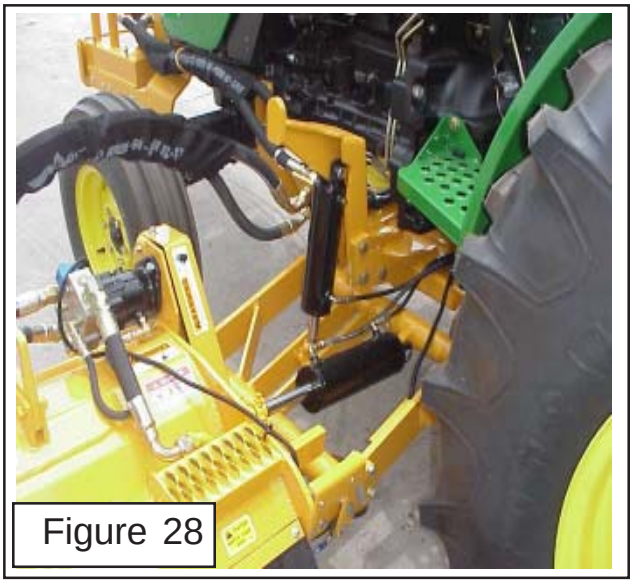


Figure 28

Valve to Cylinder Hose Connections (Cab & ROPS)

Figure 29

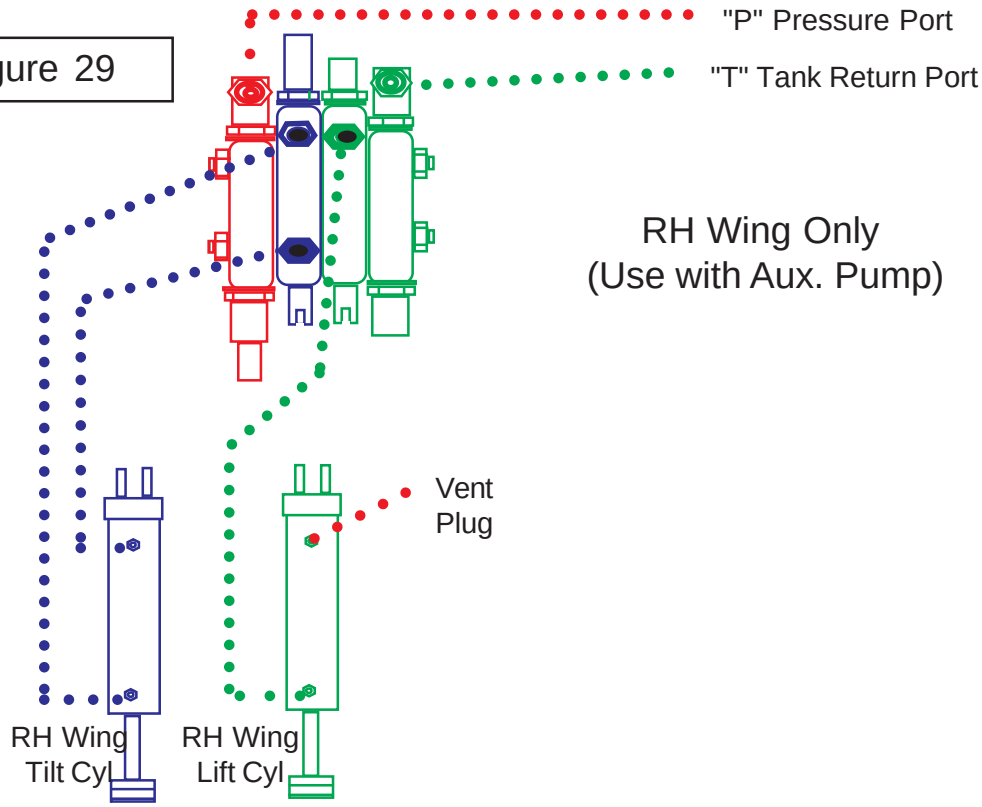
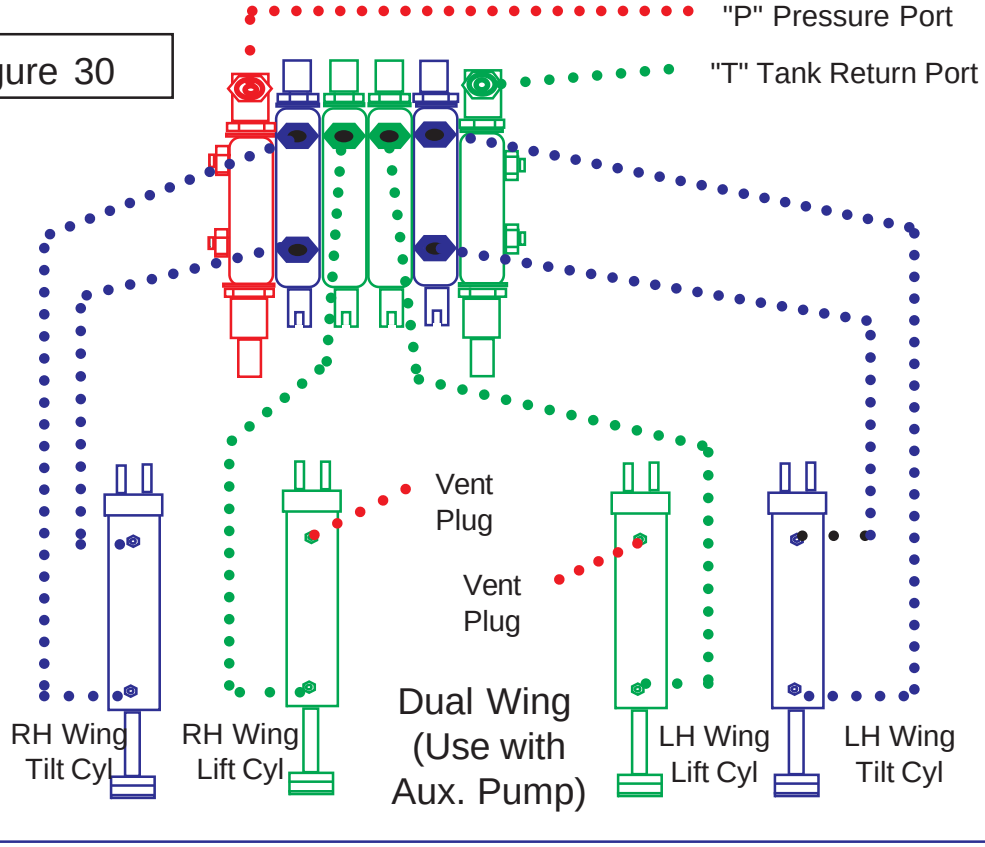


Figure 30



Valve Connections (ROPS Tractor)

Valve Connections ROPS Tractor:

1. Install Valve Stand to Tractor on ROPS Tractor only. Attach Valve Stand to the top of the Right Lift Cylinder Support with (3) 1/2" x 1-1/2" bolts, and (3) 1/2" locknuts (See Figure 31 & 34).

2. Attach Valve Stand to Valve Mount Bracket. Attach Valve Stand to the Valve Mount Bracket with (2) 3/8" x 1-1/4" bolts and (2) 3/8" locknuts (See Figure 32, 37 & 38).

3. Attach Control Valve to the Valve Stand. Attach Control Valve to the Valve Stand with (2) 3/8" x 1" bolts, (2) 3/8" locknuts. Attach the Top Cover and the Bottom Cover to the Valve Mount Bracket with (8) 3/8" x 1" bolts, (8) 3/8 washers and (8) 3/8" locknuts (See Figure 33 & 38).

4. Install Mower Wing ON / Off Switches. Make certain to install connector so that larger brown wires are located on bottom poles of switch. This applies to Dual Wing and Single Wing applications (See Figure 34, 35, 40 & 43)

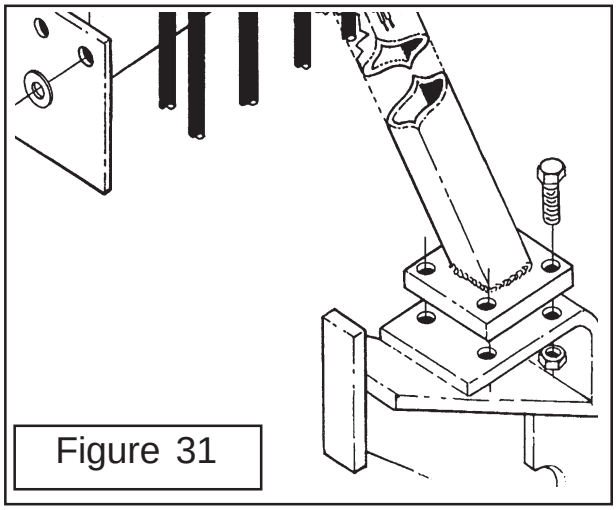


Figure 31

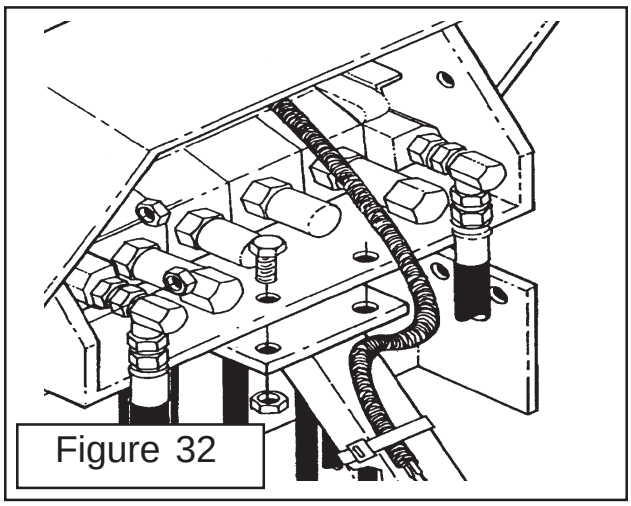


Figure 32

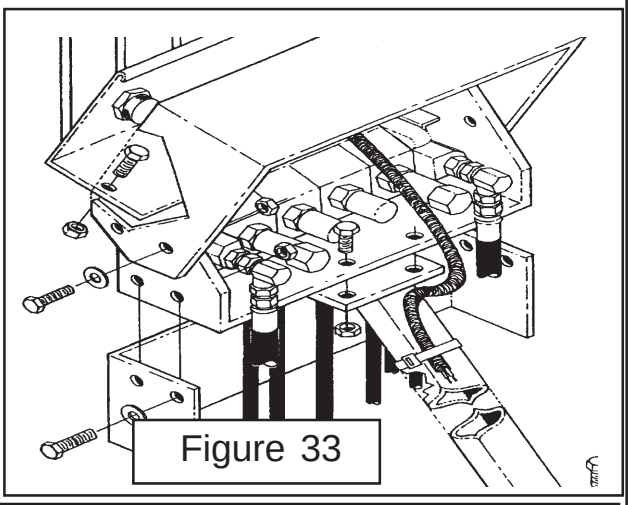


Figure 33

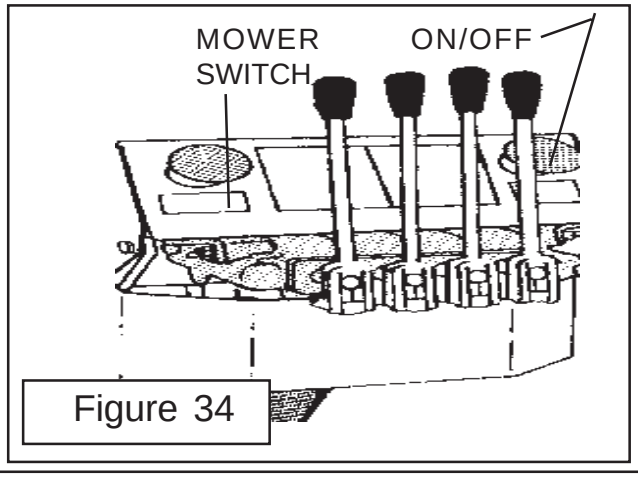


Figure 34

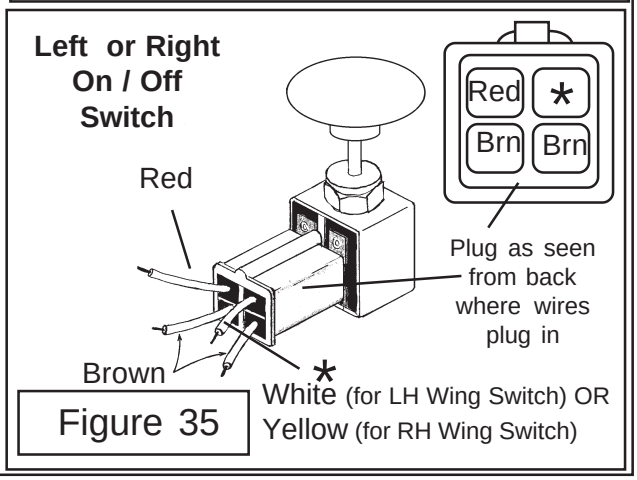


Figure 35

Valve Connections (ROPS Tractor)

5. Install Valve Supply and return hoses. Attach Valve pressure and return hoses to the valve (See Figure 10 & 41) These hoses must be connected according to the schematic shown in figure 10. Do not remove the caps from the ends of the hoses or the valve connections until hoses are being connected.

6. Install cylinder hoses to Valve. Attach the cylinder hose to the cylinders. If a single wing see figure 29 and if a dual wing see figure 30. these hose must be connected as shown in order for the control handles of the valve to match the valve operation instruction decal.

7. Connect cylinder hoses to valve. The hose will connect to the control valve from the bottom. These hose must be connected correctly in order for the valve handle to function as designed (See Figure 29, 30 & 42).

8. Install lower Valve cover. The lower valve cover will cover the hose connections to the valve. This is a safety item and unit must not be operated without this cover installed at all times (See Figure 42).

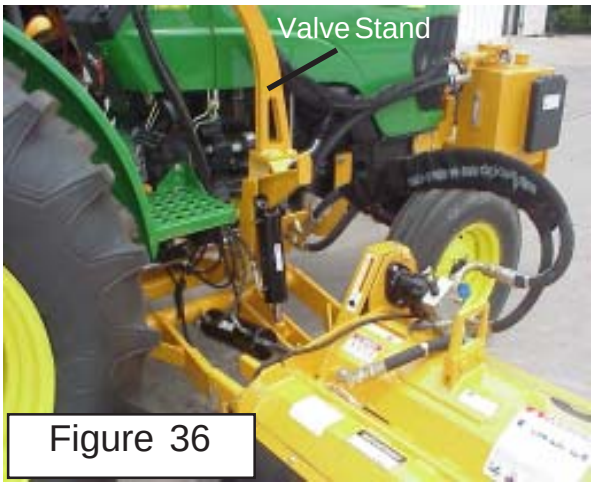


Figure 36

9. Install upper valve cover. Install the upper valve / switch cover on the top of the valve (See Figure 41)

10. Install operation decal for Valve. The decal with handle function will be installed on the lower valve cover and the decal for the motor switch will install on the top valve cover under the switches (See Figure 43)

Figure 37

Figure 38

Figure 39

Valve Connections (ROPS Tractor)

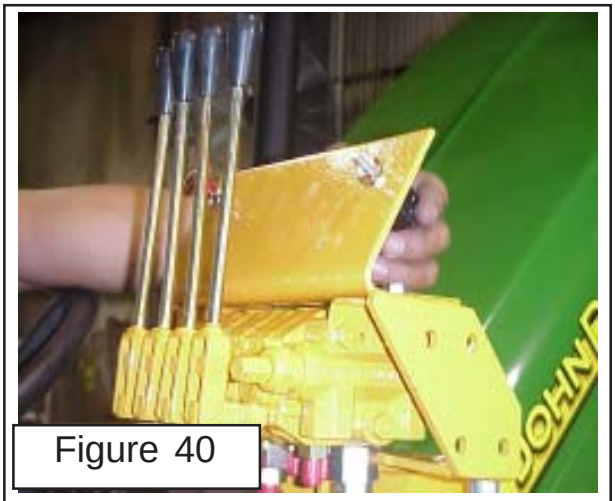


Figure 40

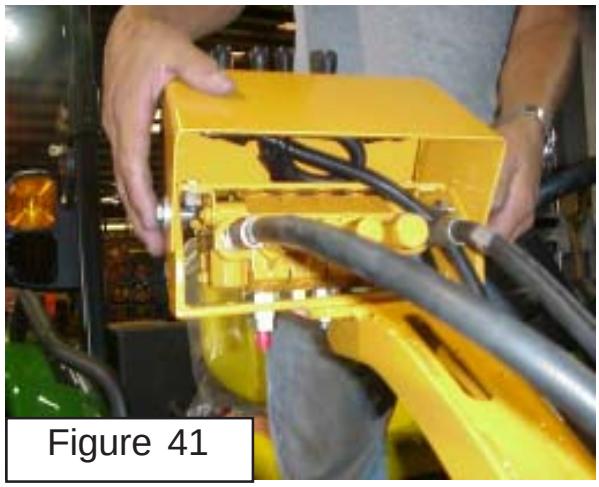


Figure 41

Figure 42

Figure 43

Figure 44

Figure 45

Wire Harness Connections (CAB & ROPS)

Wire Harness Connections:

1. Connect Wire Harness to Tractor Starter Activation Wires. The wires to the starter from the motor control switches will need to be connected to the tractor near the ignition switch connections. Or they can be connected near the starter solenoid, this is something the technician will need todecide as they assemble the unit. Alamo Industrial recommends connecting the wires at thetractor ignition switch (See Figure 46 thru 58). Also see the wire / harness schematic on the following pages. Consult Tractor Repair Manual for wiring schematic of Tractor to determine what wire is what on the tractor ignition switch.

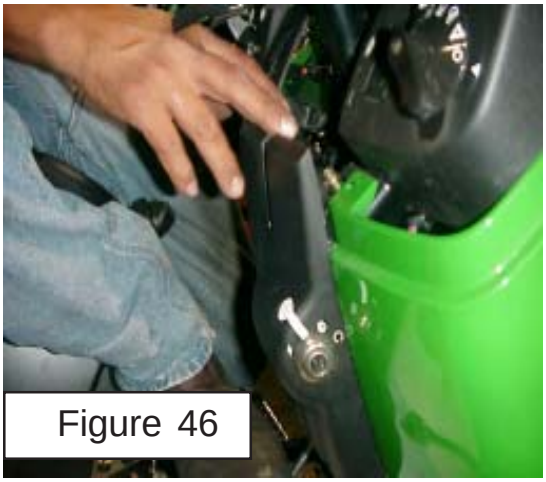


Figure 46

2. Connect Power Supply for Motor Control Switches. **Make certain the battery is disconnected before connecting wires.** The power supply wire must be connected to a wire that only has current when the tractors ignition switch is in the "ON" position. **If the supply wire is connected to a constant active wire and the motor control switchs are left on when tractor is parked they will run the battery down**.

Figure 47

Figure 48

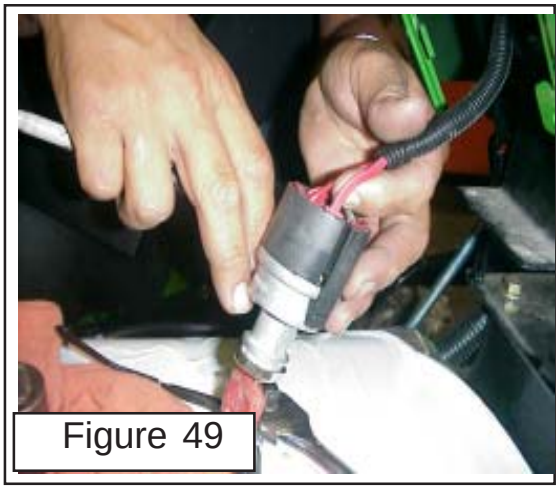


Figure 49

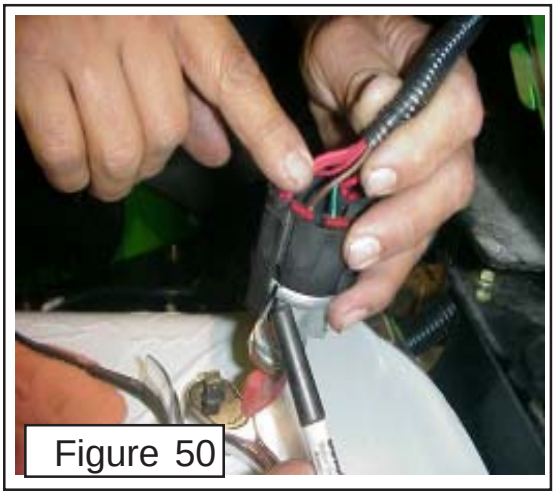


Figure 50

Wire Harness Connections (CAB & ROPS)

3. Check all Wire Harness Routing. Inspect all of the wire harness before connecting them. Make certain that all portions of wire harness that have been installed is tied up and out of the way of folding components or any thing that may damage them (See Figure 46 thru 58).

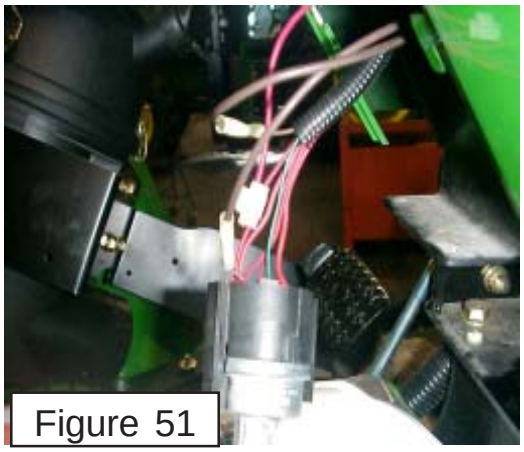


Figure 51

Figure 52

4. Wires from the safety switch must be routed close to cutter housing side sheet and lift frame pivot points. This will prevent wires from being stretched and broken when cutter housing is raised or lowered to maximum positions (See Figure 52)

5. Route Wires for Cut Off Switches. The wire harnes for the magnetic cut off switches mounted on the wing hinges will be ran through a piece of square tubing welded to the lift frame, this is to protect the wires from be hung up on object while mowing.

6. Wire Harness Components. The wire harness will be received in sections. The main wire harness (Single or dual wings) and the wing harness, a RH harness and a LH harness. The RH and LH harness will both be used for a dual wing unit. and only the RH harness for a single wing unit.

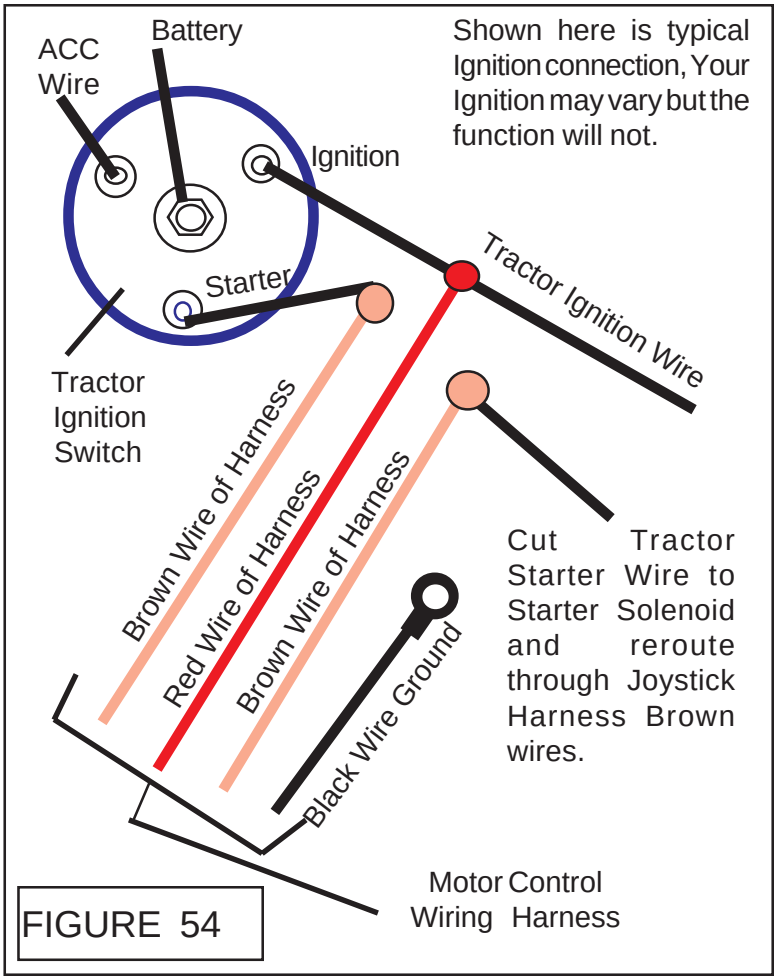


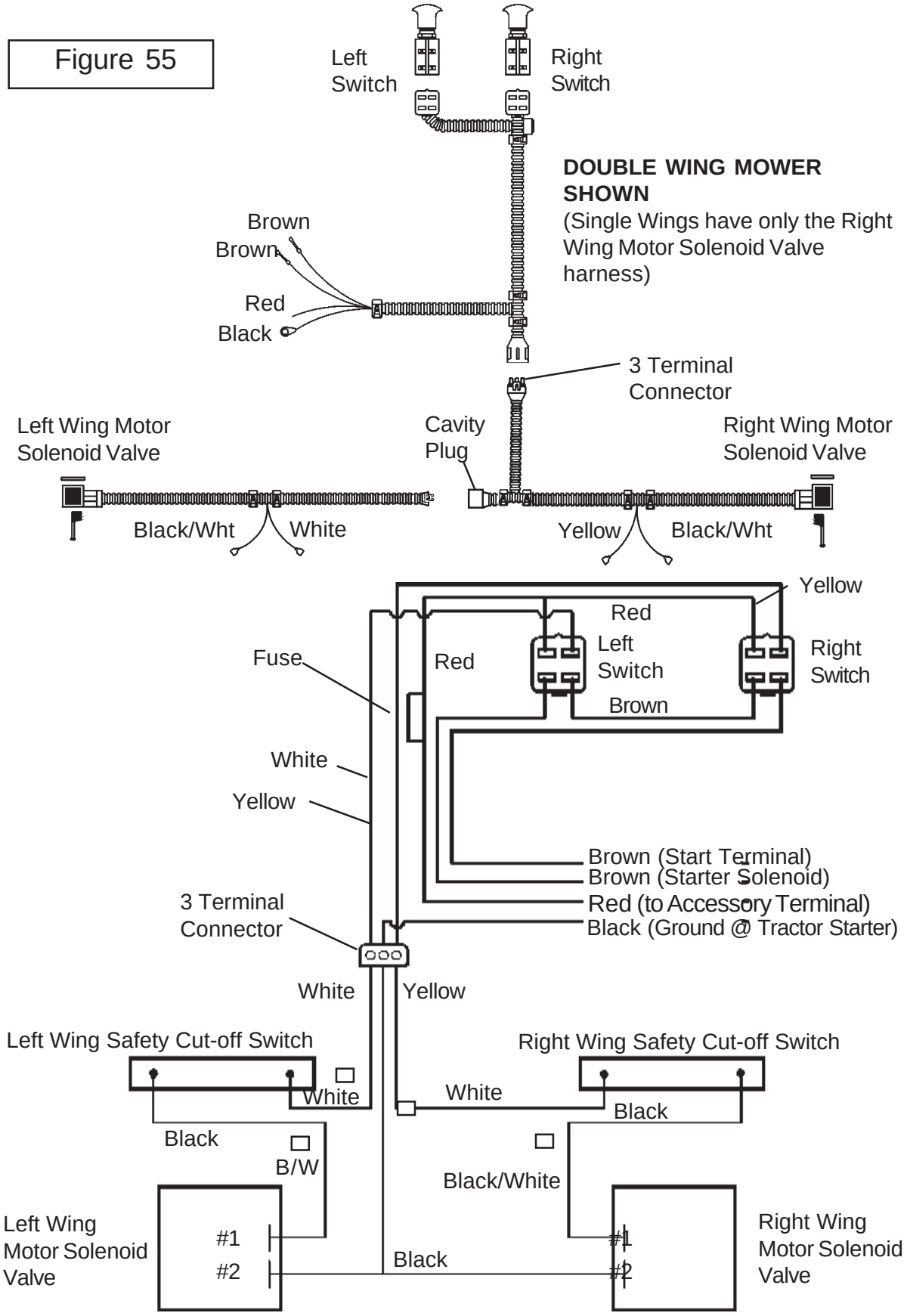
FIGURE 54

NOTE: Route wires in such a manner to prevent interference with the operation of tractor or INTERSTATER. Ensure that wires DO NOT lay against anything which could wear through insulation and cause a short circuit.

After connecting all wires, wrap wires with flex guard tubing. Neatly gather hydraulic hoses and flex guard tubing and strap together using plastic ties.

Wiring Harness Schematic (CAB & ROPS)

Figure 55



Motor Control Switch - Dual Wing

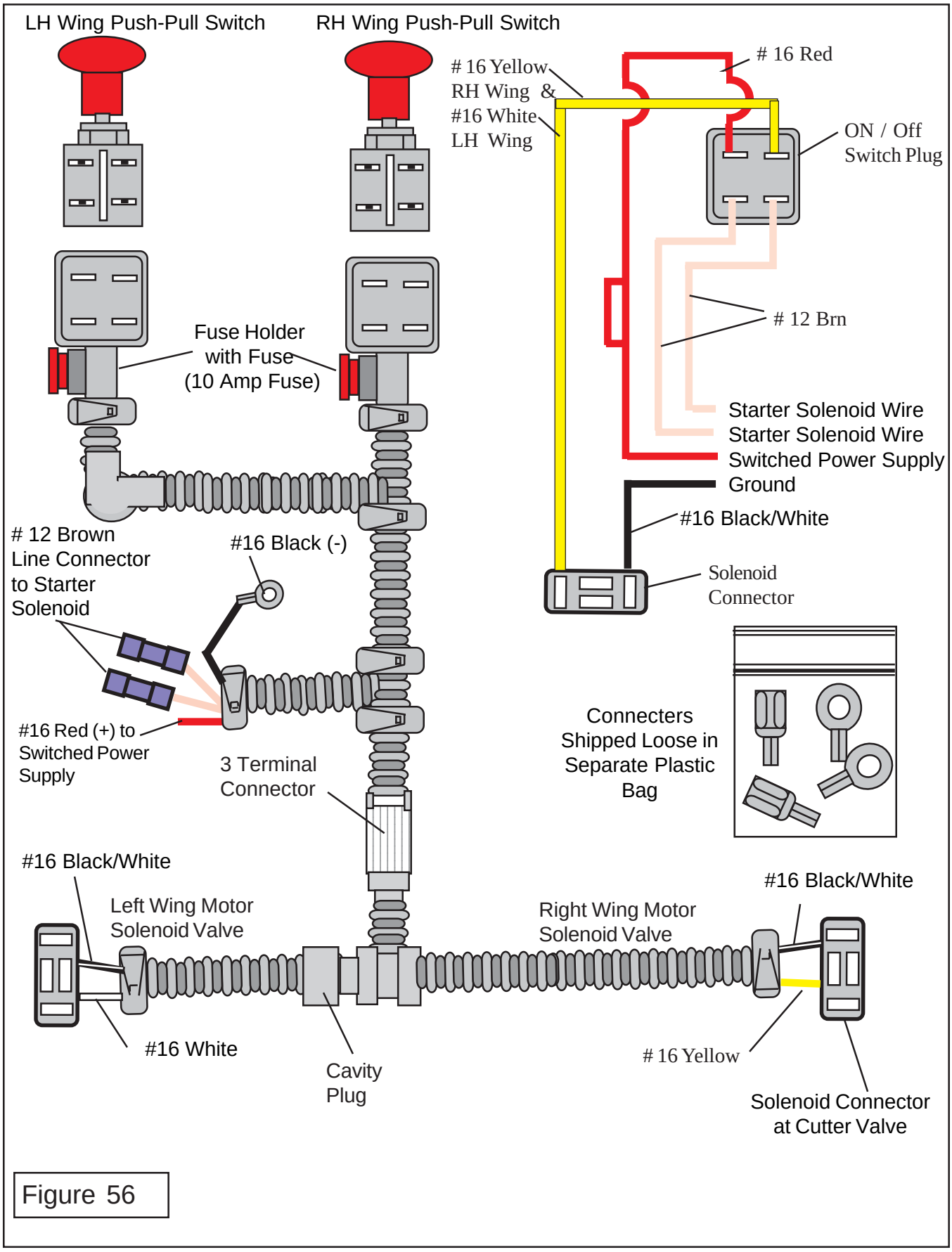


Figure 56

Motor Control Switch - RH Wing Only

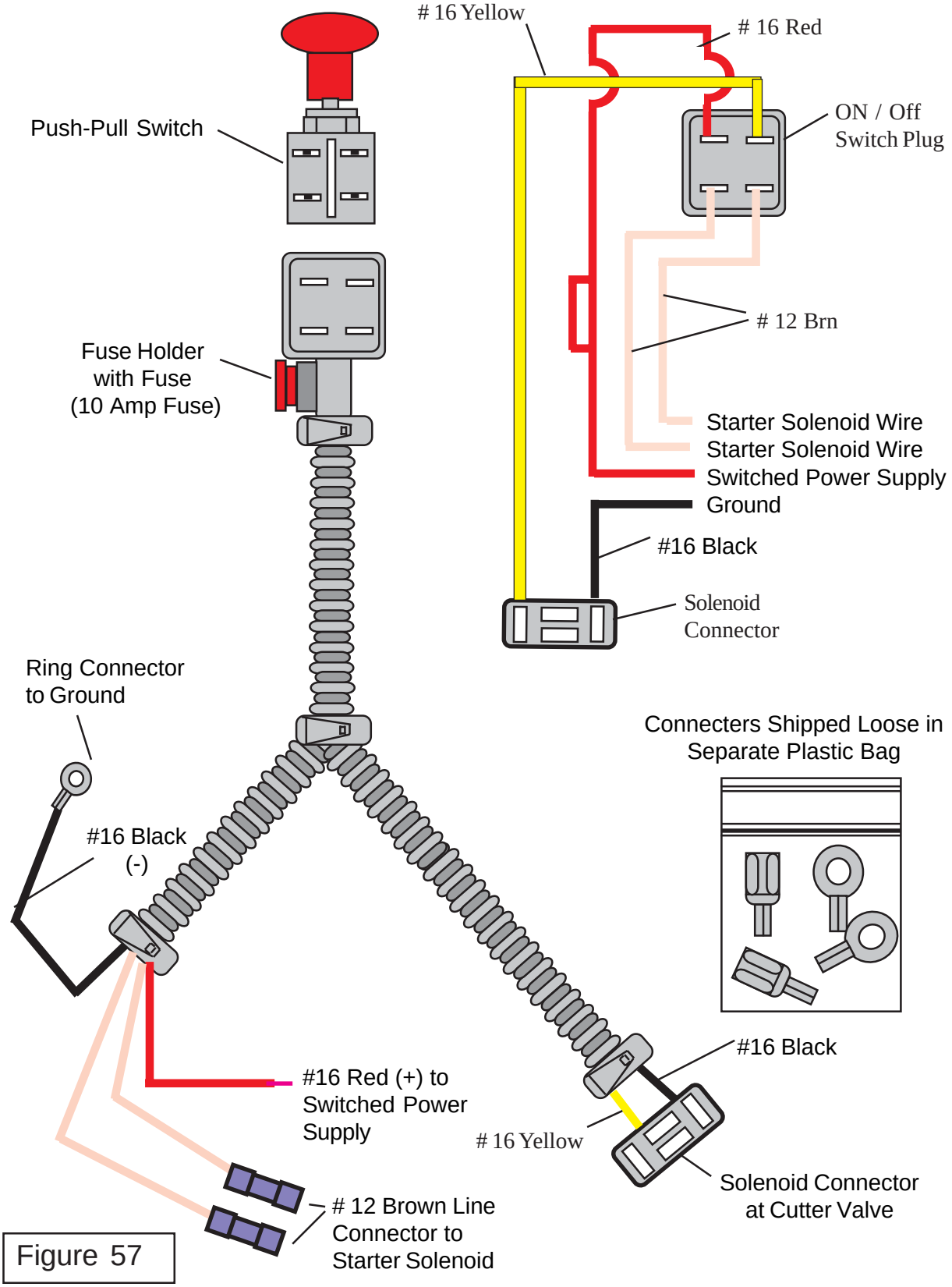


Figure 57

Wing Wire Harness - RH Wing (Single Wing)

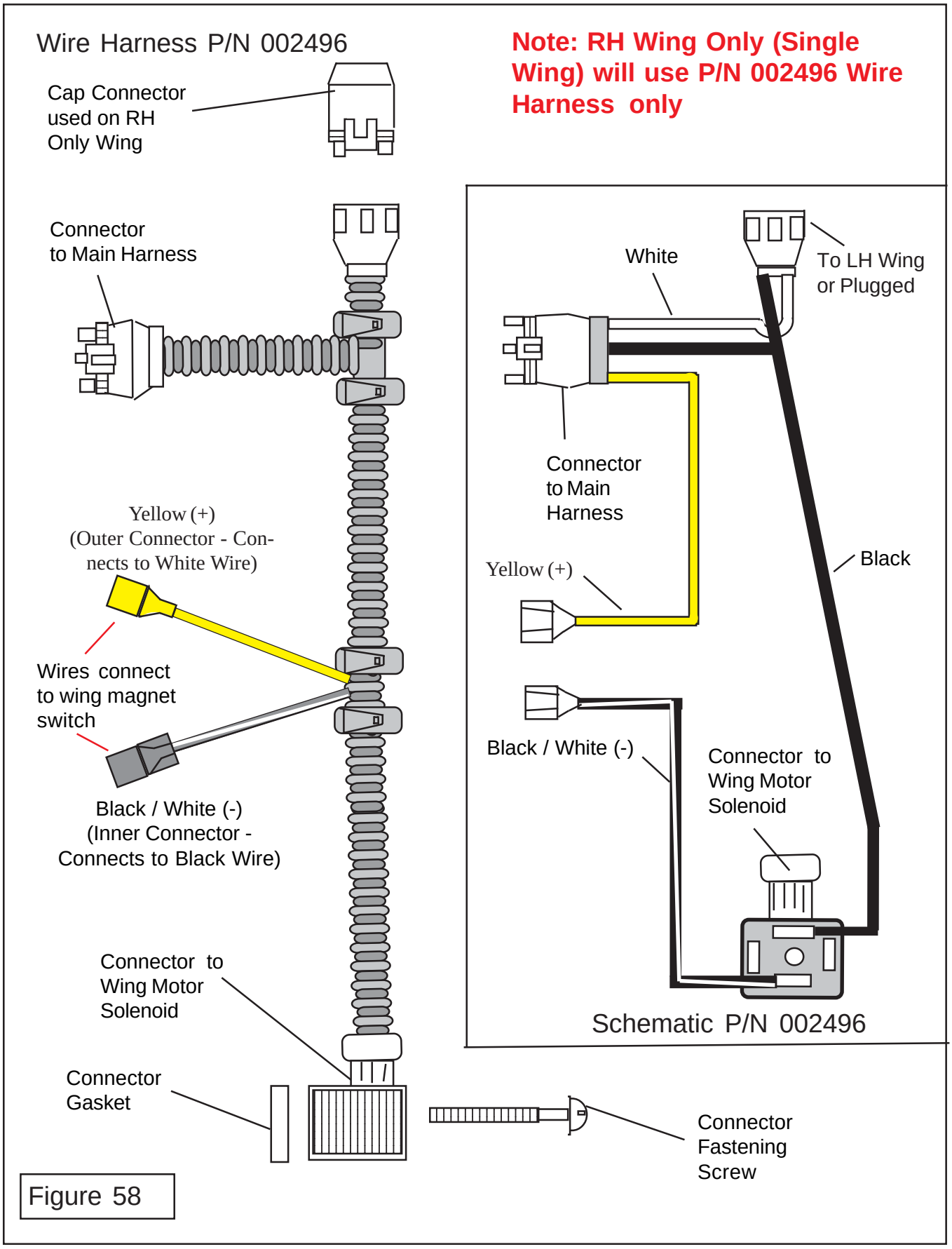


Figure 58

Wing Wire Harness - LH Wing (Dual Wing)

Wire Harness P/N 002497

Note: Dual Wing will use both P/N 002496 & P/N 002497 Wire Harness

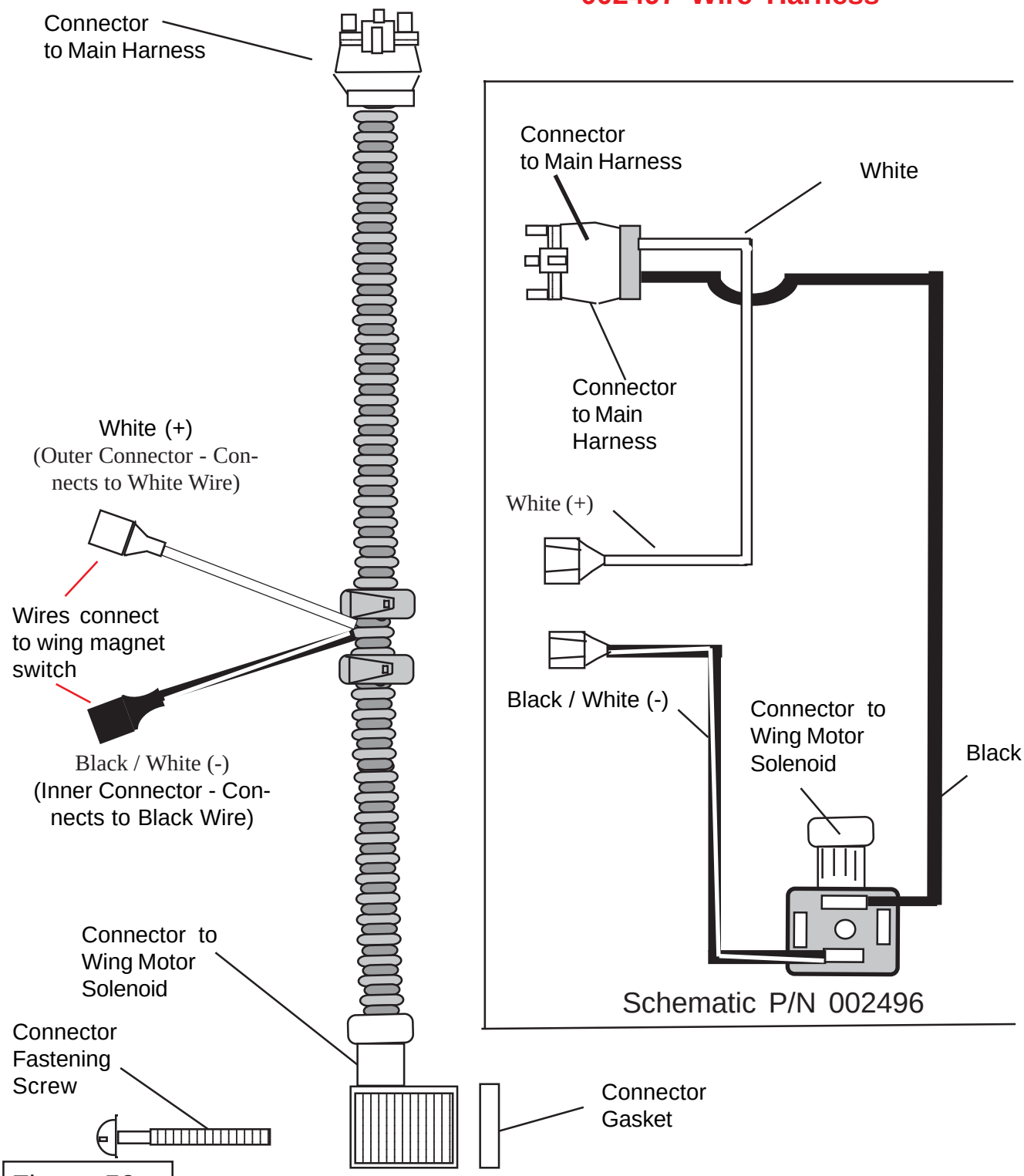


Figure 59

Hyd Supply From Tractor Hyd To Control Valve

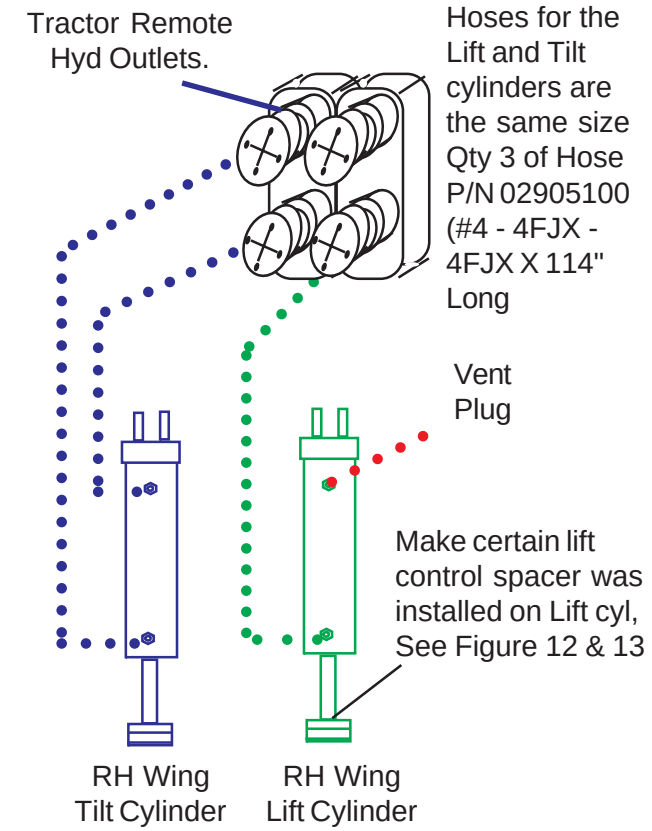


Figure 60

Connecting Cylinders To Tractor Control Valve for Hydraulic Supply.

When the tractor hydraulics are used to supply and operate the cylinders there will not be a control valve shipped with the mower. The hydraulic cylinders will connect direct to the tractors remote outlets and the tractor controls will be used (See Figure 14).

When using the Auxiliary front pump for the cylinder hydraulic system there will be a control valve and components shipped. See the section for installing the auxiliary pump and control valve.

Section 9

Interstater

SERVICE MANUAL

Main Frame & Wing Lift Arm Weldment

NOTE:

Shown here is a typical illustration of the way the mainframe and wing lift weldments are assembled. This is common but may not be shown on the type tractor you have. This tractor model is used for illustration only and should match your application in function and design. Some mounting components, brackets and the way they connect to the tractor may vary. Consult the instructions and/or assembly manual for the tractor model the unit is mounted on.

Install Main Frame / RH Only & Dual Wing

NOTE: Frame and componets in this section are for illustration only and is not intended to be the components for any particular model. Each tractor model mainframe will connect to tractor using some different components and bolt sizes. This section is reference only SEE ASSEMBLY MANUAL AND/OR ASSEMBLY INSTRUCTIONS SHIPPED WITH YOUR MODEL TRACTOR FOR SPECIFIC FRAME MOUNT SPECIFICATIONS. (Steps 6 through 9 will be mostly common on all tractors)

1. Identify and locate the frame rail (See Figure 1), Sub-frame Weldment. The tractor drawbar retainer and drawbar will have to be removed. The rear of the frame will bolt into the same holes the drawbar was removed from (See Figure 3). The frame will be slid under the tractor and lifted up under the tractor. The Dual wing mainframe shown below, the single wing mainframe will look like the dual wing with the exception there are no wing mounting lugs on the H side of frame.

2. Remove RH Side Steps. The steps on the RH side of the tractor will be removed and not used so as not to interfere with the clearance of the mower head. Any factory options that mount on RH side (if equipped) will need to be removed also for clearance. It will be dealer and/or customers choice on where and if the optional equipment is remounted somewhere else for use. (See Figure 2). On the dual wing units the LH step will also need to be removed.

3. Install Main Frame to Tractor. The frame rail (See Figure 1) will be slid under the tractor on the From the rear (See Figure 3). Do NOT tighten the frame mounting bolts until all the bolts have been installed as frame will need to be moved slightly for alignment as the bolts are installed. The frame can be installed by balancing the frame on a floor jack, if using this method it is recommended two people perform this to prevent the frame from falling. Raise the frame up to the tractor frame (See Figure 3),

4. Raise the frame rail up under the tractor. Until the rear mounting plate is under the rear axle and aligned with factory holes in the center of rear axle housing. Using the jack raise the frame up until it is against the rear axle housing. Install the new bolts and lockwashers. Do not tighten these bolts until all bolts are installed into the frame.

5. Install Front Frame Mounting Brackets. The front frame mounting brackets will consist of a RH and a LH Bracket (See Figure 4, 5 & 6). Bolt these mounting brackets to the tractor frame with two bolts on each side. These brackets will bolt to the sub frame with two bolts and nuts each. All the mounting bolts should be installed before tightening the bolts. Tighten all the bolts in sub-frame front and rear now (See Figure 4, 5 & 6).

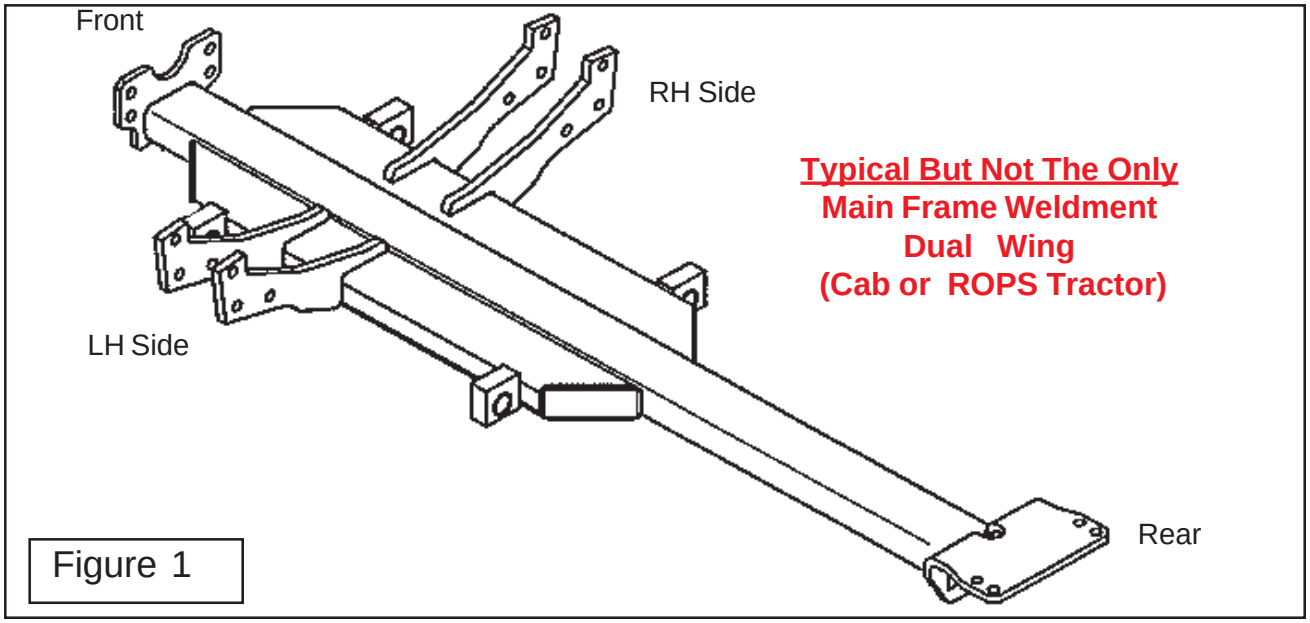


Figure 1

Install Main Frame / RH Only & Dual Wing

6. Install Cylinder Support Weldment. The cylinder support weldment bolts to the frame rail (See Figure 6). Tighten the mounting bolts once installed. On dual wing units the LH will install the same as the RH. The LH support will not have the mount with the 4 holes welded to the top of it (See Figure 7 & 8).

7. Install Wing Lift frame. The RH wing lift frame pivots on two hinge pins, one to the front and one to the rear. When installing these pins they must be aligned in a way that will allow the retaining bolt to be installed (See Figure 9, 10 & 11). On dual wing models the LH Lift frame will install the same as the RH.

8. Install Hydraulic Cylinders. Install the hydraulic cylinders as shown. The ends will have to be installed on the rod ends, Note the collars on the cylinders. These collars have locking bolts in them and must be installed with the bolts to the top where they are accessible after assembly is complete (See Figure 11).

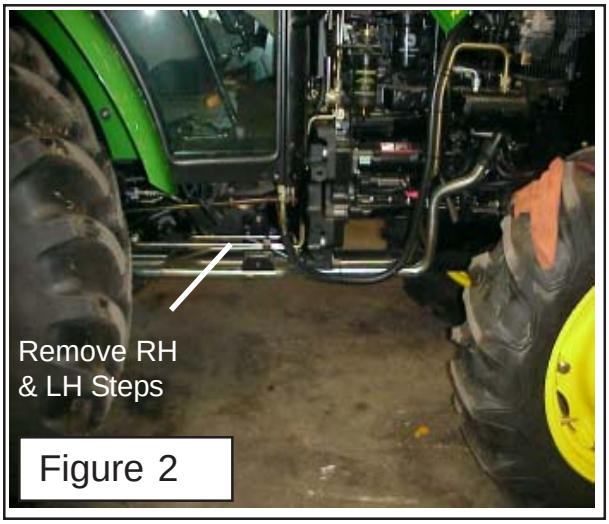


Figure 2

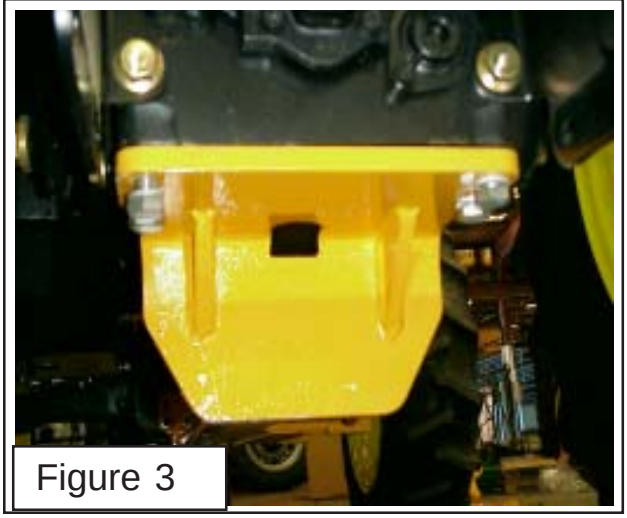


Figure 3

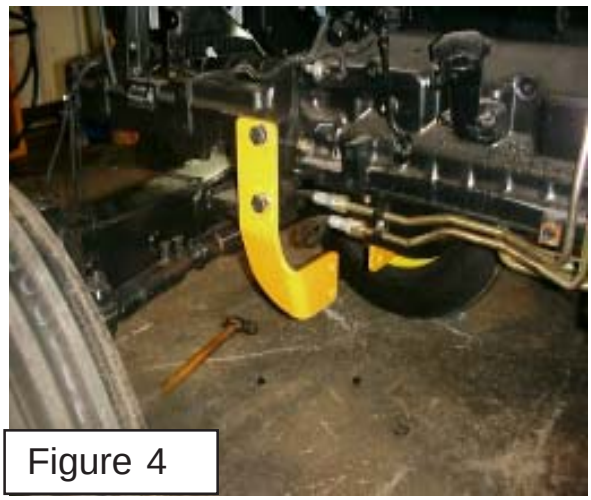


Figure 4

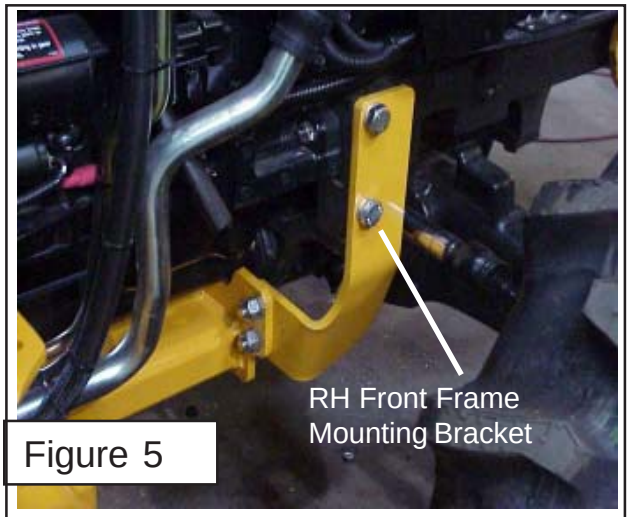


Figure 5

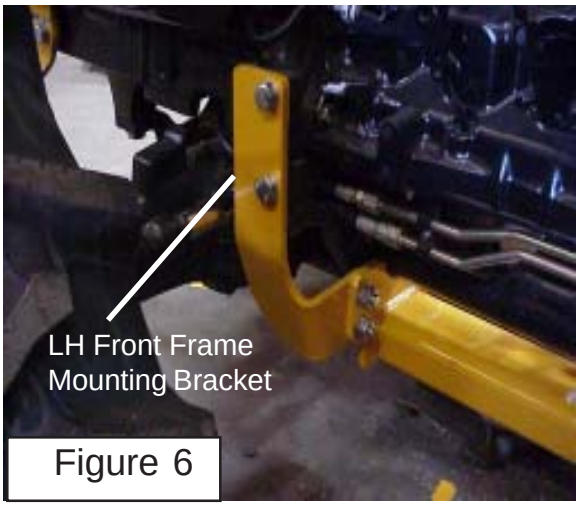


Figure 6

Install Main Frame / RH Only & Dual Wing

NOTE: Components on these two pages will mount the same on all tractor models

9. Check the Lift and Tilt Cylinders. check to make certain that when the Lift cylinder and the Tilt Cylinder were installed the grease fittings and the locking collars are pointed in the right direction (See Figure 14 & 15). When installing these they must be installed with the rod end clevis grease fitting facing up and out (See Figure 11, 12 & 13). Do not remove any shipping plugs from cylinders or hoses until you are ready to install the hoses, this will keep the system and components clean while unit is being assembled.

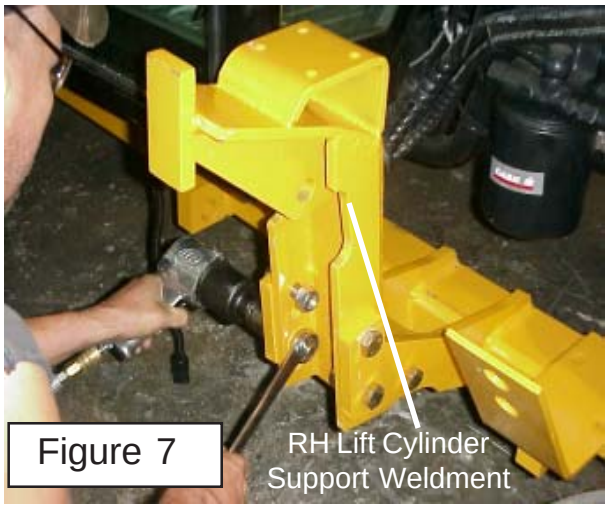


Figure 7

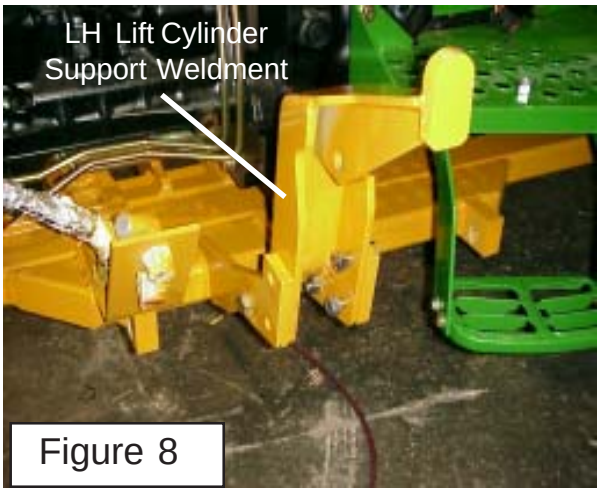


Figure 8

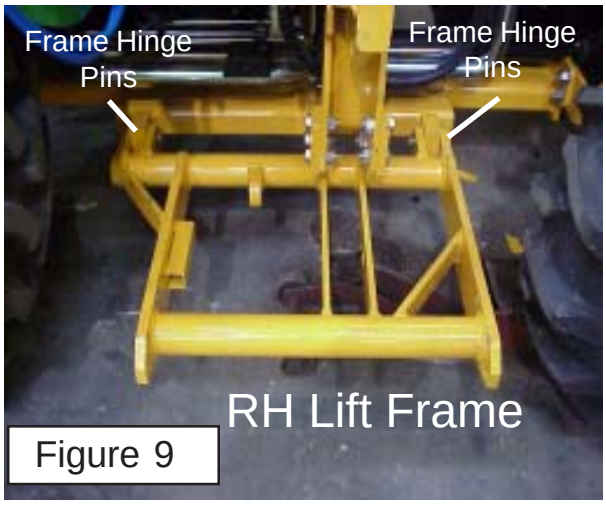


Figure 9

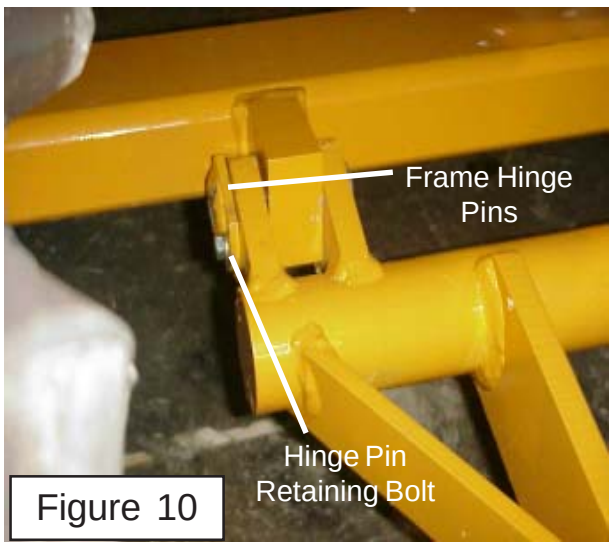


Figure 10

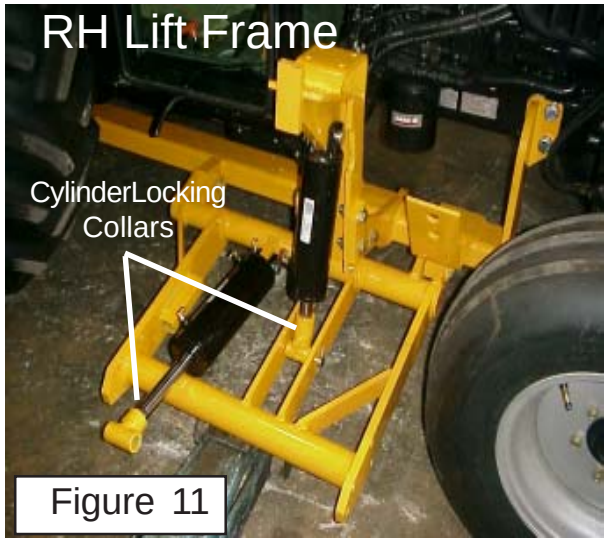


Figure 11

Install Main Frame / RH Only & Dual Wing

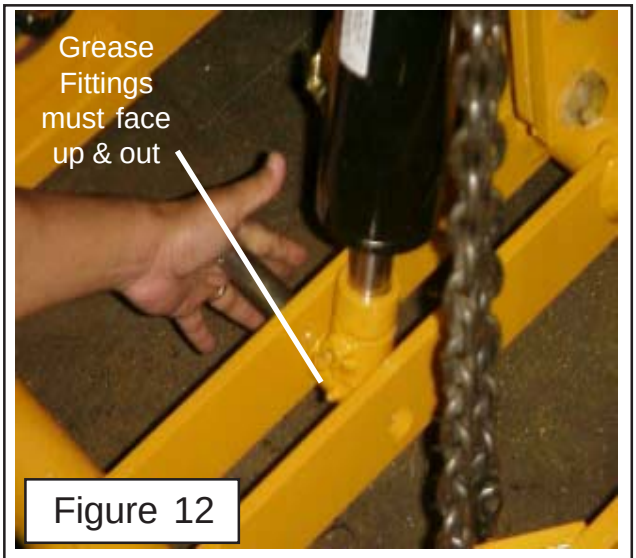


Figure 12

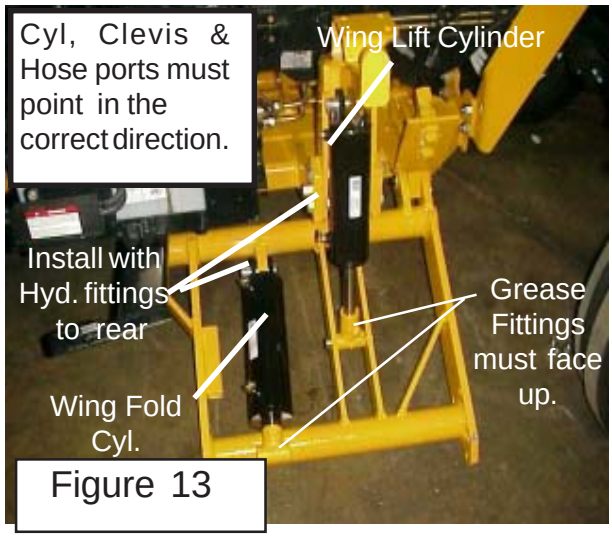


Figure 13

Figure 14

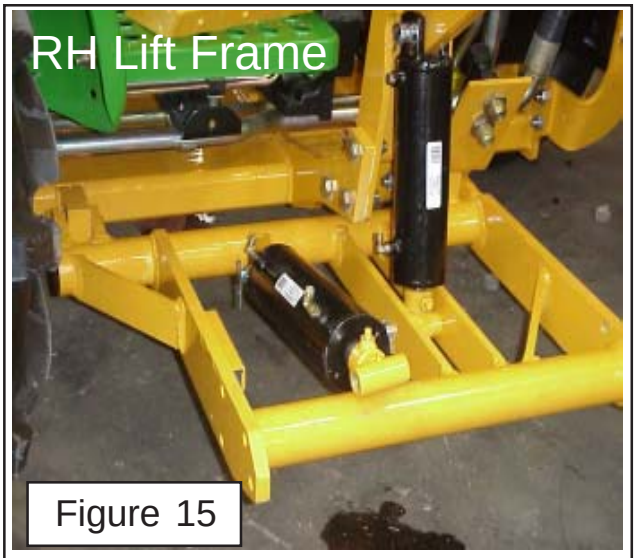


Figure 15

Figure 16

NOTES

Section 10

Interstater

SERVICE MANUAL

Hydraulic Motors

Motors for Wing Mowers

Remove - Repair - Replace

Motor Removal & Replace

GENERAL MOTOR REPAIR / REPLACEMENT INFORMATION:

A. To disassemble / repair your INTERSTATER this manual is designed to assist you with drawings, instructions and information. This manual is designed to be used in conjunction with the parts manual, operators manual and assembly manuals. If additional information or clarification is needed contact your Alamo Industrial factory representative.

B. Some of these instructions are general information and not specifically for your tractor, but in connection with our drawings, they may not show the exact application and tractor you have. In many cases reference to assembly manual for your mower to tractor application will clarify some clarity to exact applications.

C. This section covers the removal, repair and reinstallation of the hydraulic motors procedure for the Alamo Industrial Interstater mower, it also includes instruction for hoses and miscellaneous parts to be attached the hydraulic motor to mower head.

D. These instructions are for working on the motors used to power wing mower/mowers, right side mower, and left side mower units if dual wing model. For mounting one mower side only, disregard information concerning the opposite side. Hardware quantities shown are for both sides.

F. Reference to the left or right side of the Interstater is determined while facing the front of the tractor from the drivers seat.

G. The part quantities shown for an illustration pertain only to that phase of repair. The quantity given corresponds to the number of parts needed. When repairing a single-sided model based on a dual-sided model, the quantity furnished will usually be half the quantity listed.

H. Large parts may not always be listed next to an illustration because they are usually easy to identify them from name or description.

I. This manual makes reference to individual component parts, some of which may have been pre-assembled at the factory.

Abbreviation of Parts Terminology :

Whenever reference is made to parts, listed for an illustration or elsewhere in this manual, the following abbreviations may be used:

1. ASY - Assembly	2. ASSY - Assembly	3. AUX - Auxiliary
4. BRG - Bearing	5. BRKT - Bracket	6 CYL - Cylinder
7. CW - Clockwise	8. CCW - Counter Clockwise	7. EXT - Extreme
8. EXT'N - Extend / Extension	9. F/ - For or From	10. FM - Female Boss
11. FP - Female Pipe	12. FSTNR - Fastener	13. FT - Foot / Feet
14. GB - G/B - Gearbox	15. GR - Grade	16. HD - Heavy Duty
17. HHCS - Hex Head Capscrew	18. HRDND - Hardened	19. HYD - Hydraulic
20. IN - Inch	21. LB - Pound	22. LH - Left Hand
23. LW - Lock Washer	24. M - Metric	25. MB - Male Boss
26. MM - Millimeters	27. MNT - Mount	28. MP - Male Pipe
29. MTR - Motor	30. N/A - Not Applicable	31. NC - National Coarse
32. NF - National Fine	33. NLA - No Longer Available	34. NLF - No Longer Furnished
35. NPT - National Pipe Thread	36. P1.5 - Thread Pitch	37. P2.0 - Thread Pitch
38. P2.5 - Thread Pitch	39. PL - Plated	40. PLT - Plate
41. PMP - Pump	42. PTO - Power Take Off	43. PW- Plain Washer
44. REV - Reverse	45. RH - Right Hand	46. ROT - Rotation
47. RPM - Revolutions Per Minute	48. SCKT - Socket	49. SD - Severe Duty
50. SRV - Service	51. STD - Standard	52. SVR - Severe
53. W/ - With	54. W/O - With Out	55. WLDMNT - Weldment

When installing fasteners, PW and LW (generally installed in that order) are usually on the side of the fixture or part being fastened that the hex/lock nut is on. When only HHCS, LW and/or PW are required, they are generally installed in that order. Some parts do not require a PW or LW. Refer to illustrations for exceptions. Fasteners should be installed so they cause the least interference with other parts. When securing driveshaft pulley to hub, tighten fasteners to 9 lb-ft torque.

Motor Removal & Replace

BEFORE STARTING REPAIRS: Service Rules (READ THIS)

A. Clean motor and surrounding area completely before removing any connections or Lines. NO DIRT OR DEBRIS CAN BE ALLOWED ON OR NEAR HYDRAULIC SYSTEM IF IT IS BEING WORKED ON, ANY DIRT OR CONTAMINANTS IN SYSTEM NO MATTER HOW SMALL WILL DAMAGE SYSTEM!

The hydraulic system must be kept "SURGICALLY CLEAN" to ensure proper operation and long life of the pumps, motors, and valves. All components must have protective caps over openings connected to internal spaces to prevent contamination. It is important that care be taken during unpacking parts and assemblies to make certain no other contaminants which will damage parts are introduced to hydraulic system.

B. After cleaning around all connections thoroughly, Disconnect all connections, Lines, Hoses, Wiring and Remove the Motor Completely from the mower head.

C. Clean all Tools, Pans etc. The cleaning of Area and Tools MUST be done before moving (Cleaned) motor there. Drain Oil from motor, Recheck outside of motor to Make Sure it is Clean before dis-assembly.

D. After dis-assembly of motor wash all metal components in clean solvent.

E. Use compressed Air to dry parts after washing (Compressed air must be filtered and moisture free). DO NOT wipe them dry with Paper Towels or Cloth as these will leave lint and/or dust contamination. DO NOT USE Compressed Air to spin any component (Such as Bearings or Plates) as this will damage them and could be dangerous.

F. Always use new Seals when reassembling Hydraulic Motors, Lubricate the new rubber Seals with a Petroleum Jelly, (Vaseline) which will hold them in place during assembly.

G. DO NOT reinstall worn/damaged Parts in Motor, DO NOT Use a worn/damaged motor housing.

H. Torque all Bolts over Gasketed Joints. Then repeat the Torque sequence to make sure Bolts are tight, some times Gaskets can give a Torque reading that is OK but is not, so always recheck Torque.

I. Verifying the accuracy of Motor Repairs on an authorized test stand is essential.

J. DO NOT start the tractor unless the hydraulic system is filled with hydraulic oil, all components have been connected and all safety equipment hase been reinstalled. Running without oil will damage the pumps and hydraulic system. Check the oil level in the reservoir before start-up after repair.

K.. Care should be taken when filling the reservoir to prevent contamination of the hydraulic system. Always use new hydraulic fluid when filling the system. USE ONLY APPROVED HYDRAULIC OIL IN THE HYDRAULIC SYSTEM.

RECOMMENDED TOOLS:

A. Hex Allen Wrench (Qty 5) (9/16", 5/32", 5/16", 3/32", 5/64"
B. Retaining Ring Pliers (Qty 3), 1 each of Internal (Straight .070 tip) internal (Straight .090 tip) & 1 each External (Straight 0.90 tip)
C. Retaining E-Ring Applicator (Qty 2), 1 each 9/32" & 1 each 1/2".
D. O-Ring Pick (Qty 1)
E. End Wrench (Qty 4), 1 each of 7/16", 9/16", 3/4", 1"
F. Torque Wrench (Qty 1), 0 to 100 ft. lbs. (135.6 nm) capacity
G. Hammer, Soft Face (Qty 1)
H. Seal Driver Set (Qty 1)
I. Arbor Press (Qty 1)
J. Sockets (Qty 3) 7/16", 9/16", 3/4" , Drive Size should match Torque Wrench Drive)
K. Light Petroleum Jelly (Vaseline)
L.. Locktite, # 222 and #277 or equivalent (Qty 1 tube each)
M. Petroluim Jelly (Vasoline) Samll Jar.

RECOMMENDED GAUGES FOR DIAGNOSTICS:

A. Inlet Vacuum: 30 PSI to 30 in Mercury (207 bar to 0 bar)
B. System Pressure Gauge: 6,000 PSI (700 bar)
C. Charge Pressure Gauge: 0 to 500 PSI (0 to 25 bar)

Motor Removal & Replace

MOTOR REMOVAL FROM WING DECK:

1. Secure tractor & Mowers. Lower Wing and rear Mowers down until they are resting on the ground, DO NOT MAKE REPAIRS with mowers lifted or folded. Secure Tractor as to tractors manufactures specification for parking tractor. Secure tractor so it **cannot be started, Alamo Industrial recommends that battery cables be dis-connected from tractor battery.**

2. Remove Drive Belt Cover on Wing Mowers. Remove drivebelt cover (See Figure 1) which will allow access to the motor drive belt and pulley (See Figure 2).

3. Dis-connect Hoses from Wing Motor. The hoses on the wing will need to be dis-connected from motor. Cap (Plug) these hoses and all openings in motor immediately when you disconnect them (See Figure 2)

4. Disconnect Wire Harness From Motor Control Block. Unplug wire harness connection at the motor solenoid on the motor control block. It will not require that wire harness be completely removed only unplugged and lay it aside. (See Figure 3)

5. Remove Motor Drive Pulley on Wing Mower. The drive pulley is retained with a taper lock pulley. Remove the bolts and start them in the other holes in the hub. This will force the pulley inward off the tapered hub. Hub should pull off the pump shaft. (See Figure 4)

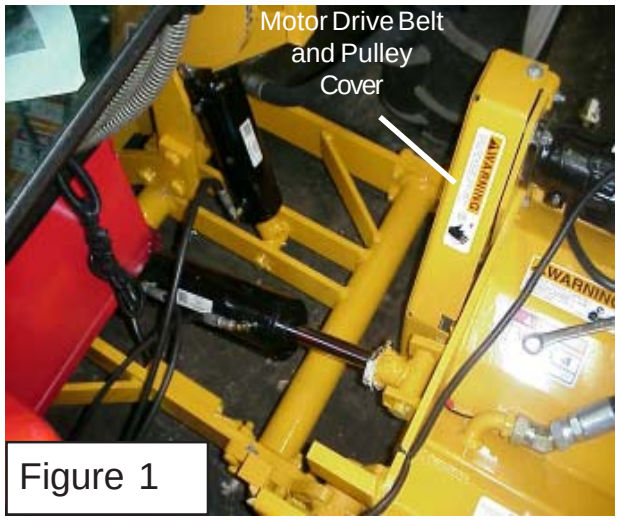


Figure 1

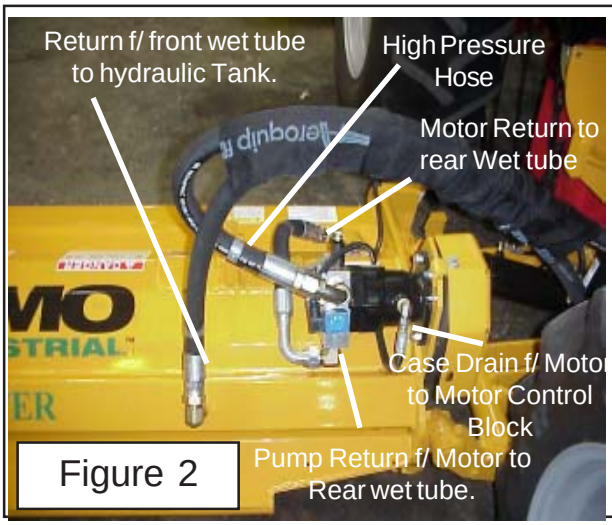


Figure 2

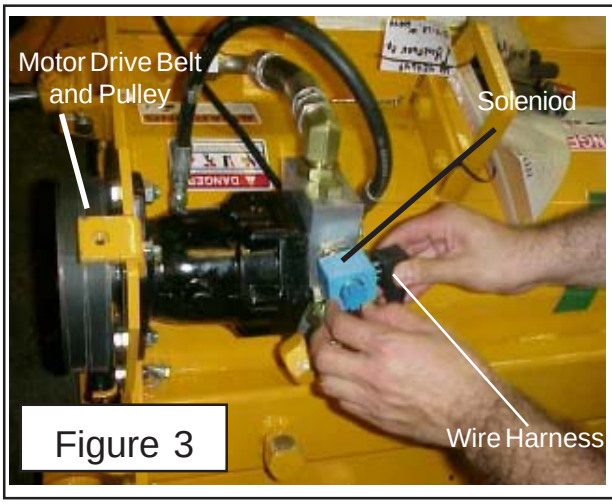


Figure 3

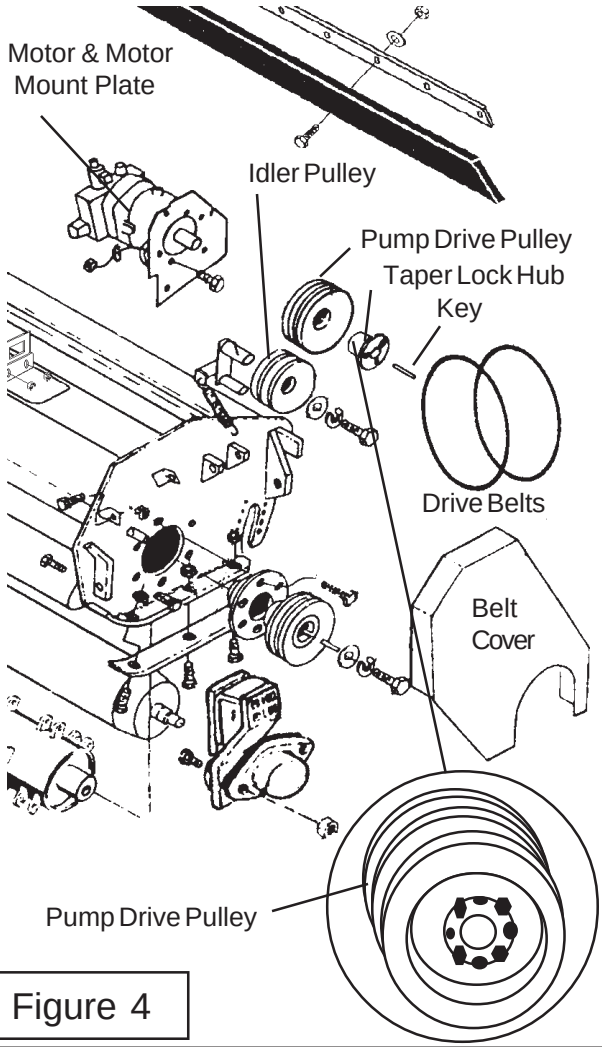


Figure 4

Motor Removal & Replace

6. Remove Motor Asy from Wing Mowers. Remove bolts retaining motor mount plate to deck and lift motor off and away from deck.

7. Remove Motor Mount Plate From Motor. Motor Mount Plate bolts to motor flange. Remove these bolts and mount flange will pull off front of motor. If Motor mount plate was unbolted from mower with the drive pulley attached to motor, Motor pulley will need removal before mount plate can be removed.

8. Motor Replace or Repair. The motor is being replace continue to next step. If motor is being repaired go to motor repair dis-assembly / assembly section in next pages.

9. Reinstall Motor Mount Plate. The motor mount plate bolts to the motor flange. Motor mount plate bolts to deck of mower. The mount plate will not require any adjustment as it bolts to deck in predetermined holes. (See Figure 4)

10. Install Motor Drive Pulley. Insert motor key into motor shaft. Slide the drive pulley onto motor shaft. Insert taper lock pulley hub onto motor shaft and into drive pulley. The pulley on motor will require alignment with the idler and cutter shaft pulley. This may require moving and tightening pulley more than once. Align motor pulley with other two pulleys as close as possible. The taper lock mounting bolts will pull the pulley into the lock hub and sometimes may mis-align the pulley, if this happens loosen taper lock hub and reposition it and try again. When pulley is aligned and taper lock hub tighten the three pulleys should be aligned. Check alignment with a straight edge sighting across the three pulleys.

11. Install Drive Belts. Drive belts should be a matched set of belts. Check to make certain belts are in serviceable condition. The drivebelts install over the top drive pulley and then idler pulley, this will leave the belts hanging. Using a bar to pry the idler pulley back, slip the belts over the cutter shaft pulley. Release pressure on the idler pulley, Belt tension is self adjusting through the idler pulley spring. (See Figure 4)

12. Reinstall Belt Cover. Install the belt cover back onto the end of the mower deck and reinstall the retaining bolts. Do not operate any mower with shields or guard damaged or missing. (See Figure 1 through 4)

13. Motor Control Manifold. The motor control manifold bolts to the top of the motor. If manifold was removed it will need to be installed before the hoses can be connected. Always use new O-Rings on manifold. Manifold must be orientated as shown in figure 6 in order for hoses to connect correctly.

14. Reconnect Hoses and Wire Harness. The Cross Over Hose at the outer end of deck should not have been removed, check it for condition and make certain it is still connected. Reconnect the hoses to motor. **CAUTION** Make certain that you **DO NOT** connect the high pressure hose to deck tubes. The high pressure **WILL DAMAGE TUBES ON DECK, ONLY** the return pressure from motor can be run through the deck tubes. (See Figure 6)

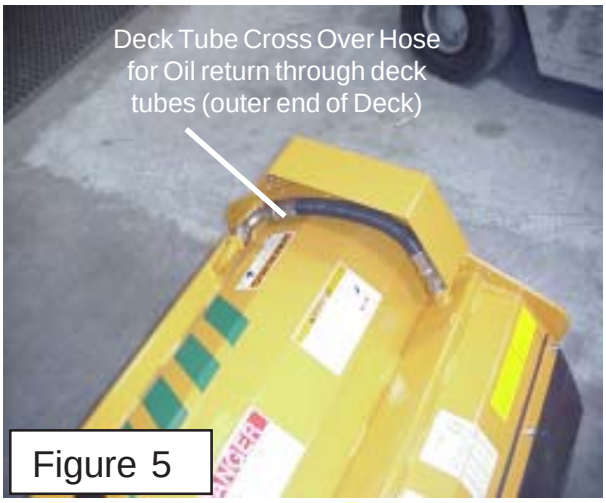


Figure 5

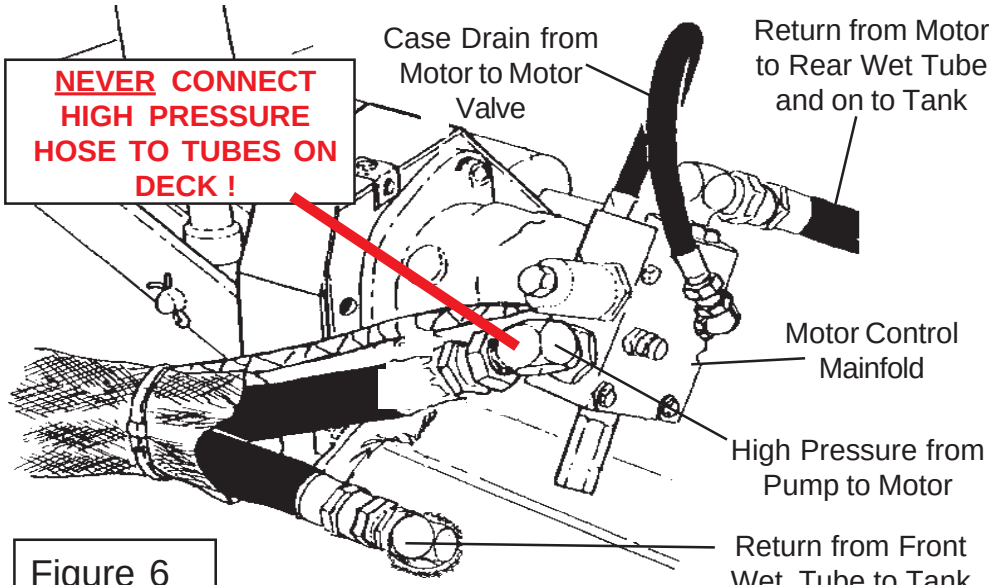


Figure 6

Motor Manifold Re-Move, Repair & Re-Place

MOTOR CONTROL MANIFOLD RE-MOVE, REPAIR & REPLACE:

1. Motor Control Manifold. Motor control manifold components can be replace d, block, test port plug, Machining port plug, Pressure Relief Valve, Solenoid Valve and/or Solenoid Valve Components. Reference to parts manual for replacement part numbers. (See Figure 7, 8 & 9). The Motor manifold can be removed and/or replace without removing motor, or it can be removed with the motor. The procedure to remove, repair and /or replace will be the same. For illustration it will be assumed the manifold was removed with the motor.

2. Remove Hoses from Manifold. If hoses are still connected to manifold and only manifold is being removed see step 3 in previous section. Make Certain all motor components and area around motor have been cleaned before disconnecting any components. Make certain to cap or plug all opened hydraulic connections immediately after opened to prevent contamination from getting in system. Make certain all work areas and tools are cleaned.

3. Clamp Pump and Manifold in Vise. Clamp the motor and manifold in vise with protective caps on jaws of vise (See Figure 9) with the manifold up.

4. Remove Manifold from Motor. Remove the four manifold mounting bolts (See Figure 9). Lift the manifold up off of motor. There are two O-Rings between manifold and motor, make certain these O-rings did not stick to motor back plate or to the manifold. Locate these O-rings and remove them now.

5. Repair Manifold. The Motor Control Manifold will not have a lot of components that will need repairing. The most important thing about manifold is cleaning and inspecting. This is best done by removing all the components from the manifold. Wash the bare manifold in clean solvent and blow dry with filtered compressed air. Inspect manifold for any debris or damage to block, replace as needed.

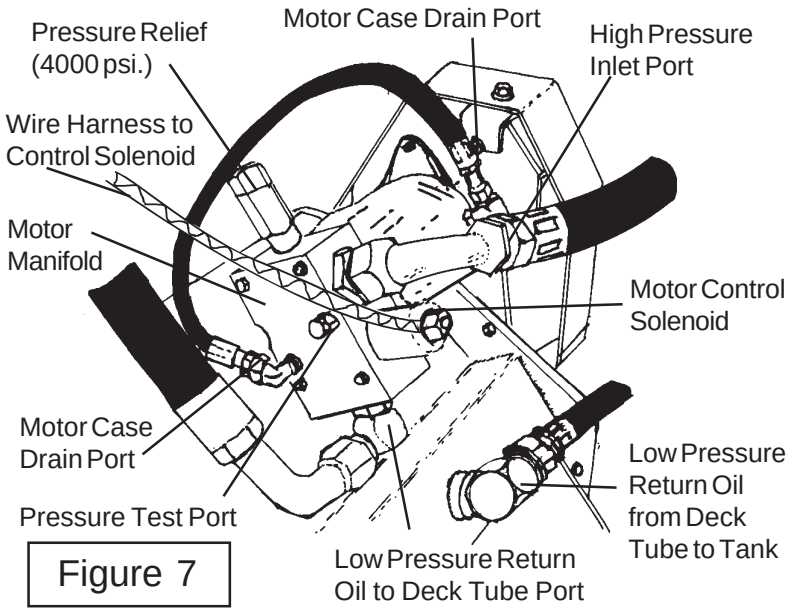


Figure 7

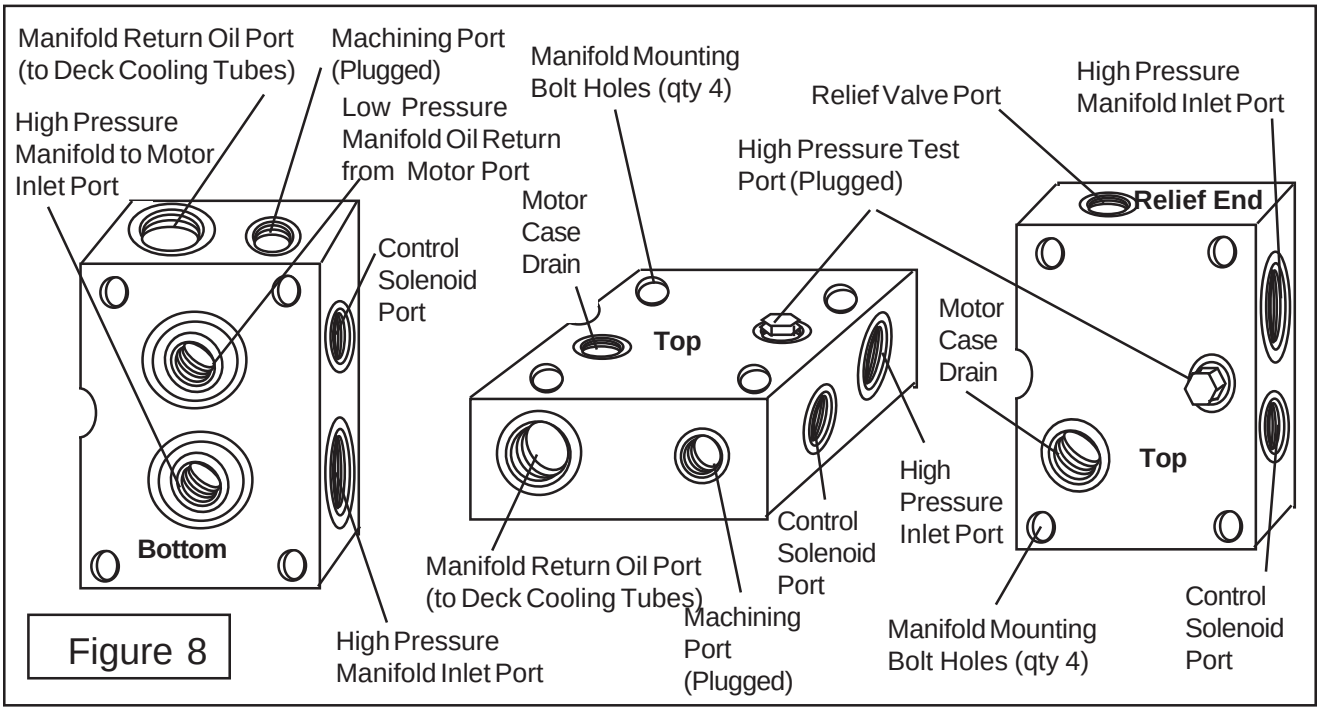


Figure 8

Motor Manifold Re-Move, Repair & Re-Place

6. Motor Dis-assembly and/or Repair. If the motor is to be dis-assembled go on motor repair section and return to here when it is time to reinstall manifold block assembly.

7. Installing New Manifold Block. Always wash a new manifold block with clean solvent the same as when re-installing an existing one. Dry the manifold block using filtered compressed air to remove all solvent. This cleaning is critical to make certain the passage ways and ports are cleaned.

8. Holding Manifold for Re-assembly. If manifold is clamped in a vise **extreme caution must be taken** to not damage aluminum manifold block with vise. It is recommended that the manifold be bolted to the motor after it has been bolted to the deck or while motor is still clamped in vise. (See Figure 9)

9. Re-assembly of Manifold. With manifold secure re-install components to the manifold (See Figure 7, 8 & 9).

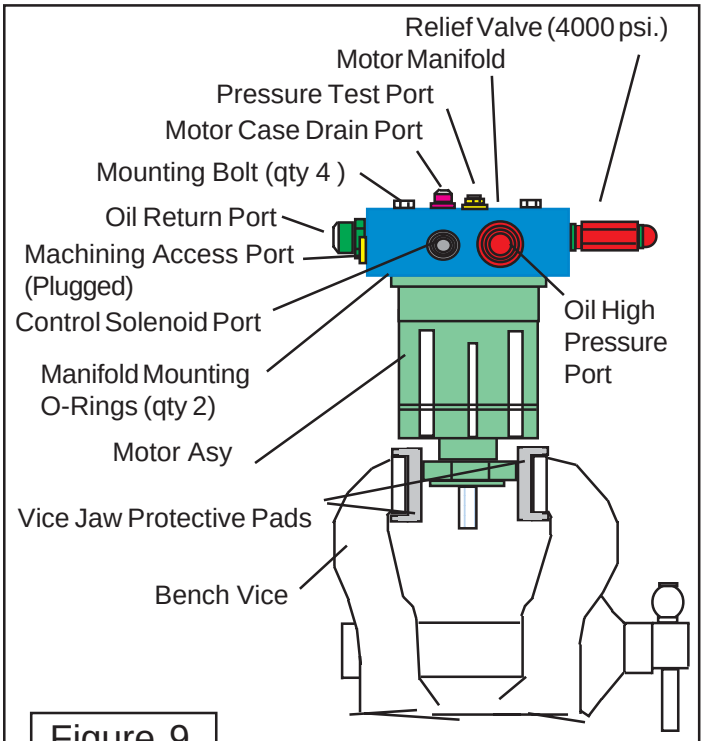


Figure 9 Wing Motor Assembly

A. Pressure Relief, This is preset at 4000 psi and is not adjustable.

B. Oil High Pressure Port Fitting. This is a hose fitting that will screw directly into the manifold block for inlet pressure (high pressure) supply to motor.

C. Control Solenoid assembly. The solenoid will consist multiple components that may

D. Machine Access Port Plug. This port has no function other than it was required during the manufacturing process and should always remain plugged.

E. Oil Re-turn Port Fitting. This is a hose fitting that will screw directly into the manifold block and is for oil leaving the motor. This is a low pressure line

F. Motor Case Drain Port Fitting. This is a hose fitting that will screw directly into the manifold block and is for case drain of the motor. This is a low pressure line.

G. High Pressure Test Port Plug. This port is to enable technician to connect gauge to test the high pressure from the pump. This port is to always remain plugged and only used when testing pressure. Do Not install a pressure gauge here and leave it.

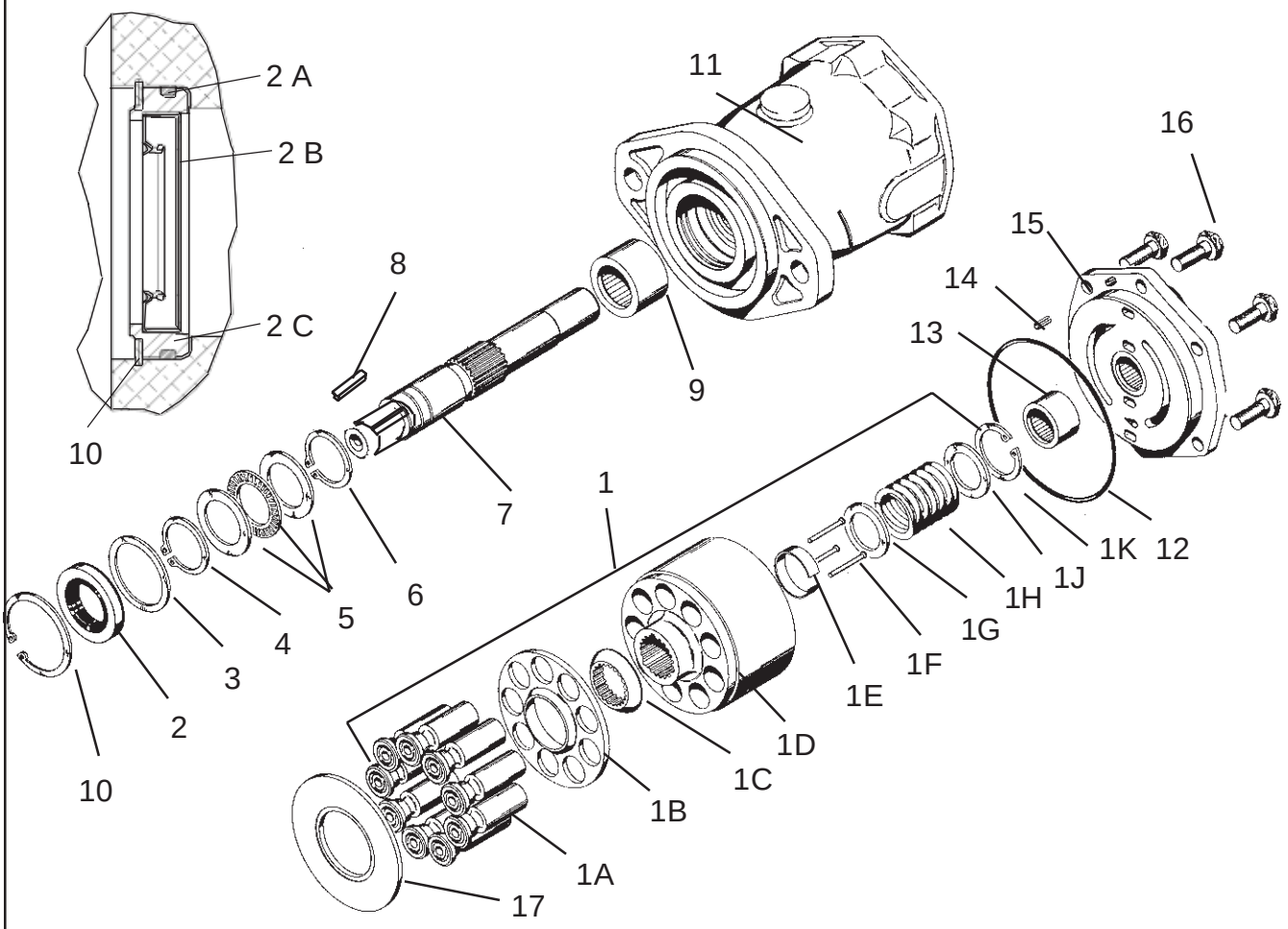
H. Manifold Mounting bolts. There are four mounting bolts that are inserted into the manifold, these bolts will go through the motor back plate and screw into the motor housing. The torque of these four bolts are critical. These **bolts must be TORQUED at 15 to 18 ft lbs.**

Figure 10

10. Reinstall Motor and Manifold Assembly to mower deck. See the previous section for instructions on how to connect motor and manifold assembly to mower. **USE EXTREME CAUTION!** Do Not connect the High Pressure hose to the cooling tubes of the deck, the high pressure will damage these tubes, they will expand from the high pressure and in some cases crack and leak. **ONLY** the return hose from the motor return (outlet) port can be connected to the cooling tubes as the return line is low pressure. (See Figure 10).

11. Re-Connect Wire Harness. When reconnecting wire harness make certain the wire harness is routed and tied so it will not catch or rub on anything while being operated or folded for transport.

Motor Dis-Assembly & Re-Assembly



Item	Qty	Description
1	1	Rotating Kit Asy (items 1A thru 1K)
1A	1	Piston Asy
1B	1	Spider
1C	1	Pivot
1D	1	Piston Block
1E	1	Pin Keeper
1F	3	Pin
1G	1	Washer
1H	1	Spring
1J	1	Washer
1K	1	Snap Ring
2	1	High Pressure Seal Kit (items 2A thru 2C)
2A	1	O-Ring
2B	1	High Pressure Seal
2C	1	Seal Adapter
3	1	Washer

Item	Qty	Description
4	1	Snap Ring
5	1	Thrust Race & Bearing
6	1	Snap Ring
7	1	Motor Shaft (Keyed)
8	1	Key
9	1	Needle Bearing (f/ Housing)
10	1	Snap reing
11	1	Housing, (Not Furnished As Parts)
12	1	* "O" Ring
13	1	Needle Bearing (f/ Backplate)
14	1	Roll Pin
15	1	Backplate Asy w/ Bearing
16	2	Bolt. Short Bolt
	4	Bolt, Long Bolt
17	1	Cam Plate Insert
18	1	Seal kit, (* in Seal Kit)

Figure 11

Motor Dis-Assembly & Re-Assembly

Dis-Assemble Motor: (For item numbers See Figure 11)

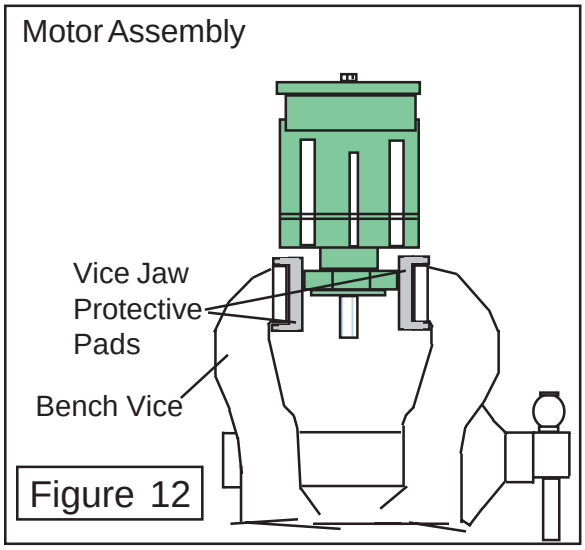


Figure 12

1. Motor Dis-Assembly w/o Manifold. Manifold should already be removed before starting to dis-assemble motor. See Previous section for instruction to remove & replace motor manifold block.
2. Clamp Single Motor in Vice with Jaw Protectors. Motor can be clamped in vice with protective covers for vise jaws (See Figure 12), or it can be dis-assembled while on work bench.
3. Remove Back Plate (Item 15). The backplate is mounted with 6 hex head bolts (item 16), 4 of these bolts will already be removed as they mounted the manifold block. It is important to note which holes these last two bolts come out of as they must go back in same holes when re-assembled. Remove remaining two bolts. It may require a small amount of force to free back plate loose from pump housing. Use soft faced hammer, tap sides of backplate.This will break backplate loose from pump housing, do not hit back plate with excess force it will damage backplate and pump housing. Lift Back plate up and out of motor housing. Remove & needle brg (item 13)
4. Remove O-Ring from Backplate. Remove the O-Ring Seal (item 12) from backplate O-ring groove (item 15).
5. Remove Complete Piston Block Assembly (item 1) from Motor Housing (item 11). Lift Piston Block asy upward and out of pump housing, It will require you to remove pump from vice and dump Piston Block asy out. Catch the block with hand don't let it fall out on floor or bench. DO NOT remove the spring snap Ring (item 1K) from piston block assembly as spring (item 1H) has compression on it, this compression will require relieving before snap ring is removed, this can be done later.
6. Remove the Piston Assembly (item 1A) from the Piston Block (item 1D). The piston assembly will pull upward and out of piston block.
7. Remove Spider (item 1B) and Pivot (item 1C) . The spider (item 1B) will be left lying on the piston block when the piston assembly is removed. The Pivot (item 1C) will also be left on the piston block and can be removed.
8. Piston Block Dis-Assembly (item 1D). The Piston block assembly need not be dis-assembled unless the pins (item 19F) or the Spring (item 1H) is damaged. CAUTION ! The following procedure should be used if the spring is to be removed from the piston block. The spring (item 1H) is highly compressed and the snap ring (item 1K) should NOT be removed without compressing the spring. The following parts will be needed to dis-assemble the piston block 2 ea.3/8" ID X 1-1/8" OD Flatwasher, 1 ea.3/8"-NC X 3-1/4" Bolt, Hex Head & 1 ea. 3/8"-NC Hex Nut. Place one flatwashers over 3/8" X 3-1/4 bolt , place this through center of piston block. Place other flatwasher over t bolt and let it rest on the three pins (item 1F). Screw the nut on and compress the spring inside piston block. Use snap ring pliers and remove the internal snap ring (item 1K). Unscrew bolt, nut & two washers, this will release pressure on spring (item 1H). Remove spring (item 1K), three pins (item 1F) and the pin keeper (item 1E).
9. Remove Snap Ring (item 10). Using internal snap ring pliers remove internal snap ring (item 10) from front side of housing (item 11). Seal Adapter (item 2C) has an O-ring around the OD of it and may make it difficult to remove. The motor shaft can be pushed from the back plate side of housing to push the seal adapter out.
10. Remove Input Seal (item 2B) Seal adapter (item 2C). The input seal will be remove from the adapter from the back side of the seal adapter. Use caution when removing the input seal so you don't scratch or damage the interior seal seat area of the seal adapter.
11. Remove Seal Washer (item 3) which is located behind input seal adapter. It may require to lift the housing and dump the washer out.
12. Remove Driveshaft (item 7) from housing (item 11). The driveshaft must be pulled out of housing to the front side. The driveshaft will have the retaining rings (item 4 & 6) and thrust race and bearing (item 5) still on it when it is pulled out of housing.
13. Remove Snap Ring (item 4) and Thrust Race & Bearing (item 5) from drive shaft. Use Snap Ring Pliers to remove the outer snap ring (item 4) from the end of the driveshaft. Slide the Trust Race & Bearing (item 5) from the driveshaft. Remove the second snap ring (item 6) from the driveshaft using snap ring pliers.

Motor Dis-Assembly & Re-Assembly

Motor Component Inspection: (For item numbers See Figure 11)

1. Wash All Parts. Wash all parts in suitable clean solvent. Use clean filtered compressed air to dry parts after washing. DO NOT use compressed air to spin bearing when drying parts. DO NOT use rags or towels that will leave lint to dry parts. Parts must be kept clean at all times. Work area and place parts are kept during repair process must remain clean and dust free.
2. Examine Needle Bearings (item 9 and 13). Inspect the needle bearings in the housing (item 11) and the back plate (item 15). If the needles are free of excessive play and remain in the bearing cage there is no need to replace the bearing asy.
3. Inspect thrust washers and thrust bearings (item 5). All surfaces should be free of any signs of wear or fretting. Should be no sign of distortion or flaking.
4. Inspect Spider (item 1B) and Pivot (item 1C). Conical surfaces should be free of wear and score marks.
5. Inspect Pistons (item 1A). The O.D. surface should be smooth and free of scoring. The shoes should be snug fit to piston. The face of the shoe should be flat and free of scoring and flaking. Do Not lap piston shoes.
6. Inspect the Piston Block (item 1D). The bore should be free of scoring. The surface that contacts the back plate should be smooth and free of grooves or metal build up.
7. Inspect the Cam Plate Insert (item 17). The surface should show no signs of scoring or grooves.
8. Inspect the flat surface on the Back Plate (item 15). The back plate surface should be free of excessive scoring or metal build up.
9. Inspect the Drive Shaft (item 7). Inspect for fretting in the bearing areas. Check keyed area for twisted, broken or worn spots. Check for chips and/or cracks in shaft.

Re-Assemble Motor: (For item numbers See Figure 11)

1. Coat Moving Parts for Re-Assembly. All moving parts should be coated with lubricant before and during re-assembly. If pump is to used immediately after assembly, the recommend hydraulic oil for interstater will work. If pump is to set aside for use at latter date, pumps moving components should be coating with something that will withstand the time pump is sitting. Petroleum Jelly (vaseline) which can be purchased local. This will work excellent for this as it will stick to the pump components while spare pump is sitting on parts shelf. If parts are to be assembled later the parts should be rewashed and cleaned.
2. Install Snap Rings (item 6) and Thrust Race & Bearing (item 5) on Driveshaft. Install inner snap ring (item 12) onto driveshaft from input end. Install one Thrust Race (part of item 5) onto driveshaft sliding it down against snap ring. Install Thrust Bearing (part of item 5) onto driveshaft until it is against Thrust race. Install Second Thrust Race (part of item 5) onto driveshaft until it is against thrust bearing. Install second snap ring (item 4) onto driveshaft until seated in snap ring groove of driveshaft and seated against thrust race.
3. Replace Needle Bearing (item 9) into Pump Housing (item 11). Install needle bearing asy into the pump housing. If necessary, install driveshaft (item 7) into pump housing (item 11) and install Washer (item 3).
4. Install Input Seal / Seal Adapter Kit. Replace the O-ring Seal (item 2A) on seal adapter (item 2C). Install input seal (item 2B) into seal adapter. Coat the I.D. of Shaft Seal (item 2B) and O-ring (item 2A) of seal adapter. Press seal adapter assembly into the pump housing (item 11). Install the outer snap ring (item 10) into pump housing until it is seated into snap ring groove of housing.
5. Install Pin Keeper (item 1E) and Pins (item 1F) into spline area of piston block (item 1D). Compress Pin Keeper and install it in the splined area of the piston block. Install the three pins in the special grooves of the spline area of the piston block with the head end of pin toward inside of block.
6. Install Washers (item 1G & 1J) and Spring (item 19H) into Piston Block (item 1D). install Washer (item 1G or 1J are the same) into the piston block, Install Spring (item 19H) into piston block and against washer (item 1G). Install second washer (item 1J) into piston block and against spring. (CAUTION ! See Step 7 for spring compression instructions)
7. Compress Spring (item 1H) and install retaining snap ring (item 1K). CAUTION ! The following procedure should be used if the spring has been removed from the piston block and is being re-installed. The spring (item 1H) will have to be compressed. The following parts will be needed to assemble the piston block

   2 ea. 3/8" ID X 1-1/8" OD Flatwasher
   1 ea. 3/8"-NC X 3-1/4" Bolt, Hex Head
   1 ea. 3/8"-NC Hex Nut

(Contnued Next Page)

Motor Dis-Assembly & Re-Assembly

(Continued From Previous Page

Re-Assemble Motor: (For item numbers See Figure 11)

8. (Continued From Previous Page) Place one flatwasher over 3/8" X 3-1/4 bolt, place this through center of piston block. Place other flatwasher over bolt and let it rest on the three pins (item 1F). Screw nut on to compress spring inside piston block. Use snap ring pliers to install internal snap ring (item 1K). Install internal snap ring (item 1K) , make certain it is seated into snap ring groove in piston block. Unscrew bolt, nut and two washers, this will release pressure on spring (item 1H) allowing it to seat against snap ring (item 1K). **Never Remove snap ring in piston block with out compressing spring first !**

9. Install Pivot (item 1C), Spider (item 1B) and piston assembly (item 1A). Sit pivot (item 1C) down onto piston block with taper rounded side up (See Figure 11). Sit spider (item 1B) down over pivot noting concave hole in center of spider will sit over rounded edge of pivot, align holes in the spider with holes in piston block. Lower Piston assemblies (item 1A) through spider holes and into piston block, piston assembly can be installed one at a time.

10. Install Piston Block Assembly (item 1). The piston block assembly needs to be coated with oil. Slide piston block assembly into end of pump housing aligning ID of it over driveshaft. Push piston block assembly into housing and over driveshaft until piston shoes are in contact with cam plate insert, it may require driveshaft to be turned as piston block assembly is being slid in to align splines of shaft with spline of the components of piston block assembly. DO NOT use excessive force to install piston block assembly, if it will not slide together with the force of your hand, there is something wrong.

10. Install Needle Bearing (item 13) into Back Plate Asy (item 15). The needle bearings will install into center opening of back plate, Coat this bearing with oil as you slide it into back plate. Install Bearings into back plate with number end of bearing up and visible. Bearing will be slightly higher (.09") than back plate. (See Figure 13).

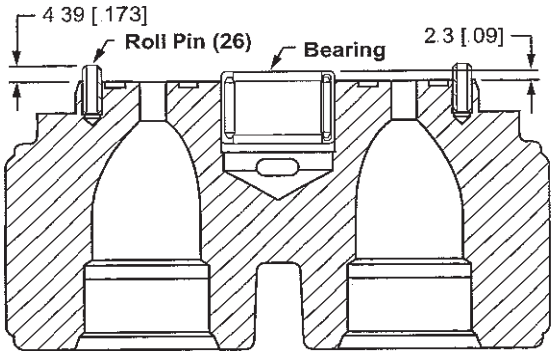
11. Back Plate (item 15) & Sealing O-Ring (item 12). The back plate is sealed with an O-Ring that is inserted into a groove on back plate (item 15), make certain this O-Ring is seated into this groove, lubricate the OD of O-Ring to aid inserting of Back Plate into motor housing (item 11).

12. Back Plate Asy (item 15) Roll Pin (item 14) and Alignment. The backplate has a Roll Pin installed into it. This roll pin (item 14) is to align back plate on pump housing so front flange of housing and back plate ports will be in the correct orientation, roll pin should not be more that .173" higher than surface of back plate. This alignment is important and must be correct. Make certain the roll pin is in the back plate. Lower the Back Plate (item 15) down onto the pump Housing (item 11) aligning the back plate down over driveshaft until the sealing O-Ring (item 12) inserts into pump housing. Back plate should slide down until it is inside of pump housing, If back plate can not be pushing completely down without a lot of force, check it for something wrong. DO NOT use excessive force or use the bolts to pull back plate down.

13. Install 2 Retaining Bolts (item 16) into motor housing (item 11) to fasten back plate (item 15). Inspect the bolts, make certain all threads are good condition. The bolts need to be installed in same holes they were removed from. tighten these 2 bolts from one side to the other until snug. **These bolts must be TORQUED to 15 to 18 ft.** lbs. Do this in increment and staggered pattern also.

14. Re-install Motor Manifold Now. The motor manifold installation is shown in previous pages under pump manifold section. When installing motor manifold always install the two O-ring between manifold and motor with new O-rings. Use petroleum Jelly to hold O-rings in position during mounting of manifold to motor.

15. Fill Motor Case with Oil when connecting rebuilt or new Motor. The pump should be filled half full with oil, this can be done by pouring clean oil through the pressure port of motor manifold. When motor is installed on mower, Connect motor high pressure hose, motor case drain hose to motor manifold and install motor return hose.



Roll Pin & Bearing Installation

Figure 13

Section 11

INTERSTATER

Wing Mower
Remove - Repair - Replace

The Re-placing of wing mower will be the reverse of the Re-moval steps

General Information For Repairs:

A. To disassemble / repair your INTERSTATER this manual is designed to assist you with drawings, instructions and information. This manual is designed to be used in conjunction with the parts manual, operators manual and the assembly manuals. If additional information or clarification is needed contact your Alamo Industrial factory representative.

B. Some of these instructions are general information and not specifically for your tractor. In connection with our drawings, they may not show the exact application and tractor you have. In many cases refer to assembly manual for your mower to tractor application will clarify some infprmation to exact applications.

C. This section covers the removal, repair and reinstallation of the wing mowers for the Alamo Industrial Interstater Mower. These instructions are for working on the pumps used to power wing mower/mowers, right side mower, and left side mower units if dual wing model. For mounting one mower side only, disregard information concerning the opposite side. Hardware quantities shown are for both sides.

E. The Auxiliary pump is used to supply the lift and tilt hydraulic cylinder circuit. This auxiliary pump will not be used on all units, some will use the tractor hydraulic system to supply cylinder circuit.

F. Reference to the left or right side of the Interstater is determined while facing the front of the tractor from the drivers seat.

G. The part quantities shown for an illustration pertain only to that phase of repair. The quantity given corresponds to the number of parts needed. When repairing a single-sided model based on a dual-sided model, the quantity furnished will usually be half the quantity listed.

H. Large parts may not always be listed next to an illustration because they are usually easy to identify them from name or description.

I. This manual makes reference to individual component parts, some of which may have been pre-assembled at the factory.

Abbreviation of Parts Terminology :

Whenever reference is made to parts, listed for an illustration or elsewhere in this manual, some of the following abbreviations may be used:

1. ASY - Assembly	2. ASSY - Assembly	3. AUX - Auxiliary
4. BRG - Bearing	5. BRKT - Bracket	6 CYL - Cylinder
7. CW - Clockwise	8. CCW - Counter Clockwise	7. EXT - Extreme
8. EXT'N - Extend / Extension	9. F/ - For or From	10. FM - Female Boss
11. FP - Female Pipe	12. FSTNR - Fastener	13. FT - Foot / Feet
14. GB - G/B - Gearbox	15. GR - Grade	16. HD - Heavy Duty
17. HHCS - Hex Head Capscrew	18. HRDND - Hardened	19. HYD - Hydraulic
20. IN - Inch	21. LB - Pound	22. LH - Left Hand
23. LW - Lock Washer	24. M - Metric	25. MB - Male Boss
26. MM - Millimeters	27. MNT - Mount	28. MP - Male Pipe
29. MTR - Motor	30. N/A - Not Applicable	31. NC - National Coarse
32. NF - National Fine	33. NLA - No Longer Available	34. NLF - No Longer Furnished
35. NPT - National Pipe Thread	36. P1.5 - Thread Pitch	37. P2.0 - Thread Pitch
38. P2.5 - Thread Pitch	39. PL - Plated	40. PLT - Plate
41. PMP - Pump	42. PTO - Power Take Off	43. PW- Plain Washer
44. REV - Reverse	45. RH - Right Hand	46. ROT - Rotation
47. RPM - Revolutions Per Minute	48. SCKT - Socket	49. SD - Severe Duty
50. SRV - Service	51. STD - Standard	52. SVR - Severe
53. W/ - With	54. W/O - With Out	55. WLDMNT - Weldment

When installing fasteners, PW and LW (generally installed in that order) are usually on the side of the fixture or part being fastened that the hex/lock nut is on. When only HHCS, LW and/or PW are required, they are generally installed in that order. Some parts do not require a PW or LW. Refer to illustrations for exceptions. Fasteners should be installed so they cause the least interference with other parts. When securing driveshaft pulley to hub, tighten fasteners to 9 lb-ft torque.

Wing Cut Off Switch:

NOTE: This section will show Dual Wing installation. The LH and RIGHT hand wing will assemble the same except in a mirror image.

1. Assemble Brackets & Magnetic Switches. Locate the Magnetic switch mounting bracket, dual wings there will be two of these (See Figure 1). If Dual wings the two brackets will have the switches mounted on the opposite side (See Figure 2). Once these have the switches bolted on lay the brackets aside for now. (See Figure 20)

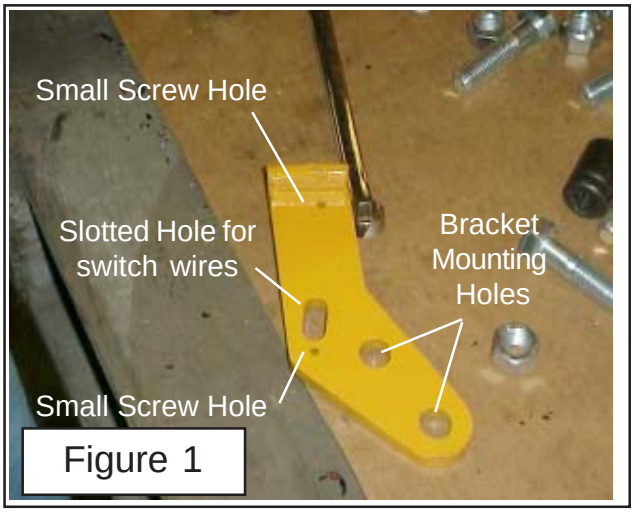


Figure 1

2. Assemble Magnetic Switch Activators. This magnetic switch activator has a magnet inside and a cover that must be installed (See Figure 4). There are brackets that these bolt to. With dual wings there is a LH and RH bracket. Bolt the Magnetic activators to the brackets (See Figure 5) LH Bracket Shown). Note there are two sets of mounting holes. In figure 5 the set that have the bolts through them is used to shut wing off at 45 degree up. If the other set of holes are used wing mower will shut off at 90 degrees up. The 45 degree setting is recommended for standard applications.

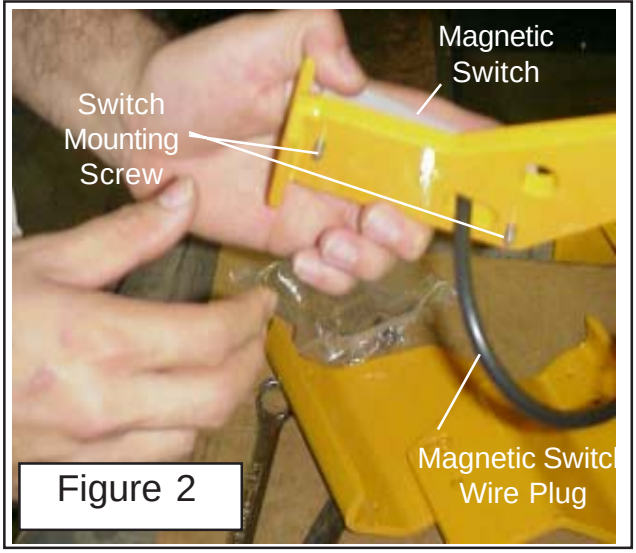


Figure 2

3. Install Switch Brackets & Head Mounting Brackets. Use a hoist to lift the Wing Mower and position it for mounting. DO NOT get under Mower while lifted on a hoist (See Figure 6). Mower is only be positions so that switch brackets and hinge brackets can be installed to head, this must be done before mower can be mounted to lift frame.

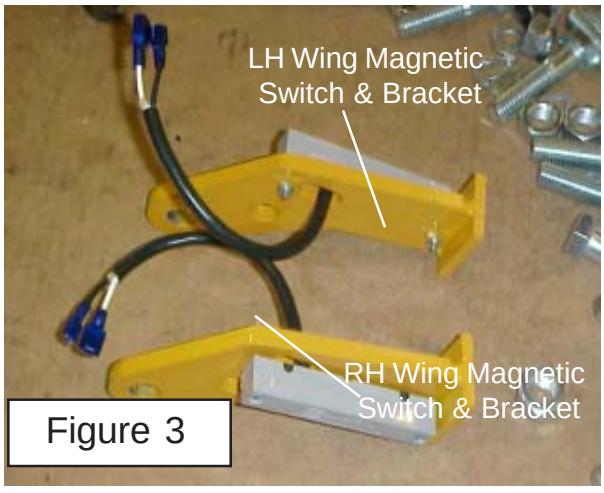


Figure 3

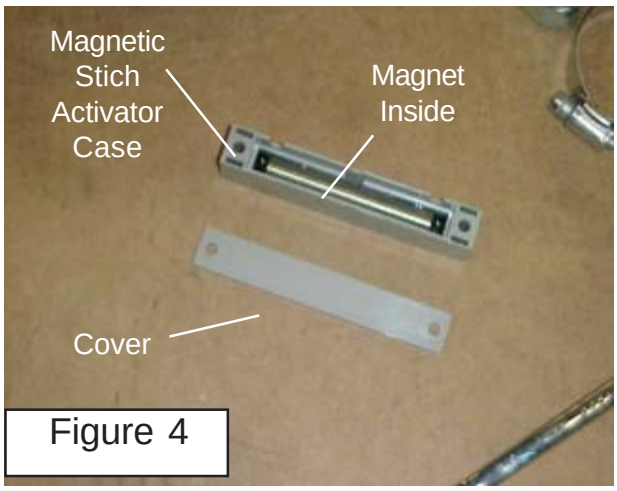


Figure 4

Wing Cut Off Switch: (continued)

4. Install Mower Rear Mounting Brackets & Magnetic Switches. The Mower Hinge Link has a LH & RH (See Figure 7). These brackets will slide over the Hinge Pin which is bolted to the mower deck at the factory. There are two Threaded holes in the end of the hinge pin (See Figure 7) These two holes serve dual purpose. First they hole the hinge bracket on and the Magnetic Activator Bracket on. Some times you will need to loosen the Hinge pin to align the two holes so the bracket will bolt on. (See Figure 8 & 9). Tighten the two mounting bolts in to the hinge pin. The Hinge bracket will still turn free.

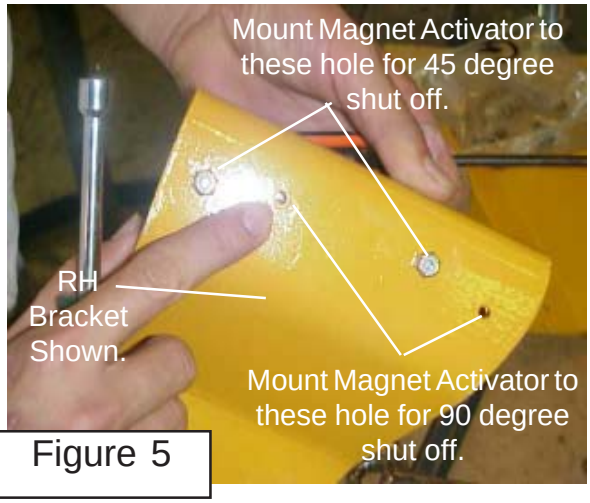


Figure 5

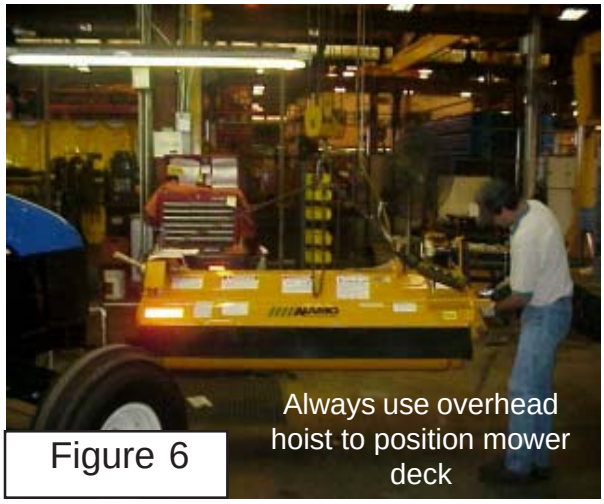


Figure 6

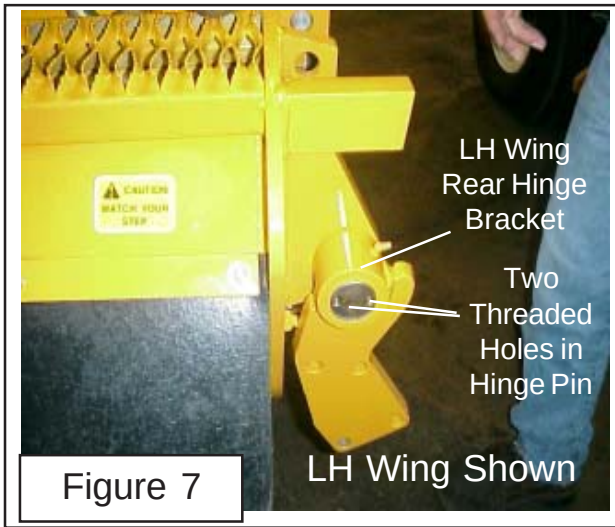


Figure 7

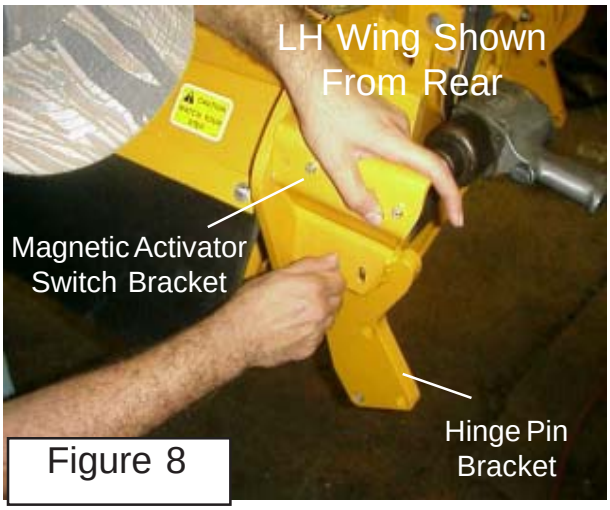


Figure 8

Figure 9

Wing Cut Off Switch: (continued)

5. Install Mower Front Mounting Brackets. The Mower Hinge Front Bracket has a has a LH & RH (See Figure 10). These brackets will slide over the Hinge Pin which is bolted to the mower deck at the factory. This bracket will be bolted to the Lift frame with four bolts. This hinge Pin WILL NOT have threaded holes as the rear hinge pin did.

6. Install Wing Mower to Lift Frame. Using the over head hoist position the Mower Deck (See Figure 10) to where the front hinge bracket will align with the lift frame. Install at least two of the mounting bolts and snug them down.

7. Install the wire harness to wings. The Wire harness will have a lead to each wing. These can be determined by the length, the longer lead will go to the left wing. There is apiece of square tube welded to the lift frame on the back for the wire harness to be run through (See Figure 11). The wire harness will be run down and under the round bar of lift frame. Leave harness here for now.

8. Install Magnetic Switch Pickup & Bracket as well as the rear hinge bracket. The Rear hinge Bracket will install similar to the way the front does, but not the same because the Magnetic switches and brackets bolt on with it. Before installing the rear Hinge bracket locate the magnetic Switch Bracket (See Figure 12). There are two spacers about 3/4" long that must be installed between the magnetic switch bracket and the hinge Bracket (See Figure 12), Also the wire harness must be run between these two spacers and between these two brackets (See Figure 13 & 14). Install the remaining two bolts and tighten all the hinge bracket bolts, this will include the front hinge bracket bolts. (See Figure 21)

9. Plug Magnetic Switch into Wire Harness. The wire harness should have a plug that aligns with the magnetic switch wire. Plug these together now and continued to run wire harness up behind the hinge and on up to the mower decks motor. (See Figure 21)

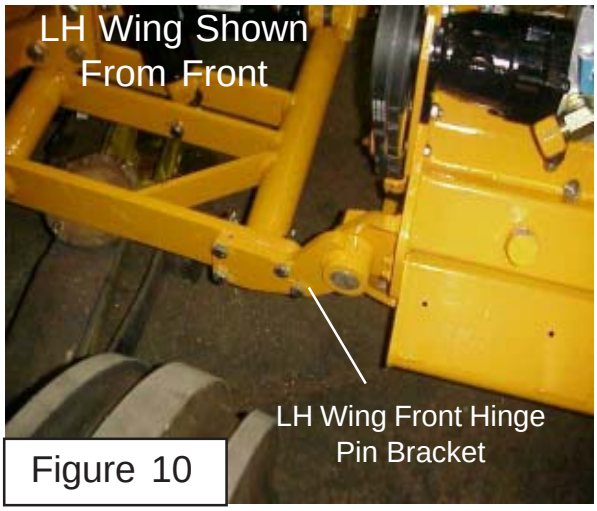


Figure 10

Figure 11

Figure 12

Wing Cut Off Switch: (continued)

10. Connect Tilt Cylinder to Mower Deck. The Tilt Cylinder connects to the mower head (See Figure 15 & 16). Note you will need to remove the belt guard to connect this cylinder so you will have room for the cylinder mounting pin to be installed (See Figure 16). When connecting the cylinder the grease fitting on the rod end must face up, the locking collar on the cylinder must face up and be tightened on rod end. The RH Wing and the LH Wing will mount the same. Install the RH wing the same as the LH wing . Reinstall Belt Guard.

11. Install Wire Harness to Motor Solenoid. The thumb nut on top of the solenoid will allow the solenoid to be turned to different direction if needed. (See Figure 17 & 21)

Figure 13

Figure 14

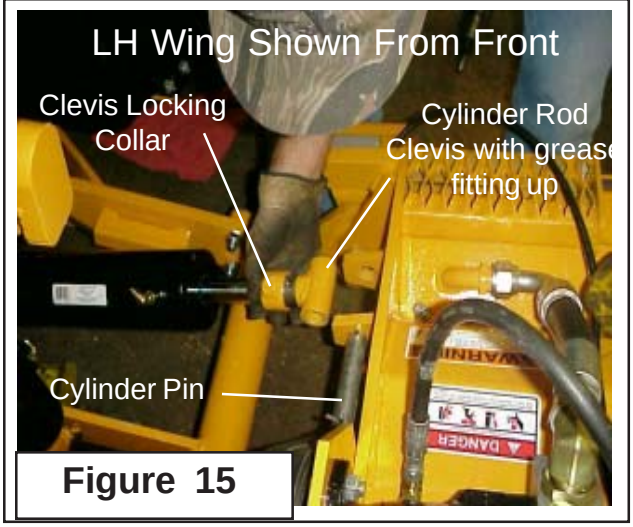


Figure 15

Figure 16

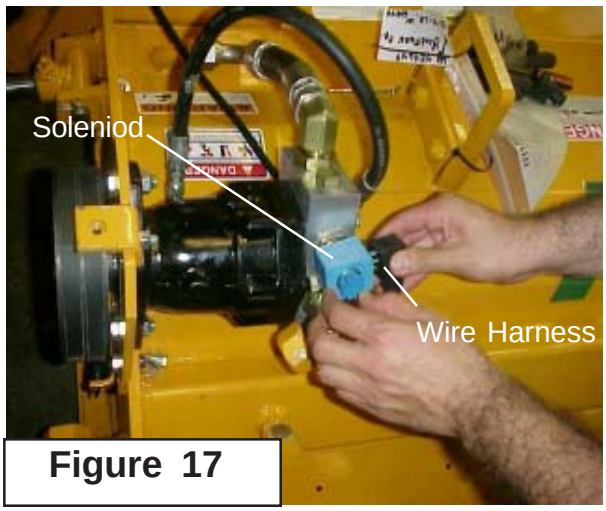


Figure 17

Connecting Mower Motor Hoses:

1. Connect Motor Pressure & Return Hoses to Mower Deck. Connecting the Motor Hoses is very critical that they a re connected to the correct fittings, If these hose are connected backwards it will damage the cooling tubes on the deck, the cooling tubes cannot take the pressure it will make them swell up and bulge.

IMPORTANT FACT. When connecting the hoses to the fittings on the mainframe crossmember remember the top hose is always thew pressure hose and will only connect to the motor, never the cooling tubes on the deck. The bottom hoses are the return hoses and will always connect to the cooling tubes on the mower deck. (See Figure 18 & 19). The RH wing will connect the same as the LH mower (Shown). IMPORTANT. On the RH Wing the top hose is pressure and connect to the Motor and the bottom hose connects to the Tank return.

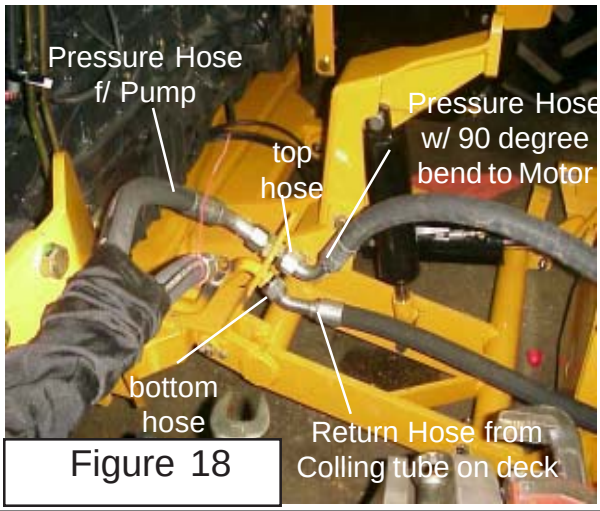


Figure 18

2. Double Check all Hose Connections. Before operating the mower make certain all hydraulic hoses are connected correctly. IT IS MOST critical that you make certain NO HIGH PRESSURE hoses are connected to the wet tubes of the mower deck, The wet tubes will expand (swell up) and be damage if the High Pressure hose is connected to the deck wet (cooling) tubes. See Figure 21, 22, 23, 24, 25, 26 & 27. Looking at all these figure before going on to next step is important.

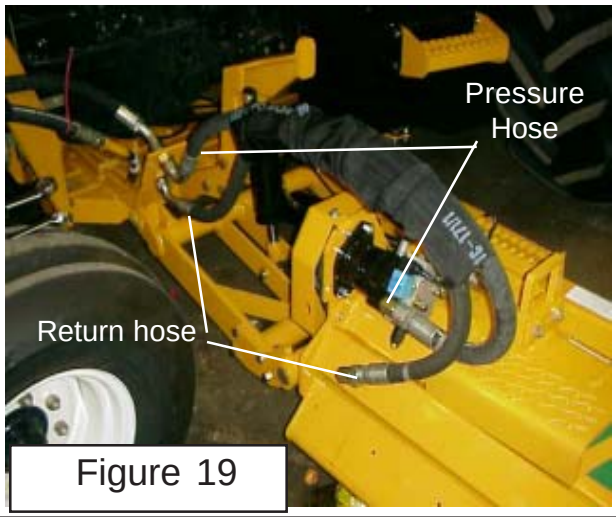


Figure 19

3. Install Pump Cover. The front pump cover will bolt to the tank, this cover will cover pumps and all hoses and/or fittings connected to the pump (See Figure 20). Set the cover down over the pumps. Align the hove in cover with the tabs welded to the tank (See Figure 20).

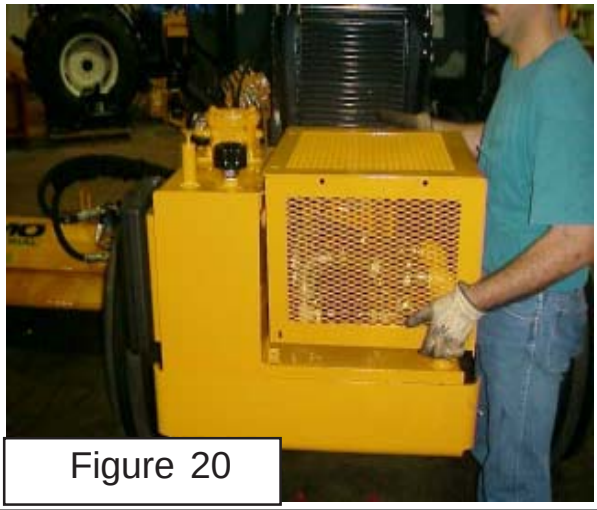
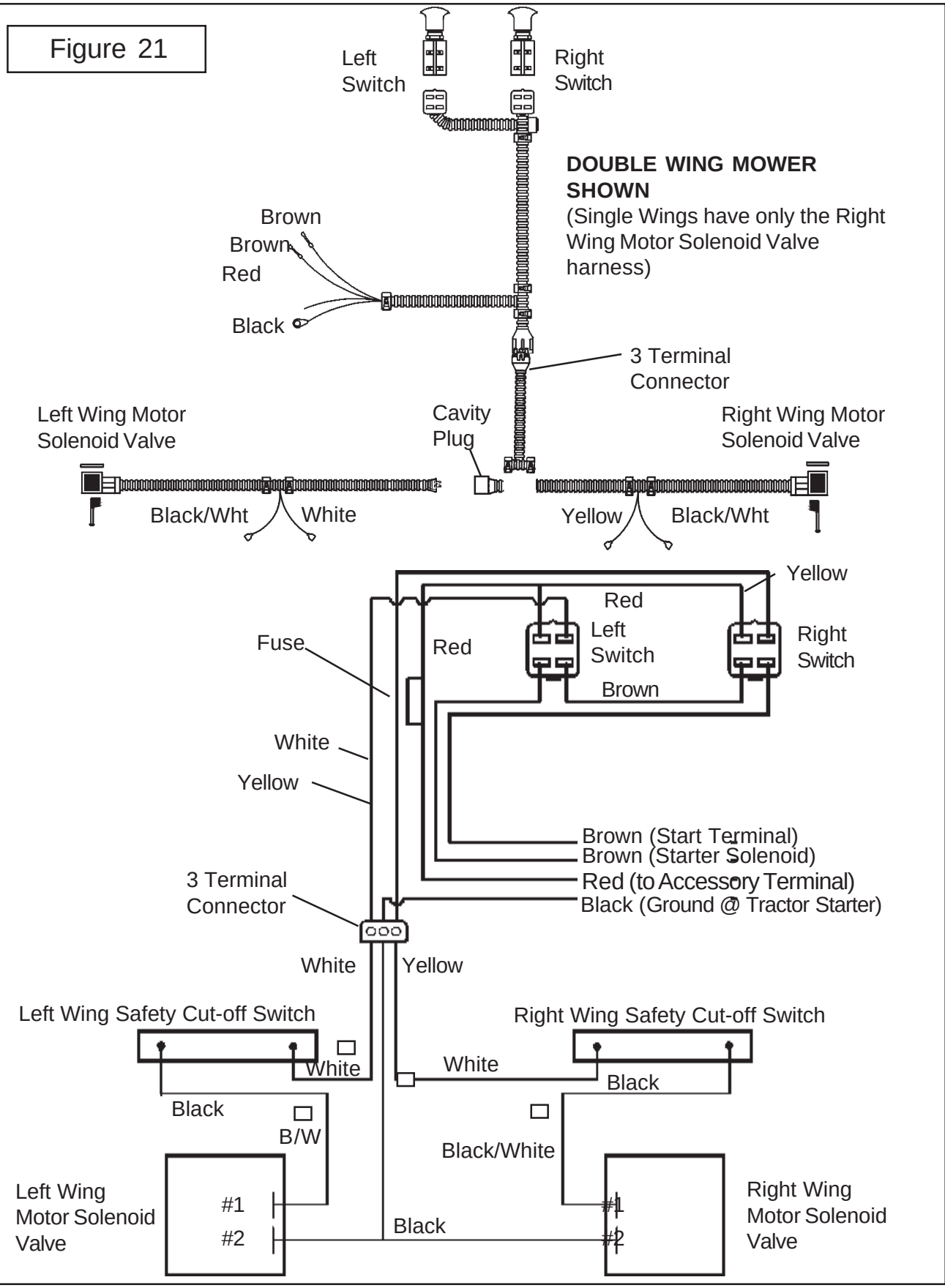


Figure 20

4. Install Rear Mower. Go on to the Install rear mower section which will also include the Initial Start up procedures. DO NOT START Tractor until you have completed the initial start up section.

Wing Cut Off Switch Schematic (Dual Wing)

Figure 21



Interstater (Service Man.) 03/06

Wing Motor Control Switch - Dual Wing

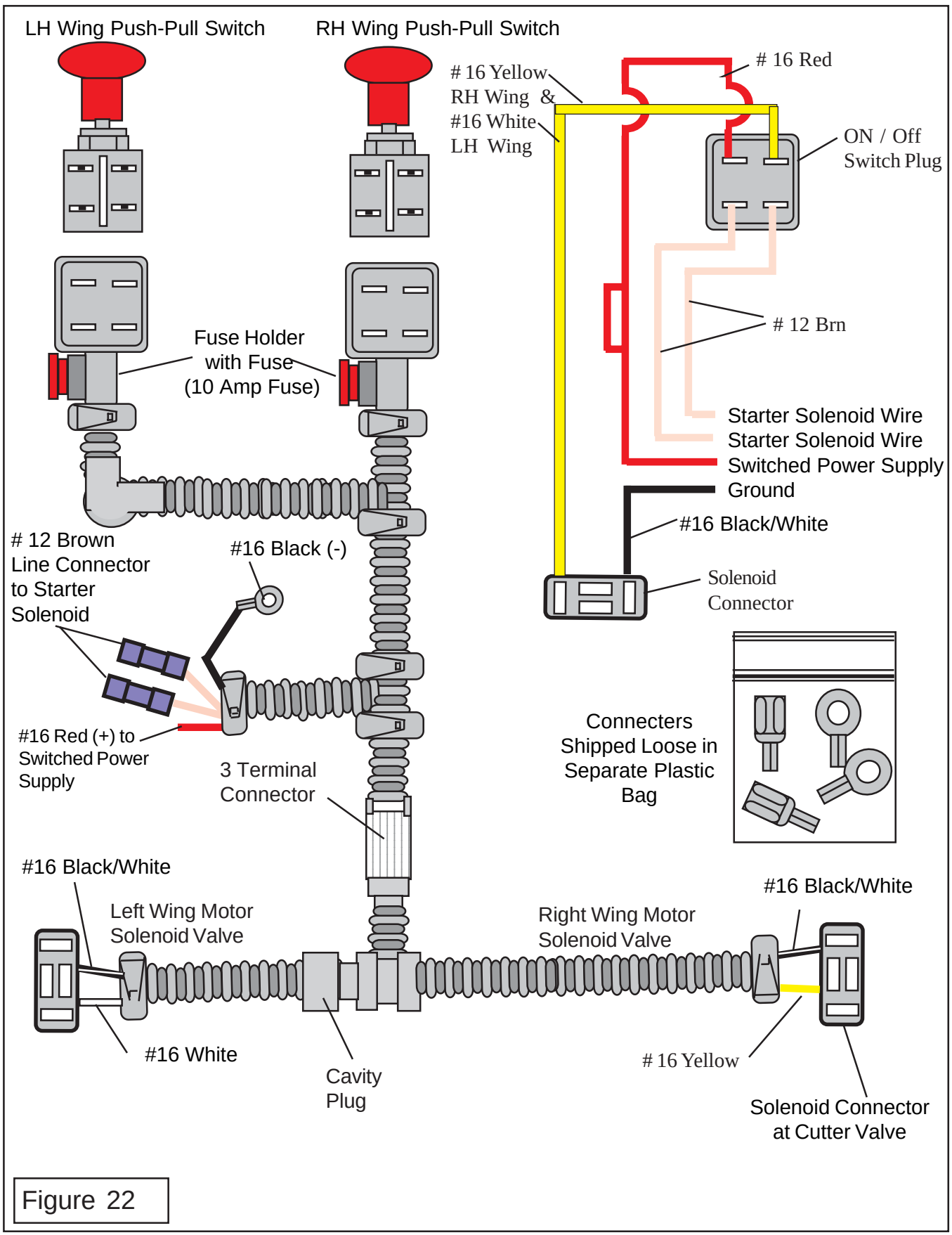


Figure 22

Motor Control Switch - RH Wing Only

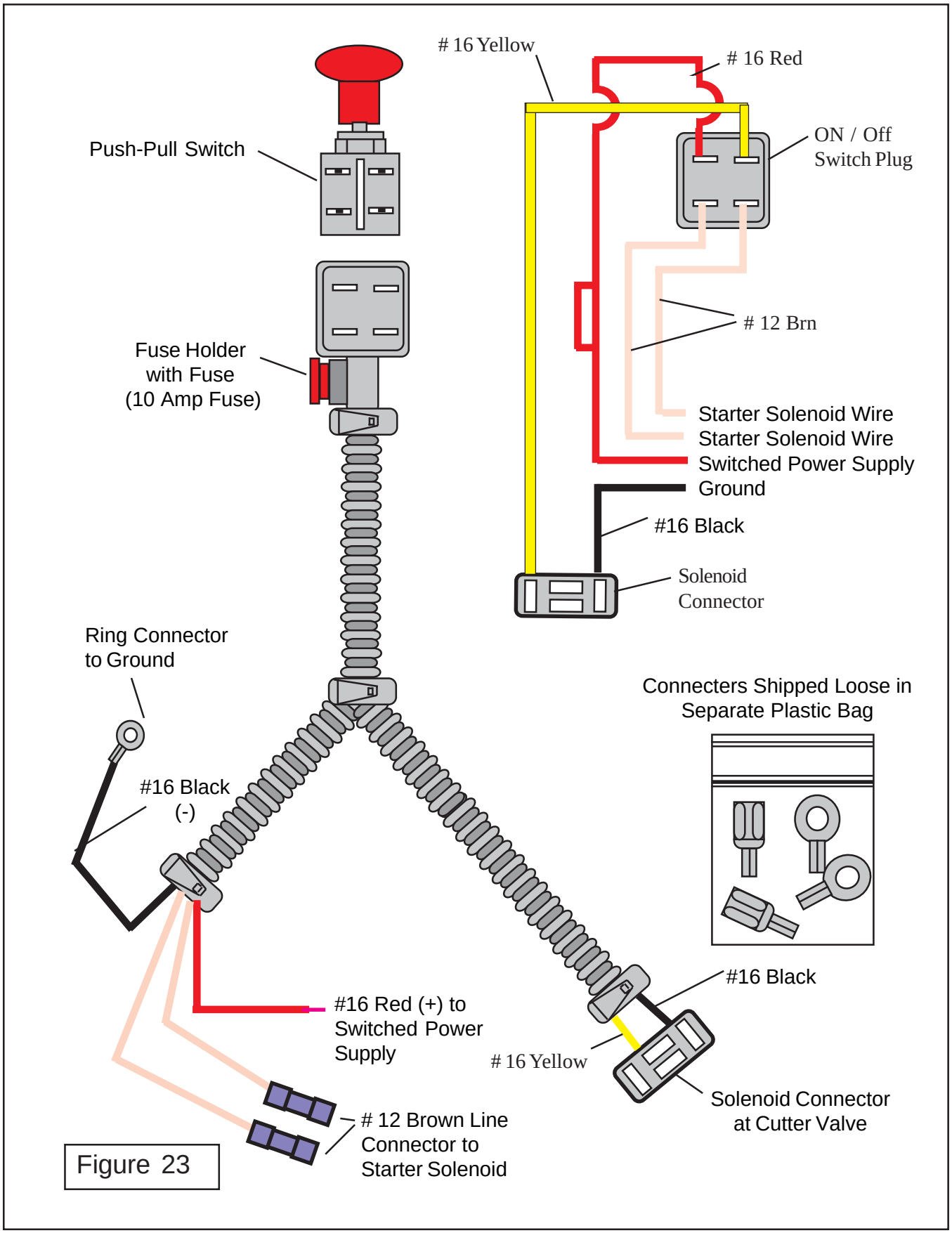


Figure 23

Pump & Motor Hyd Schematic (RH Wing Only)

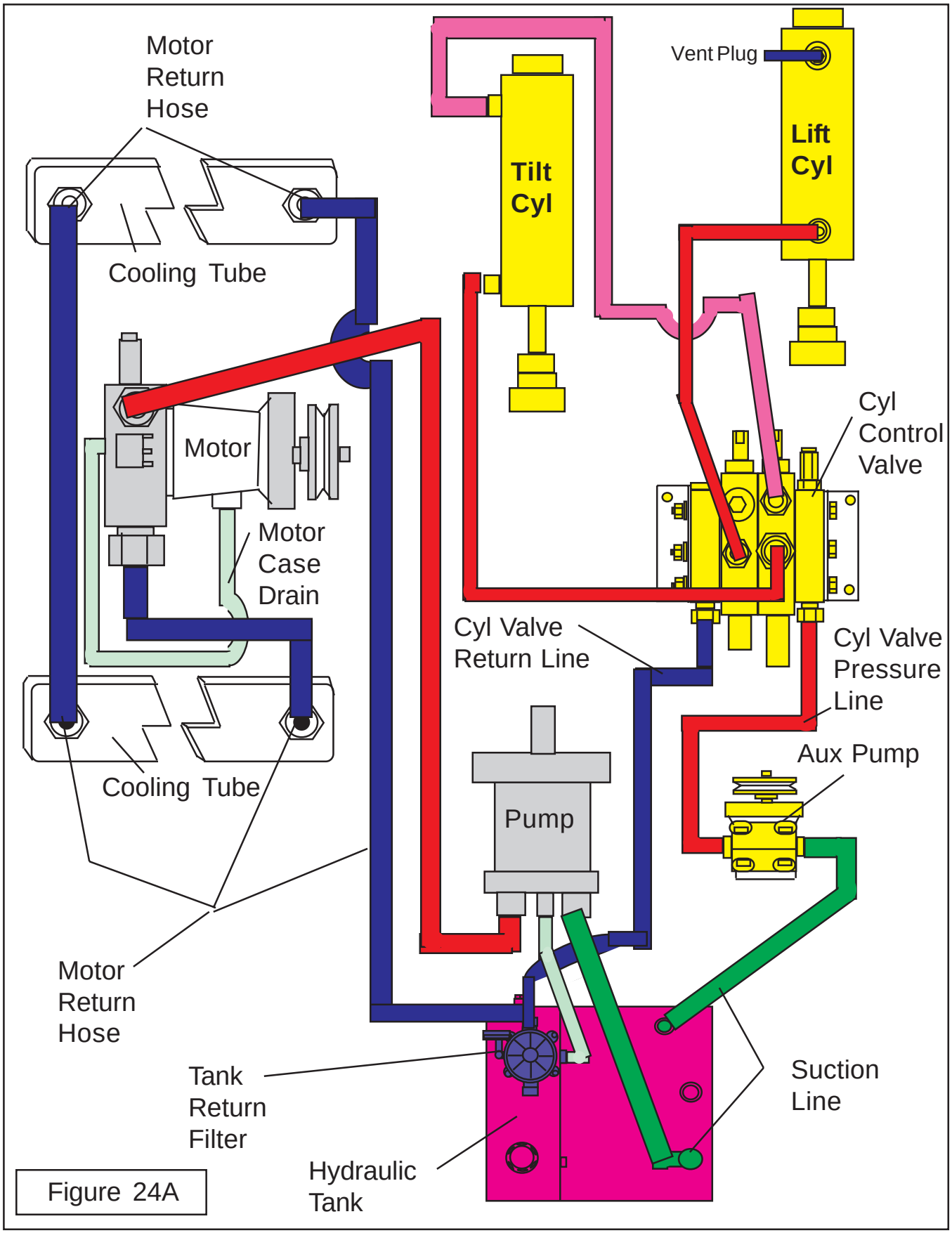


Figure 24A

Pump & Motor Hyd Schematic (Dual Wing)

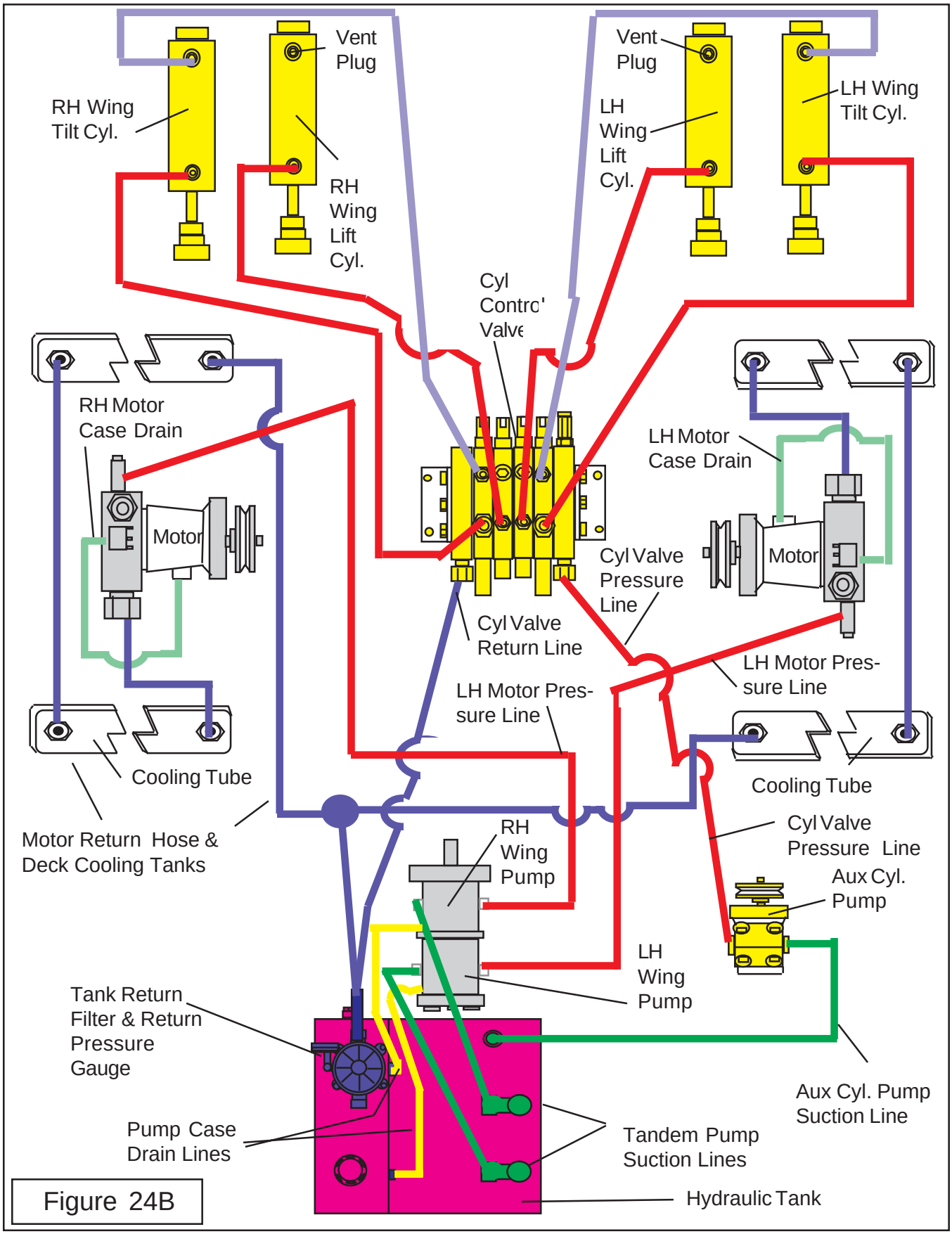
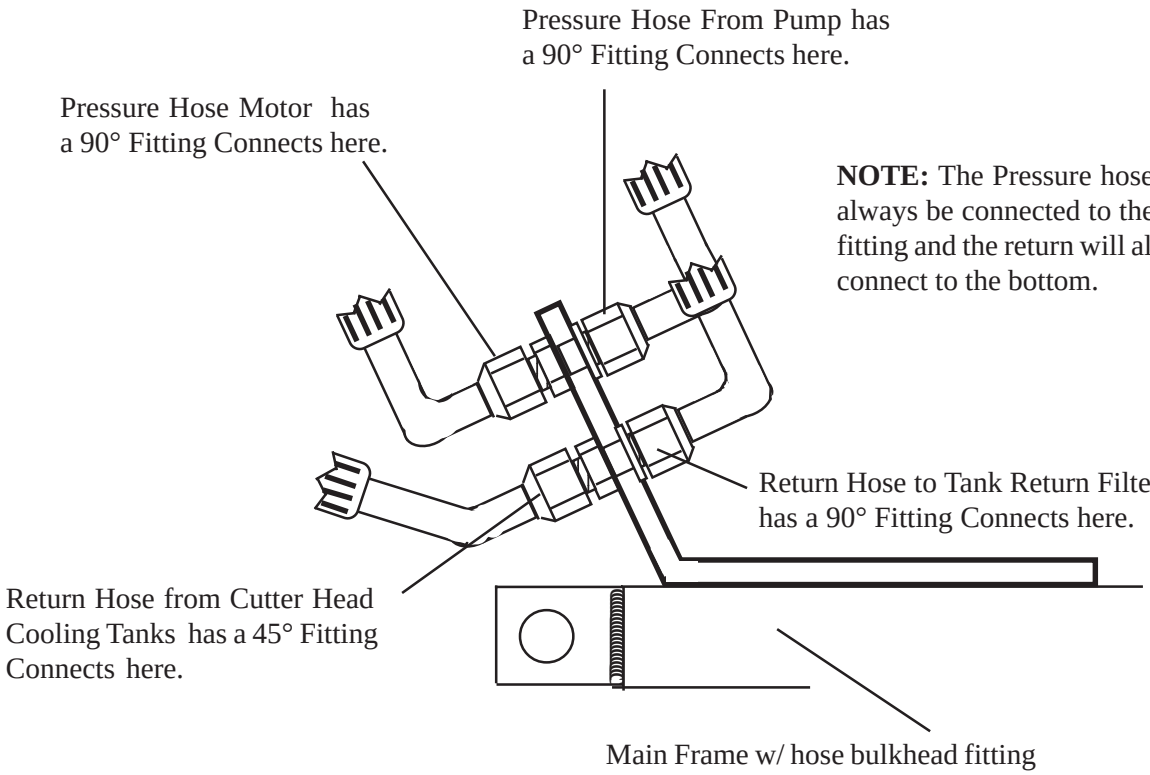


Figure 24B

Pump & Motor Hyd Schematic (RH Wing)



RH side of tractor looking from front to rear of tractor

Single Wing Shown, Dual Wing has metal cross over pipe with a Tee in it for the return.

Figure 25

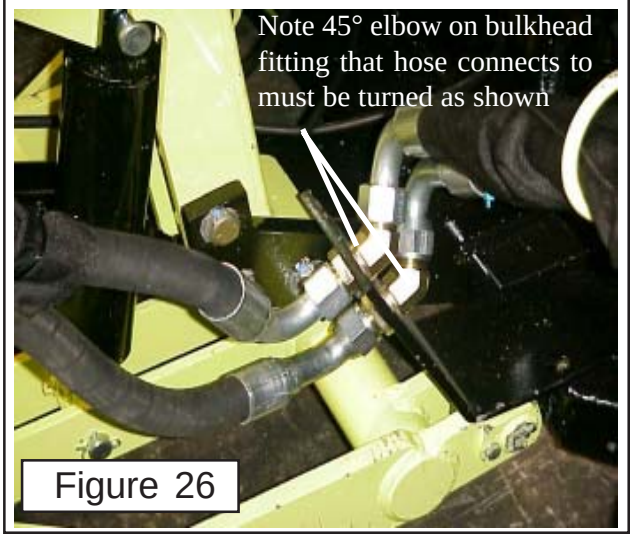


Figure 26

Pump & Motor Hyd Schematic (Dual Wing)

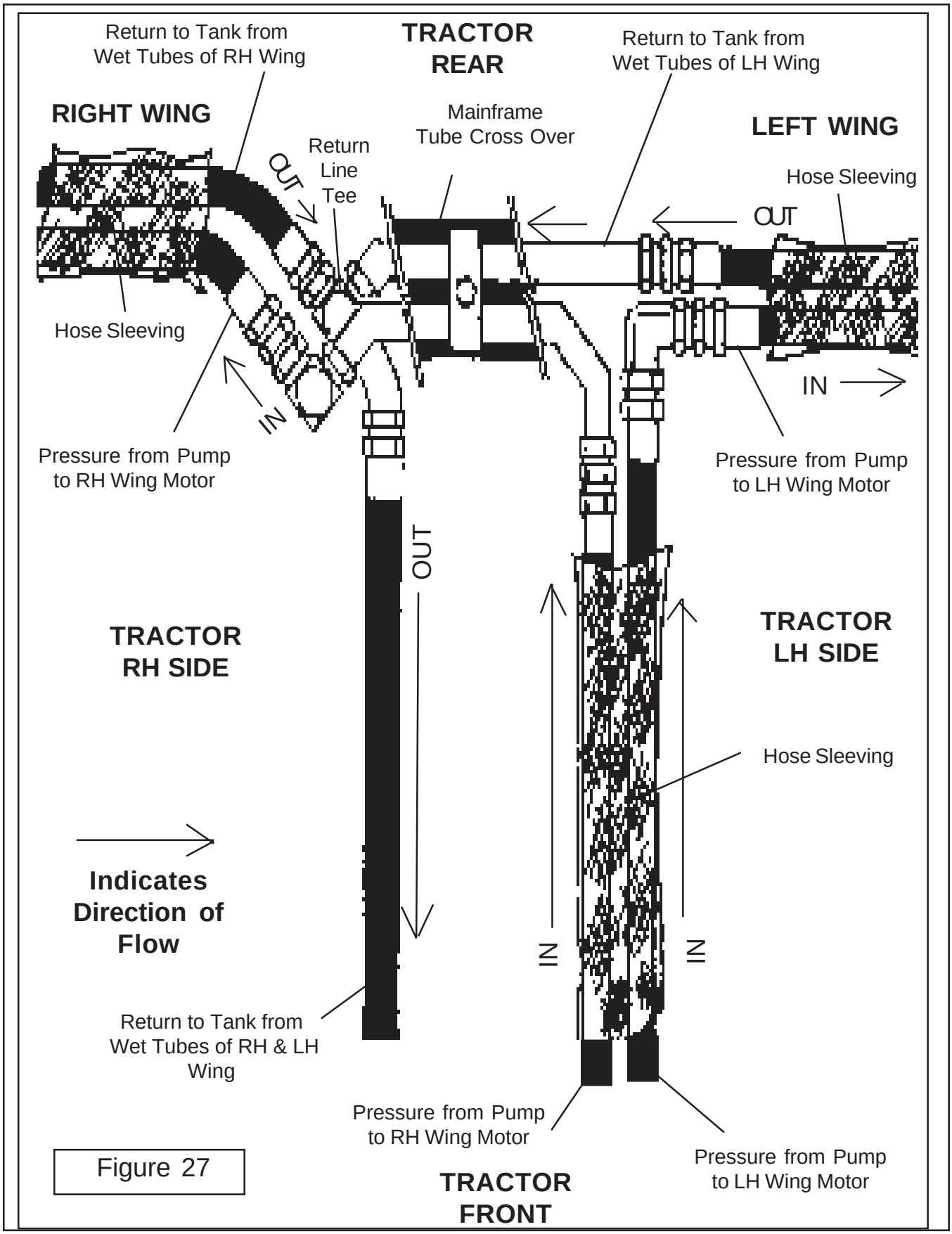


Figure 27

Pump & Motor Hydraulic Schematic

RH WING ONLY HYDRAULIC MOTOR SHOWN

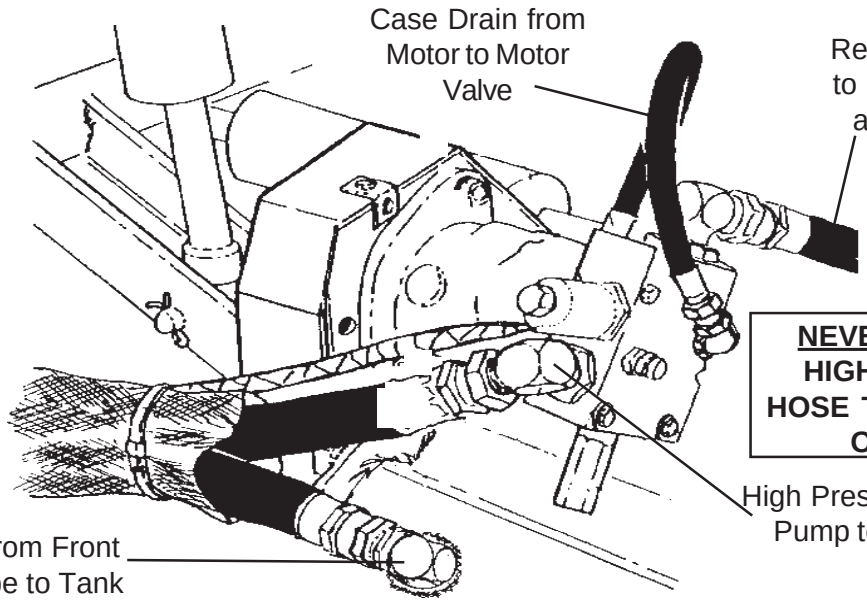


Figure 28

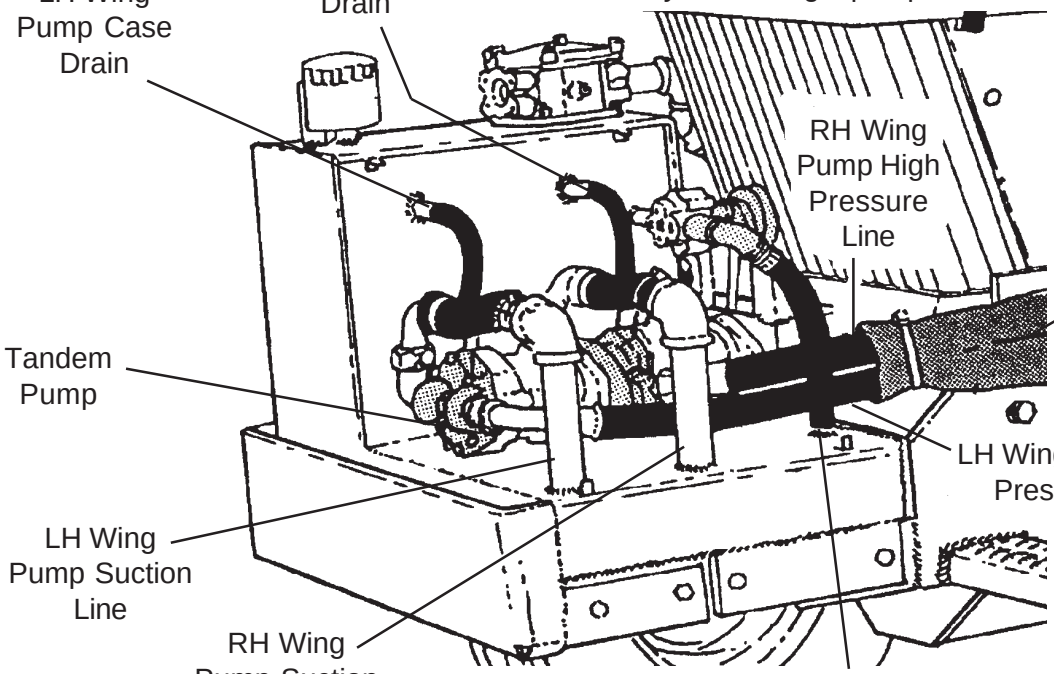


Figure 29

Pump & Motor Hydraulic Schematic

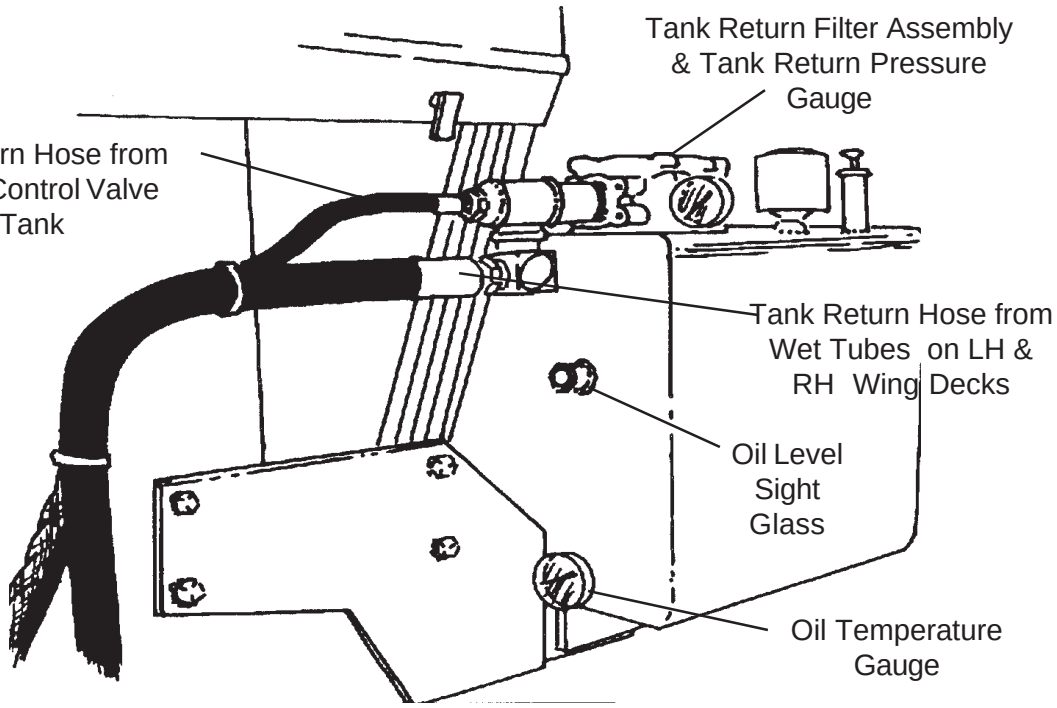


Figure 30

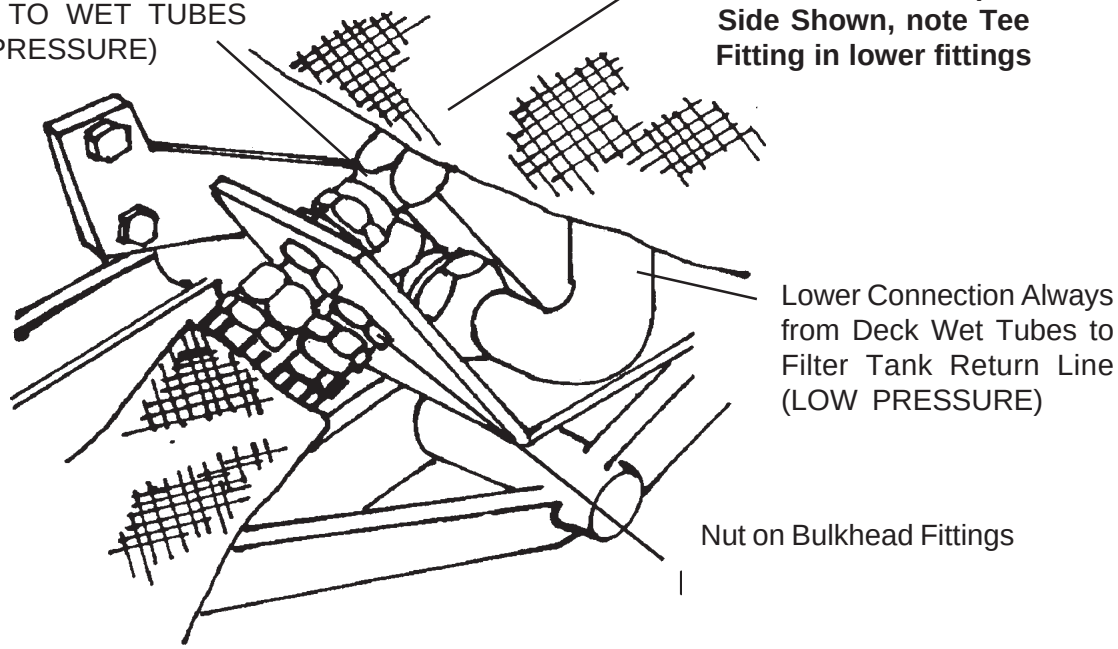
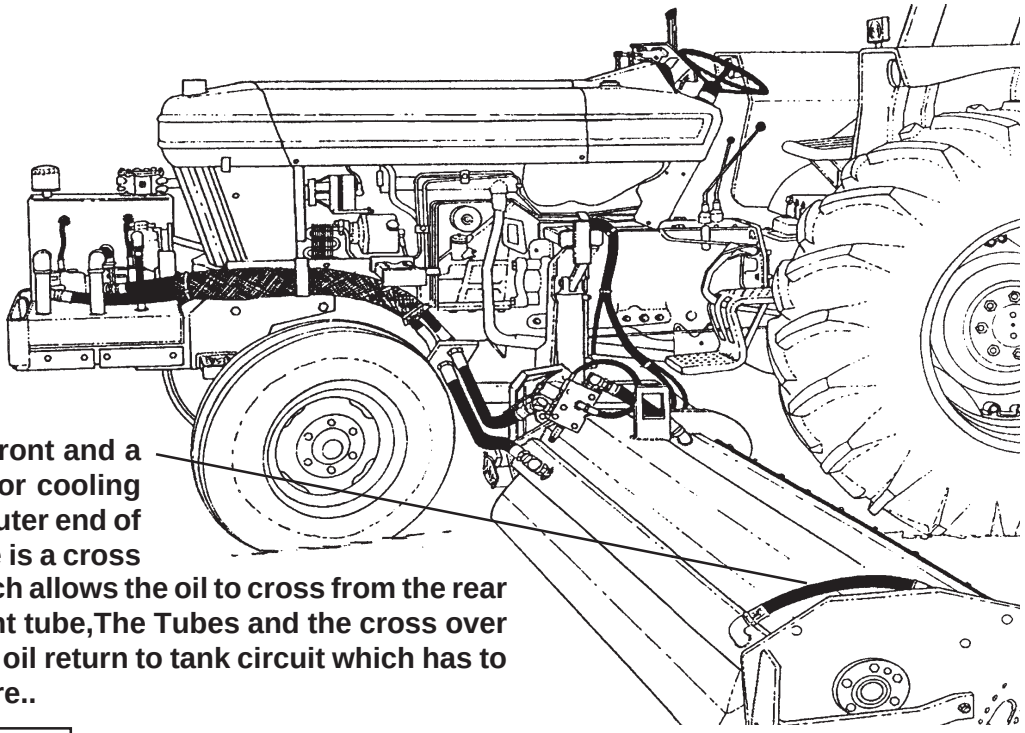


Figure 31

Pump & Motor Hydraulic Schematic



Wings have a front and a rear wet tube for cooling the oil. At the outer end of the decks there is a cross over hose which allows the oil to cross from the rear tube to the front tube,The Tubes and the cross over hose are in the oil return to tank circuit which has to be low pressure..

Figure 32

GENERAL:

1. Mower should be in the lowered position (mowers resting on the ground). Tractor shut down and parked safely according to tractor manufactures instructions. NEVER work on or repair mowers with tractor running and mowers supported by hydraulic system.
2. Mowing is accomplished by a series of knives which rotate at high speed on a shaft. On Wing Mowers the shaft is driven by a hydraulic motor through a set of drive belts. Belt tension is maintained by a spring-loaded idler pulley.
3. The cutter unit is mounted to the lift frame by two mounting pins and held in place by a hydraulic cylinder. This cylinder is used to tilt the cutter unit to allow mowing on an angle and tilting to the vertical position for transporting. Another hydraulic cylinder is mounted to the lift frame and the lift cylinder support. This cylinder is used to raise the cutter unit via the lift frame.
4. The cutter unit rides on a large roller assembly. The position of this roller is adjustable and will determine the cutting height of the knives.

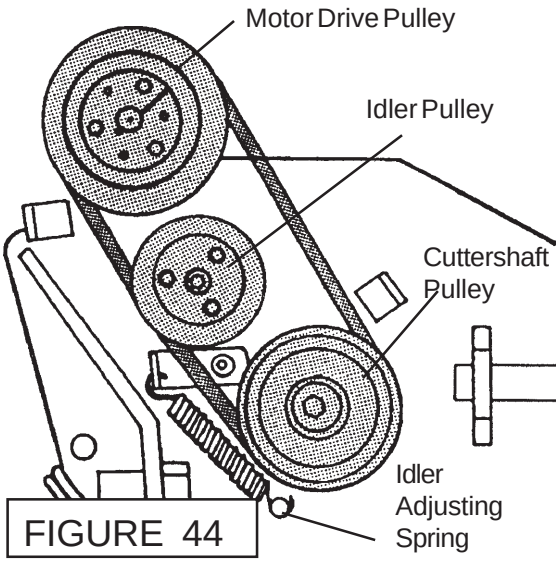


FIGURE 44

REPLACE DRIVE BELTS:

NOTE: Belts must be replaced as a matched set. DO NOT replace just one belt. (See Figure 44 & 45)

1. Place unit on ground or support securely.
2. Remove belt guard.
3. Remove idler arm spring.
4. Remove motor mounting bracket front bolt and loosen rear bolt.
5. Pivot motor-mounting bracket assembly. Remove old belts and install new ones.
6. Reinstall front mounting bolt then secure motor mounting bracket to unit.
7. Reinstall idler arm spring and belt guard.

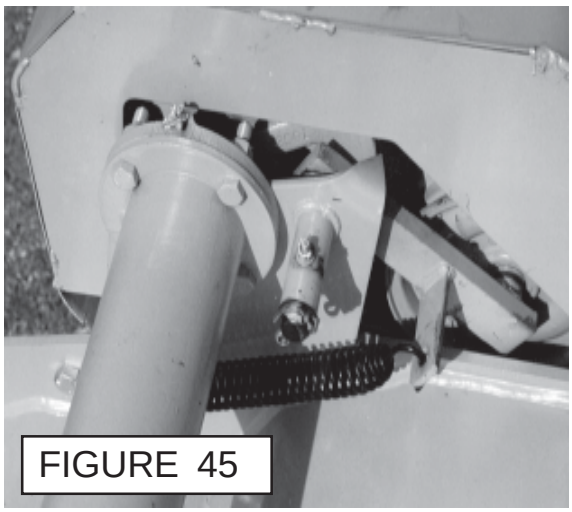


FIGURE 45

ADJUSTING CUTTING HEIGHT:

(See Figure 46, 47 48 & 49)

1. Lower cutter unit (& Roller) to ground and place control valve levers in "FLOAT" position.
2. Place lifting device (scissors jack, hydraulic jack) under center of cutter housing or use an over head hoist. When lifting mower deck always use jack stands to support the object being lifted. When working under a mower always use safety glasses.
3. Remove hex nuts, washers and carriage bolts from bracket at each end of roller. Make certain that roller bracket is free to move up and down once the fasteners are removed. A stuck roller could drop suddenly and cause an injury. While Lifting Deck Roller should be slid down or pushed up to change mowing height. DO NOT lift mower very high with bolts removed from roller mounting bracket. A stuck roller could drop suddenly and cause an injury.

(Continued Next Page)

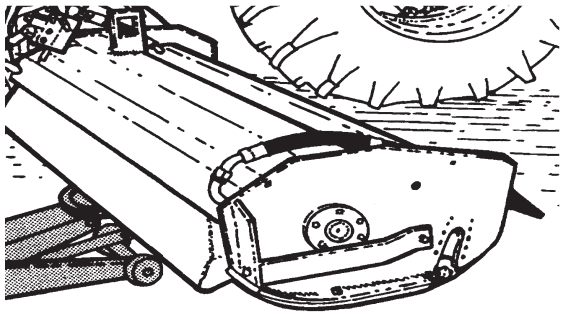


FIGURE 46

ADJUSTING CUTTING HEIGHT:

(Continued From Previous Page)

4. Use lifting device to reposition cutter housing to desired cutting height. Align bracket holes with cutter housing holes, then reinstall fasteners. Refer to cutting height decal on mower or Safety Section.
5. Lower cutter unit to ground; then remove lifting device, jack or hoist.
6. When adjusting cutting height on interstater chose the desired hole by reading the decal (shown in Figure 50) which should be on the mower decks of the interstater showing the adjusting steps and procedure.

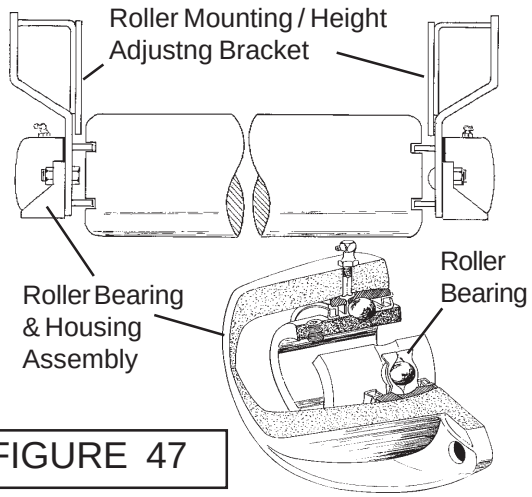


FIGURE 47

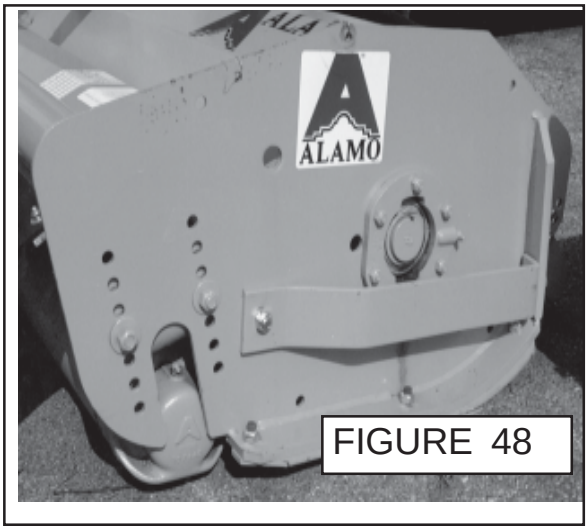


FIGURE 48

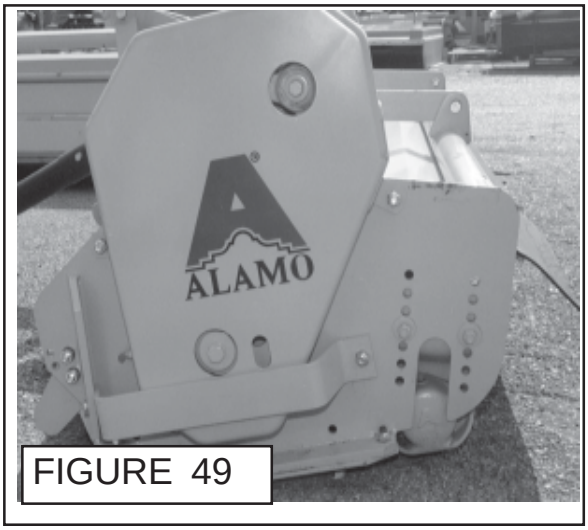
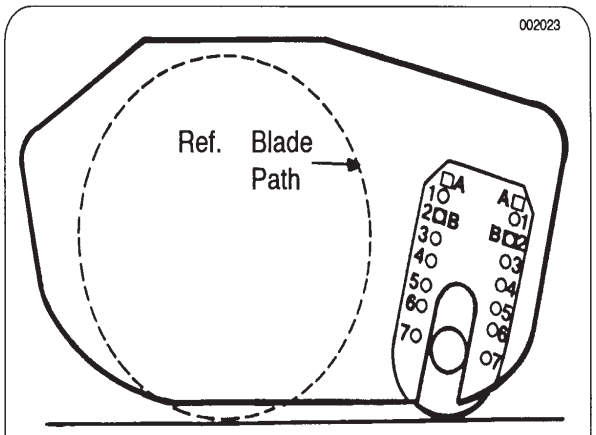


FIGURE 49



MOWER CUTTING HEIGHT ADJUSTMENT

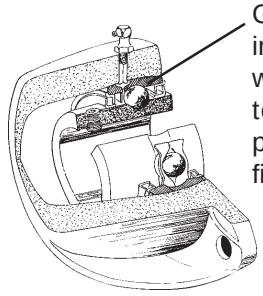
DESIRED CUTTING HEIGHT (INCHES)	ADJUSTMENT BRACKET HOLE	MOWER END PLATE HOLE
1/2	B	2
1	A	1
1-1/2	B	3
2	A	2
2-1/2	B	4
3	A	3
3-1/2	B	5
4	A	4
4-1/2	B	6
5	A	5
5-1/2	B	7
6	A	6

P/N 002023 Cutting Height Adjustment Instruction.

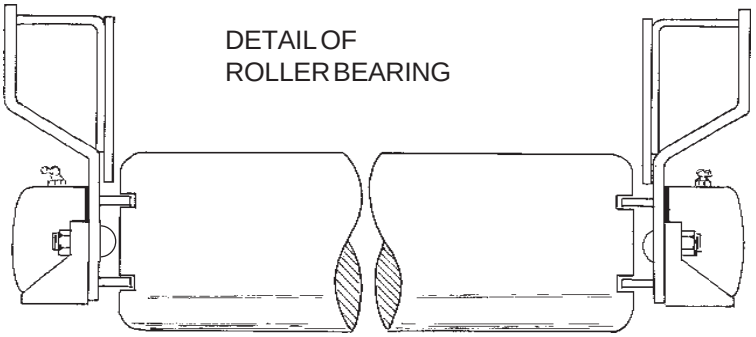
FIGURE 50

ROLLER BEARING REPLACEMENT: (See Figure 51)

1. Securely support mower before beginning any repairs or service to mower, all mower must be lowered and resting on ground or supports and NOT lifted by hydraulic system. Secure tractor as directed by tractor manufactures instruction for parking. Secure tractor to prevent it from being started while being repaired.
2. Remove roller and both bearing and bracket assemblies from mower. Lift the mower only high enough to remove the roller assembly. If installing a roller with pre-assembled bearing and bracket assemblies, remove the old roller, proceed to step 12.
3. Slide bearing and bracket assemblies off each end of roller. If replacing with new bearing and bracket assemblies, proceed to step 10.
4. Remove roller bearing and housing assembly attaching hardware. Remove assembly from bracket. Inspect seal between assembly and bracket for brittleness, cracks, wear and tear. Replace if necessary. If replacing with new roller bearing and housing assemblies, proceed to step 9.
5. Remove grease fitting from the top of bearing housing.
6. Remove bearing form housing. By Rotating Bearing 90° sideways and line up with notches in Bearing Housing: then pull out.
7. Install new bearing into housing. Bearing must be installed with grease hole in bearing aligned with grease fitting hole in housing.
8. Reinstall grease fitting to housing. Grease fitting must be tight and seated in grease hole in bearing to prevent bearing from rotating in housing.
9. Attach roller bearing and housing assembly to bracket with seal between housing and bracket.
10. Slide bearing and bracket assemblies on each end of roller.
11. Check bearing for proper installation in housing by gently rocking bearing and bracket assembly in end of roller. Play should be slight to none at all.
12. Install roller and bearing and bracket assemblies on mower.
13. Lubricate roller bearing until lubricant can be seen coming out between roller and bearing housing.
14. When reinstalling roller, bearing & mount bracket make certain to bolt at the desired height. Desired height will normally be the same bolt holes as before the repair. (See Previous pages for adjust roller height).



Grease hole in bearing must be inline with hole in housing to insure correct placement of grease fitting



DETAIL OF ROLLER BEARING

FIGURE 51

OUTBOARD CUTTERSHAFT BEARING: (See Figure 52 & 53)

1. Lift cutter unit to maximum horizontal height; then securely support ends of cutter housing with jack stands or strong blocks, do not use just a jack or hoist.
2. Remove enough knives to place a floor jack under center of cuttershaft to support cutter shaft when removing cutter shaft bearing. Securely support cuttershaft. NOTE: The cuttershaft must remain supported while changing bearings.
3. Remove outboard fender.

(Continued Next Page)

OUTBOARD CUTTERSHAFT BEARING:

(Continued From Previous Page)

4. Remove fasteners securing bearing and housing assembly to cutter housing, then remove bearing and housing assembly (See Figure 46). NOTE: There are two tapped holes in the housing which can be used to pull bearing and housing assembly out by using special tool No. 701627.
5. Using a jack to align parts, install bearing and housing asy to cutter unit & make certain that bearing setscrew (If Used) is located in keyway on cuttershaft. Grease bearing and install cap over fitting. If only the outboard bearing and housing assembly is to be replaced, proceed as follows: Remove jack and check shaft rotation. Reinstall knives which were removed. Reinstall outboard fender. Remove supports, lower unit to ground and test unit If the inboard (drive) bearing is to be replaced, proceed to step 6.

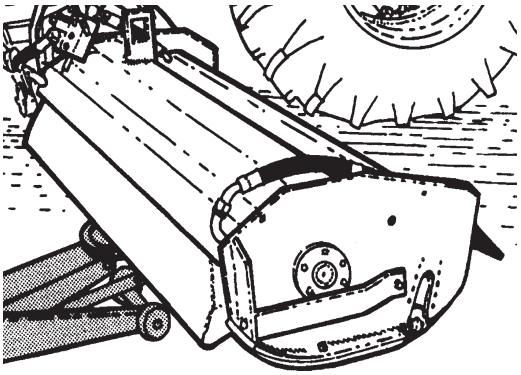


FIGURE 52

INBOARD CUTTERSHAFT BEARING:

(See Figure 52 & 53)

6. Remove spring from idler arm.
7. Remove motor mounting bracket fasteners, at the cutter housing. Pivot motor- mounting bracket assembly and remove drive belts.
8. Remove fasteners that secure pulley to cuttershaft (See Figure 53 item 2). Remove pulley and key (See Figure 53 & item 2)
9. Remove fasteners securing inboard bearing and housing assembly to cutter- housing, then remove bearing and housing assembly. Refer to Illustration 9. NOTE: There are two tapped holes in the housing which can be used to pull bearing and housing assembly out by using special tool P/N 701627.
10. Using a jack to align parts, install inboard bearing and housing assembly to cutter unit. Grease bearing and install cap over fitting.
11. Reinstall key and pulley. Secure with cuttershaft fasteners.
12. Remove jack and check shaft rotation. Reinstall knives which were removed.
13. Reinstall drive belts then secure motor mounting bracket to cutter housing.
14. Reinstall idler arm spring.
15. Reinstall belt guard.
16. Remove supports, lower unit to ground and test unit. Reinstall outboard fender, if not already installed.

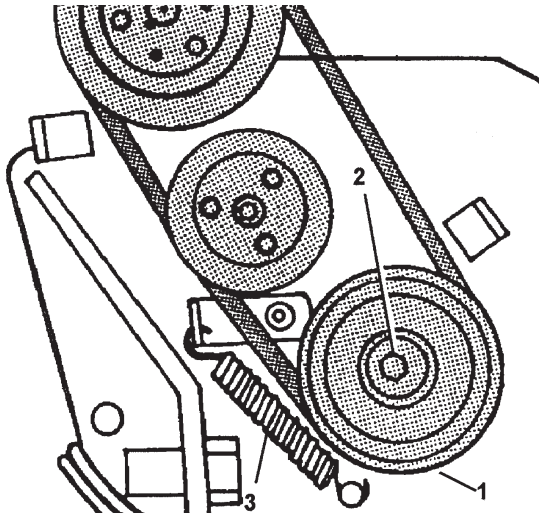


FIGURE 53

CUTTERSHAFT REPLACEMENT:

NOTE: It is recommended that cuttershaft bearing and housing assemblies be replaced when replacing cutter shaft. Use caution when changing cutter shaft, it is heavy and the cutting blades on it can be sharp. It is recommended that blades be removed for dis-assembly and re-assembly.

1. Place Mower Units resting on the ground or securely support at a convenient height.
2. Remove cuttershaft bearing and housing assemblies as outlined in Paragraph Cutter shaft Bearing repair replace section on previous pages. After removing both inboard and outboard bearing assemblies, the cuttershaft can be removed and a new one installed. It may be necessary to remove two sets of knives nearest the drive end of cutter shaft to allow cuttershaft to slide inward far enough for other end to drop down.
3. Install new bearing and housing assemblies as outlined in inboard and outboard bearing repair on previous pages.

REPLACING CUTTER BLADES (KNIVES):

The cutter knives are attached to the cutter shaft in three different ways depending on the cuttershaft application, there is fine cut and course cut. These cuttershafts use different types of blades and different type blade hangers. To remove existing knives, remove and replace hanger components (See Figure 54).

A. Type "A" is used on fine cut cuttershaft and is the standard fine cut knife. It is retained with a hardened pin and hardened cotter pin. These pin must be installed with the head and cotter pins a certain way, see below for installing pin depending on cutter shaft rotation.

B. Type "B" is used on fine cut cutter shaft and is a Ring & Clip mounted knife. This Knife is retained with a bolt and nut. This bolt and nut must be torqued to 20 ft. lbs.

C. Type "C" is used on the course cut cutter shaft. It is the standard course cut knife and retained with a D-Ring, hardened Pin with a hardened cotter pin. This knife must have the pin and cotter pin installed in the right direction (See Below)

FOR FORWARD ROTATION:

On the right wing and rear unit, all knife pins must be installed with their heads facing away form the cuttershaft pulley. On the left wing, the heads of the knife pins must face the cuttershaft pulley.

FOR REVERSE ROTATION:

On the right wing and rear unit, all knife pins must be installed with their heads facing toward the cuttershaft pulley. On the left wing, and rear unit, the heads of the knife pins must face away from the cuttershaft pulley.

NOTE: Rotation is the direction of the cuttershaft in relation to the direction of travel of the mower. The blades will not need to be reversed as they are double sided and designed to cut on either side.

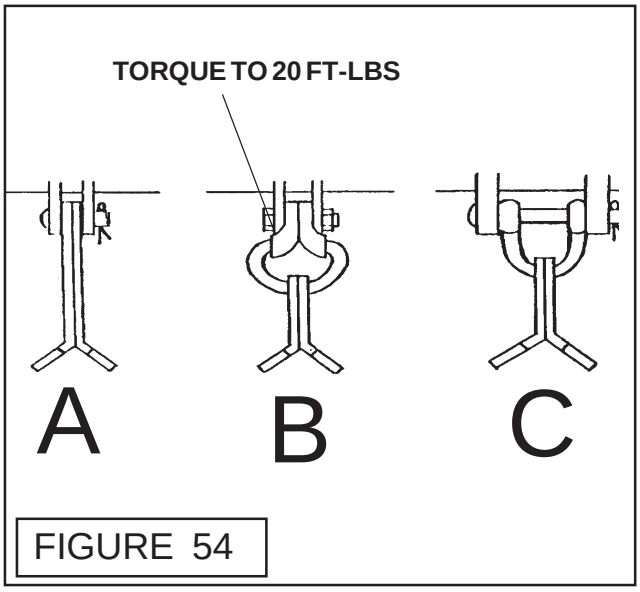


FIGURE 54

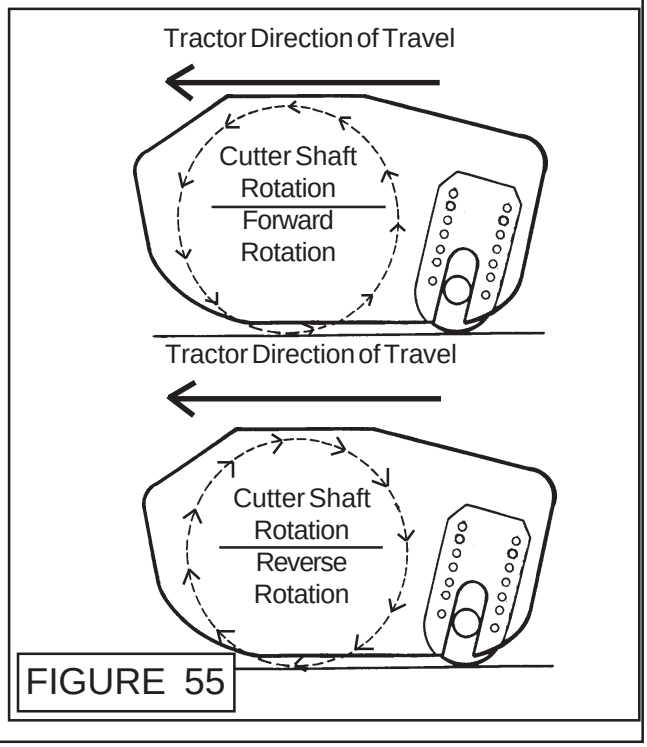


FIGURE 55

Changing Mower Cutter Shaft Rotation to Forward or Reverse:

WING MOWERS

The hydraulic wing motors are dual rotation motors which means they will rotate in either direction depending on the inlet port used. An arrow on the flat surface of the motor housing at both ports indicate the direction of rotation. To change rotation, remove the four bolts that mount the manifold block to the motor. Remove the case drain hose at the motor, but leave it attached in present location at the manifold block. Leave all other plumbing as presently installed at the manifold block. Remove the two mounting bolts at the motor mounting plate and rotate the motor 180 deg. This changes the present inlet port into the outlet port of the motor. Re-install manifold block but do not change the position. Install case drain hose.

REAR MOWER

To change direction of cutter shaft rotation for the rear mover, three left hand parts are required. A belt guard, an outboard bearing plate and a idler pulley arm. (Consult parts book for these part numbers). Remove the cutter shaft and turn 180 deg. Remove the gearbox cutter shaft drive pulley and outboard bearing plate, (using the proper bearing plate) mount the plate to opposite side of mower housing. Remove the four bolts that mounts the gearbox and rotate gearbox 180 deg. to new position. Install cutter shaft pulley, gearbox output pulley, idler arm pulley assembly and belt. REPLACE EXISTING BELT GUARD WITH PROPER GUARD.

LIFT AND TILT CYLINDERS: (See Figure 56)

To assist in identification of the cylinders, Lift Cylinder measure 3-1/4" O.D. and Tilt Cylinder measure 3-3/4" O.D. (See Figure 56)

Hydraulic cylinders change the position of the cutter unit. The lift cylinder raises and lowers the unit by changing position of the lift frame. To lift unit, oil is supplied to rod side of cylinder. Gravity lowers unit when lift levers are in "DOWN" position.

The tilt cylinder changes the angle of the cutter unit. Oil is supplied to both ends of the cylinder and provides power to tilt the unit up or down. The unit can be tilted to the full vertical position for transport.

DIS-ASSEMBLY & ASSEMBLY OF LIFT OR TILT CYLINDER: (See Figure 56)

For part numbers and illustration, refer to the Parts Listing section.

1. Disconnect hoses at cylinder. Cap all hoses to prevent fluid contamination. Remove cylinder from unit.
2. Remove reducer bushing and snap ring which retains the rod guide. Remove rod guide, rod, and piston. Remove guide and piston from rod.
3. Replace all "O" rings, back-up washers and rod wiper. Inspect rod, guide, piston, and body for damage.
4. Clean inside of cylinder with mineral spirits. DO NOT wipe dry; air dry instead. Lint, dirt, and, grit can cause immediate or premature failure.
5. Lubricate all parts with clean hydraulic oil and reassemble.

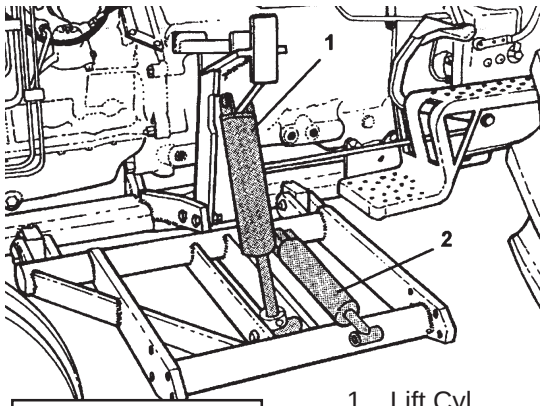


FIGURE 56

1. Lift Cyl.
2. Tilt Cyl.

SECTIONAL CONTROL VALVE:

The control valve directs oil flow from the gear pump to the hydraulic cylinders. In the "HOLD" position, the spool blocks oil flow to the cylinders which prevents movement, and directs oil through the valve back to the reservoir.

When the spool is shifted, oil flows to one side of the cylinder while the other side is opened to the return line. The cylinder rod then moves in or out and changes the cutter unit's position.

In the "FLOAT" position, the spool will open both sides of the cylinder to the return line. The cylinder rod is then free to move since oil can enter or leave either side of the cylinder.

There are two valve sections for each side of the tractor. One is for TILT, one is for LIFT. The sections are bolted together between an inlet and an outlet section. The LIFT section has three positions: UP, HOLD and DOWN & FLOAT. The TILT section has four positions: UP, HOLD, OUT and FLOAT.

A pressure relief valve is mounted in the inlet section of the valve. When a cylinder is bottomed, the relief valve will open and allow oil from the gear pump to return to the reservoir.

CHECKING RELIEF VALVE PRESSURE:

1. To check the relief valve pressure setting, remove inlet hose at the control valve. Install a tee fitting and reconnect the hose to a pressure gauge.
2. Check for proper tension on front drive belts (1/4 inch play at midpoint).
3. Start engine and run at low idle.
4. Raise the Tilt cylinder and note the pressure when the cylinder bottoms.
5. The pressure should be the same on both circuits, 1200 psi. If the pressure is 1200 psi on one and not on the other, the relief valve and the pump are working fine. Problem would be somewhere else.
6. If pressure is low on both circuits, adjust relief valve. Remove hex cap, loosen lock nut (if present) and turn adjusting screw clockwise.
7. If the pressure does not increase, remove the relief valve and inspect it. If the valve is good, the gear pump is worn.

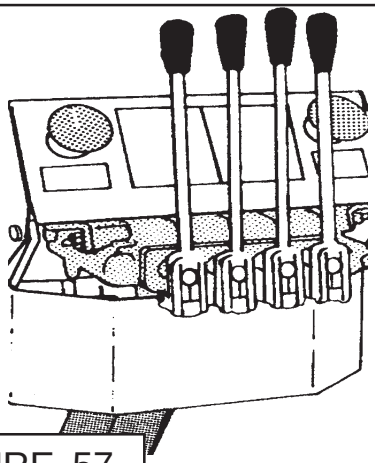


FIGURE 57

Control valve is only used to raise and lower the wing mowers only, the rear mower will be lifted and lowered by the tractors three point hydraulic system.

(Figure 57) Shows ROPS Tractor mounting with the control handles connected direct to the valve within the operators reach.

(Figure 58) Shows Cab Tractor with the valve mounted in a remote location out side the tractor cab. The valve is operated by remote cables mounted to remote handle assemblies which are mounted in cab

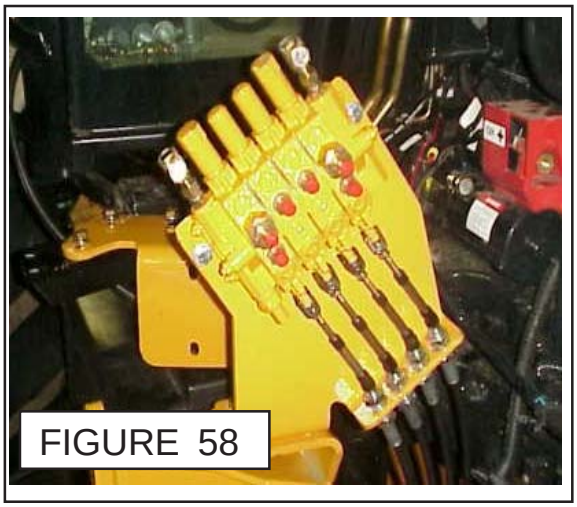


FIGURE 58

TANK FILLING INSTRUCTIONS: (*USE Tractor Hydraulic Oil only.)*

A double wing Interstater with 74" wing mowers will require approximately 26 gallons of oil to fill the hydraulic tank, hoses, cylinders and cooling tubes in the mower deck. An Interstater with 60" wings will require less oil and with 88" wings will require more oil. The Hydraulic tank only holds 15 gallons of oil and you can not add enough oil to the tank the first time to completely fill the system. Therefore, the following filling instructions must be carefully followed to prevent pump cavitation and instant pump failure.

1. After the Interstater mower is completely assembled to the tractor and with the wings on the ground, fill the mower hydraulic tank above the oil level sight gauge approximately 5" or 1" below the top of the tank. Use Tractor Hydraulic Oil only.
2. Start the tractor and run it for 30 to 45 seconds and then turn it off.
3. Check the oil level in the sight gauge. If no oil is seen, add oil to bring the level up to the sight gauge.

   NOTE!!

   Do not fill the tank with oil above the level of the sight gauge after the first filling. Overfilling the tank with oil after the initial filling may result in oil being discharged through the air filter on top of the hydraulic tank.
4. Start the tractor and run it for 2 minutes and then turn it off.
5. Again check the oil level in the sight gauge. If the oil level is in the sight gauge, the unit is ready to run. If no oil is seen, add oil to bring the level up to the sight gauge.
6. Repeat steps 4 and 5 as required until the oil level stabilizes at the level of the sight gauge.

INFORMATION ON FLAIL MOWER VIBRATION:

EXCESSIVE VIBRATION

Vibration is a **MONSTER** and if allowed to continue unchecked, can cause the complete break-up of a machine in a very short time.

A properly operated Flail Mower will produce very little vibration. If vibration does occur, the mower should be **STOPPED IMMEDIATELY** and **CORRECT THE TROUBLE,**

NOTE: warranty does not cover failures resulting from continued operation after something happens to cause the mower to vibrate excessively.

Vibration is caused by a rotating part which is out of balance. This could be the cutter shaft or, on those models (rear Mower) having a universal slip joint assembly drive shaft, from the drive shaft.

If the two extreme ends of the drive shaft, (the splined yokes which fit on the tractor power take off shaft and on the mower gear box driven shaft), are not parallel, vibration will be evident. This is because of the mechanics of a universal drive wherein the rotational speed through a universal joint is not uniform. If the ends of a universal drive shaft are parallel, the uneven rotation effect is cancelled out and the machine being driven will be driven at a uniform rate of speed. However, if the ends are not parallel, the uneven rotation effect may be multiplied, resulting in a speeding up and slowing down of the entire mower system (gear box, extension shaft, pulleys, belt, and cutter shaft) each revolution. This effect can be readily noticed if the mower, while running, is raised to an extreme height on the tractor lift.

For smoothest operation, the tilt of the mower should be adjusted (on a 3-point hitch, by adjusting the length of the top link between the tractor and the mower) so that the ends of the drive shaft are parallel when the mower is down in operating position. Raising the mower, while running, to extreme heights on the lift should be avoided.

To check where the vibration is originating, first be sure the ends of the universal drive shaft are parallel. Then, if vibration is still present, remove the drive belt and run the mower. If vibration is still present, it most likely is coming from and caused by a bent drive shaft. If so, the shaft should be replaced or straightened. If the vibration is gone - the drive portion of the mower is running smoothly - then the vibration is probably coming from the cutter shaft (it could be a pulley out of balance or a faulty belt with a varying cross section, but this is not likely).

The cutter shaft will run out of balance if:

1. Wire, rope, string, rags, etc., around the cutter shaft, are holding the knives in a folded back position. Remove such foreign objects and be sure all knives are free to swing to the extended position.
2. (a) Knives are missing or broken. Replace missing or broken knives.
   (b) Knife hanger lugs are broken off shaft. This condition usually results from continued operation in contact with large hard objects where the knife hanger lugs themselves are hitting the hard objects. Lugs should be replaced using arc welding equipment so as not to direct too much heat in one area of the shaft.
3. Cutter shaft ball bearings are worn enough to have radial "play" in them. Replace ball bearing and other worn parts to eliminate "play".
4. Shaft is bent. Shafts are straight within a couple of thousandths of an inch when they are made. It is possible that they will become bent in use, such as if the shaft is hooked on a stump while the tractor is moving forward at a good speed.
5. Shafts are operated at improper speed. Rotating shafts have what is known as a natural period of vibration. The same is true of the cutter shafts on the Flail Mowers.

   The actual speed at which the harmonic will occur will vary with each mower and each installation. To avoid this harmonic vibration when operating the mower, it may be necessary to adjust the engine speed of the tractor up or down.

   Some units have a harmonic which occurs below the nominal operating speed. On these units, it will be noticed that there is always a little vibration at a particular RPM as the mower is being sped up to operating speed. This occurs as the shaft passes through its normal harmonic vibration point. As long as the mower is opened at the proper speed, then harmonic vibration will not be an issue.

NOTES

Section 12

INTERSTATER

Rear Mower Repairs

INFORMATION ON FLAIL MOWER VIBRATION:

EXCESSIVE VIBRATION

Vibration is a **MONSTER** and if allowed to continue unchecked, can cause the complete break-up of a machine in a very short time.

A properly operated Flail Mower will produce very little vibration. If vibration does occur, the mower should be **STOPPED IMMEDIATELY** and **CORRECT THE TROUBLE,**

NOTE: warranty does not cover failures resulting from continued operation after something happens to cause the mower to vibrate excessively.

Vibration is caused by a rotating part which is out of balance. This could be the cutter shaft or, on those models (rear Mower) having a universal slip joint assembly drive shaft, from the drive shaft.

If the two extreme ends of the drive shaft, (the splined yokes which fit on the tractor power take off shaft and on the mower gear box driven shaft), are not parallel, vibration will be evident. This is because of the mechanics of a universal drive wherein the rotational speed through a universal joint is not uniform. If the ends of a universal drive shaft are parallel, the uneven rotation effect is cancelled out and the machine being driven will be driven at a uniform rate of speed. However, if the ends are not parallel, the uneven rotation effect may be multiplied, resulting in a speeding up and slowing down of the entire mower system (gear box, extension shaft, pulleys, belt, and cutter shaft) each revolution. This effect can be readily noticed if the mower, while running, is raised to an extreme height on the tractor lift.

For smoothest operation, the tilt of the mower should be adjusted (on a 3-point hitch, by adjusting the length of the top link between the tractor and the mower) so that the ends of the drive shaft are parallel when the mower is down in operating position. Raising the mower, while running, to extreme heights on the lift should be avoided.

To check where the vibration is originating, first be sure the ends of the universal drive shaft are parallel. Then, if vibration is still present, remove the drive belt and run the mower. If vibration is still present, it most likely is coming from and caused by a bent drive shaft. If so, the shaft should be replaced or straightened. If the vibration is gone - the drive portion of the mower is running smoothly - then the vibration is probably coming from the cutter shaft (it could be a pulley out of balance or a faulty belt with a varying cross section, but this is not likely).

The cutter shaft will run out of balance if:

1. Wire, rope, string, rags, etc., around the cutter shaft, are holding the knives in a folded back position. Remove such foreign objects and be sure all knives are free to swing to the extended position.
2. (a) Knives are missing or broken. Replace missing or broken knives.
   (b) Knife hanger lugs are broken off shaft. This condition usually results from continued operation in contact with large hard objects where the knife hanger lugs themselves are hitting the hard objects. Lugs should be replaced using arc welding equipment so as not to direct too much heat in one area of the shaft.
3. Cutter shaft ball bearings are worn enough to have radial "play" in them. Replace ball bearing and other worn parts to eliminate "play".
4. Shaft is bent. Shafts are straight within a couple of thousandths of an inch when they are made. It is possible that they will become bent in use, such as if the shaft is hooked on a stump while the tractor is moving forward at a good speed.
5. Shafts are operated at improper speed. Rotating shafts have what is known as a natural period of vibration. The same is true of the cutter shafts on the Flail Mowers.

   The actual speed at which the harmonic will occur will vary with each mower and each installation. To avoid this harmonic vibration when operating the mower, it may be necessary to adjust the engine speed of the tractor up or down.

   Some units have a harmonic which occurs below the nominal operating speed. On these units, it will be noticed that there is always a little vibration at a particular RPM as the mower is being sped up to operating speed. This occurs as the shaft passes through its normal harmonic vibration point. As long as the mower is opened at the proper speed, then harmonic vibration will not be an issue.

Rear Three Point Mower Connection:

1. Install Rear Lift Chains Option. Rear lift chains will replace three point lift links using the same pins you removed from lift links. These chains allow mower to float with contour of the ground. These are optional equipment and may or may not have been ordered. (See Figure 1, 2 & 3). Note: Shown below is a New Holland Tractor in figure 1, 2 & 3. The John Deere check chains will mount the same.

2. The Rear Mower is a standard Three Point Hitch mounted mower that is PTO driven through driveline. It is sent already assembled with driveline tied to it. (See Figure 1)

3. Connect Lower Hitch Pins. Lower hitch pins connect to lift arms of the tractor with click pins, pins are furnished with mower. (See Figure 5 & 7). It 's best to connect lower arms of three point first. You will use the lower arms of tractor

4. Connect Upper Hitch Pin. Upper hitch pin will connect to top three point adjustable Link with pin and click pin. Top Link is furnished with tractor not with mower. Top Link is adjustable in length and is used to level the mower. (See Figure 8).

5. Connect Driveline . Driveline is tied to the mower (See Figure 6 & 9). Cut the ties loose from mower. Connect the clutch end of the driveline to the mower, the clutch is retained to the gearbox input shaft by a clamp yoke on clutch hub. Slip the clutch onto the input shaft until holes in clamp yoke are aligned with the grooves in the input shaft. Install and tighten the two bolts and nuts. The QD Yoke end connect to the Tractor PTO.

6. Leveling the Rear Mower . The Rear Mower is leveled with the top Three Point Link. The Cutting Height is adjusted by moving the Roller up or down by change the bearing bracket mounting hole. There is a decal on the deck next the Operators/ parts manual cannister (See Figure 10 & 11)

7. Rear Mower Completely Connected. With the rear mower completely connected. Check all Oil levels and grease mower components (See Figure 14) before running mower. Also DO NOT start tractor if the rest of the assembly to the interstater is not done. Make certain that all hoses, components, wiring is completed and Oil Tank for interstater has been filled with oil.


Figure 1


Figure 2


Figure 3

Figure 4


Figure 5

8. Slip clutch is incorporated in the PTO driveline. It is designed to slip, absorb the shock load, and protect the driveline. It is important that the clutch lining plates slip when an obstacle or load heavier than clutch setting is encountered. Therefore, if the machine sits outside longer than 30 days and is exposed to rain and/or humid air it is important to make sure that the clutch lining plates are not rusted/corroded together. Before using the mower use the following procedure to make sure the clutch will slip and give the overload protection required. (See Figure 13) This is a required step because the driveline has been sitting and may be stuck.


Figure 6

A. Loosen nuts on springs until the springs can freely rotate, yet remain secure on bolts.

B. Attach mower to tractor and start the tractor. Set the engine speed at 1200 RPM.

C. Mark outer plates with marker, paint or any form that will work for you to tell if the components of the clutch slipped.

D. Engage the PTO (approximately one second) and then quickly disengage it. The friction lining plates should break loose (check the mark).

E. Turn tractor off and tighten the nuts on the springs to their original position of 1-5/16" compressed spring length.


Figure 7

9. Slip clutch is incorporated in the PTO driveline. It is designed to slip, absorb the shock load, and protect the driveline. After the first hour of operation, the slip clutch should be checked for overheating. After this first check, the slip clutch should be checked weekly or anytime there is overheating. To adjust the slip clutch, tighten the spring bolts 1/8 (maximum) turn at a time. Bolts should NEVER be adjusted to the point where the springs are compressed solid. The slip clutch should be checked periodically and adjusted to compensate for wear. The lining plates are 1/8" thick when new. Replace after 1/32" wear. If the mower has been idle for an extended period of time, or in wet weather, before operating check to be sure the friction lining plates are not frozen or rusted together. Should this freezing occur refer to the procedure described in the "Seasonal Clutch Maintenance" on the next page. There are 4 friction disc the slip clutch. These should be checked weekly for oil or grease, wear, and moisture which could cause corrosion on the drive plates. (See Step 8) **NOTE: Above information is listed as a reference and is listed in the operators manual as well.**


Figure 8


Figure 9

9A. IMPORTANT CLUTCH ADJUST INFORMATION: There have been **three different clutches used , (1) The First & earlier clutch** had 6 small springs and would adjust to a length of 1-1/16" long, this early clutch could be identified by the small springs which are about 1-3/16" long un-compressed. **(2) The Next clutch had 8 springs** as shown in figure 10 and spring are tightened to 1-5/16" long. **(3)The newest clutch has 6 springs** and the springs will be tighten to 1-9/16" long when adjusted. The clutch are easily identified by the springs. Always check before adjusting clutch. The different clutches are installed on different series universal joint drivelines and can not be interchange among drivelines. When repairing the clutches the correct type must be identified to enable the correct parts be ordered, a good source of identification is the Interstater Archive Manual.

10.Check All Shields. Make certain any shields that were removed during assembly are reinstalled. DO NOT operate mower or tractor with any shields or guards missing.

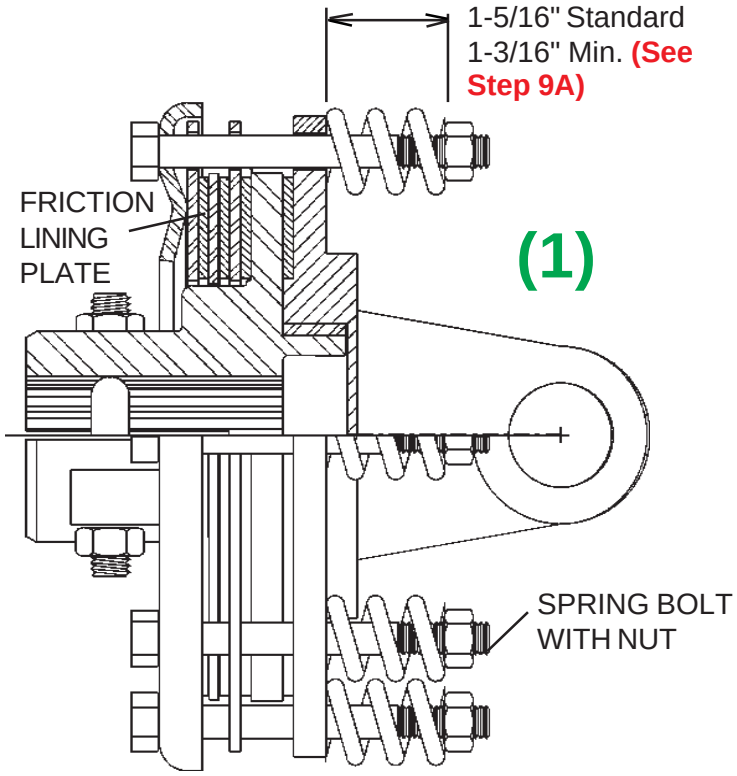


Figure 10 — Style Clutch with 8 large springs shown, see Step 9A for other clutches

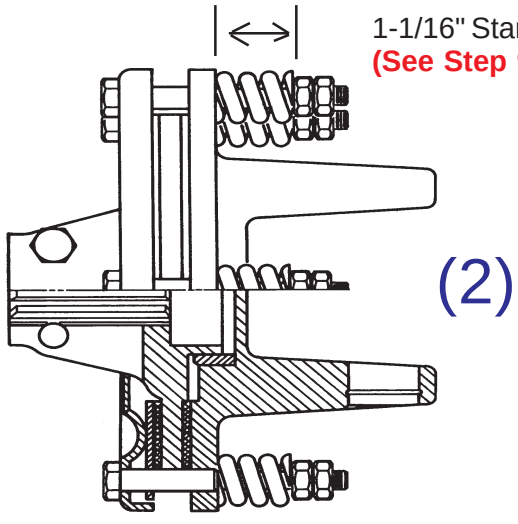


Figure 10A — Style Clutch with 6 Small springs shown, see Step 9A for other clutches

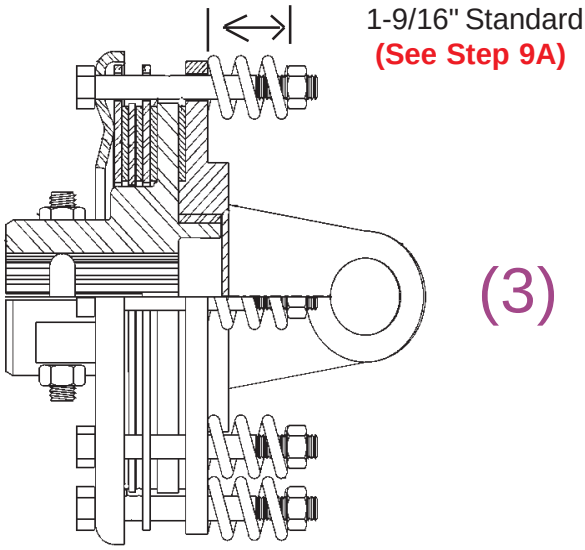


Figure 10B — Style Clutch with 6 large springs shown, see Step 9A for other clutches

GENERAL:

1. Mower should be in the lowered position (mowers resting on the ground). Tractor shut down and parked safely according to tractor manufactures instructions. NEVER work on or repair mowers with tractor running and mowers supported by hydraulic system.

2. Mowing is accomplished by a series of knives which rotate at high speed on a shaft. On Wing Mowers the shaft is driven by a hydraulic motor through a set ofdrive belts. Belt tension is maintained by a spring loaded idler pulley. drive belts. Belt tension is maintained by a spring loaded idler pulley.

3. The cutter unit is mounted to the lift frame by two mounting pins and held in place by a hydraulic cyl. This cylinder is used to tilt the cutter unit to allow mowing on an angle and tilting to the vertical position for transporting. Another hydraulic cylinder is mounted to the lift frame and the lift cylinder support. This cyl. is used to raise the cutter unit via the lift frame.

4. The cutter unit rides on a large roller assembly. The position of this roller is adjustable and will determine the cutting height of the knives.

Figure 11

REPLACE DRIVE BELTS:

NOTE: Belts must be replaced as a matched set. DO NOT replace just one belt. (See Figure 12 & 14)

1. Place unit on ground or support securely.

2. Remove belt guard.

3. Remove idler arm spring.

4. Remove motor mounting bracket front bolt and loosen rear bolt.

5. Pivot motor-mounting bracket assembly. Remove old belts and install new ones.

6. Reinstall front mounting bolt then secure motor mounting bracket to unit.

7. Reinstall idler arm spring and belt guard.

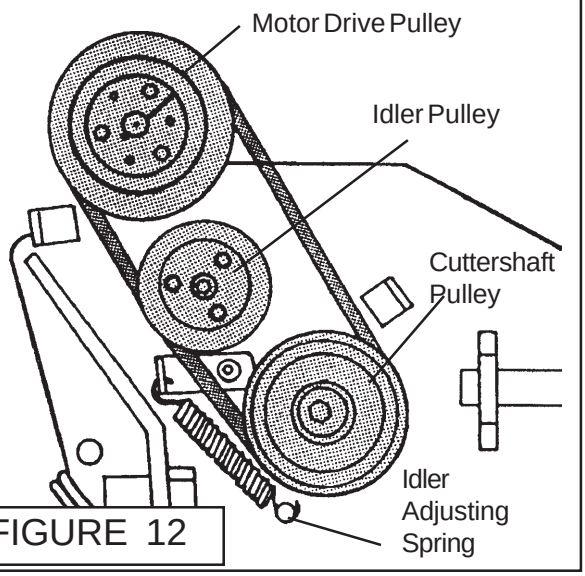


FIGURE 12

ADJUSTING CUTTING HEIGHT:

(See Figure 14, 15, 16 & 17)

1. Lower cutter unit (& Roller) to ground and place control valve levers in "FLOAT" position.

2. Place lifting device (scissors jack, hydraulic jack) under center of cutter housing or use an over head hoist. When lifting mower deck always use jack stands to support the object being lifted. When working under a mower always use safety glasses.

3. Remove hex nuts, washers and carriage bolts from bracket at each end of roller. Make certain that roller bracket is free to move up and down once the fasteners are removed. A stuck roller could drop suddenly and cause an injury. While Lifting Deck Roller should be slid down or pushed up to change mowing height. DO NOT lift mower very high with bolts removed from roller mounting bracket, a stuck roller could drop suddenly and cause an injury.

4. Use lifting device to reposition cutter housing to desired cutting height. Align bracket holes with cutter housing holes, then reinstall fasteners. Refer to cutting height decal on mower or Safety Section.

5. Lower cutter unit to ground; then remove lifting device, jack or hoist.

6. When adjusting cutting height on interstater chose the desired hole by reading the decal (shown in Figure 50) which should be on the mower decks of the interstater showing the adjusting steps and procedure.

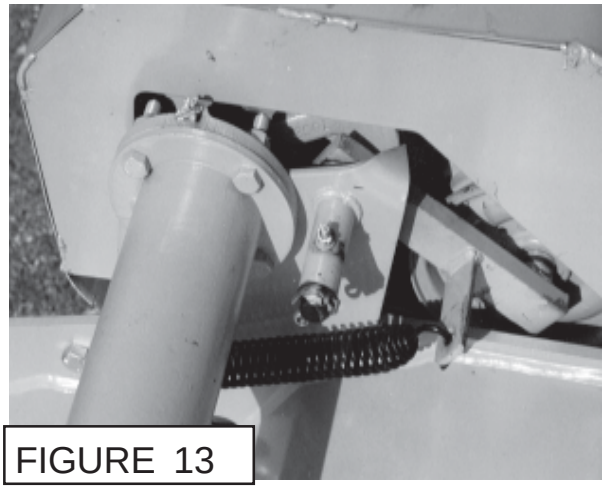


FIGURE 13

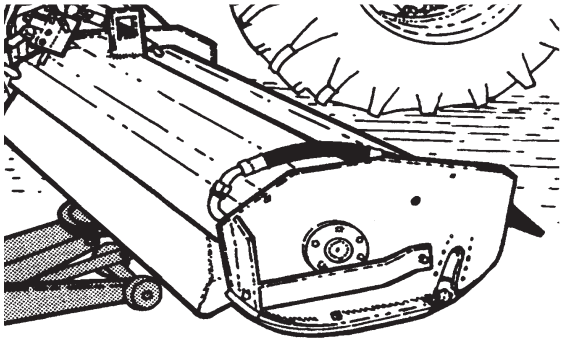


FIGURE 14

ROLLER BEARING REPLACEMENT:

(See Figure 19)

1. Securely support mower before beginning any repairs or service to mower, all mower must be lowered and resting on ground or supports and NOT lifted by hydraulic system. Secure tractor as directed by tractor manufactures instruction for parking. Secure tractor to prevent it from being started while being repaired.

2. Remove roller and both bearing and bracket assemblies from mower. Lift the mower only high enough to remove the roller assembly. If installing a roller with pre-assembled bearing and bracket assemblies, remove the old roller, proceed to step 12.

3. Slide bearing and bracket assemblies off each end of roller. If replacing with new bearing and bracket assemblies, proceed to step 10.

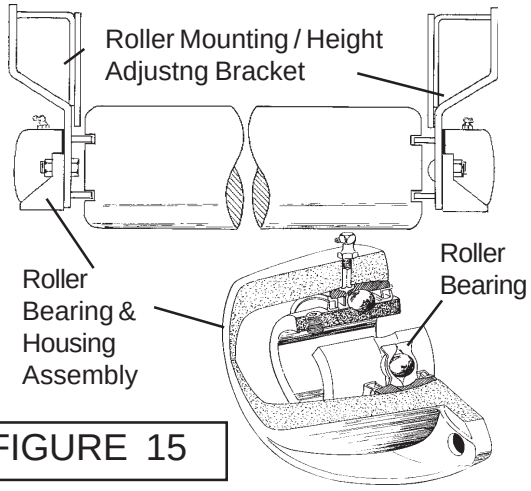


FIGURE 15

4. Remove roller bearing and housing assembly attaching hardware. Remove assembly from bracket. Inspect seal between assembly and bracket for brittleness, cracks, wear and tear. Replace if necessary. If replacing with new roller bearing and housing assemblies, proceed to step 9.

5. Remove grease fitting from the top of bearing housing.

6. Remove bearing form housing. By Rotating Bearing 90˚ sideways and line up with notches in Bearing Housing: then pull out.

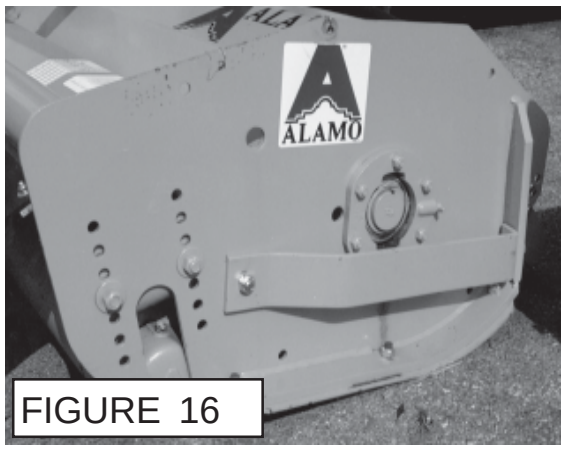


FIGURE 16

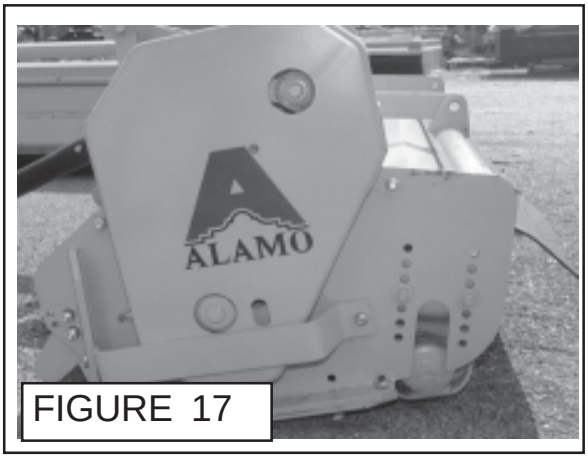


FIGURE 17

ROLLER BEARING REPLACEMENT: (See Figure 19)

7. Install new bearing into housing. Bearing must be installed with grease hole in bearing aligned with grease fitting hole in housing.

8. Reinstall grease fitting to housing. Grease fitting must be tight and seated in grease hole in bearing to prevent bearing from rotating in housing.

9. Attach roller bearing and housing assembly to bracket with seal between housing and bracket.

10. Slide bearing and bracket assemblies on each end of roller.

11. Check bearing for proper installation in housing by gently rocking bearing and bracket assembly in end of roller. Play should be slight to none at all.

12. Install roller and bearing and bracket assemblies on mower.

13. Lubricate roller bearing until lubricant can be seen coming out between roller and bearing housing.

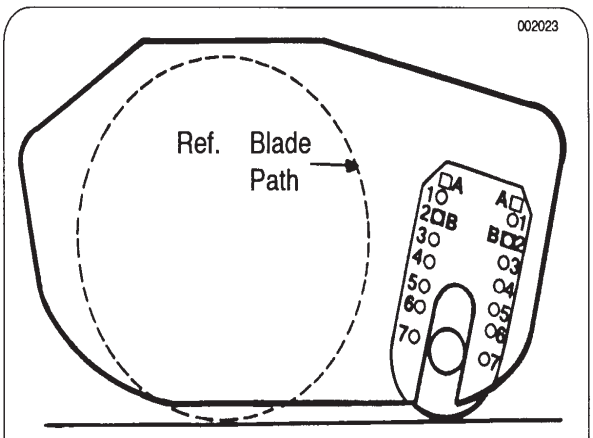
14. When reinstalling roller, bearing & mount bracket make certain to bolt at the desired height. Desired height will normally be the same bolt holes as before the repair. (See Previous pages for adjust roller height).

NON-DRIVE END CUTTERSHAFT BEARING: (See Figure 20, 21 & 22)

1. Lift cutter unit to maximum horizontal height; then securely support ends of cutter housing with jack stands or strong blocks, do not use just a jack or hoist.

2. Remove enough knives to place a floor jack under center of cuttershaft to support cutter shaft when removing cutter shaft bearing. Securely support cuttershaft. NOTE: The cuttershaft must remain supported while changing bearings.

(Continued Next Page)

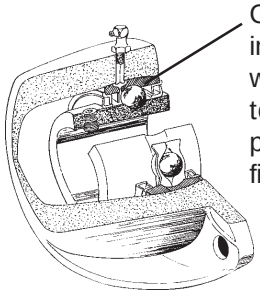


MOWER CUTTING HEIGHT ADJUSTMENT

DESIRED CUTTING HEIGHT (INCHES)	ADJUSTMENT BRACKET HOLE	MOWER END PLATE HOLE
1/2	B	2
1	A	1
1-1/2	B	3
2	A	2
2-1/2	B	4
3	A	3
3-1/2	B	5
4	A	4
4-1/2	B	6
5	A	5
5-1/2	B	7
6	A	6

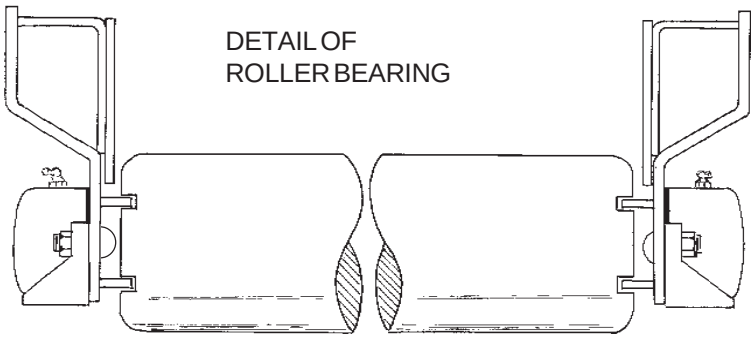
P/N 002023 Cutting Height Adjustment Instruction.

FIGURE 18



Grease hole in bearing must be inline with hole in housing to insure correct placement of grease fitting

FIGURE 19



DETAIL OF ROLLER BEARING

NON-DRIVE END CUTTERSHAFT BEARING: (See Figure 20, 21 & 22)

(Contiued From Previous Page

3. Remove outboard fender.

4. Remove fasteners securing bearing and housing assembly to cutter housing, then remove bearing and housing assembly (See Figure 14). NOTE: There are two tapped holes in the housing which can be used to pull bearing and housing assembly out by using special tool No. 701627.

5. Using a jack to align parts, install bearing and housing asy to cutter unit & make certain that bearing setscrew (If Used) is located in keyway on cuttershaft. Grease bearing and install cap over fitting. If only the outboard bearing and housing assembly is to be replaced, proceed as follows: Remove jack and check shaft rotation. Reinstall knives which were removed. Reinstall outboard fender. Remove supports, lower unit to ground and test unit If the inboard (drive) bearing is to be replaced, proceed to step 6.

DRIVE END CUTTERSHAFT BEARING: (See Figure 20, 21 & 22)

6. Remove spring from idler arm.

7. Remove motor mounting bracket fasteners, at the cutter housing. Pivot motor- mounting bracket assembly and remove drive belts.

8. Remove fasteners that secure pulley to cuttershaft (See Figure 21 item 2). Remove pulley and key (See Figure 21 & item 2)

9. Remove fasteners securing inboard bearing and housing assembly to cutter- housing, then remove bearing and housing assembly. Refer to Illustration 9. NOTE: There are two tapped holes in the housing which can be used to pull bearing and housing assembly out by using special tool P/N 701627.

10. Using a jack to align parts, install inboard bearing and housing assembly to cutter unit. Grease bearing and install cap over fitting.

11. Reinstall key and pulley. Secure with cuttershaft fasteners.

12. Remove jack and check shaft rotation. Reinstall knives which were removed.

13. Reinstall drive belts then secure motor mounting bracket to cutter housing.

14. Reinstall idler arm spring.

15. Reinstall belt guard.

16. Remove supports, lower unit to ground and test unit. Reinstall outboard fender, if not already installed.

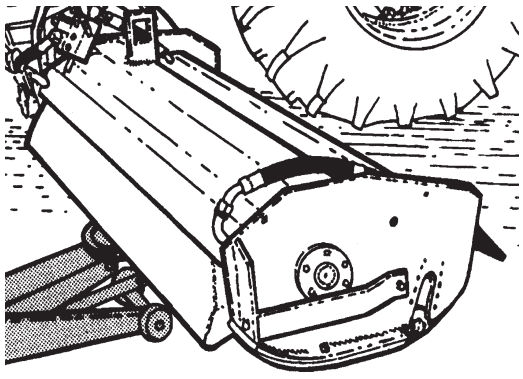


FIGURE 20

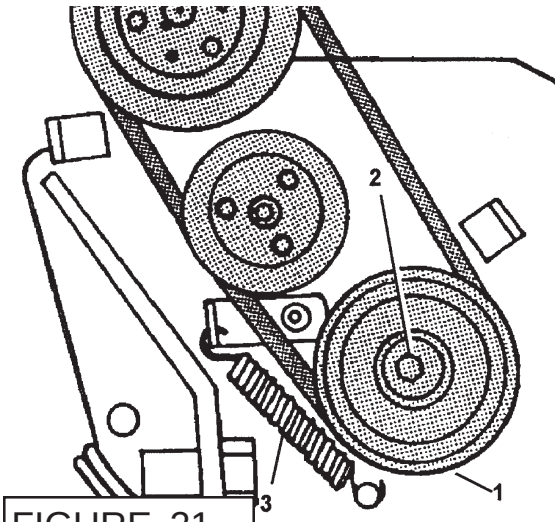


FIGURE 21

(Continued Next Page)

CUTTERSHAFT REPLACEMENT:

NOTE: It is recommended that cuttershaft bearing and housing assemblies be replaced when replacing cutter shaft. Use caution when changing cutter shaft, it is heavy and the cutting blades on it can be sharp. It is recommended that blades be removed for dis-assembly and re-assembly.

1. Place Mower Units resting on the ground or securely support at a convenient height.
2. Remove cuttershaft bearing and housing assemblies as outlined in Paragraph Cutter shaft Bearing repair replace section on previous pages. After removing both inboard and outboard bearing assemblies, the cuttershaft can be removed and a new one installed. It may be necessary to remove two sets of knives nearest the drive end of cutter shaft to allow cuttershaft to slide inward far enough for other end to drop down.
3. Install new bearing and housing assemblies as outlined in inboard and outboard bearing repair on previous pages.

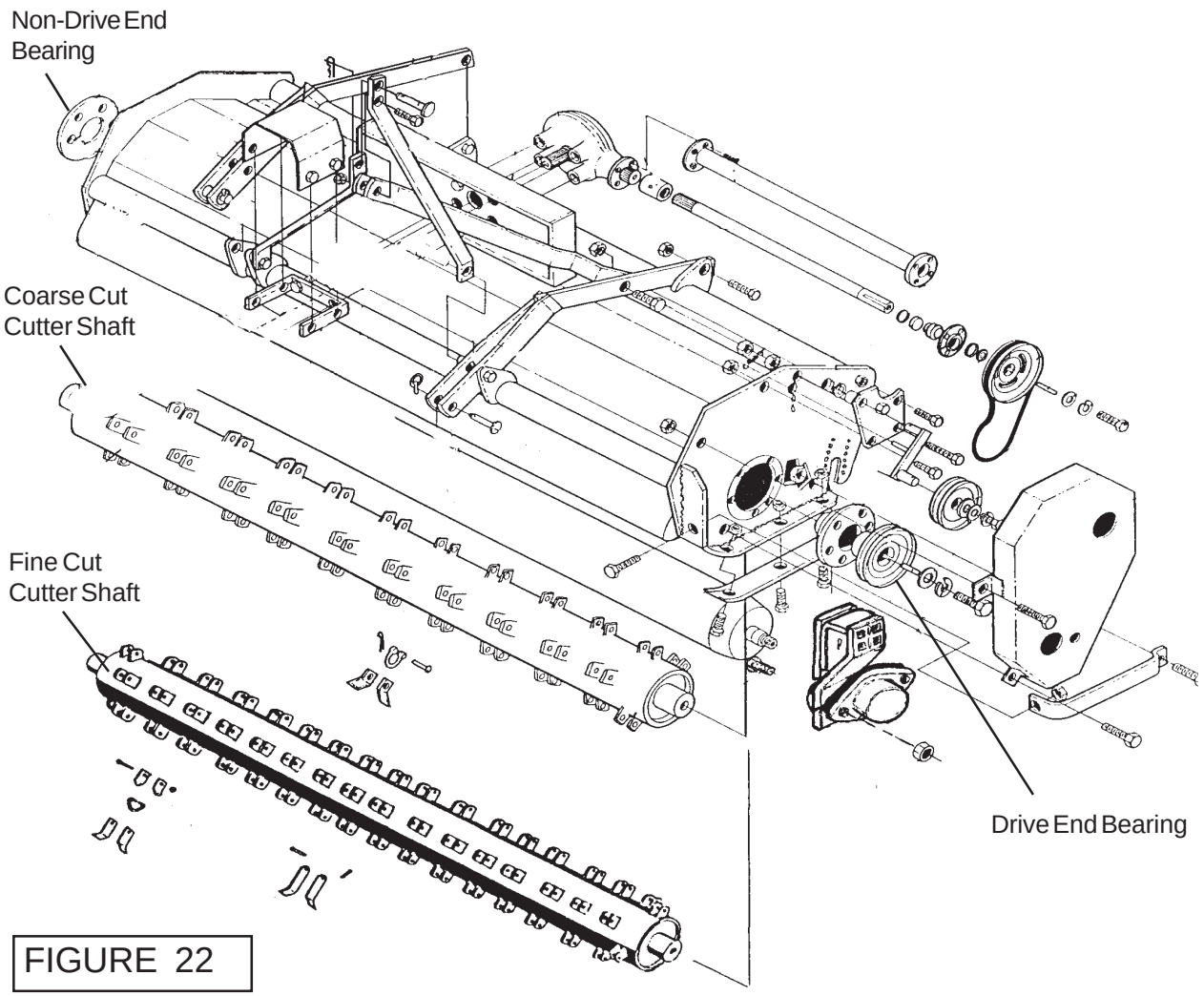


FIGURE 22

REPLACING CUTTER BLADES (KNIVES):

The cutter knives are attached to the cutter shaft in three different ways depending on the cuttershaft application, there is fine cut and course cut. These cuttershafts use different types of blades and different type blade hangers. To remove existing knives, remove and replace hanger components (See Figure 23).

A. Type "A" is used on fine cut cuttershaft and is the standard fine cut knife. It is retained with a hardened pin and hardened cotter pin. These pin must be installed with the head and cotter pins a certain way, see below for installing pin depending on cutter shaft rotation.

(Continued Next Page)

REPLACING CUTTER BLADES (KNIVES): (Continued from Previous Page)

B. Type "B" is used on fine cut cutter shaft and is a Ring & Clip mounted knife. This Knife is retained with a bolt and nut. This bolt and nut must be torqued to 20 ft. lbs.

C. Type "C" is used on the course cut cutter shaft. It is the standard course cut knife and retained with a D-Ring, hardened Pin with a hardened cotter pin. Knife must have the pin and cotter pin installed in the right direction (See Below)

FOR FORWARD ROTATION: On the right wing and rear unit, all knife pins must be installed with their heads facing away form the cuttershaft pulley. On the left wing, the heads of the knife pins must face the cuttershaft pulley.

FOR REVERSE ROTATION: On the right wing and rear unit, all knife pins must be installed with their heads facing toward the cuttershaft pulley. On the left wing, and rear unit, the heads of the knife pins must face away from the cuttershaft pulley.

NOTE: Rotation is the direction of the cuttershaft in relation to the direction of travel of the mower. The blades will not need to be reversed as they are double sided and designed to cut on either side.

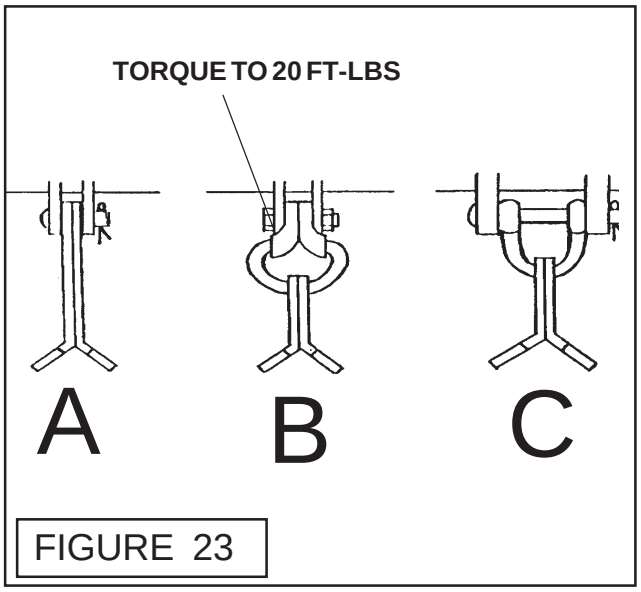


FIGURE 23

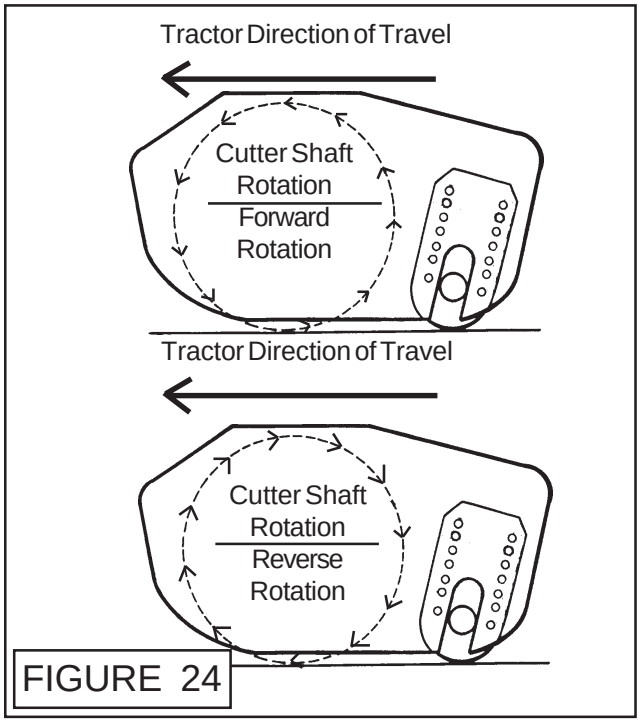


FIGURE 24

Changing Mower Cutter Shaft Rotation to Forward or Reverse:

WING MOWERS

The hydraulic wing motors are dual rotation motors which means they will rotate in either direction depending on the inlet port used. An arrow on the flat surface of the motor housing at both ports indicate the direction of rotation. To change rotation, remove the four bolts that mount the manifold block to the motor. Remove the case drain hose at the motor, but leave it attached in present location at the manifold block. Leave all other plumbing as presently installed at the manifold block. Remove the two mounting bolts at the motor mounting plate and rotate the motor 180 deg. This changes the present inlet port into the outlet port of the motor. Re-install manifold block but do not change the position. Install case drain hose.

REAR MOWER

To change direction of cutter shaft rotation for the rear mover, three left hand parts are required. A belt guard, an outboard bearing plate and a idler pulley arm. (Consult parts book for these part numbers). Remove the cutter shaft and turn 180 deg. Remove the gearbox cutter shaft drive pulley and outboard bearing plate, (using the proper bearing plate) mount the plate to opposite side of mower housing. Remove the four bolts that mounts the gearbox and rotate gearbox 180 deg. to new position. Install cutter shaft pulley, gearbox output pulley, idler arm pulley assembly and belt. REPLACE EXISTING BELT GUARD WITH PROPER GUARD.

G/B & Ext'n Shaft Asy. / Rear Mower

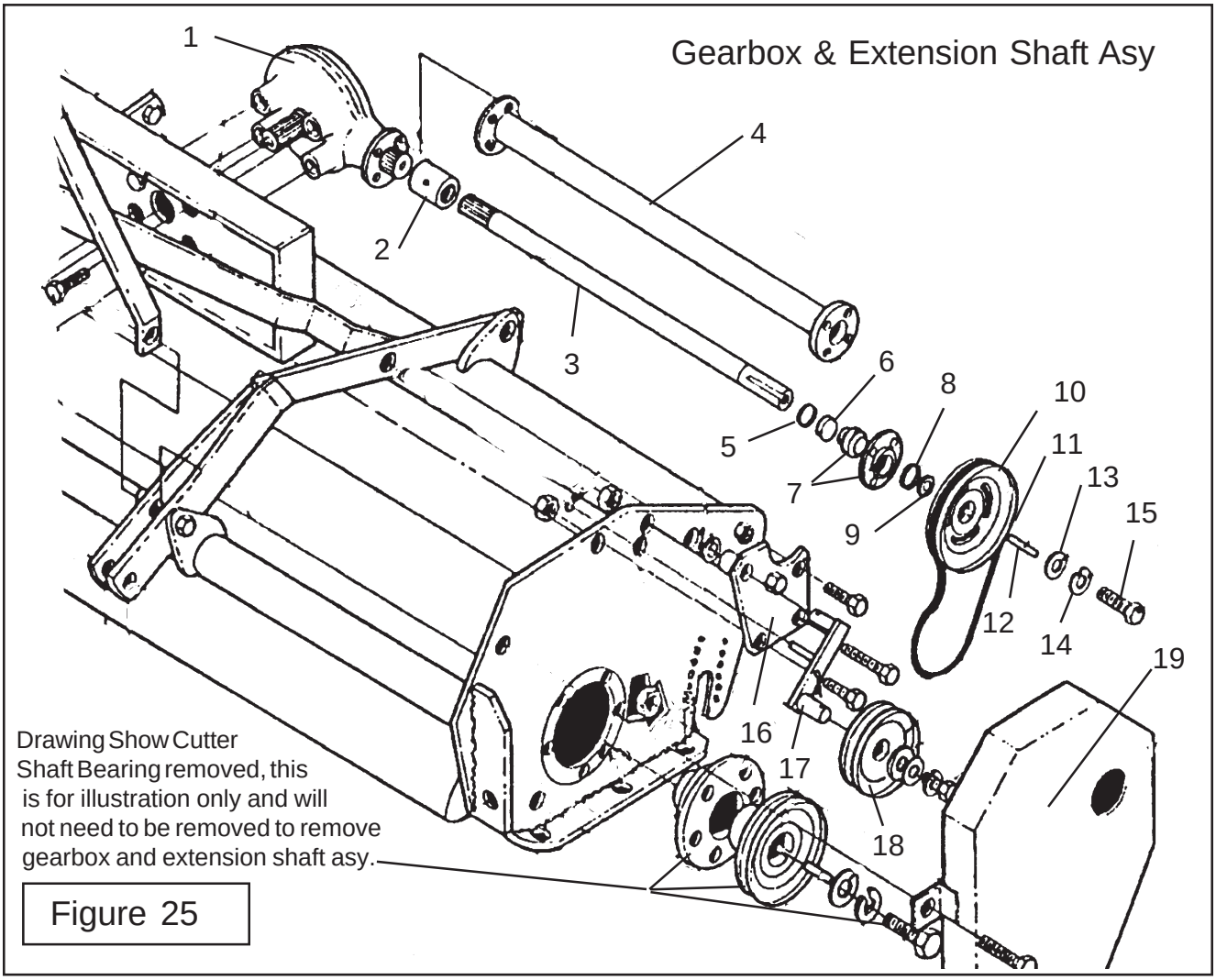


Figure 25

Item	Qty	Description
	1	Gearbox & Extension Shaft Asy.
1	1	Gearbox Asy. (08/90 & Down)
1-1	1	Gearbox Asy (09/90 & Up)
2	1	Spline Coupler Asy. w/ Grease Fitting
2-1	4	Counter Bore Screw
2-2	4	Lockwasher
3	1	Extension Shaft
4	1	Extension Shaft Hsg.
5	1	Bevel Ring
6	1	Snap Ring
7	1	Bearing & Hsg Asy. (w/ Items below)
7-1	1	Bearing Only
7-2	1	Bearing Housing Only
7-3	1	Lubricap
7-4	4	Bolt
7-5	4	Nut
8	1	Bearing Retaining Ring
9	3	Pulley Shim (Use Qty As Needed)
10	1	Pulley, Top Shaft Drive
11	1	Drive Belt
12	1	Key
13	1	Heavy Flat Washer
14	1	Lockwasher
15	1	Bolt
16	1	Idler Brg / Ext'n shaft Mount Plate
17	1	Idler Pulley Arm
18	1	Idler Pulley
19	1	Belt Guard Shield

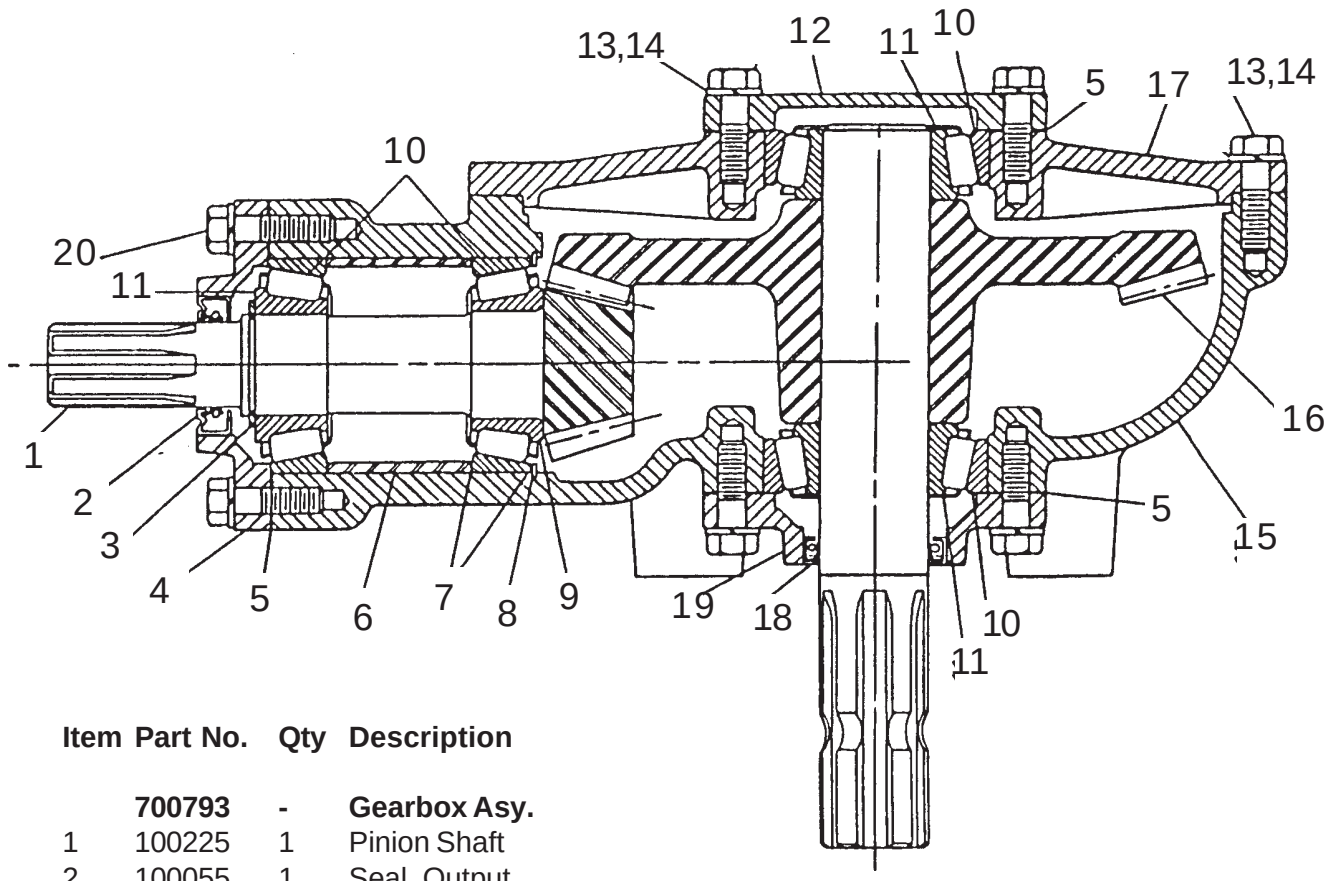
G/B & Ext'n Shaft Asy. / Rear Mower

Gearbox & Extension Shaft Assembly Remove, Repair & Replace:

(See Figure 25 for component location and identification)

1. Offset Models are Offset to Right, To ID Forward Rotation Drive Belt is to the Left Side, Reverse Rotation Drive Belt is on Right Side Standing Behind Unit looking toward Tractor. Item # 3 & 4 Lengths are from End to End, Item # 4 includes welded on round Flanges on Ends in measurement, To ID which Unit you have, measure the Extension Shafts or Housings, see interstater Archive Parts Manual for lengths of shafts & housings.
2. Gearbox Asy & Extension Shaft Asy Identification. The rear mowers are mechanical driven through a driveline and gearbox assembly. The gearbox has a extension shaft connected to it. These shafts will not all be the same, they will be different lengths depending on the size (Width) of the mower, the cutter shaft rotation (forward or reverse) and the amount and direction of the offset of the A-Frame on the mower. The mower will need to be identified before ordering shaft, tube (See Interstater Archive Parts Manual for extension shaft ID). There were two different gearbox assemblies used (See Gearbox Repair in next pages to ID gearbox).
3. Remove Drive belt Guard. Remove the drive belt guard (item 19) , it is retained by two bolts. One bolt to the front and one to the rear of the deck. Set the belt cover aside as it will not be need until repair is finished.
4. Remove Gearbox & Extension Shaft as an Assembly. It is recommended gearbox and cutter shaft be removed as an assembly, this will keep oil from being spilled on mower deck and component, drive pulleys and belts. Remove the bolts that connect the cutter shaft bearing housing (item 7-2) to the idler bearing / extension shaft mount plate (item 16), is may be easier to remove these bolts by removing the upper drive pulley (item 10) and drive belt (item 11). To remove drive pulley (item 10) remove the pulley retaining bolt (item 15), lockwasher (item 14), flatwasher (item 13). Pull the drive pulley off, note the pulley key (item 12) may come off with pulley or stay in shaft. Remove key now so as not to lose it. Note how many shims washers (item 9) are on the extension shaft behind the pulley, quantity can vary so it is best to count them and use the same amount when reassembling the shaft. With the bearing housing bolts removed go to the gearbox end and remove the 4 bolts mounting the gearbox (item 1) to the a-frame mounting plate. This will allow the gearbox / extension shaft assembly to be lifted up off the deck. Bearing housing (item 7-2) should slide off extension shaft.
5. Remove Bearing Retaining Ring. Remove bearing retaining ring (item 8) from the extension shaft. This can be done with external snap ring pliers.
6. Remove extension shaft housing. Extension shaft housing (item 4) is mounted to the gearbox with 4 mounting bolts, removing these four bolts will allow the housing to be slid away from gearbox. Note: the extension housing can be removed from gearbox with the extension shaft inside housing and bearing (item 7) left on shaft. The extension shaft (item 3) will be removed out of extension shaft housing on the gearbox end. The best way to do this is to hold the housing up and drop the shaft down on to apiece of wood lying on the work bench. This will force the shaft back up into the housing and at the same time push the bearing down the shaft. If extension shaft is removed the snap ring (item 6) and bevel ring (item 5) must be replaced in the same order as removed when re-assembled.
7. Remove Splined Coupler. The splined coupler (item 2) that connects extension shaft to gearbox, will slide off. There is a grease fitting in this coupler that allows the coupler to be greased.
8. Clean and inspect all parts. Clean all the parts removed except the bearing (item 7). Caution must be taken when cleaning bearing (item 7), be careful not to use any cleaner or cleaning method that will damaged the seals in the bearing as this is a sealed bearing. Inspect the splined coupler and grease fitting, make certain the splines in the coupler, on the shaft and on the gearbox shaft are in good conditions.
9. Rebuild Gearbox Assembly. See gearbox rebuild steps in this section for gearbox assembly instruction and gearbox identification (Next Pages)
10. Re-Assemble Gearbox / Extension Shaft Asy. To re-assemble gearbox / extension shaft assembly to deck reverse the dis-assembly steps listed above. The extension shaft housing (item 4) has a hole in the tube part of it. This hole will always be at the gearbox end and will be installed to the rear so you can use a grease gun to grease the splined coupler inside. Make certain that all snap rings (item 6 & 8) are installed on shaft and seated into snap ring grooves of shaft. Make certain that the shims (item 9) are installed, these shims are to align the drive pulley with the cutter shaft and idler pulley. Remove or add shims as needed.

Gearbox Asy P/N 700493



Item	Part No.	Qty	Description
	700793	**-**	**Gearbox Asy.**
1	100225	1	Pinion Shaft
2	100055	1	Seal, Output
3	000330	1	Retaining Ring
4	100707	1	Seal Housing
5	100232	a/r	Shim (.020")
	100233	a/r	Shim (.007")
	100234	a/r	Shim (.005")
	100235	a/r	Shim (.002")
6	100241	1	Spacer
7	100237	a/r	Shim (.002")
	100238	a/r	Shim (.004")
	100239	a/r	Shim (.006")
	100240	a/r	Shim (.020")
8	000331	1	Retainer Ring
9	000329	1	Bearing, Cone
10	000327	4	Bearing, Cup

Item	Part No.	Qty	Description
11	000328	3	Bearing, Cone
12	100231	1	Bearing Cap
13	000354	16	Bolt
14	000019	20	Lockwasher
15	100228	1	Gear Housing
16	700495	1	Shaft & Gear Asy
17	100229	1	Housing Cover
18	100054	1	Seal, Input
19	100230	1	Seal Housing
20	000601	4	Bolt
21	000054	1	Pipe Plug, Level (1/2")
22	000055	1	Pipe Plug, Fill (1/4")

NOTE: This G/B Asy (P/N 700493) is replaced by later style (P/N 702673) as an Asy. Parts WILL NOT interchange between them. The easiest way to tell which G/B you have is by looking were the Shaft goes through the G/B Housing, The Old Style had Bolt on Caps Here and the new style will not.

Gearbox Asy P/N 700493 Asy Instructions

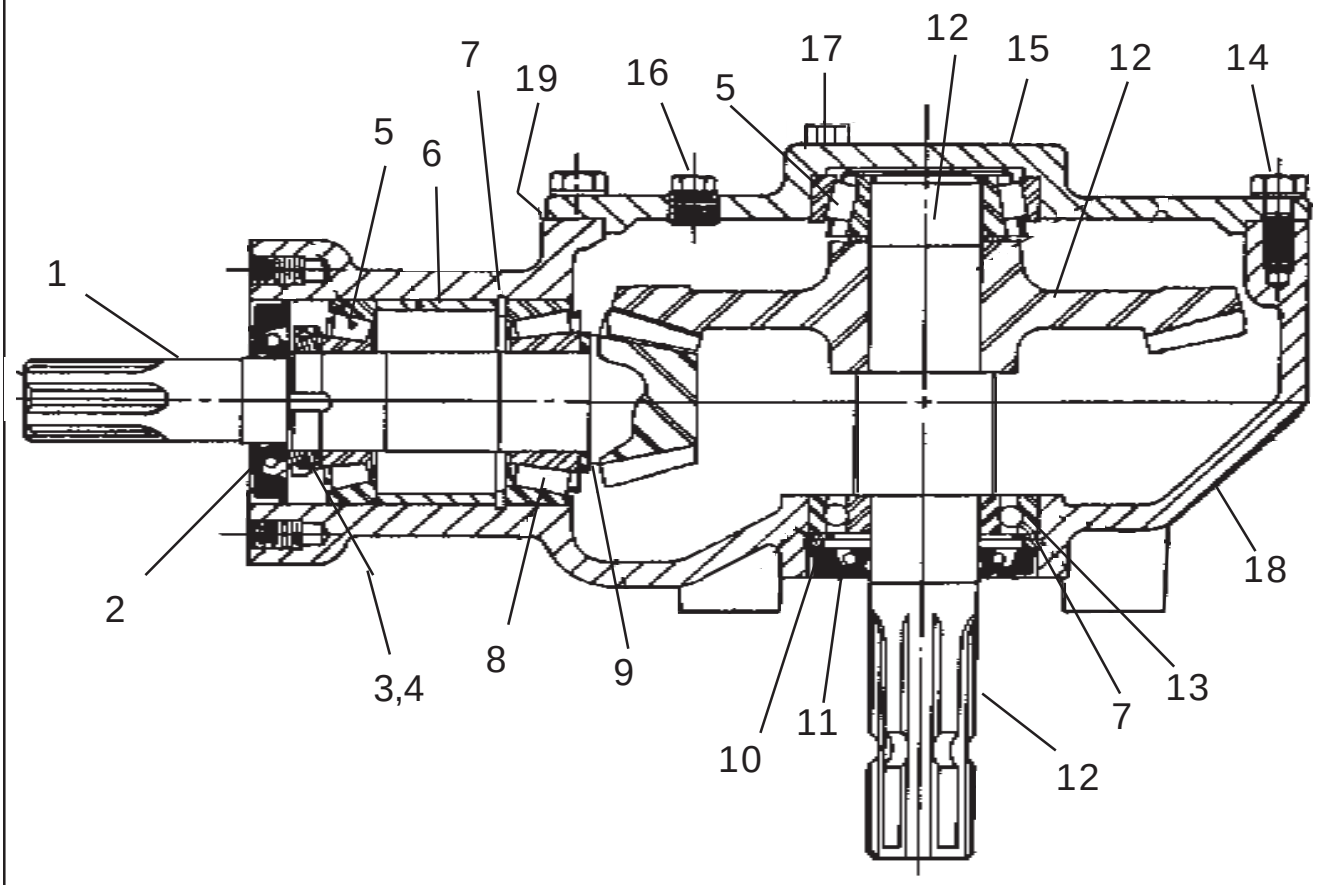
Asy instructions Gearbox # 700493
(540 RPM Used Jan. 1991 & Down)

1. **Install Output Shaft & Pinion Gear** into Main Housing (# 100228)
2. Install Snap Ring (# 000331) into Main Housing (#100228). Install Inner Output Bearing Cone (#000329) on Output Shaft (#100225). Install Inner Bearing Cup (#000327) down over Bearing Cone, Make Note of Shims (#100236 = .002", #100237 = .004", #100238 = .006", #100239 = .012" & #100240 = .020") quantity will be as required, try to put in the same amount as taken out. These shims will be on either side of Inner Output Shaft Bearing Cup. Slide out put shaft into housing with Inner Bearing Cup with Shims. Slide Bearing Spacer (#100241) in till it bottoms out against inner Bearing Cup, Insert Outer Bearing Cup (#000327) into Main Housing, Slide Outer Bearing Cone (#000328) over Shaft till it seats against Outer Cup (#000327). Install Snap Ring (#000330) onto output shaft next to outer Bearing Cup.
3. Install Output Seal (#100055) into Seal Housing (#100707), Install Seal Housing using Shims (#100232 = .020"), (#10233 = .007"), (#100234 = .005"), (#100235 = .002") quantity as required onto Main Housing over Output Shaft. Tighten Bolts (#000601) and check Bearing Pre-Load, Should be from 14" to 16" pounds of rolling torque. Shaft should NOT have end play, If you have end play it will be required to rearrange shims at Inner Bearing Cup or at Bearing cover till settings are right.
4. **Install Input Shaft & Gear** into Main Housing:
5. Install front Bearing Cone (#000328) and rear Bearing Cone (#000328) onto Input Shaft and Gear Asy. (#700492) Gear & Shaft can only be replaced as an Assembly, Gear cannot be pressed off of Shaft. Install Input Seal (#100054) into Input Bearing Cover (#100230), Install outer Bearing Cup (#000327) into Main Housing. Using Shims (#100232 = .020"), (#100233 = .007"), (#100234 = .005"), (#100235 = .002") quantity as required (try same quantity as taken off) install Input Bearing Cover on front of Main Housing tightening 4 retaining bolts.
6. Install Rear Housing Cover (#100229) on rear of Main Housing, Use Gasket Sealer on this cover it will not use a Gasket, If a Gasket is wanted Gasket # 00769800 can be used. Install Rear Bearing Cup (#000327) into rear Housing Cover. Using Shims (#100232 = .020", #100233 = .007", #100234 = .005" & #100235 = .002") quantity as required (try same quantity as taken off) install Rear Bearing Cap (#100231) on Rear Housing Cover, tightening 4 retaining bolts. This will set Bearing Pre-Load, It should be at 14" to 16" pounds of rolling torque. It may be required to remove shims from Bearing Caps or add Shims.
7. Set Gear Back Lash with Bearing Cap Shims, Gear Back Lash should be from .014" to .017", This is very critical. By moving shims from front cover to back cover or vice versa gear is moved inward or outward, DO NOT add or delete shims as this will change your Bearing Pre-Load.
8. Fill Gearbox with Oil till Oil flows out of Oil Level hole. Install Oil Level Plug (#000054) and Oil Fill Plug (#000055). Check all Seals and Gasket areas for leaks. After Running Mower 1/2 to 1 hour recheck Oil Level and check for any leaks.

HELP !

There were TWO GEARBOXES used that looked very much the same but they are not, The earlier model (# 700493) till approx Jan. 1991 , this gearbox can be identified by the round 4 bolt cover at the input shaft and small 4 bolt round cover in the middle of the larger 8 bolt cover in the rear, There is a 4 bolt cover at the Output Shaft also. These covers are to adjust the Bearing pre-load and Gear backlash. This gearbox will also have Roller Bearings on Input Shaft and Output Shaft. The Later Type (# 702673) Feb 1991 & up has Ball Bearings on Input shaft and will replace the # 700493 G/B as an assembly, Parts WILL NOT interchange between these two gearboxes.

Gearbox Asy P/N 702673



Item	Part No.	Qty	Description
	702673	**-**	**Gearbox Asy.**
1	001718	1	Pinion
2	001719	1	Seal
3	001717	1	Nut
4	001720	1	Spring Washer
5	00754757	2	Bearing, Roller
6	001716	1	Spacer
7	00754752	2	Circlip, Internal
8	001722	1	Bearing, Roller
9	00753222	2	Shim
10	00754761	1	Shim

Item	Part No.	Qty	Description
11	001724	1	Seal
12	001725	1	Shaft & Gear
13	00754459	1	Bearing, Ball
14	001708	8	Bolt
15	001710	1	Cover
16	00755633	2	Plug
17	000055	2	Plug, Drain
18	002516	1	Housing
19*	00769800	1	Gasket (See * NOTE:)

* NOTE: Some Models Used Gaskets. Currently All Models Use Sealant, or Form - A - Gasket.

NOTE: This G/B Asy (P/N 702673) Can replace earlier style (P/N 700493) as an Asy but parts WILL NOT interchange between them. The easiest way to tell which G/B you have is by looking were the Shaft goes through the G/B Housing, The Old Style had Bolt on Caps Here and the new style will not.

Gearbox Asy P/N 702673 Asy Instructions

Assembly Instructions Gearbox # 702673 (Used Feb. 1991 & Up)

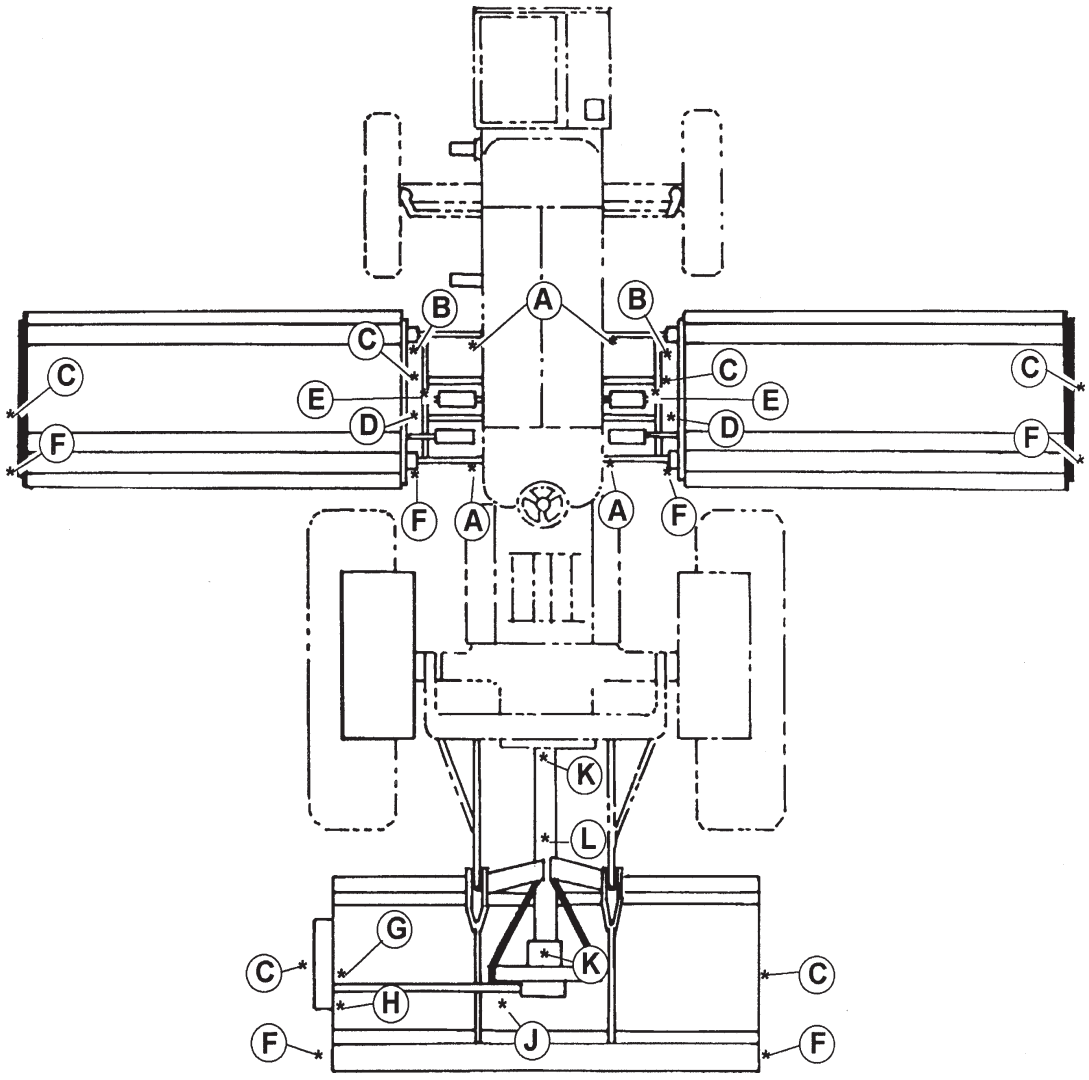
1. **Install Output Shaft & Pinion Gear** into Main Housing (# 002516).
2. Install Snap Ring (# 00754752) into Main Housing (#002516). Install Shims (#00753222) on Output Shaft next to Gear. Install Inner Output Bearing Cone (#001722 Cup & Cone) on Output Shaft (#001718). Install Inner Bearing Cup (#001722 Cup & Cone) down over Bearing Cone, Slide out put shaft into housing. Insert Snap Ring (#00754752) into Main Housing. Slide Bearing Spacer (#001716) in till it bottoms out against Snap Ring.
3. Insert Outer Bearing Cup (#00754757 Cup & Cone)) into Main Housing till it is against Bearing Spacer, Slide Outer Bearing Cone (#00754757 Cup & Cone) over Shaft till it seats against Outer Cup. Install Tabbed Lock Washer (#001720) onto output shaft next to outer Bearing Cone, Make sure Inner Tab of locking washer is in keyway of Shaft. Install Notched Locking Nut (#001717) by screwing it onto Output Shaft, Tighten Nut till Bearing Pre-Load is set at 14' to 16" lbs. of rolling Torque. When Bearing Pre-Load is correct, DON'T BEND Locking Washer Tabs into Notches on Locking Nut and DON'T INSTALL OUTPUT SEAL AT THIS TIME, this is important.
4. Install Input Shaft & Gear into Main Housing (# 002516)
5. Install front Bearing (#00754459) into Main Housing (#002516). Using Shims (#00754761), quantity as required (try same quantity as taken out) install Snap ring (#00754752) into Main Housing. DO NOT INSTALL INPUT SEAL AT THIS TIME, this is important.
6. **Install Input Shaft and Gear** Assembly (#001725) into rear of Main Housing and through front input Bearing. Install Rear Bearing Cone (#00754757 Cup & Cone) onto back of input Shaft. Install Rear Bearing Cup (#00754757 Cup & Cone) into Rear Housing Cover (#001710), make sure cup is bottomed out in Cover. Install Rear Cover using Gasket Sealer onto Main Housing and Tighten Bolts, Some rear covers may use a Gasket some sealed with Sealer, If Gasket wanted Gasket # 00769800 will fit and can be used for rear cover.
7. Set Bearing Pre-load on Input Shaft to remove end Play Only, this is because outer Bearing is a Ball Bearing. Do this by adding or removing Shims between Front input Bearing and Snap Ring.
8. Set Gear Back Lash with Shims on output shaft next to output Pinion Gear, Add or remove shims, Gear Back Lash should be from .016" to .019", This is very critical. After Gear Back Lash is correct reset Bearing Pre-Load on Output shaft.
9. Install Input Seal (#0017240 and Output Seal (#001719), Inspect all opening for seals to make sure there are no Burrs or Scratches to damage seals when installed, Always coat ID of Seals with light coat of grease this helps to prevent damage to ID of seals when being installed.
10. Fill Gearbox with Oil till Oil flows out of Oil Level hole. Install Oil Level plug and Oil Fill Plug. Check all Seals and Gasket areas for leaks. After Running Mower for 1/2 to 1 hour recheck Oil Level Looking for any leaks.

HELP !

This Later Gearbox # 702673 will only have a large 8 bolt cover on rear of gearbox without the small cover in center of it. There is a Ball bearing on front of input shaft the old style had all Roller Bearings, Input Seals are different, Older Gearbox seal is a bit larger than the later, The later type used a snap ring behind seal to hold bearings in where the earlier type had bolt on covers. If you have these bolt on covers see G/B # 700493

These gearboxes DID NOT use vent plugs at all.

Lubrication Points



LUBRICATE ALL POINTS BEFORE OPERATING MOWER FIRST TIME

A	Lift Frame Pivot Pin	G	Rear Mower Idler Arm
B	Wing Mower Belt Idler Arm	H	Banjo Bearings
C	Cuttershaft Bearings	J	Banjo Coupling
D	TIlt Cylinder Rod Ends	K	Driveline Yoke
E	Lift Cylinder Rod Ends	L	Driveline slip
F	Roller Bearings		

Figure 26

Initial Start-Up Procedure

INITIAL START-UP PROCEDURE:

1. Check all nuts and hex head bolts to ensure all are tight and all lock washers are fully compressed (flattened).
2. Check all hoses and hydraulic connections. Make certain they are secure.
3. Inspect all moving parts and make certain that no wires or hoses will be caught or pinched when the tractor or the INTERSTATER is in operation. Tie down loose wires and hoses.
4. Thoroughly grease the INTERSTATER and install a lubricap on each grease fitting. Refer to the Operation and Maintenance Section.
5. Jack front of tractor up enough to allow axle to pivot through its full range. While turning wheels through their limits, right and left, swing them up and down. Look for interference between tires and any part of the INTERSTATER. If interference occurs, shims (not furnished) must be welded to axle pivot stop or steering arm to limit the movement enough to avoid interference. Tractors with an adjustable front axle may require an outward adjustment of the wheels.
6. To fill the INTERSTATER reservoir with new, clean hydraulic oil, follow the steps below. Refer to the Operation and Maintenance Section for specifications. (See Figure 16)
   - A. With a hydraulic jack raise the right side of the tractor. This will tilt the tank and allow only a minimum amount of air when filling.
   - B. Avoid hydraulic contamination by filtering the hydraulic oil while filling the hydraulic tank.
   - C. Filter buggies or carts are commercially available for hydraulic system cleanup. These consist of a high-efficiency, high-capacity filter, a circulating pump, a drive motor, and hoses for connecting the overhauled machine's hydraulic system.
   - D. After the first 10 hours of operation, replace the hydraulic filter with a new one. An extra Filter Element is provided for you. Refer to the Operation and Maintenance Section for instruction.

7. After the Interstater mower is completely assembled to the tractor and with the wings on the ground, fill the mower hydraulic tank above the oil level sight gauge approximately 5" or 1" below the top of the tank.

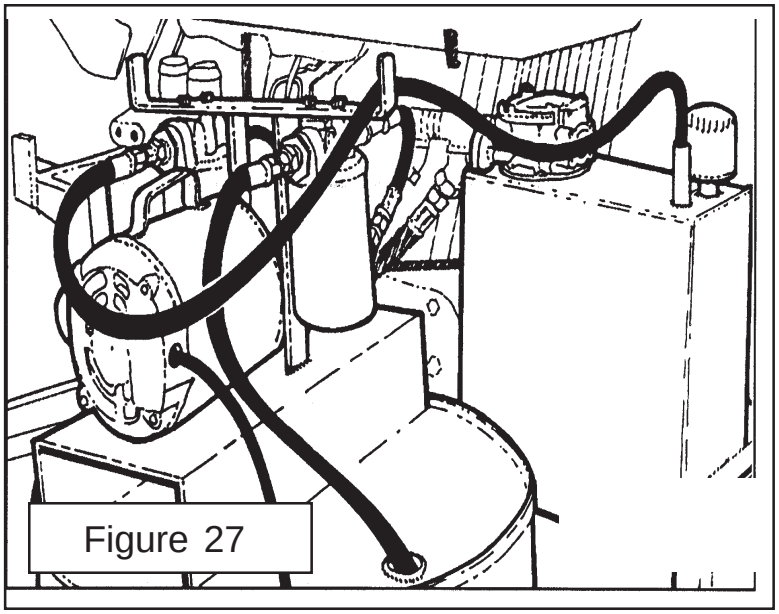


Figure 27

8. With mower ON/OFF switches in "ON" position and tractor fuel cut off, crank engine for about 30 to 45 seconds to allow oil to fill pumps and motors. Check the oil level in the sight gauge. If no oil is seen add oil to bring the level up to the sight gauge. NOTE: Do not fill the tank with oil above the level of the sight gauge. Over filling the tank with oil after the initial filling may result in oil being discharged through the air filter on top of the hydraulic tank. Start the tractor and run it for 2 minutes and then turn it off. Again check the oil level in the sight gauge. If the oil level is in the sight gauge, the unit is ready to run. If no oil is seen, add oil to bring the level up to the sight gauge.

Initial Start-Up Procedure

CAUTION ROTATING KNIVES! Remove all foreign objects and stand clear of cutter units. DO NOT GET NEAR!

NOTE: On tractor hydraulic powered circuit only, make certain that there is full flow from tractor hydraulic system to control valve. Refer to tractor manual.

9. After hydraulic system is fully charged and functioning properly, switch cutter units on, then speed engine up to 540 RPM PTO speed. Maintain this speed for about 5 minutes. Check complete INTERSTATER, look for any leaks, loose connections, or anything that could cause premature wear or failure.

FINAL CHECK

Run INTERSTATER for about 1/2 hour at full speed. Check for leaks and vibrations. Frequently check oil temperature. Make certain it does not exceed 180 deg.

NOTE: When raising wings, make certain there is no interference with mower, frame, cylinders or tractor. Lift wings slowly.

CAUTION: DO NOT leave unit unattended, and COMPLY WITH ALL WARNING DECALS.

If unit starts to make unusual noise, stop unit and check oil level. Also check for frothy oil which would indicate a leak on suction side of system.

Section 12

INTERSTATER

DELIVERY
INSPECTION CHECKLIST

It is recommended a complete inspection of mower, tractor and all components be done before mower is returned to customer after repairs. This section contains suggestions of some things that should be inspected on the mower components and operation. Make certain all safety instruction material (decals, manuals and etc.) are present and in good condition. The tractor should be checked using the tractor manufacturers guidelines and/or recommendations.

INTERSTATER DELIVERY INSPECTION CHECKLIST

Pre-Operation Inspection: Check the following items before operating the unit to assure that they are properly assembled. (See following page 1-4 for component location)

Safety Equipment:

___ Operators Manual is with Unit.
___ The Safety Decals are installed as listed in the Assembly Manual.
___ Valve operation plate is installed.
___ Operators cage or Tractor Cab is in place
___ Deflectors are installed on the Mower Head
___ Tractor Rops or Cab with seat belts installed properly.
___ All Foot Guards and safety switch are installed and functional.

Frame:

___ Axle Plate Bolts are torqued.
___ Head Mounting Bolts tightened.
___ Frame attaching Bolts tightened.
___ Front Support Bolts are torqued.
___ Hydraulic Tank mounting Pins / Bolts in place correctly.
___ All Welds inspected to insure proper welds and locations.

Hydraulic System:

___ Oil Level in Hydraulic Tank is within the sight gauge. (Item 5 page 1-4)
___ Hose connections are tight.
___ Hoses do not have any kinks or twist in them.
___ Front Pump Shaft adapter bolts are tight.
___ Front Pump Shaft Coupler / Drive Shaft is lubricated and has an anti-seize compound on the Splines of Pump and Shafts.
___ The Pump Drive Shaft has correct alignment.
___ Suction Hose has no leaks or kinks.

Flail Mower Head:

___ Skid Shoe Bolts are torqued to 120 ft-lbs
___ Motor Bolts are torqued to 120 ft-lbs
___ Belt Alignment& tension adjustment is correct.
___ Cutter shaft bearings are properly lubricated
___ Roller bearings are properly lubricated
___ Blades swing freely.
___ All Pins and Clips for Rear Mower are installed
___ Clutch on Rear Mower has been checked for proper adjustment and conditions per parts book requirements.
___ All Belt guards are installed correctly.

INTERSTATER DELIVERY INSPECTION CHECKLIST

Pre-Operation Inspection: Check the following items before operating the unit to assure that they are properly assembled. (See following page 1-4 for component location)

Tractor Mower Operation Inspection:

Using all Safety precautions, operate the Tractor and Mower unit for 30 minutes and while the unit is running check the following items: **Note!** Only make adjustments after the mower has been turned off and all motion has stopped and all hydraulic pressure has been relieved.

___ Check for Hydraulic oil leaks at the hose connections
___ Operate the boom and mower head throughout its full range of motion and check for hose's rubbing, pinching, or kinking.
___ Make sure the Return Filter Gauge is reading in the Green after Oil is warm.
___ Check the function of the Mower Head On-Off Valve and switch for proper function
___ Make sure that the tractor will not start with the mower on-off switch in the on position.
___ Check the Blade Rotation for the Rotary Mower Head to make sure it is turning Clockwise looking from the top of the mower deck.
___ Make sure the control valve boom movements agree with the valve operation decal.
___ Make Sure Boom Movement operates as expected and is smooth and under control (no air in the control system)
___ Look for any unusual or excessive noise or vibrations.
___ Make sure the left rear wheel of the tractor stays on the ground when the boom is fully extended horizontally with 200 lbs. placed on the outside of the mower head.

Post-Operation Inspection:

___ Check that the oil in the hydraulic tank has not turned milky in color or has foam on top.
___ Check that there are no loose fasteners or hardware.

Operator/Customer Orientation:

___ Details discussed with operator/customer, any variance pointed out and discussed.
___ Operator/customer aware of all aspects of repairs.
___ Notes:

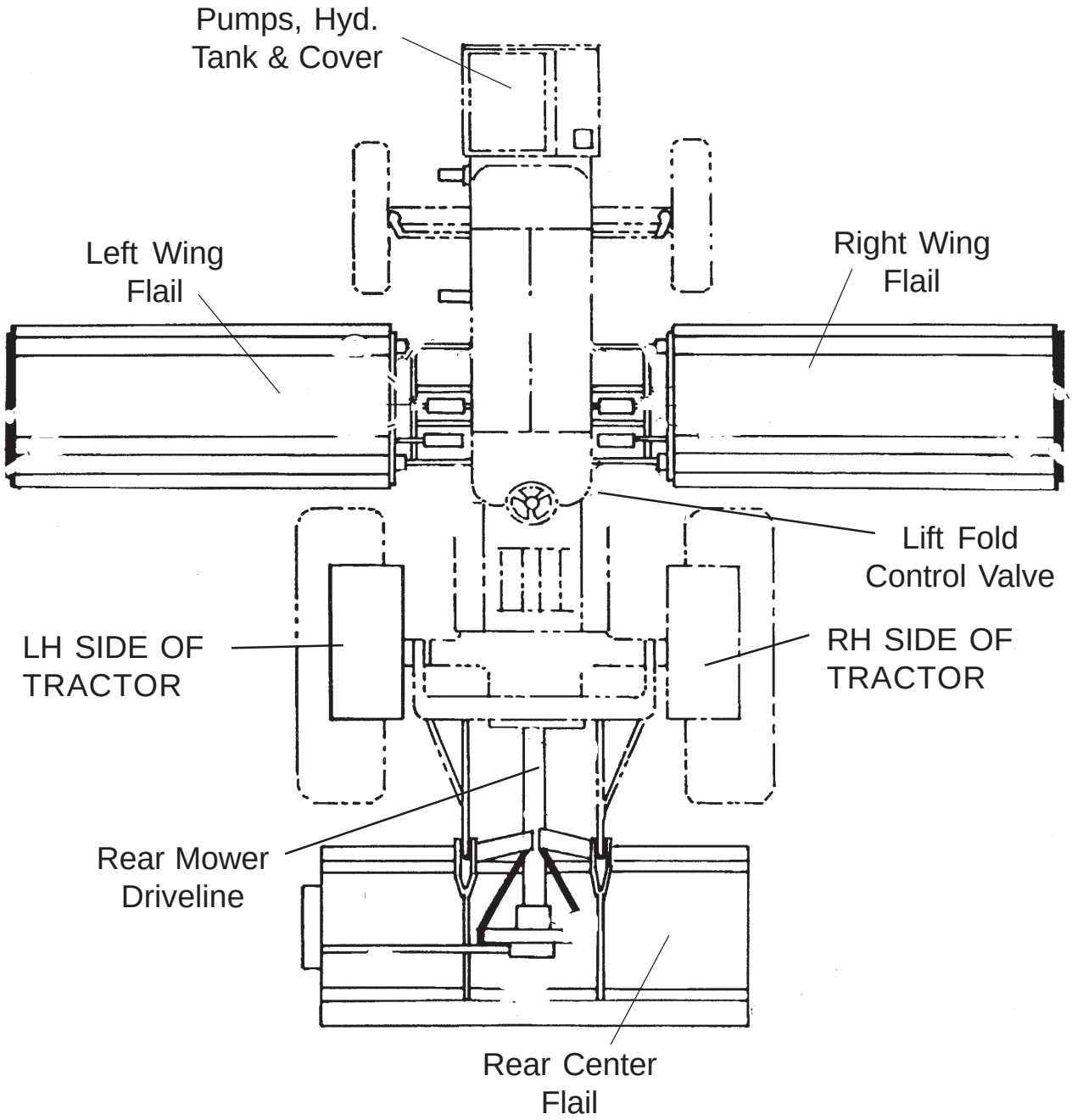
_____

_____

_____

_____

Tractor - Mower Component Location For Check List



ALAMO INDUSTRIAL™

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