

Pub 08-11

Part No. 3XXXXXXX

## Terrain Master™ - Flail King™ Service Manual



**¡ATENCIÓN!**  
LEA EL INSTRUCTIVO



Si No Lee Ingles, Pida  
Ayuda a Alguien  
Que Se Lo Lea Para Que le  
Traduzca Las  
Medidas de Seguridad



An Operator's Manual was shipped with the equipment in the Manual Canister. This Operator's Manual is an integral part of the safe operation of this machine and must be maintained with the unit at all times. **READ, UNDERSTAND, and FOLLOW** the **SAFETY** and Operation Instructions contained in this manual before operating the equipment. If the Operator's Manual is not with the equipment, contact your dealer or Terrain King 800-882-5756 to obtain a Free copy before operating the equipment.

# 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!



# DANGER

FAILING TO FOLLOW SAFETY MESSAGES AND OPERATING INSTRUCTIONS CAN CAUSE SERIOUS BODILY INJURY OR EVEN DEATH TO OPERATOR AND OTHERS IN THE AREA.



1. Study and understand Operator's Manuals, Safety Signs, and Instructional Decals for tractor & flail mower to prevent misuse, abuse, & accidents. Practice before operating mower in a confined area or near passersby.

*✍* Learn how to stop engine suddenly in an emergency. Be alert for passersby and especially children.

2. Allow no children on or near implement or tractor. Allow no riders on tractor or implement. Falling off can cause serious injury or death from being runover by tractor or mower or contact with Flail Mower Blades.

3. Operate only with tractor having Roll-Over Protective Structure (ROPS) and with seatbelt fastened securely and snugly to prevent injury and possible death from falling off or tractor overturn. Personal Protective Equipment such as Hard Hat, Safety Glasses, Safety Shoes, and Ear Plugs are recommended.

4. Block up or support raised machine and all lifted components securely before putting hands or feet under or working underneath any lifted component to prevent crushing injury or death from sudden dropping or inadvertent operation of controls. Make certain that area is clear before lowering or folding.

5. Before transporting, put Lift Lever in detent or full-lift position. Install Transport Safety Devices securely on folding implements. Slow down when turning and on hillsides.

*✍* Install \*\*Restrictor in folding circuit to slow down lowering and unfolding if action is faster than is desirable.

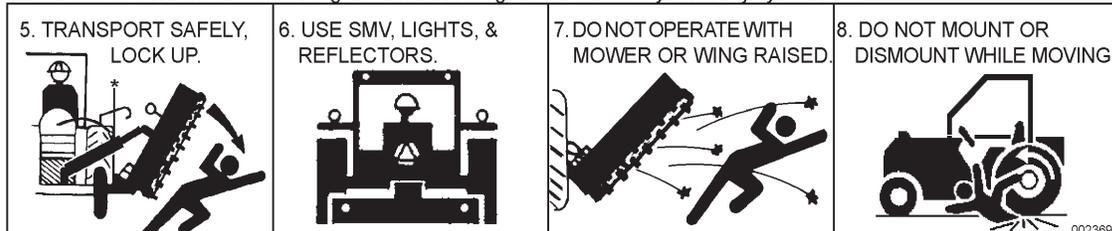
6. Make certain that SMV sign, Warning Lights, and Reflectors are clearly visible. Follow local traffic codes.

7. Never operate with Flail Mower or Folding Section raised if passersby, bystanders or traffic are in the area to reduce possibility of injury or death from objects thrown by Blades under Shields or implement structure.

8. Before dismounting, secure flail mower in transport position or lower to ground.

*✍* Put tractor in park or set brake, disengage PTO, stop engine, remove key, and wait until noise of rotation has ceased to prevent entanglement in rotating parts which may cause injury or death.

*✍* Never mount or dismount a moving vehicle. Crushing from runover may cause injury or death.



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## 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.



Dear Valued Customer,

Everyone at Alamo Group (TX) Inc. would like to thank you for your recent equipment purchase. We strive to offer you industry leading performance and technology with safety and cost in mind. You can be confident in your purchase knowing that your product is designed, built, and serviced by people who care greatly about the product they produce and how it performs for you.

We have been producing roadside mowing equipment for more than 30 years and we maintain the highest level of experience, knowledge, and expertise in our industry to provide the service and support necessary to make your time of ownership a pleasant one. Your product is covered with a full manufacturer supported warranty. We design our equipment with the expectation that it will provide you increased productivity, less downtime and lower maintenance costs. Our Sales, Customer Service and Warranty teams are readily available to offer information or advice on any questions that you may have regarding the safety, operation or maintenance of your mowing equipment. We are here to help you at 800-356-6286.

Again, we thank you, and we greatly appreciate your decision to invest your resources in a world class organization that has your expectations in mind. It is our goal to achieve 100% customer satisfaction and that your new piece of equipment exceeds your expectations.

Be Safe!

Sincerely,

Ian Burden  
President, Alamo Group (TX)

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# Safety

**SAFETY**

## **GENERAL SAFETY INSTRUCTIONS AND PRACTICES**

A careful operator is the best operator. Safety is of primary importance to the manufacturer and should be to the owner/operator. Most accidents can be avoided by being aware of your equipment, your surroundings, and observing certain precautions. The first section of this manual includes a list of Safety Messages that, if followed, will help protect the operator and bystanders from injury or death. Read and understand these Safety Messages before assembling, operating or servicing this Implement. This equipment should only be operated by those persons who have read the manual, who are responsible and trained, and who know how to do so responsibly.



The Safety Alert Symbol combined with a Signal Word, as seen below, is used throughout this manual and on decals which are attached to the equipment. The Safety Alert Symbol means: "ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!" The Symbol and Signal Word are intended to warn the owner/operator of impending hazards and the degree of possible injury faced when operating this equipment.

**Practice all usual and customary safe working precautions and above all--- remember safety is up to YOU. Only YOU can prevent serious injury or death from unsafe practices.**



Indicates an imminently hazardous situation that, if not avoided, WILL result in DEATH OR VERY SERIOUS INJURY.



Indicates an imminently hazardous situation that, if not avoided, COULD result in DEATH OR SERIOUS INJURY.



Indicates an imminently hazardous situation that, if not avoided, MAY result in MINOR INJURY.



Identifies special instructions or procedures that, if not strictly observed, could result in damage to, or destruction of the machine, attachments or the environment.

**NOTE:** *Identifies points of particular interest for more efficient and convenient operation or repair.*

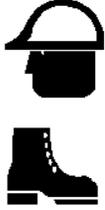
READ, UNDERSTAND, and FOLLOW the following Safety Messages. Serious injury or death may occur unless care is taken to follow the warnings and instructions stated in this Manual and in the Safety Messages on the implement. Always follow the instruction in this manual and use good common sense to avoid hazards.



**NOTE:** *If you want a translation of this safety section in one of the following Languages, please contact: Translations at 1502 E. Walnut Street Seguin, TX 78155; Fax: (830) 372-9529; Safety Section Translations are available in Spanish, Portuguese, French, German, Russian. PN 6S01*

# Safety

## OPERATOR SAFETY

				
Read and understand Operator's Manual	Always wear Safety Glasses	Wear Hard Hat Safety Shoes	Never use Drugs or Alcohol when operating equipment	Wear Safety Vest when operating on or near roads



**TO AVOID SERIOUS INJURY OR DEATH DO THE FOLLOWING:**

- **READ, UNDERSTAND** and **FOLLOW** Operator's Manual instructions, Warnings and Safety Messages.
- **WEAR SAFETY GLASSES**, safety shoes, hard hat, hearing protection and gloves when operating or repairing equipment
- **WEAR** appropriate breathing respirator when operating in dusty conditions to avoid respiratory diseases.
- **DO NOT WEAR** loose clothing or jewelry to avoid rotating parts entanglement injury.
- **DO NOT USE DRUGS** or **ALCOHOL** before or while operating equipment.
- **DO NOT ALLOW** anyone to operate equipment under the influence of drug or alcohol.
- **CONSULT** medical professional for medication impairment side effects.
- **STAY ALERT**, prolonged operation can cause fatigue, **STOP** and **REST**.

## GENERAL OPERATING SAFETY

### **VISIBILITY CONDITIONS WHEN MOWING:**

- **OPERATE IN DAYLIGHT** or with lights that gives at least 100 yards clear visibility.
- **BE ABLE TO SEE** and identify passersby, steep slopes, ditches, drop-offs, overhead obstructions, power lines, debris and foreign objects.

### **GROUND SPEED WHEN MOWING:**

- **NORMAL SPEED** range is between 2 to 5mph.
- **ADJUST MOWING SPEED** for terrain conditions and grass type, density and cut height.
- **REDUCE MOWING SPEED** when near steep slopes, ditches, drop-offs, overhead obstructions, power lines and to avoid debris and foreign objects.

### **INSECT INFESTATION**

- Do Not operate in areas where bees or insects may attack unless you **WEAR PROTECTIVE CLOTHING** or use enclosed tractor cab.

### **PTO SPEED:**

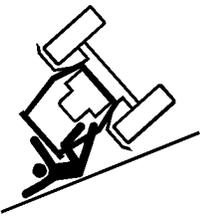
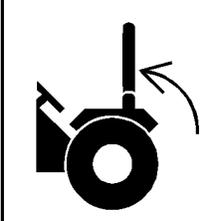
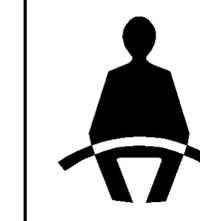
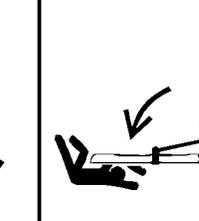
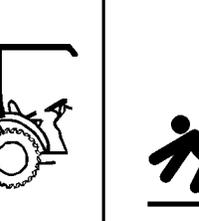
- **DO NOT EXCEED IMPLEMENT RATED PTO SPEED**
- **AVOID** exceeding rated PTO speeds that may result in broken drivelines or blade failures.

### **SAFETY SIGNS:**

- **REPLACE** missing, damaged or unreadable safety signs immediately. *PN OS01*

# Safety

## CRUSHING HAZARDS

				
Crushing injury from roll over	Lock ROPS in up position	Always wear seatbelt	Crushing injury implement falling	Crushing injury wing falling

### **⚠ DANGER**

**TO AVOID SERIOUS INJURY OR DEATH FROM FALLING OFF TRACTOR, EQUIPMENT RUN OVER, ROLLOVER AND CRUSHING BY FALLING WING OR IMPLEMENT:**

- **USE ROPS** and **SEAT BELT** equipped tractors for mowing operations.
- **KEEP ROPS** lock in up position.
- **ALWAYS BUCKLE UP** seat belt when operating tractor and equipment.
- **ONLY OPERATE** tractor and equipment while seated in tractor seat.

#### **WHEN RAISING OR LOWERING WINGS:**

- Raise or lower **ONLY WHILE SEATED** in tractor seat with seat belt buckled.
- **KEEP BYSTANDERS CLEAR** of area **TO AVOID** crushing.
- **KEEP** sufficient clearance around implement and wings **TO AVOID** contacting buildings or overhead power lines.

**LIFTED Equipment can fall from mechanical or hydraulic failure or inadvertent Control Lever movement.**

### **⚠ WARNING**

**TO AVOID EQUIPMENT FALLING while working near or under lifted wings, components and implements raised by 3-Pointed tractor hitch:**

- **SECURELY SUPPORT** or **block up** raised equipment, wings and components.
- **BLOCK UP** and **securely support** equipment before putting hands, feet or body under raised equipment or lifted components.
- **KEEP BYSTANDERS CLEAR** of folded wings until wings are blocked or locked up.

#### **WHEN PARKING** Implement and Tractor:

- **LOWER** implement, **LOCK** or **BLOCK** lifted parts before leaving equipment.
- **NEVER** leave implement unattended in a raised position.

### **⚠ WARNING**

**TO AVOID CHILDREN FALLING OFF OR BEING CRUSHED BY EQUIPMENT:**

- **NEVER ALLOW** children to play on or around Tractor or Implement.

#### **WHEN UNHITCHING IMPLEMENT:**

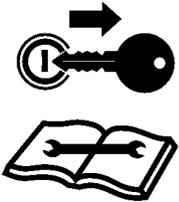
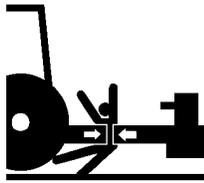
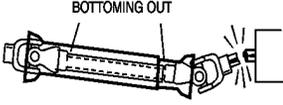
- **LOWER** implement, **LOCK** or **BLOCK** lifted parts before leaving equipment.

#### **BEFORE REMOVING Wing Retaining Lock:**

- **ATTACH** hoses to tractor.
- **FILL** Wing Cylinders with oil. (*Refer to Instructions in Operation Section*)
- **KEEP** bystanders away before operating wings.
- **LOWER WINGS** slowly and carefully. *PN CHFM-03*

# Safety

## CONNECTING OR DISCONNECTING IMPLEMENT SAFETY

			 <p>PTO (Barra Gitoria)</p>	 <p>BOTTOMING OUT</p>
<p>Stop Tractor Remove Key Read Manual</p>	<p>Crushing injury between tractor and implement</p>	<p>Crushing injury wing falling</p>	<p>Make sure PTO shaft is securely attached to tractor</p>	<p>Make sure PTO shaft are proper length</p>

**⚠ DANGER** TO AVOID SERIOUS INJURY OR DEATH FROM BEING CRUSHED BY TRACTOR OR IMPLEMENT:

**WHEN BACKING** tractor to implement hitch:

- **DO NOT ALLOW BYSTANDERS** between tractor and implement.

**BEFORE** connecting and disconnecting implement hitch:

- **STOP TRACTOR ENGINE**, place transmission into park, engage parking brake and remove key.

**WHEN** connecting and disconnecting implement hitch:

- **DO NOT** crawl or walk under raised mower or wing.

**WHEN CONNECTING IMPLEMENT DRIVELINE:**

**TO AVOID** implement driveline coming loose during operation:

- **LUBRICATE** yoke spring locking collar to ensure it freely slides on PTO shaft.
- **SECURELY** seat yoke locking balls in PTO shaft groove.
- **PUSH** and **PULL DRIVELINE** on both the tractor and implement **PTO SHAFTS** to ensure it is **SECURELY ATTACHED**.

**TO AVOID** broken driveline during operations:

- **CHECK** driveline for proper length between PTO shaft and implement gearbox shaft. *(Refer to Instructions in Operation Section)*
- Drivelines too short can pull apart or disengage.
- Drivelines too long can bottom out.
- Bottoming driveline telescoping assembly will stop sliding and become solid.
- Driveline bottoming can push through support bearings and break off PTO shaft.

**CONTACT DEALER** if implement driveline does not match Tractor PTO shaft:

- **DO NOT USE PTO ADAPTER.**  
Using a PTO adapter can cause:
  - Excessive vibration, thrown objects, blade and implement failures by doubling operating speed.
  - Increased working length exposing unshielded driveline areas and entanglement hazards.

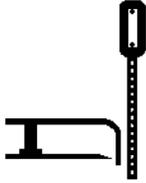
**BEFORE REMOVING WING RETAINING LOCKS:**

- **FILL** Wing Cylinders with oil. *(Refer to Instructions in Operation Section)*
- **KEEP** bystanders clear of area before operating wings.
- **LOWER WINGS** slowly and carefully.

**DO NOT** connect the Mower to a tractor with the PTO directly connected to the Tractor transmission. **PN CDFM-03**

# Safety

## THROWN OBJECTS HAZARDS

			
<p>Mower Thrown Objects Hazard</p>	<p>Raised Mower Thrown Objects</p>	<p>Inspect Area remove foreign objects</p>	<p>Do not let blades contact solid objects</p>



**ROTARY MOWERS CAN THROW OBJECTS 300 FEET OR MORE UNDER ADVERSE CONDITIONS.**

### TO AVOID SERIOUS INJURY OR DEATH TO OPERATOR OR BYSTANDERS FROM THROWN OBJECTS:

- KEEP bystanders 300 feet away

### STOP MOWING IF PASSERSBY ARE WITHIN 300 FEET UNLESS:

- **ALL THROWN OBJECT SHIELDING** including, Front and Rear Deflectors, Steel Guards, Bands, Side Skirts and Skid Shoes in place and in good condition when mowing.
- Mower sections or wing are adjusted to be close and parallel to ground without exposing blades.
- **MOWING AREA** has been inspected and foreign materials and debris have been removed.
- **PASSERSBY** are inside enclosed vehicle.

### INSPECT AREA FOR POTENTIAL THROWN OBJECTS BEFORE MOWING:

- **REMOVE** debris, rocks, wire, cable, metal objects and other foreign material from area.  
Wire, cable, rope, chains and metal objects can be thrown or swing outside deck with great velocity:
  1. **MARK** objects that cannot removed.
  2. **AVOID** these objects when mowing.

### HIGH GRASS and WEED AREA INSPECTION:

- **INSPECT** for and **REMOVE** any hidden large debris.
- **MOW** at Intermediate height
- **INSPECT** and remove remaining debris
- **MOW** at final height.

### MOWER THROWN OBJECT SHIELDING:

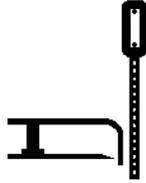
- **KEEP** all thrown object shielding including, Front and Rear Deflectors, Steel Guards, Bands, Side Skirts and Skid Shoes in place and in good condition when mowing.
- **DO NOT OPERATE** with any thrown object shielding missing, damaged or removed.

### RIGHT OF WAY (Highway) MOWING

- No shielding is 100% effective in preventing thrown objects. To Reduce Possibility of Injury:
  1. **MAINTAIN MOWER SHIELDING**, side skirts, skid shoes, and blades in good operational condition,
  2. **RAISE CUTTING HEIGHT** to **6 INCHES** minimum,
  3. **INSPECT AREA** thoroughly before mowing to **REMOVE** potential **THROWN OBJECT HAZARDS**,
  4. **NEVER ALLOW BLADES** to **CONTACT SOLID OBJECTS** like wire, rocks, post, curbs, guardrails, or ground while mowing. *PN TOFM-01*

# Safety

## THROWN OBJECTS HAZARD (CONTINUED)

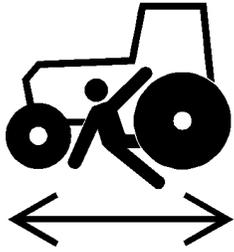
			
<p>Mower Thrown Objects Hazard</p>	<p>Raised Mower Thrown Objects</p>	<p>Inspect Area remove foreign objects</p>	<p>Do not let blades contact solid objects</p>

### MOWER OPERATION:

- **DO NOT** exceed mower's rated Cutting Capacity or cut non-vegetative material.
- **USE ENCLOSED TRACTOR CABS** when two or more mowers are operating in mowing area.
- **ADJUST** mower sections or wing close and parallel to ground without exposing blades
- **ADJUST** cutting **HEIGHT** to **AVOID BLADE CONTACT** with solid objects like wire, rocks, posts, curbs, guard rails and fixed obstructions.
- **DO NOT** operate mower when mower is raised or in transport position
- **STOP MOWING** immediately if blades strike heavy objects, fixed structures, metal guard rails and concrete structures:
  1. **BLADES CAN FAIL** from impact and objects can be thrown with great velocity.
  2. **INSPECT** and **REPLACE** any damaged blades.
  3. **CHECK** blade carrier balance and **REPLACE** if damaged.
- **DO NOT** mow in standing water **TO AVOID** possible **BLADE FAILURE**.
- **AVOID MOWING** in reverse:
  1. **STOP PTO** and back up mower.
  2. **LOWER** mower, engage **PTO** and mow forward.
- **STOP PTO** and **BLADES** when raising the mower to transport position.
- **DO NOT ENGAGE PTO** with mower in transport position.
- **STOP** mowing when **EXCESSIVE VIBRATION** occurs:
  1. **STOP PTO** and tractor **ENGINE**.
  2. **INSPECT** mower for vibration source
  3. **REPLACE** any damage parts and bent or damaged **BLADES**. *PN TOFM-02*

# Safety

## RUN OVER HAZARDS

		
Operator run over hazard	Rider fall off run over hazard	Rider fall off run over hazard



**TO AVOID SERIOUS INJURY OR DEATH FROM FALLING OFF TRACTOR OR EQUIPMENT RUN OVER:**

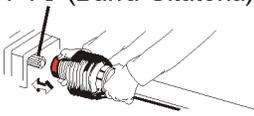
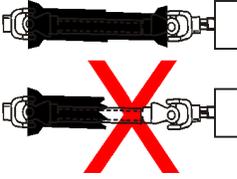
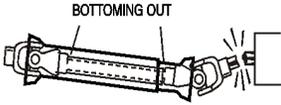
- **USE ROPS** and **SEAT BELT** equipped tractors for mowing operations.
- **KEEP ROPS** locked in **UP** position.
- **ONLY** start tractor while seated in tractor seat.
- **ALWAYS BUCKLE UP** seat belt when operating tractor and equipment.
- **ONLY OPERATE** tractor and equipment while seated in tractor seat.
- **NEVER ALLOW RIDERS** on tractor or implement.

### **WHEN MOUNTING AND DISMOUNTING TRACTOR:**

- **ONLY** mount or dismount when tractor and moving parts are stopped.
- **STOP ENGINE AND PTO, engage parking brake, lower implement, allow all moving parts to stop and remove key before dismounting from tractor.** *PN R001*

# Safety

## PTO ENTANGLEMENT HAZARDS

	 <p>PTO (Barra Gitoria)</p>		 <p>BOTTOMING OUT</p>
<p>Entanglement hazard Do Not approach or touch a rotating PTO driveshaft</p>	<p>Make sure PTO shaft is securely attached Do Not Use PTO Adapter</p>	<p>DO NOT Operate if PTO shields are damaged or missing</p>	<p>Make sure PTO shafts are proper length</p>



**KEEP AWAY FROM ROTATING DRIVELINES AND ELEMENTS TO AVOID SERIOUS INJURY OR DEATH:**

**STAY AWAY** and **KEEP** hands, feet and body **AWAY** from rotating blades, drivelines and parts until all moving elements have stopped.

- **STOP, LOOK** and **LISTEN** before approaching the mower to make sure all rotating motion has stopped.
- **ROTATING COMPONENTS CONTINUE** to **ROTATE** after the PTO is shut off.

### PTO SHIELDING:

#### TO AVOID SERIOUS INJURY OR DEATH FROM ENTANGLEMENT WHEN OPERATING IMPLEMENT:

- **KEEP PTO** shields, integral driveline shields and input shields installed
- **DO NOT OPERATE** mower without shields and guards in place or missing
- **REPAIR OR REPLACE** if damage, broken or missing
- **ALWAYS REPLACE GUARDS** that have been removed for service or maintenance.
- Do Not use PTO or PTO guard as a step.

#### TO AVOID broken driveline during operations:

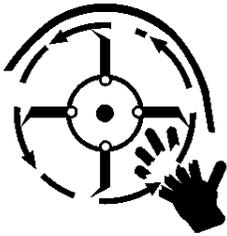
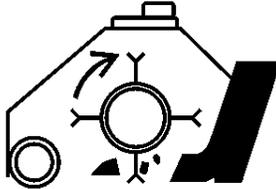
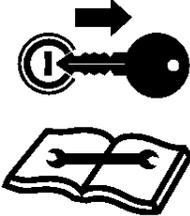
- **CHECK** driveline for proper length between PTO shaft and implement gearbox shaft. *(Refer to Instructions in Operation Section)*
- Drivelines too short can pull apart or disengage.
- Drivelines too long can bottom out.  
Bottoming driveline telescoping assembly will stop sliding and become solid.
- Driveline bottoming can push through support bearings and break off PTO shaft
- **AVOID** sharp turns or lift mower to heights to cause driveline "knocking".
- Lubricate driveshaft-telescoping components weekly.

#### CONTACT DEALER if implement driveline does not match Tractor PTO shaft:

- **DO NOT USE PTO ADAPTER.**  
Using a PTO adapter can cause excessive vibration, thrown objects, blade and implement failures by doubling operating speed. Increased working length exposing unshielded driveline areas. **PN PE01**

# Safety

## MOWER BLADE CONTACT HAZARDS

		
Do not put fingers underneath mower	Do not put foot underneath mower	Stop Tractor Remove Key Read Manual

**⚠ DANGER**

**KEEP AWAY FROM ROTATING BLADES TO AVOID SERIOUS INJURY OR DEATH FROM BLADE CONTACT:**

- **STAY AWAY** and **KEEP HANDS, FEET** and **BODY AWAY** from rotating blades, drivelines and parts until all moving elements have stopped.
- **DO NOT** put hands or feet under mower decks
- **STOP** rotating **BLADES** disengage PTO and wait for blade to stop rotating before raising mower deck or wings
- **STOP LOOK** and **LISTEN** before approaching the mower to make sure all rotating motion has stopped. **PN MBFM-01**

# Safety

## HIGH PRESSURE OIL LEAK HAZARD

			
High pressure oil penetrating skin	High pressure oil eroding skin	Using cardboard to check for oil leaks	Tank contents under pressure. Allow oil to cool before slowly removing cap



**TO AVOID SERIOUS INJURY OR DEATH FROM HIGH PRESSURE HYDRAULIC OIL LEAKS PENERATING SKIN:**

- **DO NOT OPERATE** equipment with oil or fuel leaks.
- **KEEP** all hydraulic hoses, lines and connections in **GOOD CONDITION** and **TIGHT** before applying system pressure.
- **RELIEVE HYDRAULIC PRESSURE** before disconnecting lines or working on the system.
- **REMOVE** and replace hose if you suspect it leaks. Have dealer test it for leaks.

### **HIGH PRESSURE FLUID LEAKS CAN BE INVISIBLE.**

#### **WHEN CHECKING FOR HYDRAULIC LEAKS AND WORKING AROUND HYDRAULIC SYSTEMS:**

- **ALWAYS WEAR** safety glasses and impenetrable gloves.
- **USE** paper or cardboard to search for leaks.
- **DO NOT USE** hands or body parts to search for leak.
- **KEEP** hands and body **AWAY** from pin holes and nozzles ejecting hydraulic fluid.
- Hydraulic fluid may cause gangrene if not surgically removed immediately by a doctor familiar with this form of injury.

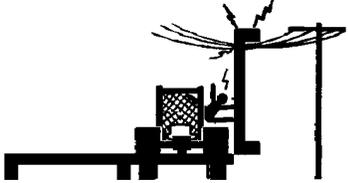
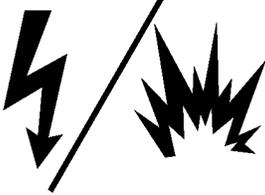
#### **Use Caution when removing Hydraulic Tank cap.**

- Tank content maybe under pressure.
- Allow oil to cool before removing cap.
- Relieve oil pressure before removing cap slowly.
- Stay away from hot oil that may spray from tank.

*PN HPFM-01*

# Safety

## **ELECTRICAL & FIRE HAZARDS**

		
<p>Wing contacting overhead electrical lines</p>	<p>Strike and explosion Hazard Blades Contacting Utility or Gas Lines</p>	<p>Do not operate near fires. Keep mower deck clear of debris</p>

**⚠ DANGER**

**TO AVOID SERIOUS INJURY OR DEATH FROM ELECTRICAL CONTACT WHEN WORKING AROUND ELECTRICAL POWER LINES, GAS LINES AND UTILITY LINES:**

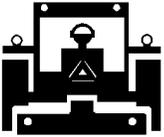
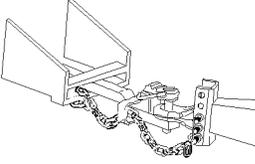
- **INSPECT** mowing area for overhead or underground electrical power lines, obstructions, gas lines, cables and Utility, Municipal, or other type structure.
- **KEEP** all raised wings at a 10 feet or greater distance from all power lines and overhead obstructions.
- **DO NOT** allow mower to contact with any Utility, Municipal, or type of structures and obstructions.
- **CALL 811** and 1-800-258-0808 for identify buried utility lines.

**FIRE PREVENTION GUIDELINES while Operating, Servicing, and Repairing Mower and Tractor to reduce equipment and grass fire Risk:**

- **EQUIP** Tractor with a **FIRE EXTINGUISHER**
- **DO NOT OPERATE** mower on a tractor equipped with under frame exhaust
- **DO NOT SMOKE** or have open flame near Mower or Tractor
- **DO NOT DRIVE** into burning debris or freshly burnt area
- **AVOID FIRE IGNITION** by not allowing mower blade to contact solid objects like metal or rock.
- **ADJUST SLIP CLUTCHES** to avoid excessive slippage and clutch plate heating.
- **CLEAR** any grass clippings or debris buildup around mower drivelines, slip clutches, and gearboxes.
- **SHUT OFF ENGINE** while refueling.
- Do not operate if oil is leaking. Repair oil leak and remove all accumulated oil before operating.
- **CLEAR** any grass clippings or debris buildup around mower hydraulic pumps, valves or tanks. *PN EFFM-01*

# Safety

## TRANSPORTING HAZARDS

				
Use SMV signs and Flashing Lights	Loss of Control Stopping Hazard	Loss of Control Speeding Hazard	Use Safety Tow Chain - Tractor to Implement	Engage Transport Locks

**⚠ WARNING** TO AVOID SERIOUS INJURY AND DEATH WHEN TOWING OR TRANSPORTING EQUIPMENT:

- **KEEP** transport speed **BELOW** 20 mph to maintain control of equipment.
- **REDUCE SPEED** on inclines, on turns and in poor towing conditions.
- **DO NOT TOW** with trucks or other vehicles.
- **USE** only properly sized and equipped tractor for towing equipment.
- **FOLLOW** all local traffic regulations.

**TRACTOR REQUIREMENTS FOR TOWING OR TRANSPORTING IMPLEMENTS:**

- **ONLY TRANSPORT** with tractor with **ROPS** in the raised position.
- **USE** properly sized and equipped tractor that exceeds implement weight by at least 20%.
- **KEEP** 20% of tractor weight on front wheels to maintain safe steering.

**BEFORE TRANSPORTING OR TOWING IMPLEMENT:**

**TRACTOR INSPECTION:**

- **CHECK** steering and braking for proper operation and in good condition.
- **CHECK SMV** sign, reflectors and warning lights for proper operation and visibility behind unit.
- **CHECK** that your driving vision is not impaired by tractor, cab, or implement while seated in tractor seat.
- **ADJUST** your operating position, mirrors, and implement transport for clear vision for traveling and traffic conditions.

**PREPARE IMPLEMENT FOR TRANSPORTING OR TOWING:**

**ENGAGE TRANSPORT LOCKS AND SAFETY CHAINS:**

- **RAISE MOWER** and **ENGAGE** center axle cylinder transport stops or pins.
- **RAISE WINGS** and **ENGAGE TRANSPORT LOCKS** or pins.
- **ATTACH** implement **SAFETY CHAIN** to tractor.
- **REMOVE** any cut material collected on mower deck.

**DETERMINE STOPPING CHARACTERISTICS OF TRACTOR AND IMPLEMENT FOR TRANSPORTING OR TOWING:**

**BRAKING TESTS:**

- **INSTALL** center axle cylinder transport stops or pins.
- Observe **STOPPING** distances increases with increased speeds.
- **DETERMINE** the maximum safe transport speed that does not exceed 20 mph.

**DETERMINE MAXIMUM TURNING SPEED BEFORE OPERATING ON ROADS OR UNEVEN GROUND:**

- **TEST** equipment in slowly increasing speed in turns to determine it can be operated at higher speeds.
- **USE REDUCED** turning speeds in sharp turns to avoid equipment turning over.

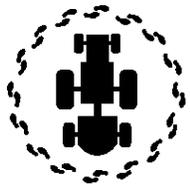
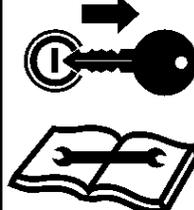
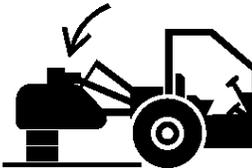
**WHEN TOWING OR TRANSPORTING EQUIPMENT:**

- Always **WEAR SEAT BELT** when operating or transporting mower.
- **USE** low speeds to avoid overturn with raised wings.
- **USE** low speeds and gradual steering on curves, hills, rough or uneven surfaces and on wet roads.
- **TURN ON** tractor **FLASHING WARNING LIGHTS**.
- **ALLOW** clearance for implement swing while turning.

**KEEP** all raised wings at 10 feet or greater distance from all power lines and overhead obstructions. *PN TH01*

# Safety

## HAZARDS WITH MAINTENANCE OF IMPLEMENT

				
Periodically inspect all moving parts, lubricate drivelines, and tighten all fasteners	Stop engine remove key before conducting maintenance	Block up implement before servicing Use large blocks on soft or wet soil	Engage cylinder transport locks	Inspect Blades for damage or cracks

**WARNING** AVOID SERIOUS INJURY OR DEATH FROM COMPONENT FAILURE BY KEEPING IMPLEMENT IN GOOD OPERATING CONDITION IN PERFORMING PROPER SERVICE, REPAIRS AND MAINTENANCE.

### BEFORE PERFORMING SERVICE, REPAIRS AND MAINTENANCE ON THE IMPLEMENT:

- **STOP ENGINE AND PTO**, engage parking brake, lower implement, allow all moving parts to stop and remove key before dismantling from tractor.
- **PLACE** implement on ground or securely block up raised equipment. Use large blocks on soft or wet soil.
- **PUSH** and **PULL** Remote Hydraulic Cylinder lever to relieve hydraulic pressure.
- **DISCONNECT IMPLEMENT** driveline from tractor **PTO SHAFT**.

**WEAR SAFETY GLASSES, PROTECTIVE GLOVES** and follow **SAFETY PROCEDURES** when performing service, repairs and maintenance on the implement:

- Always **WEAR** protective **GLOVES** when handling blades, knives, cutting edges or worn component with sharp edges.
- Always **WEAR GLOVES** and **SAFETY GLASSES** when servicing hot components
- **AVOID CONTACT** with hot hydraulic oil tanks, pumps, motors, valves and hose connection surfaces.
- **SECURELY** support or **BLOCK UP** raised implement, framework and lifted components before working underneath equipment.
- **STOP** any implement movements and **SHUT-OFF TRACTOR** engine before doing any work procedures.
- **USE** ladder or raised stands to reach high equipment areas inaccessible from ground.
- **ENSURE** good footing by standing on solid flat surfaces when getting on implement to perform work.
- **FOLLOW** manufacturer's instructions in handling oils, solvents, cleansers, and other chemical agents.
- **DO NOT** change any factory-set hydraulic calibrations to avoid component or equipment failures.
- **DO NOT** modify or alter implement, functions or components.
- **DO NOT WELD** or repair rotating mower components. These may cause vibrations and component failures being thrown from mower.

### PERFORM SERVICE, REPAIRS, LUBRICATION AND MAINTENANCE OUTLINED IN IMPLEMENT MAINTENANCE SECTION:

- **INSPECT** for loose fasteners, worn or broken parts, leaky or loose fittings, missing or broken cotter keys and washers on pins, and all moving parts for wear.
- **REPLACE** any worn or broken parts with authorized service parts.
- **LUBRICATE** unit as specified by lubrication schedule
- **NEVER** lubricate, adjust or remove material while it is running or in motion.
- **TORQUE** all bolts and nuts as specified.

### BLADE INSPECTION:

- **REPLACE** bent, damage, cracked or broken blades immediately with new blades.
- **AVOID** blade failures and thrown broken blades. **DO NOT** straighten, weld, or weld hard-facing blades.

### SAFETY SHIELDS, GUARDS AND SAFETY DEVICES INSPECTION:

- **KEEP** all Deflectors, Steel Guards, Gearbox Shields, and PTO integral shields, Bands, Side Skirts and Skid Shoes in place and in good condition.
- **REPLACE** any missing, broken or worn safety shields, guards and safety devices.
- Engine Exhaust, some of its constituents, and certain vehicle components contain or emit chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.
- Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.
- **DISCONNECT** Pump solenoid valve or PTO driveline connection before servicing mower head.
- **FOLLOW INSTRUCTIONS** in maintenance section when replacing hydraulic cylinders to prevent component falling.

PN HMFM-02

# Safety

## **PARTS INFORMATION**

### PARTS INFORMATION

Terrain King mowers use balanced and matched system components for blade carriers, blades, cuttershafts, knives, knife hangers, rollers, drivetrain components, and bearings. These parts are made and tested to Terrain King specifications. Non-genuine "will fit" parts do not consistently meet these specifications. The use of "will fit" parts may reduce mower performance, void mower warranties, and present a safety hazard. Use genuine Terrain King mower parts for economy and safety. (SPTK-1)

**SEE YOUR TERRAIN KING DEALER**

# Section 1

## **General Mower Service and Repairs**

# Failure / Cause / Solution

## Mower Function Troubleshooting

### 1 - Possible Failure..... Mower will not rotate

- Cause..... 1-A. In line 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.

# Failure / Cause / Solution

## Mower Function Troubleshooting

### 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 low.

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, reinstalled 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.

# Failure / Cause / Solution

## Mower Function Troubleshooting

### 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 34 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.

# Failure / Cause / Solution

## Mower Function Troubleshooting

### 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 too heavy, change to proper viscosity oil.
  
- Cause..... B. Internal pump or motor wear or damage
- Solution..... B. Disassemble, inspect, and repair

# Mower Repairs / Wing Mower Decks

## 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 THE PROBLEM CORRECTED.*

*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*) during 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

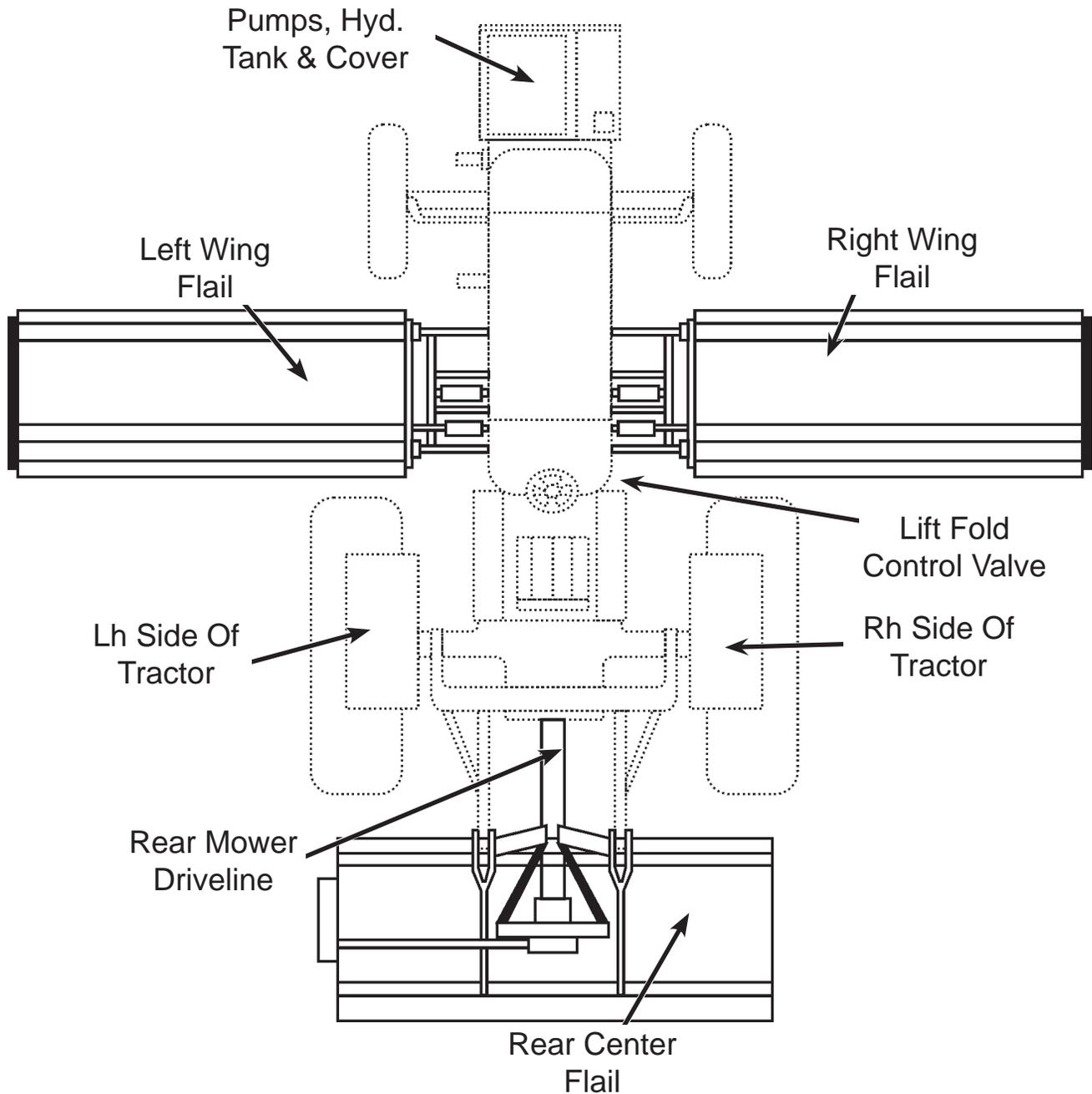
1. Wire, rope, string, rags, etc., around the cutter shaft, are holding the knives in a folded back position.
  - Remove such foreign objects and be sure all knives are free to swing to the extended position.
2. Knives are missing or broken.
  - Replace missing or broken knives.
3. Knife hanger lugs 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.
4. Cutter shaft ball bearings are worn enough to have radial "play" in them.
  - Replace ball bearing and other worn parts to eliminate "play".
5. 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.
6. 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.

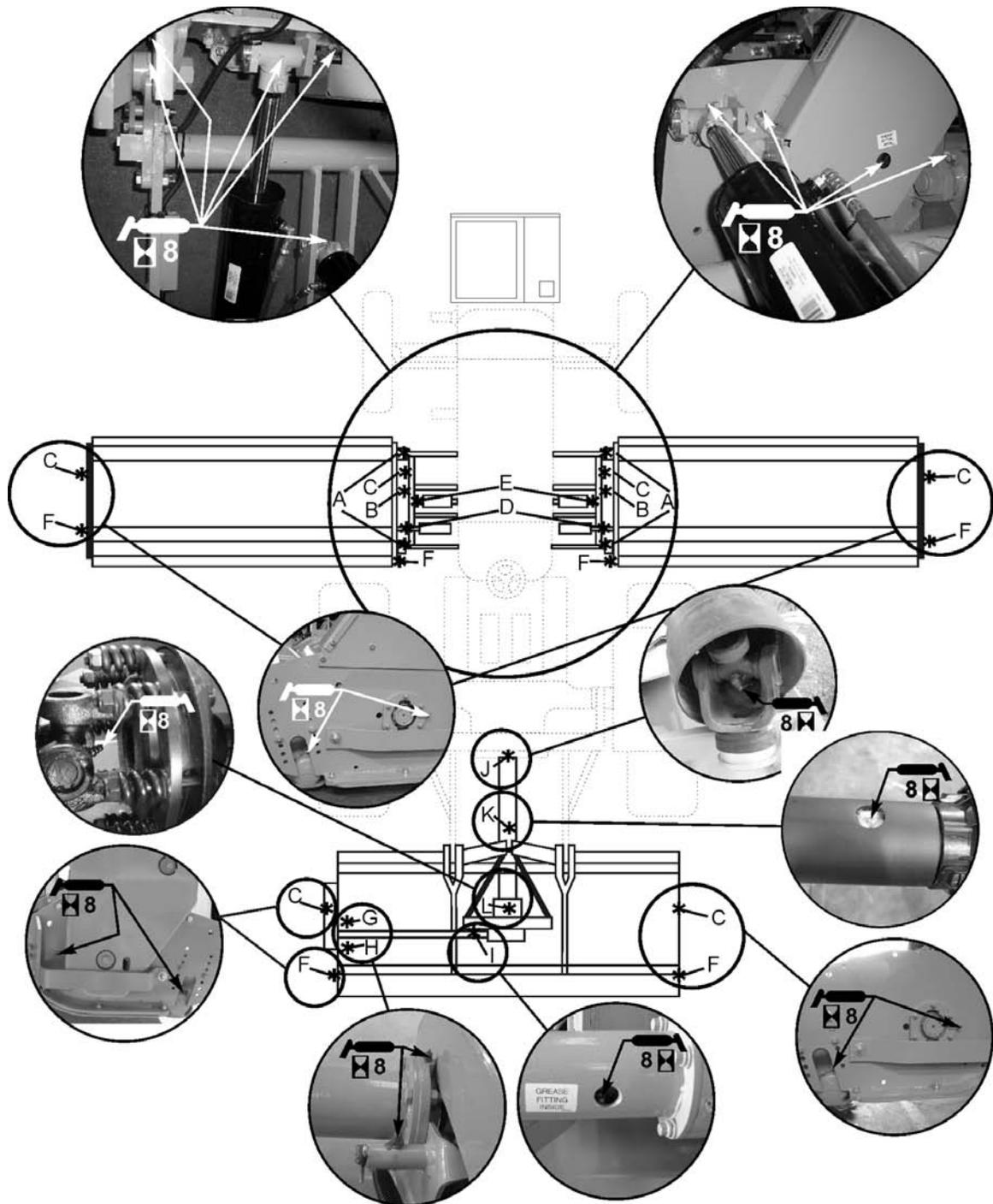
# Mower Component Location

## Tractor - Mower Component Location For Check List



# Lubrication Points

SERVICE AND REPAIR



LUBRICATE ALL POINTS EVERY 8 HOURS OF OPERATION

 Use NLG1-with Lithium Grease

- |   |                          |   |                     |
|---|--------------------------|---|---------------------|
| A | LIFT FRAME POVOT PIN     | G | REAR MOWER IDLERARM |
| B | WING MOWER BELT IDLERARM | H | BANJO BEARING       |
| C | CUTTERSHAFT BEARINGS     | I | BANJO COUPLING      |
| D | TILT CYLINDER ROD END    | J | DRIVELINE YOKE      |
| E | LIFT CYLINDER ROD END    | K | DRIVELINE SHAFT     |
| F | ROLLER BEARING           | L | SLIP CLUTCH         |

Mnt-FL-0001

# Drive Belt - Cutting Height

## 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 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.

## 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 11

## Adjusting Cutting Height

*(See Figure 14, 15, 16 & 17)*

1. Lower cutter unit and 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 Terrain Master chose the desired hole by reading the decal (*Shown in figure 50*) which should be on the mower decks of the Terrain Master showing the adjusting steps and procedure.

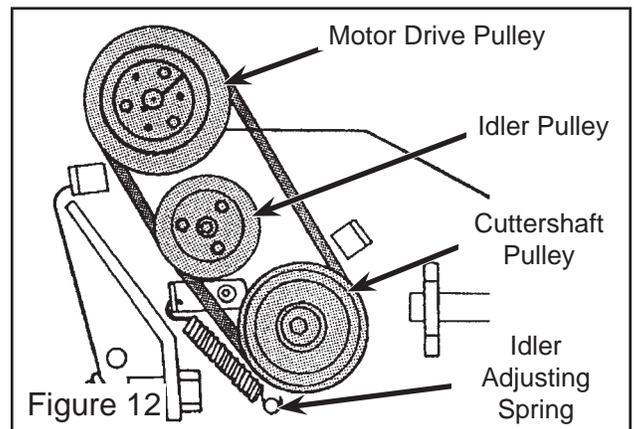


Figure 12

# Roller Bearing

## 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.
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.

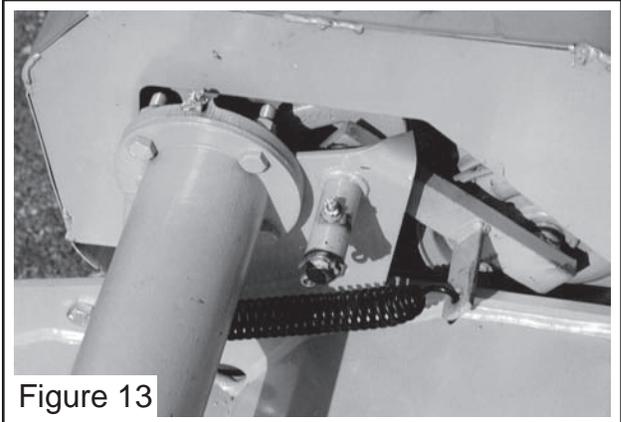


Figure 13

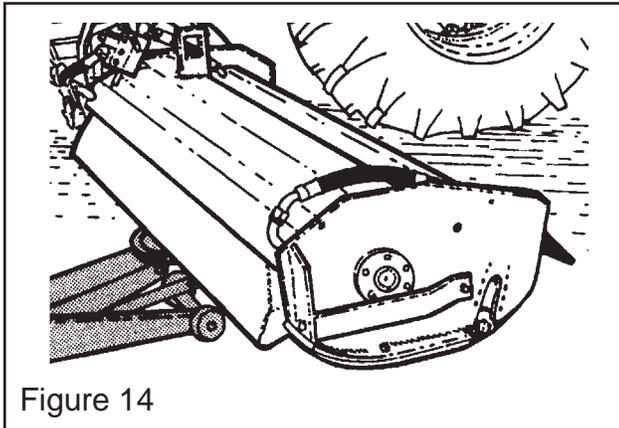


Figure 14

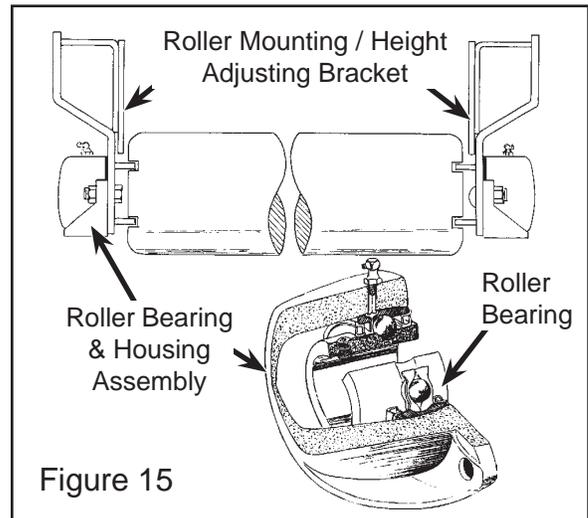


Figure 15

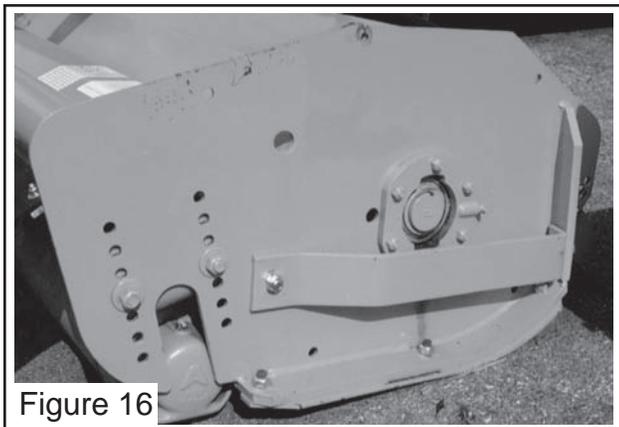


Figure 16

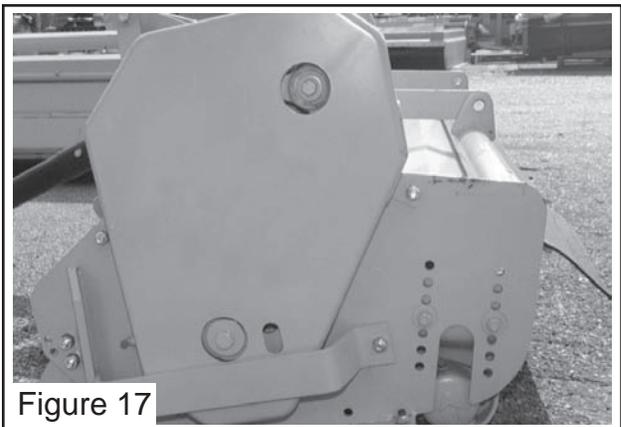


Figure 17

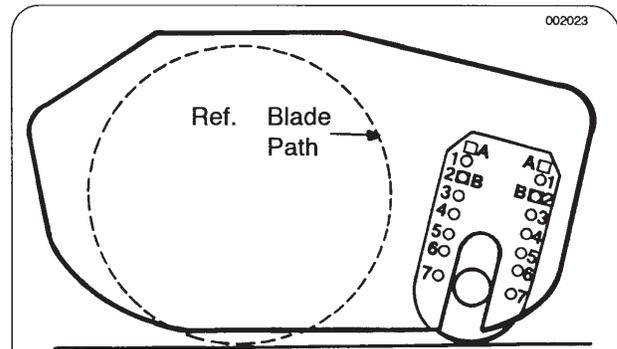
# Cutter Shaft Bearing

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 and 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 cutter shaft to support cutter shaft when removing cutter shaft bearing. Securely support cutter shaft. *Note: the cutter shaft must remain supported while changing bearings.*
3. Remove outboard fender.

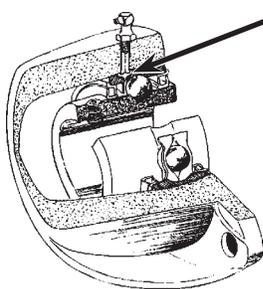


MOWER CUTTING HEIGHT ADJUSTMENT

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 in line with hole in housing to insure correct placement of grease fitting

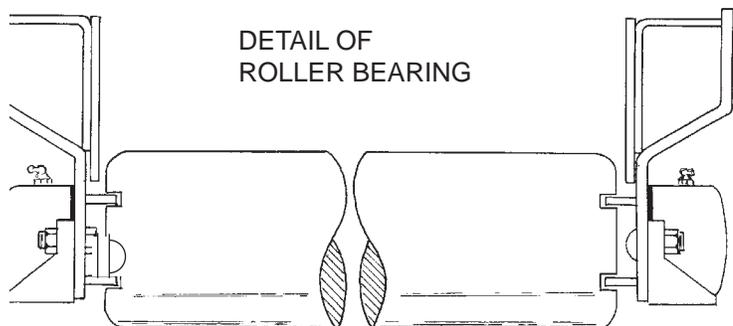


Figure 19

# Cutter Shaft Bearing

1. 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.*
2. Using a jack to align parts, install bearing and housing assembly to cutter unit and make certain that bearing setscrew (If Used) is located in keyway on cutter shaft. 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)

1. Remove spring from idler arm.
2. Remove motor mounting bracket fasteners, at the cutter housing. Pivot motor mounting bracket assembly and remove drive belts.
3. Remove fasteners that secure pulley to cutter shaft. (See Figure 21 item 2) Remove pulley and key. (See Figure 21 and item 2)
4. 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.*
5. Using a jack to align parts, install inboard bearing and housing assembly to cutter unit. Grease bearing and install cap over fitting.
6. Reinstall key and pulley. Secure with cutter shaft fasteners.
7. Remove jack and check shaft rotation. Reinstall knives which were removed.
8. Reinstall drive belts then secure motor mounting bracket to cutter housing.
9. Reinstall idler arm spring.
10. Reinstall belt guard.
11. Remove supports, lower unit to ground and test unit. Reinstall outboard fender, if not already installed.

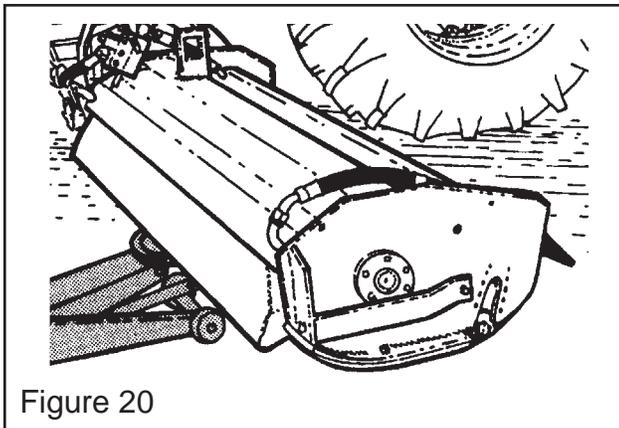


Figure 20

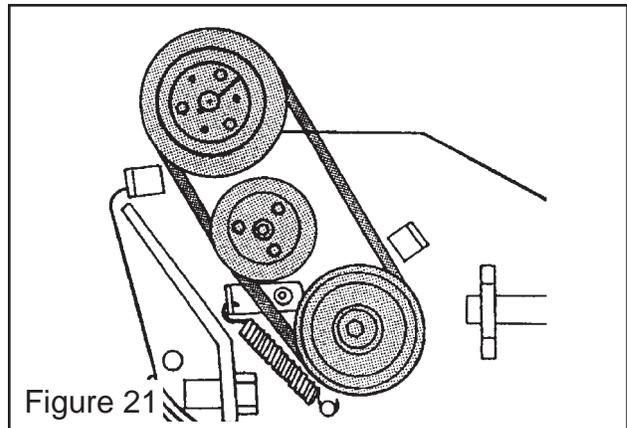


Figure 21

# Cutter Shaft Replacement

## Cutter Shaft Replacement

*Note: It is recommended that cutter shaft 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 disassembly and reassembly.*

1. Place mower units resting on the ground or securely support at a convenient height.
2. Remove cutter shaft 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 cutter shaft 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 cutter shaft 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 cutter shaft application, there is fine cut and course cut. These cutter shafts 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 cutter shaft and is the standard fine cut knife. It is retained with a hardened nut and hardened bolt. 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 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. (See following page)

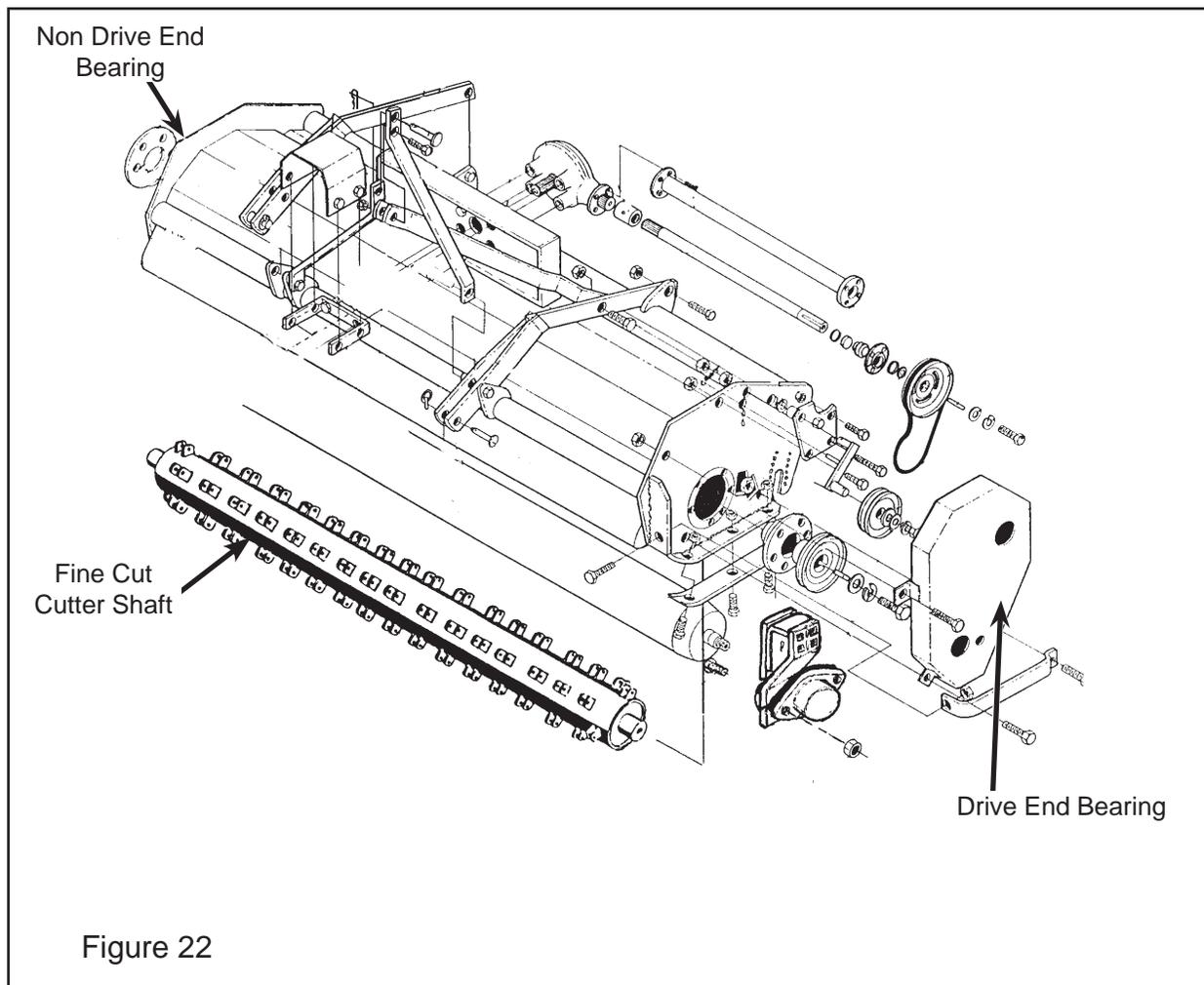


Figure 22

# Knife Installation

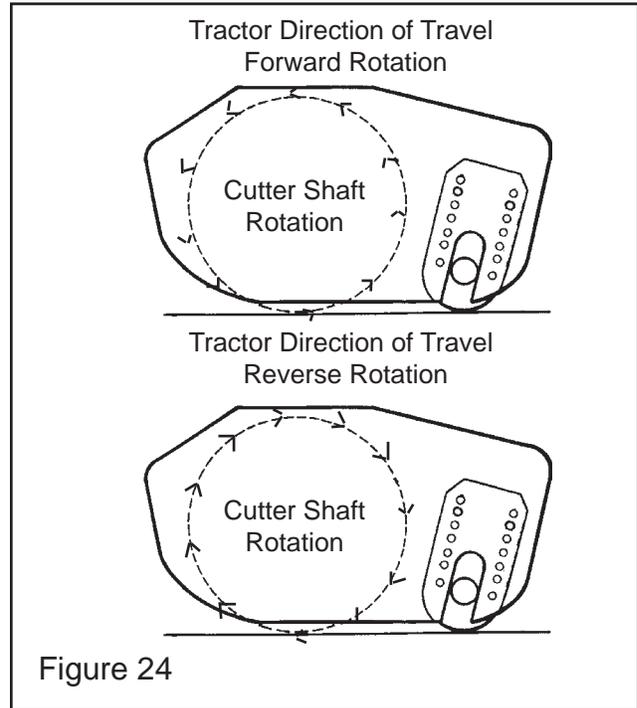
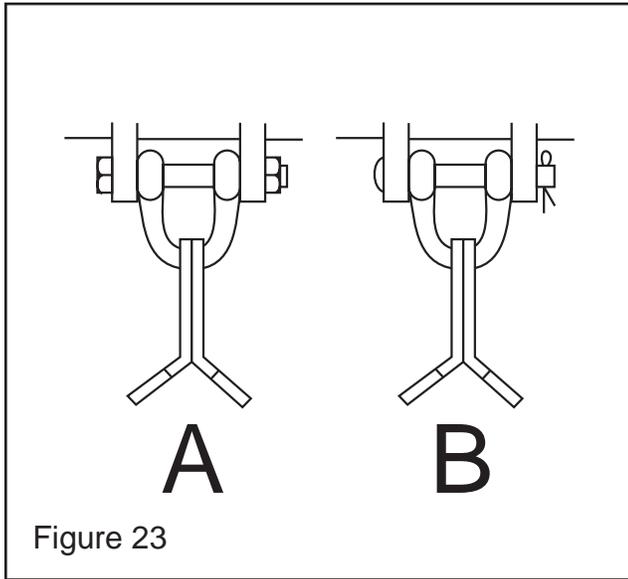
## For Forward Rotation

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

## For Reverse Rotation

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

*Note: Rotation is the direction of the cutter shaft 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.*



## 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° this changes the present inlet port into the outlet port of the motor. Reinstall manifold block but do not change the position. Install case drain hose.

### Rear Mower

To change direction of cutter shaft rotation for the rear mower, 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° 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° to new position. Install cutter shaft pulley, gearbox output pulley, idler arm pulley assembly and belt. Replace existing belt guard with proper guard.

# Check Relief Valve Pressure

## 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.

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

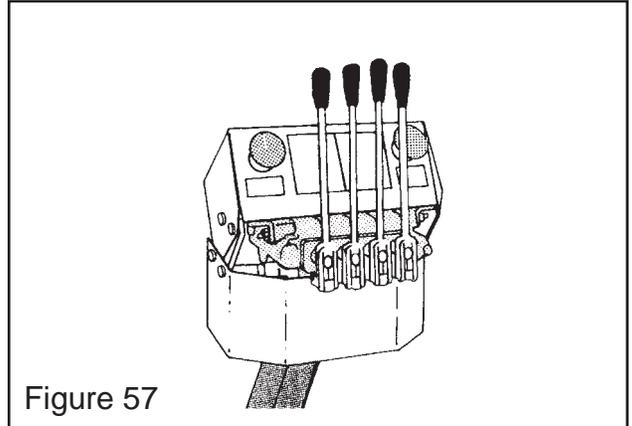


Figure 57

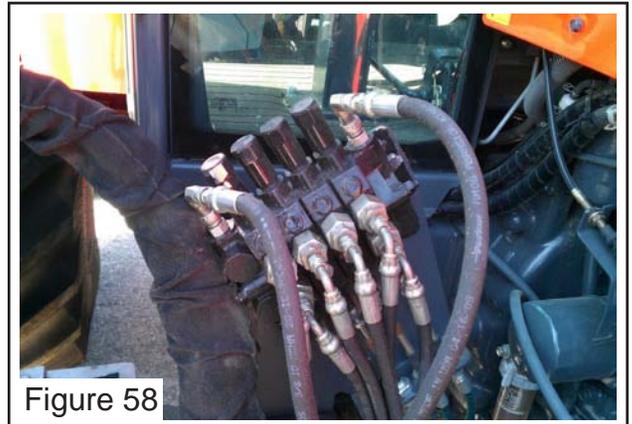


Figure 58

# Tank Filling Instructions

## TANK FILLING INSTRUCTIONS

*(USE Tractor Hydraulic Oil only.)*

A double wing Terrain Master 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 Terrain Master 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 Terrain Master 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.

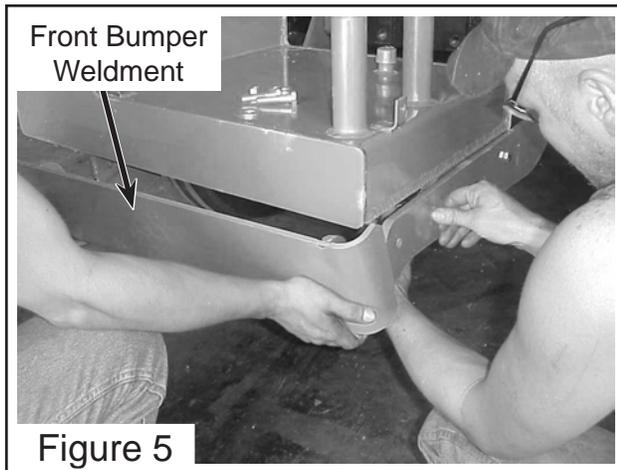
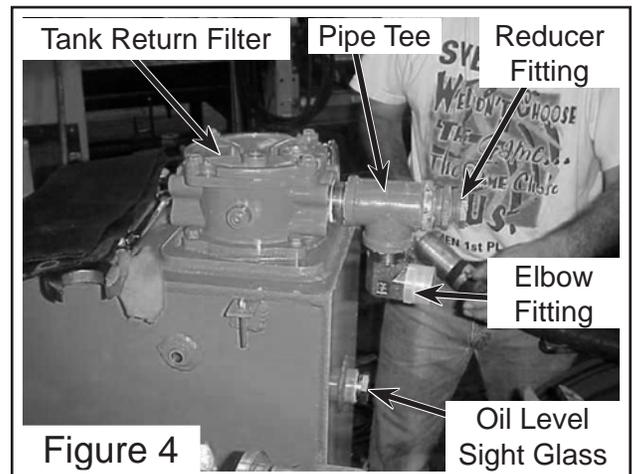
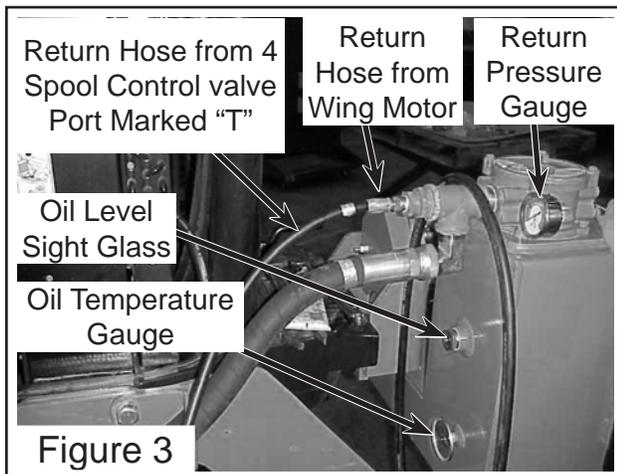
### **NOTE!!**

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.

# Hydraulic Tank Repair Information

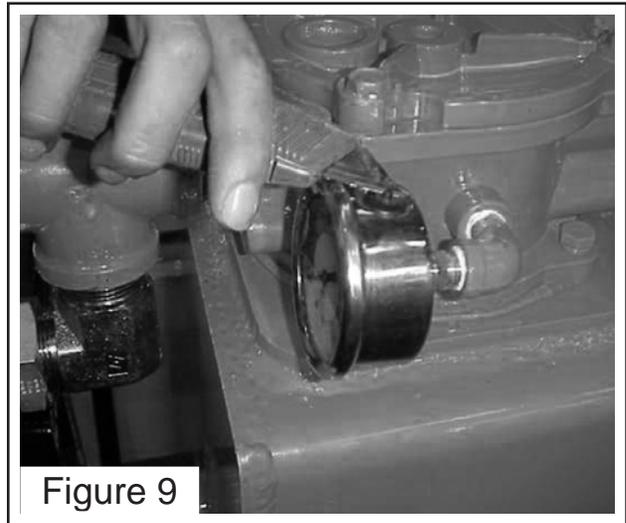
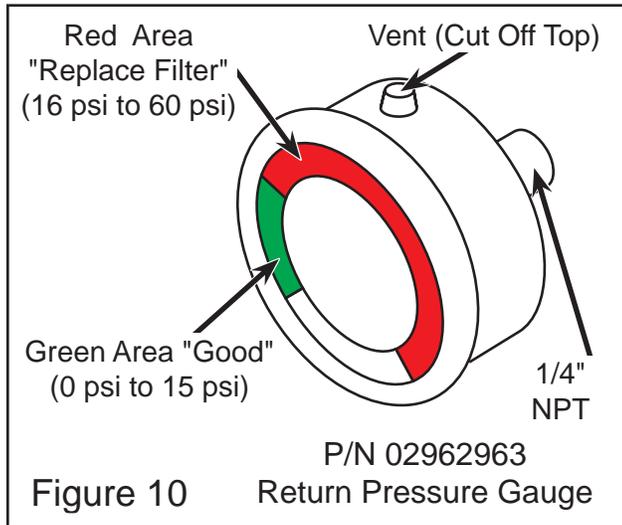
1. Clean the entire area around the hydraulic tank, hoses, pumps and any other component that is going to be worked on, do not disconnect any hydraulic system in any way before completely cleaning the area and all tools to be used. Keeping every thing clean, work area, tools, drain pans and components 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.
3. 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 Terrain Master 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)
4. Remove front tank bumper weldment. The front bumper weldment bolts to the tank mounting rails (See Figure 5). Remove the front bumper.
5. 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 6). With the tank supported by the overhead hoist slide the tank outward away from the pumps and then upward.
6. 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.



# Hydraulic Tank Repair Information

## Replacement of Return Filter Pressure Gauge

1. Return filter pressure gauge. The return filter pressure gauge (See Figure 8 & 9) is a glycerin 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 should 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 red at operating temperature (100° F above ambient temperature, check the return filter it may need changing.)



# Hydraulic Tank Repair Information

## Remove Old Hydraulic System Filter

1. Hydraulic 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 components 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 supporting any weight, 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 filter up and out of filter housing. Use caution the housing may still have oil in it. (See Figure 16)

Return Filter Assembly



Figure 10

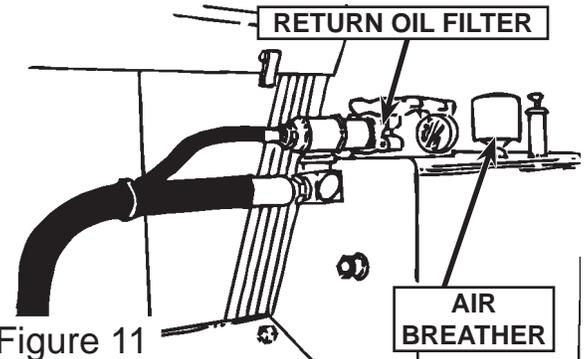


Figure 11

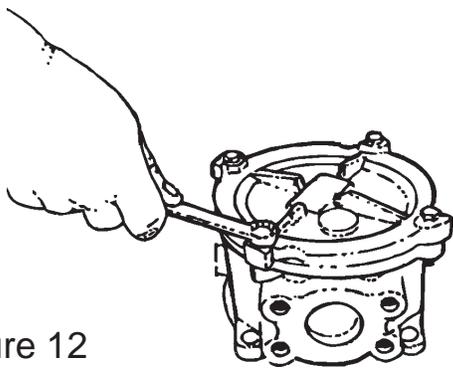


Figure 12

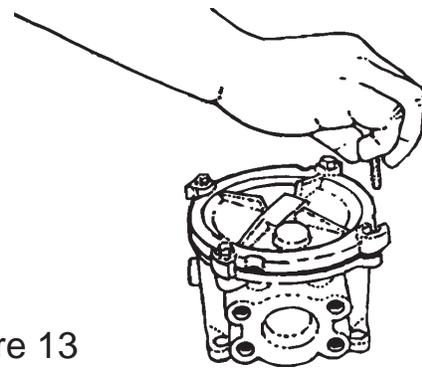


Figure 13

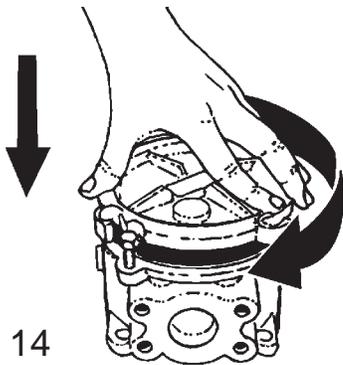


Figure 14

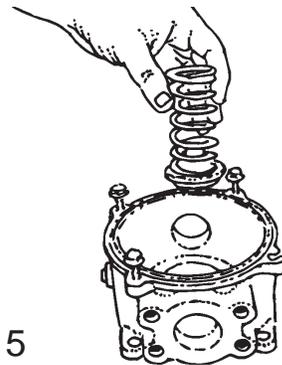


Figure 15

# Hydraulic Tank Repair Information

## Reinstall New Hydraulic 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 canister needs cleaning it can not be done with any type of solvent as it would run into oil tank. If 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 canister 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. (See Figure 21)

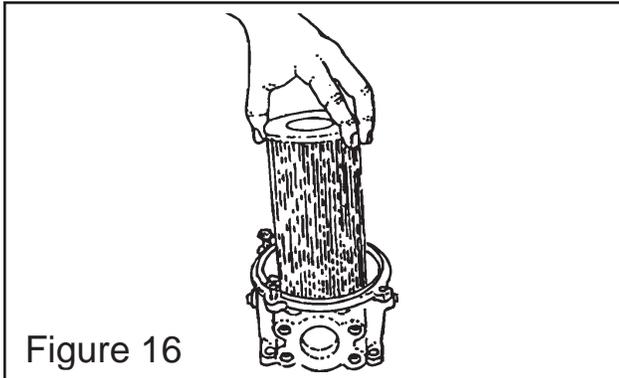


Figure 16

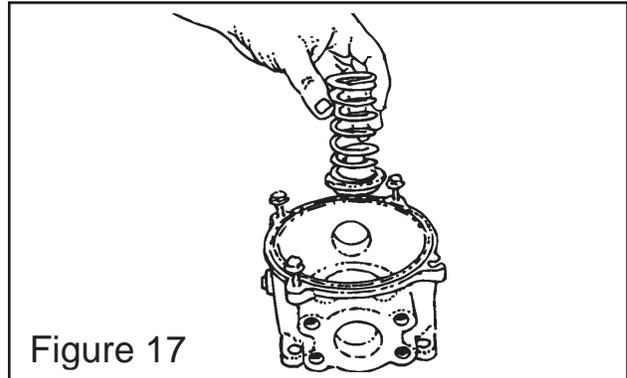


Figure 17

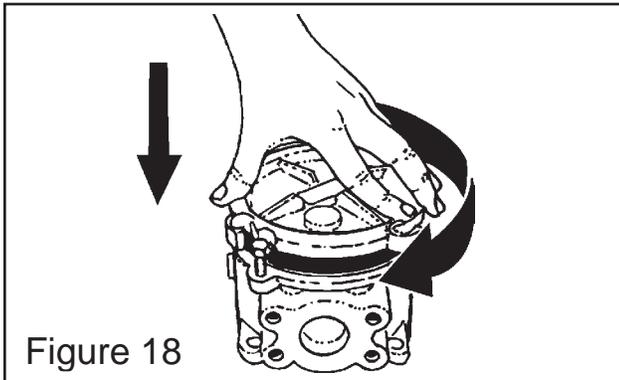


Figure 18

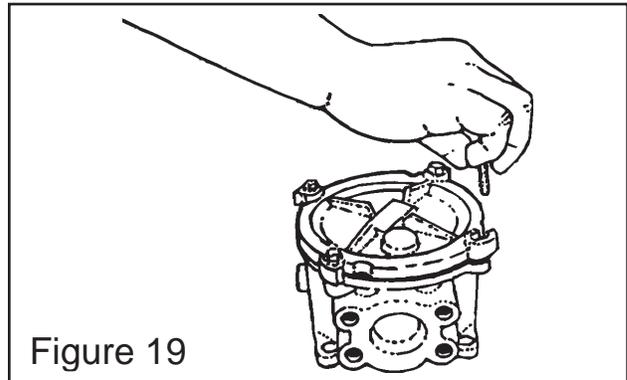


Figure 19

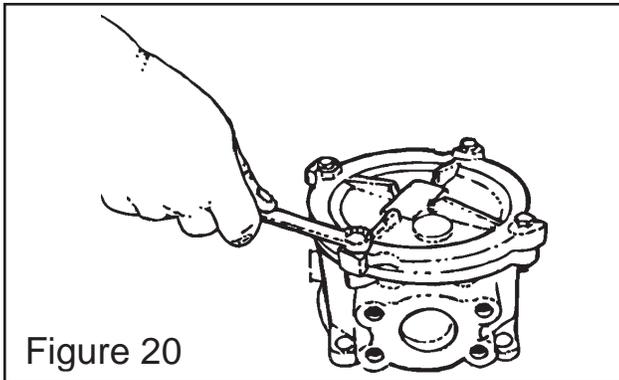


Figure 20

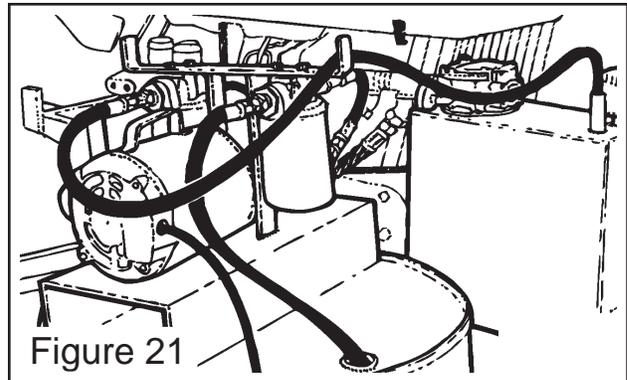


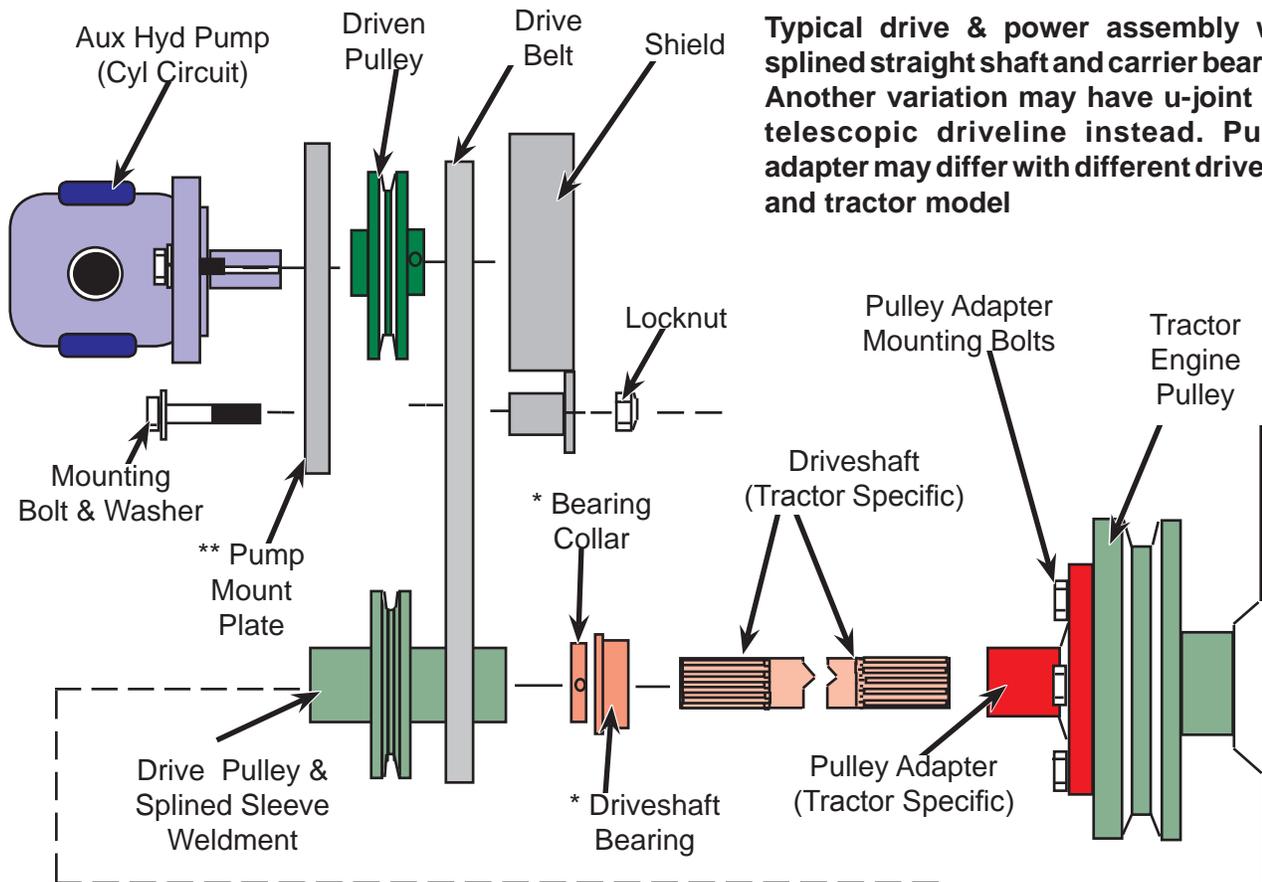
Figure 21

# Section 2

## **Driveline Assembly**

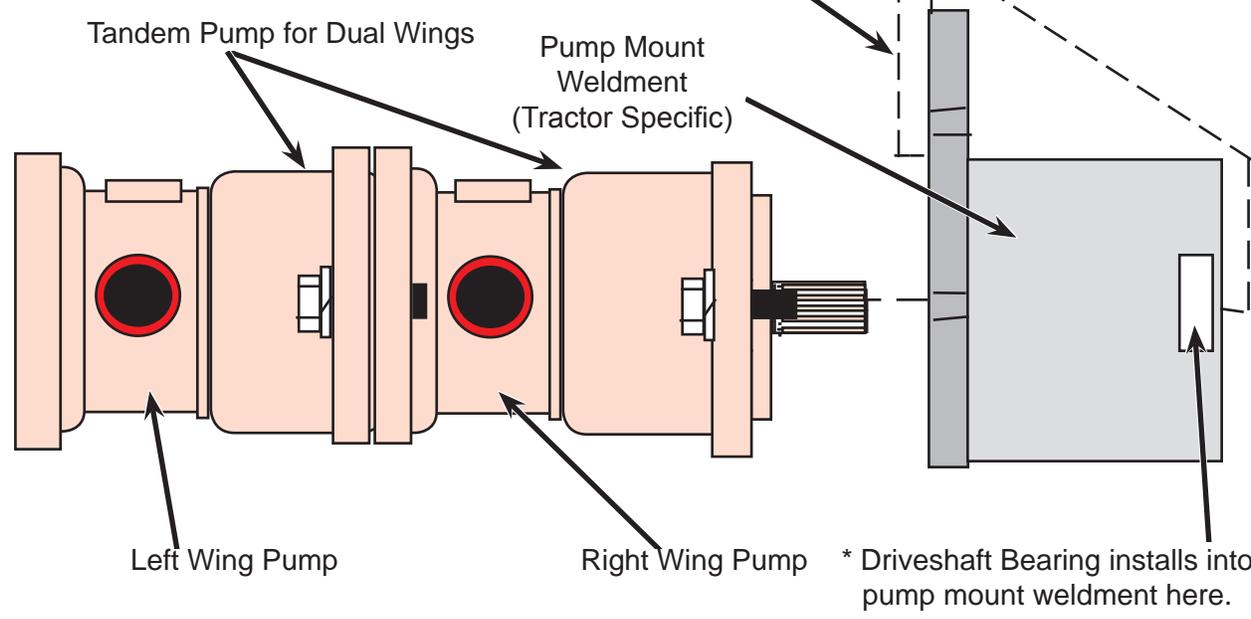
# Tandem Pump & Driveshaft Asy w/ Aux Pump

DRIVELINE ASSEMBLY



Typical drive & power assembly with splined straight shaft and carrier bearing. Another variation may have u-joint and telescopic driveline instead. Pulley adapter may differ with different driveline and tractor model

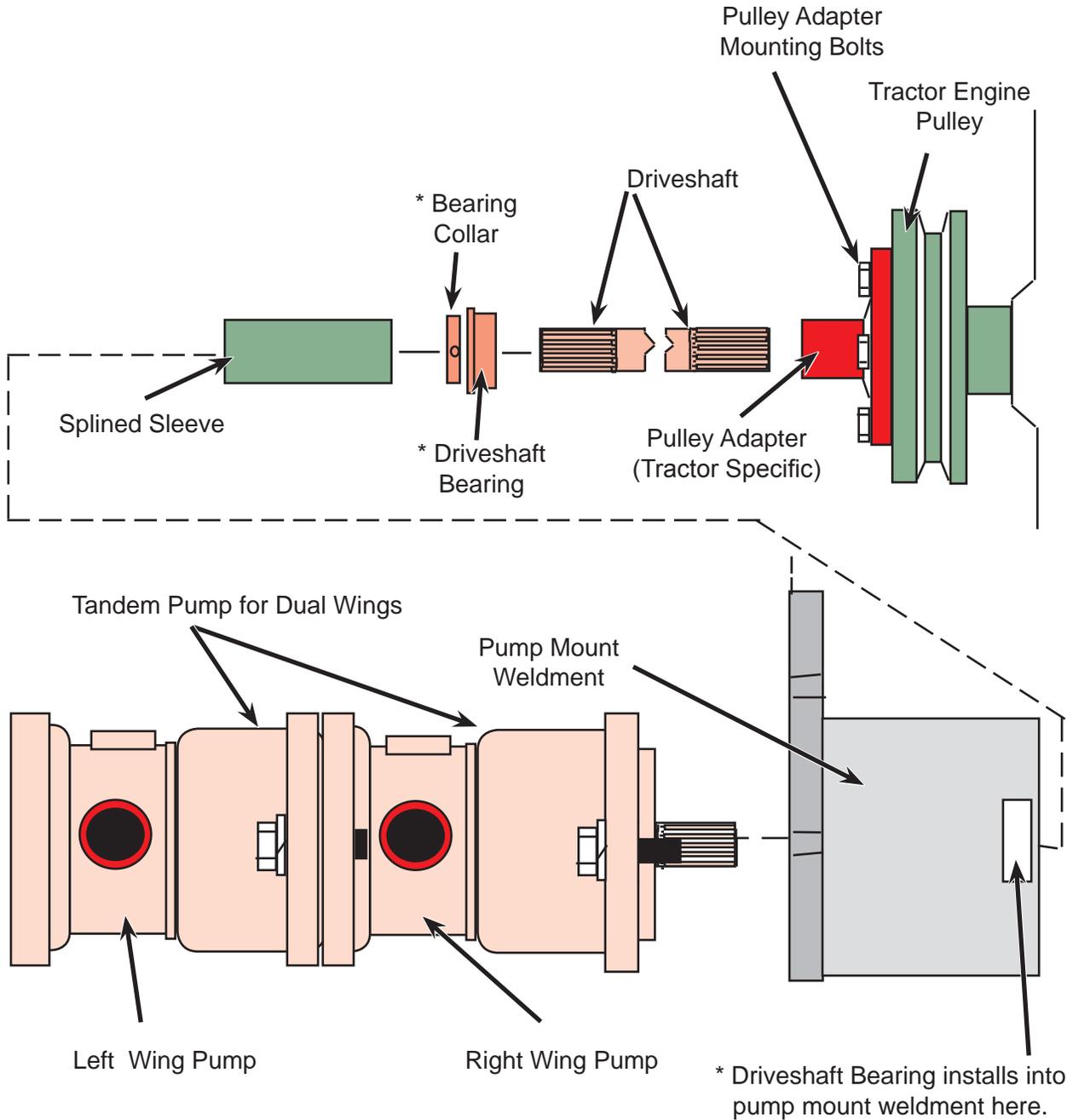
\*\* Small (Cyl Hyd) Pump Mount Plate mounts here



\* Driveshaft Bearing installs into pump mount weldment here.

# Tandem Pump & Driveshaft Asy w/o Aux Pump

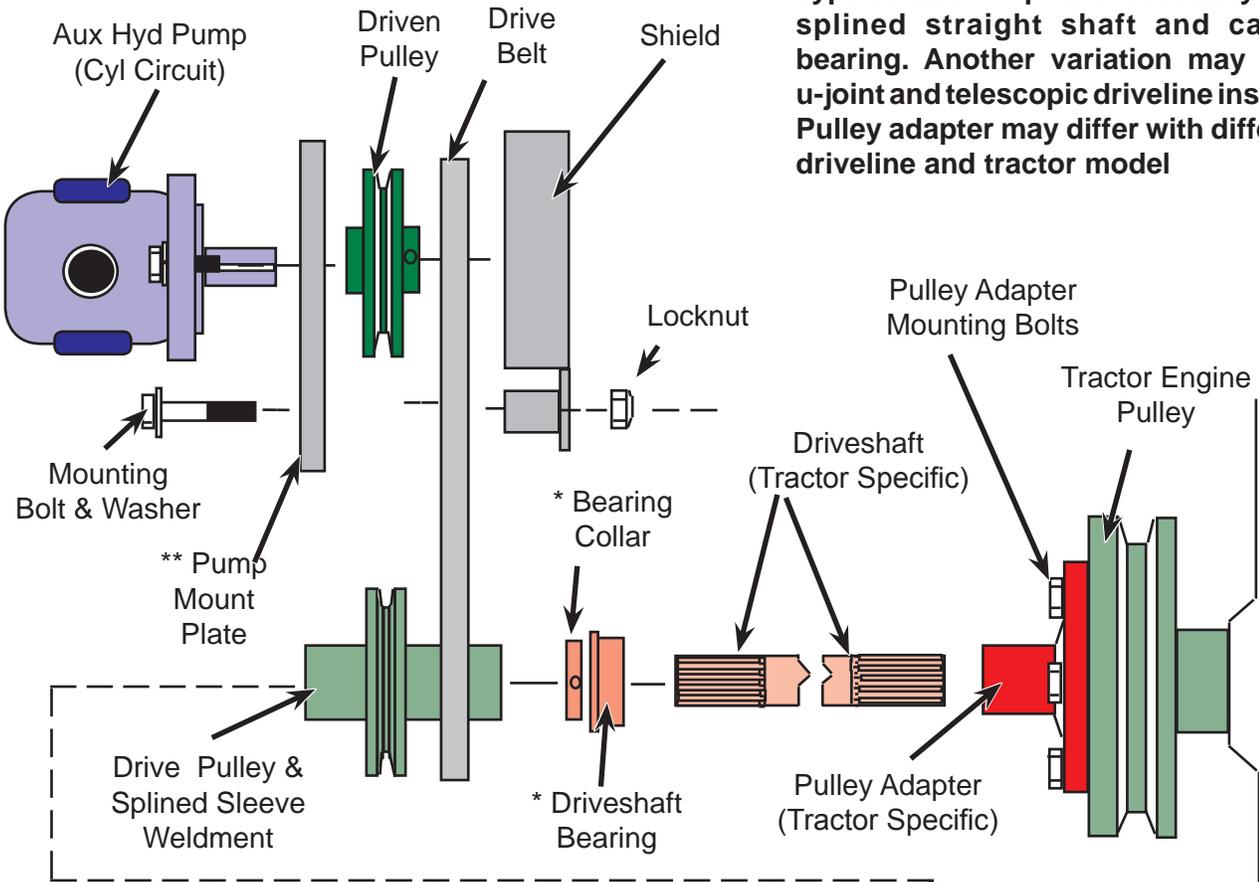
Typical drive & power assembly with splined straight shaft and carrier bearing. Another variation may have u-joint and telescopic driveline instead. Pulley adapter may differ with different driveline and tractor model



# Single Pump & Driveshaft Asy w/ Aux Pump

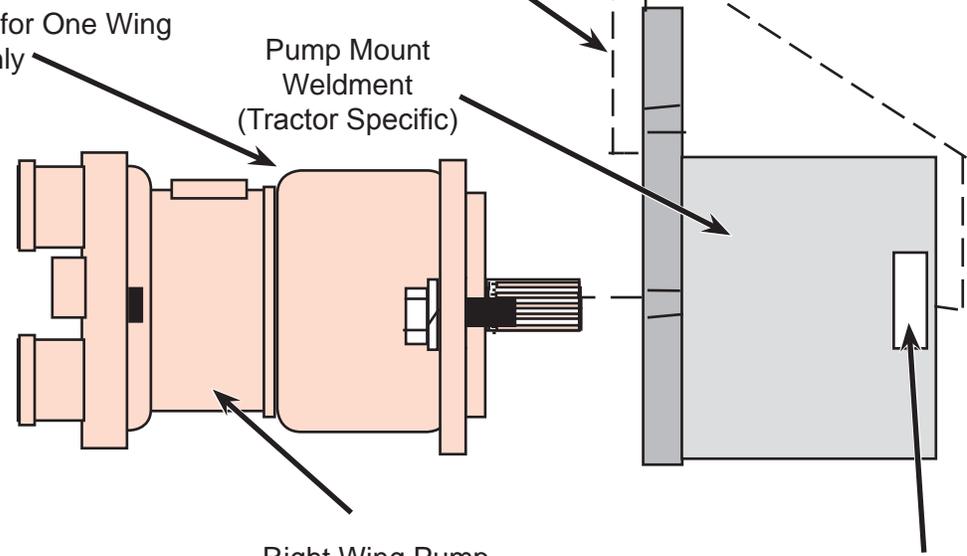
DRIVELINE ASSEMBLY

Typical drive & power assembly with splined straight shaft and carrier bearing. Another variation may have u-joint and telescopic driveline instead. Pulley adapter may differ with different driveline and tractor model



\*\* Small (Cyl Hyd) Pump Mount Plate mounts here

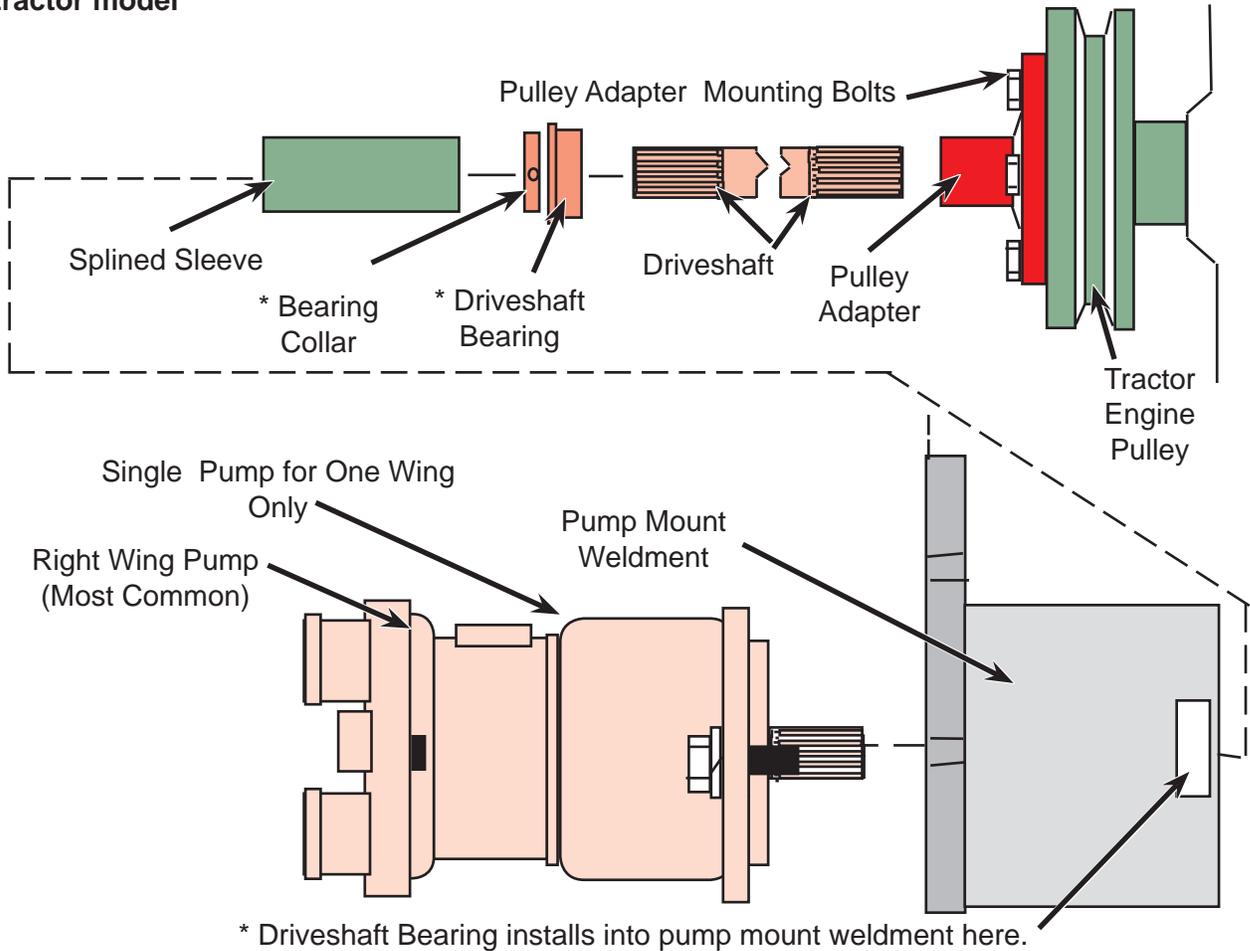
Single Pump for One Wing Only



\* Driveshaft Bearing installs into pump mount weldment here.

# Single Pump & Driveshaft Asy w/o Aux Pump

Typical drive & power assembly with splined straight shaft and carrier bearing. Another variation may have u-joint and telescopic driveline instead. Pulley adapter may differ with different driveline and tractor model



DRIVELINE ASSEMBLY

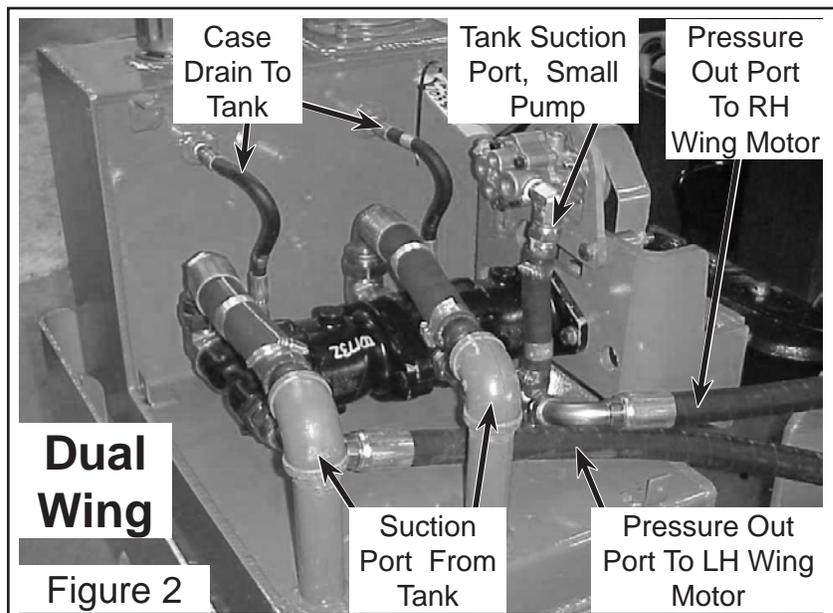
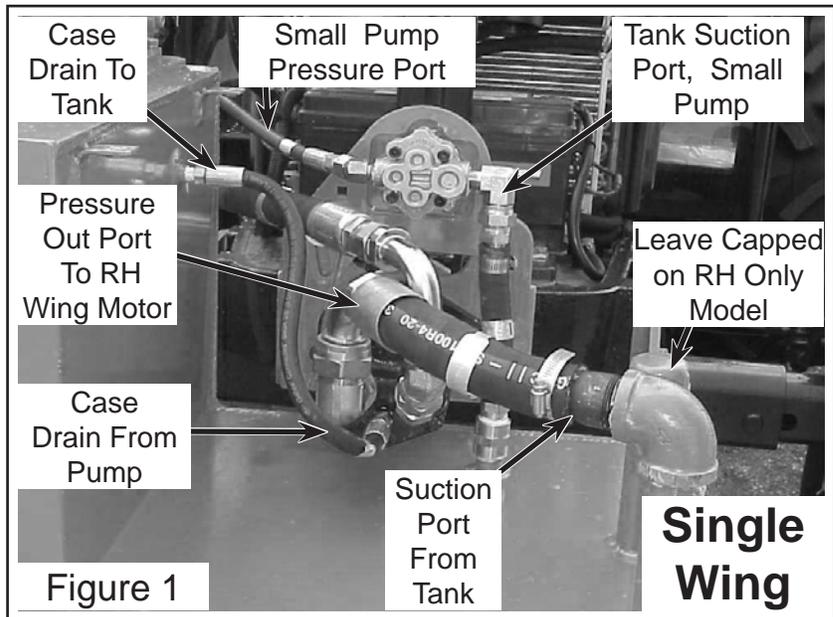
# Pump Mount Weldment Remove & Replace

## Preparation

- 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 approximately 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)
- 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

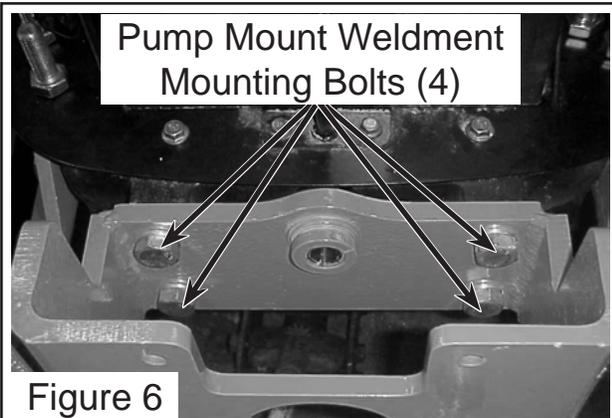
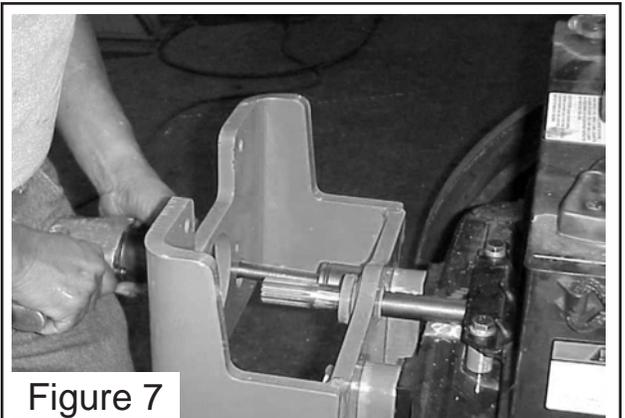
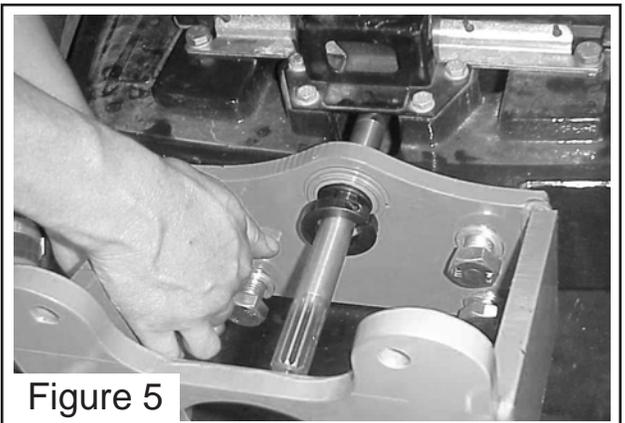
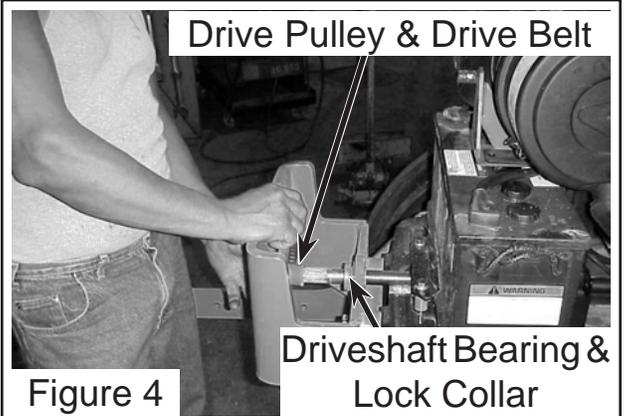
1. The hoses and pump will require being unbolted from the pump mount weldment, use the steps in the pump repair replacement section.
2. The pumps removed the model using the auxiliary pump will have the drive pulley and belt still on the driveshaft. Model that do not have the auxiliary pump will have a spline coupler. (See *Figure 3*).
3. The drive pulley weldment or splined coupler will slide off of driveshaft through the hole for the main pump (See *Figure 4*)
4. 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*)
5. The pump mount weldment has four mounting bolts. These 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



# Pump Mount Weldment Remove & Replace

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 use 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*).

6. 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



# Pump Mount Weldment Remove & Replace

1. 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.
2. 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)
3. Pump mount weldment replacement. The procedure to replace the pump mount weldment will be the reverse of the disassembly procedure.

**Important notes:**

- Make certain driveshaft is seated into the splined pulley adapter.
- Coat driveshaft with anti-seize compound where it goes through the carrier bearing.
- 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.
- It is recommended that the main pump shaft and the auxiliary pump shaft be coated with anti seize compound before installation. (See Figure 12)

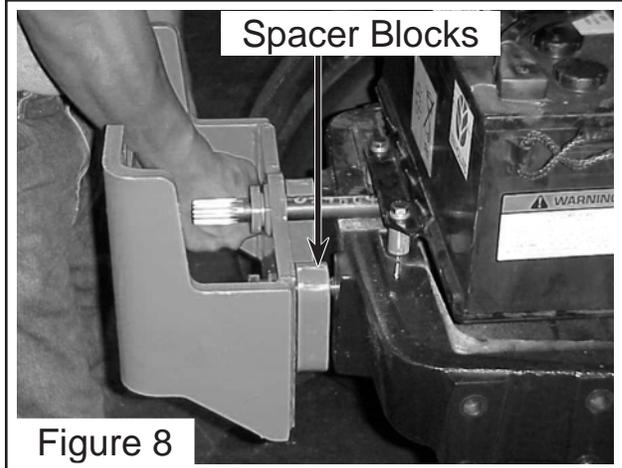


Figure 8

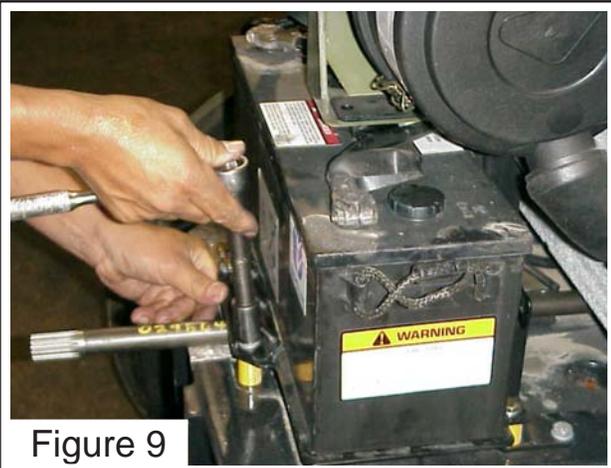


Figure 9

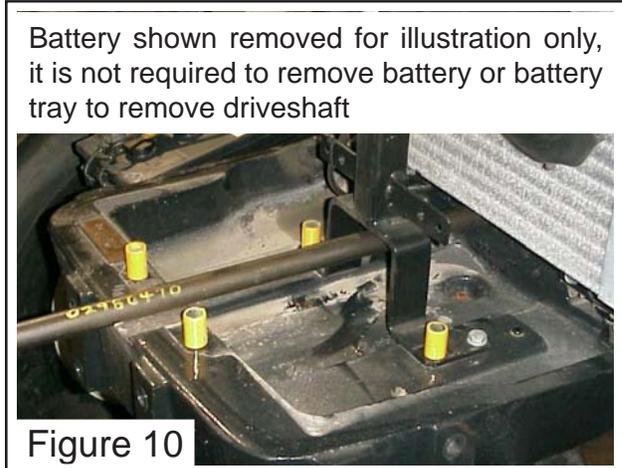


Figure 10

Battery shown removed for illustration only, it is not required to remove battery or battery tray to remove driveshaft

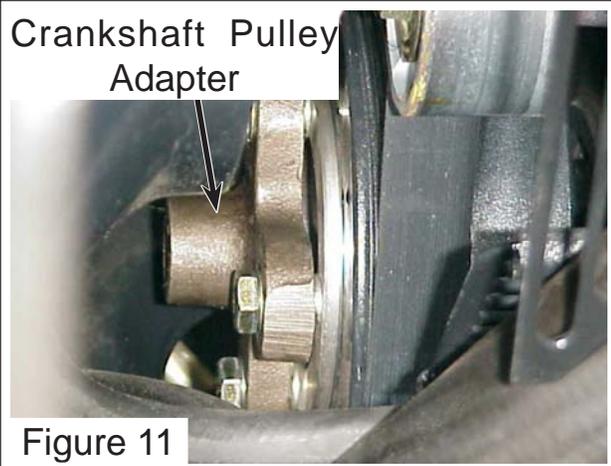


Figure 11



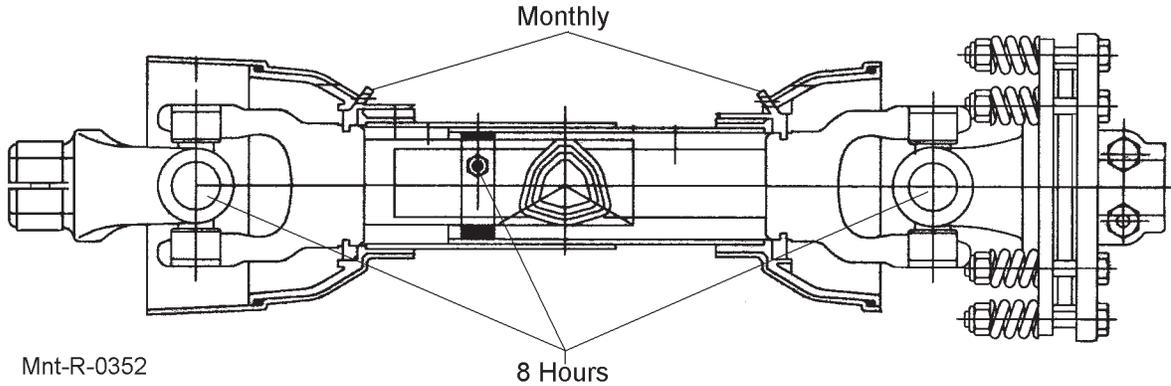
Figure 12

Coat pump shafts with anti-seize compound

# Driveline

## Driveline Lubrication

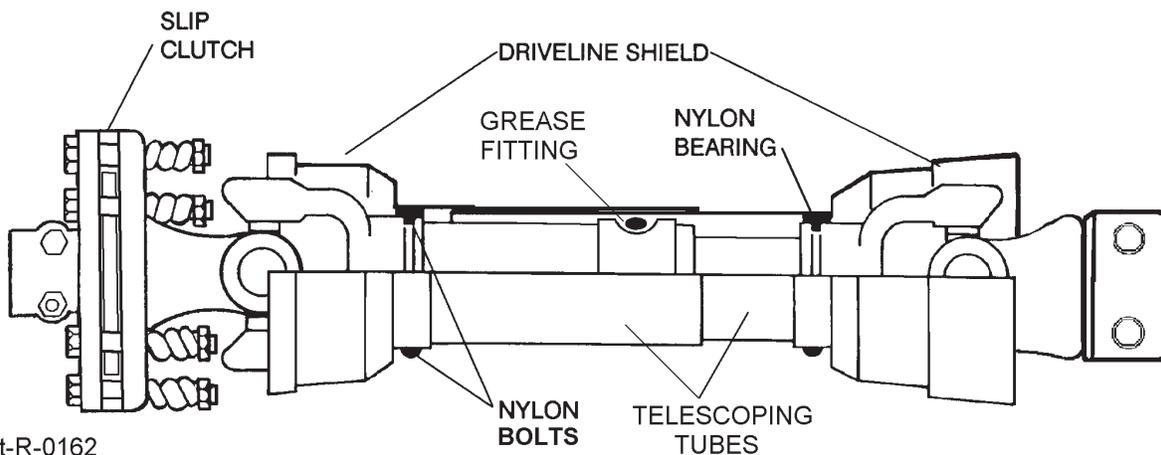
The drivelines and u-joints should be inspected each time before the mower is started. The u-joint on the driveline undergo extreme forces when the unit is turning. It is important that the u-joints be greased each time before the unit is started. The u-joints are located at each end of the drivelines. The u-joint assemblies are accessible by rotating the driveline safety shield until the hole in the shield matches up with the grease fitting. Use #2 bearing grease for lubrication. Inspect the u-joint for wear by holding the shaft on one side of the u-joint while trying to rotate the shaft on the other side of the u-joint. If there is noticeable movement in the driveline replace the u-joint before it causes severe damage to the driveline.



Mnt-R-0352

## Driveline Shields

The driveline integral shields should not become dented or otherwise damaged. The integral shield assembly has a nylon bearing at each end and should turn freely. This nylon bearing should require lubrication every 8 hours. To remove the integral shields for replacement or repair, turn the three nylon nuts 1/4 turn in the shield slots of the cone and tube and remove them. Slip the shield cone assembly off inner section of the driveline. Install the new or repaired shield on the driveline. Place the split nylon bearing over the driveline housing of shaft against the yoke and in the bearing groove. Install shield over the housing so the nylon bearing fits into the shield bearing retainer. Align a slot in the shield cone with one of the slots in the shield. Put one of the nylon nuts back in through the aligned slots and turn until it is perpendicular to the slots. Add the other two nylon nuts. Make certain that the driveline integral shields are free to telescope and rotate around the driveline without binding.



Mnt-R-0162

<u>Location</u>	<u>Extended Lube Interval</u>	<u>Lever Action Pumps</u>
Cross & Bearings	8 Hours	2 - 3
Telescoping Tube	8 Hours	6 - 8
Shield Bearings	50 Hours	1 - 2
Yoke Hub	20 Hours	1 - 2

# Driveline

DRIVELINE ASSEMBLY

## To Disassemble Universal Joint

1. Remove all snap rings.



EXTERNAL



Mnt-R-0364

INTERNAL

2. Position joint in loose vice, strike top arm of unsupported yoke to drive the top cup up. Repeat on opposite side.



Mnt-R-0365

3. If you cannot grip the loosened cap per Step 4, use a pointed tool to tip a needle then repeat Step 2.



Mnt-R-0366

4. Grip loosened cup in vise, strike yoke arm to drive yoke off cup. Repeat on opposite cup.



Mnt-R-0367

5. Support cross in loose vise and strike yoke arm. Repeat Step 4 to remove remaining two cups.



Mnt-R-0368

# Driveline

## To Reassemble Universal Joint

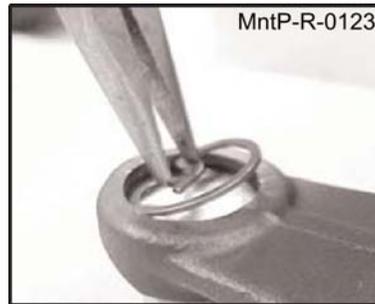
1. Smear grease into bearings and check for dirt. *CAUTION! Make sure all needle bearings are seated properly.*



2. Insert cup and cross. Drive in with spacer.



3. Insert snap ring



4. Insert second cup and hold cross into cup. Drive cup flush with arm.



# Driveline

5. Drive cup down with spacer and insert snap ring



6. To loosen cross, strike yoke arm and check cross for free rotation



7. Position second yoke on cross. Repeat Steps 2 to 6.

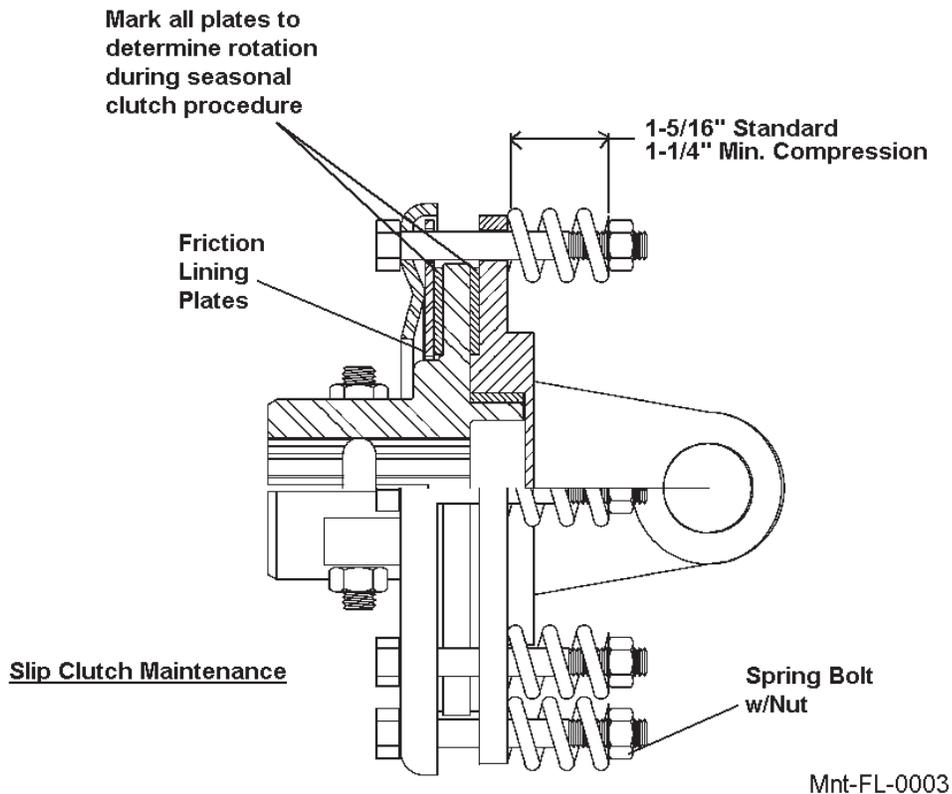


8. Grease Kit after assembly is completed.

# Slip Clutch

## Slip Clutch

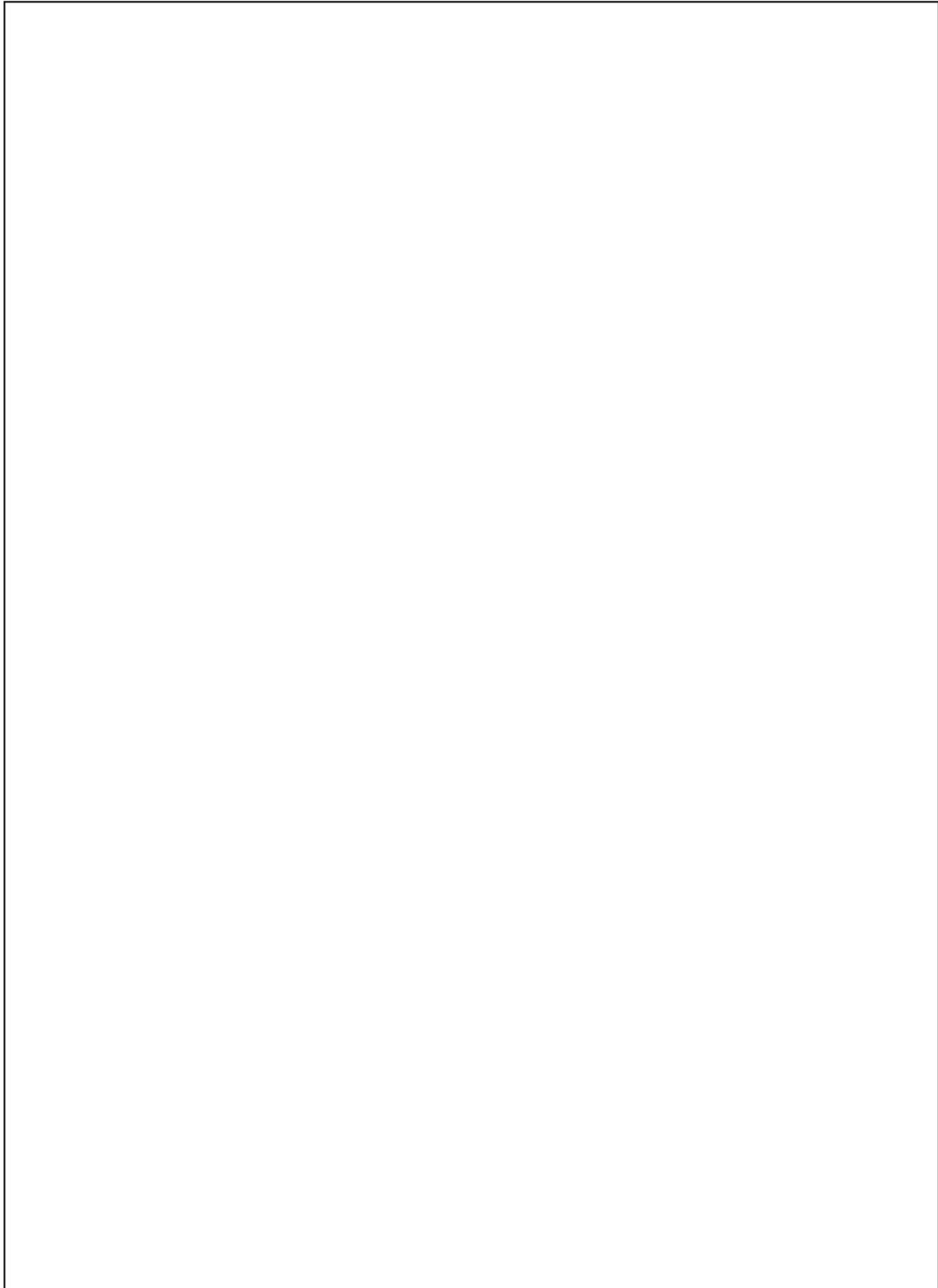
A slip clutch is incorporated in the PTO driveline. It is designed to slip, absorb the shock load, and protect the driveline. After the first hour of operation, the slip clutch should be checked for overheating. After this first check, the slip clutch should be checked weekly or anytime there is overheating. 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. Minimum spring compression length is  $1-1/4$ ". 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" section on the next page.



## Seasonal Clutch Maintenance

It is important that the clutch lining plates slip when an obstacle or load heavier than the 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.

1. Loosen nuts on springs until the springs can freely rotate, yet remain secure on bolts.
2. Attach mower to tractor and start the tractor. Set the engine speed at 1200 RPM.
3. Mark outer plates as shown above.
4. Engage the PTO (approximately one second) and then quickly disengage it. The friction lining plates should break loose (check the mark).
5. Turn tractor off and tighten the nuts on the springs to their original position of  $1-5/16$ " compressed spring length.



# Section 3

## **Hydraulic Pump and Motor Repair and Replace**

# Tandem & Single Pump Repair / Replace

## 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)

## 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.

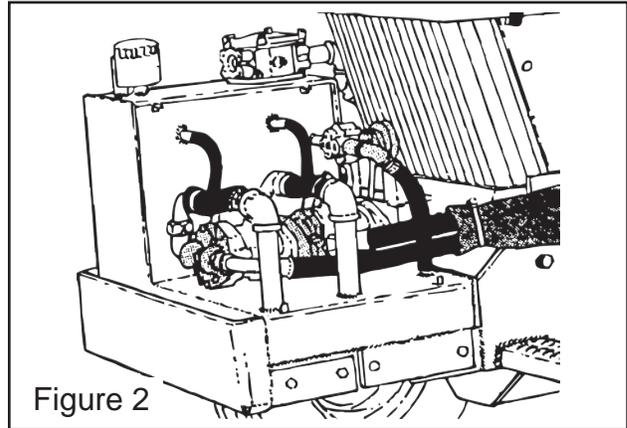


Figure 2

## Pump Type

The pump unit for the wing mower rotor shaft drive power 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.

## Pump Configurations Used

There are different pump configurations available that power the flail heads, motor circuit, and operate the hydraulic cylinder. They will use the same hydraulic tank and not all ports on the hydraulic tank will be used. The porting depends on the configuration.

- 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 achieve 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.

# Tandem & Single Pump Repair / Replace

## Type Hydraulic Reservoir Used

The Hydraulic reservoir for the Terrain Master 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 remain plugged.

## Drain Hydraulic Reservoir

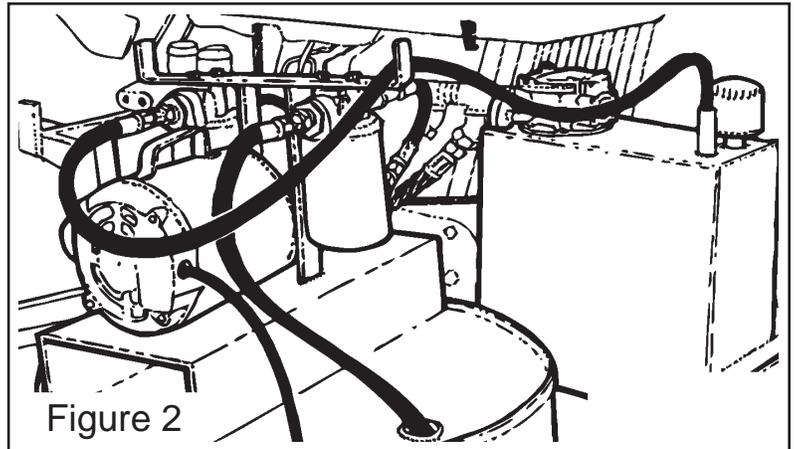
Secure Tractor so it cannot be started while repairing the pump. It will require the oil to be drained from the system and the tractor *must never* be started without proper level of oil in the system

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

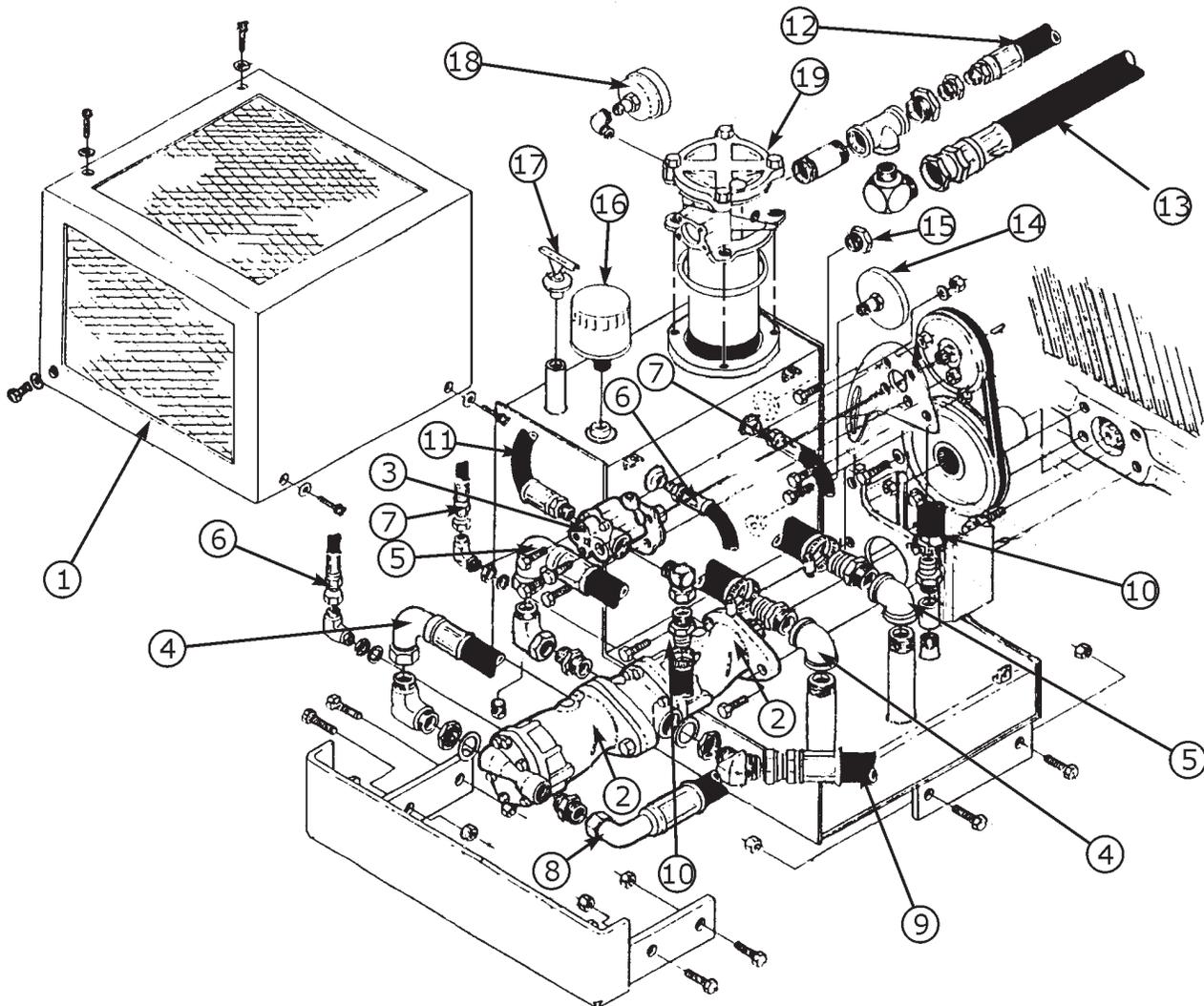
## Remove Pump Cover

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 disassembling starts, this will include all metal surfaces, hoses and hose fittings. (See *Figure 2*)



# Tandem Pump w/ Tank & Aux Pump

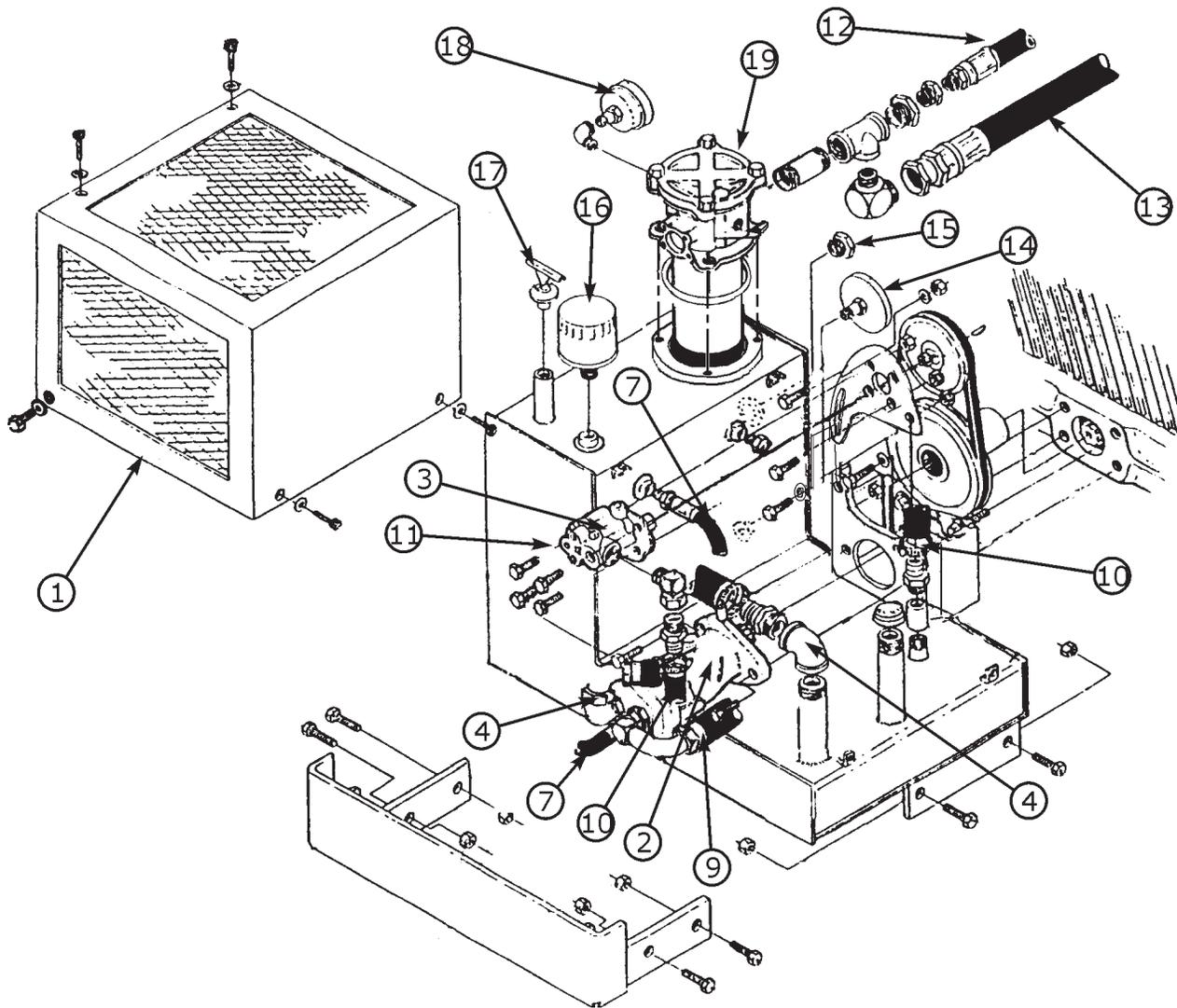
PUMP AND MOTOR



Item	Qty	Description
1	1	Hydraulic Tank and Pump Cover Weldment
2	1	Tandem Pump Assy, Outer Half LH Wing, Inner Half RH Wing
3	1	Auxillary Pump Assy
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 Auxillary Pump
11	1	Pressure Hose F/ Auxillary 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 & Single Pump Remove / Replace

PUMP AND MOTOR

## Important Warning

Once the pump removal process is started tractor *cannot* be started unless both pumps and pump driveshaft is removed. It is the responsibility 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 placed in the tractor operators compartment to prevent others from starting it. IF the tractor is started with pumps partially disconnected or drive shaft left in the tractor when tractor is started it will damage the tractor and/or other components.

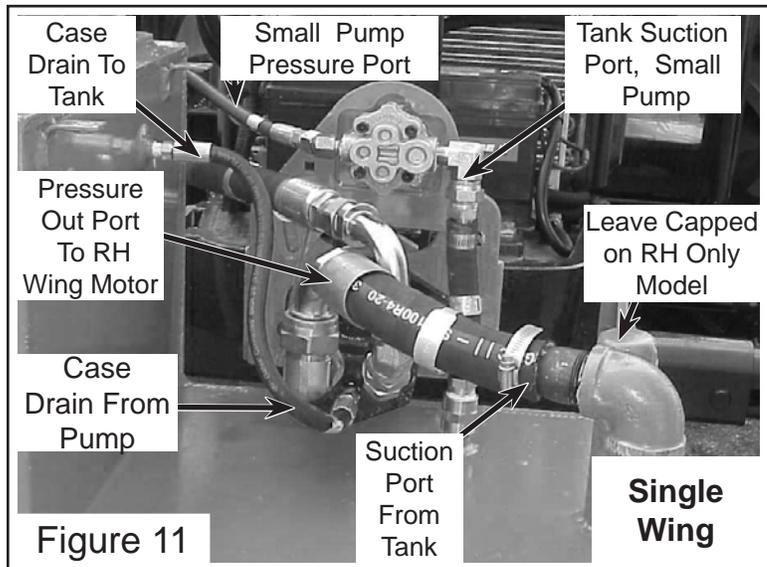
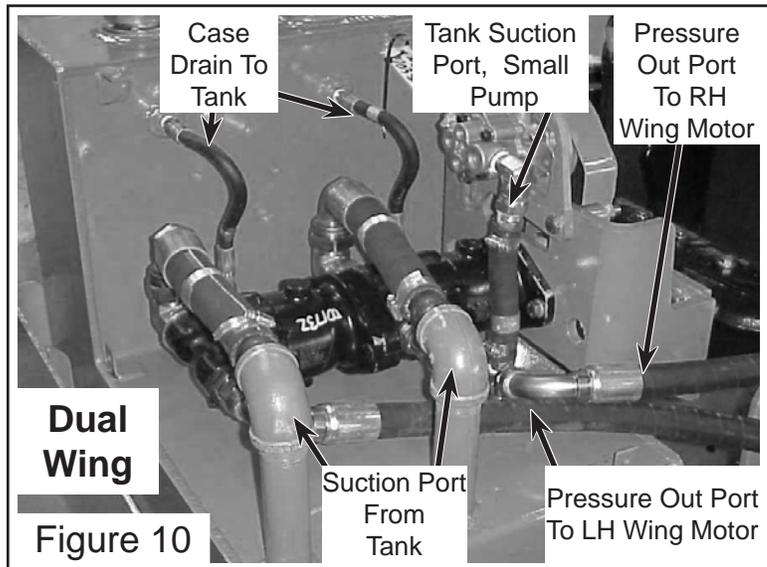
## Remove Pump (Pump For Motor Supply)

(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 its ports. Clean all oil spills at once. Cap all hoses immediately to prevent contamination of the hydraulic system.

## Remove Outer and 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 and 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 replaced 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.



# Tandem & Single Pump Remove / Replace

## Replace Outer and 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 and 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 and 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 too long or too 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 (with auxiliary pump) is installed correctly, *Note: do not tighten auxiliary pump pulley to driveshaft until later.* Make certain that auxiliary pump drive belt 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 with 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 single pump 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. Readjust 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 Terrain Masters 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 Disassembly & Reassembly

PUMP AND MOTOR

Tandem Pump (Dual Wing Model)

Inner (Rear) Pump  
 P/N 001840 = 2.77 CID  
 P/N 001734 = 2.28 CID

Pump ID Reference  
 No. is Stamped Here

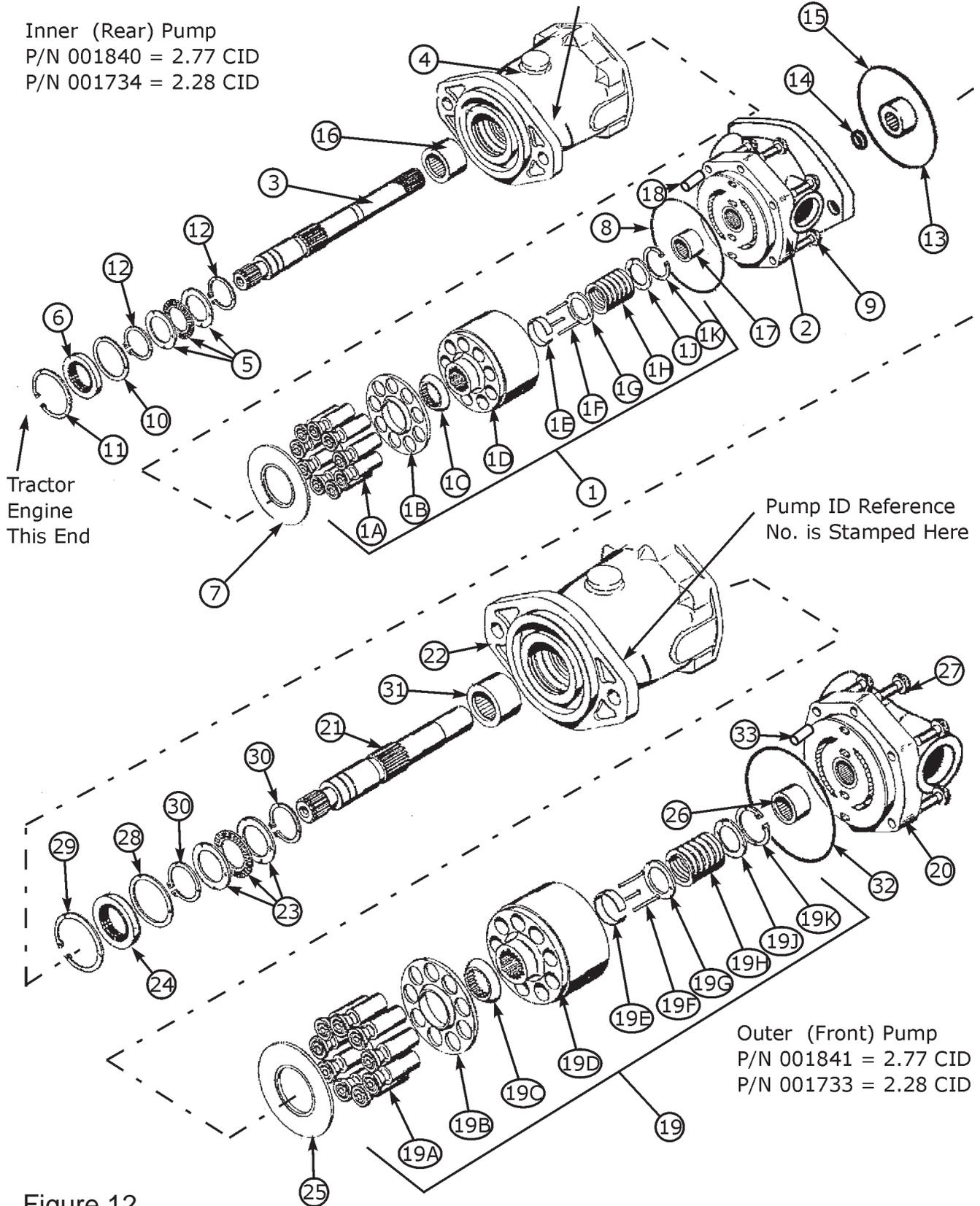


Figure 12

# Single Pump Disassembly & Reassembly

## Disassemble Single Pump

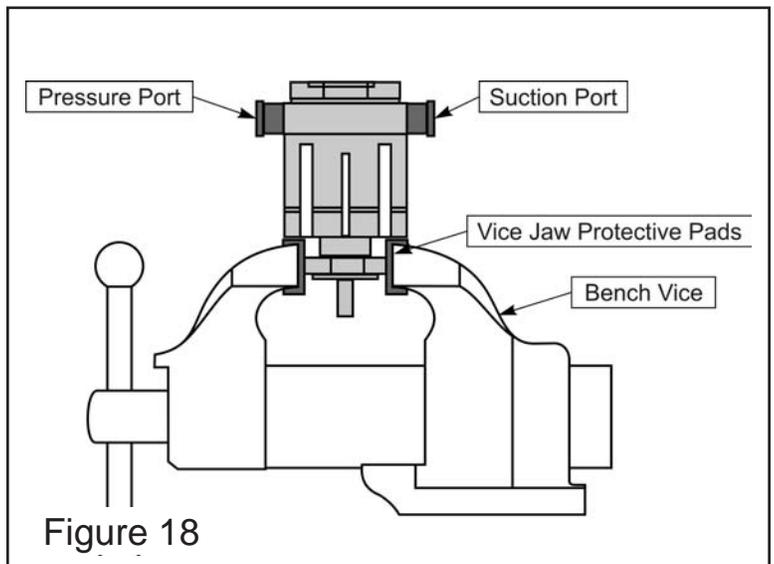
(For item numbers See Figure 17)

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 assembly upward and out of pump housing, it will require you to remove pump from vice and dump piston block assembly 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.
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 Disassembly. (Item 1D) The Piston block assembly need not be disassembled 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 disassemble the piston block

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

8. Place one flat washers over 3/8" x 3-1/4 bolt, place it through the center of piston block. Place other flat washer over the 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)
9. 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.
10. Remove snap ring. (Item 11) using internal snap ring pliers remove internal snap ring (Item 11) from front side of housing. (Item 4)
11. 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.
12. Remove seal washer (Item 10) which is located behind input seal. It may require to lift the housing and dump the washer out.
13. 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.
14. Remove snap ring (Item 12) and thrust race and 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 and bearing (Item 5) from the driveshaft. Remove the second snap ring (Item 12) from the driveshaft using snap ring pliers.



# Single Pump Disassembly & Reassembly

## 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 assembly.
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 OD 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.

## Reassemble Outer (Front) Pump

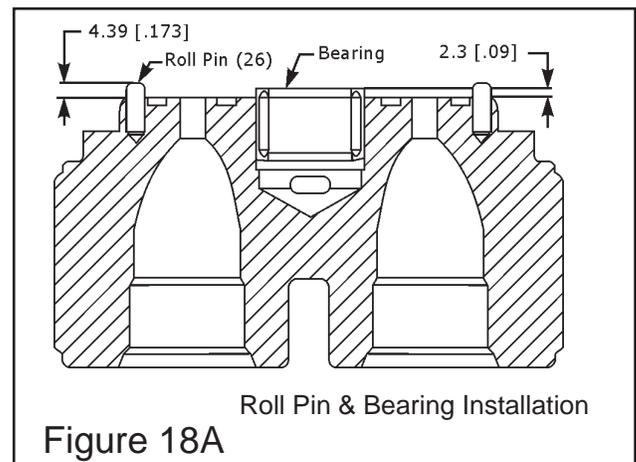
(For item numbers See Figure 17)

1. Coat moving parts for reassembly. All moving parts should be coated with lubricant before and during reassembly. If pump is to be used immediately after assembly, the recommended hydraulic oil for Terrain Master will work. If pump is to be set aside for use at a later date, pump moving components should be coated with something that will withstand the time the pump is sitting. Petroleum jelly (Vaseline) which can be purchased locally. This will work excellent for this as it will stick to the pump components while the spare pump is sitting on the parts shelf. If parts are to be assembled later the parts should be re-washed and cleaned.
2. Install snap rings (Item 12) and thrust race and 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 assembly into the pump housing. If necessary, install driveshaft (Item 3) into pump housing (Item 4) and install washer. (Item 10) Coat the ID 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 and 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 Flat washer  
1 ea. 3/8"-NC X 3-1/4" Bolt, Hex Head  
1 ea. 3/8"-NC Hex Nut
7. Place one flat washer over 3/8" x 3-1/4 bolt, place this through center of piston block. Place other flat washer over bolt and let it rest on the three pins. (Item 1F) Screw nut on to compress spring inside piston block. Use

# Single Pump Disassembly & Reassembly

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.

8. 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.
9. 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.
10. 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.
11. Install needle bearing (Item 17) into back plate assembly. (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)
12. Back plate (Item 2) and 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.
13. Back plate assembly (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.
14. 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.
15. 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.



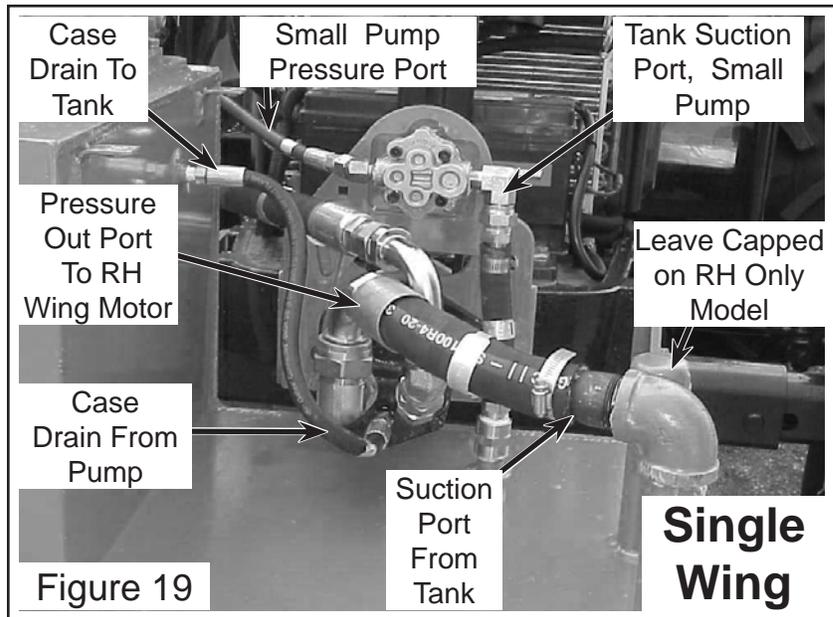
# Auxiliary Pump Remove & Repair

## Single Pump and Single Wing

The pump for the RH wing only (*single pump*) has one pressure hose. The rear (*closest to tractor engine*) is 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*)

## Tandem Pump and 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*)



## Suction Hoses From/ Motor Supply Pumps

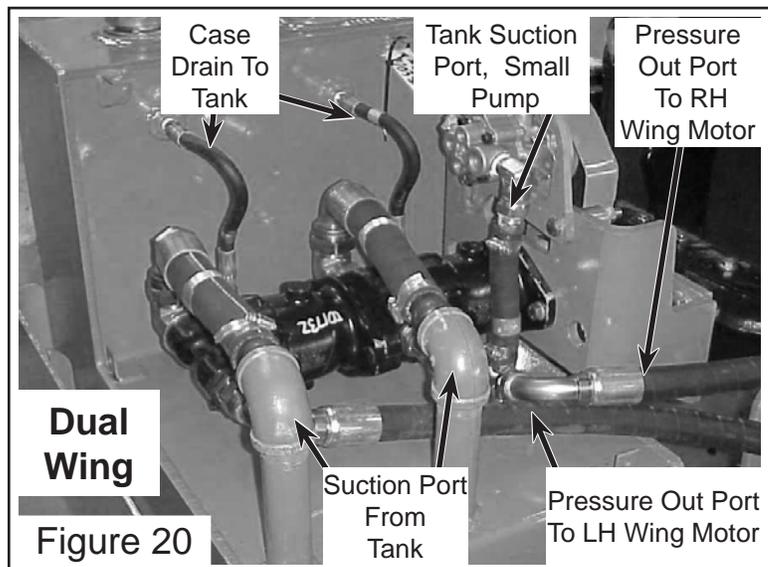
The suction hose is used for each pump section. (*Single or dual as shown*) When single pump is used one of the suction ports of the pump will remain plugged. (See *figure 5 and 19*)

## 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 and 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 and 9*)

## Remove Auxiliary Pump Hoses And Belt Guard

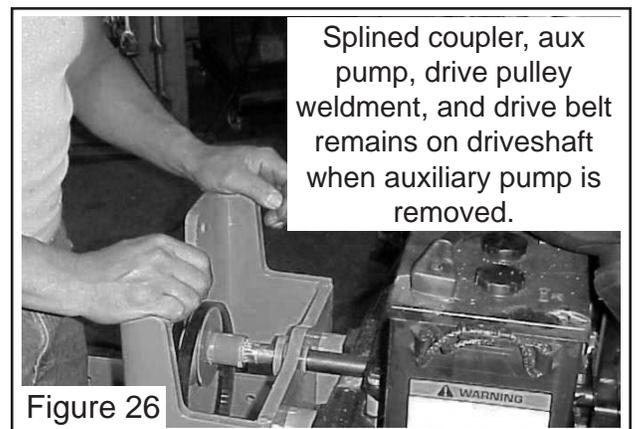
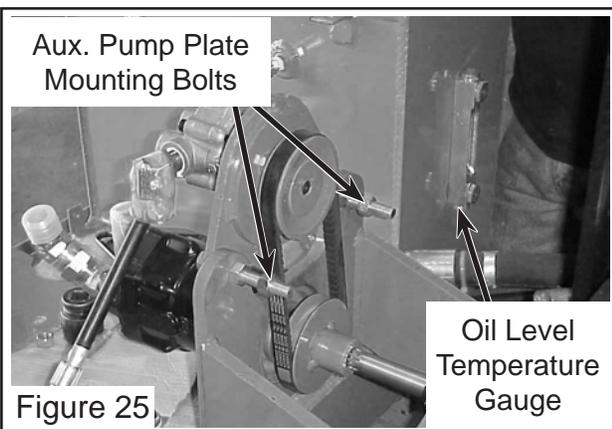
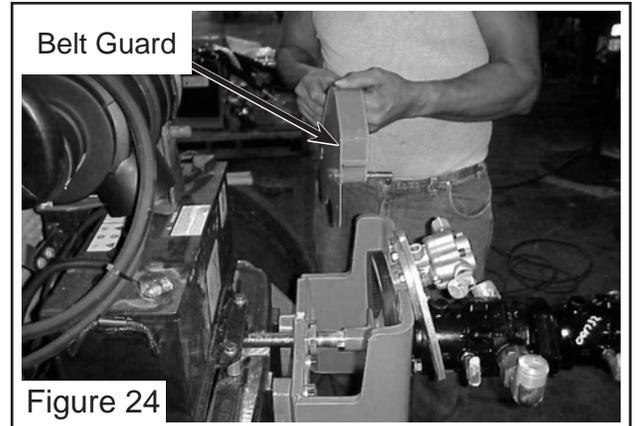
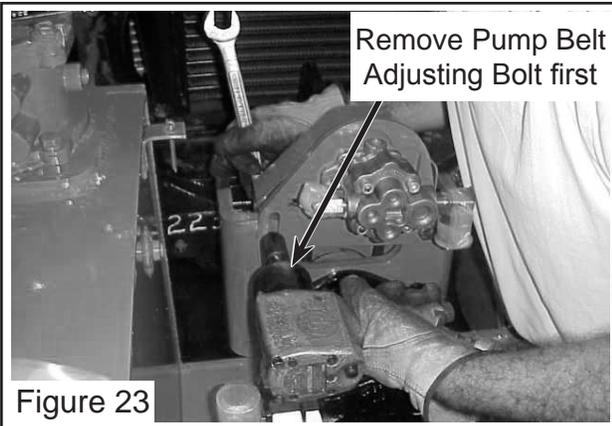
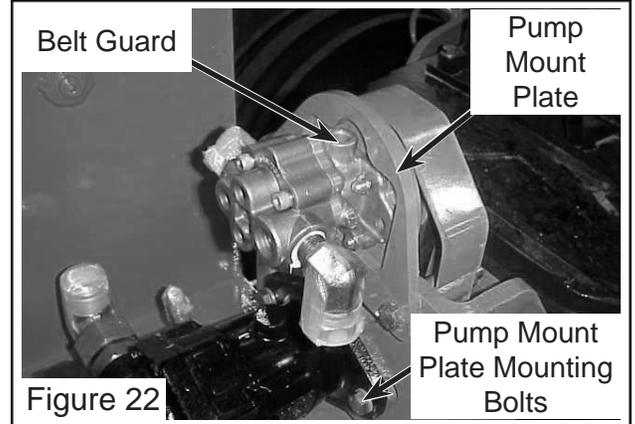
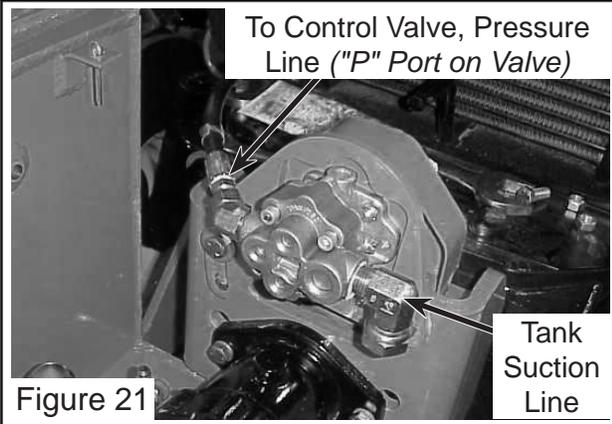
Remove the suction hose and the pressure hose from the auxiliary pump. (See *figure 22*) Make certain to cap. (*Plug all hydraulic opening when hoses and fittings are disconnected*) The belt guard is retained by the same bolts that retain the auxiliary pump mount plate to the main pump mount plate. There 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 and 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 and 26*)



# Auxiliary Pump Remove & Replace

## Remove Auxiliary Pump

Remove the two auxiliary pump mount plate bolts, (See *figure 24 and 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 splined coupler pulley weldment (See *figure 17 and 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.

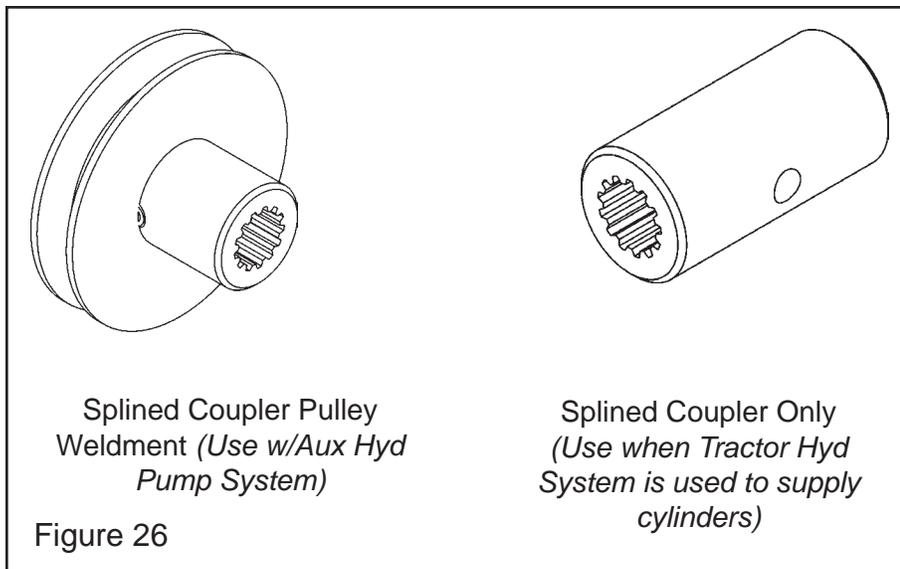


# Auxiliary Pump Disassembly

## Disassemble Auxiliary Pump

(See Figure 28 and 29)

1. Remove auxiliary pump drive pulley, loosen set screw in pulley and slide it off of pump shaft.
2. Remove pump from pump mount plate bracket. There are two bolts that mount the pump to the mounting plate bracket, remove these two bolts.
3. Remove drive key from pump input shaft before beginning the disassembly of pump. (See Figure 28)
4. 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)
5. Unbolt the pump assembly bolts that hold the two pump halves together. (See Figure 28)
6. 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)
7. 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 and 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.
8. 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.
9. 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 Reassembly, 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.
10. You 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 replaced 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 assembly, anti-extrusion block, wear plate, gasket insert, bridging insert are available as replacement parts in the form of a pump repair kit.



# Auxiliary Pump Reassembly

## Assemble auxiliary pump

(See Figure 28 and 29)

Note: To assemble and disassemble the auxiliary steps are basically the same in reverse. Use Disassembly And Reassembly section.

1. 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 vise at the pump mounting flange, use caution do not over tighten the vice and damage pump mounting flange.
2. 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)
3. 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)
4. 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.
5. Install seal assembly. 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)
6. Install wear plate. The wear plate is also referred to as other 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)
7. Install drive gear and driven gear. Check the input shaft of the drive gear around the keyway slot to make certain there are no burrs or sharp edges that will cut 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

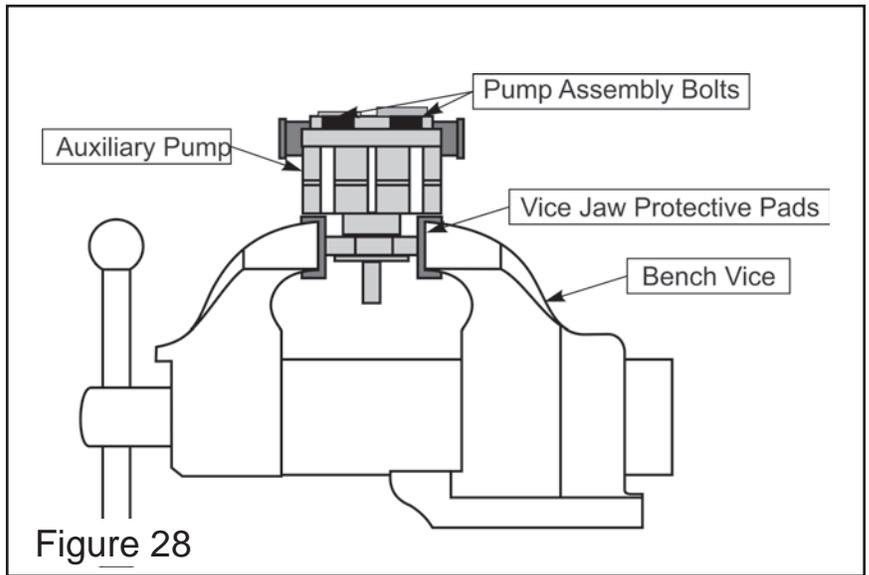


Figure 28

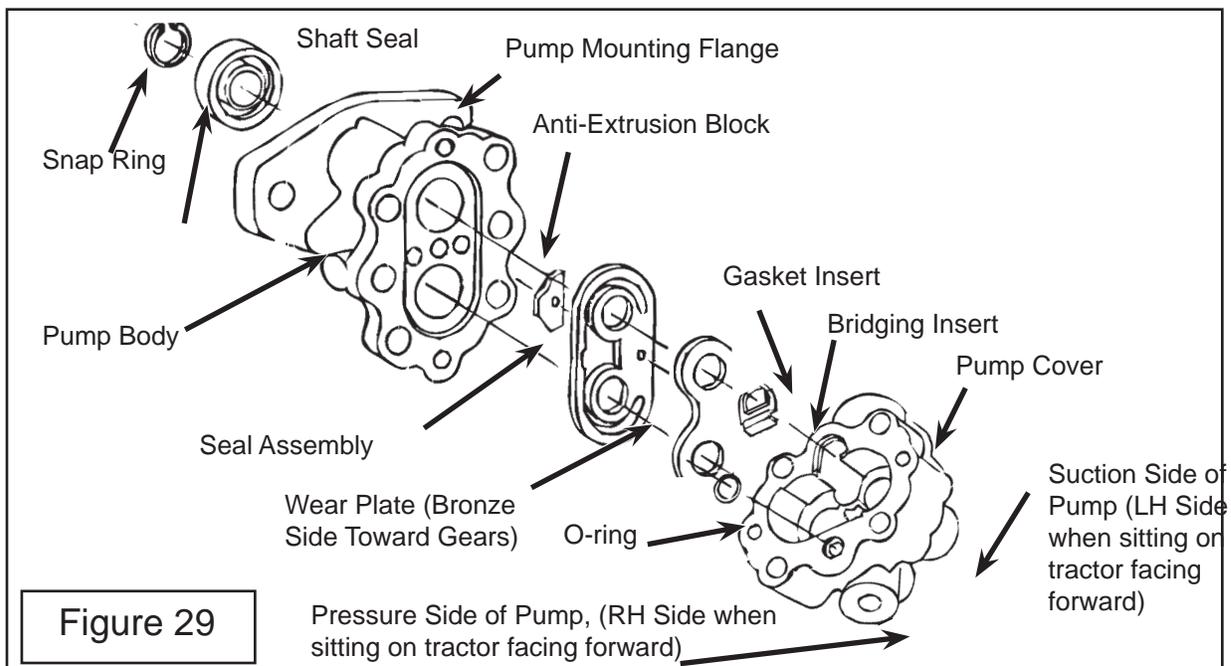


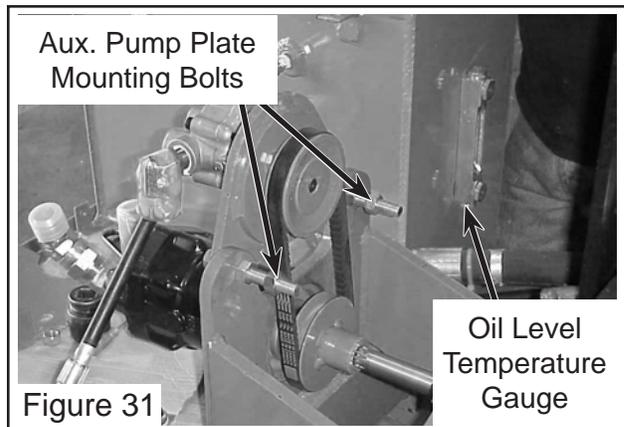
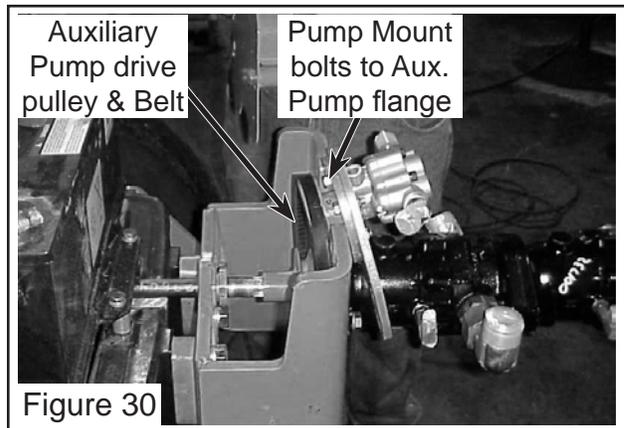
Figure 29

# Auxiliary Pump Reassembly & Reinstall

- certain they are seated correctly. Do not attempt to continue assembly if gears are not even in height.
8. 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.
  9. Install O-ring into pump cover. Coat O-ring with Vaseline which will hold the O-ring in the pump cover for assembly. Insert it in grooved space around hole in pump cover apposite where bridging insert installs. (See Figure 29)
  10. 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) Bolt pump cover and pump body together. There are four bolts and lock washer used to bolt the pump together. These bolts screw into the aluminum pump body. Do not over tighten these bolts.

## Reinstall Auxiliary Pump

1. Reinstall 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)
2. Install auxiliary pump drive pulley. Install drive pulley on auxiliary 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.
3. Bolt pump mount plate to main pump mounting plate. The auxiliary 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)
4. Align auxiliary pump drive pulley. With the auxiliary pump mount plate firmly tightened and the drive belt on the pulley, but not adjusted tight. Slide the pump drive pulley on the pump shaft until the upper pulley is aligned with the lower one. Once the pulleys are aligned tighten the retaining set screw in the upper pulley to secure it to the pump shaft. (See Figure 33)
5. Install auxiliary pump belt cover. The belt cover will mount on the same two bolts that mounts the auxiliary pump mount plate to the main pump mount plate. Do not tighten the mounting bolts yet. (See Figure 34)
6. 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 adjust 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 adjusting bolts. (See Figure 32 and 35)



# Auxiliary Pump Removal, Repair & Replace

7. 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.
8. 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 and 38) which shows these ports. Make certain the elbow (Pressure port of outer tandem pump See Figure 37, 38 and 39) is installed and tightened pointing to the rear of the pump, this is the pressure port to the cylinder control valve.
9. Reinstall 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)

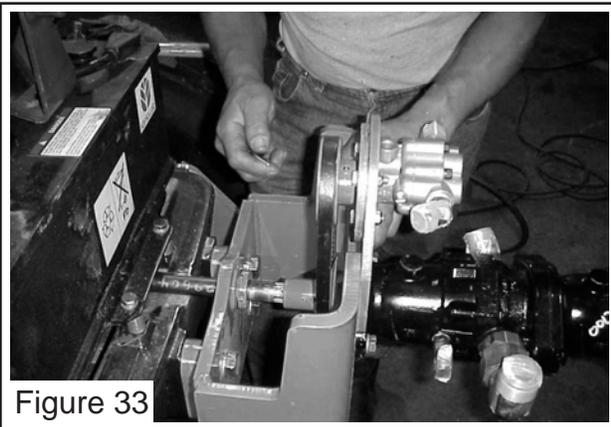


Figure 33

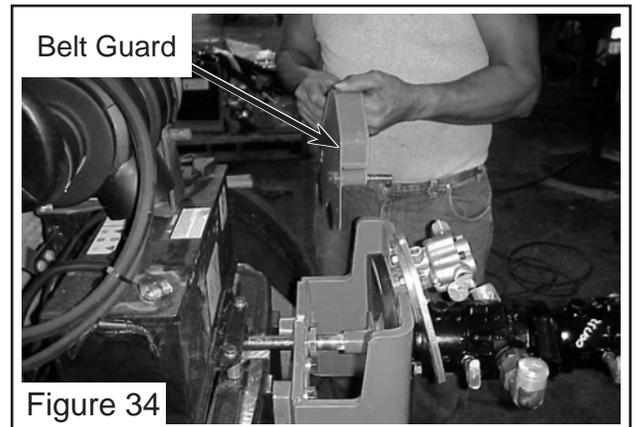


Figure 34

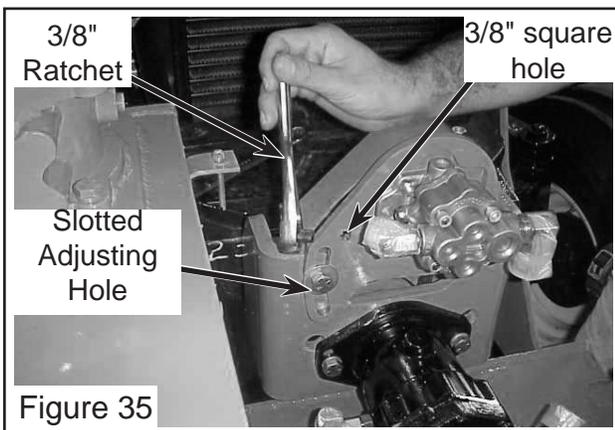


Figure 35

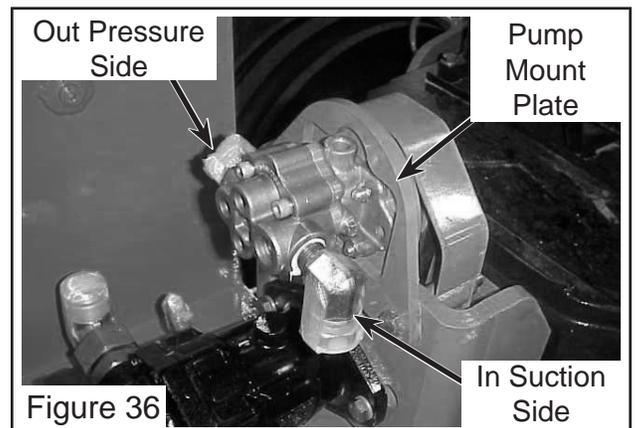


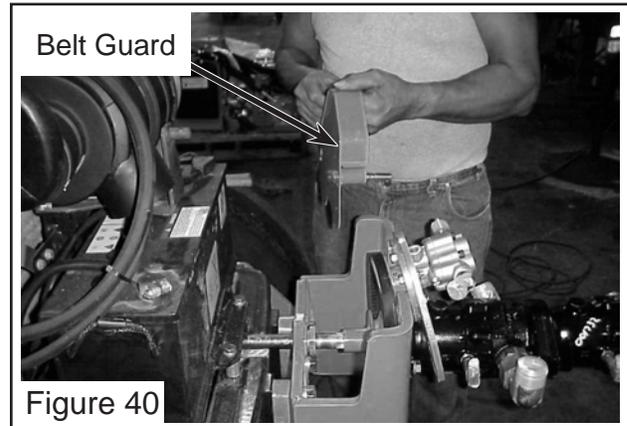
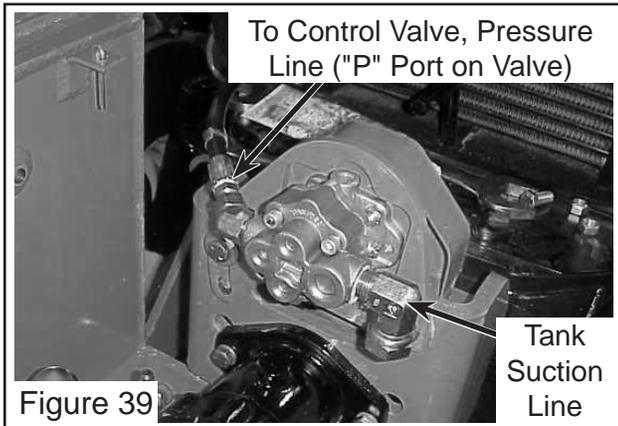
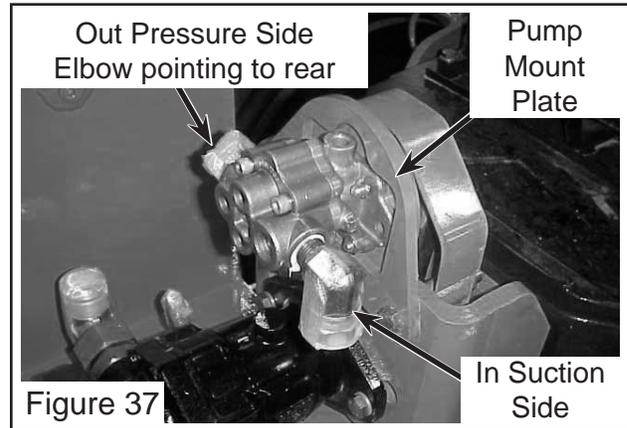
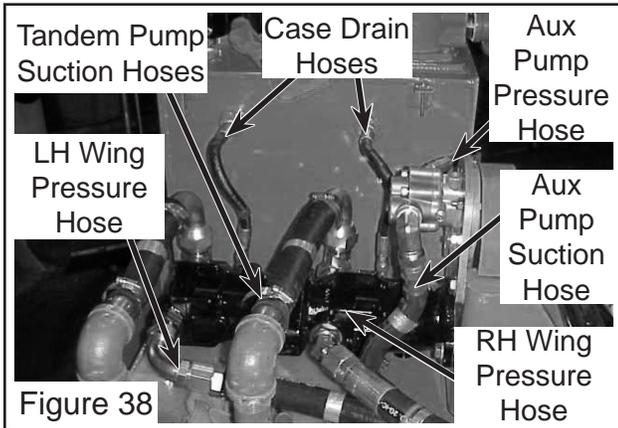
Figure 36

# Auxiliary Pump Removal, Repair & Replace

## Hydraulic Schematics

(See Hydraulic and Electric Schematic Figure 41 thru 44 on next pages)

1. Figure 41, Hydraulic Schematic Single Pump for single Wing with Auxiliary hydraulic pump for cylinder control
2. Figure 42, Hydraulic Schematic Dual Pump for Dual Wing with Auxiliary hydraulic pump for cylinder control.
3. Figure 43, Hydraulic Schematic Single Pump for single Wing using tractor hydraulic pump for cylinder control
4. Figure 44, Hydraulic Schematic Dual Pump for Dual Wing using tractor hydraulic pump for cylinder control.



# Tandem Pump Disassembly & Reassembly

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

\*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	Qty	Description	Item	Part No.	Qty	Description
1	1	Rotating Kit Asy	19	1	Rotating Kit Asy	
1A	1	Piston Asy	19A	1	Piston Asy	
1B	1	Spider	19B	1	Spider	
1C	1	Pivot	19C	1	Pivot	
1D	1	Piston Block	19D	1	Piston Block	
1E	1	Pin Keeper	19E	1	Pin Keeper	
1F	3	Pin	19F	3	Pin	
1G	1	Washer	19G	1	Washer	
1H	1	Spring	19H	1	Spring	
1J	1	Washer	19J	1	Washer	
1K	1	Snap Ring	19K	1	Snap Ring	
2	1	Back-Up Plate Asy w/Brg	20	1	Back-Up Plate Asy w/Brg	
3	1	Driveshaft	21	1	Driveshaft	
4	1	Housing (Not Furnished as Parts)	22	1	Housing (Not Furnished as Parts)	
5	1	Thrust Race & Bearing	23	1	Thrust Race & Bearing	
6	1	* Shaft Seal	24	1	* Shaft Seal	
7	1	Cam Plate Insert	25	1	Cam Plate Insert	
8	1	* "O" Ring	26	1	* O-Ring	
9	6	Bolt	27	6	Bolt	
10	1	Washer	28	1	Washer	
11	1	* Retaining Ring	29	1	* Retaining Ring	
12	2	* Retaining Ring	30	2	* Retaining Ring	
13	1	Coupler	31	1	Bearing, Backplate	
14	1	Lock Ring	32	1	Bearing, Housing	
15	1	"O" Ring	33	1	Roll Pin	
16	1	Bearing, Backplate	33A	1	Seal kit, Outer Pump (* in Seal Kit)	
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
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)

# Tandem Pump Disassembly & Reassembly

## Tools Required For Pump Disassembly And Reassembly

- 1 Ea. Ratchet wrench 1 ea. 1/2" Socket
- 1 Ea. Seal driver or similar tool 1 ea. Torque wrench 68 n\*m (50 ft lbs)
- 1 Ea. Soft face hammer 1 ea. Petroleum jelly (Vaseline)
- 1 Ea. Internal snap ring pliers (straight 2.3mm (.090 In.) Tip)
- 1 Ea. External snap ring pliers (straight 1.8mm (.070 In) tip)

## Tandem Pump Disassembly 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 Terrain Master. For a specific tractor mounting components see the assembly manual and/or the assembly instruction that were shipped with unit.

## Unbolt Outer Pump From Inner Pump

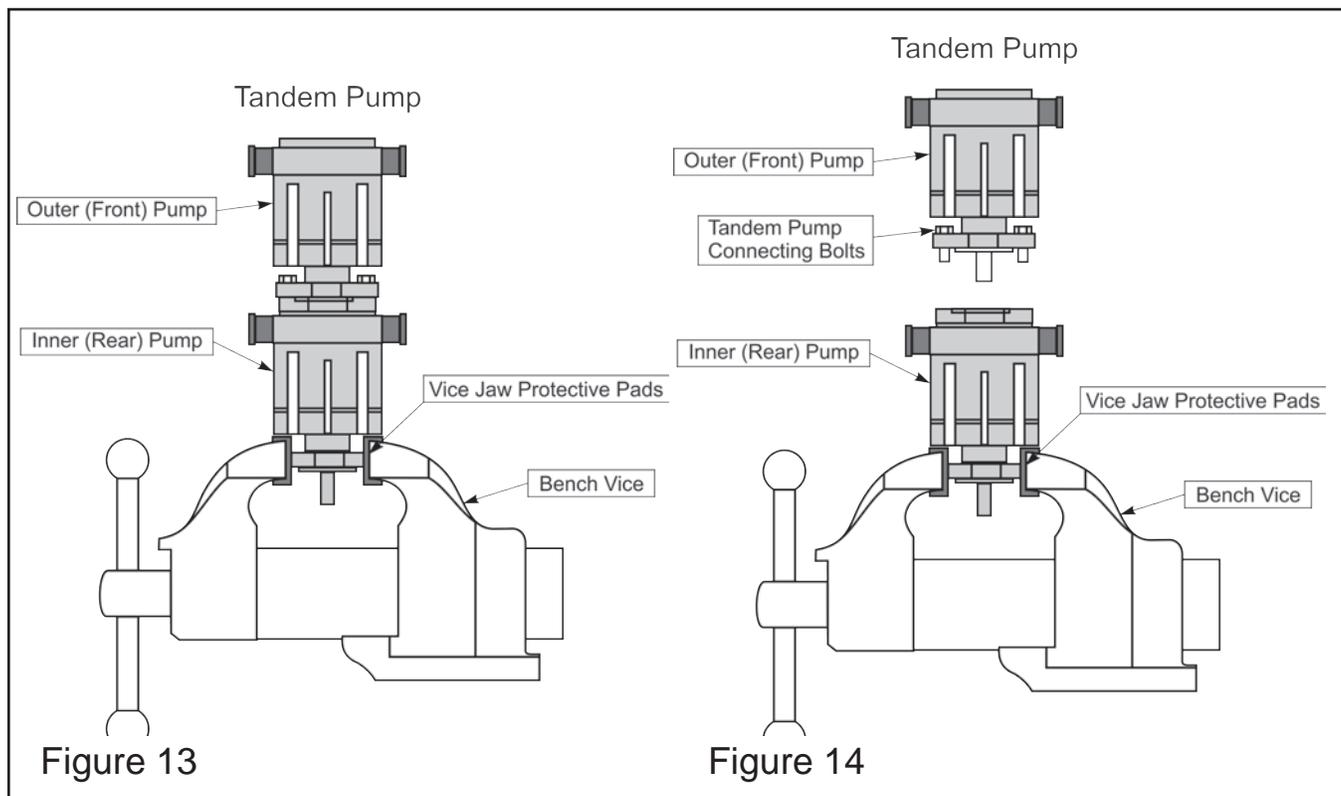
Clean the outside of pump assembly thoroughly if this was not done before it was removed from tractor. Make certain all pump openings are sealed during cleaning. Make certain work area and all tools are clean.

1. 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 and outer pump separated set outer pump aside for now. (See Figure 14)

## Disassemble 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 disassembly.
2. Remove inner pump to outer pump coupler. Pump shaft coupler (Item 13) may have stayed on outer pump input



# Tandem Pump Disassembly & Reassembly

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*)
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 disassembly. (*Item 1D*) The piston block assembly need not be disassembled unless the pins (*Item 1F*) or the spring (*Item 1H*) is damaged.
11. *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 disassemble the piston block

- 2 Ea. 3/8"-ID x 1-1/8" OD flat washer
- 1 Ea. 3/8"-NC x 3-1/4" bolt, hex head
- 1 Ea. 3/8"-NC hex nut

12. Place one of the flat washers over the 3/8" x 3-1/4 bolt and place this through the center of the piston block. Place the other flat washer 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 1E*) and the pin keeper. (*Item 1E*)
13. 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.
14. Remove snap ring. (*Item 11*) Using internal snap ring pliers remove internal snap ring (*Item 11*) from front side of housing. (*Item 4*)
15. 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.
16. Remove seal washer (*Item 10*) which is located behind input seal. It may require to lift the housing and dump the washer out.
17. 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.
18. Remove snap ring (*Item 12*) and thrust race and 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 and bearing (*Item 5*) from the driveshaft. Remove the second snap ring (*Item 12*) from the driveshaft using snap ring pliers.

# Tandem Pump Disassembly & Reassembly

## 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 assembly.
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 OD 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.

## Reassemble Inner (Rear) Pump

(For item numbers See Figure 12)

1. Coat moving parts for reassembly. It is recommended that all moving parts be coated before and during reassembly. If pump is to used immediately after assembly, the recommend hydraulic oil for the Terrain Master 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 and 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 assembly into the pump housing. If necessary, install driveshaft (Item 3) into pump housing (Item 4) and install washer. (Item 10) Coat the ID 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 and 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 flat washer  
1 Ea. 3/8"-NC x 3-1/4" bolt, hex head  
1 Ea. 3/8"-NC hex nut
7. Place one of the flat washers over the 3/8" x 3-1/4 bolt and place this through the center of the piston block. Place the other flat washer 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

# Tandem Pump Disassembly & Reassembly

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.

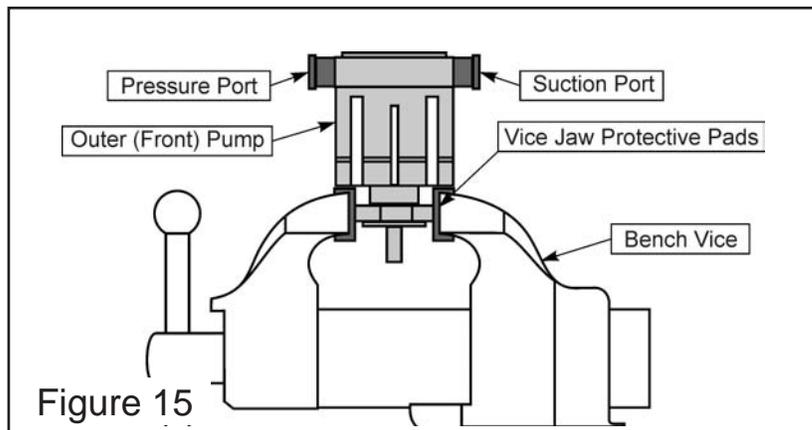
8. Install pivot (*Item 1C*), spider (*Item 1B*) and piston assembly. (*Item 1A*) Sit the pivot (*Item 1C*) down onto the piston block with the taper rounded side up. (*See Figure 12*) Sit the spider (*Item 1B*) down over the pivot noting the concave hole in the center of the spider will sit over the 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
9. 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.
10. 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.
11. Install needle bearing (*Item 17*) into back plate assembly. (*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.
12. Back plate (*Item 2*) and 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.
13. Back plate assembly (*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" High 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.
14. 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.
15. 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.
16. 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 Vaseline.

# Tandem Pump Disassembly & Reassembly

## Disassemble 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 for disassembly, 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 assembly (Item 19) f/pump housing. (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 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 disassembly. (Item 19D) The piston block assembly need not be disassembled 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 disassemble the piston block

- 2 Ea. 3/8" Id x 1-1/8" OD flat washer
- 1 Ea. 3/8"-Nc x 3-1/4" bolt, hex head
- 1 Ea. 3/8"-Nc hex nut

Place one of the flat washers over the 3/8" x 3-1/4 bolt and place this through the center of the piston block. Place the other flat washer 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 and 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 and bearing (Item 23) from the driveshaft. Remove the second snap ring (Item 30) from the driveshaft using snap ring pliers.

# Tandem Pump Disassembly & Reassembly

## 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 assembly.
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.
5. Inspect pistons. (Item 19A) The OD 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.

## Reassemble Outer (Front) Pump

(For item numbers See Figure 12)

1. Coat moving parts for reassembly. It is recommended that all moving parts be coated before and during reassembly. If pump is to used immediately after assembly, the recommend hydraulic oil for the Terrain Master 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 and 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 assembly into the pump housing. If necessary, install driveshaft (Item 21) into pump housing (Item 22) and install washer. (Item 28) Coat the ID 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 and 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 Flat Washer
- 1 Ea. 3/8"-NC X 3-1/4" Bolt, Hex Head
- 1 Ea. 3/8"-NC Hex Nut

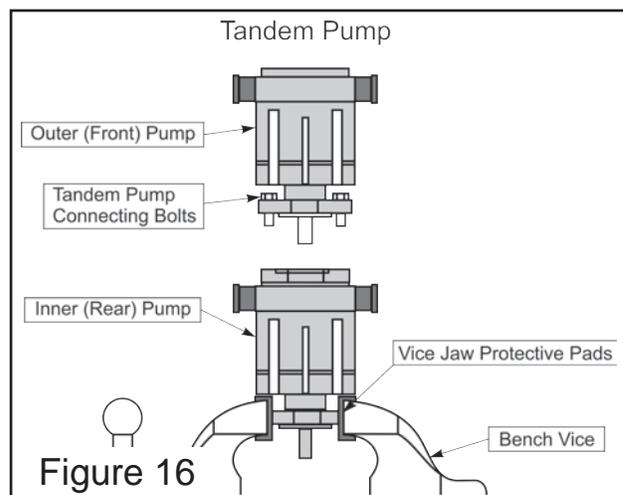
Place one flat washer over 3/8" x 3-1/4 bolt, place this through center of piston block. Place other flat washer over bolt and let it rest on the three pins. (Item 19F) Screw nut on to compress spring inside piston block. Use snap ring pliers to install internal snap ring. (Item 19K) Install internal 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 pressure on spring (Item 19H) allowing it to seat against snap ring. (Item 19K) Never remove snap ring in piston block without compressing spring first.

# Tandem Pump Disassembly & Reassembly

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 a time.
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 assembly with oil. Slide piston block assembly into end of pump housing aligning id of it over driveshaft. Push piston block assembly 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 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 force of your hand there is something wrong.
10. Install needle bearing (*Item 32*) into back plate assembly. (*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*) and 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 assembly (*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 downward. (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 and 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 reassemble 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.



# Single Pump Disassembly & Reassembly

## Single Pump (Single Wing Model)

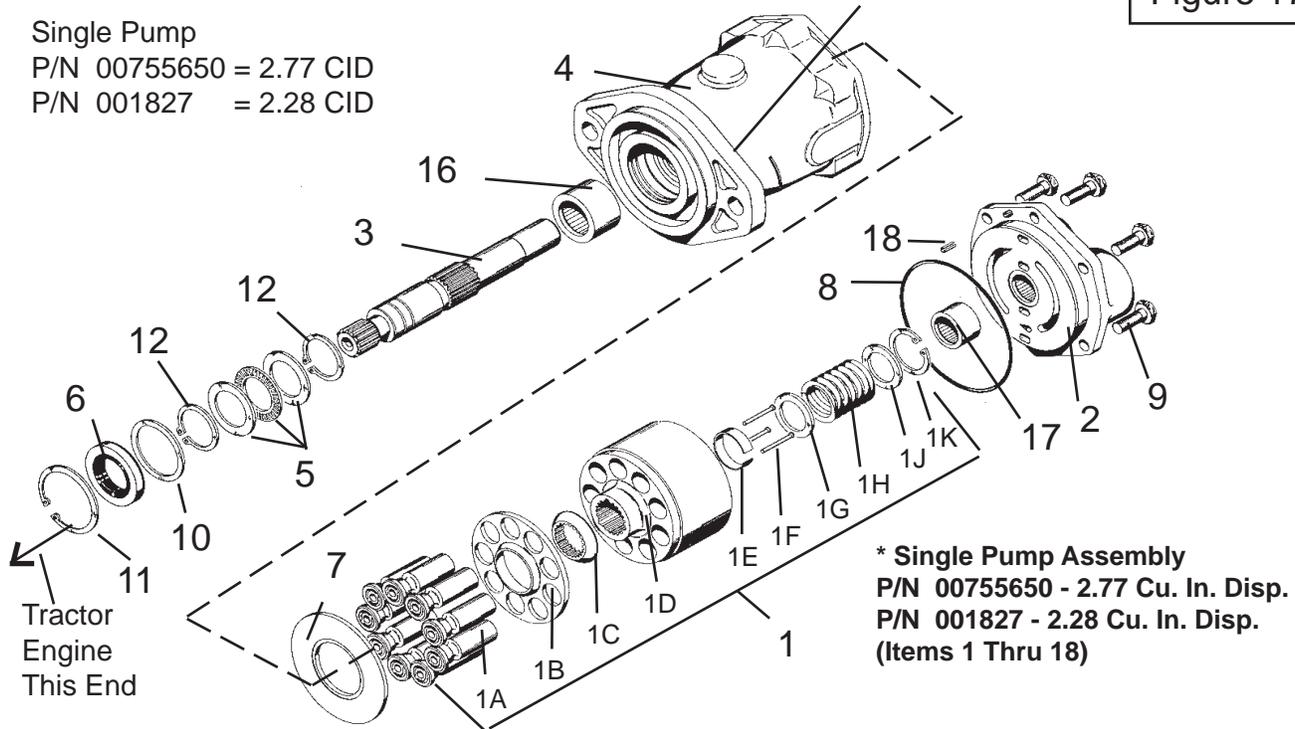
Pump ID Reference  
No. is Stamped Here

Figure 17

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

\* 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 Replacing 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 available as a replacement part. If the housing needed to be replaced it would require the pump assembly to be replaced as an assembly. This is when it is so important to identify the pump by checking the number stamped in the pump flange.

# Motor Removal & Replace

## Motor Removal From Wing Deck

Secure tractor and 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 disconnected from tractor battery.

1. Remove drive belt cover on wing mowers. Remove drive belt cover (See Figure 1) which will allow access to the motor drive belt and pulley. (See Figure 2)
2. Disconnect hoses from wing motor. The hoses on the wing will need to be disconnected from motor. Cap (plug) these hoses and all openings in motor immediately when you disconnect them. (See Figure 2)
3. 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)
4. 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)
5. Remove motor asy from wing mowers. Remove bolts retaining motor mount plate to deck and lift motor off and away from deck.
6. Remove motor mount plate from motor. Motor mount plate bolts to motor flange. Remove these bolts and mount

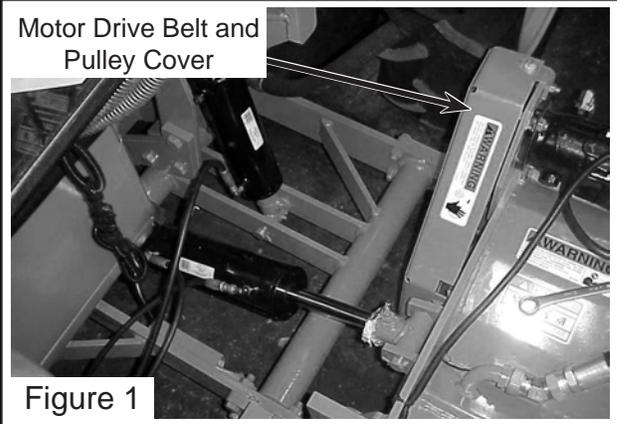


Figure 1

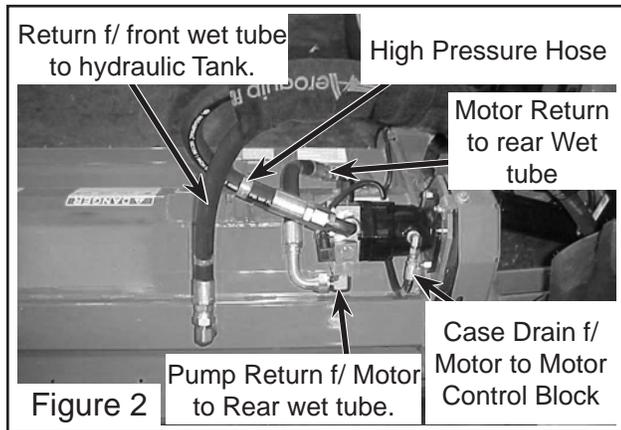


Figure 2

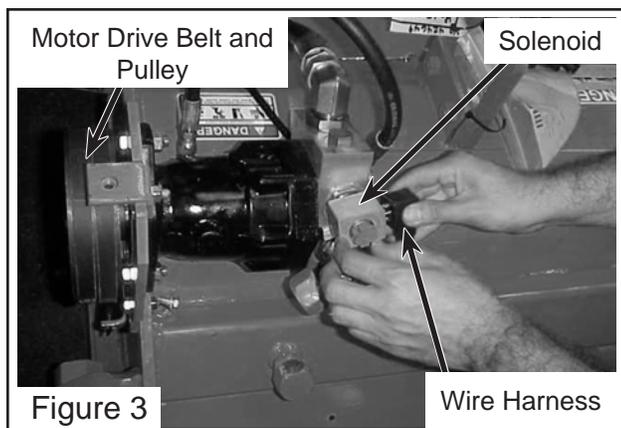


Figure 3

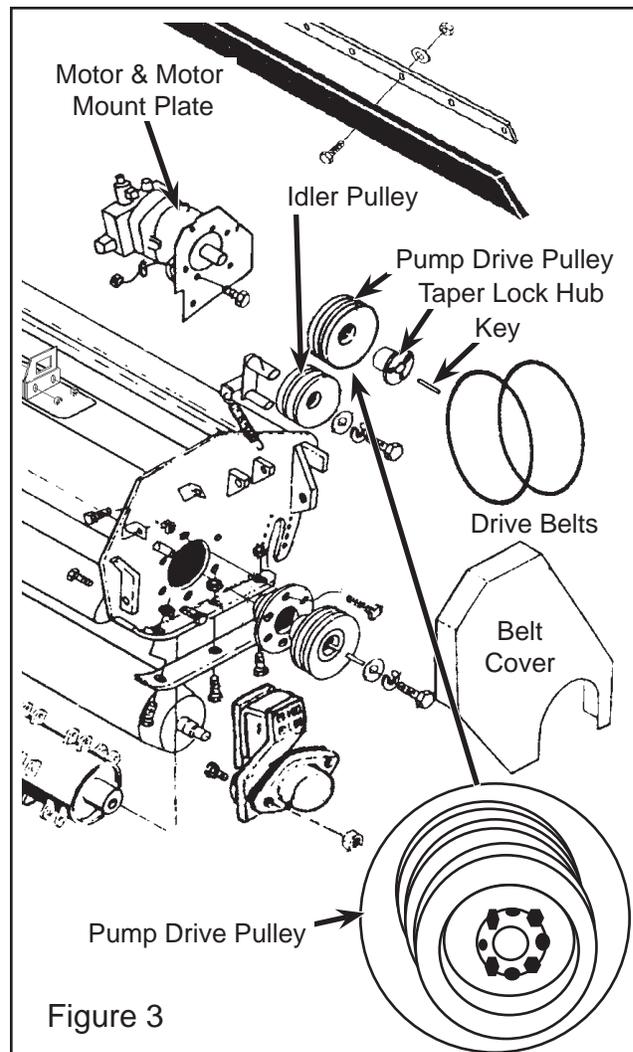


Figure 3

# Motor Removal & Replace

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.

7. Motor replace or repair. The motor is being replace continue to next step. If motor is being repaired go to motor repair disassembly / assembly section in next pages.
8. 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)
9. 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 misalign 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.
10. Install drive belts. Drive belts should be a matched set of belts. Check to make certain belts are in serviceable condition. The drive belts 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)
11. 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)
12. 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-ring on manifold. Manifold must be orientated as shown in figure 6 in order for hoses to connect correctly.
13. 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)

Deck Tube Cross Over Hose for Oil return through deck tubes (outer end of Deck)

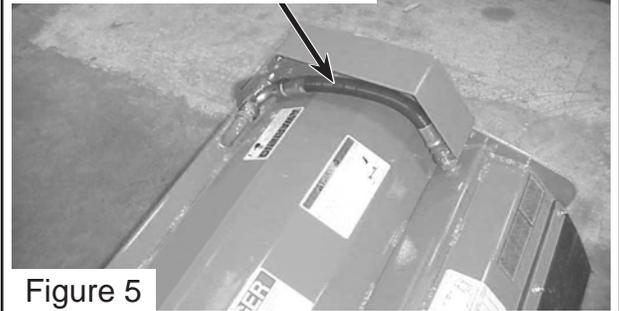


Figure 5

## RH WING ONLY HYDRAULIC MOTOR SHOWN

NEVER CONNECT HIGH PRESSURE HOSE TO TUBES ON DECK !

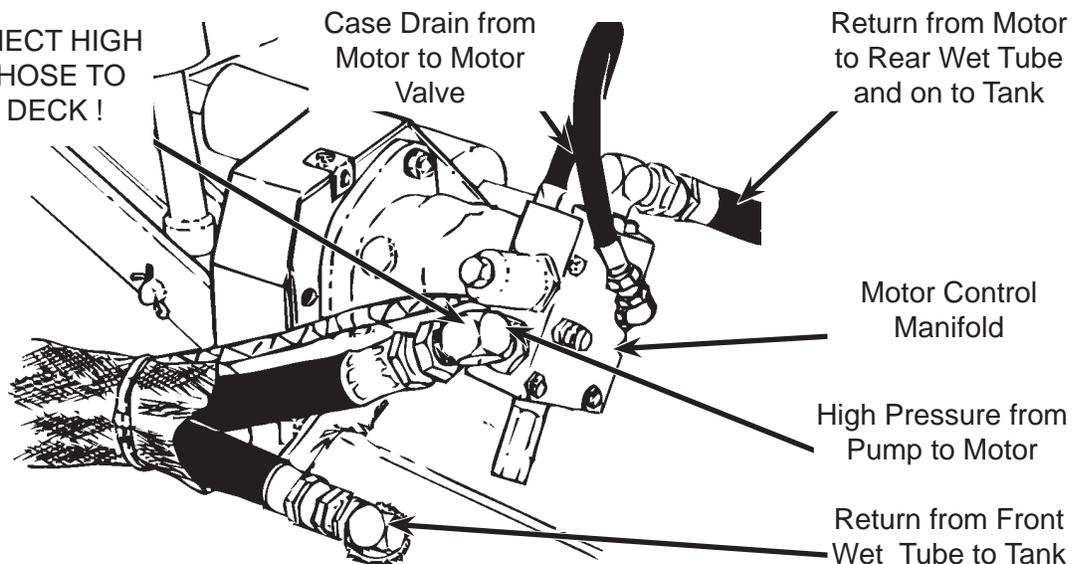


Figure 5

# Motor Manifold Remove, Repair & Replace

## Motor control manifold remove, repair and replace

1. Motor control manifold. Motor control manifold components can be replaced, 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 replaced 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.
6. Motor disassembly and/or repair. If the motor is to be disassembled go on motor repair section and return to here when it is time to reinstall manifold block assembly.

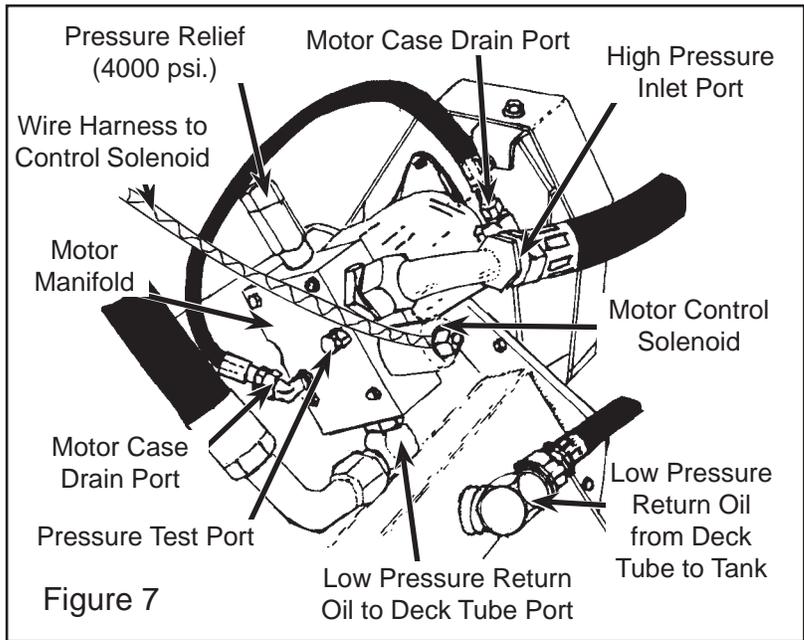


Figure 7

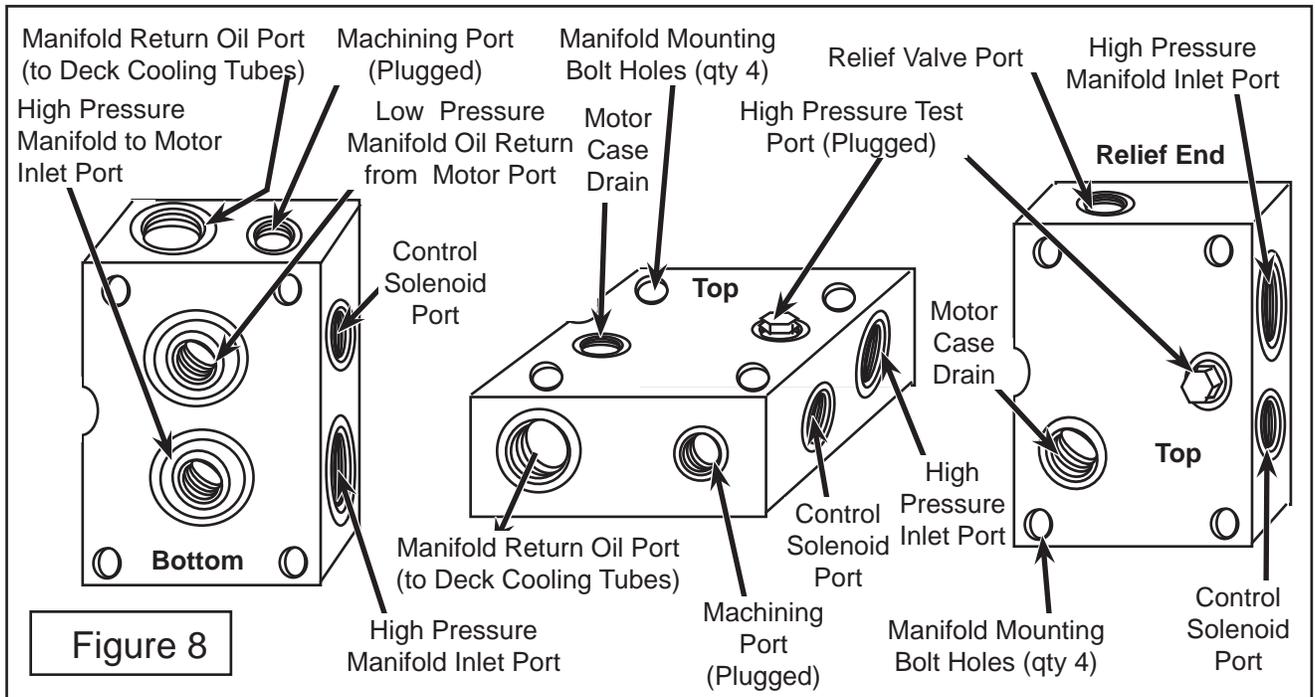


Figure 8

# Motor Manifold Remove, Repair & Replace

7. Installing new manifold block. Always wash a new manifold block with clean solvent the same as when reinstalling 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 reassembly. 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. Reassembly of manifold. With manifold secure re install components to the manifold. (See Figure 7, 8 & 9)
  - 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 return 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.
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.
11. Reconnect 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.

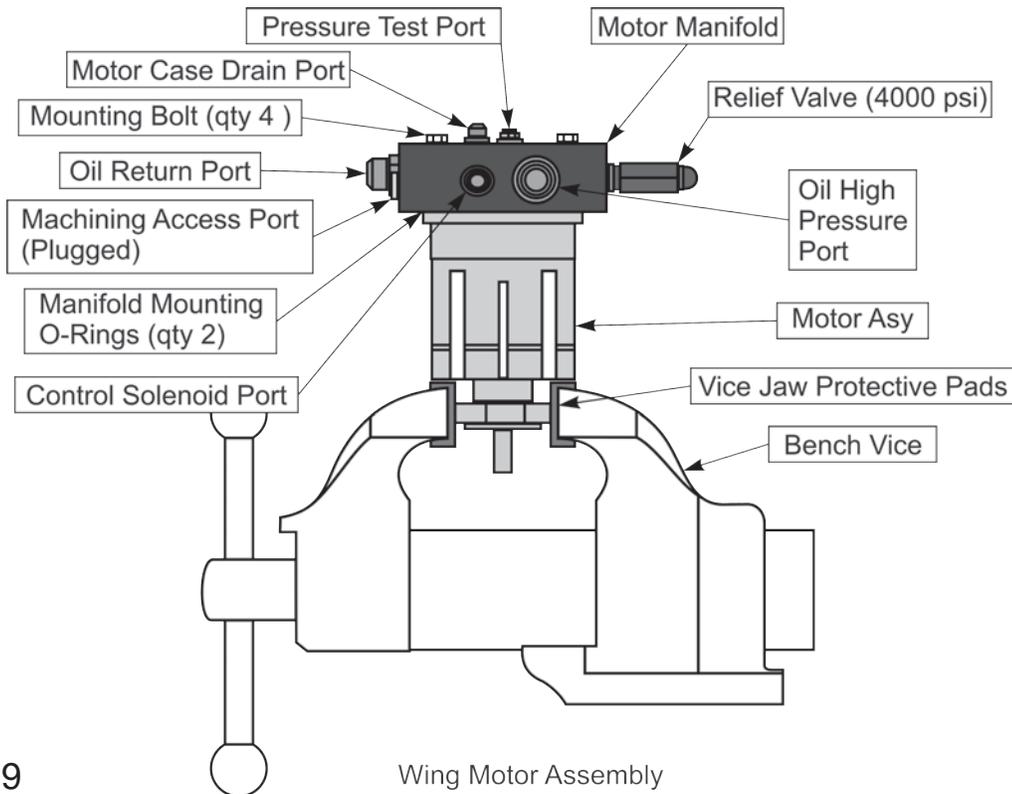
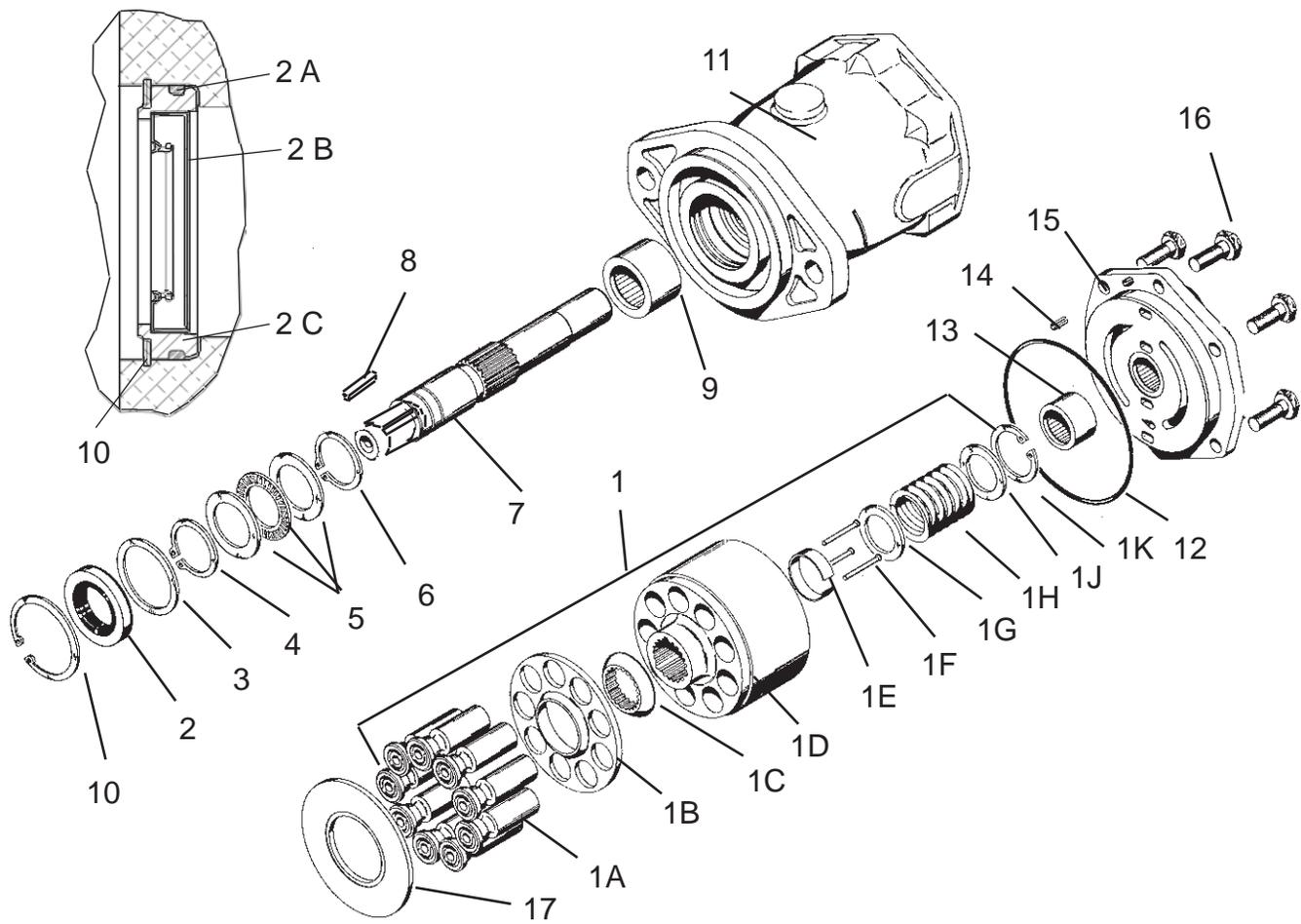


Figure 9

Wing Motor Assembly

# Motor Disassembly & Reassembly

PUMP AND MOTOR



Item	Qty	Description	Item	Qty	Description
1	1	Rotating Kit Asy (Items 1A thru 1K)	4	1	Snap Ring
1A	1	Piston Asy	5	1	Thrust Race & Bearing
1B	1	Spider	6	1	Snap Ring
1C	1	Pivot	7	1	Motor Shaft (Keyed)
1D	1	Piston Block	8	1	Key
1E	1	Pin Keeper	9	1	Needle Bearing (f/ Housing)
1F	3	Pin	10	1	Snap reing
1G	1	Washer	11	1	Housing, (Not Furnished As Parts)
1H	1	Spring	12	1	* "O" Ring
1J	1	Washer	13	1	Needle Bearing (f/ Backplate)
1K	1	Snap Ring	14	1	Roll Pin
2	1	High Pressure Seal Kit (Items 2A thru 2C)	15	1	Backplate Asy w/ Bearing
2A	1	O-Ring	16	2	Bolt. Short Bolt
2B	1	High Pressure Seal	4	1	Bolt, Long Bolt
2C	1	Seal Adapter	17	1	Cam Plate Insert
3	1	Washer	18	1	Seal kit, (* in Seal Kit)

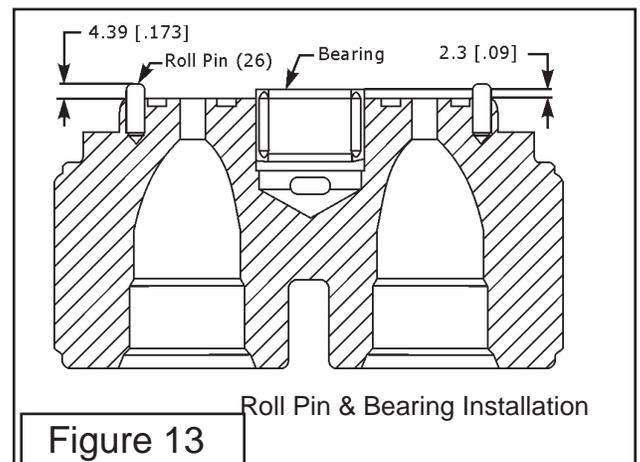
Figure 11

# Motor Disassembly & Reassembly

## Disassemble Motor

(for item numbers see figure 11)

1. Motor disassembly w/o manifold. Manifold should already be removed before starting to disassemble motor. See previous section for instruction to remove and 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 disassembled while on work bench.
3. Remove backplate. (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 reassembled. Remove remaining two bolts. It may require a small amount of force to free backplate loose from pump housing. Use soft faced hammer, tap sides of backplate. This will break backplate loose from pump housing, do not hit backplate with excess force it will damage backplate and pump housing. Lift backplate up and out of motor housing. Remove the needle bearing. (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 assembly upward and out of pump housing, it will require you to remove pump from vice and dump piston block assembly 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 disassembly. (Item 1D) The piston block assembly need not be disassembled 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 disassemble the piston block 2 ea. 3/8" Id x 1-1/8" OD flat washer, 1 ea. 3/8"-Nc x 3-1/4" bolt, hex head & 1 ea. 3/8"-NC hex nut. Place one flat washers over 3/8" x 3-1/4 bolt, place this through center of piston block. Place other flat washer over the 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)
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 and 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 and bearing (Item 5) from the driveshaft. Remove the second snap ring (Item 6) from the driveshaft using snap ring pliers.



# Motor Disassembly & Reassembly

## 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 assembly.
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 OD 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.

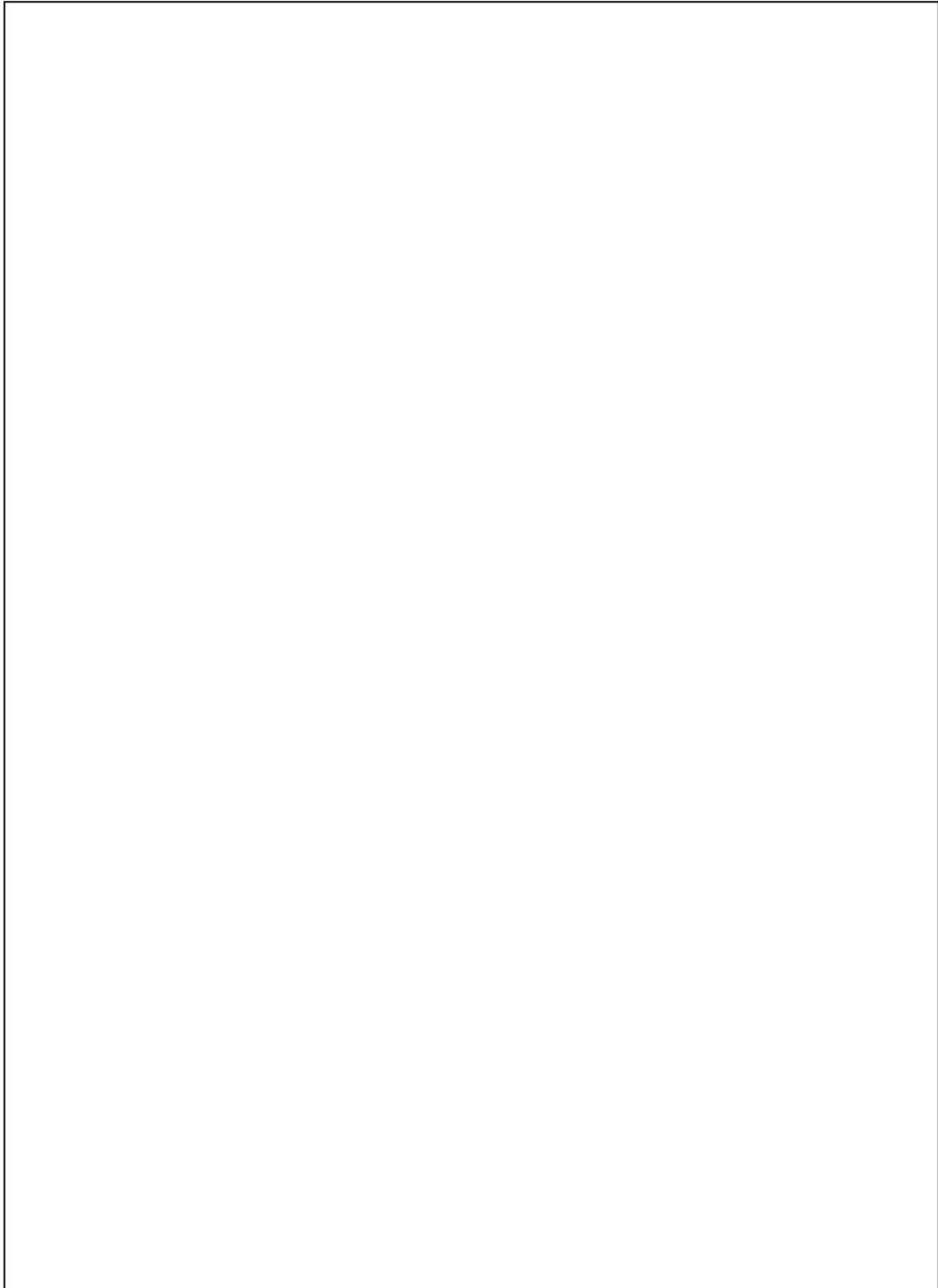
## Reassemble Motor

(For item numbers See Figure 11)

1. Coat moving parts for reassembly. All moving parts should be coated with lubricant before and during reassembly. If pump is to be used immediately after assembly, the recommended hydraulic oil for Terrain Master will work. If pump is to be set aside for use at a later date, pump moving components should be coated with something that will withstand the time the pump is sitting. Petroleum jelly (Vaseline) which can be purchased locally. This will work excellent for this as it will stick to the pump components while the spare pump is sitting on the parts shelf. If parts are to be assembled later the parts should be re-washed and cleaned.
2. Install snap rings (Item 6) and thrust race and 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 assembly 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 ID 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 reinstalled.** 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 Flat Washer
  - 1 Ea. 3/8"-NC X 3-1/4" Bolt, Hex Head
  - 1 Ea. 3/8"-NC Hex Nut

# Motor Disassembly & Reassembly

8. Place one flat washer over 3/8" x 3-1/4 bolt, place this through center of piston block. Place other flat washer 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.
11. Install needle bearing *(Item 13)* into back plate assembly. *(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)*
12. Back plate *(Item 15)* and 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)*
13. Back plate assembly *(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 than .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.
14. 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.
15. Reinstall 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.
16. 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.



# Section 4

## **Rear and Wing Mower Service and Repair**

# Mower Repairs / Rear Mower

## 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 and 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 to the operators/parts manual canister. (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 Terrain Master is not done. Make certain that all hoses, components, wiring is completed and oil tank for Terrain Master has been filled with oil.
8. Slip clutch is incorporated in the PTO driveline. It is



Figure 1



Figure 2



Figure 3

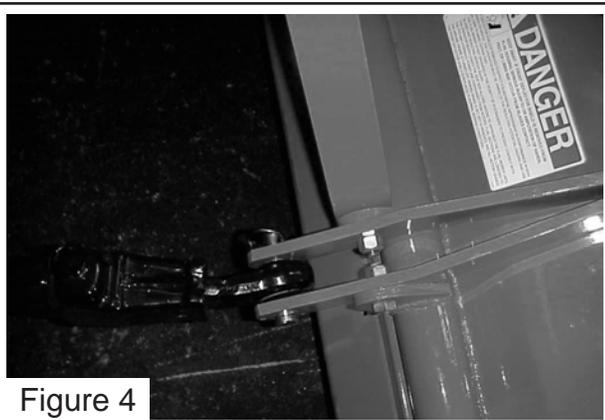


Figure 4

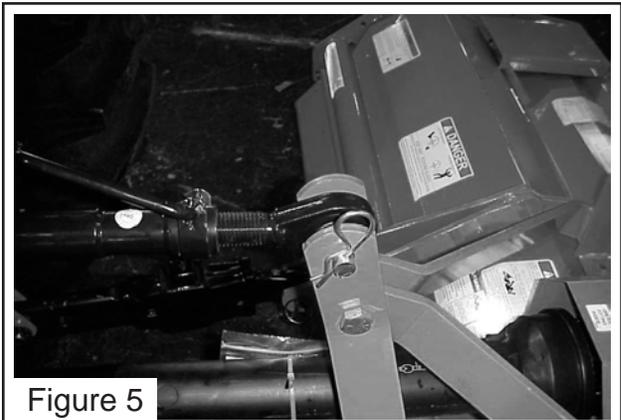


Figure 5

# Mower Repairs / Rear Mower

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.

- Loosen nuts on springs until the springs can freely rotate, yet remain secure on bolts.
  - Attach mower to tractor and start the tractor. Set the engine speed at 1200 rpm.
  - Mark outer plates with marker, paint or any form that will work for you to tell if the components of the clutch slipped.
  - Engage the PTO (*approximately one second*) and then quickly disengage it. The friction lining plates should break loose. (*Check the mark*)
  - Turn tractor off and tighten the nuts on the springs to their original position of 1-5/16" compressed spring length.
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 6



Figure 7



Figure 8



Figure 9

# Mower Repairs / Rear Mower

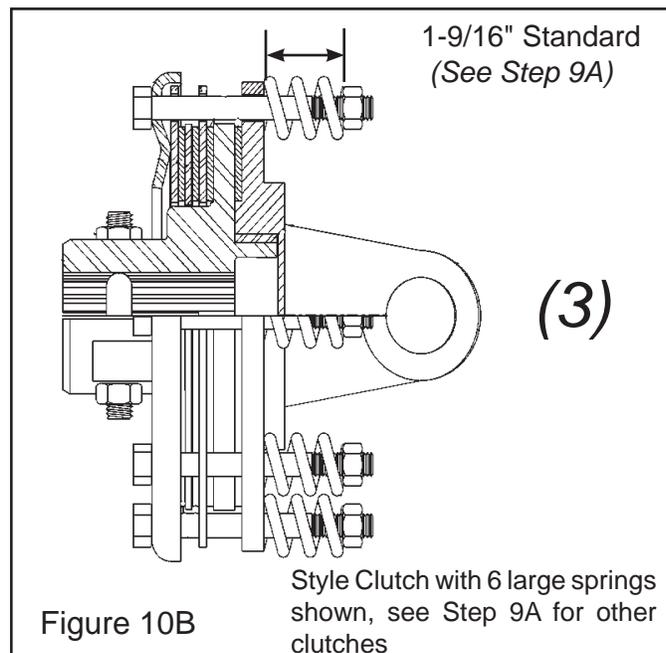
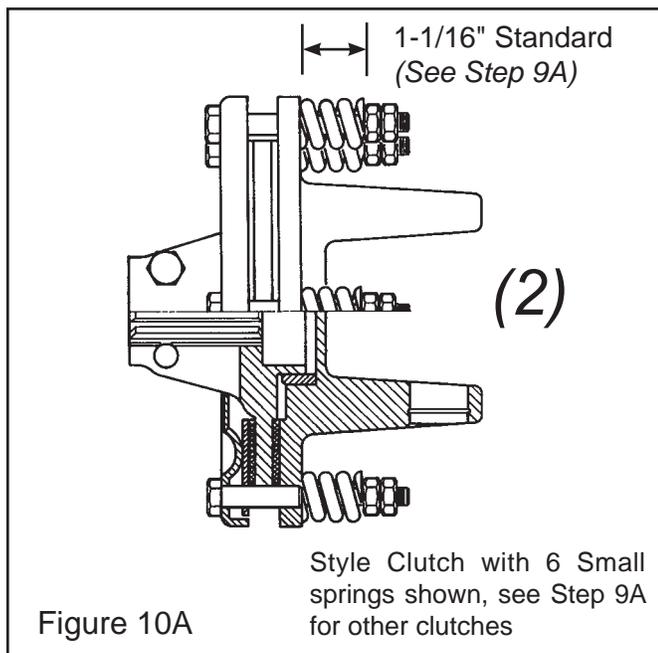
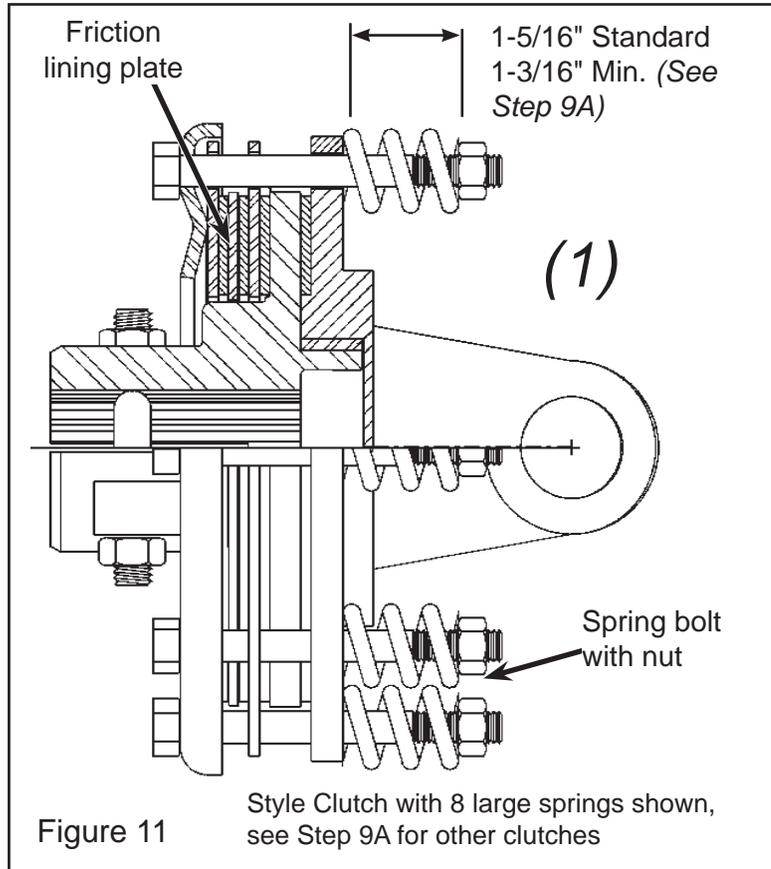
## Important Clutch Adjust Information

There have been **three different clutches used**.

1. The first and 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 uncompressed.
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 drive lines and can not be interchange among drive lines. When repairing the clutches the correct type must be identified to enable the correct parts be ordered, a good source of identification is the Terrain Master archive manual.

## 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.



# Gearbox & Extended Shaft Asy. / Rear Mower

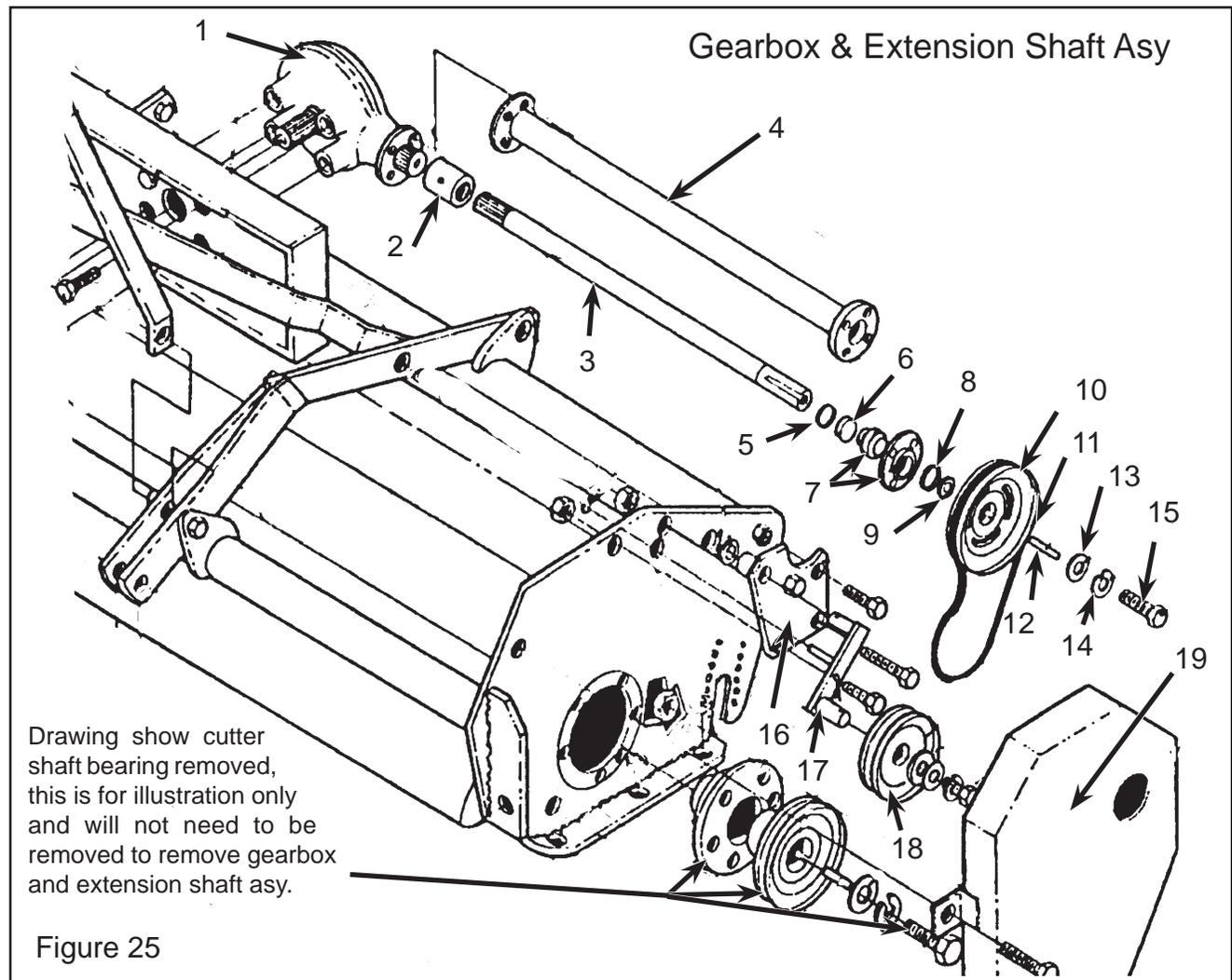


Figure 25

REAR AND WING MOWER

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

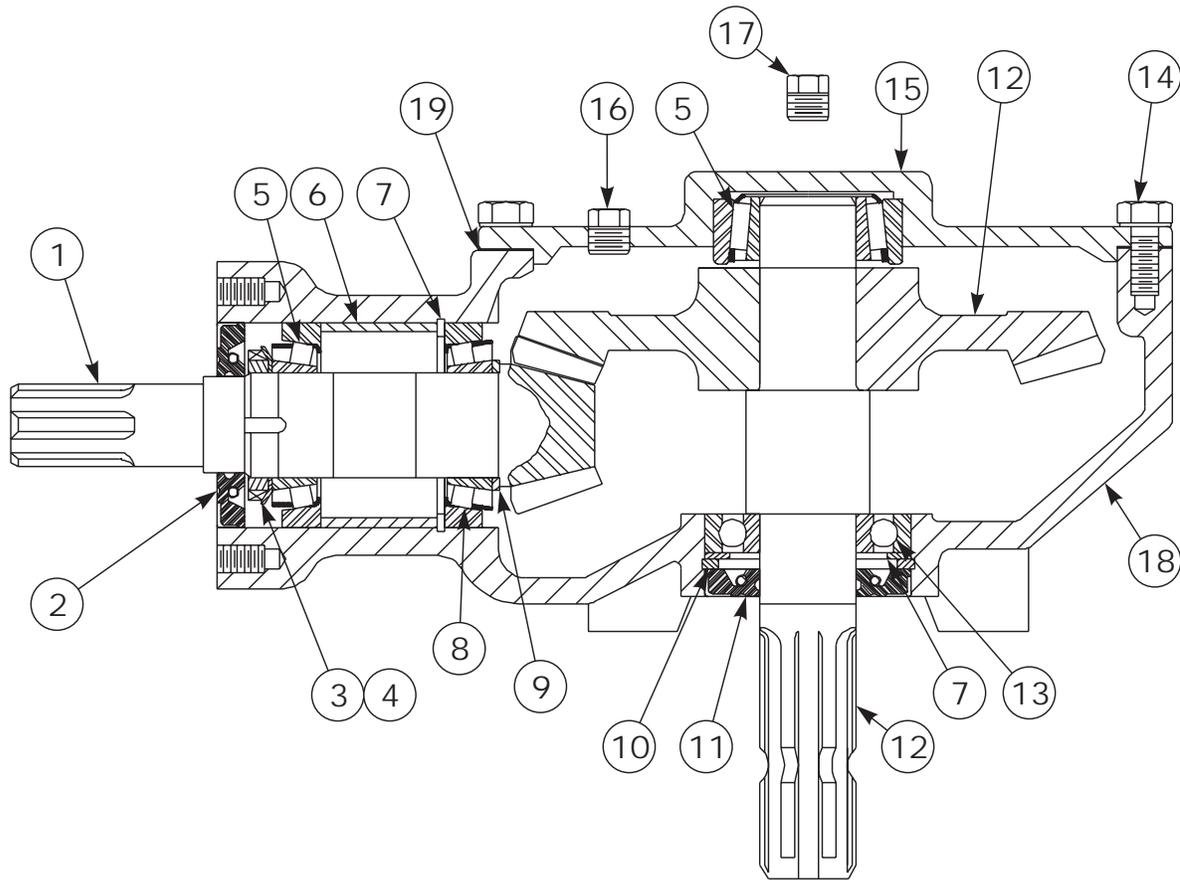
# Gearbox & Extended Shaft Asy. / Rear Mower

## Gearbox and Extension Shaft Assembly Remove, Repair and 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 and 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 Terrain Master archive parts manual for lengths of shafts and housings.
2. Gearbox assembly and extension shaft assembly 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 *Terrain Master 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 and 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*), lock washer (*Item 14*), flat washer. (*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 a piece 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 reassembled.
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. Reassemble gearbox / extension shaft assembly. To reassemble gearbox / extension shaft assembly to deck reverse the disassembly 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 702673



**REAR AND WING MOWER**

Item	Part No.	Qty	Description	Item	Part No.	Qty	Description
	<b>702673</b>	-	<b>Gearbox Asy.</b>	11	001724	1	Seal
1	001718	1	Pinion	12	001725	1	Shaft & Gear
2	001719	1	Seal	13	00754459	1	Bearing, Ball
3	001717	1	Nut	14	001708	8	Bolt
4	001720	1	Spring Washer	15	001710	1	Cover
5	00754757	2	Bearing, Roller	16	00755633	2	Plug
6	001716	1	Spacer	17	000055	2	Plug, Drain
7	00754752	2	Circlip, Internal	18	002516	1	Housing
8	001722	1	Bearing, Roller	19	00769800	1	Gasket (See NOTE:)
9	00753222	2	Shim				
10	00754761	1	Shim				

*Note: Some models used gaskets. Currently all models use sealant, or form - A - Gasket.  
 This gearbox assembly (P/N 702673) Can replace earlier style (P/N 700493) as an assembly but parts will not interchange between them. The easiest way to tell which gearbox you have is by looking were the shaft goes through the gearbox 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

1. Install Output Shaft and 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 and 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.

# Section 5

## Index

# Specifications

## Base Unit Specifications

Overall Cutting Width.....	16'5", 18'5", or 20'9" Overall Cutting Widths
Frame Construction.....	Full-Length Welded Tubular Frame With Transport Lock
Reservoir Capacity.....	25-Gallon Reservoir
Filtration.....	10-micron with a 75-gpm capacity.
Hydraulic Oil.....	Chevron THF 1000 or equivalent
Pump Type & Rating.....(Dual Wing).....	Tandem Piston Pumps Rated @ 48 GPM @ 3800 PSI
.....(Single Wing).....	Tandem Piston Pump Rated @ 24 GPM @ 3800 PSI
Auxiliary pump.....	Gear, 2000 psi continuous, 4000 RPM max
Cylinder Control Valve...(Dual Wing).....	4-Spool Valve with Detent Position 1280 psi relief w/ handle or cable
.....(Single Wing).....	2-Spool Valve with Detent Position 1280 psi relief w/ handle or cable
Lift Cylinders.....	3" bore with an 8" stroke, capable of 14" horizontal lift.
Tilt Cylinders.....	3-1/2" bore with a 9" stroke, 40° downward and 57° upward.
Motor.....	Piston, 52 HP, 2.48 cubic inch, 3600 max RPM 5000 psi max allowable
Motor circuit Relief.....	4000 PSI
Grease.....	Ronex MP or equiv, Multi purpose Lithium Complex, NLGI Grade 2 ISO 150

## Wing Mower Specifications

Wing Mower cutting Width Options.....	62", 74", or 88" Cutting Widths
Cutter Housing Construction.....	10 Gauge 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 Type & Size.....	53 HP Piston Motor
Cutter Shaft Drive.....	Belt Drive F/Motor to Cuttershaft w/ Automatic Spring Tension
Cutter Shaft Drive Belt.....	V-Belt w/Kevlar Construction
Cuttershaft Bearings.....	greaseable, sealed, self-aligning, 1-15/16" id rated 3,300 lbs.
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
Cooling.....	In-frame cooling with pressure relief valves for each wing

## Rear Mower Specifications

Rear Mower cutting Width Options.....	88" or 96" Cutting Width (Configuration Dependant)
Cutter Housing Construction.....	10-Gauge 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 Driven f/Gearbox to Cuttershaft, Automatic Spring Tension
Cutter Shaft Drive Belt.....	V-Belt w/ Kevlar Construction
Cuttershaft Bearings.....	greaseable, sealed, self-aligning, 1-15/16" id rated 3,300 lbs.
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, Controlled By Tractor Operator
Rear Mower to Tractor Connection.....	CAT I or CAT II Three Point Hitch
Cooling.....	In-frame cooling with pressure relief valves for each wing

# Specifications

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

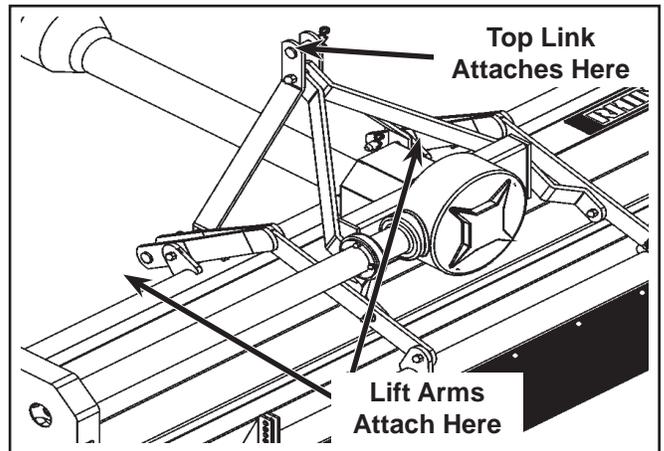
Use the correct hitch pins for the hitch category being used. For a Cat I hitch, 7/8" lower and 3/4" upper diameter hitch pins are used and Cat II hitches require 1-1/8" lower and 1" upper diameter hitch pins.

## 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"
Lynch pin diameter .....	15/32"

# Special Tools Available

## Special Tools Available

Special tools, for installing and servicing Terrain Master 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."

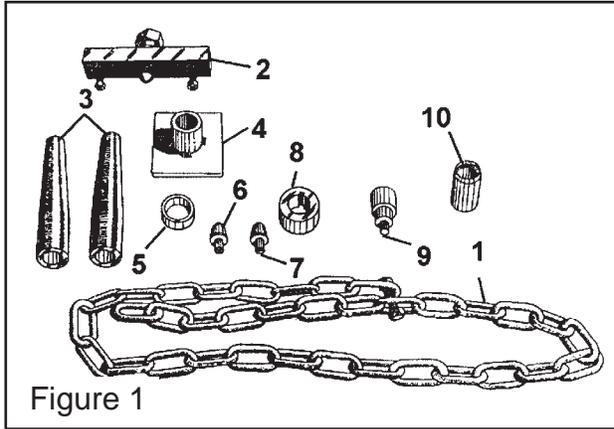


Figure 1

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

# Hydraulic Pump Testing

## Hydraulic Pump Testing

- A. Connect your flow meter with adjustable restriction valve and pressure gage in the pressure line of the pump that is in question.
- B. Open Restriction Valve on the meter completely open.
- C. Fill any porting or prime with oil if necessary.
- D. Start tractor, with no load, allow engine to run until oil is warmed to 100°F.
- E. Set engine RPM to 540 PTO.
- F. With engine at 540 close restriction valve at 500 RPM increments from 500 to 3000 psi and record flow reading.
- G. If pump has less than 90% of its original capability when new it is due for rebuild or replacement.
- H. If pump has better than 90% of its original capability and the machine still has poor cutting performance the main relief should be tested for proper operation. If not the main relief, check to see if oil bypassing motor due to disfunctional logic valve.
- I. After pump replacement the same procedure (A-F) can be followed to ensure the replacement is operating properly.

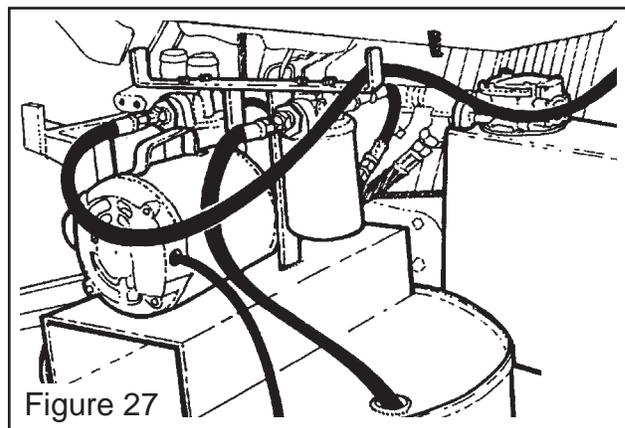
## Test Equipment Needed

1. Flow Meter, The Flow meter should have components to measure:
  - A. Gauge 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.

# 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.
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 Terrain Master is in operation. Tie down loose wires and hoses.
4. Thoroughly grease the Terrain Master 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 Terrain Master. 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 Terrain Master reservoir with new, clean hydraulic oil, follow the steps below. Refer to the operation and maintenance section for specifications. (See Figure 16)
  - 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.
  - Avoid hydraulic contamination by filtering the hydraulic oil while filling the hydraulic tank.
  - 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.
  - 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 Terrain Master 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.
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.



# Torque Chart

## Hose End Fitting Torque Specification

<b>Hose End Type: 37 Degree Angle End Steel Hose End Fittings</b>			
Dash Size	Nominal Port Size	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 torques 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.

## 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 depending on what is bolted down and the type material (Metal) that is being bolted together. Thread condition and lubrication will vary Torque settings.

Proper Torque Values for Standard Bolts		
Bolt Diameter		
	Head Marking Three Lines Grade Five	Head Marking Six Lines Grade Eight
	Pound - Foot Value Dry	Pound - Foot Value Dry
1/4"	7	10
5/16"	15	22
3/8"	26	39
7/16"	42	60
1/2"	64	88
9/16"	100	134
5/8"	128	180
3/4"	227	320
7/8"	365	515
1"	547	772

To get Newton-Meters multiply pound-foot of torque by 1.356

Proper Torque Values for Metric Bolts				
Bolt Diameter				
	Head Marking 4.6	Head Marking 8.8 or 9.8	Head Marking 10.9	Head Marking 12.9
	Pound - Foot Value Dry	Pound - Foot Value Dry	Pound - Foot Value Dry	Pound - Foot Value Dry
6mm	3	7	9	10
8mm	6.2	16	23	24
10mm	12	32	45	47
12mm	21	55	79	81
14mm	34	88	126	130
16mm	53	137	196	202
18mm	73	189	270	279
20mm	104	267	382	394
22mm	141	364	520	537
24mm	179	461	660	680
27mm	262	676	968	998
30mm	355	917	1312	1353

Mnt-B-0005

# Torque Multiplier

## How To Compute Torque When Using An Adapter

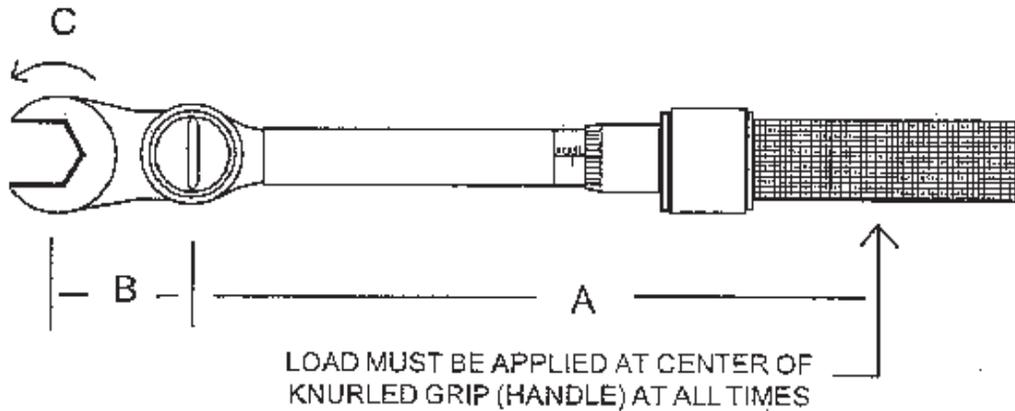


Figure 1 Typical Torque Wrench Shown

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%.

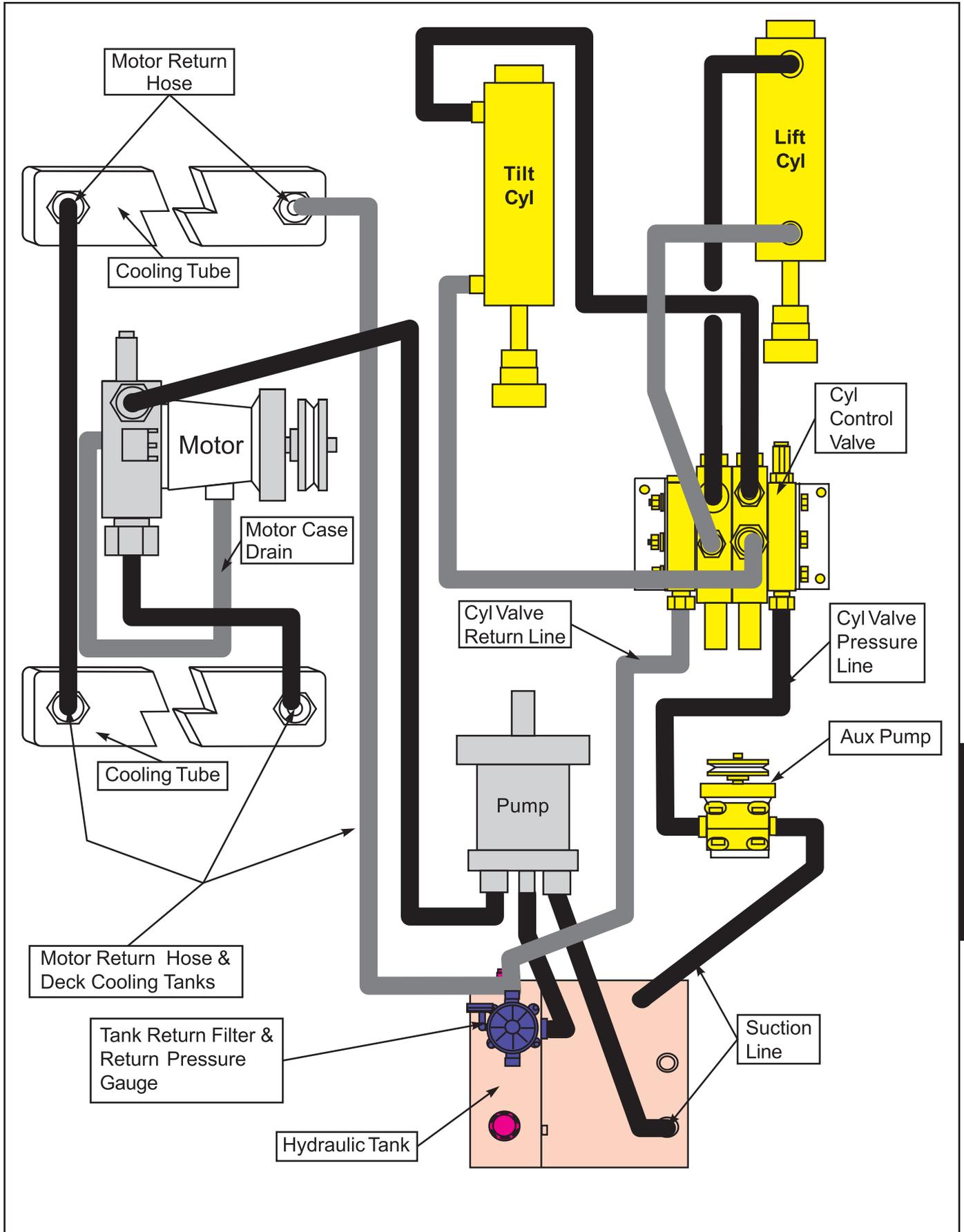
Here is a typical problem. You have an adapter that adds 10.0 inches to a torque wrench length (dimension B) What should the setting be to obtain 320 ft. lbs. of torque at the end of the adapter.

- 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 to set torque wrench for 320 ft. lbs of torque).

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

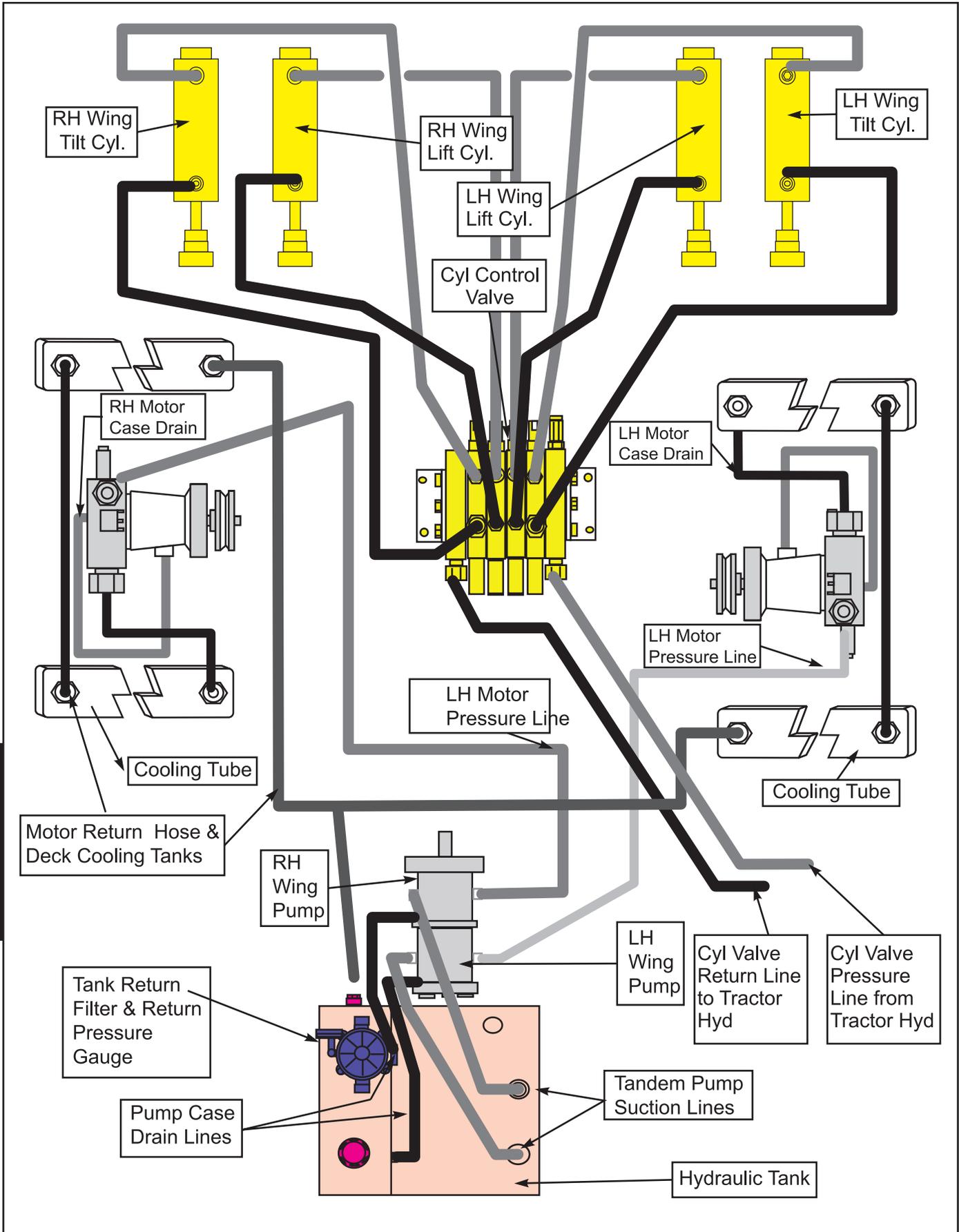
Your Answer (D) is a setting of 222 ft. lbs. on the torque wrench will give 320 ft. lbs. of torque at the bolt. By using the above formula an accuracy of + or - 6 % of the desired torque will result at the end of the adapter due to length change during grip adjustment.

# Hydraulic Schematic W/ Auxiliary Pump (RH Wing)



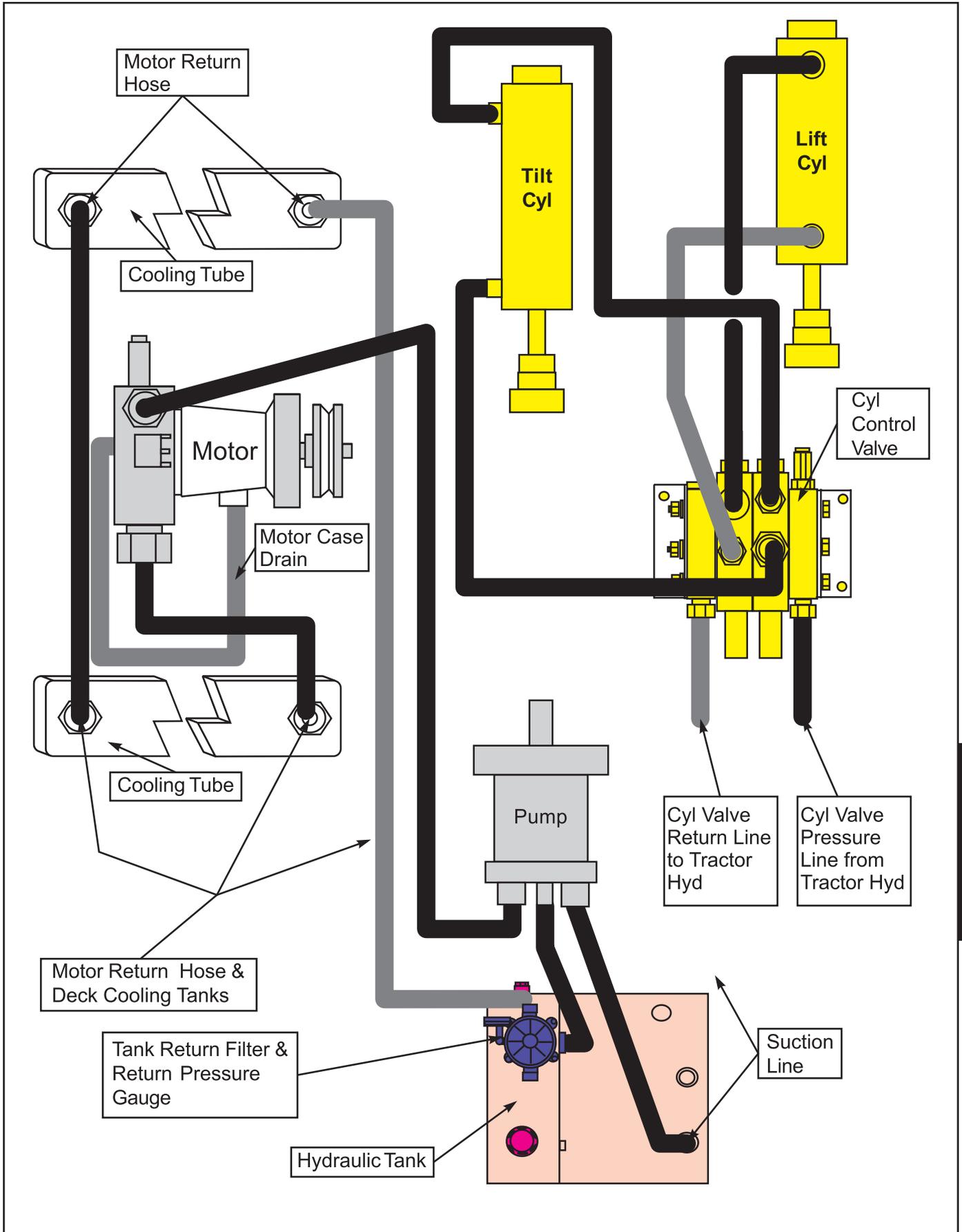
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# Hydraulic Schematic W/ Auxiliary Pump (Dual Wing)



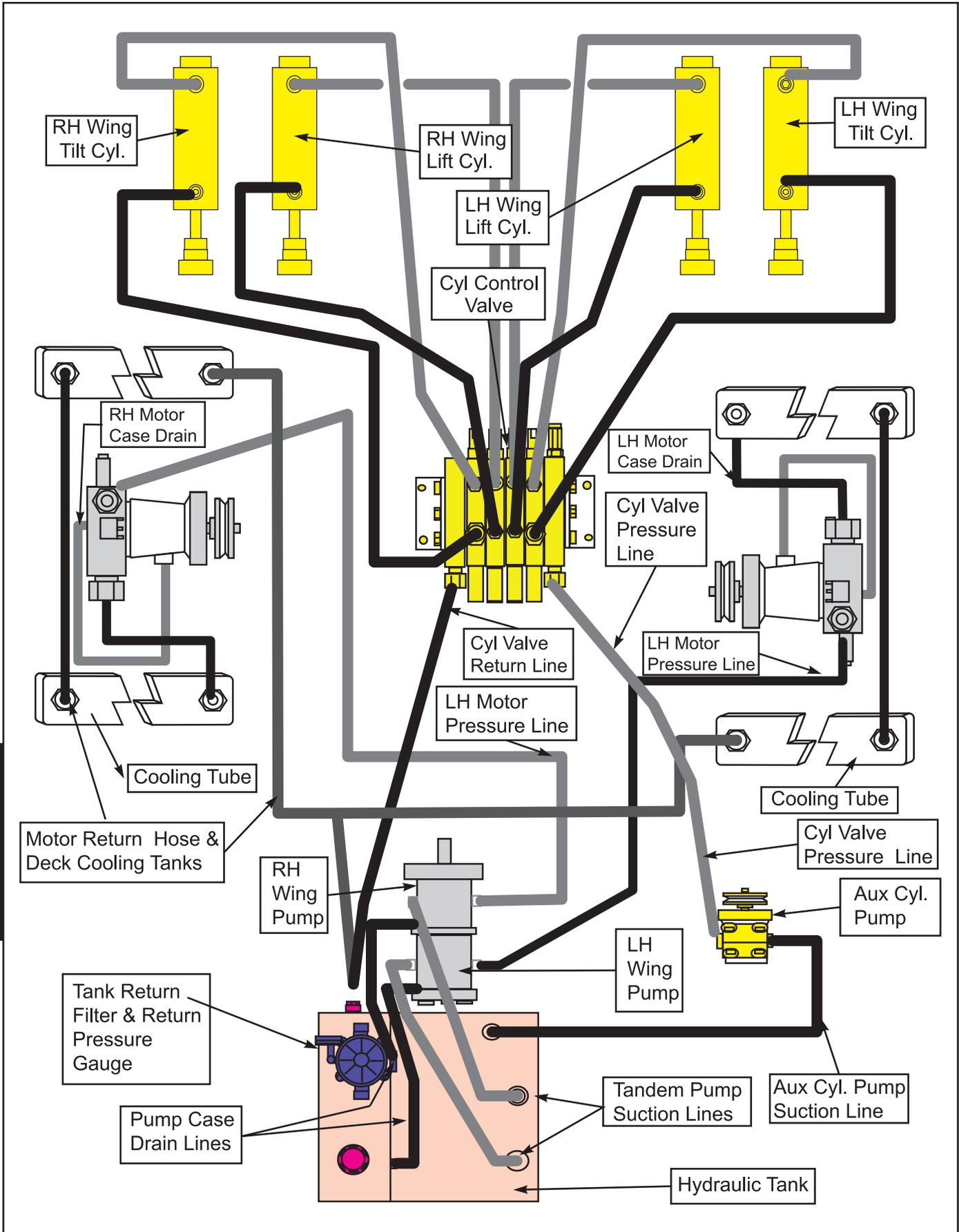
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# Hydraulic Schematic W/O Auxiliary Pump (RH Wing)



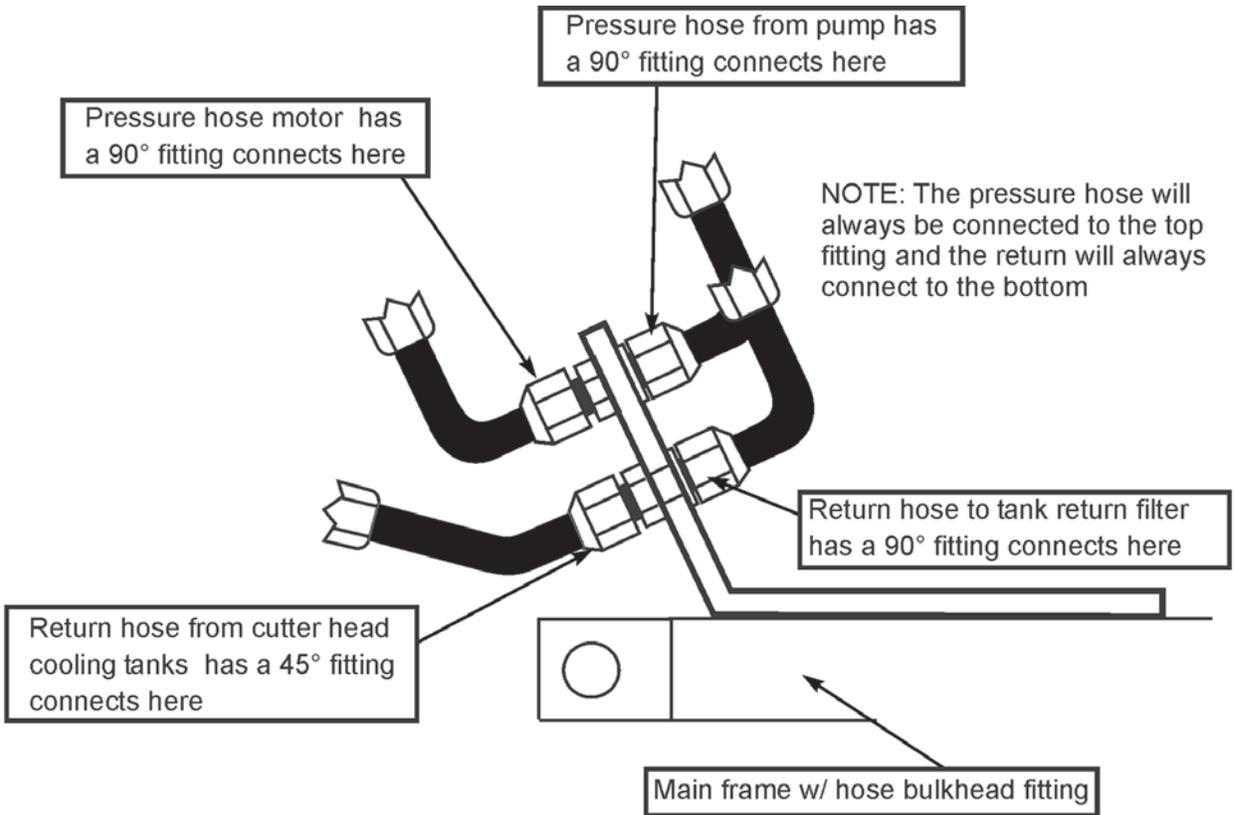
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# Hydraulic Schematic W/O Auxiliary Pump (Dual Wing)

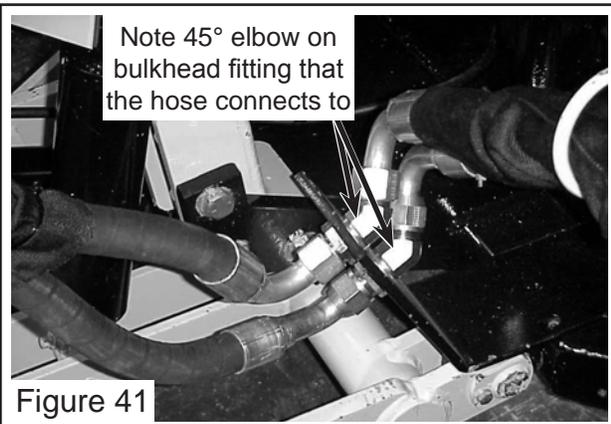


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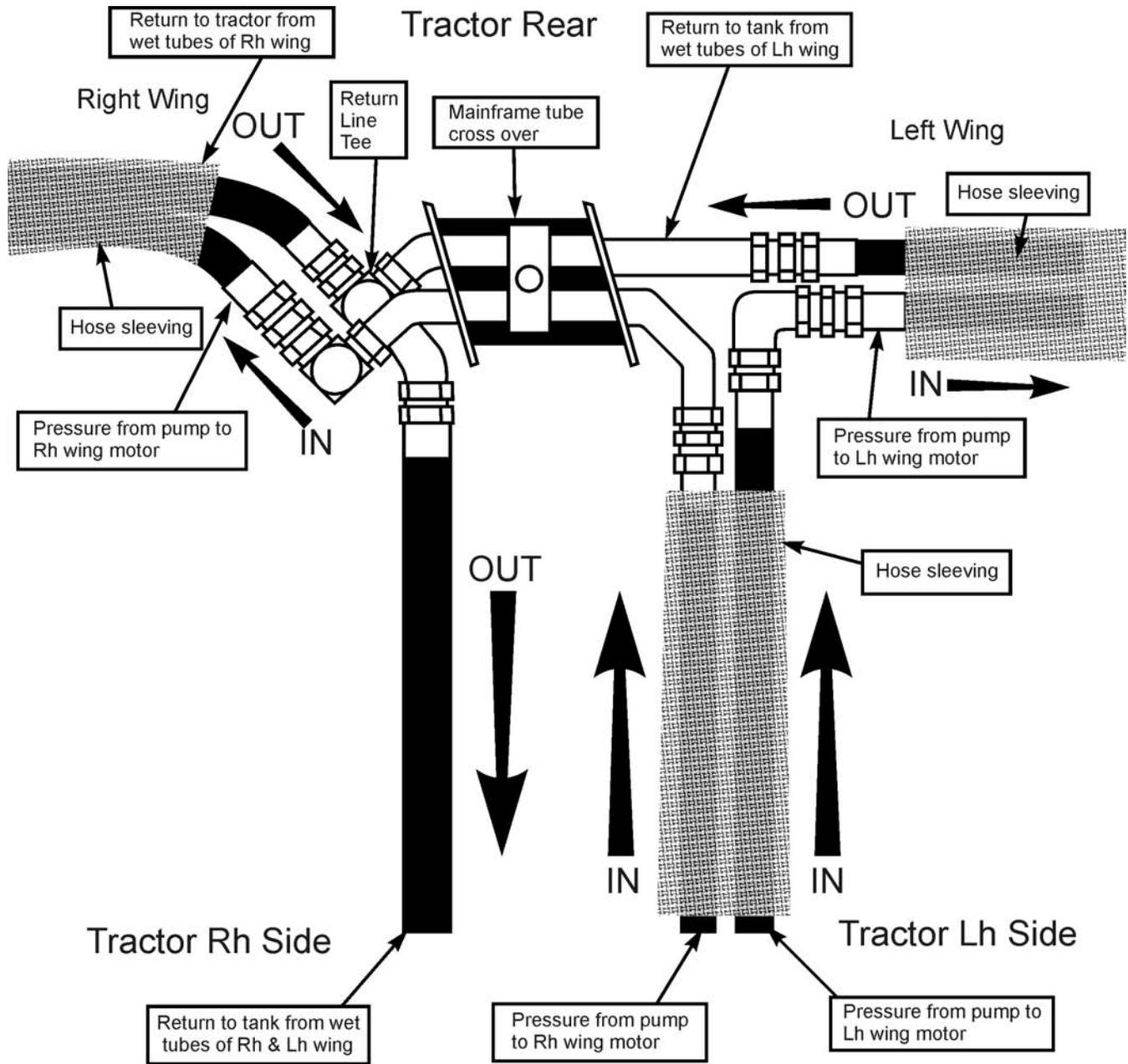
# Pump & Motor Hydraulic Schematic (RH Wing Only)



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.



# Pump & Motor Hydraulic Schematic (Dual Wing)



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# Pump & Motor Hydraulic Schematic

## RH WING ONLY HYDRAULIC MOTOR SHOWN

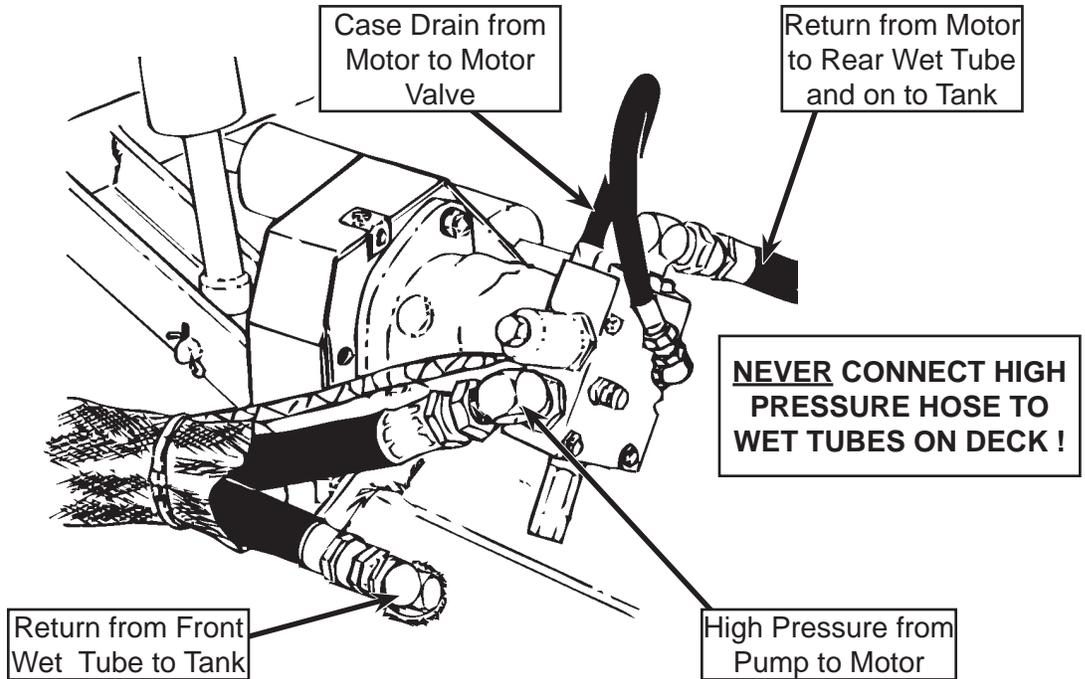


Figure 43

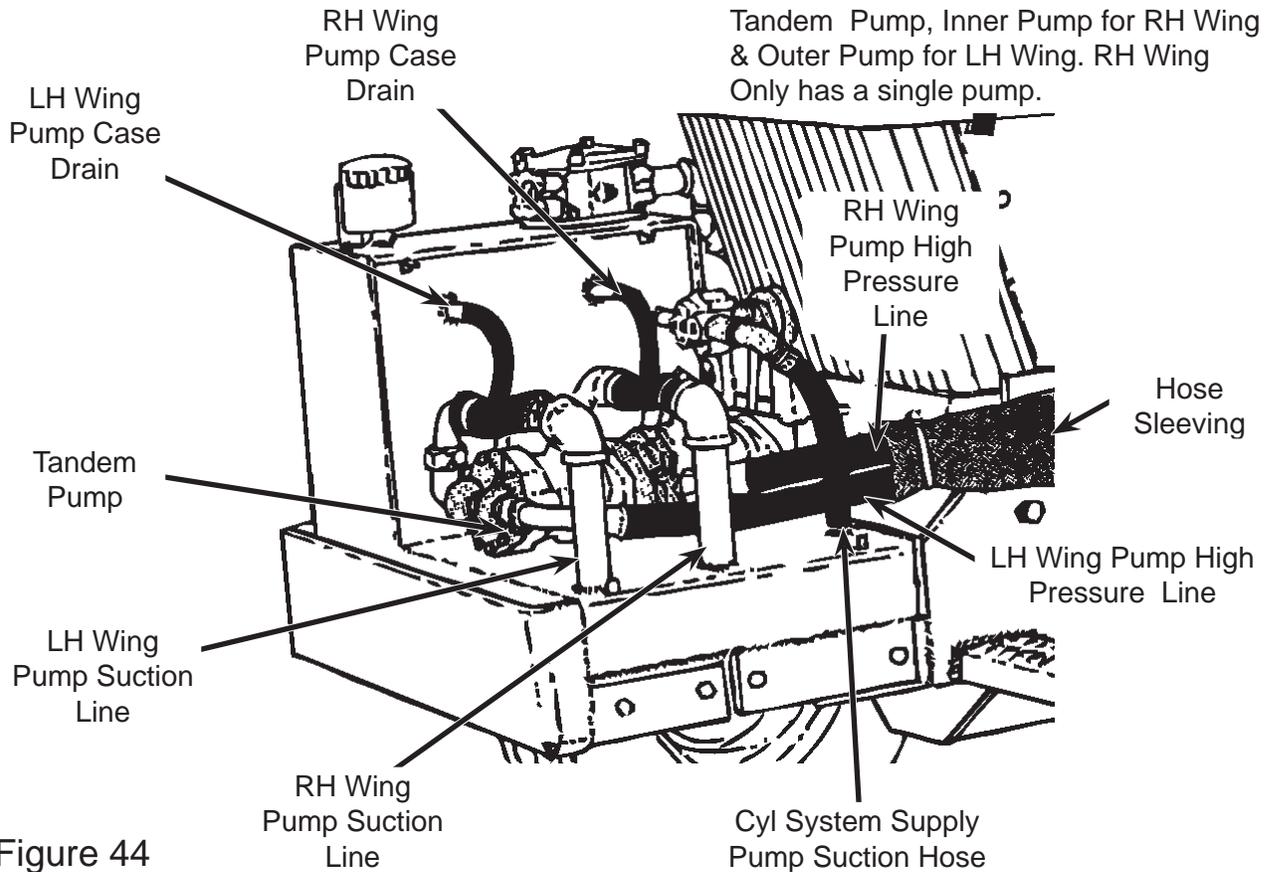


Figure 44

# Pump & Motor Hydraulic Schematic

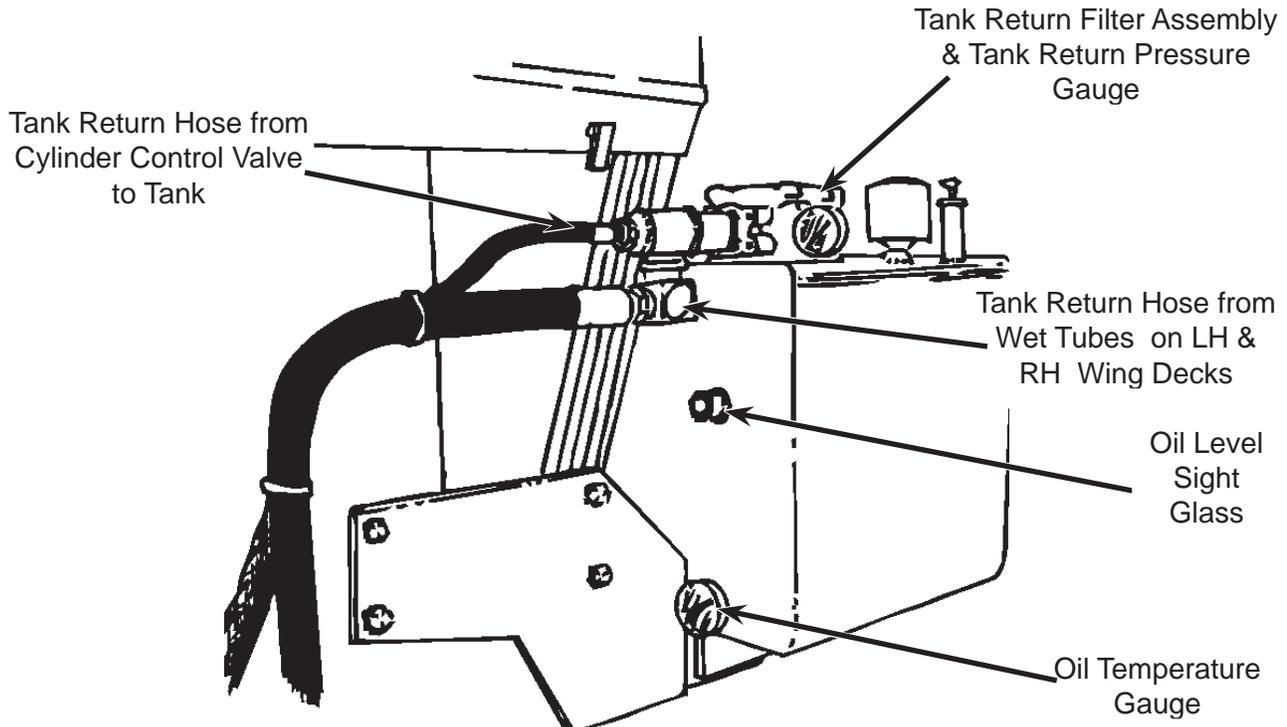


Figure 43

Upper Connection Always from Pump To Wing Motors NEVER TO WET TUBES (HIGH PRESSURE)

Main Frame Cross Over Bracket & Tubes (RH Side Shown, note Tee Fitting in lower fittings)

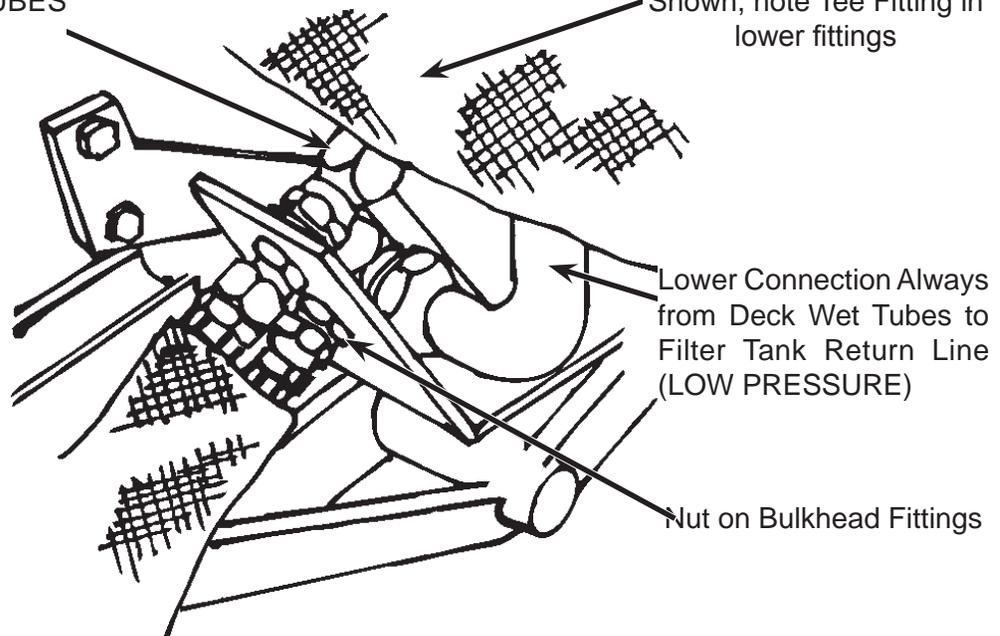
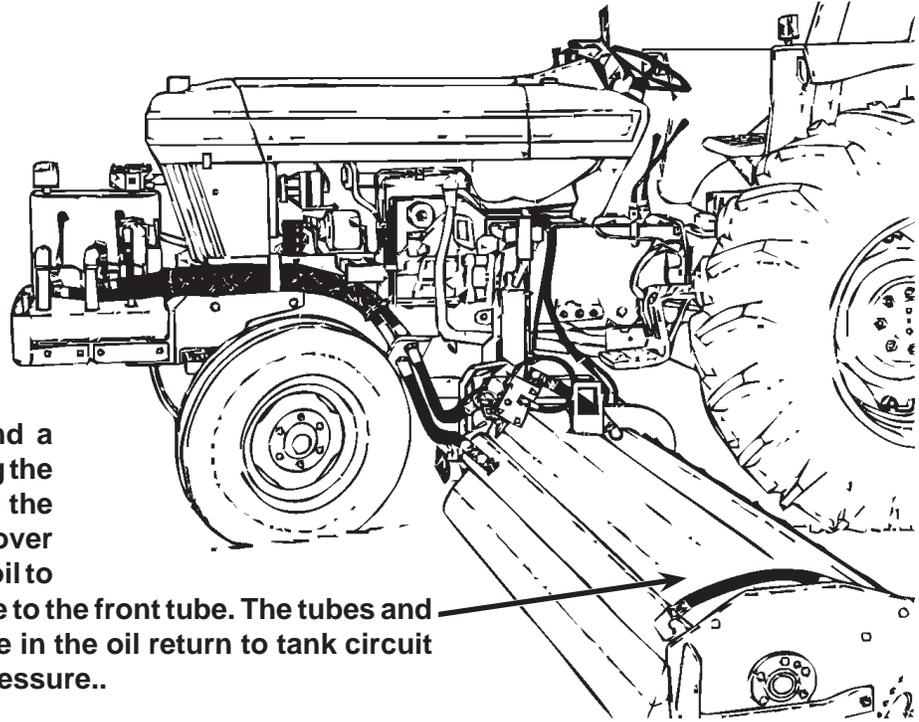


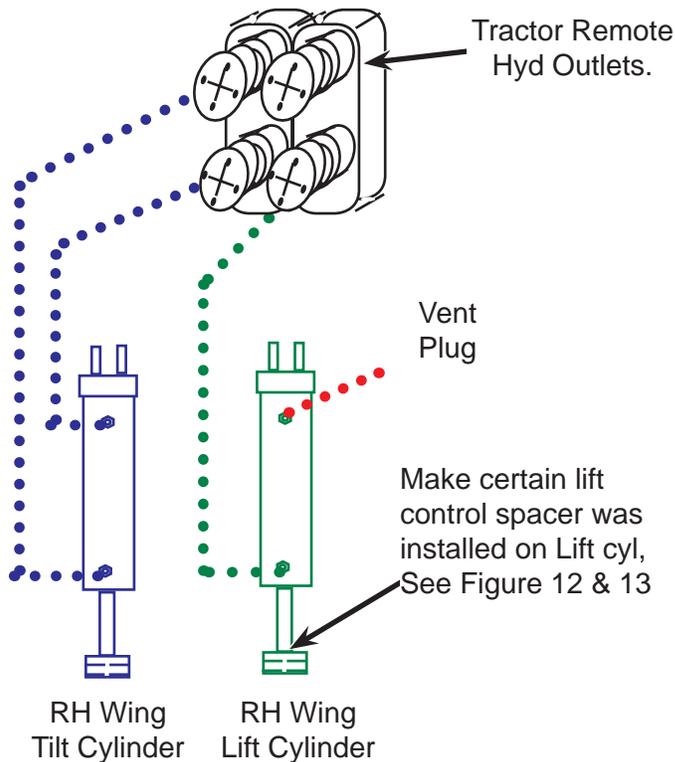
Figure 44

# 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



## Connecting Cylinders To Tractor Control Valve for Hydraulic Supply.

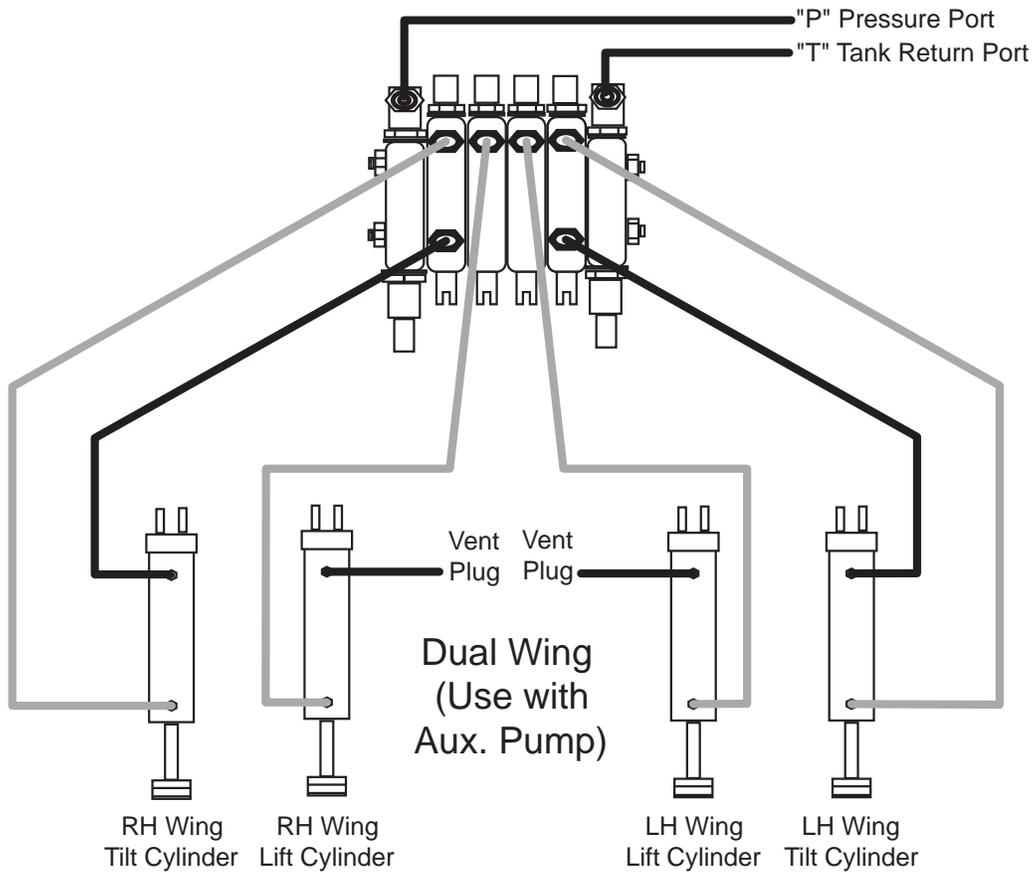
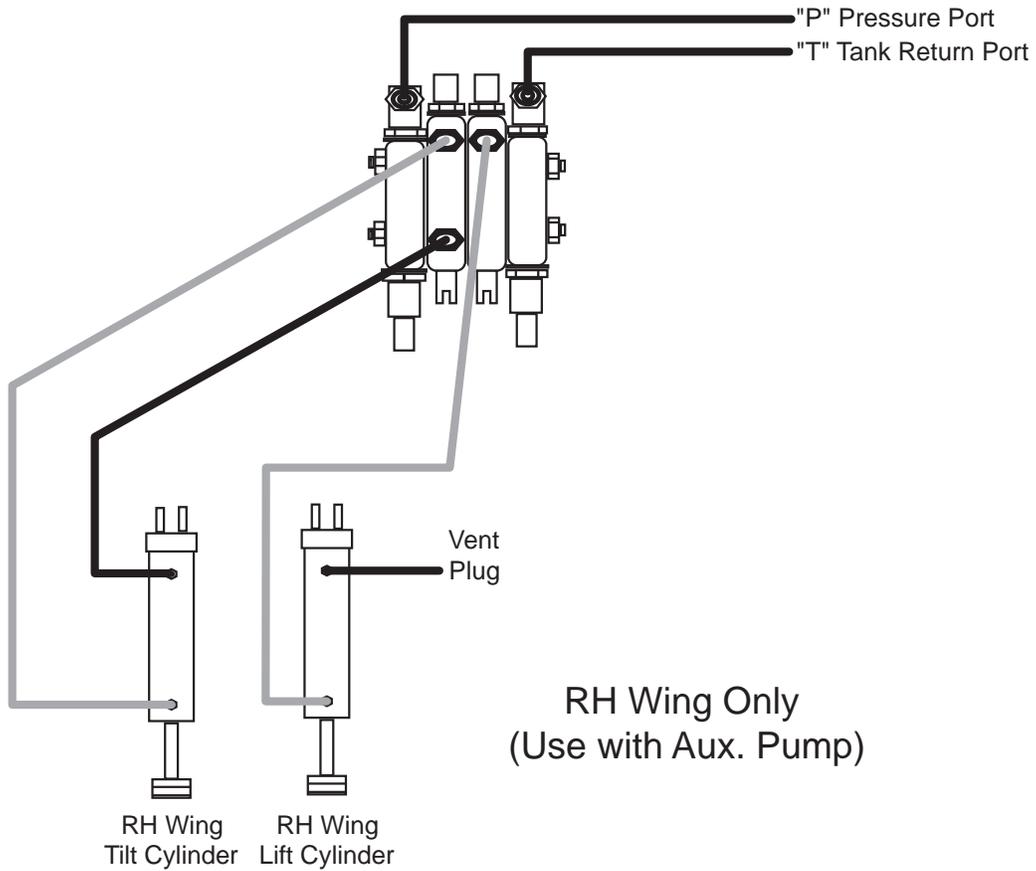
When the tractor hydraulics are used to supply and operate the cylinders there will not be a control valve shipped with the mower. The hydraulic cylinders will connect direct to the tractors remote outlets and the tractor controls will be used (See Figure 14).

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.

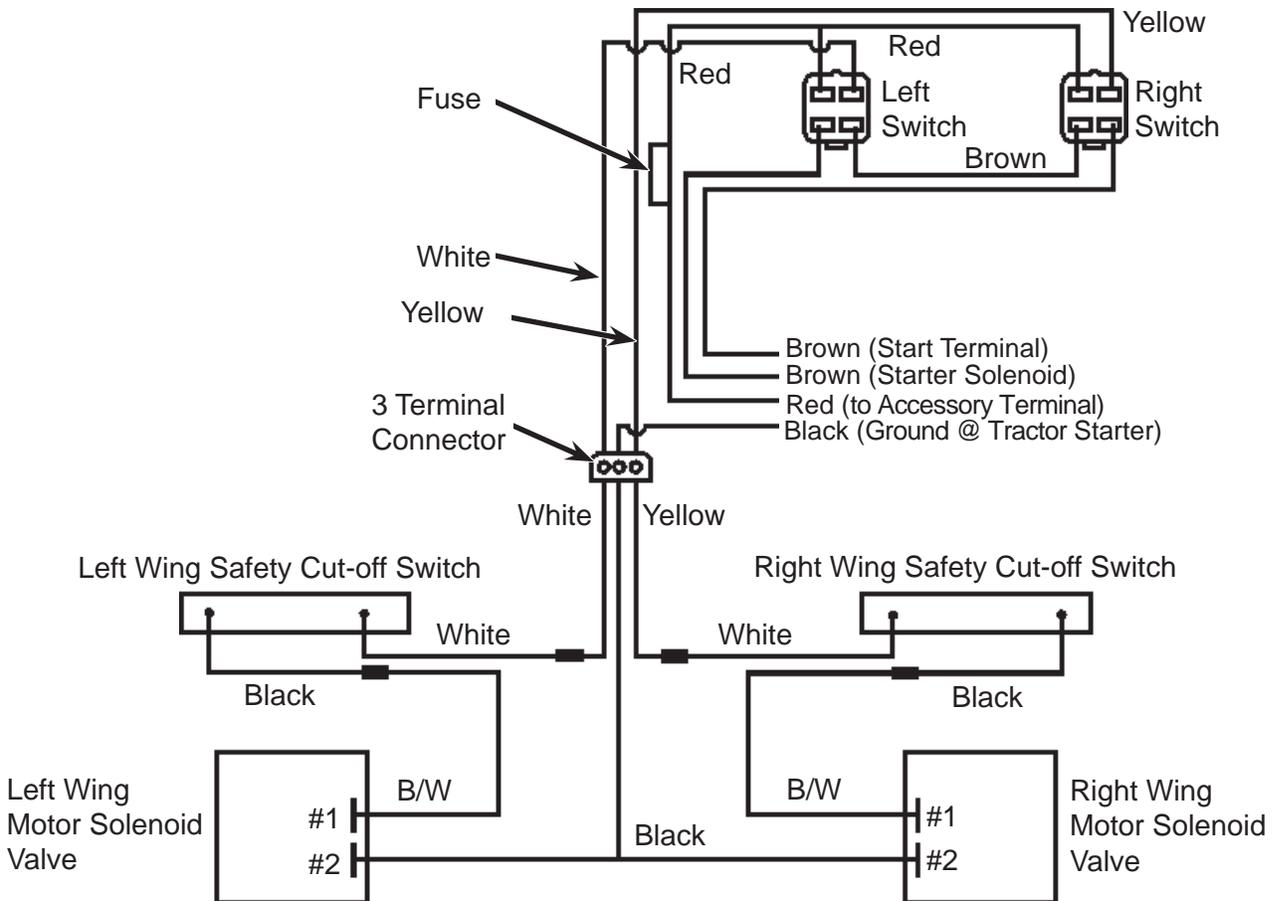
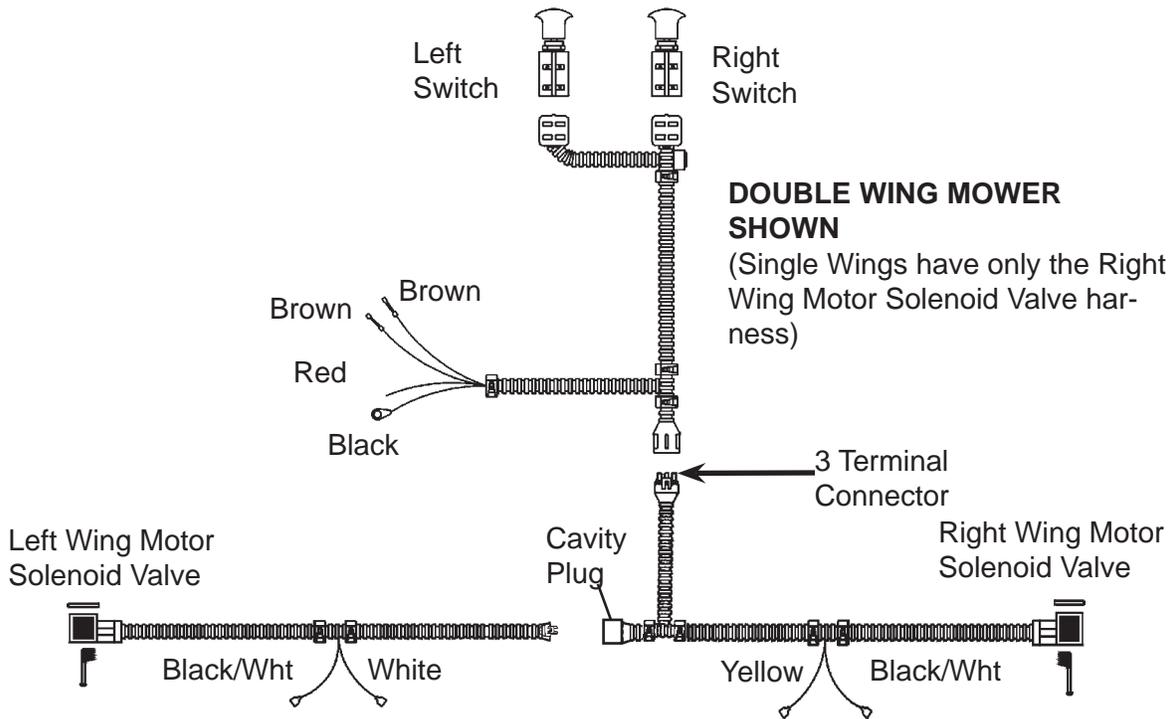
Hoses for the Lift and Tilt cylinders are the same size Qty 3 of Hose P/N 02905100 (#4 - 4FJX - 4FJX X 114" Long

Figure 48

# Valve to Cylinder Hose Connections (Cab & ROPS)



# Wiring Harness Schematic (CAB & ROPS)

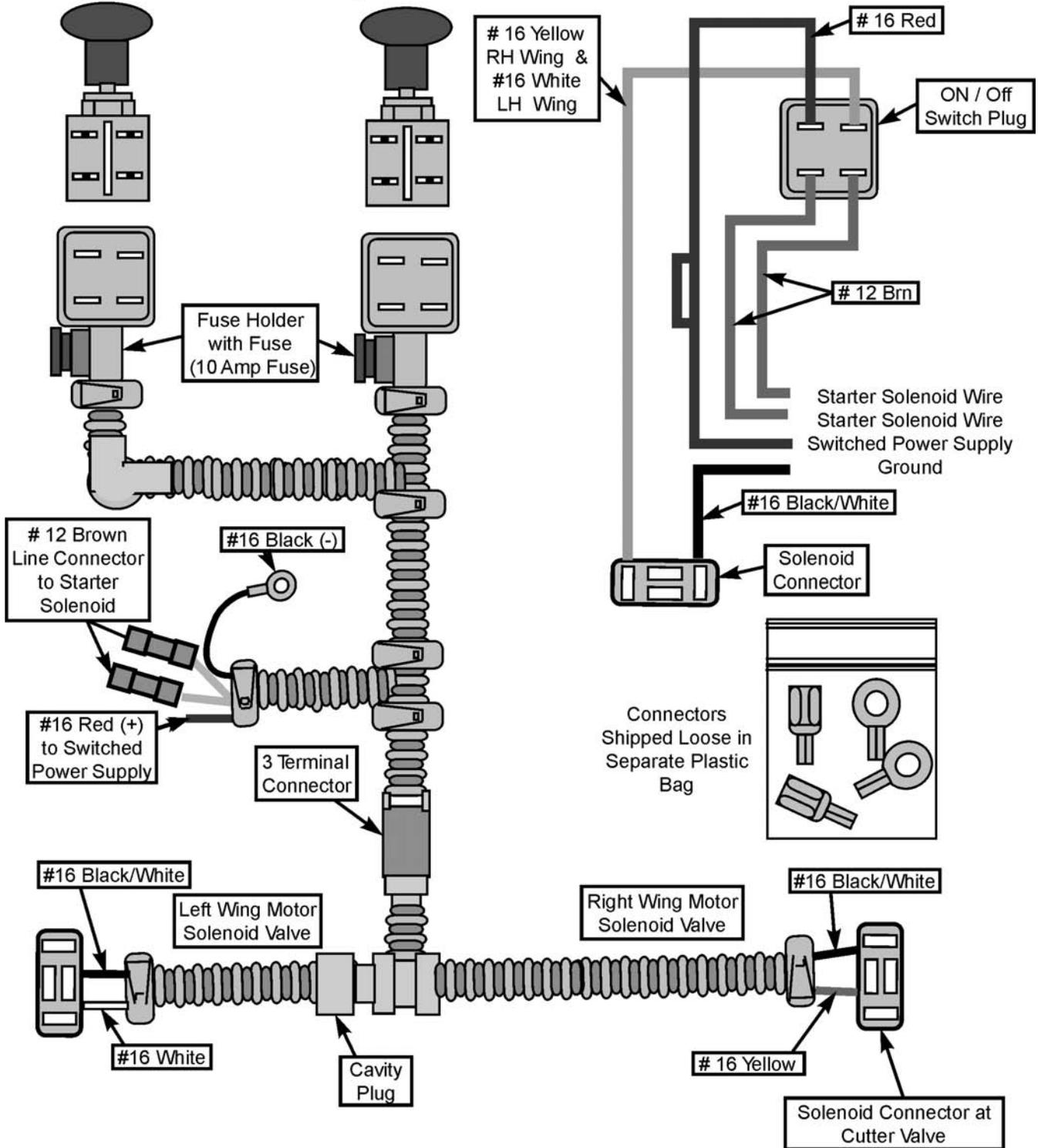


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# Motor Control Switch - Dual Wing

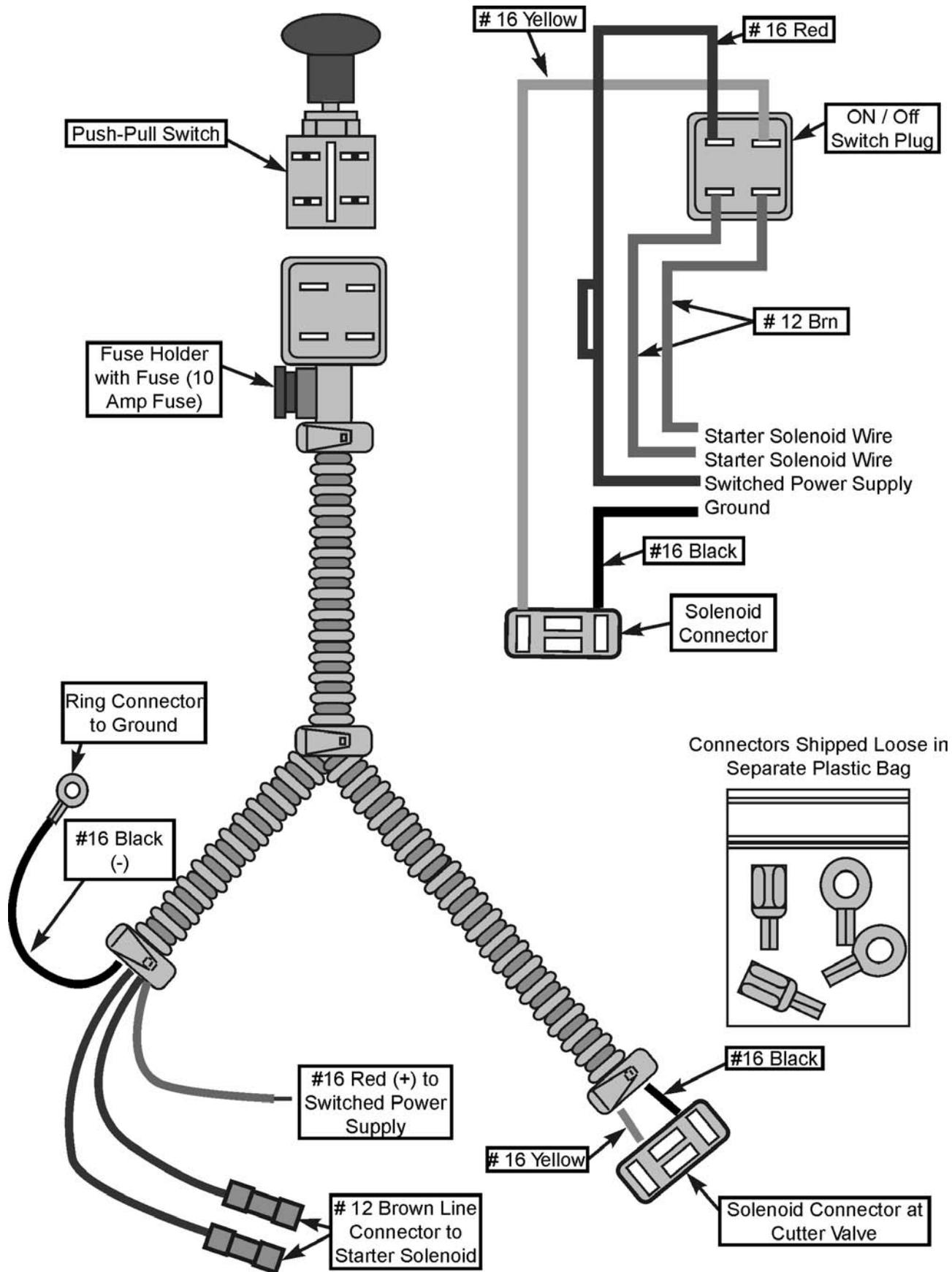
LH Wing Push-Pull Switch

RH Wing Push-Pull Switch



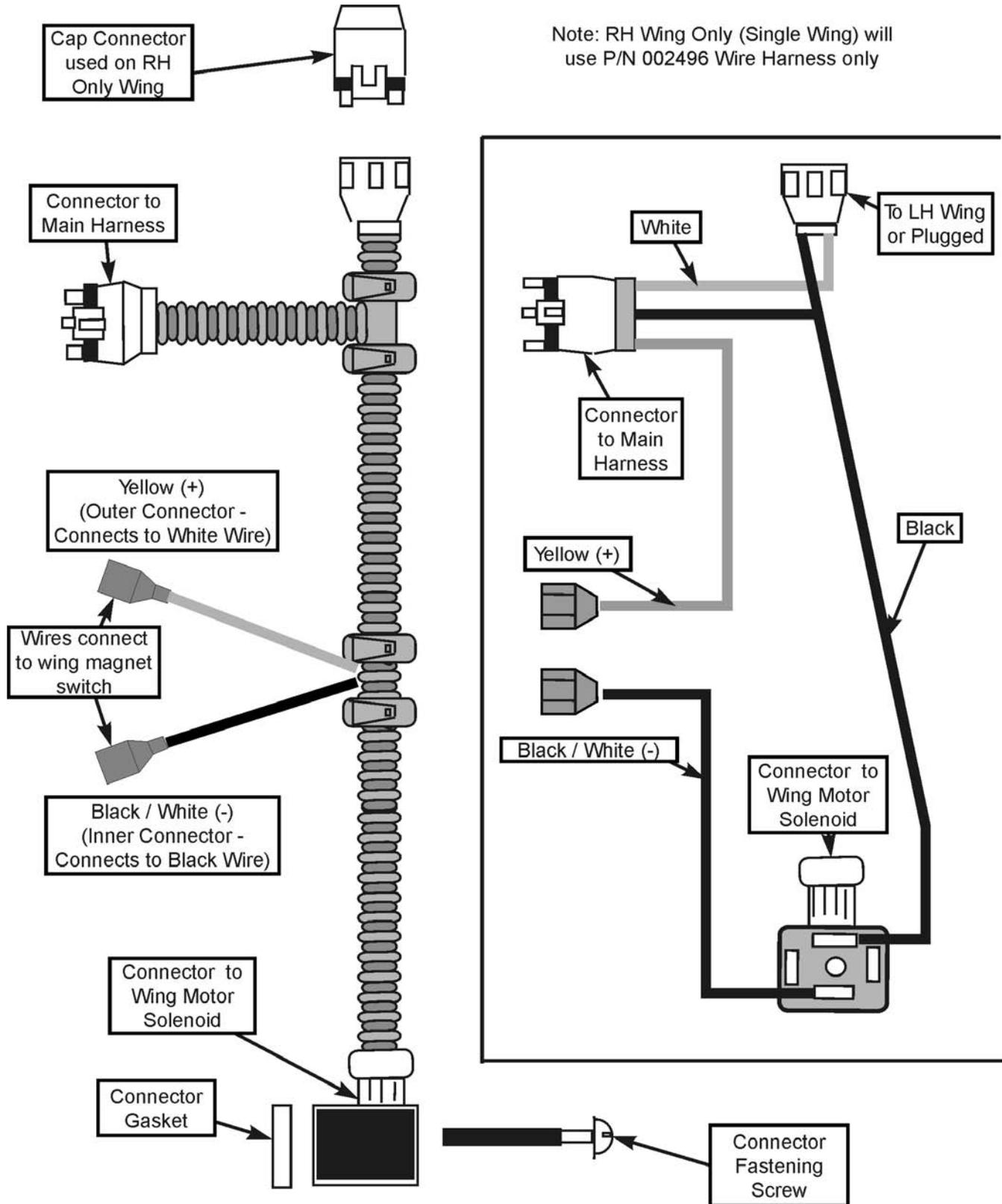
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# Motor Control Switch - RH Wing Only



# Wing Wire Harness - RH Wing (Single Wing)

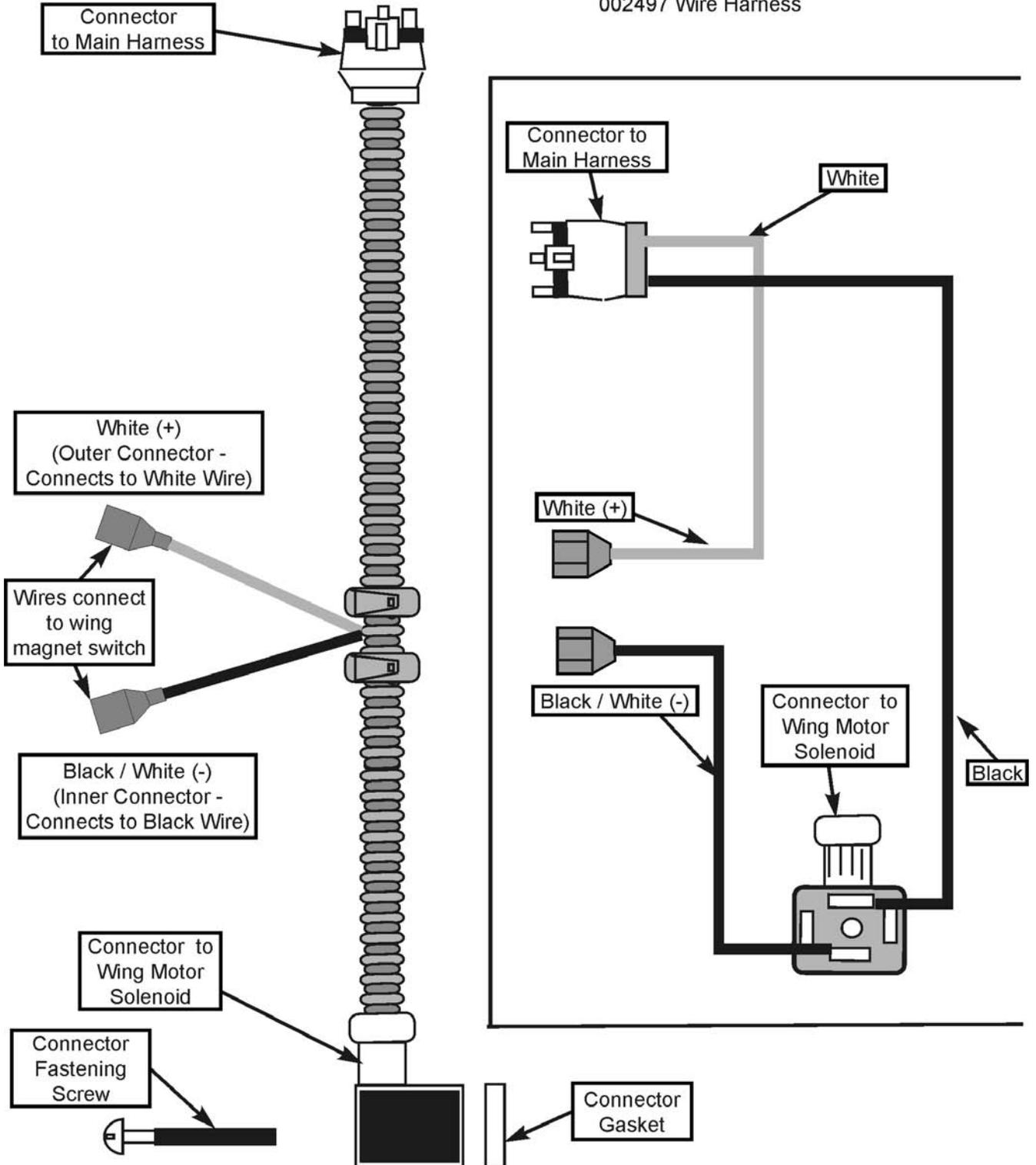
Note: RH Wing Only (Single Wing) will use P/N 002496 Wire Harness only



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# Wing Wire Harness - LH & RH Wing (Dual Wing)

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



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# 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.

# 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:

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