FALCON Boom

Operator's Manual

67000003 (4/00)

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Dear Owner,

Thank you for purchasing a HARDI® product and welcome to the ever-increasing family of HARDI® sprayer owners.

Our sprayers and accesories are rapidly becoming a familiar sight on North American farms. We believe that this results from growers becoming increasingly conscious of crop protection input costs and the vital need for cost effective spray application equipment.

Please take the time to thoroughly read the Operator's Manual before using your equipment. You will find many helpful hints as well as important safety and operation information.

Some of the features on your FALCON boom were suggested by growers. There is no substitute for "on farm" experience and we invite your comments and suggestions.

Please address your correspondence to the Service Manager at one of these branches:

HARDI® MIDWEST
1500 West 76th St.
Davenport, Iowa 52806
Phone: (319) 386-1730
Fax: (319) 386-1710

HARDI® GREAT LAKES
290 Sovereign Rd.
London, Ontario N6M 1B3
Phone: (519) 659-2771
Fax: (519) 659-2821

HARDI® WEST COAST
5646 W. Barstow, Suite 101
Fresno, California 93722
Phone: (559) 271-3106
Fax: (559) 271-3107

Sincerely,

Tom L. Kinzenbaw
President

HARDI FALCON Boom (50’ shown)

1.0 INTRODUCTION

The HARDI® FALCON boom is available in the following sizes:
The **42', 45',** and **50'** FALCON booms are built with the same basic components, with differences in the inner and outer wing sections to give the range of boom widths. The breakaway is located at the folding point between the inner and outer wing. It only breaks away to the rear.

All FALCON booms are available in two different hydraulic versions. They are:

The HY model -

This model features hydraulic lift cylinder adjustment for boom height and two fold cylinders for simultaneous boom wing fold and unfold. This requires one single-acting hydraulic outlet and one double-acting hydraulic outlet on the tractor.

The Tilt Options model -

This model has the same features as the HY, but also has two boom wing tilt cylinders that give the ability to obtain individual boom tilt. This version requires an additional single acting hydraulic outlet on the tractor. The Tilt Options model also requires a 12V power supply for the in-cab mounted tilt controls.

All FALCON booms can be equipped with either single snap-fit or triplet nozzle bodies or drop nozzle assemblies.

2.0 SAFETY INFORMATION

WARNING

ALWAYS READ OPERATORS MANUAL BEFORE USING EQUIPMENT

DO NOT REMOVE ANY SAFETY DEVICES OR SHIELDS. NEVER SERVICE, CLEAN OR REPAIR A MACHINE WHILE IT IS OPERATING

WARNING

ALWAYS WATCH FOR THIS SYMBOL TO POINT OUT IMPORTANT SAFETY PRECAUTIONS

IT MEANS ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

RECOGNIZE SAFETY INFORMATION

This is the Safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.

2.1 Follow Safety Instructions

- Carefully read all the safety messages in this manual and the safety labels fitted to the machine. Keep safety labels in good condition. Replace missing or damaged safety labels. Be sure that new equipment components include any current safety labels. Replacement safety labels are available from your authorized HARDI® dealer.

- Learn how to operate the spray boom and controls properly. Do not let anyone operate the machine without proper instructions.

- Keep your FALCON boom in proper working condition. Unauthorized modifications or use may impair the function and/or safety and affect the spray boom's life.

- If you do not understand any part of this manual and need assistance, please contact your authorized HARDI® dealer.

2.2 Operating The FALCON Boom Safely

1. Read the complete manual carefully and become familiar with the operation of the equipment before initial operation of each spraying season. Failure to do so may result in possible over or under application of spray solution which may drastically affect crop production or lead to personal injury.

2. Before starting the engine on the tractor unit, be sure all operating controls are in the off or neutral position including, but not limited to, the P.T.O. shaft and/or spray controls. Be sure the tractor power train is disengaged.

3. Operate spray and boom functions only when seated in the operator's seat.

4. One of the most frequent causes of personal injury or death results from persons falling off or being run over. Do not permit others to ride on or in. Only one person - the operator - should be on the machine when in operation.

5. Before leaving the tractor seat, stop the engine, put all controls in neutral, and put the transmission control lever in the park position or neutral with the brakes locked. Read the tractor operations manual for added safety precautions.

6. P.T.O. driven equipment can cause serious injury. Before working on or near the P.T.O. shaft, servicing or cleaning the equipment, put P.T.O. lever in the DISENGAGE position and stop the engine.

7. Do not fold or unfold boom near overhead wires. Serious injury or death could result if contact is made with electric wires.

8. Keep hands, feet & clothing away from moving parts.

9. Wear relatively tight and belted clothing to prevent from being caught on some part of the machine.

10. Slow down when turning, especially with boom extended.

11. Always keep children away from your sprayer and/or tractor unit.

12. Before transporting the sprayer, ensure that the boom is fully folded and fully locked into transport rests and stops. Ensure all locking devices are fully engaged whether hydraulic or mechanical.

13. Slow moving tractors and spray equipment can create a hazard when on public roads. Avoid personal injury or death resulting from any accidents by using flashing lights. Local regulations may require installation of warning lights.

14. Avoid injuries from high pressure fluids penetrating the skin by relieving system pressure before disconnecting hydraulics or other lines. Ensure all fittings are tight before applying pressure to the system.

15. Understand service procedures before undertaking any maintenance. Never lubricate, service, or adjust the spray boom while its operating. Securely support any components before working on them.

16. Keep all parts in good condition and properly installed. Fix damaged parts immediately. Replace worn or broken parts. Remove excessive buildup of grease, oil, or debris.

2.3 Handling Chemical Products Safely

1. Direct exposure to hazardous chemicals can cause serious injury. These chemicals can include lubricants, coolants, paints, adhesives and agricultural chemicals. Material Safety Data Sheets (M.S.D.S.) are available for all hazardous chemicals which inform the user of specific details including, physical and health hazards, safety procedures, and emergency response techniques.

2. Protective clothing such as rubber gloves, goggles, coveralls and respirator must be worn during operation. All protective clothing should be kept in excellent condition and cleaned regularly or discarded.

3. If chemicals come in contact with any exposed skin areas, wash immediately with clean water and detergent. Never place nozzle tips or any other components that have been exposed to chemicals to mouth to blow out obstructions. Use a soft brush to clean spray nozzles.

4. Dedicate an area to fill, flush, calibrate and decontaminate sprayer where chemicals will not drift or run off to contaminate people, animals, vegetation, water supply, etc. Locate this area where there is virtually no chance of children being in contact with this residue.

5. Decontaminate equipment used in mixing, transferring, and applying chemicals after use. Follow the instructions on the chemical label for the correct procedure required. Wash spray residue from outside of the sprayer to prevent corrosion.

6. Extreme care should be taken in measuring spray products. Powders should be used in suitable sized packages or weighed accurately. Liquids should be poured into a suitable graduated container. Keep chemical containers low when pouring. Wear a filtered respirator and let the wind blow away from you to avoid dust and/or splashes contacting the skin or hair.

7. Store chemicals in a separate, plainly marked locked building. Keep the chemical in its original container with the label intact.

8. Dispose all empty containers after rinsing in accordance with local regulations & by-laws. Dispose of all unused chemicals and left over fertilizer in an approved manner.

9. Keep a first aid kit and fire extinguisher available at all times when handling chemicals.

2.4 Local Poison Information Center

PHONE NO. _____-_____-_____

Find the phone number for the poison control center in your phone book and write it in the space above.

Keep a list in the space provided below, of all the chemicals that you have in use.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

3.0 GLOSSARY

1.) ***RIGHT HAND & LEFT HAND SIDES-*** Are determined by facing the forward direction of travel.

2.) ***HY MODEL-*** A Falcon boom with basic hydraulics. This boom can only lift and lower, fold and unfold both boom wings simultaneously.

3.) ***TILT OPTION MODEL-*** A Falcon boom with more advanced hydraulics. This boom can lift and lower, fold and unfold both boom wings simultaneously, as well as tilt the wings up and down independently from each other.

4.) ***FOLDED BOOM-*** Refers to the boom in transport position.

5.) ***UNFOLDED BOOM-*** Refers to the boom in spraying position.

6.) ***WING-*** Refers to the folding portion of the boom.

7.) ***CENTER FRAME-*** Refers to the portion of the boom that the wings attach to. The wings move up and down with the center.

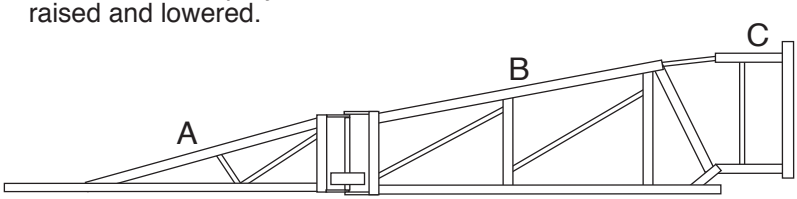
8.) ***BOOM SLIDE-*** The part of the center section that slides along the H frame.

9.) ***INTERMEDIATE WING-*** Refers to the inner portion of the wing.

10.) ***OUTER WING-*** Refers to the outer portion of the wing.

11.) ***BREAKAWAY-*** Refers to the device between the inner wing and outer wing section that allows the outer wing to swing backward if an obstacle is encountered.

12.) ***H-FRAME-*** Refers to the portion of the center that is stationarily attached to the sprayer frame, and that the boom travels on when raised and lowered.



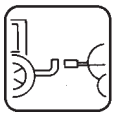
A - Outer Wing Section/Breakaway
B - Intermediate Wing Section
C - Center Section

Fig. 1

4.0 PREPARATION

Hydraulic booms need one single outlet for the lift function of the spray boom and one double outlet for the folding function (If equipped with Tilt Option, another single outlet is needed). Note that the boom's hydraulic system requires an oil capacity of approximately .8 GPM (3 litres/min.) and a minimum pressure of 1,950 PSI (130 bar).

5.0 HYDRAULIC HOOK-UP



WARNING:

- **BE SURE TO HOOK UP HYDRAULIC LINES PROPERLY!**
- **MAKE SURE THE HYDRAULIC LINES HAVE NOT BEEN DAMAGED DURING SHIPPING.**
- **ESCAPING HYDRAULIC FLUID UNDER PRESSURE CAN PENETRATE THE SKIN CAUSING SERIOUS INJURY. AVOID THIS HAZARD BY RELIEVING PRESSURE BEFORE DISCONNECTING HYDRAULIC LINES.**
- **ENSURE ALL CONNECTIONS ARE TIGHT BEFORE APPLYING PRESSURE, SEARCH FOR LEAKS WITH A PIECE OF CARDBOARD NOT YOUR HANDS!**
- **IMPROPER HOOK-UP CAN CAUSE DANGEROUS BOOM MOVEMENTS AND/OR DAMAGE TO THE SPRAYER HYDRAULICS.**
- **DO NOT ALLOW ANYONE NEAR A HYDRAULIC BOOM IN OPERATION.**
- **ALWAYS SHUT TRACTOR OFF WHEN CONNECTING, SERVICING OR ADJUSTING BOOM.**

IMPORTANT: ***Due to the wide variations in tractor hydraulic systems and capacities, care should be exercised when initially operating the sprayer hydraulic cylinders. It is advisable to adjust the hydraulic flow control down to the minimum rate before operating the system. Adjust/increase the flow control after the system is bled of any air, if necessary.***

1. Attach the heavier (3/8“) hydraulic hose to the tractor's single acting outlet.

2. Attach the smaller (1/4“) hydraulic hose to the tractor's double acting outlet.

5.1 Tilt Option

A) Installation Of The Tilt Option Control Box

1. Mount the Tilt Option switch box in a suitable location in the tractor cab.
2. Connect the bayonet plug from the switch box to a 12V power supply. HARDI® recommends using electronic distribution box #817925 to ensure a good power supply to various 12V attachments.
   Note polarity: **BROWN** WIRE **=** POSITIVE (+)
   BLUE WIRE **=** NEGATIVE (-)
3. Connect the female 2 pin plug from the switch box to the 2 pin male plug from the sprayer.
4. Connect the 1/4" hydraulic hose with the white marker band to a single acting hydraulic outlet on the tractor.

6.0 OPERATING THE HYDRAULIC FALCON BOOM

WARNING: **• USE EXTREME CAUTION THE FIRST SEVERAL TIMES YOU OPERATE THE BOOM AS THE AIR IS BLED OUT.**
• AIR MAY STILL BE TRAPPED IN THE HYDRAULICS SYSTEM. THE BOOM CAN MAKE SUDDEN AND UNEXPECTED MOVEMENTS!
• ALWAYS OPERATE BOOM ON LEVEL GROUND.
• BEFORE UNFOLDING THE BOOM, ENSURE THAT THE SPRAYER IS HITCHED TO THE TRACTOR UNIT.
• ENSURE THAT THERE ARE NO OBSTRUCTIONS OR PERSONS IN THE PATH OF TRAVEL BEFORE FOLDING OR UNFOLDING THE BOOM.

6.1 Releasing The FALCON Boom From Transport Supports

WARNING: **ALWAYS OPERATE BOOM ON LEVEL GROUND!**

1. Remove pins from transport brackets (right and left sides) and place in storage holes on transport upright (Fig. 2).
2. Raise the boom to release it from the transport supports.
3. Activate the double acting hydraulic outlet to unfold the boom. Both wings will now unfold simultaneously.

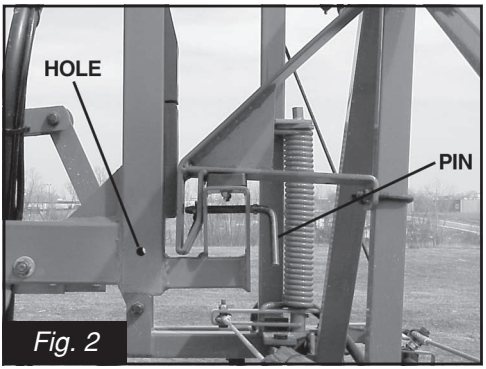


Fig. 2

4. When the boom is completely unfolded, unlock the contour following lock in the center at the rear. The boom can now be raised or lowered to the desired spray height by activating the single acting hydraulic outlet.
5. Before attempting to fold the boom wings back into the transport position, lock the center with the pin lock to prevent contour following from falling to one side when folding, then raise the boom all the way to the top by activating the single acting outlet.
6. The boom is folded in by activating the double acting outlet. The boom can now be lowered into the transport supports.
7. Replace pins in transport brackets (right and left sides).

6.2 Tilting Boom (Tilt Option Only)

WARNING:
- **NEVER ATTEMPT TO FOLD BOOM TO TRANSPORT POSITION WHEN WINGS ARE TILTED. ALWAYS LET WINGS DOWN TO HORIZONTAL POSITION PRIOR TO FOLDING.**
- **NEVER ATTEMPT TO WORK ON OR AROUND WING SECTION WHEN TILTED UP.**
- **UNEXPECTED BOOM MOVEMENTS MAY OCCUR IF WINGS ARE TILTED WHEN FOLDING.**
- **NEVER USE TILT FUNCTION WHEN BOOM IS FOLDED INTO TRANSPORT POSITION.**

A) Operating The Tilt Option Control Box

1. Flip switch (**A**) (Fig. 3) to Right or Left position, depending on which side is to be tilted.
2. Activate the single acting outlet to tilt wing up.
3. Deactivate the handle to return boom wing to level position.

Note: The switch can be changed from right to left to tilt both wings up or down simultaneously.

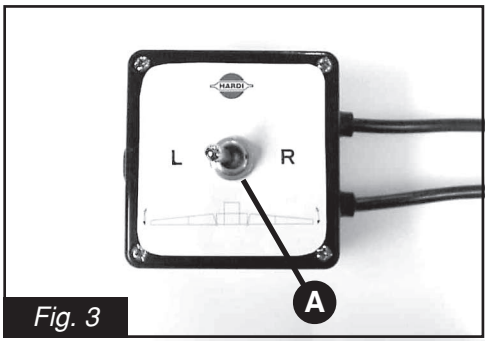


Fig. 3

7.0 ADJUSTMENTS

WARNING:
- **HARDI® CANNOT ASSUME RESPONSIBILITY OR BE HELD LIABLE FOR ANY LOSS OR DAMAGE THAT OCCURS DUE TO LACK OF ADJUSTMENTS OR MAINTENANCE.**
- **WE URGE YOU TO FOLLOW THE ADJUSTMENT AND MAINTENANCE RECOMMENDATIONS FOR EVERYONE'S SAFETY.**
- **MAKE IT A DAILY HABIT TO INSPECT YOUR BOOM FOR NEED OF ADJUSTMENT OR MAINTENANCE.**
- **IMMEDIATELY REPLACE ANY PARTS ON THE BOOM THAT ARE WORN OR BROKEN.**
- **ALWAYS CLEAN YOUR BOOM BEFORE ADJUSTING IT TO AVOID UNNECESSARY CONTACT WITH CHEMICALS**.

Your new HARDI® FALCON boom was hydraulically charged and adjusted at time of assembly. (This applies to booms sold with sprayers as complete units only.)

The FALCON boom will require additional adjustments shortly after being taken into use (after 10 hours) and thereafter at a minimum of an annual basis or when necessary to perform at its maximum level.

To further ensure proper performance the FALCON boom also has to be maintained on a regular basis. Please follow the suggested maintenance intervals. It is important to perform the adjustment procedures in the same sequence as they are written in this manual.

7.1 Adjustment And Maintenance Intervals

IMPORTANT: ***To maximize boom life and performance, retighten all boom fasteners and inspect boom for proper adjustment after the first 10 hours of use. Thereafter adjust the boom at a minimum of once a year and check all fasteners at 50 hr. intervals. Lubrication of the boom should be done daily to ensure maximum performance and life (Section 8.2).***

7.2 Alignment of Wing Assemblies

1. With the boom unfolded and in the working position, check alignment of the intermediate section with the center frame.
2. With the fold cylinder pressurized, determine if the intermediate section needs to be adjusted to the front or rear to come into alignment with the center frame.

   NOTE! Because of adjustments made later, it is better to start with the wing assemblies angled slightly to the rear.

3. Relieve pressure from the cylinder by folding the boom in a few inches.
4. Disconnect the cylinder rod eye (**B**) (Fig. 4) from the intermediate boom section.
5. Loosen the lock nut (**A**) (Fig. 4) and adjust the rod eye (**B**) (Fig. 4) in to move boom forward or out to move boom rearward. Tighten the lock nut (**A**) (Fig. 4).
6. Attach the cylinder rod to the boom and pressurize the cylinder to check boom alignment.

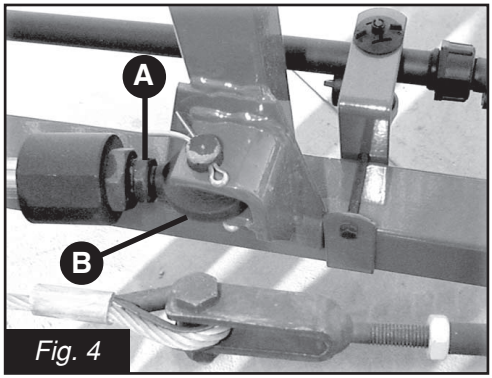


Fig. 4

7.3 Adjusting Front Fold Cable

WARNING: **The rear cable can snap and injure you or someone else if tensioned when the boom is unfolded. Always adjust the front cable first with the boom unfolded and the rear cable last with the boom folded in the transport position.**

1. Unfold the boom into the operating (spraying) position.
2. Shut the tractor off.
3. Slide a straight edge down the underside of the intermediate section until it just contacts the front cable.

4. Suspend a 10 lb. (4.5 kg) weight from the cable at the straight edge-to-cable contact point and check cable deflection by measuring the distance from the straight edge to the cable. The cable should deflect 1/2" to 3/4".
5. Loosen the lock nuts (**A**) (Fig. 5) on the turnbuckle assembly and adjust the turnbuckle (**B**) (Fig. 5) for proper cable deflection.
6. Tighten the lock nuts (**A**) (Fig. 5) and remove the weight.

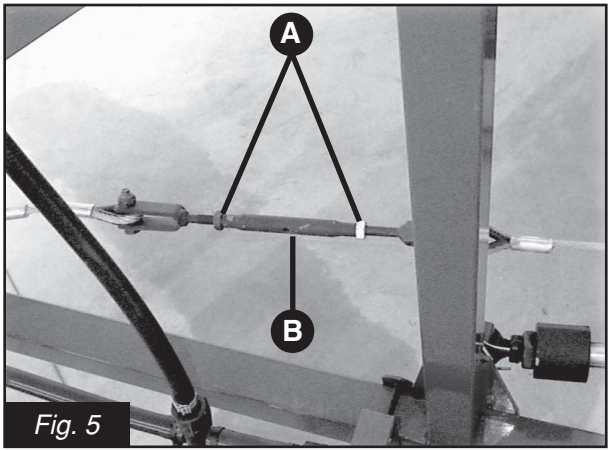


Fig. 5

IMPORTANT: ***Check the boom alignment again. If the front cable was tightened, the wing assembly will move forward; If loosened, the wing will move rearward. Adjust the fold cylinder (if necessary) as described in Alignment Of Wing Assemblies (Section 7.2).***

7.4 Adjusting Wings Level To Ground

1. Ensure the wing is firmly supported.
2. Disconnect the rod eye (**B**) (Fig. 6).
3. Adjust the wing support to ensure the wing is level.
4. Loosen the lock nut (**A**) (Fig. 6) and adjust the rod eye (**B**) (Fig. 6) to allow re-connection.
5. After connecting the rod eye (**B**) (Fig. 6), secure the lock nut (**A**) (Fig 6).

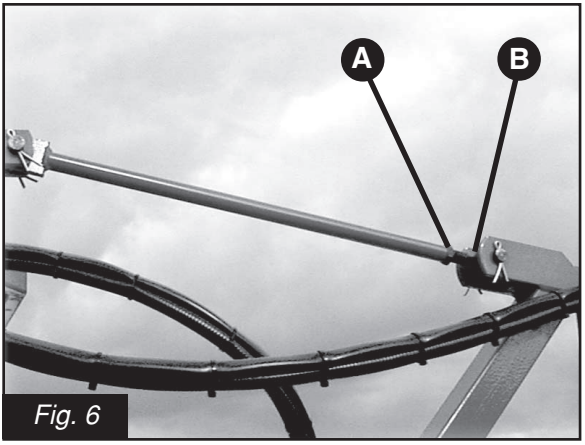


Fig. 6

7.5 Adjusting Center Frame

This adjustment will affect the trapeze function and must therefore be done properly.

IMPORTANT: ***Lubricate the pivot linkage and grease the skid plates prior to adjustment. Refer to "Greasing The H-Frame And Center Frame" (Section 8.2A)***

1. Park the sprayer on level ground
2. Tighten the six adjustment bolts (**A**) (Fig. 7) in approximately half a turn.
3. Lift the boom all the way to the top, then lower the boom all the way down.
4. Repeat the above procedure until the center is firmly adjusted inside the H-Frame.
5. If the boom will not lower all the way down, the bolts need to be loosened again.
6. Tighten the four adjustment bolts (**B**) (Fig. 7) approximately half a turn.
7. Grasp the wing by the end and lift it approximately 20". Let the wing go and it should go down to an approximately horizontal position.

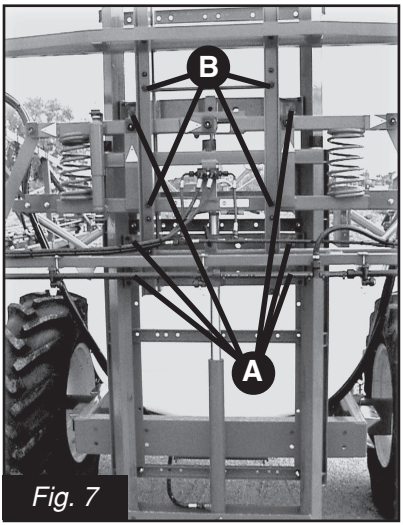


Fig. 7

8. Repeat steps **6** and **7** until the boom is firmly held in place, but without affecting the trapeze function.
9. If the trapeze will not let the boom go back to the horizontal position, the bolts must be loosened again.

7.6 Adjusting The Boom To Rest In Transports

1. Lift the boom all the way to the top.
2. Fold the boom into the transport position. With the fold cylinder pressurized, determine if the boom sections need to be adjusted inwards or outwards.
3. If the boom rests too far in on the transport support, loosen the lock nut (**B**) (Fig. 8) and adjust the collar (**A**) (Fig. 8) in towards the cylinder housing.
4. If the boom rests too far out on the transport suport, the collar (**A**) (Fig. 8) has to go out from the cylinder housing.
5. Secure the lock nut (**B**) (Fig. 8).
6. Pressurize the cylinder to see if the boom is properly adjusted. If not, repeat the above procedure until it is correctly adjusted.

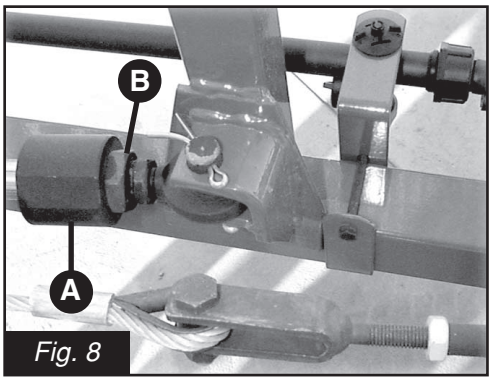


Fig. 8

7.7 Adjusting Rear Cable

WARNING: **The rear cable can snap and injure you or someone else if tensioned when the boom is unfolded. Always adjust the front cable first with the boom unfolded and the rear cable last with the boom folded in the transport position.**

1. Raise the boom to its highest position. Fold the boom to the transport position. Make sure fold cylinders are pressurized and that the boom is folded all the way in.
2. Shut the tractor off.

3. Loosen the lock nuts on the turnbuckle. Adjust (tighten) the turnbuckle so that the outer wing section contacts the boom transport stop bracket. Tighten the turnbuckle another 4 complete turns and retighten the lock nuts.

8.0 MAINTENANCE

In order to derive full benefit from the boom for many years, the following maintenance program should be followed.

WARNING: **ALWAYS CLEAN YOUR BOOM AT THE END OF THE WORK DAY OR BEFORE SERVICING IS DONE TO AVOID UNNECESSARY CONTACT WITH CHEMICALS!**

IMPORTANT: ***Always read carefully through the individual paragraphs regarding maintenance jobs before starting the job. If any portion remains unclear or requires facilities which are not available, then for safety reasons, please leave the job to your HARDI® dealer's workshop.***

NOTE! For maintenance of the sprayer, please refer to your sprayer's operator's manual.

To effectively maintain the boom you must:

1. Clean the boom as part of cleaning the sprayer, after spraying is completed and before performing any maintenance (Section 8.1).
2. Lubricate the boom according to the lubrication interval reached (Sections 8.2, 8.2A & 8.2B).
3. Perform Adjustments as needed following a daily boom inspection (Section 7).
4. Perform Occasional maintenance jobs as needed following boom inspections.
5. Immediately fit Replacement parts for parts that are worn or broken.

8.1 Cleaning

The entire sprayer and the boom should be cleaned together only (Refer to the Cleaning section in you HARDI® sprayer's operator's manual).

If you have a HARDI® FALCON boom fitted to a HARDI® sprayer that does not have an operator's manual, or if you have a HARDI® FALCON boom fitted to a non-HARDI® sprayer and you don't have any form of instructions or manuals, please read the following for a brief overview of cleaning:

1. Dilute the remaining spray liquid in the tank with at least 10 times the amount of water and spray the liquid out into the field you have just sprayed.
2. Select and use the appropriate protective clothing. Select detergent suitable for cleaning and suitable deactivating agents if necessary.
3. Flush and clean the sprayer and tractor externally. Use detergent if necessary.
4. Remove all the filters and clean them - be careful not to damage their mesh. Re-fit the filters when the sprayer is completely clean.
5. Clean the pressure relief valve and attached hose of any residue.
6. With the pump running, flush the inside of the tank (remember the tank roof). Flush and operate all components and any equipment that has been in contact with the chemical. Before opening the distribution valves and spraying the liquid out, decide whether this should be done in the field again or on the soakway.
7. After spraying the liquid out, stop the pump and fill at least 20% of the tank with clean water. Note that some chemicals require the tank to be completely filled. Add appropriate detergent and/or deactivating agent, e.g. Washing Soda or Triple Ammonia.

   NOTE! If a cleaning procedure is given on the chemical label, follow it closely.

8. Start the pump and operate all controls, enabling the liquid to come in contact with all the components. Leave the distribution valves until last. Some detergents and deactivating agents work best if left in the tank for a short period. Check the label.
9. Drain the tank and if the pump is able to - let the pump run dry. Flush the inside of the tank, again letting pump run dry (if possible).
10. If the chemicals used have a tendency to block nozzles and filters, remove and clean them now.
11. Re-fit all the filters and nozzles and store the sprayer. If from previous experiences, it is noted that the solvents and the chemicals are particualarly aggressive, store the sprayer with the tank lid open.

8.2 Lubrication

Lubrication of the boom daily will ensure maximum performance and life. This lubrication includes the H-Frame and center frame as well as the boom hinges.

8.2 (A) Greasing The H-Frame And Center Frame

Every 8 hours (daily) new grease should be applied to the wear surfaces on the H-Frame and center frame (Fig. 9).

1. Apply grease to the inner and outer wear surfaces of the lower portion of the H-Frame with the boom in the transport position.
2. Apply grease to the inner and outer wear surfaces of the upper portion of the H-Frame with the boom unfolded and lowered all the way down.
3. Apply grease to all the center frame skid plates.

Every 50 hours the grease on the H-Frame and center frame should be completely cleaned off with a degreasing solvent and new grease applied. Follow the above steps when doing this.

Fig. 9

Upper & Lower H-Frame Skid Plates run vertically against Wear Surfaces (Outer Right side shown - Grease left side and both inner Wear Surfaces behind H-Frame also)

Center Frame Skid Plates

8.2 (B) Greasing The Boom And Hinge Assemblies

Fig. 10

Every 8 hours (daily) grease the zerks indicated in Fig. 10 and Fig. 11.

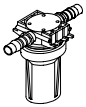
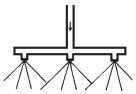
Fig. 11

8.3 Nozzle Filters

Each nozzle assembly is equipped with a 50 mesh filter screen as standard on units equipped with 20 GPA green Color Tips™. Properly maintained suction filter and self cleaning filter will eliminate the plugging of the screens and nozzles.

8.4 In-Line Filters (Optional)

If in-line filters are fitted, they should be cleaned every 8hrs. (daily). Unscrew the bowl to remove sediment.

Nozzle Size 	Inline Filters (optional) 	Nozzle Screen 
Lilac (08) Brown (10) Yellow (12) Orange (14)	100	100
Red (16) White (18)	80	80
Green (20) & Larger	50*	50*

***** Standard mesh

8.5 Nozzle Tubes And Fittings

Poor seals are usually caused by:
- Missing O-rings or gaskets
- Damaged or incorrectly seated O-rings
- Dry or deformed O-rings or gaskets
- Foreign materials

Therefore, in case of leaks; **DO NOT** overtighten any fittings (Fig. 12). Disassemble, check the condition and position of the O-ring or gasket, clean, lubricate and then reassemble. For **radial** seals (O-ring) (Fig.12) only hand tighten the fittings. Do not use pliers or wrenches.
The O-rings need to be lubricated **ALL THE WAY AROUND** before fitting on to the nozzle tube.

HARDI® recommends using a vegetable based oil to prolong the life of the O-ring.

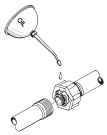
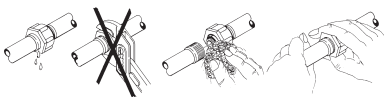


Fig. 12



8.6 Maintenance Of Triplets (When fitted)

Every 50 hours the triplets should be disassembled, removed and cleaned. This is done by pulling out the stainless clip on the side of the triplet assembly (Fig. 13). Clean the bottom part as well as the top part thoroughly. Coat the O-ring with a light film of vegetable oil if the sprayer is to be stored for a long period of time.

If the triplets are not cleaned regularly they will not rotate readily and possible damage to them may occur.

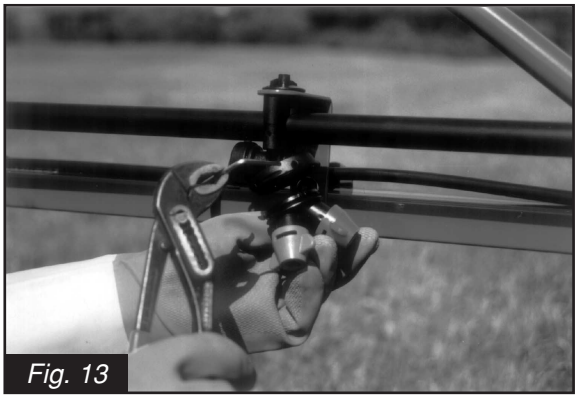


Fig. 13

WARNING: **NEVER SERVICE YOUR CONTAMINATED NOZZLES WITHOUT WEARING CHEMICAL RESISTANT GLOVES AND SAFETY GOGGLES.**

9.0 TRANSPORTATION AND STORAGE

9.1 Follow Safe Transport And Towing Procedures

WARNING: **KEEP AWAY FROM OVERHEAD POWER LINES TO AVOID SERIOUS INJURY OR DEATH TO YOURSELF OR SOMEONE ELSE. KNOW THE TRANSPORT HEIGHT OF YOUR MACHINE.**

- Keep all persons away from machine when folding boom.
- When transporting sprayers equipped the with FALCON booms, only transport with the boom folded and resting on transport support arms.
- Ensure transport pins are installed through the transport brackets properly.
- Maximum transport speed is 15 mph (24 km/h).
- Have warning lights flashing when transporting or towing sprayer.

Fig. 14

9.2 Winter Storage

When the spraying season is over you should devote some extra time to cleaning and preparing the sprayer for storage.

Hoses

Check that none of the hoses are caught or have sharp bends. A leaky hose can give an annoying delay in the middle of the spraying job. Therefore check all the hoses and change them if there is any doubt about their physical condition.

Paint

Some chemicals are very hard on paints. It is therefore recommended to remove rust, if any, and then touch up the paint.

Anti-freeze Precaution

If the FALCON boom is not stored in a frost-free place, you should take the following precautions:

1. Drain as much water as possible from sprayer.
2. Pour in a mixture of ethylene glycol base anti-freeze and water at the ratio for the desired temperature protection (Volume of mixture should be about 1% of tank volume).
3. Run the sprayer and circulate the anti-freeze in the pump, controls and boom lines. The anti-freeze solution prevents the O-rings and gaskets from drying out.

WARNING: **NEVER USE OIL OR DIESEL FUEL IN A SPRAYER.**

Remove nozzles and screens. Clean and store in a safe, dry location away from children and animals. Remove pressure gauges and store upright in a warm dry location.

10.0 TROUBLESHOOTING

10.1 Hydraulic Systems

General Hydraulics

Problem	*Solution*
1. The boom moves too quickly when unfolding/folding.	A. Adjust the hydraulic flow control on the tractor. B. Check for restrictor (0.7mm) in return side of cylinder. C. Bleed air from hydraulic system.
2. Hydraulic system tilt functions will not operate.	A. Check for proper 12V power supply.
3. One function (fold or tilt) will not operate.	A. Check for defective switch(es). B. Check continuity of cables. C. Check for operation of applicable solenoid (coil not activating or plunger stuck). D. Check for short circuit in wiring juction box at rear of sprayer. E. Dirt in the restrictor port of the cylinder.

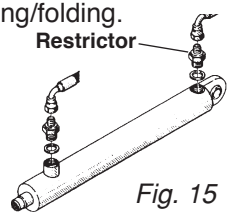


Fig. 15

10.2 Mechanical Problems

Problem	*Solution*
1. Boom will not completely fold in or out.	A. Adjust the fold cylinder. (Section 7.2)
2. Boom not in alignment.	A. Adjust and grease complete boom cables and stops. (Sections 7 & 8)
3. Boom won't stay in spray position.	A. Check for hydraulic leak through solenoid block. B. Check for a solenoid that is stuck open.
4. Boom won't go up or down.	A. H-frame needs to be greased. B. Grease on H-frame is dry and dirty, clean and regrease. C. Boom slide is too tight to H-frame. Readjust Center Frame (Section 7.5).

10.3 Hydraulic Schematics

A) HY Schematics

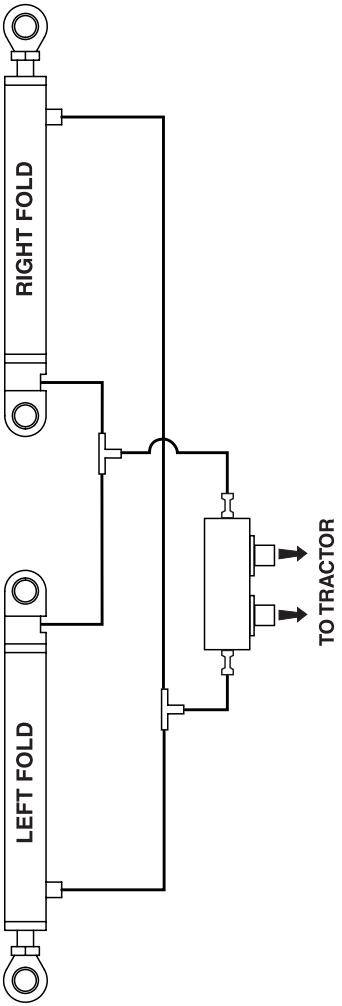


Fig. 16

B) Tilt Schematics

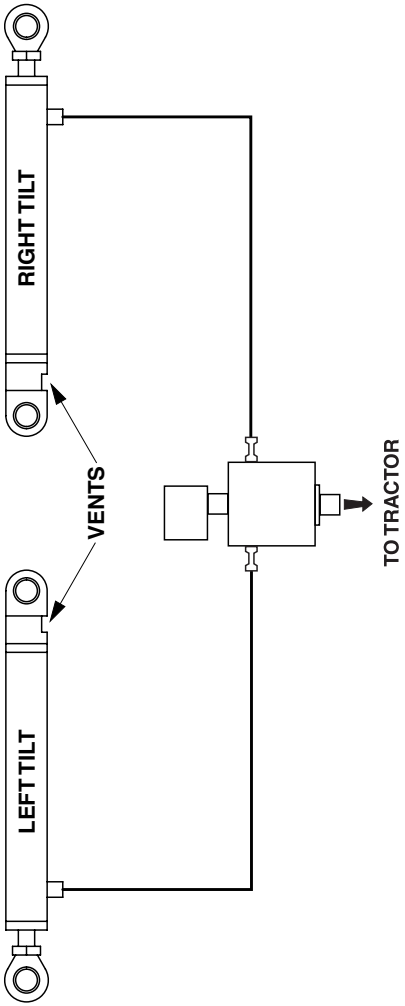


Fig. 17

11.0 WARRANTY POLICY AND CONDITIONS

HARDI® INC. , 1500 West 76th Street, Davenport, Iowa USA; 5646 W. Barstow, Fresno, California, USA; and 290 Sovereign Road, London, Ontario, Canada hereinafter called "HARDI®", offers the following limited warranty in accordance with the provisions below to each original retail purchaser of HARDI® new equipment of its own manufacturer, from an authorized HARDI® dealer, that such equipment is at the time of delivery to such purchaser, free from defects in material and workmanship and that such equipment will be warranted for a period of one year from the date of delivery to the end user providing the machine is used and serviced in accordance with the recommendations in the Operators Manual and is operated under normal farm conditions.

1. This limited warranty is subject to the following exceptions:

   a) Parts of the machine are not manufactured by HARDI®, (i.e. engines, tires, tubes, electronic controls, and other components or trade accesories, etc.) are not covered by this warranty but are subject to the warranty of the original manufacturer. Any claim falling into this category will be taken up with the manufacturer concerned.

   b) This warranty will be withdrawn if any equipment has been used for purposes other than for which it was intended or if it has been misused, neglected, or damaged by accident, let out on hire or furnished by a rental agency. Nor can claims be accepted if parts other than those manufactured by HARDI® have been incorporated in any of our equipment. Further, HARDI® shall not be responsible for damage in transit or handling by any common carrier and under no circumstances within or without the warranty period will HARDI® be liable for damages of loss of use, or damages resulting from delay or any consequential damage.

2. We cannot be held responsible for loss of livestock, loss of crops, loss because of delays in harvesting or any expense or loss incurred for labor, supplies, substitute machinery, rental for any other reason, or for injuries either to the owner or to a third party, nor can we be called upon to be responsible for labor charges, other than originally agreed, incurred in the removal or replacement of components.

3. The customer will be responsible for and bear the costs of:

   a) Normal maintenance such as greasing, maintenance of oil levels, minor adjustments, etc.

   b) Transportation of any HARDI® product to and from where the warranty work is performed.

   c) Dealer travel time to and from the machine or to deliver and return the machine from the service workshop for repair.

   d) Dealer traveling costs.

4. Parts defined as normal wearing items, (i.e. tires and V-belts) are not in any way covered under this warranty.

5. This warranty will not apply to any product which is altered or modified without the express written permission of HARDI® and/or repaired by anyone other than an Authorized Service Dealer.

6. Warranty is dependent upon the strict observance by the purchaser of the following provisions:

   a) That this warranty may not be assigned or transferred to anyone.

   b) That the Warranty Registration Certificate has been correctly completed by dealer and purchaser with their names and addresses, dated, signed and returned to the appropriate address as given on the Warranty Registration Certificate.

   c) That all safety instructions in the operators manual shall be followed and all safety guards regularly inspected and replaced where necessary.

7. No warranty is given on second-hand products and none is to be implied.
8. Subject to the following terms, conditions and contributions, HARDI® extends the warranty on polyethylenetanks (excluding fittings, lids and gaskets) to FIVE YEARS. To qualify for this extended warranty, the tank must be drained and flushed with fresh water after each day of use. HARDI®'s liability is limited to replacement of the tank, FOB our plant at no cost to the purchaser during the first twelve months; at 20% of the then current price during the second year ; at 40% during the third year ; at 60% during the fourth year; and at 80% during the fifth year. This five year extended warranty is subject, in each instance, to the tank being inspected and approved for replacement or repair by HARDI® personnel before HARDI® will accept any liability hereunder.
9. Subject to the following terms, conditions, contributions, HARDI® extends the warranty on HARDI® diaphragm pumps (excluding wearing parts such as diaphragms, valves, etc.) to FIVE YEARS. To qualify for this extended warranty, the pump must be drained and flushed with fresh water after each day of use. HARDI®'s liability is limited to replacement of defective parts, FOB our plants in Davenport, Iowa, USA; Fresno, CA, USA; and London, Ontario, Canada at no cost to the purchaser during the first twelve months after date of purchase, at 20% of the then current retail price during the second year ; at 40% during the third year ; at 60% during the fourth year ; and at 80% during the fifth year. This five year extended warranty is subject, in each instance, to the tank being inspected and approved for replacement or repair by HARDI® personnel before HARDI® will accept any liability hereunder.
10. HARDI® reserves the right to incorporate any change in design in its products without obligation to make such changes on units previously manufactured.
11. The judgement of HARDI® in all cases of claims under this warranty shall be final and conclusive and the purchaser agrees to accept its decisions on all questions as to defect and to the exchange of any part or parts.
12. No employee or representative is authorized to change this warranty in any way or grant any other warranty unless such change is made in writing and signed by an officer of HARDI® at it's head office.
13. Any warranty work performed which will exceed $400.00 MUST be approved IN ADVANCE by the Service Manager.
14. Any pump replacement must be approved in advance by the Service Manager.
15. Claims under this policy must be filled with HARDI® within thirty (30) days of work performed or warranty shall be void.
16. Parts requested must be returned prepaid within thirty (30) days for warranty settlement.
17. Warranty claims must be COMPLETELY filled out properly or will be returned.

DISCLAIMER OF FURTHER WARRANTY

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, EXCEPT AS SET FORTH ABOVE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION OF THE PRODUCT CONTAINED HEREIN. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES (SUCH AS LOSS OF ANTICIPATED PROFITS) IN CONNECTION WITH THE RETAIL PURCHASER'S USE OF THE PRODUCT.

12.0 NOTES

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