EAGLE™ SPB/SPC Boom

Operator's Manual

67302403 (10/04)

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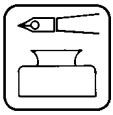

Dear Owner,

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

Our sprayers and accessories 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 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 EAGLE™ SPB/SPC boom were suggested by growers. There is no substitute for "on farm" experience and we invite your comments and suggestions. If any portion of this instruction book remains unclear after reading it, contact your HARDI® dealer or service personnel for further explanation before using the equipment.

For Product, Service or Warranty Information:
- Please contact your local HARDI® dealer.

To contact HARDI® directly:
- Please use the HARDI® Customer Service number: 1-866-770-7063
- Or send your email to CUSTSERV@hardi-us.com

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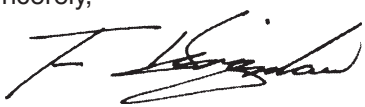
Sincerely,



Tom L. Kinzenbaw
President

Fig. 1

HARDI® Eagle™ SPB Boom - H-Frame (60' shown)

Fig. 2

HARDI® Eagle™ SPC Boom - Paralift™ (100' shown)

1.0 INTRODUCTION

The HARDI® EAGLE™ booms are available in the following sizes:
The **45'-50'** and **60'-66'** EAGLE™ SPB booms are built with the same basic components. There are differences in the outer wing sections to give the range of boom widths. There is also a difference in the location of the breakaway.

The **80'-90'** EAGLE™ SPB booms are built with the same basic components. The 80' boom has a different outer wing section than the 88' and 90' booms.

The **80'-100'** EAGLE™ SPC booms are built with the same basic components as the SPB booms. The main differences are in the size of the boom steel profiles, the folding hinge area between the inner and outer boom wings, and the breakaway section with claw-clutch assembly.

Components cannot be exchanged between 45'-66' and 80'-100' EAGLE™ booms or between EAGLE™ SPB and SPC booms.

All EAGLE™ booms are available in two different hydraulic system versions. They are:

The HY model -
This model features hydraulic lift cylinder for boom height adjustment and two fold cylinders for simultaneous boom wing fold and unfold.

The HZ 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 as well as individual boom wing fold. For "closed center" tractor hydraulic systems, an optional "DH" (Direct acting Hydraulics) control box is available on the HZ versions of EAGLE™ booms.

Both versions require one single acting and one double acting hydraulic outlets on the tractor. The HZ model also requires a 12V power supply for the in-cab mounted controls.
All EAGLE™ booms can be equipped with either single snap-fit or triplet nozzle bodies or drop nozzle assemblies.

2.0 SAFETY INFORMATION

WARNING

ALWAYS READ OPERATOR'S 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 EAGLE™ 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 EAGLE™ 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 operation 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 flashing 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

If you live anywhere in the United States, the following toll free number will connect you to your Local Poison Information Center.

PHONE NO. 1 - 8 0 0 - 2 2 2 - 1 2 2 2

If you live outside the United States, find the number for the poison control center in your phone book and write it in the space below:

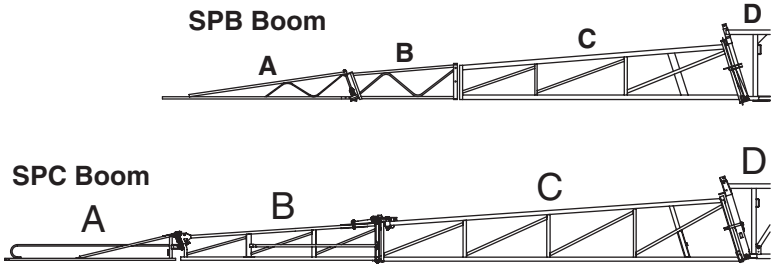
PHONE NO. _____ -_____ - _____

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 forward in the direction of travel.
2.) ***HY MODEL-*** An Eagle™ boom with basic hydraulics. This boom can only lift and lower, fold and unfold both boom wings simultaneously.
3.) ***HZ MODEL-*** An Eagle™ boom with more advanced hydraulics. This boom can lift and lower, fold one wing at a time, 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 are attached 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.) ***PARALIFT™-*** Refers to the parallel lift arms that hydraulically lift and lower the boom assembly, ensuring that the boom remains parallel to the ground.
10.) ***INTERMEDIATE WING-*** Refers to the inner portion of the wing.
11.) ***OUTER WING-*** Refers to the outer portion of the wing.
12.) ***BREAKAWAY-*** Refers to the device between the outer wing and breakaway section that allows the breakaway section to swing backward or forward if an obstacle is encountered.
13.) ***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.



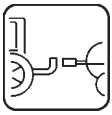
A - Breakaway Section
B - Outer Wing Section
C - Intermediate Wing Section
D - Center Frame

Fig. 3

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. Note that the booms hydraulic system requires an oil capacity of approximately .8 GPM (3 liters/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 tractors single acting outlet.

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

5.1 HZ Hydraulics Joystick Controls

A) Installation Of Handle

1. Attach the control handle to the hydraulic lever that operates the double acting outlet you intend to use (Fig. 4). The universal mounting bracket (**E**)(Fig. 4) is very flexible and a number of different mounting positions can be used.
2. Connect plug (**F**)(Fig. 4) to the tractor's 12V power system. Try to hook up the handle as close as possible to the battery or the starter for a better power supply. HARDI® recommends using electric distribution box #817925 to insure a good power supply to various 12V attachments.
   Note: Check with your dealer or tractor operator's manual for the best location to hook up the 12V system.

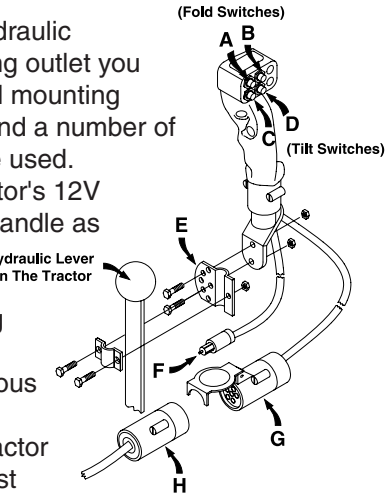


Fig. 4

Note polarity: **BROWN** WIRE = POSITIVE (**+**)
BLUE WIRE = NEGATIVE (**-**)

3. Connect electric plug (**H**)(Fig. 4) from sprayer hydraulics to plug (**G**)(Fig. 4) on handle.

5.2 'DH' Hydraulics (Optional)

Note: This kit can only be used on tractors with 'closed center' hydraulic systems.

Switch **A** operates: Left hand fold cylinder
Switch **B** operates: Right hand fold cylinder
Switch **C** operates: Left hand tilt cylinder
Switch **D** operates: Right hand tilt cylinder

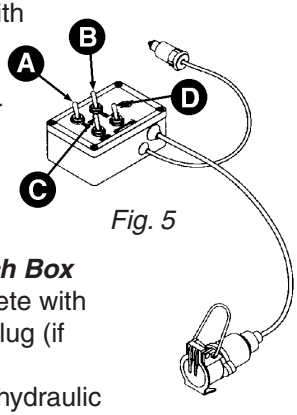


Fig. 5

A) Installation Of The 'DH' Hydraulic Switch Box

1. Remove the joystick control handle complete with bayonet style 12V plug and 7 pin female plug (if previously fitted).
2. Route the cable, with the 7 pins, from the hydraulic mount plate to the tractor.
3. Mount the 'DH' hydraulic switch box in a suitable location in the tractor cab.

4. 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 (-)
5. Connect the female 7 pin plug from the switch box to the 7 pin male plug from the sprayer.

5.3 HZ Hydraulics Control Box (Pre '95)

Switch down is on.
Switch up is off.
Switch **A** operates: left hand fold cylinder
Switch **B** operates: left hand tilt cylinder
Switch **C** operates: right hand tilt cylinder
Switch **D** operates: right hand fold cylinder

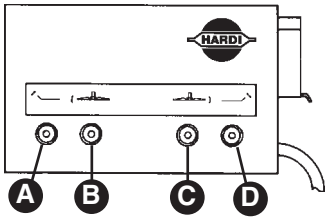


Fig. 6

A) Installation Of The HZ Hydraulic Control Box

1. Mount the 'HZ' hydraulic 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 7 pin plug from the switch box to the 7 pin male plug from the sprayer.

6.0 OPERATING THE EAGLE™ BOOM WITH HYDRAULIC H-FRAME LIFT

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.

Note: For Paralift™ Booms, see section 7.0.

6.1 Releasing The EAGLE™ Boom From Transport Supports

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

1. Start tractor and bring engine to operating RPM.
2. Activate the single acting outlet to lift the boom out of the sprayer's front transport support.
   Note: The boom also has a rear transport configured as a hook in the center of the H-frame. This hook has to be released by lifting the boom with the single acting outlet until the control arm of the hook appears between the two flat bars of the hook guide (Fig. 7). Be careful not to bring the control arm past the opening on the hook guide.

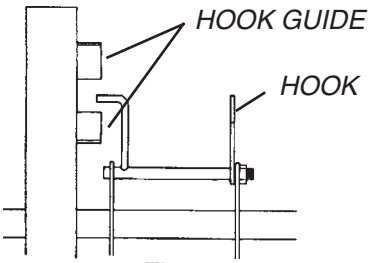


Fig. 7

6.2 Unfolding And Folding The Boom (HY Hydraulics)

1. Raise the boom to release it from the transport supports (Section 6.1).
2. Activate the double acting hydraulics outlet to unfold the boom. Both wings will now unfold simultaneously.
3. When boom is completely unfolded, it can be raised or lowered to desired spray height by activating the single acting hydraulic outlet.

4. Before attempting to fold boom back into transport position, it should be raised all the way to the top by activating the single acting outlet.
   Note: This time the control arm on the hook should be raised past the opening of the hook guide (Fig. 8).
   When boom has been raised high enough for the control arm to go past the opening on the hook guide, the wings can be folded into transport position.

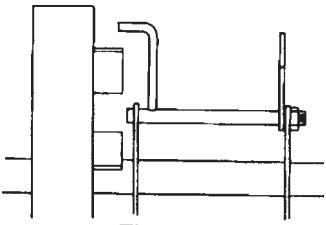


Fig. 8

5. The boom is folded in by activating the double acting outlet in the opposite direction that was used to unfold the boom. The boom can now be lowered into the transport supports. Ensure that the hook engages on the crossbar on the H-frame (rear transport).

6.3 Unfolding And Folding The Boom (HZ Hydraulics)

WARNING: **ALWAYS PUT THE WING IN THE HORIZONTAL POSITION PRIOR TO FOLDING. NEVER ATTEMPT TO FOLD BOOM TO TRANSPORT POSITION WHEN WINGS ARE TILTED. UNEXPECTED BOOM MOVEMENTS MAY OCCUR IF WINGS ARE TILTED WHEN FOLDING.**

A) Hydraulic Joystick Controls

1. Raise the boom to release it from the transport supports (Section 6.1).
2. Depress switches (**A**) & (**B**)(Fig. 4) and move hydraulic handle forward or rearward to activate oil flow. Switch positions of the hoses in the double acting remote outlet if you do not like the direction required to activate the boom.
3. "One side folding" will be achieved by following the above procedure except that only one of the switches is depressed (Section 6.6).

B) 'DH' Hydraulics Control Box (Optional)

1. Raise the boom to release it from the transport supports (Section 6.1).
2. Engage the tractor's double acting remote outlet lever and lock it in the engaged position.
3. Activate switch (**A**)(Fig. 5) upwards and hold to unfold left hand boom (Holding the switch in the down position will fold the boom). To unfold right hand boom, activate switch (**B**)(Fig. 5).
4. "One side folding" will be achieved by following the above procedure except that only one of the switches is activated (Section 6.6).

C) Hydraulic Control Box (Pre 95)

1. Raise the boom to release it from the transport supports (Section 6.1).
2. Activate switches (**A**) & (**D**)(Fig. 6) and move hydraulic handle forward or rearward to activate oil flow. Switch positions of the hoses in the double acting outlet if you do not like the direction required to activate the boom.
3. "One side folding" will be achieved by following the above procedure except that only one of the switches is activated (Section 6.6).

6.4 Tilting Boom (HZ Hydraulics 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.**
- **ALWAYS HAVE THE SLIDE TUBES ON FRONT TRANSPORT SUPPORTS IN OUTER MOST POSITION WHEN LOWERING BOOM INTO TRANSPORT POSITION.**

A) Hydraulic Joystick Controls

1. Activate switches (**C**) & (**D**)(Fig. 4) and move hydraulic handle forward or rearward to activate oil flow. Switch positions of the hoses in the double acting outlet if you do not like the direction required to activate the boom.

B) 'DH' Hydraulic Control Box (Optional)

1. Engage the tractors double acting remote outlet lever and lock it in the engaged position.
2. Activate switch (**C**)(Fig. 5) upwards and hold to tilt left hand boom up. (Holding the switch in the down position will tilt the boom down.) To tilt the right-hand boom activate switch (**D**)(Fig. 5).

C) Hydraulic Control Box (Pre 95)

1. Flip switch (**B**)(Fig. 6) or (**C**)(Fig. 6) to "ON" position, depending on which side is to be tilted.
   Switch (**B**)(Fig. 6) operates: Left hand tilt cylinder
   Switch (**C**)(Fig. 6) operates: Right hand tilt cylinder
2. Activate the double acting outlet to tilt wing up and down.
   Note: The switch can be shut off if the wing is to be kept tilted for an extended period of time.

6.5 Moving Transport Slide Tubes

1. Unfold boom.
2. Remove spring clip from lock pin (Fig. 9).
3. Remove lock pin from transport support.
4. Move slide tube (Fig. 9) toward center until the inner set of holes line up.
5. Replace lock pin.
6. Replace spring clip on lock pin.

To move the slide tube out, reverse the above procedure.

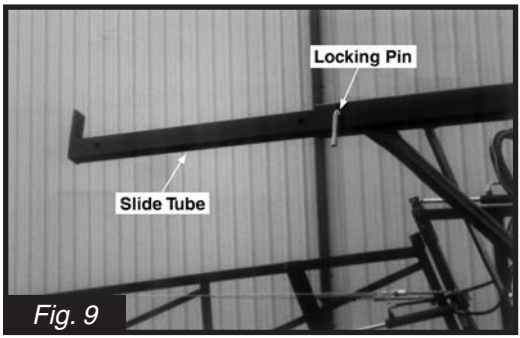


Fig. 9

6.6 Folding One Side Only (HZ Hydraulics Only)

If only one side of the boom is to be used for spraying , first unfold the boom completely and then turn switches off, then flip the switch for the side that is to be folded and activate the double acting outlet to fold that side into transport position.

Note: It is not advisable to go directly from transport position to spray position with one side only. Both wings must first be completely unfolded.

IMPORTANT: ***Before attempting to fold one side only, the slide tubes on the front transport supports must be moved to their inner most position. Serious damage to your boom or transport brackets may occur if this is not done!***

7.0 OPERATING THE EAGLE™ BOOM WITH HYDRAULIC PARALIFT™

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 HYDRAULIC 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.

7.1 Releasing The EAGLE™ Boom From Transport Supports

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

1. Start tractor and bring engine to operating RPM.
2. Activate the single acting outlet to lift the boom out of the sprayer's front transport support.

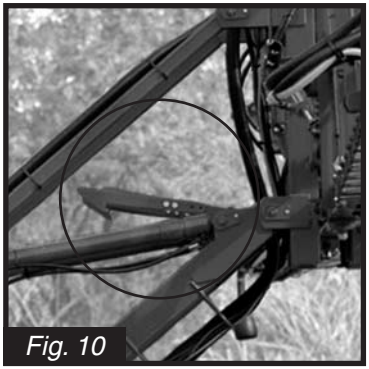


Fig. 10

Note: The boom also has a rear transport lock which automatically engages and disengages during folding and unfolding.

WARNING: **MAKE SURE THE TRANSPORT LOCK ARM STOP IS PROPERLY ADJUSTED TO PREVENT DAMAGE TO THE BOOM WHEN RAISING (see p. 43).**

7.2 Unfolding And Folding The Boom (HY Hydraulics)

1. Raise the boom to release it from the transport supports (Section 7.1).
2. Activate the double acting hydraulics outlet to unfold the boom. Both wings will now unfold simultaneously.

Note: The rear transport lock will automatically open when the boom is unfolded, allowing the boom to be lowered below the transport position.

3. When boom is completely unfolded, it can be raised or lowered to desired spray height by activating the single acting hydraulic outlet.
4. Before attempting to fold boom back into transport position, it must be raised all the way to the top by activating the single acting outlet.
5. The boom is folded in by activating the double acting outlet in the opposite direction that was used to unfold the boom. The rear transport lock will automatically engage when the hydraulics fold the boom into transport position. The boom can then be lowered into the transport supports.

7.3 Unfolding And Folding The Boom (HZ Hydraulics)

WARNING: **ALWAYS PUT THE WING IN THE HORIZONTAL POSITION PRIOR TO FOLDING. NEVER ATTEMPT TO FOLD BOOM TO TRANSPORT POSITION WHEN WINGS ARE TILTED. UNEXPECTED BOOM MOVEMENTS MAY OCCUR IF WINGS ARE TILTED WHEN FOLDING.**

A) Hydraulic Joystick Controls

1. Raise the boom to release it from the transport supports (Section 7.1).
2. Depress switches (**A**) & (**B**)(Fig. 4) and move hydraulic handle forward or rearward to activate oil flow. Switch positions of the hoses in the double acting remote outlet if you do not like the direction required to activate the boom.
3. "One side folding" will be achieved by following step 2 except that only one of the switches is depressed (Section 7.5).

B) 'DH' Hydraulics Control Box (Optional)

1. Raise the boom to release it from the transport supports (Section 7.1).
2. Engage the tractor's double acting remote outlet lever and lock it in the engaged position.
3. Activate switch (**A**)(Fig. 5) upwards and hold to unfold left hand boom (Holding the switch in the down position will fold the boom). To unfold right hand boom, activate switch (**B**)(Fig. 5).
4. "One side folding" will be achieved by following step 3 except that only one of the switches is activated (Section 7.5).

Note: The rear transport lock will automatically open when the boom is unfolded, allowing the boom to be lowered below the transport position.

C) Hydraulic Joystick or 'DH' Hydraulics Control Box

1. When boom is completely unfolded, it can be raised or lowered to desired spray height by activating the single acting hydraulic outlet.
2. Before attempting to fold boom back into transport position, it must be raised all the way to the top by activating the single acting outlet.
3. To fold the boom in:
   Hydraulic Joystick Controls: Depress switches (**A**) & (**B**)(Fig. 4), and move hydraulic handle in the opposite direction that was used to unfold the boom.
   'DH' Hydraulics Control Box (Optional): Hold switches (**A**) & (**B**) (Fig. 5) downwards to fold boom (with tractor's double acting remote outlet lever still locked in the engaged position).
4. The rear transport lock will automatically engage when the hydraulics fold the boom into transport position. The boom can then be lowered into the transport supports.

7.4 Tilting Boom (HZ Hydraulics 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) Hydraulic Joystick Controls

1. Activate switches (**C**) & (**D**)(Fig. 4) and move hydraulic handle forward or rearward to activate oil flow. Switch positions of the hoses in the double acting outlet if you do not like the direction required to activate the boom.

B) 'DH' Hydraulic Control Box (Optional)

1. Engage the tractors double acting remote outlet lever and lock it in the engaged position.
2. Activate switch (**C**)(Fig. 5) upwards and hold to tilt left hand boom up. (Holding the switch in the down position will tilt the boom down.) To tilt the right-hand boom activate switch (**D**)(Fig. 5).

7.5 Folding One Side Only (HZ Hydraulics Only)

If only one side of the boom is to be used for spraying , first unfold the boom completely and then turn switches off, then flip the switch for the side that is to be folded and activate the double acting outlet to fold that side into transport position.

Note: It is not advisable to go directly from transport position to spray position with one side only. Both wings must first be completely unfolded.

8.0 SPB BOOM 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® EAGLE™ SPB boom was hydraulically charged and adjusted at time of assembly. (This applies to booms sold with sprayers as complete units only.)

The EAGLE™ SPB 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 EAGLE™ SPB boom also has to be maintained on a regular basis (Section 10.0). 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.

8.1 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 10.0)***

8.2 Checking And Adjusting Sprocket Timing

1. With boom unfolded (in the spraying position) and standing on the rear side of the boom, check to ensure that the 7th pin connection on the 45' to 66' boom (5th pin on the 80'-90' boom) (**A**)(Fig. 11) in the timing chain is aligned with the center line between the sprocket cap screws (**B**)(Fig. 11).
2. To adjust timing, loosen turnbuckles on the front and rear cables until slack.
3. Line up the chain and sprocket as indicated in step 1.
4. Adjust front and rear cable tension (Sections 8.5 and 8.11).

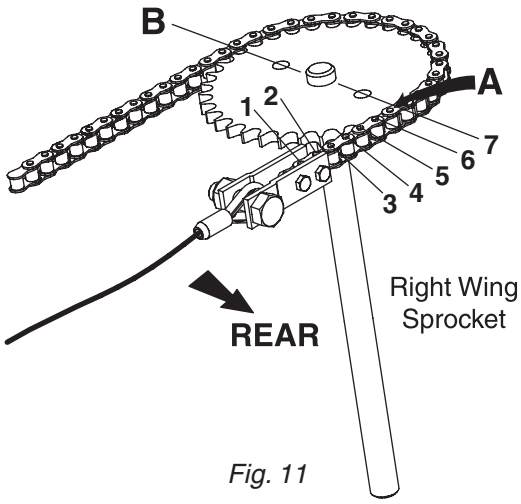


Fig. 11

8.3 Alignment Of Wing Assemblies

1. With the boom unfolded (in the spraying position), check alignment of the intermediate section with the center frame.
2. With fold cylinder pressurized, determine if the intermediate section needs to be adjusted to the front or rear to come into alignment with 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 cylinder by folding boom in a few inches.
4. Disconnect cylinder rod eye (**B**)(Fig. 12) from the intermediate boom section.
   Note: Some cylinder rods have a machined flat which, if visible, can be used for adjustments. If using machined flat for adjustment, leave rod eye pinned to boom and loosen jam nut.
5. Loosen jam nut (**A**)(Fig. 12) and adjust rod eye (**B**)(Fig. 12) IN to move boom forward or OUT to move boom rearward. Then retighten the jam nut (**A**)(Fig. 12).
6. Reattach the cylinder rod to the boom and pressurize the cylinder to check boom alignment.

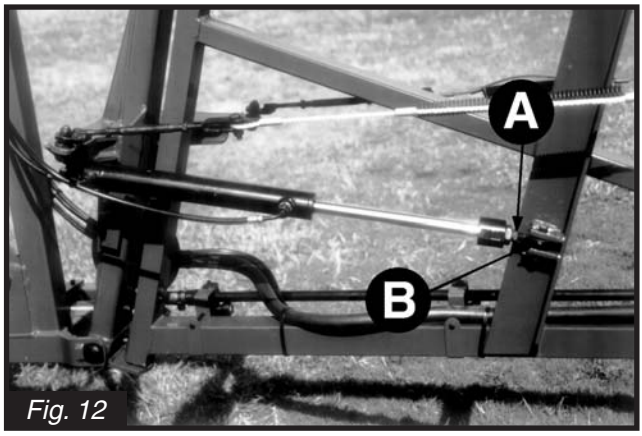


Fig. 12

8.4 Alignment Of Intermediate And Outer Wing Sections

A) 45'-50' EAGLE™ SPB Boom (45'-66' Pre '96 EAGLE™ Booms)

1. Tighten the adjustment nut (**A**)(Fig. 13) enough to secure a good engagement between the two clutches (**B**) (Fig. 13).
2. Remove rubber stop (**F**)(Fig. 15) from inner wing.
3. Undo jam nut (**C**)(Fig. 14) and adjust set screw (**D**)(Fig. 14) by turning nut (**E**)(Fig. 14) in or out until outer wing is in line with inner wing.

4. Line inner and outer wing up.
5. Hold the rubber stop close to the tabs.
6. The distance between the tabs should be approx. 1/16”-3/16” (1.5-4.75mm) less than the length of the rubber stop.
7. The rubber stop may need to be spaced out with 1 or more flat washers.
8. Replace rubber stop and tighten nut to hold it in place.

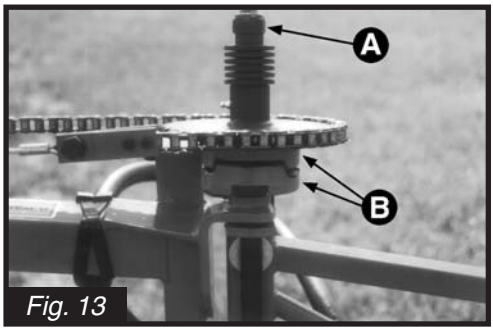


Fig. 13

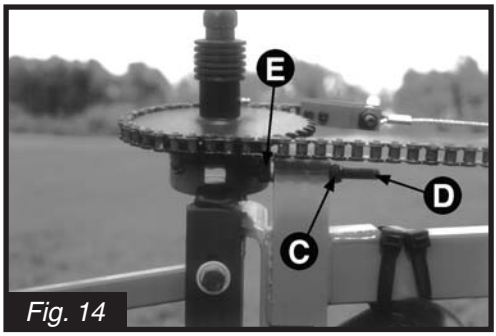


Fig. 14

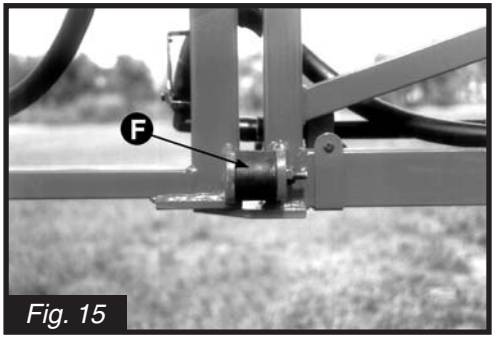


Fig. 15

B) 60'-66' EAGLE™ SPB Boom (Post '96)

1. Unfold boom into operating (spraying) position.
2. Hold M12x100 adjusting bolt, loosen lock nut (**A**)(Fig. 16), and turn nut (**B**)(Fig. 16) so the cap of the bolt head (**C**)(Fig. 16) contacts top stop plate with outer and intermediate boom sections aligned.
3. Check to ensure that lock nut is tight.

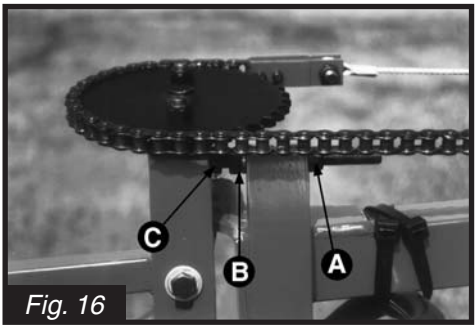


Fig. 16

C) 80'-90' EAGLE™ SPB Boom

1. Unfold boom into operating (spraying) position.
2. Hold M12x70 adjusting bolt, loosen lock nut (**A**)(Fig. 17), and turn nut (**B**)(Fig. 17) so the cap of the bolt head (**C**)(Fig. 17) contacts stop plate with outer and intermediate boom sections aligned.
3. Check to ensure that lock nut is tight.

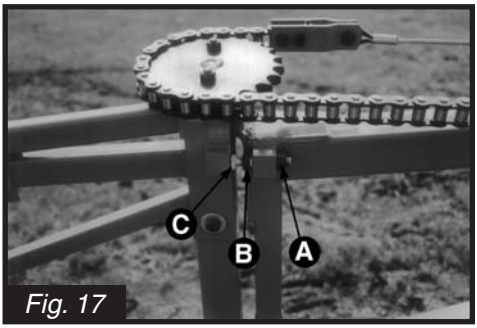


Fig. 17

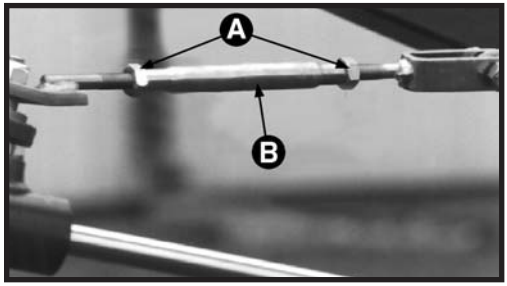
8.5 Adjusting Front Fold Cable

The performance of the EAGLE™ boom, while spraying, depends greatly on the front fold cable adjustment. A correctly adjusted cable will also control the movement of the outer wing section.

WARNING: **THE REAR CABLE CAN SNAP AND INJURE YOU OR SOMEONE ELSE IF TENSIONED WHEN THE BOOM IS UNFOLDED. ALWAYS ADJUST FRONT CABLE FIRST WITH THE BOOM UNFOLDED AND REAR CABLE LAST WITH THE BOOM FOLDED IN TRANSPORT POSITION.**

1. Unfold boom into spraying position.
2. Shut the tractor off.
3. Check security of turnbuckle anchors to the hinge.
3. Slide a straight edge down the underside of the intermediate boom section until it just contacts the front cable (**C**)(Fig. 18).
4. Suspend a 10 lb (4.5 kg) weight from the straight edge-to-cable contact point and check deflection by measuring the distance from the straightedge to the cable.
   45'-66' boom: Cable should deflect .25-.50 in. (6-13mm).
   80'-90' boom: Cable should deflect .50-.75 in. (13-19mm).
5. Loosen jam nuts (**A**)(Fig. 18) on the turnbuckle assembly and adjust turnbuckle (**B**)(Fig. 18) for proper cable deflection.
6. Tighten jam nuts (**A**)(Fig. 18) and remove weight.

IMPORTANT: ***Check boom alignment again. If front cable was tightened, the wing assembly will move forward; or if loosened, wing will move rearward. Adjust fold cylinder (if necessary) as described in Alignment Of Wing Assemblies, (Section 8.3).***



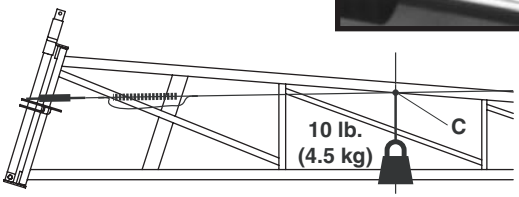


Fig. 18

8.6 Adjusting The Breakaway Clutch

WARNING: **NEVER PLACE FINGERS INTO OPEN BREAKAWAY CLUTCH OR YOU MAY BE INJURED SHOULD CLUTCH SNAP CLOSED!**
DO NOT TIGHTEN THE BREAKAWAY CLUTCH MORE THAN WHAT IS NECESSARY! OVER TIGHTENING CAN CAUSE DAMAGE TO THE BOOM!

A) 45'-50' EAGLE™ Boom (45'-66' EAGLE™ Boom Pre '96)

The tension on the breakaway for the outer wing can be adjusted by loosening or tightening the adjustment nut on top of the sprocket between the inner and outer wings (**A**)(Fig. 13).

1. If the breakaway clutch releases too easily, tighten the nut.
2. If the breakaway clutch is too stiff, loosen the nut.

Note: Spring pressure from tensioned breakaway clutch only assists in returning outer boom section to alignment.

B) 80'-90' EAGLE™ Boom (60'-66' EAGLE™ Boom Post '96)

1. Check that the lower nut (**D**)(Fig. 19) is fully tightened.
2. The breakaway wing section should pivot around the axle shaft (**E**)(Fig. 19). Ensure that section (**F**)(Fig. 19) is free to move.
3. Loosen jam nut. (**B**)(Fig. 19).
4. Tighten nut (**C**)(Fig. 19) to stiffen clutch action. Clutch is properly tensioned when breakaway boom section returns to alignment with outer boom section after breaking away. Tighten jam nuts after adjustment.

IMPORTANT: ***Properly lubricate clutch assembly before adjusting the tension. Breakaway clutch cap screws (A)(Fig. 19) must be torqued to 40lb-ft (55 N-m) every week (40 hours) to prevent boom damage. Lubricate every day (8 hours) to ensure maximum performance and life.***

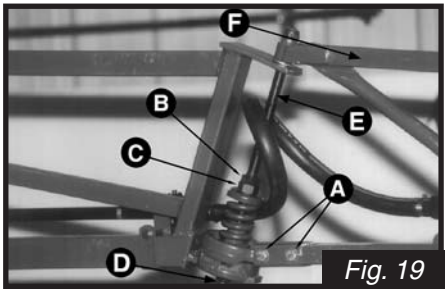


Fig. 19

8.7 Adjusting Wings Level To Ground

With boom unfolded (in the spraying position), check that boom sections are parallel to center frame and level to the ground. Adjust, if necessary, as detailed below.

A) HY 45'-66' Booms

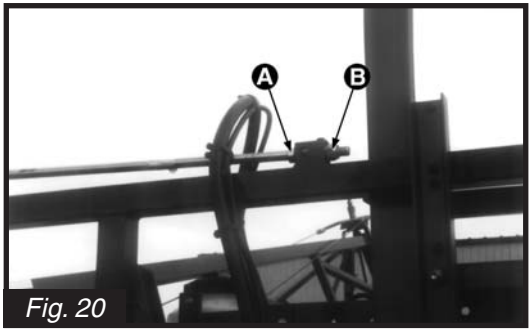


Fig. 20

1. Loosen jam nut (**A**)(Fig. 20).
2. Adjust nut (**B**)(Fig. 20) in or out until wing is level to ground.
3. Secure jam nut (**A**)(Fig. 20).

Same procedure applies to both sides.

B) HY 80'-90' Booms

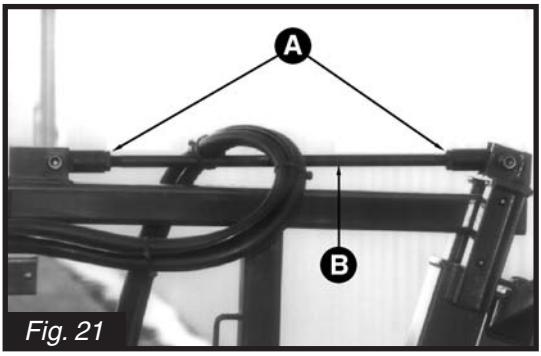


Fig. 21

1. Loosen jam nuts (**A**)(Fig. 21).
2. Adjust length of rod (**B**)(Fig. 21) until wing is level to ground.
   Note: If rod is removed to adjust length the boom wing must be supported.
3. Secure jam nuts (**A**)(Fig. 21).

Same procedure applies to both sides.

C) HZ Booms

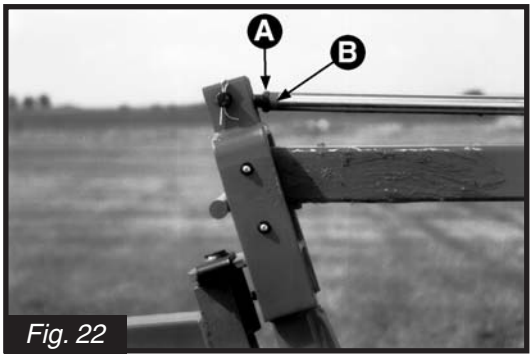


Fig. 22

1. Ensure cylinder is fully extended.
2. Loosen jam nut (**A**)(Fig. 22).
3. Apply an adjustable wrench to the machined surface at (**B**)(Fig. 22).
4. Turn the cylinder rod until boom is level to the ground.
5. Secure jam nut (**A**)(Fig. 22).

Same procedure applies to both sides.

8.8 Adjusting The Center Section

This adjustment will affect the suspension (trapeze function) and must therefore be done properly to optimize the EAGLE™ boom performance.
IMPORTANT: ***Lubricate pivot linkage (Section 10.3) and grease skid plates prior to adjustment (Section 10.2).***

1. Ensure that the sprayer is on level ground.
2. Tighten the four adjustment bolts (**A**)(Fig. 23) approx. 1/2 turn.
3. Grasp the wing by the end and lift it approx. 20 in.(490mm). Release the wing and it should smoothly return to approximately the horizontal position.
4. If the trapeze will not let the boom go back to horizontal position, the bolts must be loosened again.

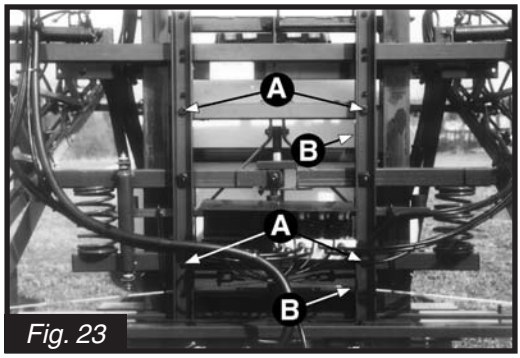


Fig. 23

8.9 Adjusting The Boom Slide To The H-Frame

This adjustment maintains the location of the boom slide relative to the H-frame, enabling the boom to raise and lower smoothly.

1. Loosen jam nuts and tighten bolts (**B** behind slide bars)(Fig. 23) in approx. 1 turn.
2. Lift boom all the way to the top, then lower the boom all the way down.
3. Repeat the above procedure until the boom slide is firmly adjusted inside the H-frame.
4. If the boom will not lower all the way down, the bolts need to be loosened again.

8.10 Adjusting Boom Transport Position

1. Lift boom all the way to the top.
2. Fold boom into transport position. With the fold cylinder pressurized, determine if boom sections need to be adjusted inwards or outwards.
   Note: Outer boom section should be approx. 1-2" inside front transport support in it's furthest position (Section 6.5).
3. Relieve the pressure from the fold cylinder by unfolding the boom a few inches.
4. If the boom rests too far in on the transport support, loosen the nut (**B**)(Fig. 24) and adjust collar (**A**)(Fig. 24) in towards the cylinder housing.
5. If the boom rests too far out on the transport support, the collar (**A**)(Fig. 24) has to go out from the cylinder housing.
6. Secure jam nut (**B**)(Fig. 24).
7. Pressurize cylinder to see if the boom is properly adjusted. If not, repeat the above procedure until it is correctly adjusted.

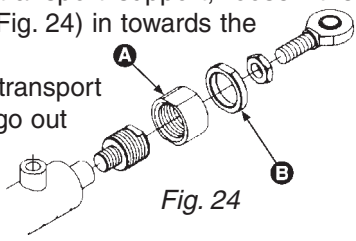


Fig. 24

8.11 Adjusting Rear Cable

WARNING: **REAR CABLE CAN SNAP AND INJURE YOU OR SOMEONE ELSE IF TENSIONED WHEN THE BOOM IS UNFOLDED. ALWAYS ADJUST FRONT CABLE FIRST WITH THE BOOM UNFOLDED INTO SPRAYING POSITION.**

1. Raise boom to its highest position. Fold boom to transport position with tilt cylinders fully extended. Make sure fold cylinders are pressurized and that boom is folded all the way in.
2. Shut the tractor off.
3. Ensure the boom transport stop arms are in contact with the outer wing. Adjust if necessary.
4. Loosen the jam nuts on the turnbuckle. Adjust (tighten) the turnbuckle so that the outer wing section contacts the boom transport stop bracket. Tighten the turnbuckle another four complete turns and retighten the jam nuts (**80'-90' Boom:** tighten the turnbuckle three turns).

8.12 Adjusting Center Section Cables

WARNING: **NEVER ATTEMPT TO ADJUST THE CENTER CABLES WITHOUT HAVING THE BOOM FOLDED ALL THE WAY INTO THE TRANSPORT POSITION!**

Center section cables work together to keep the center frame square to the H-frame, whether folding the boom in for transport or when spraying with one side raised and folded (HZ Only).

1. Fold boom into transport position.
2. Shut the tractor off.
3. Check that the tilt cylinders (**A**) (Fig. 25) are *completely* extended. Adjust if necessary (HZ Only).
4. Check that the cables are routed over the center section nozzle brackets (**B**) (Fig. 25).
5. Loosen jam nuts.

IMPORTANT: ***Alternate from side-to-side while making adjustments. Adjust one cable a small amount, and then the other, to equalize cable tension and maintain level center frame.***

6. Properly adjusted cables will be very tight and only deflect a small amount (fractions of an inch) when pulled on by hand.
   Note: Cables will be loose when booms are unfolded.
7. Tighten jam nuts.
8. Unfold boom to operating (spraying) position.
9. Fold boom and check that center frame remains square to H-frame.

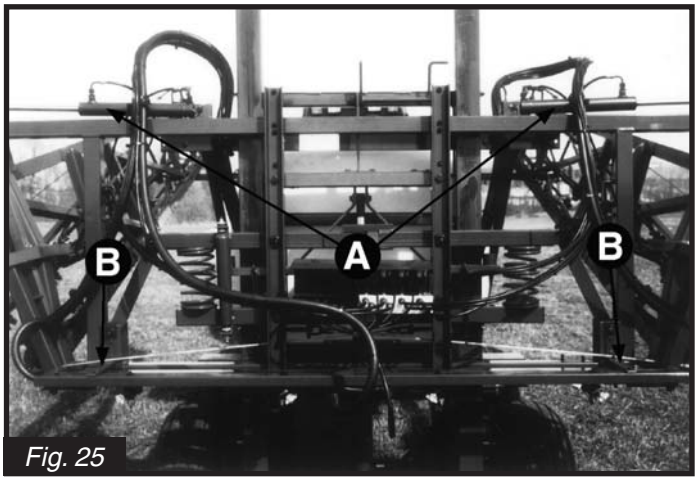


Fig. 25

9.0 SPC BOOM 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® EAGLE™ SPC boom was hydraulically charged and adjusted at time of assembly. (This applies to booms sold with sprayers as complete units only.)

The EAGLE™ SPC 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 EAGLE™ SPC 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.

9.1 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 11.0)***

9.2 Adjusting The Center Section

This adjustment will affect the suspension (trapeze function) and must therefore be done properly to optimize the EAGLE™ SPC boom performance.

IMPORTANT: ***Lubricate pivot linkage (Section 11.3) and grease skid plates prior to adjustment (Section 11.2).***

1. Check the basic adjustment of the rubber jaw dampers (Fig. 26 & Fig. 27). The compression of the jaw (Fig. 26) should measure 1-11/32" (34mm).
2. Adjust the jaw if necessary by adjusting the two M12 bolts (Fig. 27).

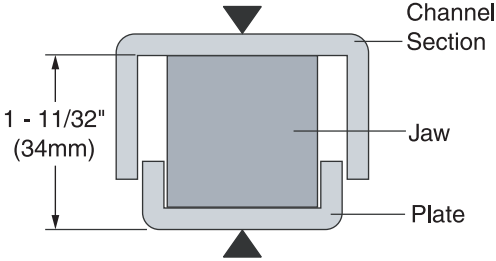


Fig. 26

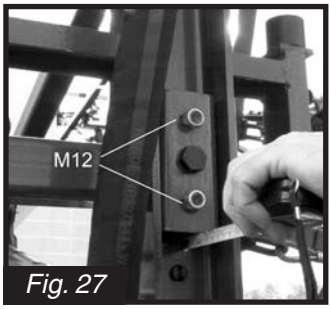


Fig. 27

3. Ensure that the sprayer is on level ground.
4. Tighten the four adjustment bolts (**A**)(Fig. 28) approx. 1/2 turn.
5. Grasp the wing by the end and lift it approx. 20 in.(490mm). Release the wing and it should smoothly return to approximately the horizontal position.
6. If the trapeze will not let the boom go back to horizontal position, the bolts must be loosened again.

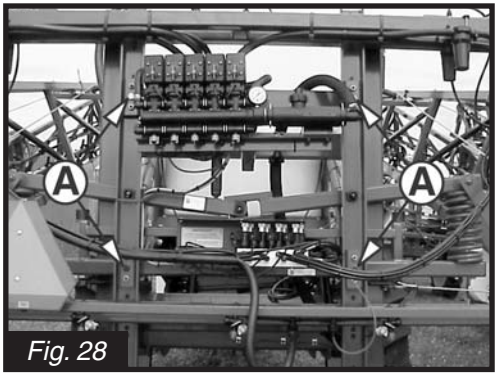


Fig. 28

9.3 Alignment Of Wing Assemblies

1. With the boom unfolded (in the spraying position), check alignment of the intermediate section with the center frame.
2. With fold cylinder pressurized, determine if the intermediate section needs to be adjusted to the front or rear to come into alignment with 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 cylinder by folding boom in a few inches.
4. Disconnect cylinder rod eye (**B**)(Fig. 29) from the intermediate boom section.
5. Loosen jam nut (**A**)(Fig. 29) and adjust rod eye (**B**)(Fig. 29) IN to move boom forward or OUT to move boom rearward. Then retighten the jam nut (**A**)(Fig. 29).
6. Reattach the cylinder rod to the boom and pressurize the cylinder to check boom alignment.

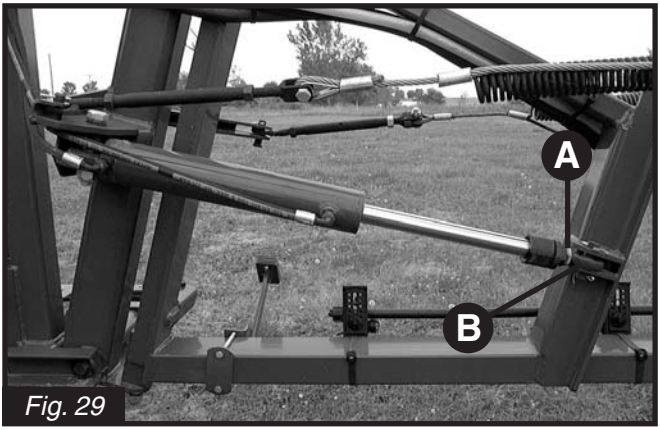


Fig. 29

9.4 Alignment Of Intermediate And Outer Wing Sections

1. Loosen the lock nuts (**A**)(Fig. 30) on both the upper and lower adjusting bolts (**B**)(Fig. 30).
2. Adjust the bottom jam nut (**C**)(Fig. 30) so the cap of the bottom M16x80 adjusting bolt contacts the stop plate with the outer and intermediate boom sections aligned.
3. Adjust the top jam nut (**C**)(Fig. 30) so the cap of the top M12x70 adjusting bolt contacts the stop plate without moving the alignment made in step 2.
4. Tighten both lock nuts (**A**)(Fig. 30) while holding the adjusting bolt heads (**B**)(Fig. 30). Make sure the outer and intermediate boom sections are still aligned. Readjust if necessary.

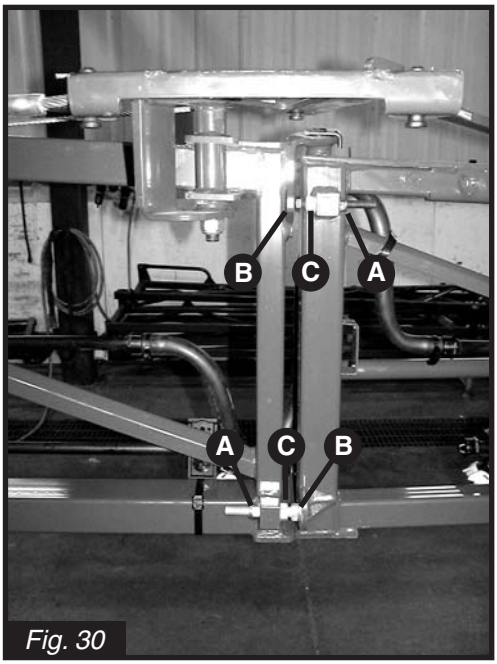


Fig. 30

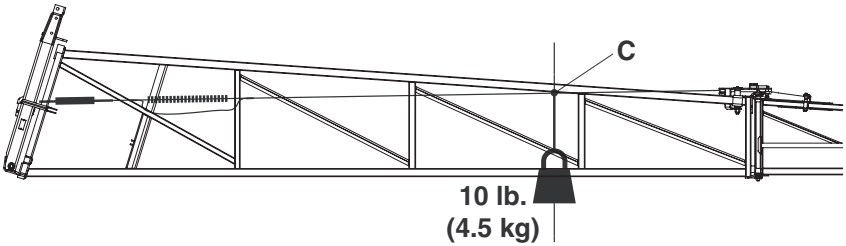
9.5 Adjusting Front Fold Cable

The performance of the EAGLE™ SPC boom, while spraying, depends greatly on the front fold cable adjustment. A correctly adjusted cable will also control the movement of the outer wing section.

WARNING: **THE REAR CABLE CAN SNAP AND INJURE YOU OR SOMEONE ELSE IF TENSIONED WHEN THE BOOM IS UNFOLDED. ALWAYS ADJUST FRONT CABLE FIRST WITH THE BOOM UNFOLDED AND REAR CABLE LAST WITH THE BOOM FOLDED IN TRANSPORT POSITION.**

1. Unfold boom into spraying position.
2. Shut the tractor off.
3. Check security of turnbuckle anchors to the hinge.
4. Slide a straight edge down the underside of the intermediate boom section until it just contacts the front cable (**C**)(Fig. 31).
5. Suspend a 10 lb (4.5 kg) weight from the straight edge-to-cable contact point and check deflection by measuring the distance from the straightedge to the cable. Cable should deflect .50-.75 in. (13-20mm).
6. Loosen jam nuts (**A**)(Fig. 31) on the turnbuckle assembly and adjust turnbuckle (**B**)(Fig. 31) for proper cable deflection.
7. Tighten jam nuts (**A**)(Fig. 31) and remove weight.

IMPORTANT: ***Check boom alignment again. If front cable was tightened, the wing assembly will move forward; or if loosened, wing will move rearward. Adjust fold cylinder (if necessary) as described in Alignment Of Wing Assemblies, (Section 9.3).***



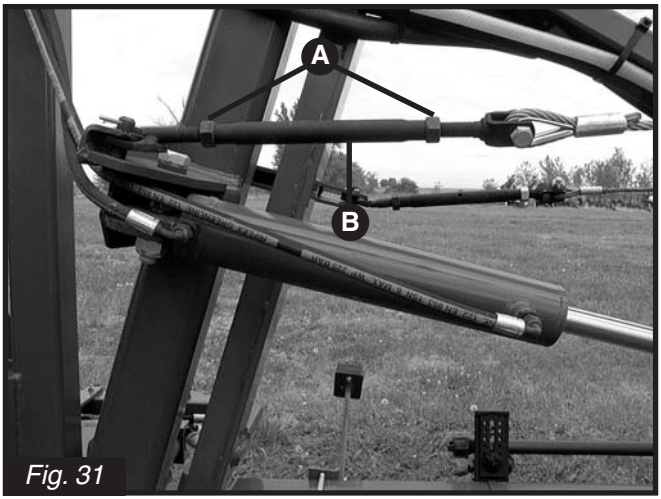


Fig. 31

9.6 Adjustment Of Breakaway Clutch

WARNING: **NEVER PLACE FINGERS INTO OPEN BREAKAWAY CLUTCH OR YOU MAY BE INJURED SHOULD CLUTCH SNAP CLOSED! DO NOT TIGHTEN THE BREAKAWAY CLUTCH MORE THAN WHAT IS NECESSARY! OVER TIGHTENING CAN CAUSE DAMAGE TO THE BOOM!**

The breakaway section must release when a force of approximately 35 lbs (150 N) is applied to the extremity of the breakaway section. If necessary, the release force is adjusted as follows:

1. Make sure the claw coupling is correctly lubricated.
2. Loosen the jam nut (**A**)(Fig. 32).
3. Adjust the nut (**B**)(Fig. 32) until the breakaway will release as desired.
4. Tighten the jam nut again.
5. Make sure the breakaway is level with the outer wing. If necessary, adjust by loosening locknut (**C**)(Fig. 32) and adjusting nut (**D**)(Fig. 32) until the breakaway is level. Tighten locknut (**C**)(Fig. 32) again.

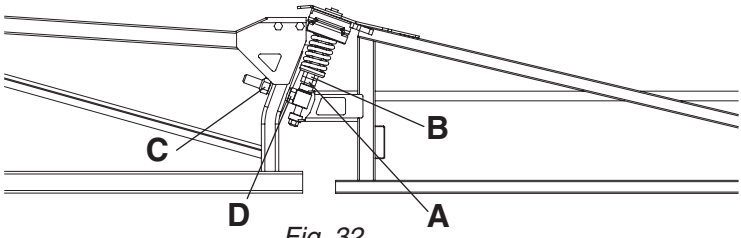


Fig. 32

9.7 Adjusting Wings Level To Ground

With boom unfolded (in the spraying position), check that boom sections are parallel to center frame and level to the ground. Adjust, if necessary, as detailed below:

A) HY Booms

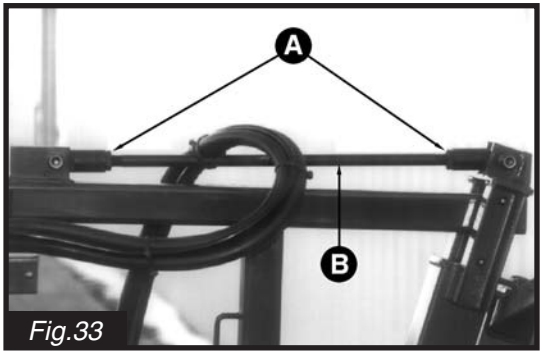


Fig.33

1. Loosen jam nuts (**A**)(Fig. 33).
2. Adjust length of rod (**B**)(Fig. 33) until wing is level to ground.
   Note: If rod is removed to adjust length, the boom wing must be supported.
3. Secure jam nuts (**A**)(Fig. 33).

Same procedure applies to both sides.

B) HZ Booms

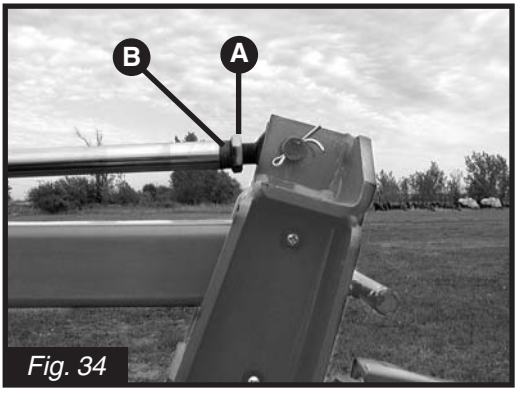


Fig. 34

1. Ensure cylinder is fully extended.
2. Loosen jam nut (**A**)(Fig. 34).
3. Apply an adjustable wrench to the machined surface at (**B**)(Fig. 34).
4. Turn the cylinder rod until boom is level to the ground.
5. Secure jam nut (**A**)(Fig. 34).

Same procedure applies to both sides.

9.8 Adjusting Boom Transport Position

1. Lift boom all the way to the top.
2. Fold boom into transport position. With the fold cylinder pressurized, determine if boom sections need to be adjusted inwards or outwards.
   Note: Outer boom section should be approx. 1-2" inside front transport support in it's furthest position.
3. Relieve the pressure from the fold cylinder by unfolding the boom a few inches.
4. If the boom rests too far in on the transport support, loosen the nut (**B**)(Fig. 35) and adjust collar (**A**)(Fig. 35) in towards the cylinder housing.
5. If the boom rests too far out on the transport support, the collar (**A**)(Fig. 35) has to go out from the cylinder housing.
6. Secure jam nut (**B**)(Fig. 35).
7. Pressurize cylinder to see if the boom is properly adjusted. If not, repeat the above procedure until it is correctly adjusted.

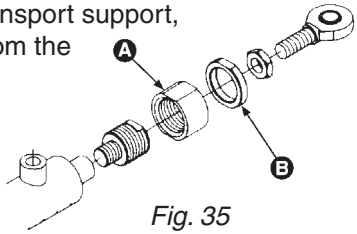


Fig. 35

9.9 Adjusting Rear Cable

WARNING: **REAR CABLE CAN SNAP AND INJURE YOU OR SOMEONE ELSE IF TENSIONED WHEN THE BOOM IS UNFOLDED. ALWAYS ADJUST FRONT CABLE FIRST WITH THE BOOM UNFOLDED INTO SPRAYING POSITION.**

1. Raise boom to its highest position. Fold boom to transport position with tilt cylinders fully extended. Make sure fold cylinders are pressurized and that boom is folded all the way in.
2. Shut the tractor off.
3. Ensure the boom transport stop arms are in contact with the outer wing. Adjust if necessary.
4. Loosen the jam nuts on the turnbuckle. Adjust (tighten) the turnbuckle so that the outer wing section contacts the boom transport stop bracket. Tighten the turnbuckle another three complete turns and retighten the jam nuts.

9.10 Adjusting Transport Lock Arm Stop

When the boom is folded, resting on the front transport supports, and rear transport lock arm is engaged: The head of bolt (**A**)(Fig. 36) should be touching the rear transport lock arm. Adjust bolt if necessary.

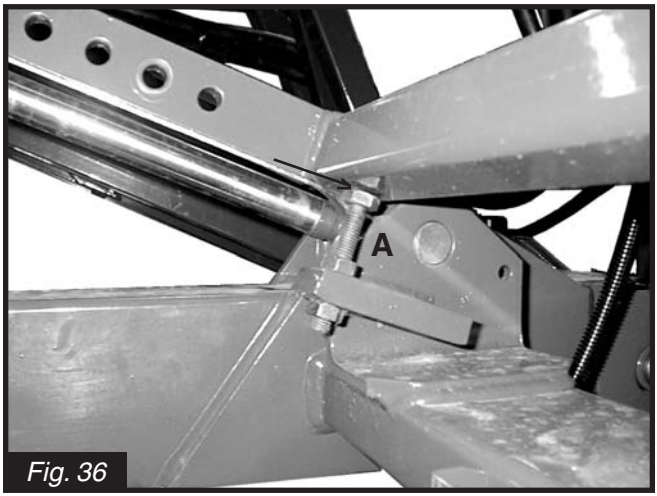


Fig. 36

9.11 Adjusting Transport Hooks

1. Raise the boom all the way up.
2. Fold the boom in and lower until it first touches the Transport Brackets.
3. Measure the distance from the rear of the boom to the ground and then lower boom to fully rest into Transport Brackets.
4. Re-measure the distance from the rear of the boom to the ground. If the difference between the two measurements is greater than 2", then the transport hooks need to be re-adjusted.
5. Shorten the overall hook length (Fig. 37) by moving both sides in one hole.
6. Repeat steps 1-5 until the difference is less than 2".

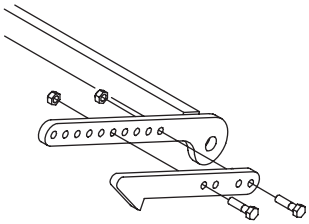


Fig. 37

9.12 Adjusting Center Section Cables

WARNING: **NEVER ATTEMPT TO ADJUST THE CENTER CABLES WITHOUT HAVING THE BOOM FOLDED ALL THE WAY INTO THE TRANSPORT POSITION!**

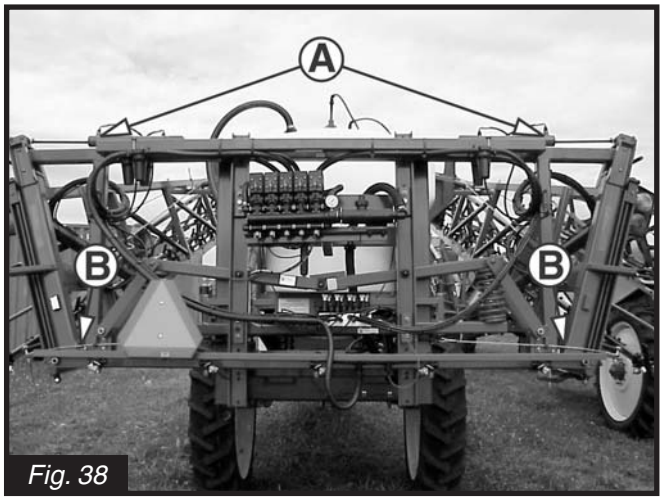


Fig. 38

Center section cables work together to keep the center frame square to the Paralift™, whether folding the boom in for transport or when spraying with one side raised and folded (HZ Only).

1. Fold boom into transport position.
2. Shut the tractor off.
3. Check that the tilt cylinders (**A**) (Fig. 38) are *completely* extended. Adjust if necessary (HZ Only).
4. Check that the cables are routed over the center section nozzle brackets (**B**) (Fig. 38).
5. Loosen jam nuts.

IMPORTANT: ***Alternate from side-to-side while making adjustments. Adjust one cable a small amount, and then the other, to equalize cable tension and maintain level center frame.***

6. Properly adjusted cables will be very tight and only deflect a small amount (fractions of an inch) when pulled on by hand.
   Note: Cables will be loose when booms are unfolded.
7. Tighten jam nuts.
8. Unfold boom to operating (spraying) position.
9. Fold boom and check that center frame remains square to Paralift™.

10.0 SPB BOOM MAINTENANCE

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

10.1 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 and breakaway clutches.

10.2 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 the center frame (Fig. 39).

1. Apply grease to the lower portion of the H-frame **with the boom hanging in the transport hook.**
2. Apply grease to the upper portion of the H-frame **with the boom unfolded and lowered all the way down.**

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.

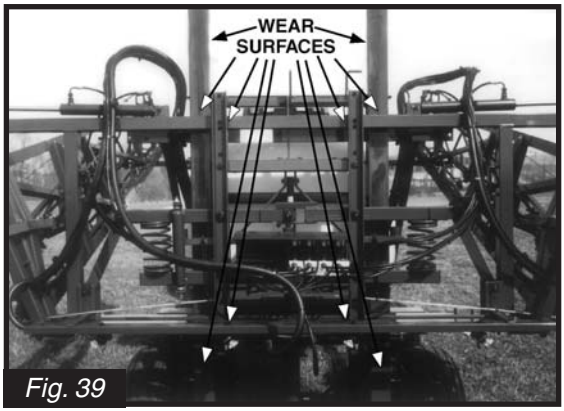


Fig. 39

10.3 Greasing The Suspension/Pivot Linkage

Every 8 hours the places indicated in (Fig. 40) should be greased.

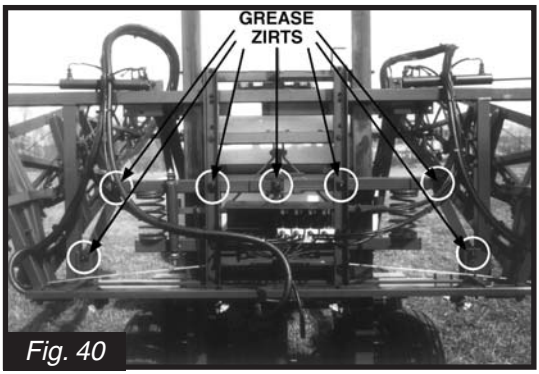


Fig. 40

10.4 Greasing The Boom

Grease the boom at all grease zerks in hinge, breakaway and chain sprocket (Fig. 41). Every 25 hours the chain and sprocket should be lubricated with a chain lubricant.

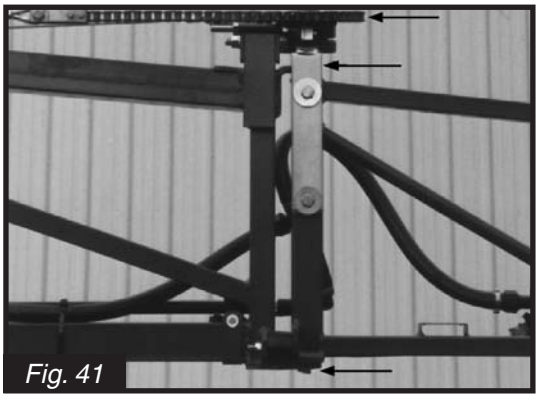


Fig. 41

10.5 Greasing The Breakaway Clutch

WARNING: **NEVER PLACE FINGERS INTO OPEN BREAKAWAY CLUTCH OR YOU MAY BE INJURED SHOULD CLUTCH SNAP CLOSED!**

1. Unfold the boom into operating (spraying) position.
2. Standing in front of the outer wing, snap the breakaway open by quickly pushing the boom away from you.
3. With the two clutches opened up, stick the nozzle of a grease gun into the clutch and apply a generous amount of grease. This should be done every 8 hours.
4. Apply oil to top of breakaway section hinge to lubricate bushing.

11.0 SPC BOOM MAINTENANCE

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

11.1 Lubrication

Lubrication of the boom daily will ensure maximum performance and life. This lubrication includes the Paralift™ and center frame, as well as the boom hinges and breakaway clutches.

11.2 Greasing The Center Frame

Every 8 hours (daily) new grease should be applied to the wear surfaces on the center frame (Fig. 42).

Fig. 42

Every 50 hours the grease on the center frame should be completely cleaned off with a degreasing solvent and new grease applied

11.3 Greasing The Suspension/Pivot Linkage

Grease the suspension/pivot linkage every 8 hours as indicated below.

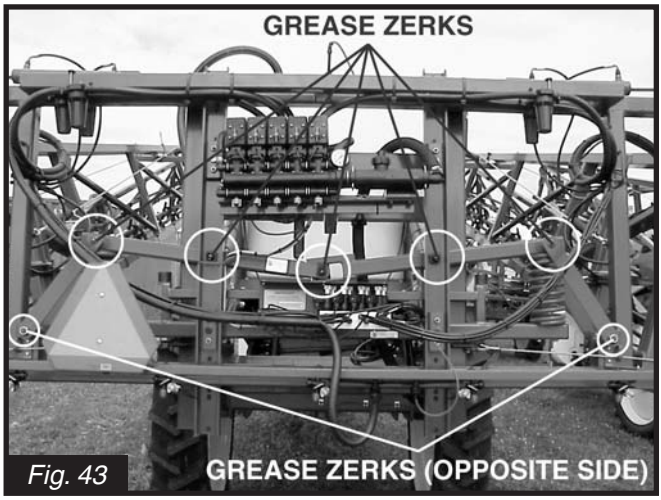


Fig. 43

11.4 Greasing The Boom

Grease the boom at all grease zerks every 8 hours.

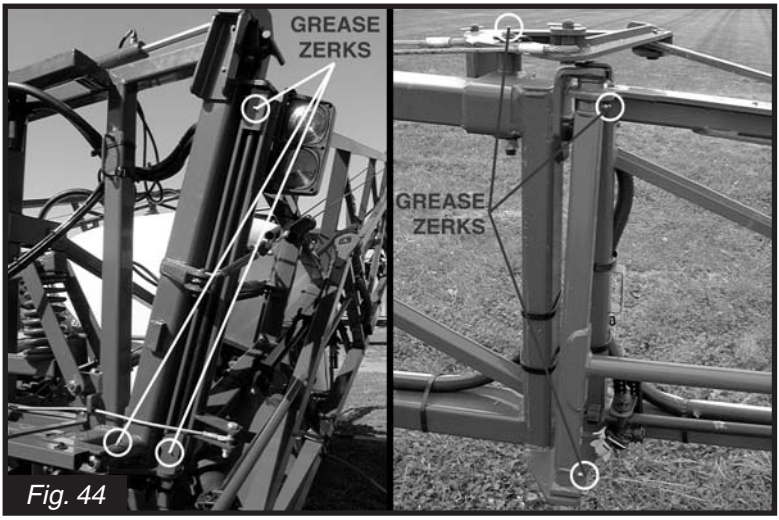


Fig. 44

11.5 Greasing The Breakaway Clutch

WARNING: **NEVER PLACE FINGERS INTO OPEN BREAKAWAY CLUTCH OR YOU MAY BE INJURED SHOULD CLUTCH SNAP CLOSED!**

1. Unfold the boom into operating (spraying) position.
2. Standing in front of the outer wing, snap the breakaway open by quickly pushing the boom away from you.
3. With the two clutches opened up, stick the nozzle of a grease gun into the clutch and apply a generous amount of grease. This should be done every 8 hours.
4. Grease the zerk at the lower pivot point until new grease becomes visible. This should be done every 8 hours.

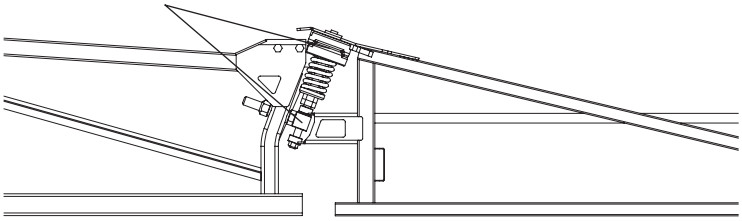


Fig. 45

11.6 Greasing The Paralift™ Assembly

Every 50 hours grease all zerks in the Paralift™ assembly.

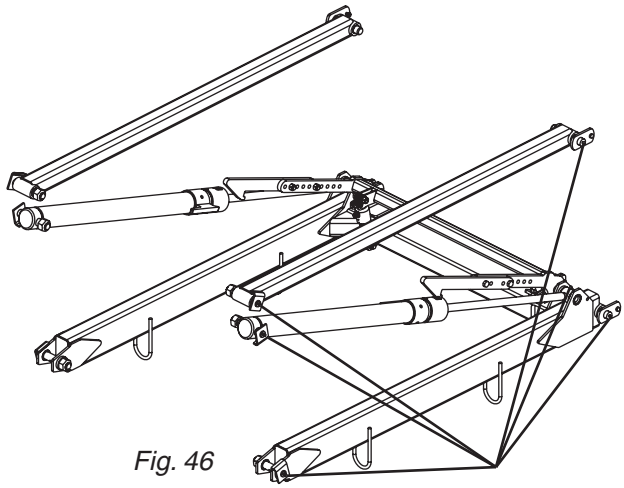


Fig. 46

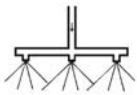
12.0 FILTER AND NOZZLE MAINTENANCE

12.1 Nozzle Filters

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

12.2 In-Line Filters (Optional)

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

ISO Nozzle Size 	Nozzle Screen 	Inline Filters (optional) 
Pink (075) Orange (01) Green (015) Yellow (02)	100	100
Lilac (025) Blue (03)	80	80
Red (04) & Larger	50*	50*

***** Standard mesh *Fig. 47*

12.3 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. 48). Disassemble, check the condition and position of the O-ring or gasket, clean, lubricate and then reassemble. For **radial** seals (O-ring) (Fig. 48) 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.

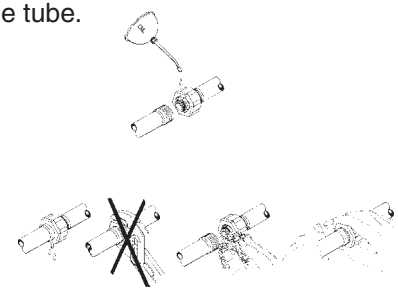


Fig. 48

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

12.4 Maintenance Of Triplets (When fitted)

Every 50 hours the triplets should be disassembled and cleaned. This is done by pulling out the stainless clip on the side of the triplet assembly. 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.

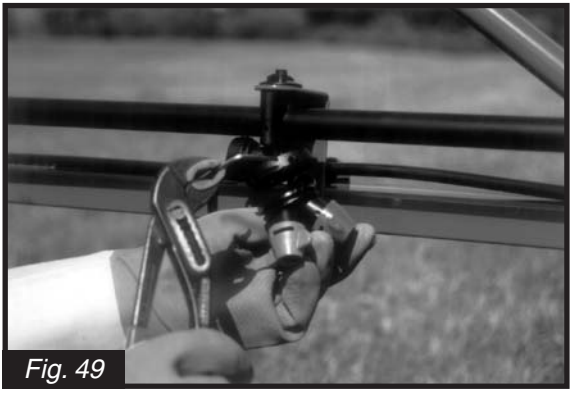


Fig. 49

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

13.0 TRANSPORTATION AND STORAGE

13.1 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 EAGLE™ SPC booms, only transport with the boom folded and resting on transport support arms.
- Ensure rear transport hook on paralift is engaged properly.
- Maximum transport speed is 15 mph (24 km/h).
- Have warning lights flashing when transporting or towing sprayer.

Fig. 50

HARDI® Eagle™ SPC Boom (100' shown)

13.2 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 the 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 EAGLE™ 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.

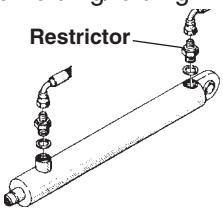
WARNING: **NEVER USE OIL OR DIESEL FUEL IN A SPRAYER.**

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.

14.0 TROUBLESHOOTING

14.1 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 fold/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(s). 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 junction box at rear of sprayer. E. Dirt in the restrictor port of the cylinder.
4. Multiple hydraulic functions with one switch activated.	A. Check for correct solenoid electric/hydraulic hook-up. B. Check for short circuit in wiring in the junction box at rear of sprayer.

'DH' Hydraulics

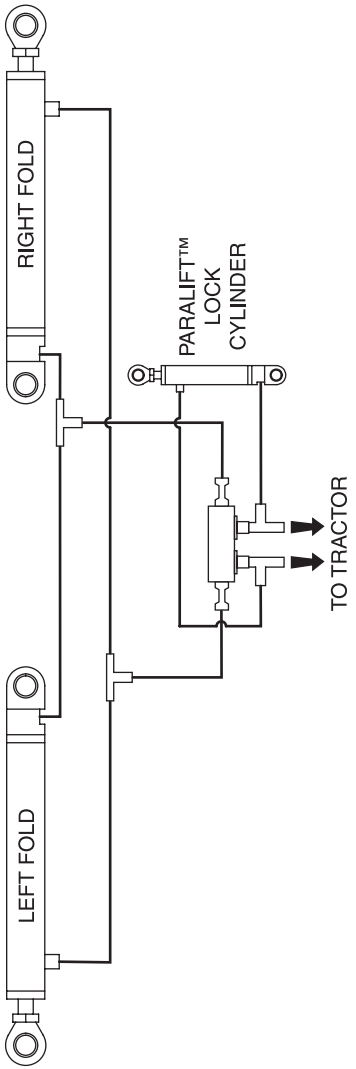
Problem	*Solution*
1. Hydraulic cylinder only moves one way.	A. Check for electrical operation of Directional Solenoid Valve. B. Check hook-up of hydraulic hoses on Directional Solenoid Valve block. **P** = Pressure from tractor **T** = Return to tractor **A**,**B** = Supply/return to solenoid block on spray boom.

2. One hydraulic function will not operate.	A. Check for electronic operation of directional solenoid valve. B. Check for electronic continuity through multi-pin plugs.

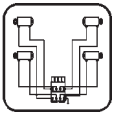
14.2 Mechanical Problems

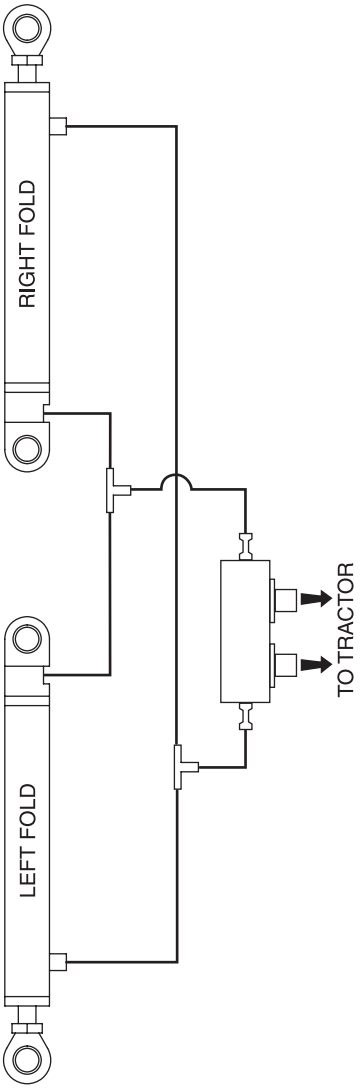
Problem	*Solution*
1. Boom will not completely fold in or out.	A. Adjust the fold cylinder. (Section 8.3/9.3)
2. Boom won't fold completely in.	A. Check adjustment of center cables. (Section 8.12/9.12)
3. Boom not in alignment.	A. Adjust and grease complete boom cables and stops. (Section 8.0/9.0, 10.0/11.0)
4. Boom won't stay in spray position.	A. Check for hydraulic leak through solenoid block. B. Check for a solenoid that is stuck open.
5. Wing to be kept folded swings out when unfolding other side of boom.	A. Boom must be completely unfolded, then fold the desired wing in. B. Check for hydraulic leak through solenoid block. C. Check for a solenoid that is stuck open.
6. Breakaway won't hold outer wing stable.	A. Adjust breakaway (Section 8.6/9.6), replace clutches if worn.
7. H-Frame 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 (Section 8.9).
8. Paralift™ Boom won't go up or down.	A. Check for proper adjustment of rear transport lock arm stop (Section 9.10).

14.3 Hydraulic Schematics
A) HY Schematic with Paralift™

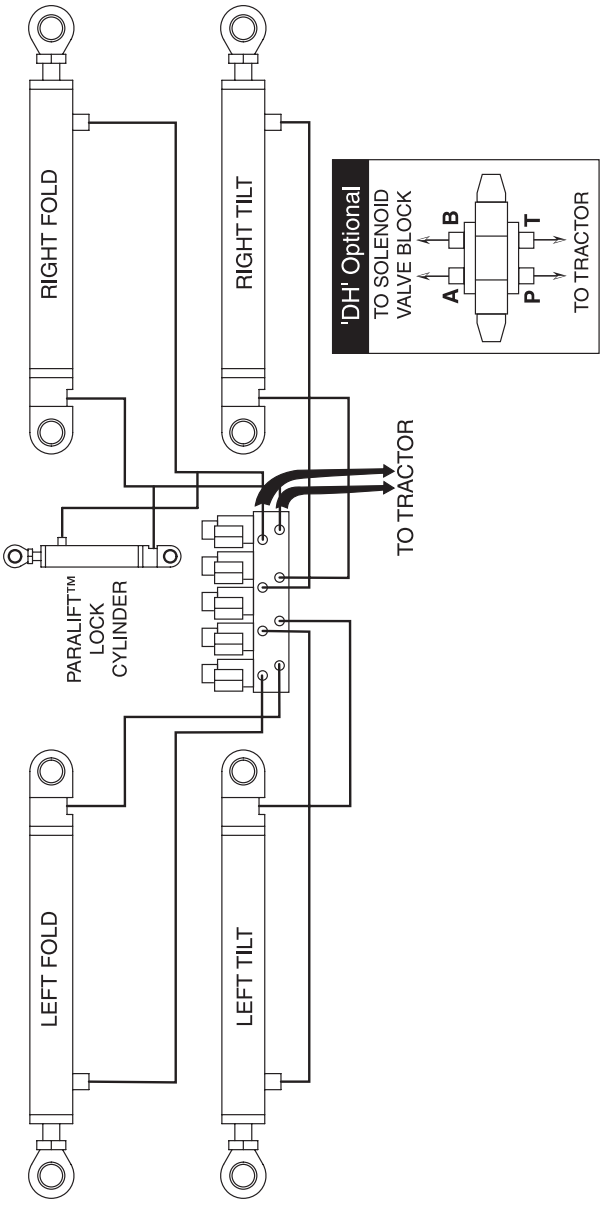


B) HY Schematic with H-Frame lift

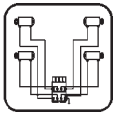


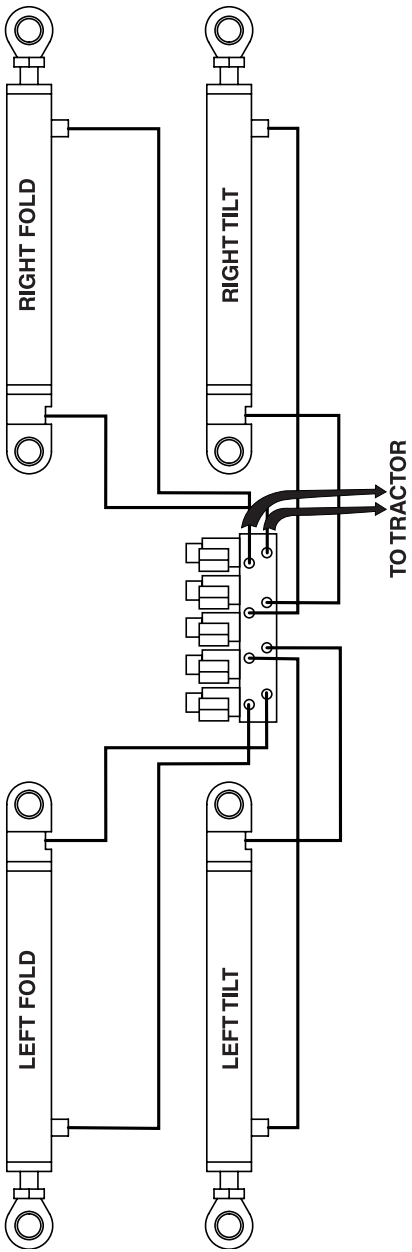


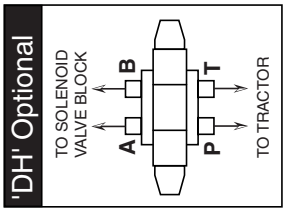
C) HZ Schematic with Paralift™

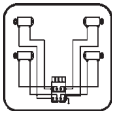


D) HZ Schematic with H-Frame lift (Post '95)

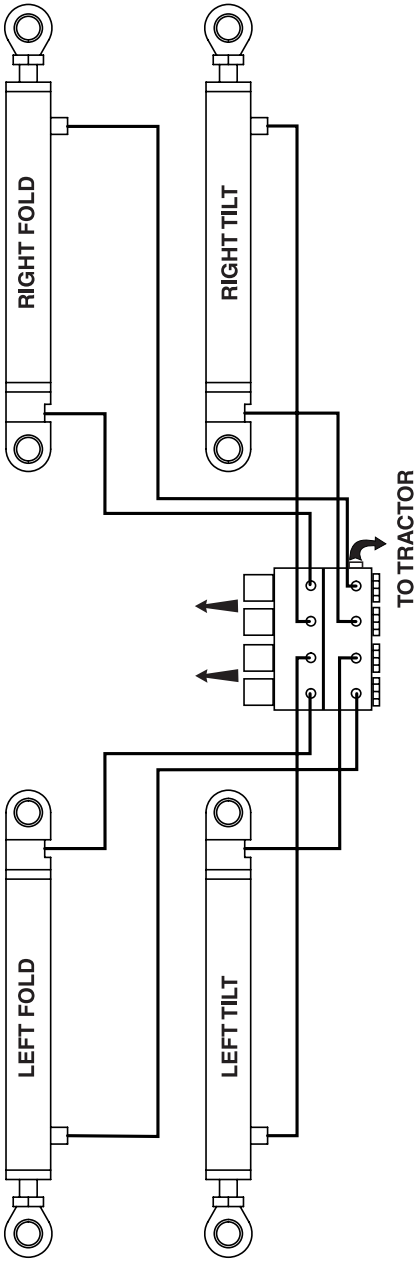




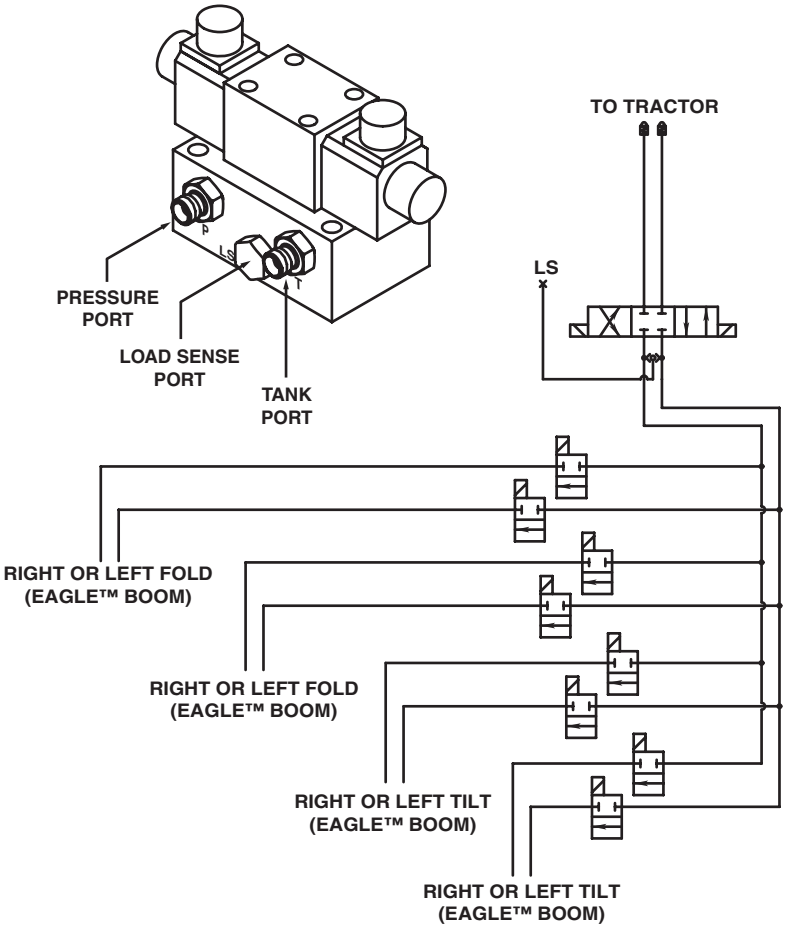




E) HZ Schematic with H-Frame lift (Pre 95)



F) DH Schematic



15.0 WARRANTY POLICY AND CONDITIONS

HARDI® INC. , 1500 West 76th Street, Davenport, Iowa, USA; 8550 W. Roosevelt Avenue, Visalia, 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 Operator's Manual and is operated under normal farm conditions.

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

   a) Parts of the machine not manufactured by HARDI®, (i.e. engines, tires, tubes, electronic controls, and other components or trade accessories, 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 operator's 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 polyethylene tanks (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 plant 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 pump 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 filed 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.

16.0 NOTES