



The Sprayer

Operator's Manual

TERRA FORCE BOOM

Instruction book

67022803 - Version 1.10

US - 06.2015

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1 - Welcome	
Welcome letter	1
2 - Safety notes	
Operator safety	1
Symbols	1
General info	1
Label explanation	2
Local poison information center	4
3 - Description	
Boom	1
Boom configurations	1
DynamicCenter	2
AutoTerrain (optional equipment)	2
Boom hydraulic controls on the SetBox (Trailed models)	3
Boom hydraulic controls on the instrument panel (Self-propelled models)	3
Boom controls on the Grip handle	4
4 - Sprayer setup	
Hydraulic systems	1
General info	1
Requirements - tractor (TERRA FORCE model)	1
Boom	2
Yaw damper gauge	2
5 - Operation	
Boom	1
Safety info	1
Maneuvering of the boom - TERRA FORCE	2
6 - Maintenance	
Lubrication	1
General info	1
Recommended lubricants	1
Boom lubrication and oiling plan	2
.....	2
Service and maintenance intervals	3
10 hours service - Lubricate boom and center	3
Occasional maintenance	4
General info	4
Feed pipe snap-lock assembly	4
Feed pipe clamp assembly	4
Opening the cable trays	5
Readjustment boom - general info	5
Horizontal alignment of center and inner wing sections	5
Vertical alignment of boom between inner, intermediate and short outer sections	6
Horizontal alignment of boom between inner, intermediate and short outer sections	7
Fold lock adjustment	7
Breakaway section adjustment	7
Vertical alignment of outer and breakaway sections	8
Yaw adjustment	8
DynamicCenter cable adjustment	9
Wing tilt adjustment	9
Pendulum lock adjustment	9

Table of contents

7 - Fault finding

Operational problems	1
General info	1
Hydraulic system - Z model	2

8 - Technical specifications

Charts	1
Boom hydraulics - AutoTerrain	1
Boom hydraulics - DynamicCenter	2

9 - Warranty

Warranty policy and conditions	1
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Welcome letter



Dear New HARDI® Owner,

Thank you for purchasing your new HARDI® product and welcome to the ever-increasing family of proud HARDI® owners.

HARDI® is the leading sprayer company in offering growers strong, reliable products made for the widest range of applications worldwide. Quality, reliability, and resale value make the HARDI® product line the preferred product line of customers both in North America as well as worldwide. Our guiding principle is to provide the highest level of customer satisfaction and long term value in the marketplace today. We have developed a very high level of customer loyalty in the marketplace which we are very proud of and strive every day to maintain and to continue to grow.

HARDI® is your specialist in spraying and we spend all of our time and keep all of our focus on spraying. We do not share our resources between other types of products or compromise on anything in providing the best quality sprayers to the market today. We can provide the latest in technology with our products if desired, or allow them to operate with the technology that you already use on other products in most cases. You get to decide that, and what best suits your needs. We feel that you, our customer, are the best suited to answer that question for your operation. Either way, you decide, and we will try and help make it happen for you.

Our broad spectrum of product offerings, from the ruggedly simple models we build to our highly sophisticated models, the built-in HARDI® strength and reliability ensures a low cost of ownership. HARDI® sprayers are all based on a functional design concept of being as simple to operate as possible and to meet our customers' requirements for all their application needs.

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 HARDI® sprayer 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.

- Please use the HARDI® Customer Service number: 1-866-770-7063

- Or send your email to CUSTSERV@hardi-us.com

HARDI® NORTH AMERICA INC.

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Sincerely,

A handwritten signature in black ink, appearing to read "Wayne Buchberger". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Wayne Buchberger

President

Operator safety

Symbols

These symbols are used throughout the book to designate where the reader needs to pay extra attention.



This symbol means DANGER. Be very alert as your safety is involved!



This symbol means WARNING. Be alert as your safety can be involved!



This symbol means ATTENTION. This guides you to better, easier and safer operation of your sprayer!



This symbol means NOTE.

General info

Note the following recommended precautions and safe operating practices before using the sprayer.



Read and understand this instruction book before using the equipment. It is equally important that other operators of this equipment read and understand this book.



If any portion of this instruction book remains unclear after reading it, contact your HARDI® dealer for further explanation before using the equipment.



Local law may demand that the operator is certified to use spray equipment. Adhere to the law.



The driver's seat is the intended working place during operation.



Wear protective clothing. Clothing may differ depending on the chemical being sprayed. Adhere to local law.



Wash and change clothes after spraying. Wash tools if they have become contaminated.



Do not eat, drink or smoke while spraying or working with contaminated equipment. In case of poisoning, immediately seek medical advice. Remember to identify chemicals used.



No persons are allowed in the operation area of the sprayer. Be careful not to hit people or surroundings when maneuvering the sprayer, especially while backing up.



Slow down when driving in uneven terrain as the machine might be in risk of turning over.



Keep children away from the equipment!



Do not go under any part of the sprayer unless it is secured. The boom is secure when placed in the transport brackets.



Pressure test with clean water prior to filling with chemicals. Never disconnect the hoses if the machine is in operation.



DANGER! Do not exceed the P.T.O. max. recommended r.p.m.



Rinse and wash equipment after use and before servicing.



Never service or repair the equipment while it is operating. Always replace all safety devices or shields immediately after servicing.

2 - Safety notes



Disconnect electrical power before servicing and depressurize equipment after use and before servicing.



If an arc welder is used on the equipment or anything connected to the equipment, disconnect power leads before welding. Remove all inflammable or explosive material from the area.



The External Cleaning Device should not be used if essential parts of the equipment have been damaged, including safety devices, high pressure hoses, etc.

Label explanation

The labels designate potential dangerous places on the machine. Anybody working with or being in close range of the sprayer must respect these labels!

The labels should always be clean and readable! Worn or damaged labels must be replaced with new ones. Contact your local dealer for new labels.



Note that not all labels shown here will apply to your sprayer.



97818100 Tank under pressure!
Beware when removing lid.



978438 Gripping area!
Manual handling of boom, etc.



978443 Service!
Carefully read operator's instruction book before handling the machine. Observe instructions and safety rules when operating.



978441 Risk of squeeze!
Stay clear of raised, unsecured loads.



978437 Chemical handling!
Carefully read the information about chemical preparation before handling the machine. Observe instructions and safety rules when operating.



97802100 Risk of death!
Do not attempt to enter tank.



978448 Risk of injury!
Keep sufficient distance away from electrical power lines.



97802300 Not for drinking!
This water must never be used for drinking water.

2 - Safety notes



97802200 Not for drinking!
This water must never be used for drinking water.



978439 Lifting point!



978436 Service!
Shut off the engine and remove ignition key before performing maintenance or repair.



978445 Risk of squeeze!
Never reach into the crushing danger area as long as parts are moving.



978440 Service!
Tighten to torque according to instruction book.



978442 Risk of falling off!
Do not ride on platform or ladder.



978435 Risk of injury!
Keep hands away.



978446 Risk of sprayer tipping over!
Be aware when disconnecting the sprayer.



978444 Risk of injury!
Do not open or remove safety shields while engine is running.



978447 Risk of burn!
Stay clear of hot surfaces.



978434 Risk of squeeze!
Keep hands away when parts are moving.



978586 Risk of injury!
Flying objects, keep safe distance from machine as long as the engine is running.

2 - Safety notes

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 - 800 - 222 - 1222



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. _____

Boom

Boom configurations

The TERRA FORCE boom is pendulum suspended, fully hydraulically operated with all functions controlled via the Direct Hydraulic System (D.H.).

The TERRA FORCE boom is suspended from a parallelogram with nitrogen dampers and is available in 88', 90', 100', 120' and 132' (26.8, 27.4, 30.5, 36.6, 40.2 m) working widths. The 88' - 100' booms have bi-fold wings, while the 120' - 132' booms have tri-fold wings.

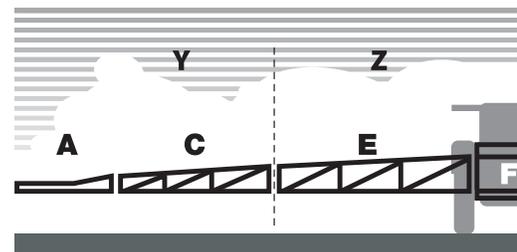
Boom features:

- Hydraulic pendulum lock.
- Outer most sections incorporate spring-loaded breakaway.
- Tilt control with individual suspension (DynamicCenter only).
- Partial folding of outer sections. This enables alternative boom widths.

Full working width	Outer section folded	1st & 2nd outer sections folded
88' (26.8 m)	58' (17.7 m)	-
90' (27.4 m)	58' (17.7 m)	-
100' (30.5 m)	58' (17.7 m)	-
120' (36.6 m)	92' (28 m)	58' (17.7 m)
132' (40.2 m)	92' (28 m)	58' (17.7 m)

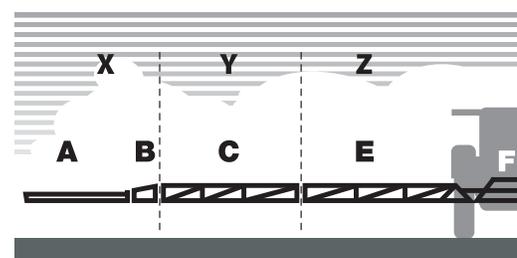
For bi-fold booms, the terminology is as follows:

- A. Breakaway section
- C. Outer section
- E. Inner section
- F. Center section



For tri-fold booms, the terminology is as follows:

- A. Breakaway section
- B. Second outer section
- C. First outer section
- E. Inner section
- F. Center section



i Note: When controlling the boom, the folding sections are:

- X. Second outer section (tri-fold booms only)
- Y. First outer section
- Z. Inner section

3 - Description

DynamicCenter

The TERRA FORCE boom features a DynamicCenter system that can adapt the boom suspension for different conditions.

DynamicCenter provides hydraulic remote control of the suspension characteristics. The settings are selected on the go and will change the boom behavior from being free to fully stabilized.

The system is adjustable in 5 steps between two absolute points of adjustment:

DynamicCenter step	Pendulum state	Terrain	Behavior
1	Free pendulum	Flat field	10% sprayer following. Boom is stable in horizontal position.
2-4	Partly stabilized pendulum	Field with slopes	Boom follows the sprayer's angle to some extent.
5	Fully stabilized pendulum	Hilly field	80% sprayer following. Boom follows the sprayer's angle in hilly terrain.

AutoTerrain (optional equipment)

AutoTerrain is an electro-hydraulic automatic boom management system which adapts the boom suspension for different field conditions on both boom movements and twisting forces on the boom. This allows the AutoTerrain to be proactive and react on the cause more than on the symptom.

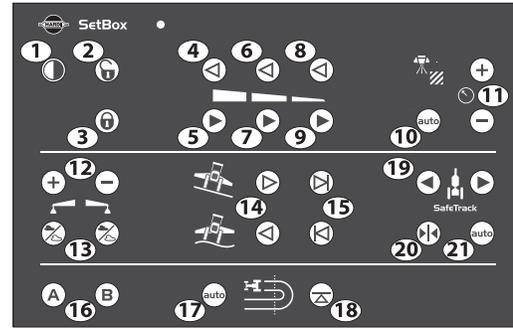


ATTENTION! Please refer to the AutoTerrain manual for detailed information about operation, calibration and maintenance of the AutoTerrain system.

Boom hydraulic controls on the SetBox (Trailed models)

The boom hydraulic controls on the SetBox control the pendulum lock, boom folding and stability functions. The buttons on the SetBox control the following functions:

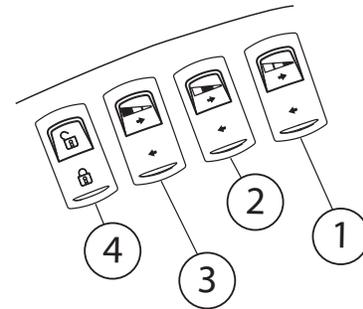
1. Power ON/OFF.
2. Pendulum unlock.
3. Pendulum lock.
4. Inner wing fold.
5. Inner wing unfold.
6. First outer wing fold.
7. First outer wing unfold.
8. Second outer wing fold.
9. Second outer wing unfold.
14. DynamicCenter adjustment (stepwise).
15. DynamicCenter outer positions 1 or 5.
17. HeadlandAssist automatic.
18. HeadlandAssist boom manual lift to preset height.



Boom hydraulic controls on the instrument panel (Self-propelled models)

The boom hydraulic controls on the instrument panel work in combination with the Grip controls. The buttons on the console control the following functions:

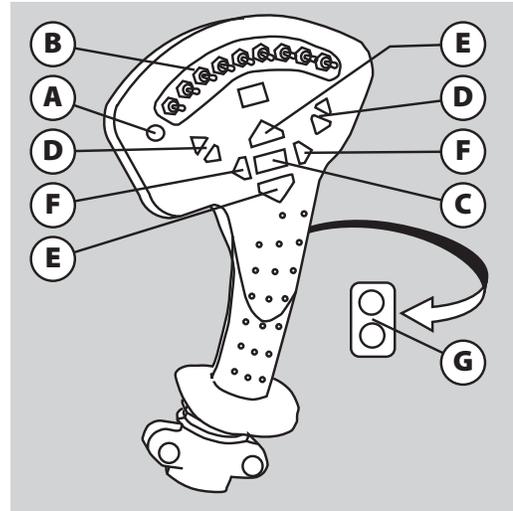
1. Unfold/Fold second outer section (120'-132' Tri-fold booms only).
2. Unfold/Fold first outer section.
3. Unfold/Fold Inner section.
4. Center Pendulum lock.



3 - Description

Boom controls on the Grip handle

- A. Status LED.
- B. Boom section controls.
- C. Main ON/OFF.
- D. Tilt.
- E. Boom height.
- F. Boom slant.
- G. Not used.



Hydraulic systems

General info

Ensure that the quick couplers are clean before connection!

After having operated the boom and the system has been filled with oil, check the vehicle's hydraulic oil level and top off, if necessary.



DANGER! Test of the hydraulic system should be done very cautiously. There may be air trapped in the system which can cause violent movements of the boom.



DANGER! Hydraulic leaks: Never use your fingers to locate a leakage in any part of the hydraulic system. Due to high pressure, hydraulic oil may penetrate the skin.

Requirements - tractor (TERRA FORCE model)

The hydraulic system requires:

- One double-acting outlet for the electro-hydraulic operation of the boom functions. The hydraulic hoses are marked with arrows and colored tie straps to indicate direction of oil flow. Red tie strap = pressure. Green tie strap = Return to tank. The hoses must be hooked up to the correct outlet for the hydraulics to function properly (pressure hose to pressure outlet, return hose to tank outlet).
- Oil flow between 4 - 10 gal/min. (15 - 38 l/min) and a min. pressure of 2610 psi (180 bar).
- Maximum permissible oil pressure is 3050 psi (210 bar).
- Return flow of the connected tractor must be maximum 215 psi (15 bar).
- For Load Sensing systems an oil flow of approximately 0.8 gal/min (3 l/min) at 360 psi (25 bar) supplied by the sprayer hydraulics.

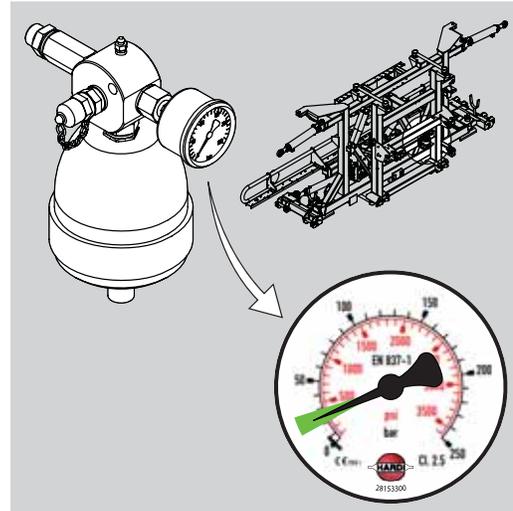
4 - Sprayer setup

Boom

Yaw damper gauge

The damper takes energy out of the boom to stabilize the yaw movements. The yaw damper is charged with nitrogen and equipped with a pressure gauge that must be checked before spraying. Unfold the boom and confirm that the pressure in the yaw damper gauge is in the green range: 290 - 435 psi (20 - 30 bar).

If the pressure gauge reads outside the green range with boom unfolded and stationary, do not use sprayer! If the nitrogen pressure charge is lost, the system will not function correctly and you must stop spraying immediately or severe damage to the boom may occur. Any damage caused by spraying with a faulty yaw damper will not be covered under warranty.



WARNING! Verification and refill/adjustment of the nitrogen pressure in the damper must be carried out by your HARDI® dealer's workshop.



WARNING! Yaw dampening circuit pressure gauge must be in green range with boom unfolded or severe damage to boom may occur. Check daily.

Boom

Safety info

The boom must not be folded/unfolded while driving! Never use the folding/unfolding functions before the sprayer has been stopped! Failure to do so will damage the boom.



DANGER! Before unfolding the boom it is important to connect trailed sprayers to the tractor to prevent overturning the sprayer.



DANGER! When folding or unfolding the boom, make sure that no persons or objects are within the operating area of the boom.



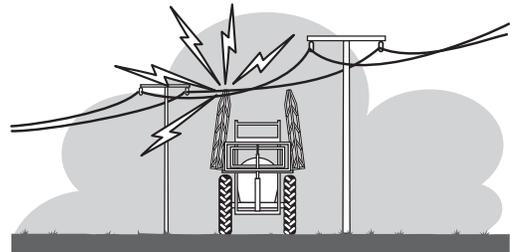
DANGER! Always follow the guidelines listed below when driving in areas with overhead power lines:

Never use the folding/unfolding functions in areas with overhead power lines.

Unintended boom movements may cause contact with overhead power lines.



ATTENTION! Only unfold and fold the boom on level ground.



5 - Operation

Maneuvering of the boom - TERRA FORCE



WARNING! The pendulum lock automatically turns ON when pressing one of the folding buttons. Boom folding is not possible if the pendulum is unlocked. A manual override of the pendulum lock is possible by activating switches 2 or 3 on the SetBox or switch 4 on the self-propelled instrument panel.



WARNING! Only operate the folding functions when the sprayer is stationary! Failure to do so may damage the boom. The pendulum lock automatically opens at speeds exceeding 0.9 mph (1.5 km/h)!



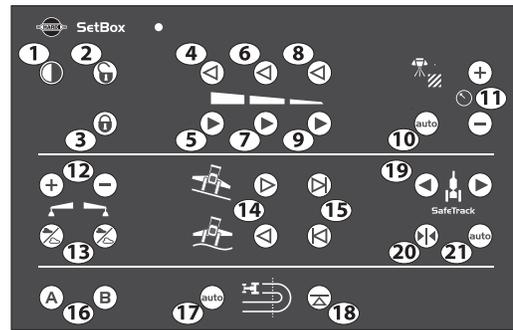
ATTENTION! If a folding sequence is not completed, a warning message on the Hardi display will ask you to complete this sequence before starting next sequence.



ATTENTION! Only buttons relevant for boom functions are mentioned here.

To unfold the boom using the SetBox & Grip controls (Trailed models)

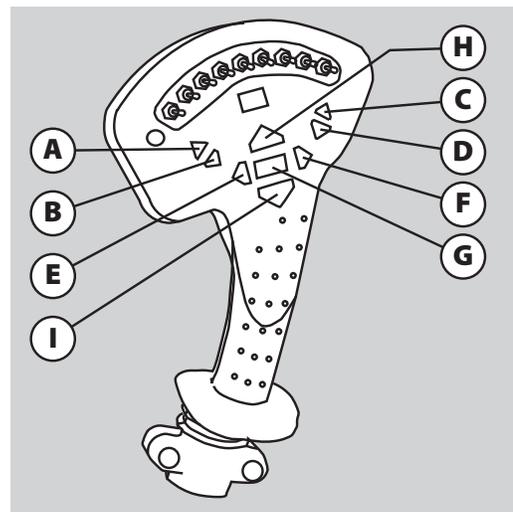
1. Press the boom lift button (H) to lift the boom clear of the transport brackets.
2. Press and hold (A) and (C) to tilt boom wings up.
3. Press and hold button (5) to unfold the inner sections completely (approximately 5 sec. or a warning will appear). Check that the pendulum locked symbol  is visible in the display.
4. Press and hold (B) and (D) to tilt boom wings down.
5. Press and hold button (7) to unfold the 1st outer sections.
6. Press and hold button (9) to unfold the 2nd outer sections (120'-132' tri-fold booms only).
7. Press and hold the boom down button (I) to lower the boom to the correct working height.
8. If not unlocked, then press (2) and + symbol appears in display until pendulum is unlocked. This takes approximately 10 seconds.



WARNING! The pendulum lock automatically opens when you begin to drive. Drive slowly until the pendulum is completely unlocked. The boom must be unlocked before engaging AutoTerrain system.

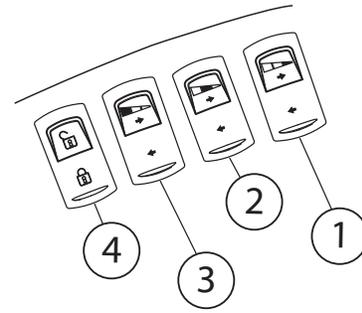
To fold the boom using the SetBox & Grip controls (Trailed models)

1. Press and hold button (18) to set neutral slant angle (no slant).
2. Press the boom lift button (H) to raise the boom to the highest possible position.
3. Press and hold button (8) to fold the 2nd outer sections (120'-132' tri-fold booms only). The + symbol appears in display until pendulum is locked. This takes approximately 10 seconds.
4. Press and hold button (6) to fold the 1st outer sections. Check that the pendulum lock symbol  is visible in the display.
5. Press and hold (A) and (C) to tilt boom wings up.
6. Press and hold button (4) to fold the inner sections.
7. Press the boom down button (I) to lower the boom until it rests in the transport locks.
8. Press and hold (B) and (D) to tilt boom wings down into the transport rests.



To unfold the boom using the Instrument panel & Grip controls (Self-propelled models)

1. Press the boom lift button (H) to lift the boom clear of the transport brackets.
2. Press and hold top of button (3) to unfold the inner sections completely (approximately 5 sec. or a warning will appear). Check that the pendulum locked symbol  is visible in the display.
3. Press and hold (B) and (D) to tilt boom wings down, if necessary.
4. Press and hold top of button (2) to unfold the 1st outer sections.
5. Press and hold top of button (1) to unfold the 2nd outer sections (120'-132' tri-fold booms only).
6. Press and hold the boom down button (I) to lower the boom to the correct working height.
7. If not unlocked, then press top of button (4) and  symbol appears in display until pendulum is unlocked. This takes approximately 10 seconds.



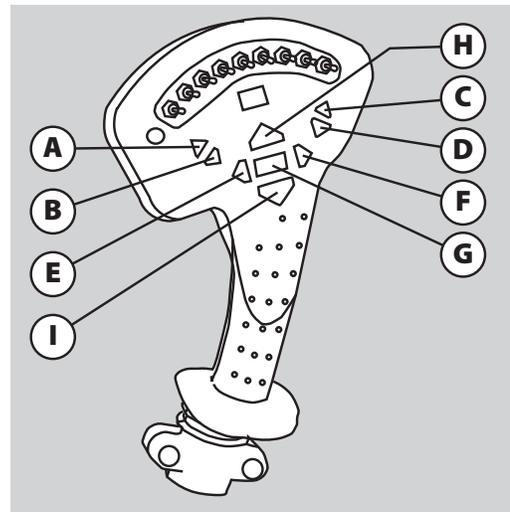
WARNING! The pendulum lock automatically opens when you begin to drive. Drive slowly until the pendulum is completely unlocked.



WARNING! The boom must be unlocked before engaging AutoTerrain system.

To fold the boom using the Instrument panel & Grip controls (Self-propelled models)

1. Press buttons (E) or (F) to set neutral slant angle (no slant).
2. Press the boom lift button (H) to raise the boom to the highest possible position.
3. Press and hold bottom of button (1) to fold the 2nd outer sections of tri-fold booms (6 sections) or outer sections of bi-fold booms (4 sections). The  symbol appears in display until pendulum is locked. This takes approximately 10 seconds.
4. Press and hold bottom of button (2) to fold the 1st outer sections of tri-fold booms (6 sections). Check that the pendulum lock symbol  is visible in the display.
5. Press and hold bottom of button (3) to fold the inner sections.
6. Press the boom down button (I) to lower the boom until it rests in the transport locks.



Lubrication

General info

Always store lubricants clean, dry and cool - preferably at a constant temperature - to avoid contamination from dirt and condensed water. Keep oil filling jugs, hoppers and grease guns clean, and clean the lubricating points thoroughly before lubricating. Avoid prolonged skin contact with oil products.

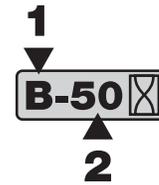
Always follow the quantity recommendations. If no quantity is recommended, lubricate until new grease becomes visible.

Pictograms in lubrication & oiling plans indicate the following:

1. Lubricant to be used (see "Recommended lubricants").
2. Recommended intervals (hours).



ATTENTION! If the sprayer is cleaned with a high pressure cleaner, lubrication of the entire machine is recommended.



Recommended lubricants



A BALL BEARINGS:
Universal Lithium grease, NLGI
No. 2
SHELL RETINAX EP2
CASTROL LMX GREASE



B SLIDE BEARINGS:
Lithium grease with
Molybdenumdisulphide or
graphite
SHELL RETINAX HD 2 (or HDX 2)



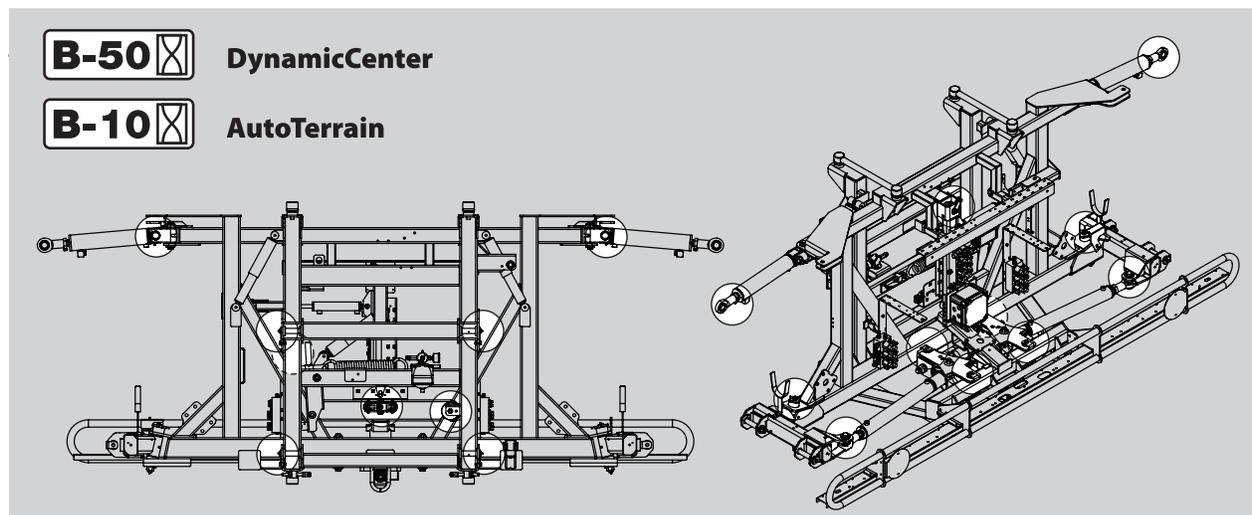
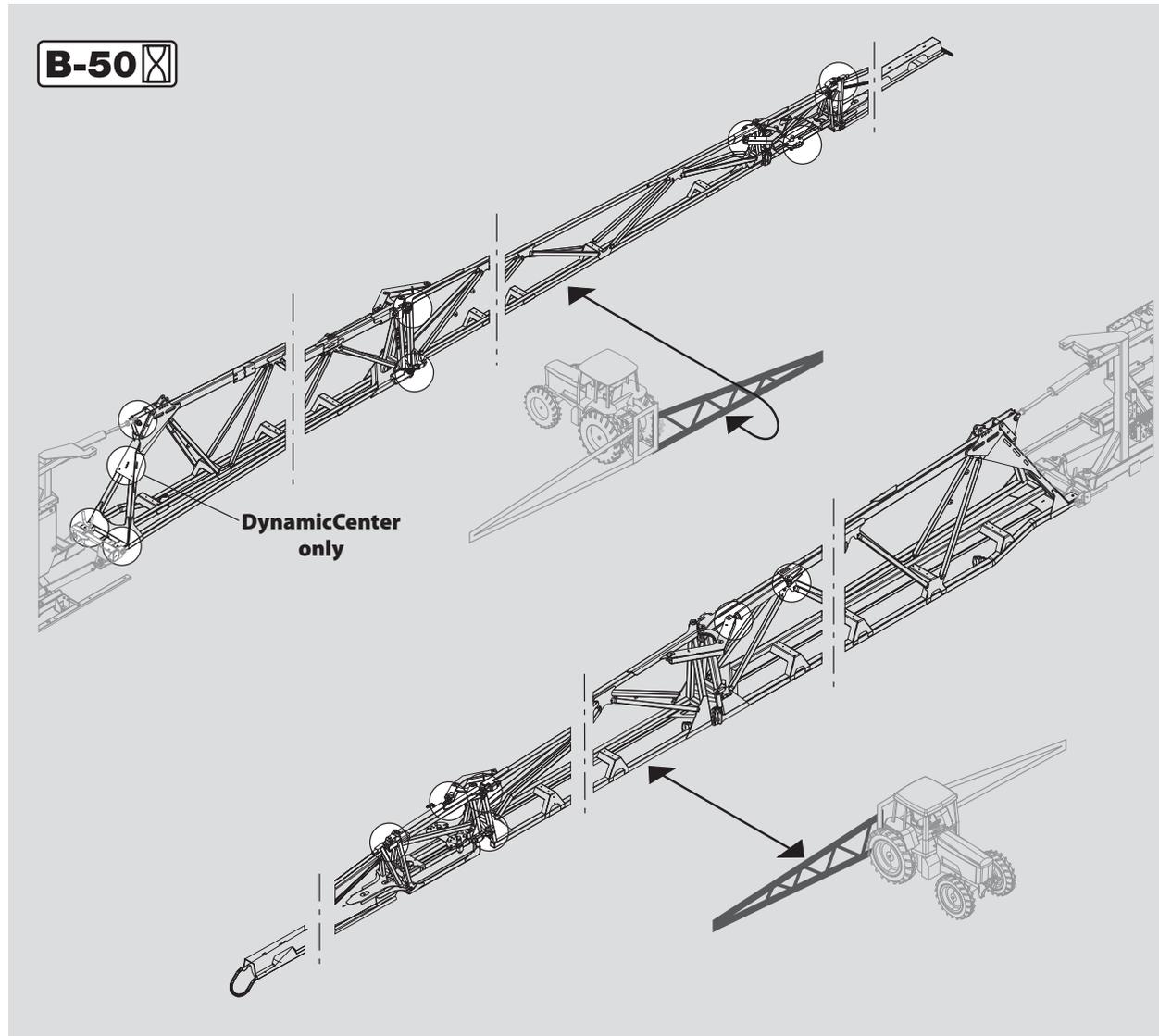
C OIL LUB. POINTS:
TOTAL Transmission TM
SAE 80W/90
Castrol EPX 80W/90
SHELL Spirax 80W/90
Mobil Mobilube 80W/90



D YAW DAMPERS:
Use a synthetic type of grease,
e.g. silicone grease.
Never use a compound with
kerosine or mineral oil.

6 - Maintenance

Boom lubrication and oiling plan



Service and maintenance intervals

10 hours service - Lubricate boom and center

Some lubrication points on the boom and center parts need extra attention when using the AutoTerrain system. These lubrication points, marked "10h" in "Boom lubrication and oiling plan" on page 6.2, need attention every 10 working hours to work correctly.

250 hours service - Readjustment of the boom

See section "Readjustment boom - general info" on page 6.5.

6 - Maintenance

Occasional maintenance

General info

The maintenance and replacement intervals for the following will depend very much on the conditions under which the sprayer will be operated and are therefore impossible to specify.

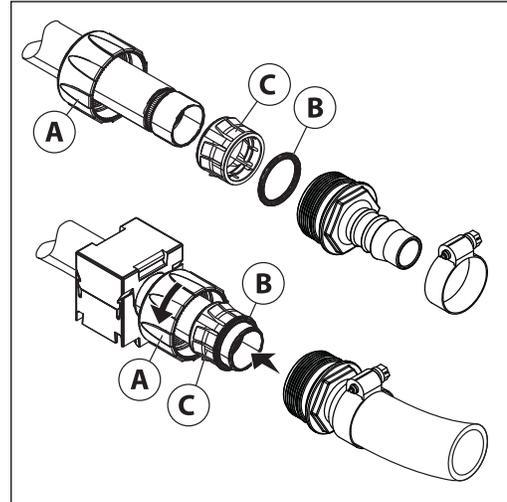
Feed pipe snap-lock assembly

Disassembly

1. Screw the union nut (A) completely off.
2. Pull the feed piping and hose barb apart.
3. Take out the O-ring (B).
4. Inspect and oil O-ring (B). Change the O-ring (B) if worn, before reassembly.

Reassembly

1. Check that the barbed lock ring (C) is fitted to the feed pipe with barb pointing away from pipe opening.
2. Fit the oiled O-ring (B) on top of the lock ring (C).
3. Push the feed pipe and hose barb together.
4. Screw the union nut (A) on the hose barb and tighten union nut (A) by hand.

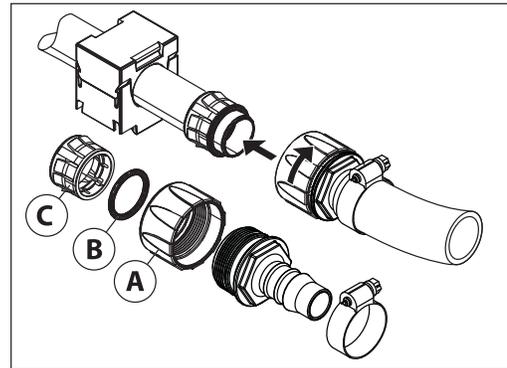


Initial fitting of fittings



ATTENTION! This method can only be used for pipes not fitted into pipe clamps.

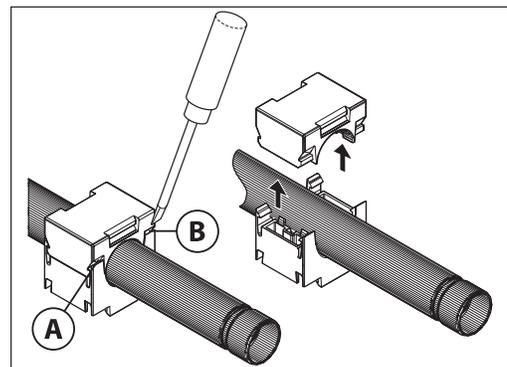
1. Fit the barbed lock ring (C) to the feed pipe with barb pointing away from pipe opening.
2. Fit the oiled O-ring (B) on top of the lock ring.
3. Screw the union nut (A) partly on the hose barb.
4. Press the feed pipe and hose barb together.
5. Tighten the union nut (A) by hand.



Feed pipe clamp assembly

A feed pipe can be removed from the pipe clamps the following way:

1. Use a flat bladed screwdriver to pry the cover off the first corner (A).
2. Hold the clamp top with your hand and pry off the opposite corner (B) with the screwdriver.
3. Pry off the other side of the pipe clamp with the screwdriver.
4. Take out the feed pipe.



Opening the cable trays

The cable trays on the boom can be opened for servicing or re-wiring.

Disassembly

1. Use a screwdriver at the end of a cable tray to pry the cable tray cover off the lock hooks.
2. Pull the cable tray cover off.

Assembly

1. Press the cover on by hand until it hits the hooks of the cable tray.



Readjustment boom - general info

Before beginning adjustment jobs, please go through this check list.

1. The sprayer must be well lubricated (see section about lubrication).
2. Connect the sprayer to the tractor.
3. Place tractor and sprayer on level ground (horizontal).
4. Unfold boom.
5. Set slanting angle to neutral position (horizontal).



WARNING! Nobody is allowed to be under the boom while adjustment is carried out.



ATTENTION! For information on boom terminology see "Boom configurations" on page 3.1.

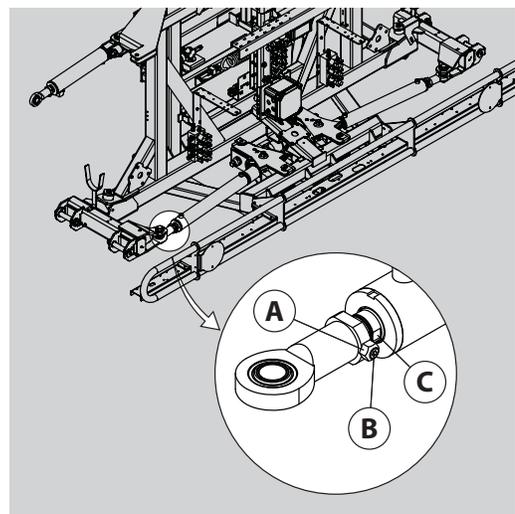


Note: Adjustment of hydraulic cylinders is to be carried out without pressure in the system.

Horizontal alignment of center and inner wing sections

The boom must be completely unfolded before adjustment.

1. Loosen nut (A) and screw (B).
2. Apply a wrench to machined surface (C).
3. Turn cylinder rod until the boom aligns. The boom tip must point slightly forward (4 - 20 inches (100- 500mm) at boom tips).
4. Tighten screw (B) on machined surface (C).
5. Tighten nut (A).



6 - Maintenance

Vertical alignment of boom between inner, intermediate and short outer sections

i Note: This is a basic adjustment of the boom. This is only to be carried out if an adjustment of the transport brackets is insufficient.

Procedure is:

1. Loosen the lock nuts (A) and (C).
2. Adjust the nuts at (B) and (D) until the boom sections align.

(hand) ATTENTION! The upper edges of the boom sections must align so the hydraulic lock will engage when folded.

i Note: It is important that the adjustments are done simultaneously and equally on nuts (B) and (D).

3. Tighten the lock nuts (A) and (C) again.
4. Perform the "Horizontal alignment of boom between inner, intermediate and short outer sections" on page 6.7.

(hand) ATTENTION! Illustration shows left boom wing.

5. Fold the boom to see if it hits and rests correctly in the transport brackets.
6. If necessary to readjust, unfold the boom and loosen the nuts (A) and (C) again.
7. Adjust the nuts at (B) and (D) simultaneously and equally until the boom rests correctly in the lock bracket.

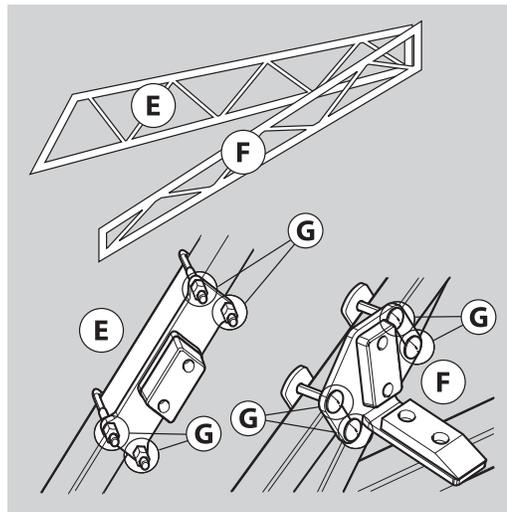
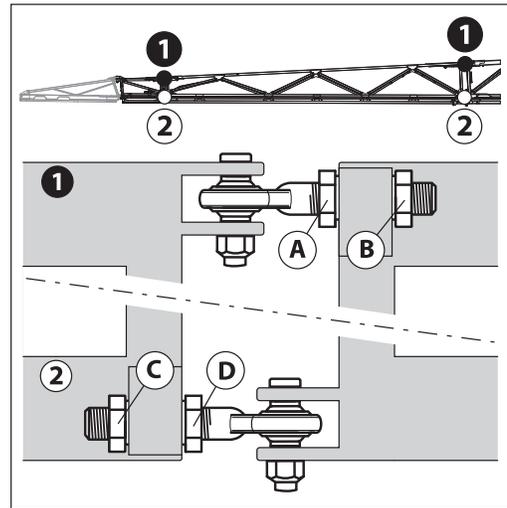
(hand) ATTENTION! The upper bolt adjusts only half of the travel, while the lower bolt adjusts the other half.

8. Tighten the lock nuts (A) and (C) to 220-370 Ft/lb (300-500 Nm).

When folded, check if the boom rests correctly at the transport pads between inner and intermediate section (E) and between intermediate and outer section (F).

If adjustment is necessary:

1. Loosen the four bolts (G) holding the bracket.
2. Reposition the bracket.
3. Tighten the four bolts (G) again.



Horizontal alignment of boom between inner, intermediate and short outer sections

Boom must be unfolded and the hydraulic lock locked.

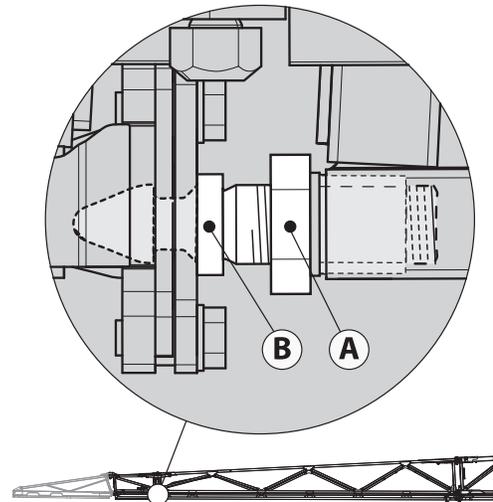
Procedure is:

1. Loosen lock nut (A).
2. Adjust the lock bolt (B) until the boom sections align.



Note: The lock bolt (B) is eccentric. Therefore it is important to check that it centers on the hole in the lock mechanism while adjusting.

3. Tighten the lock nut (A) again.



Fold lock adjustment

The "Vertical alignment of boom between inner, intermediate and short outer sections" on page 6.6 must be done prior to this adjustment.

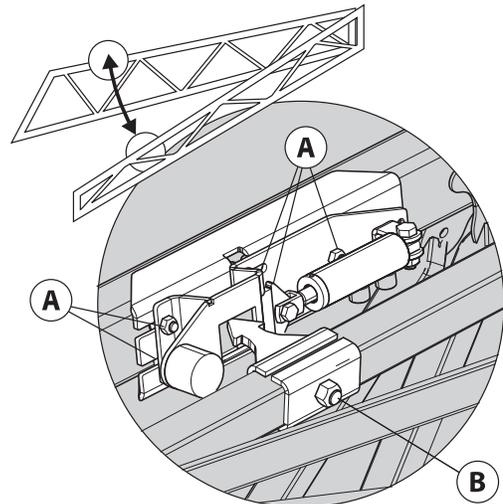
The fold lock adjustment is divided into two parts: Vertical and horizontal adjustment:

Horizontal adjustment

1. Loosen the five bolts (A) on the fold lock bracket.
2. Reposition the fold lock until the hook is aligning to the center of the fold lock hole.
3. Tighten the five bolts (A) on the fold lock bracket.

Vertical adjustment

1. Loosen the bolt (B).
2. Turn the hook upside down if needed for better fit.
3. Tighten the hook bolt (B) again.



Breakaway section adjustment

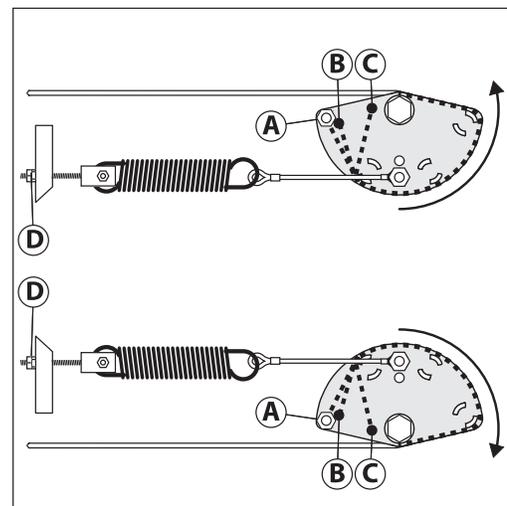
The progressive breakaway function is adjusted by altering the spring attachment point on the progressive mechanism.

The turning "half circle" part should be in a rest position as in the picture. If out of adjustment, the "half circle" part is turned more or less as in the picture and needs adjustment:

1. Loosen the nut (D) on the fork bolt to slacken the spring.
2. Remove the bolt (A) on the turning progressive mechanism that holds the breakaway wire.
3. Reposition the bolt into hole (B) or (C) to adjust the "half circle" rest position.
4. Tighten the nut (D) on the fork bolt until a suitable spring load is achieved.



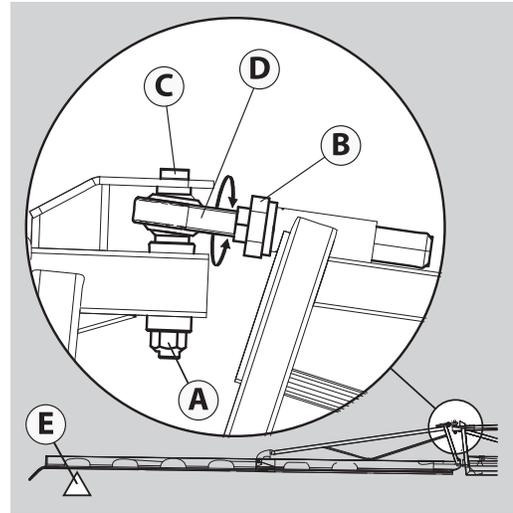
ATTENTION! Observe the amount of spring load required when driving with the sprayer. If the breakaway sections release too much, the spring load must be increased.



6 - Maintenance

Vertical alignment of outer and breakaway sections

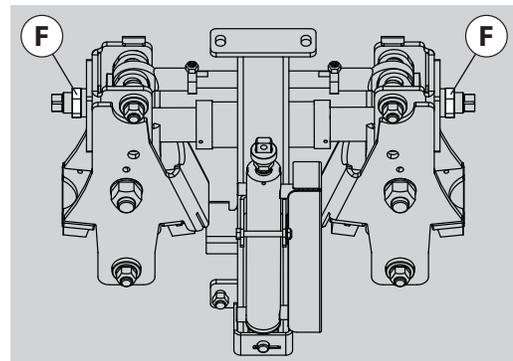
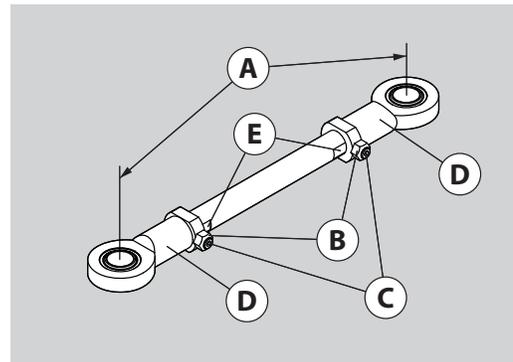
1. Support the breakaway section with a jack stand (E).
2. Loosen lock nut (B).
3. Remove nut (A).
4. Take out bolt (C).
5. Turn eye rod (D) to adjust the section.
6. Refit the bolt (C).
7. Remove the jack stand to see if the sections align.
8. If not, support the breakaway with the jack stand (E) again and repeat point 4-7 until the sections align.
9. Refit bolt (C) and tighten nut (A).
10. Tighten the lock nut (B) again.



Yaw adjustment

Initial set up (if dismantled)

1. Check that the yaw pressure gauge reads 360 psi (25 bars).
2. The front adjustable shaft must be adjusted to 17-3/4" (451mm) between link heads (A) before re-assembly. To adjust, loosen nuts (B) and screws (C). Turn outer link heads (D) equally and tighten screws (C) on machined surfaces (E). Retighten nuts (B).
3. Refill the hydraulic yaw cylinder with oil. Ensure both pistons are extended and there is no air in the system. Use the bleed screw on top of cylinder to release air and pressure from the system.
4. Adjust nuts (F) inward to remove slack and ensure the longitudinal brackets are perpendicular to the center frame.

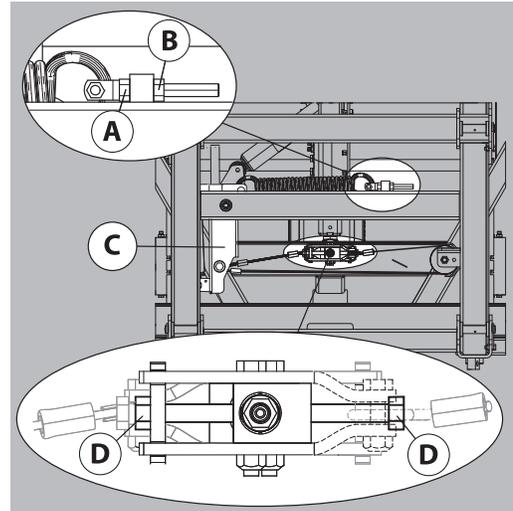


WARNING! Verification and refill/adjustment of the nitrogen pressure in the damper must be carried out by your HARDI® dealer's workshop.

DynamicCenter cable adjustment

Before beginning adjustment, the sprayer must be placed on level ground with boom unfolded and in level position.

1. Loosen jam nut (A) and slacken the spring at the nut (B).
2. Position the lever (C) with the cylinder into vertical position.
3. Tighten the horizontal spring without tensioning it.
4. Adjust the bolts (D) to tighten the two cables equally.
5. No further tightening of the spring required. But when driving in hilly terrain with high speed, you may tighten the nut (B) another 3/4" (20 mm).
6. Tighten the jam nut (A) at the horizontal spring again.



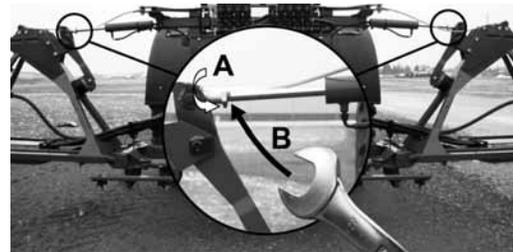
Wing tilt adjustment



Note: This adjustment is only relevant for sprayers with DynamicCenter.

The horizontal adjustment of the wings is done by the tilt cylinder. The boom must be unfolded and tilted completely down to horizontal position. If necessary, adjust the wing as follows:

1. Support the boom on jack stands to relieve the load from the hydraulic cylinder.
2. Loosen set screw (A).
3. With a 27mm wrench on key profile (B) at end of the ram, adjust the cylinder ram to get the desired wing level.
4. Tighten the set screw (A) again.
5. Repeat steps for the other side.



Pendulum lock adjustment

Pendulum lock adjustment is necessary if there is slack in the chains or the lock cylinder will not fully retract. Before adjustment, sprayer should be parked on level ground and the pendulum lock engaged.

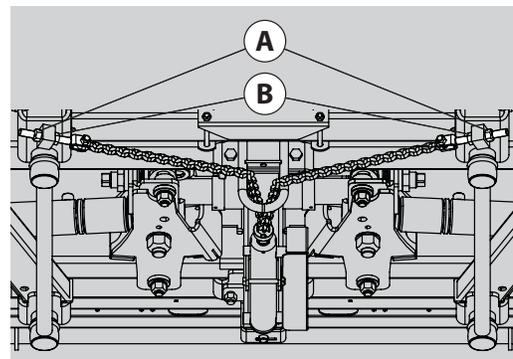
1. Loosen nuts (B) and adjust chain slack with locknuts (A).
2. When chain slack is removed (with lock cylinder still fully retracted), tighten nuts (B).
3. Check lock operation. If cylinder will not fully retract, loosen chains equally until it will.



Note: Adjust both sides equally.



Note: Prevent turnbuckles from turning while adjusting nuts (A) & (B). Do not twist chains.



Operational problems

General info

Operational incidents are frequently due to the same reasons:

1. Rusted or dirty hydraulic components cause bad connections and early wear.
2. A badly charged or faulty battery causes failures and misbehavior in the electrical system.

Therefore **ALWAYS** check

1. Hydraulic components are clean.
2. The good condition of the tractor battery and its connectors.

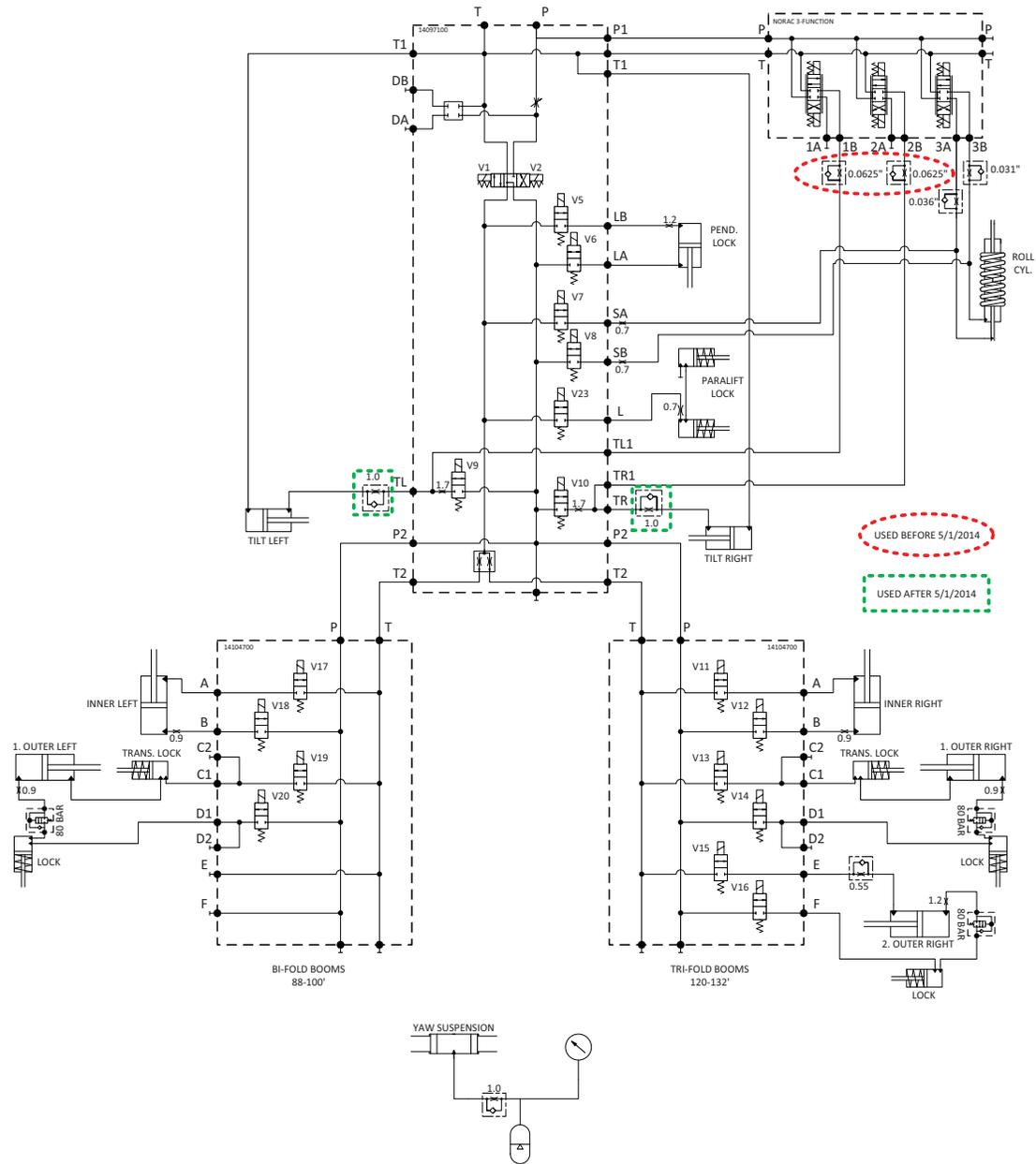
7 - Fault finding

Hydraulic system - Z model

FAULT	PROBABLE CAUSE	CONTROL/REMEDY
No boom movements when activated.	Insufficient hydraulic pressure.	Check oil pressure.
	Insufficient oil supply.	Check tractor hydraulic oil level. Oil flow must be between 13 gpm (50 l/min) and 35 gpm (130 l/min). Check tractor hydraulic oil level.
	Blown fuse(s).	Check / replace fuse in junction box.
	Bad / corroded electrical connections.	Check / clean connections, multi plugs etc.
	Insufficient power supply.	Voltage on activated solenoid valve must be more than 8 volts. Use wires at least 10 awg. (4.0 mm ²) for power supply.
	Defect relay / diodes in junction box.	Check relays, diodes and soldering at PCB in junction box. LED diodes indicate boom functions.
	Clogged restrictors in bypass block.	Remove and clean restrictors in bypass block (See hydraulic diagram). Change hydraulic oil + filter.
Boom lift raises to max. position when tractor hydraulics are engaged.	Wrong polarity.	Check polarity. Red positive (+) Black negative (-).
	Wrong oil inlet to bypass block.	Connect hydraulic snap couplers opposite in tractor outlets, or engage spool valve lever in opposite direction.
	Back pressure in return line exceeds 290 psi.	Connect the return line with free flow to hydraulic oil reservoir. Divide return line in two and lead return oil back to reservoir via two spool valves.
Oil heats up in Closed Center systems.	Bypass valve does not close properly. Internal leaks in flow regulator.	Check / close (screw in) by-pass valve. Replace flow regulator O-rings and backup rings. Replace flow regulator.
Individual ram does not move.	Clogged restrictor.	Dismantle and clean restrictor.

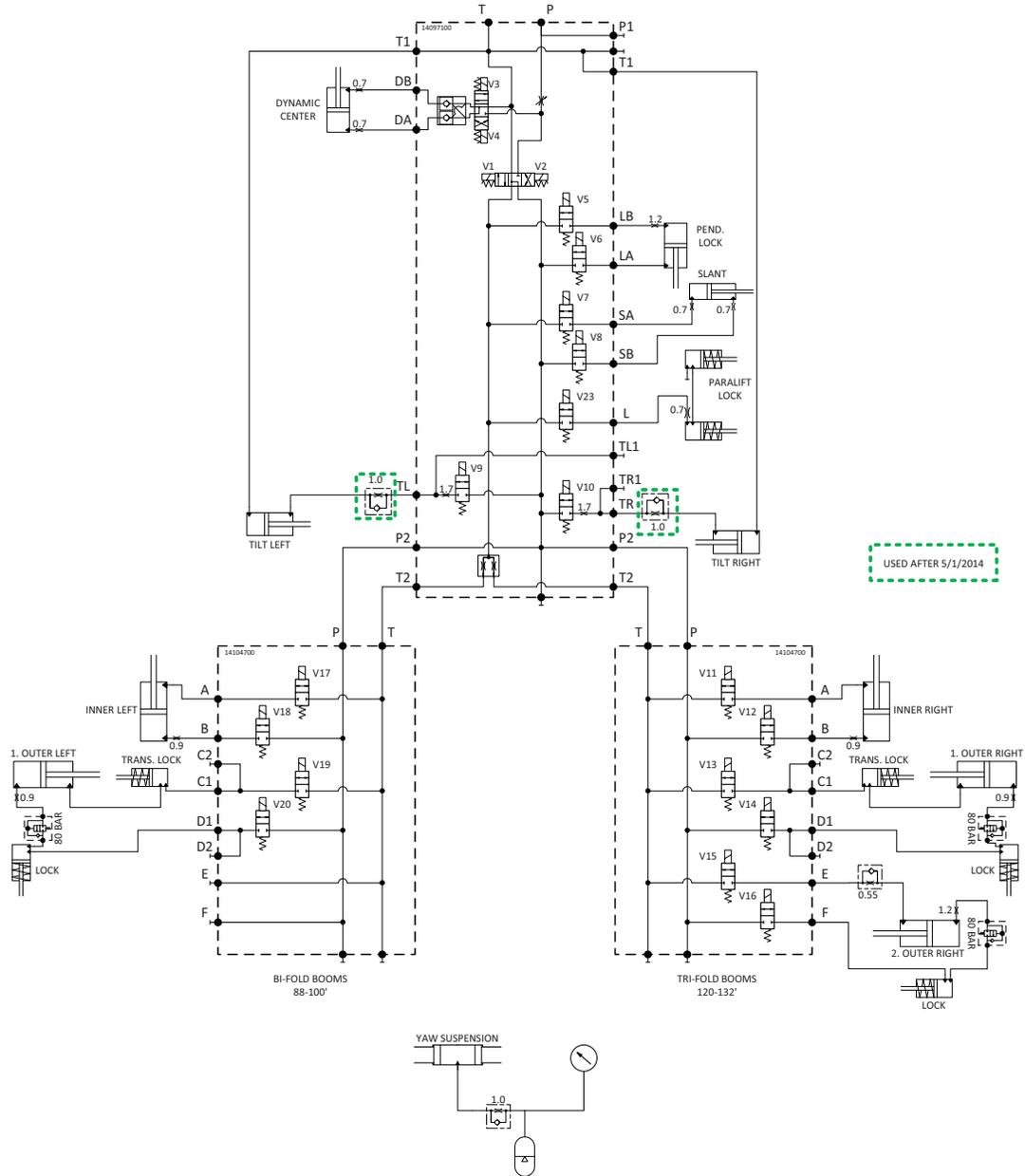
Charts

Boom hydraulics - AutoTerrain



8 - Technical specifications

Boom hydraulics - DynamicCenter



Warranty policy and conditions

HARDI® NORTH AMERICA INC. , 1500 West 76th Street, Davenport, Iowa, USA hereinafter called "HARDI®", offers the following limited warranty in accordance with the provisions below to each original retail purchaser 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 time 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 other 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 including the boom.
 - b)Transportation of any HARDI® product to and from where the warranty work is to be performed.
 - c)Dealer travel time to and from the machine or to deliver and return the machine from the service workshop for repair unless otherwise dictated by state law.
 - d)Dealer traveling costs.
4. Parts defined as normal wearing items, (i.e. Pump Diaphragms, Valves, O-rings, 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 the HARDI® Service and Engineering Departments and/or repaired by anyone other than an Authorized HARDI® 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 within 30 days of delivery to the purchaser.
 - 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 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 on field sprayers. To qualify for this extended warranty, the tank must be drained and flushed with fresh water after each day's use. HARDI®'s liability is limited to replacement of defective parts FOB our plant in Davenport, IA at no cost to the purchaser for 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 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 - Warranty

9. Subject to the following terms, conditions and contributions, HARDI® extends the warranty on HARDI® diaphragm pumps (excluding wearing parts such as diaphragms, valves and o-rings) to FIVE YEARS. To qualify for this extended warranty, the pump must be drained and flushed with fresh water after each day's use. HARDI®'s liability is limited to replacement of defective parts, FOB our plant in Davenport, IA 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 the HARDI® Service Department 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 the repair or 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 the CEO in the Davenport office. Approval of warranty is the responsibility of the HARDI® Service Department.
13. Any warranty work performed which will exceed \$1000.00 MUST be approved IN ADVANCE by the Service Department. Warranty claims filed without prior approval will be returned.
14. ANY pump replacement MUST be approved by the HARDI® Service Department.
15. Claims under this policy MUST be filed with the HARDI® Service Department within thirty (30) days of when the work is performed or warranty shall be void unless prior arrangements are made.
16. Parts which are requested for return by the HARDI® Service Department must be returned prepaid within thirty (30) days for warranty settlement.
17. Warranty claims must be COMPLETELY filled out including part numbers and quantities or claims will be returned to the submitting dealer.

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.



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