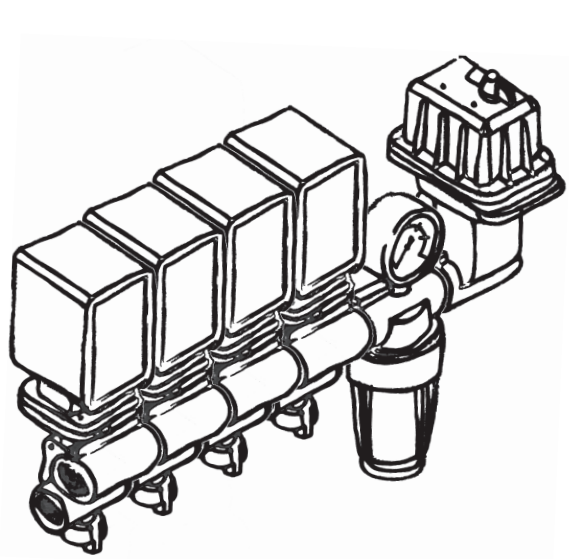
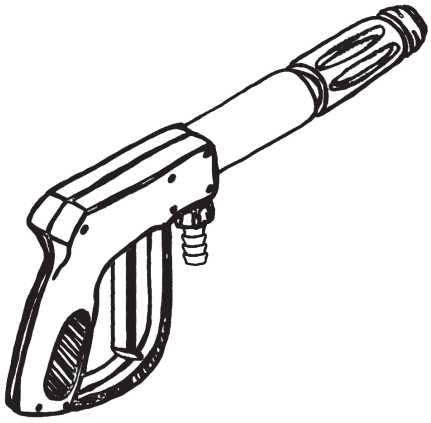
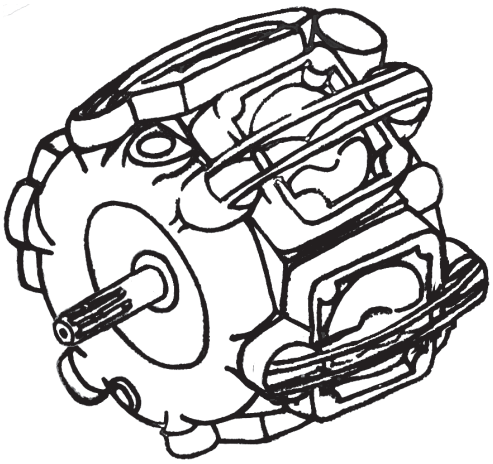
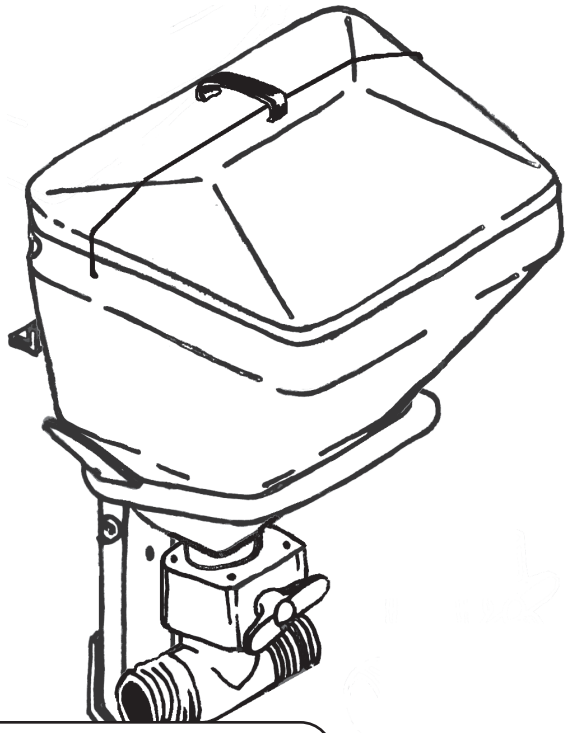
HARDI® SPRAYERS





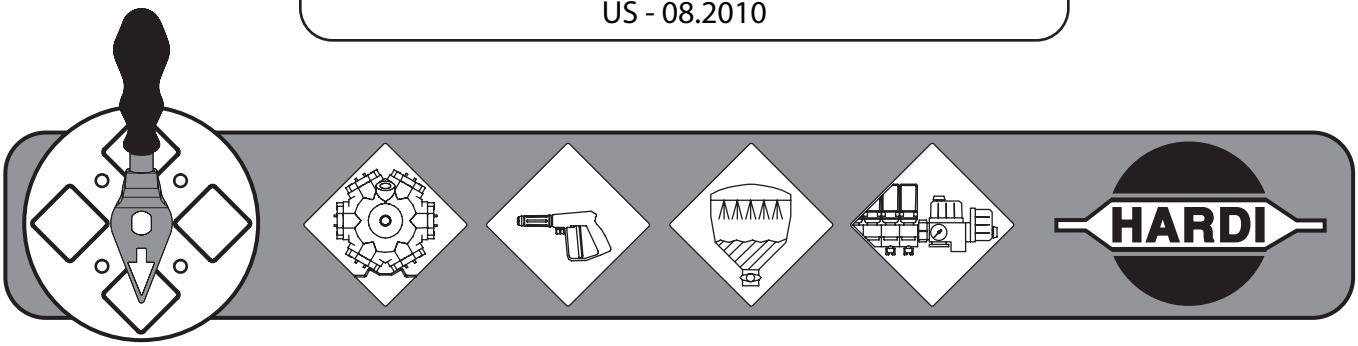




CONTROLLER
HC6500
Instruction book - sw 1.2x

67021903 - Version 1.20

US - 08.2010



CONTROLLER
HC6500

Instruction book - sw 1.2X

67021903 - Version 1.20
US - 08.2010

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Welcome letter

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 spray application equipment.

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

Some of the features on your HARDI® controller 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

HARDI® NORTH AMERICA INC. **Visit us online at: www.hardi-us.com**

1500 West 76th St.
Davenport, Iowa 52806
Phone: (563) 386-1730
Fax: (563) 386-1710

337 Sovereign Rd.
London, Ontario N6M 1A6
Phone: (519) 659-2771
Fax: (519) 659-2821

Sincerely,

Dale M. Szuminski

President

Operator safety

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 to better, easier and safer operation of your sprayer!

General info

Note the following recommended precautions and safe operating practices.

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.

Keep children away from the equipment.

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

Turn electrical power off before connecting and disconnecting the display and transducers, servicing or using a battery charger.

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.

Test with clean water prior to filling with chemicals.

Do not use a high pressure cleaner to clean the electronic components.

Press the keys with the underside of your finger. Avoid using your fingernail.

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. _____

General info

General info

The HARDI® Controller HC 6500 is for use in agricultural and horticultural production. The Controller permits automatic control of volume rate, tracking and operation of other features. The HC 6500 is a CAN system. This allows communication through cables that are smaller and more flexible. The controller itself contains a © key that is always active and all menu pages contain help text at the bottom of the display that explains the actual menu and choices. In many cases, these two features allow you to find the needed information without using the instruction book. Once installed, try the © key to familiarize yourself with the menu. Also note the bottom of the display once the # key is pressed.

Main components are:

- Terminal HC 6500 (on tractor)
- Grip HC 6300 (on tractor)
- SetBox HC 6400 (on tractor)
- Jobcom HC 6100 (on sprayer)
- Flow transducer (on sprayer)
- Speed transducer (on sprayer or tractor)

The Terminal has a 4.7" color display. Working pictures will be shown in different colors depending on the function used. Display readout includes volume rate, speed, liquid rate per minute, total covered area, total volume sprayed and 99 trip registers. It includes a total register that summarizes data from the 98 trip registers. It is illuminated internally so readout is possible even for night-time work.

Functions include correct area with closure of up to 13 spray boom sections, up to 27 alarm functions and the possibility for audio/visual alarm etc. There are also 23 warnings depending on operation. Alarms and warnings will be shown in the bottom left corner of the display.

The Grip has integrated controls for the spray functions (up to 13 sections) main ON/OFF, boom raise, boom lower, boom slant, boom tilt (left and right) and status diode.

The transducers utilized are chosen for long service life and good signal quality. The speed and flow transducers have a built-in diode that will flash to indicate when it's functioning, to aid servicing.

The Terminal is also compatible for Variable Rate Application and is prepared for communication with Precision Farming tools (e.g. HARDI® AutoSectionControl).

Data dump of registers and configuration to a personal computer are possible.

The system has a non-volatile memory with no battery which simplifies storage. All parameters in the menus are saved in the memory and are not lost when the power is disconnected.

The Terminal, SetBox and Grip should be protected from moisture and removed for storage if the tractor does not have a cabin. The components are rain and dust proof and have been developed to last many years under agricultural conditions.

Optional transducers include pressure and revolutions readout. Other options include a 12 Volt printer and a foot operated remote ON/OFF for the main ON/OFF.

HARDI® LookAhead

With LookAhead, the pressure regulation valve can predict the correct setting before the main switch goes to ON. It also improves application precision when re-starting after a tank fill.

LookAhead helps farmers who have tractors with semiautomatic gearbox, meaning the “hardimatic” function does not work due to constant PTO revs.

The LookAhead system has 3 main advantages:

1. To improve regulation response time when sections are shut OFF or opened.
2. To improve regulation response time when the spraying speed changes during headland turns.
3. To stabilize regulation during pressure/flow fluctuations in the period immediately after main ON/OFF function is turned ON.

The LookAhead feature is active when the boom is unfolded and the LookAhead menu is activated and calibrated.

When the power is switched to ON, note the regulation valve will adjust from the actual setting to the minimum setting and then back again to determine its actual position.

For LookAhead to function correctly, the controller must know which nozzles and application rate will be used. This is selected from a number of nozzle choices stored in memory. At start up of the controller, it will prompt user for a choice between using nozzles from last spray job or selecting a new nozzle to be used.

ATTENTION! The tractor gearbox must be an automatic or semi-automatic type with constant revolutions P.T.O. or the tractor must be driven with constant R.P.M. for the LookAhead to work properly.

Pressure based regulation (optional equipment)

To improve the non-equal EFC (Electric Fluid Control) system, an optional sensor can be mounted to switch from flow to pressure based regulation. When active, the system automatically switches to pressure based regulation when the flow drops below the minimum flow rate for the flowmeter.

The drop of flow can be due to number of sections selected for the boom and number of nozzles in each section. If there are few or only one nozzle in the outer section of the boom while spraying in an angle with only the outer section open, there is almost no flow in the liquid system, resulting it to shut down.

The same will happen if the sprayer is fitted with a large flow housing. The flowmeter will stop rotating and measure no flow with small boom sections or nozzles with low output.

SafeTrack and IntelliTrack

SafeTrack and IntelliTrack are steering mechanisms for the HARDI® sprayers. When using a track system, sprayer stability is a common concern. Many factors influence the sprayer, and conditions where the sprayer might tip over have to be dealt with. The factors that the driver can influence are:

- Driving behavior
- Field conditions
- Tire width
- Tire pressure

Read sprayer's instruction book for further information.

If unsafe driving occurs, an alarm will be triggered and the sprayer will align. Be aware that the alarm cannot be turned off as long as unsafe driving still occurs! (See paragraph "Menu 3.6 Track")

ATTENTION! If necessary, the level of security can be adjusted - please contact your local HARDI® dealer.

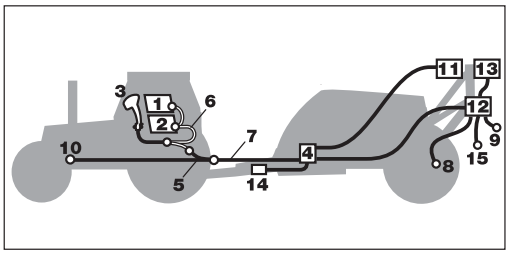
DANGER! The system has been calibrated during driving on flat fields. Special attention should be made when driving in hilly conditions.

DANGER! When driving on fields with deep tracks, the speed must be decreased.

3 - Description

System description

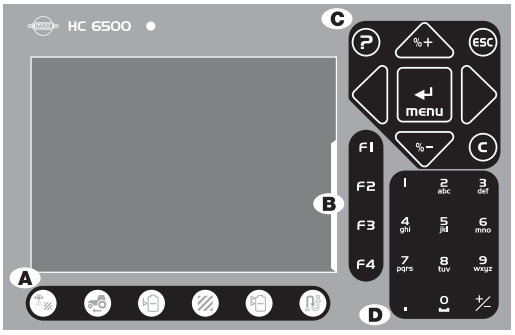
Overall description



1. HC 6500 Terminal.
2. HC 6400 SetBox.
3. HC 6300 Grip.
4. HC 6100 Jobcom junction box.
5. Harness for the tractor.
6. Harness for the cabin.
7. Harness for the sprayer.
8. Speed sensor & pulse ring.
9. Flow sensor.
10. Power supply to sprayer.
11. Hydraulics block.
12. EFC junction box
13. Electric Fluid Control unit.
14. LookAhead pressure control.
15. LookAhead boom position sensor.

Keys

General key description



A. Preset keys:

Vital information while spraying is quick and easy to access. With just one preset key press, information is shown in the lower left corner of display. Pressing the same button twice will show graphic information of the same readout on volume rate and speed.

B. Soft keys:

Soft keys control optional features. Pressing a soft key will activate it. When any of the 4 soft keys (F1, F2, F3 or F4) are pressed, the soft key menu appears in the “large right” area. The number of levels in the soft key menu system depends on the number of functions.

C. Navigation keys:

The navigation keys are initially used for set up in the menu system by coding in values. The navigation keys can change the volume rate in a set percentage or fixed volume rate.

| is used to clear a value or register.

~ is used to escape back to your working screen.

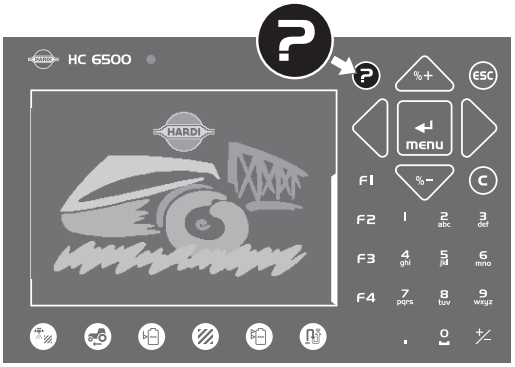
© Is used if you have questions about the menu you are in. A short help text will appear.

D. Numeric keys:

These are very much like a mobile phone. It is very easy to enter text like a field name. They are also used to key in a value or directly access a menu.

The numeric keys are used when a name or a number is keyed in.

Help key



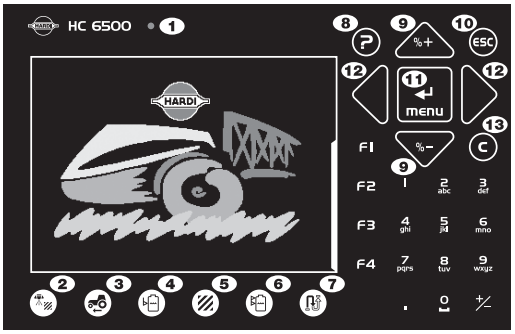
The help key is always active. It is the operator’s built-in quick guide and instruction manual. After the help key has been activated, an explanation of any control key or switch is shown on a full screen. Furthermore, if a message, warning or service reminder appears, more details are found by pressing the help key. This will free the operator from finding details in the instruction manual.

Press © to activate help text.

Press © to leave help function.

3 - Description

Terminal HC 6500



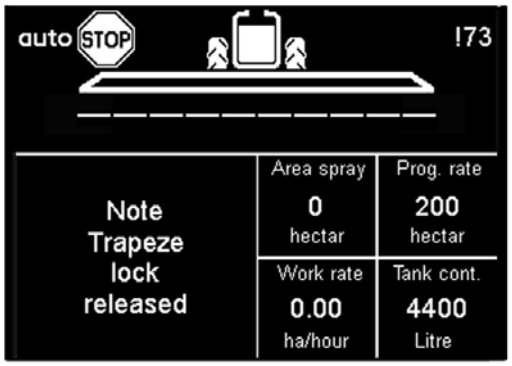
1. Status diode.
2. Preset key - Volume rate.
3. Preset key - Speed.
4. Preset key - Tank contents.
5. Preset key - Area treated.
6. Preset key - Total volume sprayed out.
7. Preset key - Distance or area remaining.
8. Help key.
9. Scroll up or down, change a value or volume rate.
10. Escape a menu.
11. Enter menu or confirm a value.
12. Move cursor to right or left.
13. Clear a value.

Icons for status:

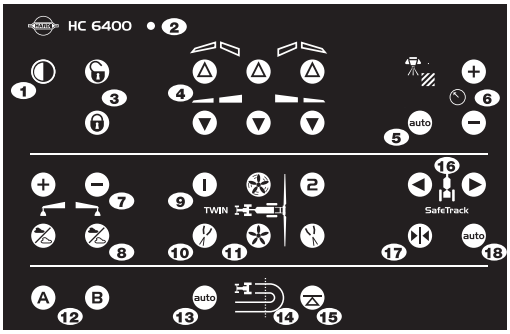
auto Volume rate Automatic	Warning	Track Track Crab right	Option B on	Pendulum Locked
Volume rate Manual	Information	TWIN Manual	Options both on	Pendulum Unlocked
Variable rate (GPS) active	Track auto Track Automatic	TWIN 1 TWIN Preset 1	Not used in North America	auto Not used in North America
All "OK"	Track Track Manual	TWIN 2 TWIN Preset 2	Not used in North America	Not used in North America
STOP Stop (critical)	Track Track Lock	Option A on	Not used in North America	Not used in North America
Track Track Crab left	Options both off	Not used in North America	man Not used in North America	
Not used in North America	% Over or under application			

Night illumination

It is possible to choose between day and night illumination. Go to menu [2.7.1 Choose day/night colors] for selection. Picture shows night illumination.



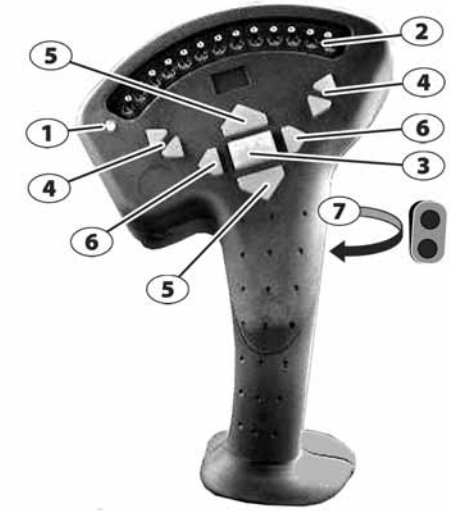
SetBox HC 6400



The SetBox controls secondary functions. The keys are large so even at a distance, operation can be carried out. The keys are grouped into control areas to simplify operator understanding.

1. Power ON/OFF.
2. Status diode.
3. Pendulum lock controls.
4. Boom fold controls.
5. Automatic volume rate.
6. Manual pressure control.
7. Foam marker regulation.
8. Foam marker ON/OFF.
9. TWIN presets.
10. Air slot for TWIN.
11. Air volume for TWIN.
12. Valve function A-B.
13. Not used in North America.
14. Not used in North America.
15. Not used in North America.
16. SafeTrack manual control.
17. SafeTrack align.
18. SafeTrack automatic selection.

Grip HC 6300



The Grip is an ergonomic remote unit that can be easily mounted inside the tractor cabin. All common functions required during normal spraying can be operated with the Grip.

The Grip cannot be switched ON or OFF separately. It receives the power supply from the Terminal HC 6500. It is therefore automatically switched ON or OFF with the Terminal.

1. Status diode.
2. Boom section controls (up to 13).
3. Main ON/OFF.
4. Tilt.
5. Boom height.
6. Boom slant.
7. TWIN presets.

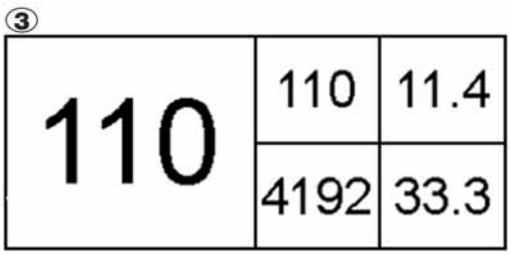
3 - Description

Display symbols

1. The 1st Line is for status and register number.
2. The 2nd Line is for boom, foam marker and end nozzles
3. The bottom half can be set-up to show 1 or 2 and up to 5 boxes with information.

Soft keys: When activated 4 rows appear beside the buttons F1 - F4.

Alarm and warning error number will be shown in the upper right corner of the display. The number has an exclamation sign in front of it, as this is also used for register number indication.



General keystrokes, daily settings

Press # to enter the menu system.

Note that the menu numbers are unique to each line or page.

When adjustments are made in settings, the display will be as shown.

The two markings > > show the actual menu where you are located. It is now possible to go up and down by using the ¿ and ª keys, or by pressing the menus last digit at the numeric keypad; e.g. pressing “6” for menu [4.6 Speed simulation].

The last value which was used, is marked with this symbol ‰. In the bottom of the display there will be help text for each menu. Where you see the two > > you will see the help text for that menu only.

This display setup will be shown every time adjustments have to be made in the menu.

4 TOOLBOX
>> 4.1 Measure 4.2 Service interval: Hours until 4.3 Stop-watch 4.4 Alarm clock 4.5 Test 4.6 Speed simulation 4.7 Emergency track Align 4.8 Computer CAN status
To measure distance and area. Setup working width

General keystrokes, Example: Tank contents

Press # to enter [1.2 TANK CONTENTS].

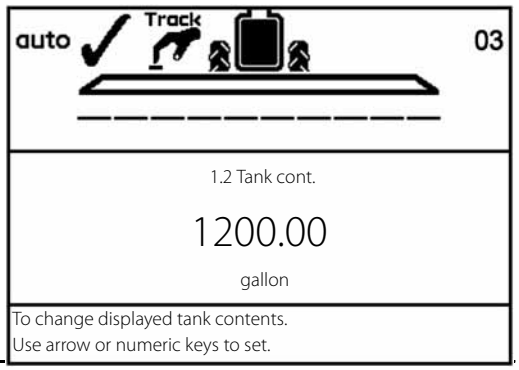
To clear value, move cursor to digit and press | .

To move the cursor press ¶ or § .

Press ¿ or ª to set the desired value, or key in value on numeric keys.

Press # to confirm. gallon

Press ~ to exit.



Keystroke menu tree

The first steps to choose a menu are shown below.

Press # to proceed into the menu. See the relevant section in the book.

Press ~ and hold to exit the menu system.

Extended menu

This menu has been set up by your HARDI® Service center. It contains parameters that are typically set only once, normally before the Controller is used.

ATTENTION! Unless instructed, do not tamper with the settings and values in these menus. Doing so may void warranty.

Auto functions

General info

The Soft key buttons F1, F2, F3 and F4 are used for the Auto functions. Currently, only F3 (End Nozzles) is available in North America. See menu tree in chapter “Soft keys”.

End nozzles (Fence line) (optional)

If End nozzles/Bijet are fitted, set the value to the equivalent coverage by the boom nozzles. E.g. End nozzle coverage is 5 feet. This is equal to [03 Boom nozzles]. Choose End Nozzles by pressing F3. When end nozzle is active, it will be shown in the display with icons in the end of the boom line.

Set up of end nozzles/Bi-jet can be done from menu 3.3.4.

ATTENTION! It is important that the volume applied from the end nozzle or Bijet matches the volume applied under the boom. This is a comparison of volume per minute per length. (Gallon/min/foot).

When the end nozzle or Bijet is active, the area covered and volume sprayed is calculated and registered. If “Active boom size” is displayed, it will show an increase when the end nozzle or Bijet is activated.

TWIN Preset

It is possible to set the air volume and air angle in 2 different positions in menu 2.2.5 to 2.2.5.2, for headwind and tailwind. When air volume and air angle are set, a long key press (position 1 headwind) will store the present setting. The same setting can be done for (position 2 tailwind). TWIN preset can be set up so it will shift automatically from position 1 to position 2 when the main ON/OFF is activated.

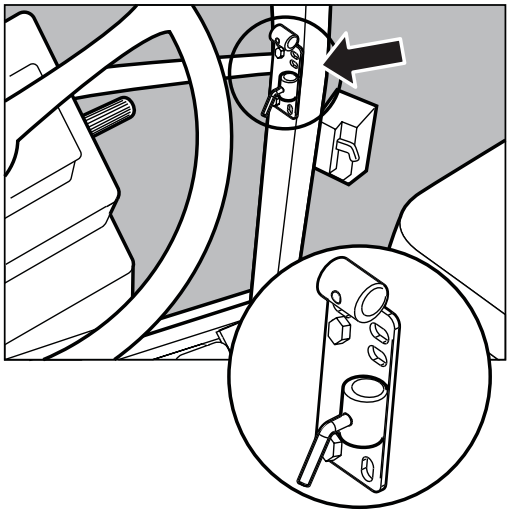
HARDI® AutoSectionControl

HARDI® AutoSectionControl is a fully automatic system that opens and closes booms sections as necessary. HARDI® AutoSectionControl manages the sections when driving over sprayed area like into a headland or wedge or around obstacles like trees etc. HARDI® AutoSectionControl is a small module connected to the HC 6500 and to a GPS receiver. When spraying, the HARDI® AutoSectionControl automatically records the area sprayed. In a typical situation where the headland is sprayed first, HARDI® AutoSectionControl will now automatically close the sections if the operator passes over a sprayed area.

Tractor installation

Control units

Find a suitable place in the tractor's cabin to secure the control units from movement. Best recommended placement is to the right of the driver seat. The supplied bracket will fit most tractors. Threaded mounting holes may be hidden behind front corner cover.

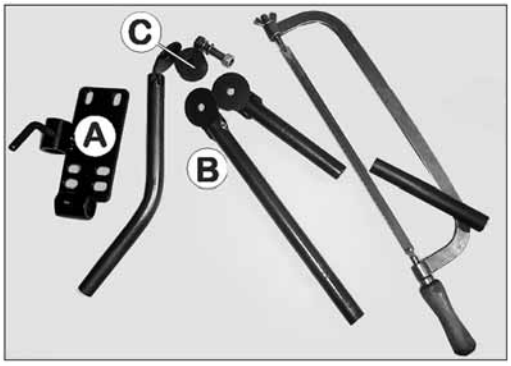


Installation of control unit brackets

The supplied tractor pillar bracket (A) has a hole spacing of 3.9 in. (100mm) and 4.7 in. (120 mm). Check tractor instructions manual for information regarding attachment points.

Three tubes (B) are supplied. One, two or all 3 may be used. They can be bent and shortened. A spacer (C) is also supplied to allow further attachment possibilities. Find the best solution for your tractor or vehicle.

Tube (B) plate is staggered so all boxes will line up if correctly oriented.

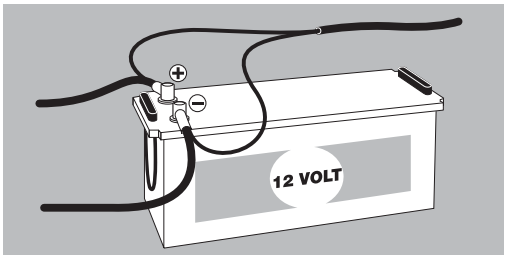


The recommended setup is to place the spacer (C) between the two tubes (B) used for the controllers and the 3rd tube (B) as shown in the picture, so it can be mounted in the bracket (A).

ATTENTION! An extension cable is available as an option if the Hydraulics control unit is to be placed further away from the EFC control unit. (Ref. no. 261933)

4 - System setup

Power supply



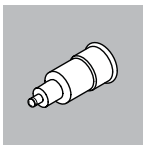
The power requirement is 12-15 Volt DC. Always note polarity!

Red wire is positive (+)

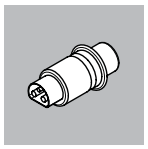
Black wire is negative (-).

Power supply must come directly from the battery. For proper function of the electric equipment, the wires must have the following gauge ratings and correct fuses to ensure a sufficient power supply. The supplied power connectors follows the standard of most newer tractors. If using a tractor with another power connector it is necessary to disassemble connector and fit it to the actual tractor connector.

Use the HARDI® power cable 26013900. A 25 amp fuse is located on the positive connection. Use the HARDI® Electric distribution box (Ref. no. 817925) to ensure a good connection.



LIGHTER CONNECTOR
Spray control unit requires:
Wire 12 awg, Fuse 10 Amp
Hydraulic control unit requires:
Wire 10 awg, Fuse 15 Amp



JOBCOM CONNECTOR
The unit requires:
Wire 8 awg, Fuse 25 Amp

WARNING! Do not connect to the starter motor or generator/alternator. Warranty is void if this is done.

ATTENTION! See paragraph “System start-up” for more about connecting the controller.

Mounting of tractor harness

Mount fuse on € pole at tractor battery. Connections are as follows:

A: Red.

B: Red/Brown.

C: Yellow.

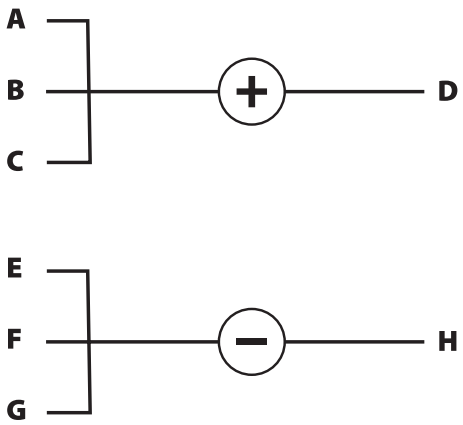
D: Mounted on € pole at tractor battery.

E: Black.

F: Black/White.

G: Blue.

H: Mounted on ± pole at tractor battery.



WARNING! Connector “H” must be connected to ± pole on the battery. Do NOT connect to ground on tractor as this might blow the controller!

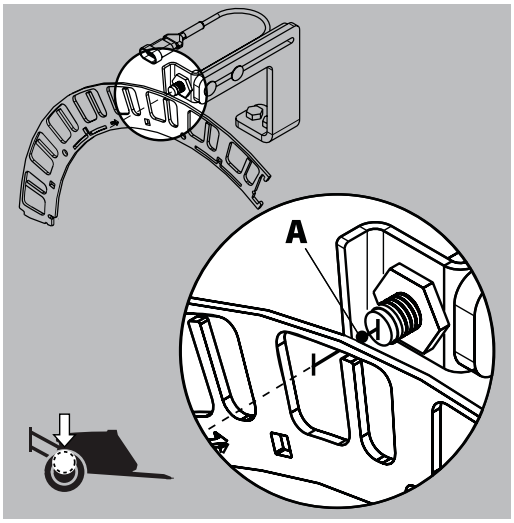
Printer

If the 12 Volt printer is fitted, the supplied tube can be utilized to fit the printer on the Controller/Terminal brackets.

ATTENTION! The Controller/Terminal should be protected from moisture and should be removed when not in use, if the tractor does not have a cabin.

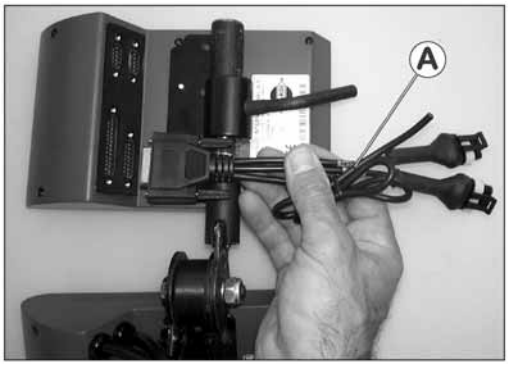
Speed transducer for sprayer

The speed transducer is located at the inside of the sprayer's right wheel. It is an inductive type that requires a metallic protrusion to pass by it to trigger a signal. A speed ring is used to trigger the transducer. It should be adjusted so the transducer is placed in the center of the holes in the speed ring (vertical direction). Recommended distance between protrusion and transducer (A) is 1/8" to 1/4" (3 to 6 mm). Check throughout the entire circumference. Correct adjustment is indicated by a constant blinking from the transducer when the wheel rotates.



Speed transducer for tractor

It is possible to connect a speed sensor from tractor gearbox or radar/GPS to the controller. A speed/switch harness (A) and extension cable are needed to connect the speed transducer to the Controller/Terminal.

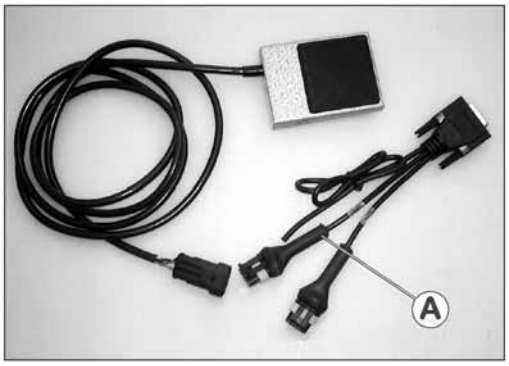


Foot pedal remote ON/OFF (optional)

Note the following if the Foot pedal remote is to be fitted.

Remote ON/OFF switch has to be activated from the extended menu at installation. The HARDI® Service center does this.

The speed/switch harness (A) is connected to the Controller/Terminal. Connect the plug from the Foot pedal ON/OFF to the correct connector on harness (A).

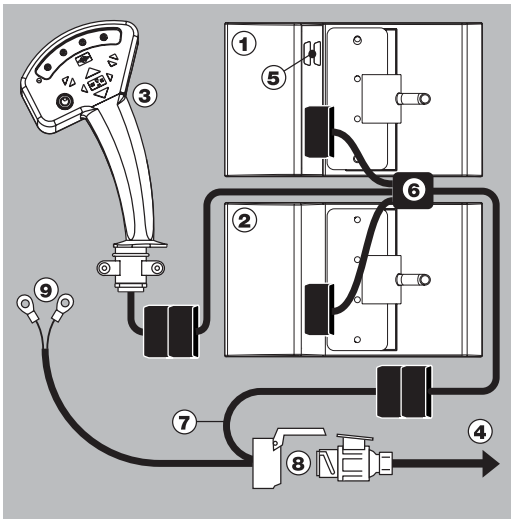


ATTENTION! The main ON/OFF valve switch at Grip overrides all remote switches. It must be set to ON for the optional Remote ON/OFF switch to function.

Initial system start-up

The HC 6500 system with basic tractor equipment and sprayer control unit.

1. Terminal HC 6500.
2. SetBox HC 6400.
3. Grip HC 6300.
4. To Jobcom HC 6100 on sprayer.
5. Printer connection DB 9 COM1/COM2 port.
6. DB 25 connector harness with power and CAN communication.
7. Tractor harness.
8. Connector for tractor to Jobcom HC 6100.
9. Power from tractor battery with a 25 amp fuse.



Daily settings

System start-up

When the HC 6500 is turned on, the controller initializes itself. If the Controller is being put into operation for the very first time, it will prompt for date and time. Set clock to enable register. Refer to “Menu 2.4 Set clock” for details on setting of clock.

If LookAhead is enabled in the HC 6500, it will prompt user for a nozzle choice - see section “LookAhead nozzle choice”.

If the pressure based regulation is enabled in the HC 6500, it will prompt user for a nozzle choice and minimum pressure - see section “Pressure based regulation”.

LookAhead nozzle choice

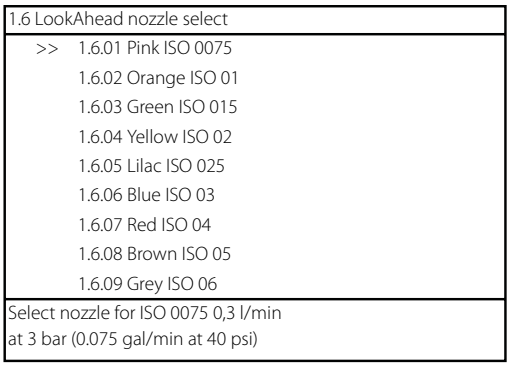
If LookAhead or pressure based regulation is enabled, the HC 6500 will prompt user for a nozzle choice at every start-up of the controller.

The present selected nozzle is designated by the ‰ symbol at the line of the nozzle description in the display.

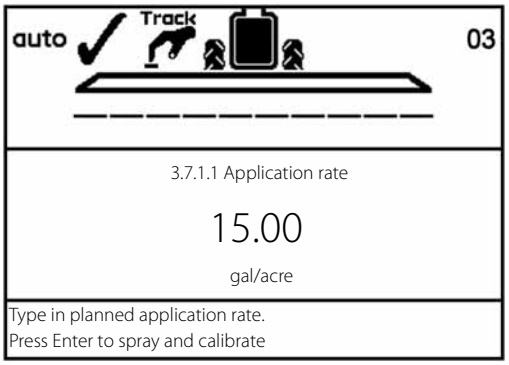
If the nozzle used at last spray job is going to be re-used, then press ~ or # .

Selecting another nozzle:

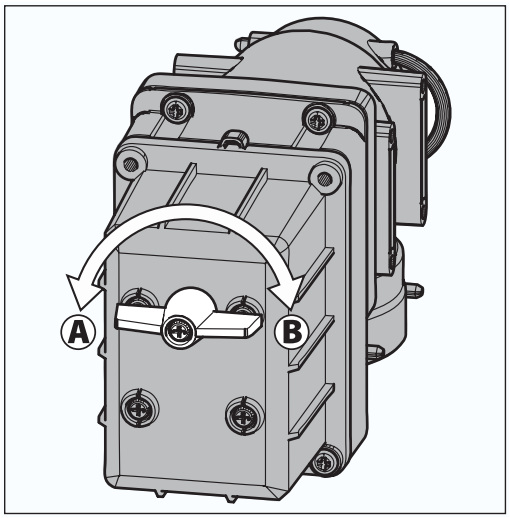
1. Select another nozzle by pressing ¿ or ª .
2. Confirm the choice by pressing # .



If LookAhead is not calibrated, then the screen changes to menu [3.7.1.1 Application rate]. Enter the expected application rate and press # to spray and calibrate. Then prepare for calibration - see menu [3.7 LookAhead] for details on this.



Check LookAhead pressure regulation at speed change

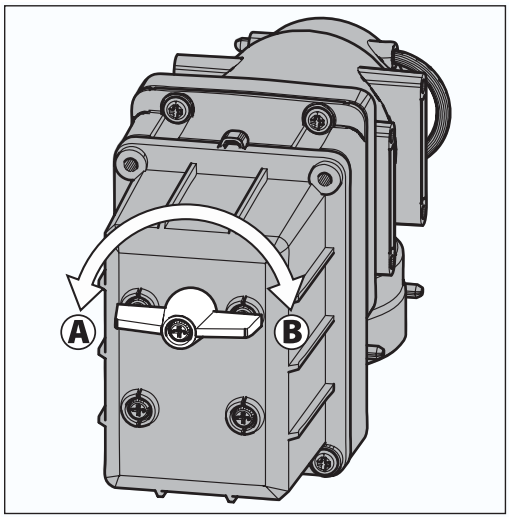


1. Press ® button for pressure regulation on the HC 6400. Confirm that check mark icon appears in upper left corner of the display.
2. Go to menu [4.6 speed simulation]. Key in e.g. 6 mph and press # to use the value. Stay in this menu (i.e. do not press ESC to leave).
3. Start PTO at nominal RPM.
4. Press main ON/OFF at the grip to ON, to open all sections. Check that the pressure regulation valve rotates and that pressure stabilizes at 70 psi.
5. In menu [4.6 speed simulation]. Key in e.g. 4 mph and press # to use value. Check that pressure regulation valve rotates and that pressure stabilizes at 30 psi.
6. After pressure regulation valve is stable (i.e. does not rotate/adjust), wait 30 seconds before proceeding.
7. Press main ON/OFF at the grip to OFF, to close all sections.
8. Go to menu [4.6 speed simulation]. Key in e.g. 6 mph and press # to use the value. Check if pressure regulation valve rotates counterclockwise (to reduce pressure) immediately after pressing # . If pressure regulation valve rotates when all sections are closed, then LookAhead is activated and works correctly.
9. Press main ON/OFF at the grip to ON, to open all sections. After a delay of approx. 3 seconds, the pressure regulation valve begins rotating to adjust actual flow to set flow.

Rotation counterclockwise (A)	**Rotation clockwise (B)**
Decreasing pressure	Increasing pressure
Lower boom flow	Higher boom flow
Closing section	Opening section
Decreasing speed	Increasing speed

Open/close the Main On/off = No movement

Check LookAhead pressure regulation at section change



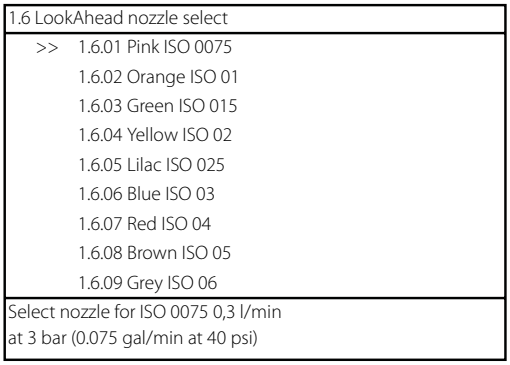
1. Go to menu [4.6 speed simulation]. Key in 4 mph and press # to use the value.
2. Press ~ to leave to workscreen.
3. Press ® button for pressure regulation on the HC 6400. Confirm that check mark icon appears in upper left corner of the display.
4. Start PTO at nominal RPM.
5. Flip down all section switches.
6. Press main ON/OFF at the grip to ON, to open all sections. Check that pressure regulation valve rotates and that pressure stabilizes at 30 psi.
7. Press main ON/OFF at the grip to OFF, to close all sections.
8. Flip up half of the section switches to close half of the sections. Check if pressure regulation valve rotates counterclockwise (to reduce pressure) immediately after the change of section switches. If pressure regulation valve rotates when all sections are closed, then LookAhead is activated and works correctly.

Rotation counterclockwise (A)	Rotation clockwise (B)
Decreasing pressure	Increasing pressure
Lower boom flow	Higher boom flow
Closing section	Opening section
Decreasing speed	Increasing speed

Open/close the Main On/off = No movement

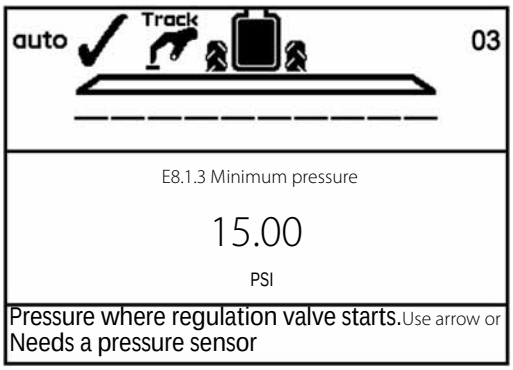
Pressure based regulation (optional equipment)

When the pressure based regulation is enabled, the HC 6500 will prompt for a nozzle choice. The last used nozzle is designated by the ‰ symbol at the line of the nozzle description in the display. If the nozzle and application rate used at last spray job is going to be re-used, then press ~ and the work screen will appear. If another nozzle will be used, then confirm your nozzle selection by pressing # . Then the minimum pressure screen will appear. If LookAhead is enabled, then LookAhead calibration will be done before menu [E8.1.3 Minimum pressure] appears.



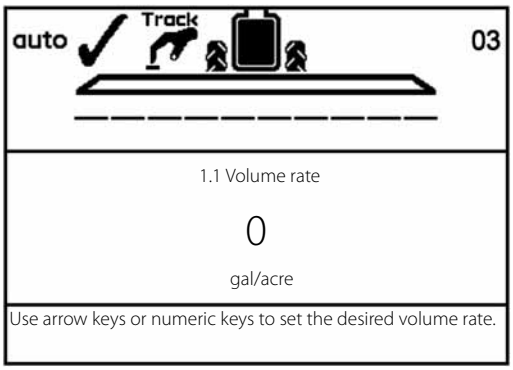
In menu [E8.1.3 Minimum pressure] the minimum pressure allowed is typed in. Confirm by pressing # .

In practice this means the regulation valve will stop if the pressure goes below this value. See “Check LookAhead pressure regulation at speed change” for illustration of pressure regulation valve functionality.



Menu 1.1 Volume rate

How to change the volume rate



The volume rate can be changed by:

1. Setting the desired rate in the Controller.
2. Manually raising or lowering the pressure via the SetBox (HC 6400)
3. Pressing ¿ or ª to apply over or under in a preset percentage, e.g. 10% (the % icon in the display indicates when this is active).

To read the volume rate: gal/acre

Shortcut ¥

Press ¥ and hold until menu [1.1 VOLUME RATE] is shown.

To change volume rate:

Move cursor with ¶ or § to the value to be changed.

Use ¿ or ª to change the value. Alternatively clear value by pressing | and key in value on the numeric keys.

Press # to confirm.

Manual dosage

To dose in manual mode, use the pressure buttons on the SetBox HC 6400. The manual mode is indicated by the ¬ symbol at the top of the display.

To go from manual to preset volume rate, press AUTO.

ATTENTION! Under 0.3 mph (0.5 km/h), the Controller will not regulate automatically.

5 - Menu 1 Daily settings

Menu 1.2 Tank contents

To change the displayed Tank contents

Shortcut @

Press @ and hold until menu [1.2 Tank contents] is shown.

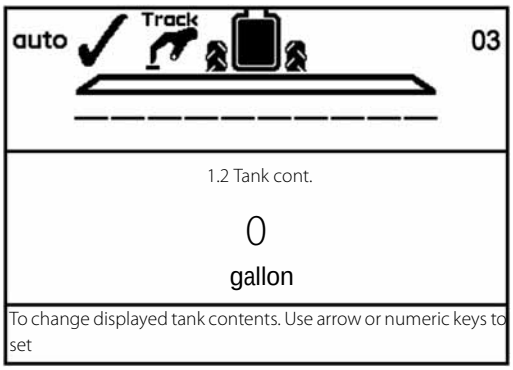
Press ¶ or § to move the cursor in order to change the value.

Press ¿ or ª to set the desired value.

Press # to confirm.

The maximum size of the tank is displayed

Press @ again and the tank contents maximum value is shown.



ATTENTION! If the sprayer is fitted with Tank gauge, contents readout is automatic.

Menu 1.3 Select register

Menu 1.3.1 Register readout and selection

1.3 Select register
>> 1.3.1 Field 651
1.3.2 Field 68
1.3.3 Field 684
1.3.4 Field 64
1.3.5 Field 654
1.3.6 Field 6541
1.3.7 Field 687
1.3.8 Field 984
1.3.9 Field 1234
Use register 1 to 99 for job. Scroll to register, then press Enter to show data

Register 1 to 98 can be used for individual areas.

Register 99 is a tally of register trips 1 to 98. They are identified with a number and it is also possible to name them. The data is saved when the system is switched off.

To read the totals of all registers:

Shortcut £

1. Press £ and hold until menu [1.3 Select register] is shown.
2. Press ¿ or ª to go to register 99.
3. Press # to enter the register and read main data.
4. Press # again to see spray data.
5. Press ~ to exit the menu.

To read the data in the active register:

Shortcut £

1. Press £ and hold until menu [1.3 Select register] is shown.
2. Press # to enter register and read main data.
3. Press # again to see spray data.
4. Press ~ to exit the menu.

To change the register:

Shortcut £

1. Press £ and hold until menu [1.3 Select register] is shown.
2. Press ¿ or ª to change the register.
3. Press # . If necessary, the register can be reset -see below.
4. Press ~ to exit the menu.

To reset register:

Press | and hold for 5 seconds to reset register. Status diode will blink once, and then blink again to indicate that register has been reset.

Reset of a register can be aborted if the | key is released before the status diode blinks again.

ATTENTION! The active register number is always visible in the right upper corner of the display.

ATTENTION! Naming of registers are done in menu 2.6.

Menu 1.6 LookAhead nozzle select

LookAhead nozzle selection

In this menu, it is possible to select another nozzle without re-starting the controller. Do the following:

1. Go to menu [1.6 LookAhead nozzle select] then press # .
2. Select nozzle with ¿ or ª .
3. Confirm by pressing # .
4. The Controller jumps to menu [3.7.1.1 Application rate]. Enter an application rate here.
5. See further steps in the chapter “Menu 3.7 LookAhead”.

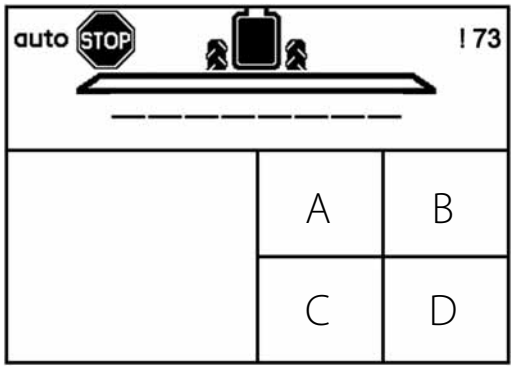
Menu 2.1 Display readout

General info

The following menu explanations assume you have mastered the general keystrokes and you can “find your way” to the specific menu. If this is not so, please re-read section “Keys”.

Menu 2.1.1 Display readout

It is possible to choose which functions are shown in the 4 different boxes (A, B, C and D) of the display.



1. Go to menu [2.1 Display readout].
2. Use ¿ or ª to choose which of following boxes you want the data shown in and press # to confirm.
   2.1.1 Show upper middle (A)
   2.1.2 Show upper right (B)
   2.1.3 Show lower middle (C)
   2.1.4 Show lower right (D)
3. Choose a submenu e.g. menu [2.1.1.04 Work rate]. Press # to confirm.
4. Press ~ to leave menu.

See next page for a complete list of possible display readouts.

Display text Description.

[2.1.1.01 Program]	Shows programmed volume rate
[2.1.1.02 Flow rate]	Flow rate per minute sprayed out through the boom
[2.1.1.03 Time]	Actual time
[2.1.1.04 Work rate]	Rate shown in acres per hour or hectares per hour
[2.1.1.05 Volume rate]	Actual rate in gallon per acre or liter per hectare
[2.1.1.06 Tank contents]	Main tank contents
[2.1.1.07 Speed]	Driving speed
[2.1.1.08 Volume sprayed]	Readouts for volume sprayed in currently active register
[2.1.1.09 Area sprayed]	Readouts for area sprayed in currently active register
[2.1.1.10 Active boom size]	Active boom size including End nozzle
[2.1.1.11 Pressure]	Displays spray pressure if sensor is fitted
[2.1.1.12 Fan speed]	Displays Twin fan speed if sensor is fitted
[2.1.1.13 Wind speed]	Displays wind speed if sensor is fitted
[2.1.1.14 Wind direction]	Displays wind direction if sensor is fitted
[2.1.1.15 Humidity]	Displays relative humidity if sensor is fitted
[2.1.1.16 Temperature]	Displays ambient temperature if sensor is fitted
[2.1.1.17 PTO Revolutions]	Displays revolutions if sensor is fitted
[2.1.1.18 Name “Extra 1”]	Readout from extra sensor 1 frequency
[2.1.1.19 Name “Extra 2”]	Readout from extra sensor 2 frequency
[2.1.1.20 Name “Extra 3”]	Readout from extra sensor 3 analog
[2.1.1.21 Name “Extra 4”]	Readout from extra sensor 4 analog
[2.1.1.22 Voltmeter]	Displays system voltage. Useful when fault finding
[2.1.1.23 Agitation]	Agitation valve opening
[2.1.1.24 Rinse Tank Content]	Rinse tank calculated content

ATTENTION! As some readouts need extra sensors, the relevant sensor has to be connected to get a readout.

Menu 2.2 Auto functions

Menu 2.2.1 Main ON/OFF

The Controller can be set to open the main ON/OFF function above a certain speed and close it below the same speed.

This allows the user to concentrate on driving. If the speed is set at zero, the function is deactivated. Suggested speed setting is spraying speed less 20%.

When the Auto ON/OFF is active and the main switch and boom section switches are on, the boom status symbol has a bar across that is blue.

Procedure is:

1. Go to menu [2.2 Auto functions]
2. Press # .
3. Select menu [2.2.1 ON/OFF].
4. Press # .
5. Set the desired minimum speed.
6. Press # .

WARNING! Remember to set the main ON/OFF switch to OFF before leaving the field, otherwise the main ON/OFF will open under transport.

Menu 2.2.2 Foam Marker (optional)

The Controller can be set to operate the HARDI® Foam marker automatically through the main ON/OFF valve. When the main ON/OFF is ON, it will automatically start the Foam marker.

Furthermore, the Foam marker can be set for up and back spraying or race-track (round and round) spraying.

Procedure:

1. Go to menu [2.2 Auto functions].
2. Press # .
3. Select menu [2.2.2 Foam marker]
4. Press # .
5. Select one of the below settings:

Setting	Activity
[Disable]	The marker will only follow the setting of the switch on the SetBox.
[Same side]	The Terminal will automatically activate the same side for race-track spraying.
[Change side]	The Terminal will automatically change side for up and back spraying.

6. Press # .

Menu 2.2.3 Dual line (not used in North America)

This menu is not used in North America.

Menu 2.2.4 HeadlandAssist setup (not used in North America)

This menu is not used in North America.

Menu 2.2.5 TWIN preset shift auto/man (TWIN only)

This menu is to select if TWIN preset shifts automatically at main ON/OFF or manually at key press.

Select the way to use the function in the submenus:

Menu 2.2.5.1 selects whether manual operation is done at the HC 6400 or at the buttons behind the grip.

Menu 2.2.5.2 is for selecting of automatic shift every time the main ON/OFF is pressed.

Menu 2.2.5.3 disables the function.

Menu 2.2.6 AutoAgitation select level (not used in North America)

This menu is not used in North America.

Menu 2.2.7 AutoAgitation fixed level (not used in North America)

This menu is not used in North America.

Menu 2.3 VRA/Remote control

Variable Rate Application (VRA) / Remote / HARDI® AutoSectionControl

If the volume rate is to come from an external source (e.g. a site specific application map or a remote sensor), this menu has to be enabled. This is done by selecting one of the submenus:

Menu 2.3.1 Disable

Menu 2.3.2 Enable

The Œ symbol on the 1st line will be visible. Manual pressure regulation and stepped over/under application is still possible. The external source is connected to the COM 1 or COM 2 via a 9 pin sub D connector.

ATTENTION! The COM port may have to be set up in the extended menu. Contact your HARDI® service center.

ATTENTION! Use of HARDI® AutoSectionControl requires a sprayer equipped with JobCom computer. If in doubt whether your sprayer has a JobCom installed, please contact your local HARDI® dealer.

ATTENTION! AutoSectionControl also uses Variable Rate Application when connected to RS 232 port on the Terminal.

Menu 2.4 Set clock

How to set clock

If the Controller prompts for date and time, [Set clock to enable register]:

This must be done before the Controller is put into operation for the first time, otherwise no start and stop time will be recorded in the registers.

ATTENTION! If no prompt, the dealer may already have done this.

Press # .

Press ª to menu [2 Setup].

Press # .

Press ª to menu [2.4 Set clock].

Press # to enter first submenu, menu [2.4.1 Time format (12 or 24 hour)].

By using ¿ or ª you can choose between:

Menu [2.4.1.1 12 hour format]

Menu [2.4.1.2 24 hour format]

Press # and return to previous menu by pressing ~ .

Press ª to menu [2.4.2 Set time]

Press # and set minutes and hours with ¿ or ª and ¶ or § . Alternatively use the numeric keys.

Press # to confirm.

Press ª to menu [2.4.3 Set date and month]

Press # and set day and month with ¿ or ª and ¶ or § . Alternatively use the numeric keys.

Press # to confirm.

Press ª to menu [2.4.4 Set year]

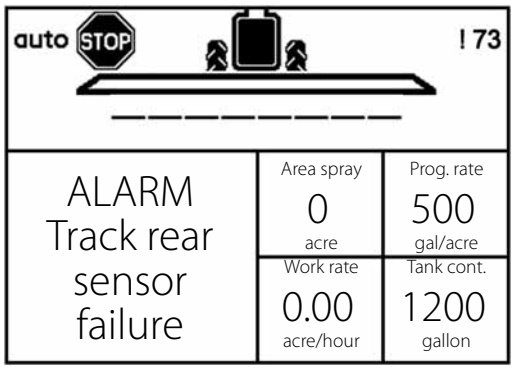
Press # and set year with ¿ or ª and ¶ or § . Alternatively use the numeric keys.

Press # to confirm.

Press ~ and hold to exit menu system.

Menu 2.5 Alarms, Warnings and Info

How to set up alarms



Different alarms can be set up.	**Choices are listed as follows.**
Display text	Notes
[2.5.01 Volume rate]	Suggested setting is 10%
[2.5.02 Tank contents]	Measured in gallons
[2.5.03 Spray pressure]	High/low pressure
[2.5.04 Fan speed]	High/low rpm
[2.5.05 Speed]	Speed max.
[2.5.06 Wind speed]	Wind speed max./min.
[2.5.07 PTO revolutions]	PTO revolutions max./min.
[2.5.08 Air temperature]	Air temperature max./min.
[2.5.09 Relative humidity]	Relative humidity max./min value.
[2.5.10 RPM]	RPM max./min.
[2.5.11 Extra1]	Value (PPU) max/min
[2.5.12 Extra2]	Value (PPU) max/min
[2.5.13 Extra3]	Value (Volt) max/min
[2.5.14 Extra4]	Value (Volt) max/min
[2.5.15 Sections off warning]	Warning when sections are switched off
[2.5.16 Audio level]	Audio steps sound when moving from one step to another.

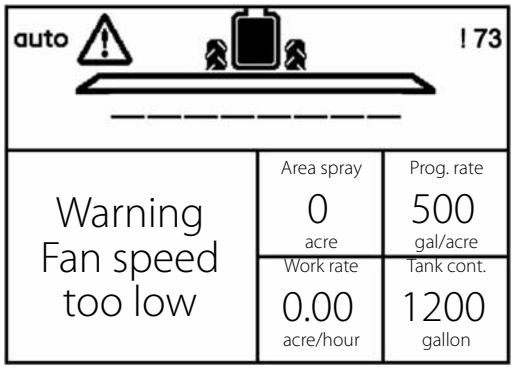
When outside the alarm parameters, the relevant warning will flash in the lower left corner of the screen. The alarm beep can also be adjusted in audio level in menu [2.5.16 Audio level]. Audio level can be selected in steps from 1 to 5. For no alarm, set at 0.

Volume rate alarm for over or under application activates after 20 seconds.

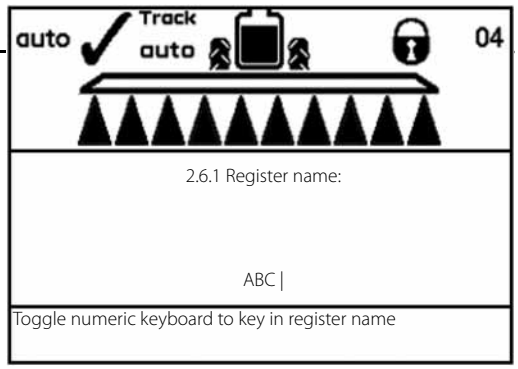
For more details on alarms see “Fault finding”.

Warnings

The warnings appear as shown. For more details on warnings see “Fault finding”.



Menu 2.6 Register names



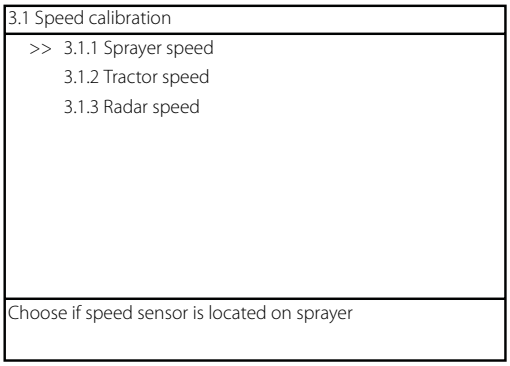
How to name the registers

If desired, the registers can be given names:

1. Go into menu [2.6 Register names]
2. Select the register number that should be named.
3. Use the numeric keys to key in name.
4. Confirm with # .
5. When registers has been named, press ~ to exit to main menu.

Menu 3.1 Speed calibration

Menu 3.1.1 Sprayer



The calibration process is the same for each sensor type. In the following example a “speed sensor on sprayer“ is used.

The menu can be reached in two ways. The shortcut * can be used or you can navigate via the menu structure.

Navigating the menu:

1. From menu [3 Calibration] the menu [3.1 Speed calibration] should be selected with ¿ or ª .
2. Press # .
3. Select one of the following menus corresponding to desired speed sensor:
   [3.1.1 Sprayer] Speed sensor on sprayer
   [3.1.2 Tractor] Speed sensor on tractor
   [3.1.3 Radar] Radar speed sensor
4. Press # to confirm. The last confirmed sensor is the active speed sensor.
5. Choose submenu with ¿ or ª and press # .
6. The rest of calibration procedure is the same as when using the shortcut - see below.

Shortcut procedure:

1. Press * until menu [3.1.1 Sprayer speed] is shown.
2. Choose submenu with ¿ or ª and press # .
3. The rest of calibration procedure is the same as when navigating the menus - see below.

From here you are at the same place in the menu whether you used the menus or used the shortcut.

It is possible to calibrate the speed sensor in different ways. By entering a theoretical speed constant or by doing a practical calibration.

Select calibration method in the two submenus to choose between:

Menu 3.1.1.1 Speed constant

Menu 3.1.1.2 Speed practical

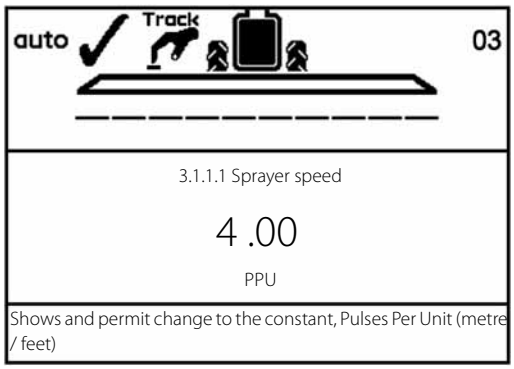
The procedure of each menu is described in the following sections.

The speed transducer can be calibrated theoretically or practically.
The practical method is recommended.

7 - Menu 3 Calibration

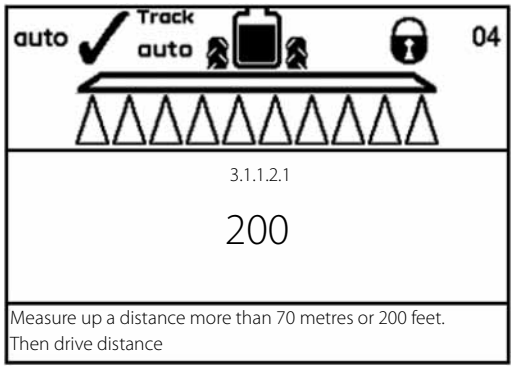
Menu 3.1.1.1 Constant

The theoretical speed constant, pulses per unit (PPU), is the distance in feet on the circumference of the wheel between holes (or protrusions / magnets) that the speed sensor records.



Menu 3.1.1.2.1 Practical

Practical calibration of speed is done by driving a measured distance and correcting the display so that the actual and the calculated distances are the same. Calibration should take place in the field with a half full tank and normal working tire pressure in order to obtain the wheel's real "working radius".



Method:

1. Measure a distance not less than 200 feet.
2. Park the tractor at the start of the measured distance.
3. Press # . When zero distance [0 ft] shows, drive the distance.
4. Press # .
5. Correct the distance shown on the display with the ¿ or ª to read the actual distance. Alternatively key in on the numeric keys.
6. Press # to see the new calculated value.
7. Press # again to accept the value.

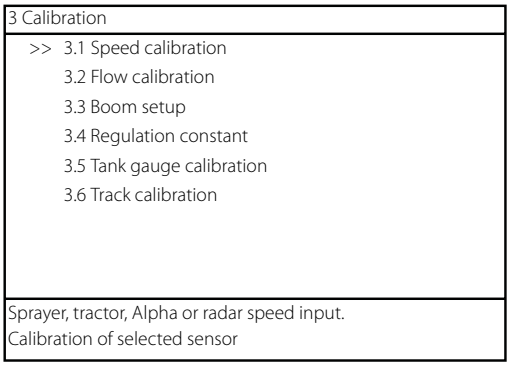
Menu 3.2 Flow calibration

Which method to use

The flow transducer can be calibrated theoretically or with two practical methods. The practical methods are preferred. Calibration is done with clean water. The Flow Tank method is time consuming, but is more accurate than the Flow Nozzle method.

When changing to nozzles with more than a 100% increase or decrease in output, it is recommended to recalibrate the flow transducer.

Calibration is recommended to be done at least once during the spraying season. Use the chart at the back of the book to record the values.

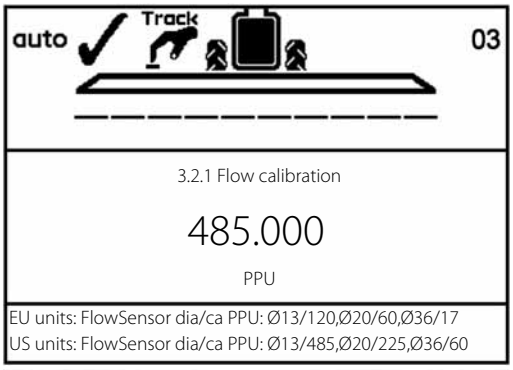


Menu 3.2.1 Flow constant

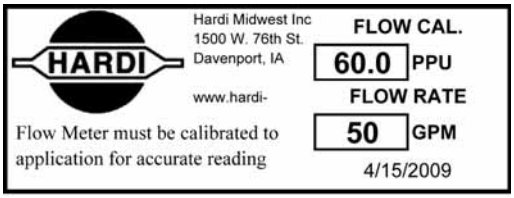
The theoretical flow constant PPU value may be entered here.

The flow housing should have a calibration tag attached that shows a tested PPU value for the flow meter. Use the navigation keys to enter this value before calibration.

If there is no calibration tag attached to the flow housing, the table below lists approximate PPU values for different flow housings. Different flow housings are designated by groove (A).



Housing	Housing identification (A)	Flow range	Orifice	PPU
		g/min	mm	value
S/67	One outside groove	2 - 30	13.5	485.00
S/67	No groove	4 - 70	20.0	225.00
S/67	Two outside grooves	20 - 160	36.0	60.00

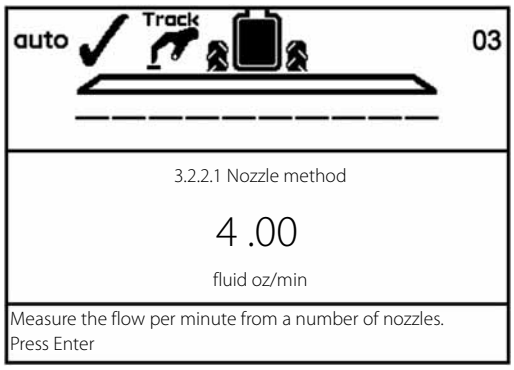


ATTENTION! Using the flow constant PPU from the calibration tag does not guarantee accuracy. Flow calibration should still be carried out using one of the practical methods.

ATTENTION! PPU indicates the number of pulses which theoretically come from the flow transducer while 1 gallon of liquid passes through.

Menu 3.2.2 Nozzle method

During practical flow calibration the individual nozzle output on the display is compared to the actual individual nozzle output. The output displayed is corrected to read the actual output.



ATTENTION! See menu [3.3 Boom] if no boom data has yet been entered.

Method:

1. Open all boom sections. Switch the main ON/OFF to ON. Close End nozzles (if fitted).
2. Go to menu [3.2.2 Nozzle method].
3. Press # . The display will then show the individual nozzle output per minute.

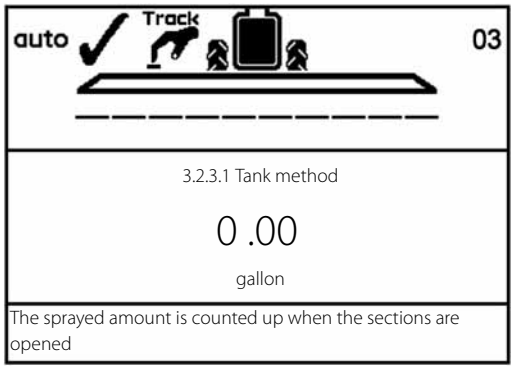
ATTENTION! If a section has not been opened or an End nozzle is not closed, a warning will show up in the largest window on the display.

4. Using a HARDI® calibration jug, check the actual nozzle output per minute. It is recommended that an average of several nozzles be taken.
5. Press # .
6. Correct the output shown on the display with the ¿ or ª keys or use the numeric keys to read the average output measured with the calibration jug.
7. Press # to see the new value.
8. Press # again to accept the value.

Menu 3.2.3 Tank method

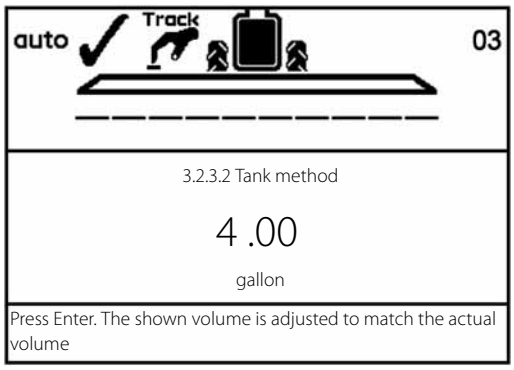
During practical flow calibration, the tank is partly emptied through the nozzles. While emptying, the display calculates the quantity emptied on the basis of the actual calibration value (PPU). The quantity displayed is compared with the quantity actually dosed.

This can be done using the tank contents level indicator or by 3.2.3.1 Tank method weight difference before and after. The quantity displayed is corrected to read the quantity actually dosed.

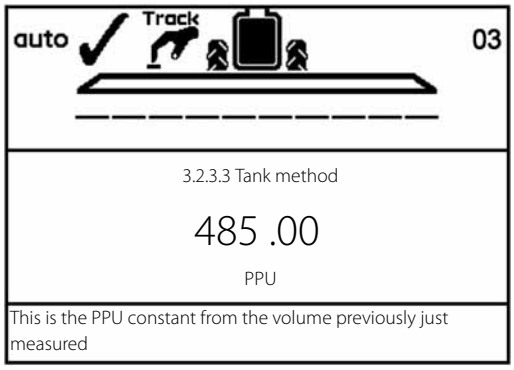


Method:

1. Place the tank on level ground and fill it up with water until the level reaches a unique mark on the tank contents level indicator, e.g. 500 gallons.
2. Open all boom sections.
3. Go to menu [3.2.3 Tank method], press # and switch the main ON/OFF to ON.
4. The display unit will then begin to count the volume being emptied through the nozzles.
5. When, for example, 300 gallons have been emptied out as shown by the tank contents level indicator, switch the main ON/OFF to OFF.



6. Press # .
7. Correct the volume shown in menu 3.2.3.2 on the display with the ¿ or ª keys or the numeric keys to read the volume shown on the tank contents level indicator.
8. Press # to see the new value.
9. Press # again to accept the new value.



7 - Menu 3 Calibration

Menu 3.3 Boom

Menu 3.3.1 Width

Use the ¿ or ª keys or numeric keys to enter boom width.

Press # to confirm.

Menu 3.3.2 Number of sections

Use the ¿ or ª keys or numeric keys to set number of boom sections.

Press # to confirm.

Menu 3.3.3 Nozzles/section

Use ¿ or ª keys or numeric keys to set correct number of nozzles per section.

Press # to continue to next boom section.

Press # after the last section.

Menu 3.3.4 End nozzles and Bi-jet (optional)

If end nozzles or Bijet are fitted, it should be set up corresponding to the number of boom nozzles it covers.

1. In menu [3.3 Boom setup] go to the menu [3.3.4 End nozzles and Bi-jet].
2. Press # .
3. Select submenu corresponding to the type of end nozzle:
   Menu 3.3.4.1 None
   Menu 3.3.4.2 End nozzles fitted
   Menu 3.3.4.3 Bi-jet fitted
4. Press # .
5. In the sub menus [3.3.4.2] and [3.3.4.3] set the value to the equivalent coverage by the boom nozzles. E.g. end nozzle coverage is 5 feet. This is equal to 3 boom nozzles.

ATTENTION! It is important that the volume applied from the end nozzle matches the volume applied under the boom. This is a comparison of volume per minute per length. (Gallon/min/foot).

When the end nozzle is active, the area covered and volume sprayed is calculated and registered. If “Active boom size” is displayed, it will show an increase when the end nozzle is activated.

Menu 3.4 Regulation constant

Regulation constant

The sensitivity of the pressure regulation valve can be adjusted. The goal is to find a value where the regulation does not overshoot the set point, but slows down and stops right before the set point.

Increasing the regulation constant will give a faster response on the pressure regulation valve. If the constant is too high, the valve will become unstable. There will also be excessive wear on the valve.

The range is in percent and is typically set between 30% to 50%. Begin with regulation constant set at 50%.

Monitor the regulation valve, does it overshoot? Then adjust until the valve slows down and stops right before the set point:

If it overshoots, then reduce the regulation constant in steps of 5%.

If it does not overshoot and the valve stops far away from the set point, then increase constant in steps of 5%.

ATTENTION! For sprayers with regulation feedback the value can be reduced to 30 %.

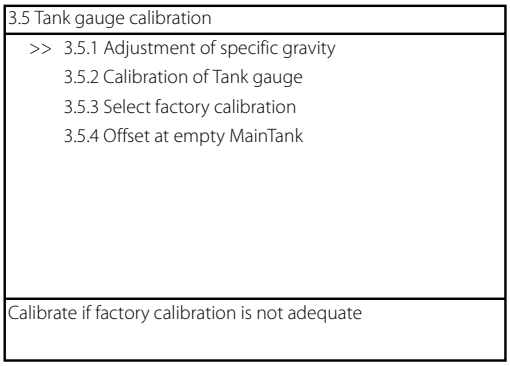
7 - Menu 3 Calibration

Menu 3.5 Tank gauge

General info

This menu item is only present if the HARDI® Tank Gauge is fitted. For increased accuracy it is recommended to do the flow calibration [3.2] before proceeding.

Present accuracy is up to +/- 13 gallons. This is at the widest liquid surface area in the tank. The smaller the liquid surface area, the more accurate the readout.



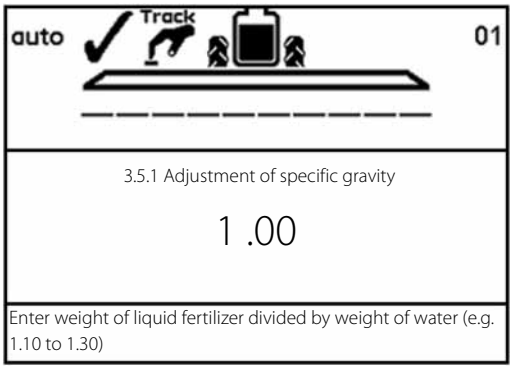
Menu 3.5.1 Adjustment of specific gravity

The correction factor for the specific gravity of the liquid sprayed can be set.

Default value is 1.000.

Corrected value is weight of solution divided by weight of water.

Liquid fertilizers may range up to 1.3 times heavier than water. The value in this case would be 1.300.



Method:

1. Press # to change value.
2. Use ¶ and § to move cursor to the figure to be changed.
3. Change figure by pressing ¿ and ª . Alternatively key in on the numeric keys.
4. Confirm setting by pressing # .

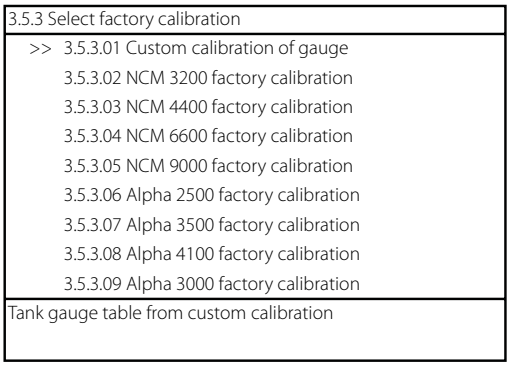
Menu 3.5.2 Custom calibration of Tank gauge

Calibration of the HARDI® Tank Gauge is necessary if the factory calibration proves inaccurate. This can be due to different placed hitch point on the tractor or different tire mounting resulting in an inaccurate calculation of the tank contents.

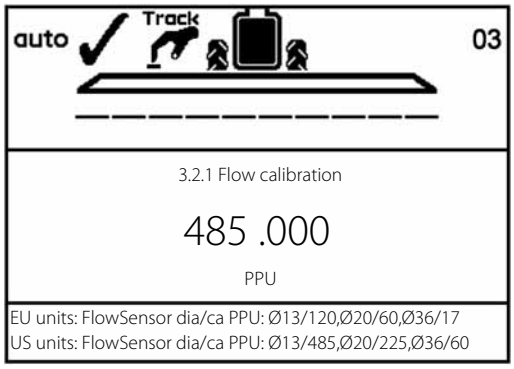
Therefore, it is recommended to begin the custom calibration by connecting the sprayer to the tractor that will be used for spraying. Later changes of tractor can affect the accuracy of the Tank gauge.

To make a custom calibration of TankGauge, do the following:

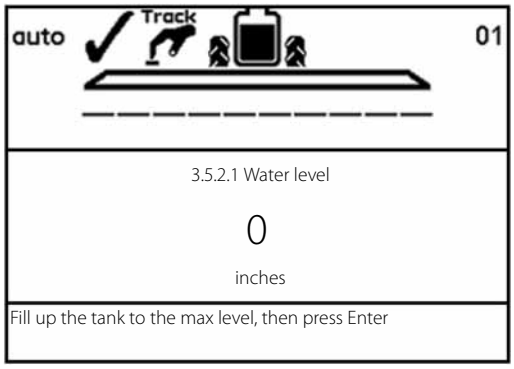
1. First enter menu [3.5.3 Select factory calibration]. Then select the submenu [3.5.3.01 Custom calibration of gauge].



2. Check that menu [3.2.1 Flow calibration] uses the correct PPU value corresponding to the sprayer's flow housing.



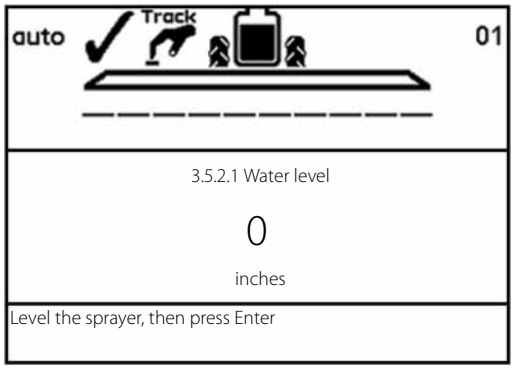
3. Go to menu [3.5.2.1 Water level].
4. Fill the sprayer completely up to the filler lid in the top of the tank, with a known amount of water, using an external calibrated flowmeter. Alternatively weight the sprayer before and after filling, and note the weight difference.
5. Press # .



ATTENTION! As the accuracy of the custom calibration is affected, it is of high importance that the external calibrated flowmeter measures the correct quantity within a 2 % deviation. Same accuracy of 2 % must be kept if weight difference of the sprayer before/after filling is used.

WARNING! Do not leave the sprayer while filling the tank and keep an eye on the level indicator in order NOT to overfill the tank.

6. Press # after ensuring the sprayer is level. Refill the tank up to the tank lid if the sprayer is re-levelled.

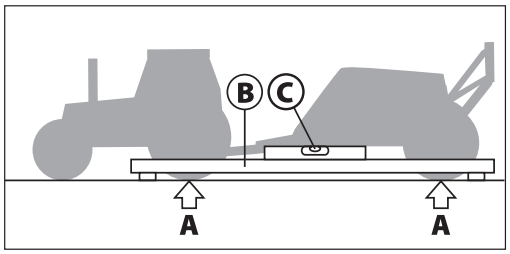


7 - Menu 3 Calibration

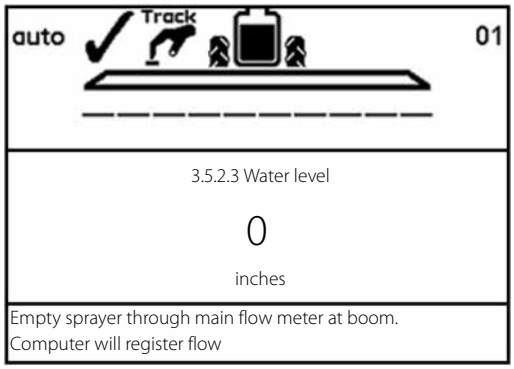
Levelling the procession of sprayer is of great importance as the accuracy is directly affected!

Assuming that the same tractor will be used after custom calibration, it is not necessary for the sprayer to be level itself. But the whole procession of tractor and sprayer (A) needs to be level.

Use e.g. a beam (B) of approximately 20 ft. length, placed on two wooden blocks at the location where the calibration will take place. Place a level (C) on the beam (B) to find the level point of the calibration location.

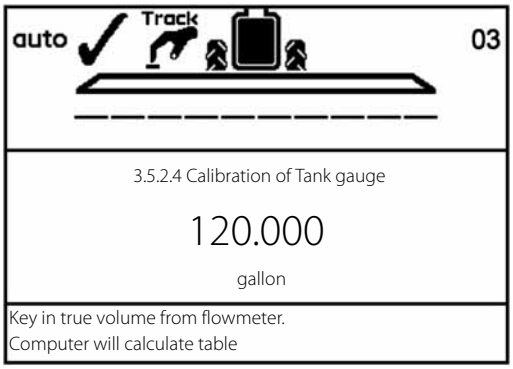


7. Engage the pump and set P.T.O. revolutions at 540 rpm or 1000 rpm (depending on pump model).
8. Open all boom sections and empty the tank. The pulses from the flow transducer are logged as data points. During this session the screen shows: [xxxx] as the actual water level in inches and [yyyyyyy] is the number of pulses from the flow meter.



ATTENTION! The definition of having an empty tank, is when no spray comes out of the nozzles anymore. Note that when empty, there will still remain about 3 gallons in the sump of the tank.

9. Press # when the tank is empty.
10. Correct the displayed volume with the ¿ or ª or with numeric keys to the actual volume sprayed out.
11. Press # . The new custom gauge table is calculated and the calibration of the HARDI® Tank Gauge is finished.



Menu 3.5.3 Select factory calibration

This menu may have been set up by your HARDI® service center. Selection can only be done with no water in the tank. See “Menu 3.5.4 Offset at empty MainTank” to check if empty.

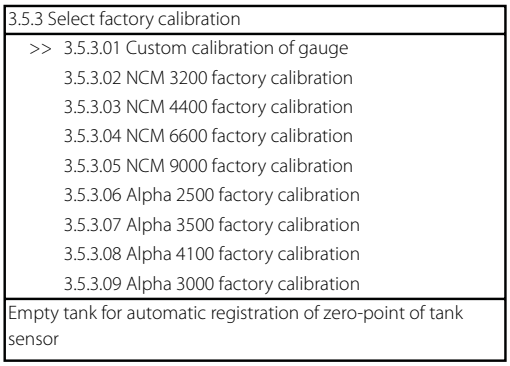
The prerequisites for accuracy of the level, when selecting the factory calibration is:

Level sprayer; When mounted to the tractor, the sprayer should be level. Check if level by placing a level on the frame of the COMMANDER sprayer as follows:

COMMANDER 4400: Underside of the frame.

COMMANDER 6600: Upperside of the frame (Important as frame is not parallel).

Height of hitch point when mounted to tractor; The height of hitch point measured from the ground should be 21.7” (550 mm). Measured tank contents changes with the height of the sprayer at the hitch point. In the following chart, an example of the difference in tank contents can be seen.



ATTENTION! If one of the prerequisites is not fulfilled, then refer to “Menu 3.5.2 Custom calibration of Tank gauge” to make a custom calibration of the tank gauge.

Height at hitch eye	COMMANDER 4400	COMMANDER 6600
Actual content*	1030 gal. (3900 liter)	1585 gal. (6000 liter)
17.7” (450 mm)	1057 gal. (4000 liter)	1611 gal. (6100 liter)
19.7” (500 mm)	1043 gal. (3950 liter)	1598 gal. (6050 liter)
21.7” (550 mm)**	1030 gal. (3900 liter)***	1585 gal. (6000 liter)***
23.6” (600 mm)	1017 gal. (3850 liter)	1572 gal. (5950 liter)
25.6” (650 mm)	1004 gal. (3800 liter)	1559 gal. (900 liter)

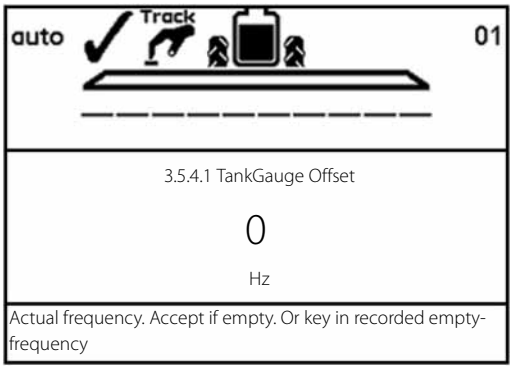
*known amount of water measured with a calibrated flowmeter.

**specified height.

***Displayed contents at correct hitch height.

Menu 3.5.4 Offset at empty MainTank

In menu [3.5.4.1 TankGauge Offset] read out the frequency (Hz) at empty tank. If the tank is completely empty, then press # to accept the frequency. In case the main tank is not empty, this menu can only be used to 3.5.4.1 TankGauge Offset correct the empty-frequency if it is known to the user.



7 - Menu 3 Calibration

Menu 3.6 Track

General info

There is no standard setting for the Track set up. The Track needs to be adjusted for different kinds of tractors since the sprayer and spraying practices can only be found under the actual conditions.

For example; for spraying done at high speed(12 to 16 mph (20 to 25 km/h)), the Track must be set up so it reacts slowly and the dead zone could be set higher than the standard setting.

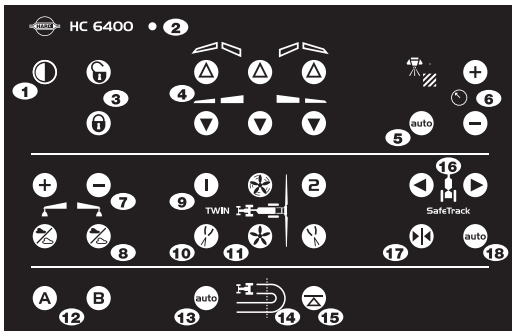
Another example; spraying with relatively low speed (4 to 6 mph (7 to10 km/h)) in a crop where the precision must be high, the dead zone can be reduced for more precision.

For each adjustment, descriptions are given of what happens if the setting is changed and what effect will it have on the sprayer.

SafeTrack

The SafeTrack is operated at the hydraulic SetBox. Track selection switches have 3 positions

1. When pressing the align button (17), sprayer will align to be in position for folding the boom.
2. When pressing “auto” (18), the system is in auto and the sprayer will follow the track from the tractor.
3. When one of the two arrow buttons (16) is pressed, the system is in manual. Using the two arrows (16) left and right , will steer the sprayer left and right. If unsafe driving occurs, an alarm will be triggered and the sprayer will align. Press # to turn alarm off. Switching to “manual” (16) or pressing “align” (17) will also turn alarm off. Be aware that the alarm can not be turned off as long as unsafe driving still occurs!



Menu 3.6.1 Track width

Here the track width can be entered. The track is measured from right side tire center to left side tire center of the sprayer wheels. It is important that the right track width is entered. The controller will calculate the speed to the center of machine and not the speed of the wheel.

If the track width is incorrect, it will influence track precision and the safety factor.

Factory setting: 71”

Menu 3.6.2 Tractor drawbar

Here the length of the tractor drawbar is entered. The measurement is from the center of the tractor rear axle to the center of the drawbar pin. This has to be adjusted every time a new tractor is hooked on to the sprayer. When hooked up, check the rigidity of the tractor drawbar mounts. There must be no sideways movement.

Factory setting: 31”

Measurement too short: The Track reacts faster, but will make the sprayer steer too large a curve.

Measurement too long: The Track reacts slower, but will make the sprayer steer too short a curve.

Menu 3.6.3 Dead zone

This is the non regulation zone when the sprayer is straight behind the tractor. If the sprayer is oscillating in the hydraulics when driving straight, this value must be increased.

Factory setting: 2" (5 cm); Over 6" (15 cm) not recommended.

Decreasing value:	Reacting on small deviations. Tendency to oscillate that will damage the boom. High precision, but more unstable driving with small corrections all the time.
Increasing value:	No oscillation but tendency to sway. Low precision, but very steady driving with less corrections.

Menu 3.6.4 Damping

If the system is too aggressive, the damping constant must be increased. Failure to do so may damage the boom.

Factory setting: 50%

No damping (0%):	High precision, but very unsteady. Fast reaction time, but more aggressive movement that potentially can damage the boom.
Full damping (100%):	Low precision, but very steady. Slow reaction time, but less aggressive.

Menu 3.6.5 Alignment offset

Here the fine tuning of tractor and sprayer alignment is done. This is to compensate if the front potentiometer is placed offset to the centerline when the sprayer is attached.

Note +/- can be changed with ¿ and ª

Factory setting: 0 %

Negative setting will move the sprayer to the left of the track, and positive setting will move the sprayer to the right of the track. The sprayer must follow the tractor in a straight line in all situations. If the value is over 4" (10 cm), it is recommended to manually adjust position of the front angle sensor.

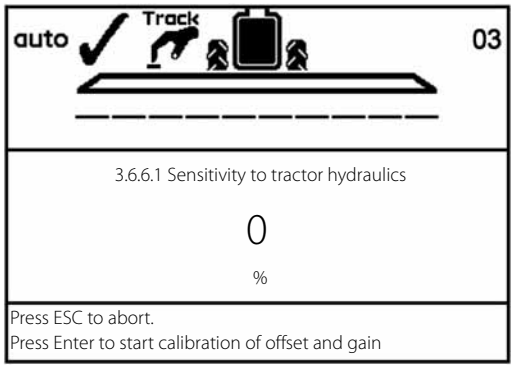
Menu 3.6.6 Sensitivity

The purpose of this menu, is to adapt the track regulation to the tractor hydraulics and to the characteristics of the sprayer hydraulics system.

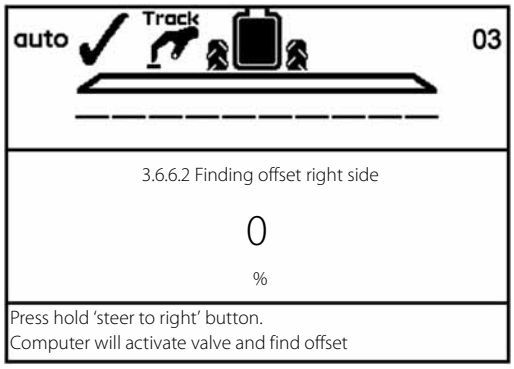
Calibration procedure is divided into 4 steps where an offset and gain value is found to both left and right movement, 4 values in all.

Method:

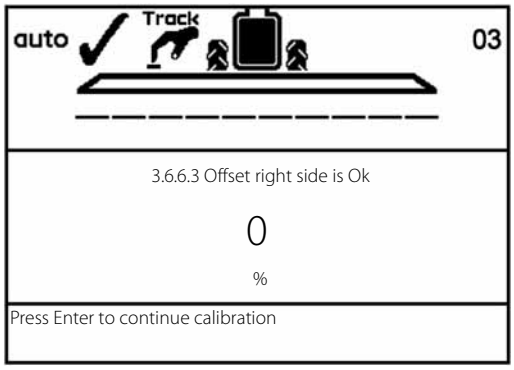
1. Unfold boom and, without driving, set P.T.O. to spraying R.P.M.%
2. Align sprayer and press ® to enable "auto" at the controller. Press ESC to abort. Press Enter to start calibration of offset and First left/right offset is found: gain
3. Go to menu [3.6.6 Sensitivity] and select "Yes" with ¿ or ª and press # . Press # again and calibration starts.



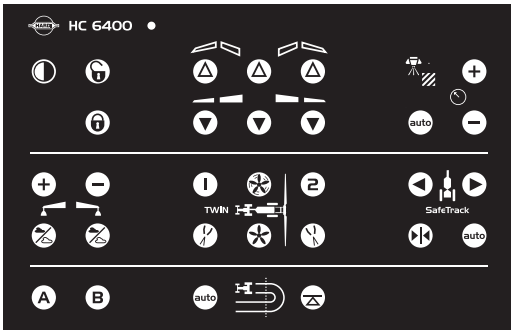
4. Press and hold the manual “steer to right” button. Display will show a counting percentage ending with an “OK” message when offset is found.



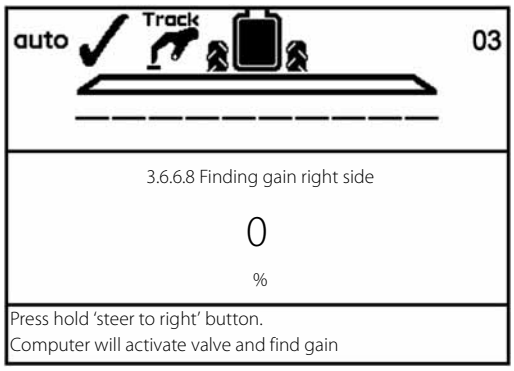
5. Afterwards same procedure is repeated for opposite direction.



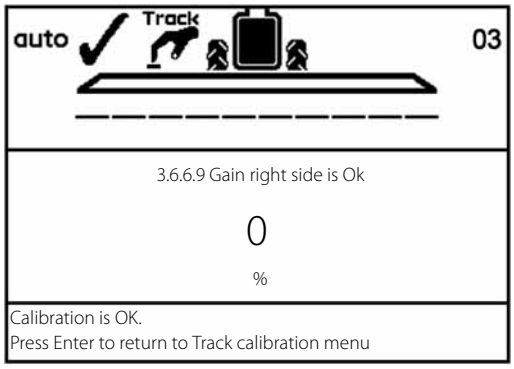
Then calibration automatically continues with gain calibration:



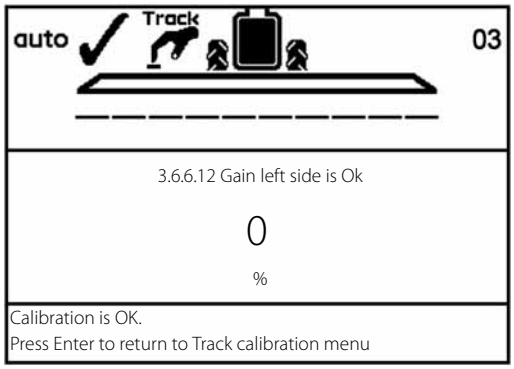
6. Press and hold the manual “steer to right” button. Display will show a counting percentage ending with an “OK” message when gain is found.



7. Afterwards, same procedure is repeated for opposite direction.



8. The display reads “CALIBRATION OK” when calibration has finished. Confirm and leave menu by pressing # .



Emergency Track

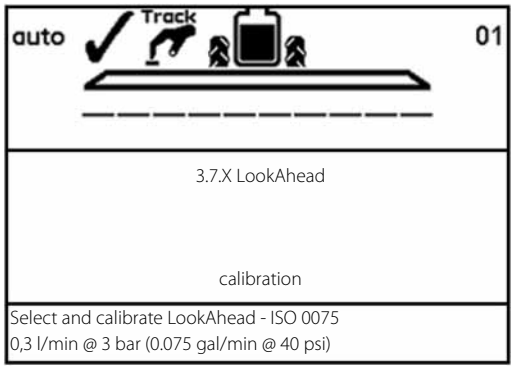
If a problem with the Track should occur, please see “Menu 4.7 Emergency Track”.

7 - Menu 3 Calibration

Menu 3.7 LookAhead

Menu 3.7.X LookAhead calibration

At start-up of the HC 6500, the user is prompted for a nozzle choice. If the selected nozzle holds no LookAhead calibration in the HC 6500 memory, it will need to be calibrated.



Press ® to enable "auto" mode prior to calibration. Calibration method:

1. Select menu 3.7 and press # .
2. Select the nozzle to be calibrated and press # .
3. Enter an application rate in the display.
4. Confirm by pressing # .
   Two spraying speeds for calibration are now calculated in the HC 6500. Set P.T.O. revolutions to fit the calculated spraying speed.
5. Start spraying at the calculated speed.
6. While spraying at calculated speed, a digit in the 3rd line of the display "Counter to 9" is counting up to 9. If calibration value is found, "ok" is shown in the display. If a value is not found, the digit starts re-counting up to 9 until a value is found.
7. Another calculated speed is now shown in the display. Repeat steps 5 and 6 again for this 2nd calculated speed. It is preferred to maintain the same P.T.O. revolutions at second driving speed.
8. The digit in the display counts up as told in step 6. But when a value is found this time, "done" is shown in the display since calibration is now finished.

If custom nozzle LookAhead calibration is selected, the flow at 40 psi must first be defined.

1. Enter value.
2. Confirm by pressing # .
3. Do all the above calibration routine as usual.

ATTENTION! To calibrate, the speed must exceed the minimum speed set in the controller memory. If minimum driving speed is set too high, please contact your local HARDI® dealer.

ATTENTION! If all section valves are turned off, then LookAhead is in standby. When turning single sections off, e.g. in wedge shaped fields, then the last valve must be turned off by using the main on/off.

ATTENTION! During the entire calibration process, the fluid system should be in "Auto" mode. If not, press ® to enable it.

ATTENTION! When using very large nozzles, it could be necessary to reduce speed until application rate is stable.

ATTENTION! If controller suggests a speed lower than min. regulation speed, then choose a higher application rate.

Menu 4.1 Measure

Trip meter

This is a simple electronic trip meter. You can measure distance. If the implement width is entered in menu [4.1.3 Working width], area can also be measured in menu [4.1.2 Area].

Use | to clear the value.

Following submenus are possible:

[4.1.1 Distance]	Measures a distance being travelled.
[4.1.2 Area]	Measures the area the boom covers at a travelled distance.
[4.1.3 Working width]	Menu for entering the boom working width to be measured.
[4.1.4 Stop watch]	Measures the time being used.
[4.1.5 Alarm clock]	Can give an alarm at a preset time.

Menu 4.2 Service intervals

Menu and intervals

Service intervals and a nozzle check are programmed into the Controller. This makes it easier for the operator to remember the service intervals.

From the factory, the Controller is set up with a nozzle check and three service reminders.

Menu & interval	Hours	Action
[4.2.1 Check filters]	10	See sprayer instruction book, Maintenance.
[4.2.2 Grease boom]	50	See sprayer instruction book, Maintenance.
[4.2.3 Grease track and center]	250	See sprayer instruction book, Maintenance.
[4.2.4 Miscellaneous service]	-	Not defined from factory.
[4.2.5 Check nozzles]	50	Check flow rate. Change nozzles if more than 10% of rated flow.

Entering the above menus will display the hours remaining until next service. The importer or dealer may have added Interval D. If no interval is set, [D Not defined] is shown.

Press # to register service or control, if displayed when switched on. The warning ¢ will remain present until the service interval is reset.

Menu 4.3 Service interval reset

Service interval reset

To reset service interval, go to relevant interval menu listed:

[4.2.1 Check filters reset]	10	See sprayer instruction book, Maintenance.
[4.2.2 Grease boom reset]	50	See sprayer instruction book, Maintenance.
[4.2.3 Grease track and center reset]	250	See sprayer instruction book, Maintenance.
[4.2.4 Miscellaneous service reset]	-	Not defined from factory.
[4.2.5 Check nozzles reset]	50	Check flow rate. Change nozzles if more than 10% of rated flow.

Press | to reset hour meter.

Press # to confirm.

Menu 4.4 Reserved

Reserved function - This menu is not used

Menu 4.5 Test

How to test

All readouts for the transducers are in accumulated counts, i.e. one signal gives one count, except for the optional (analog) transducer that is read in milli-ampere.

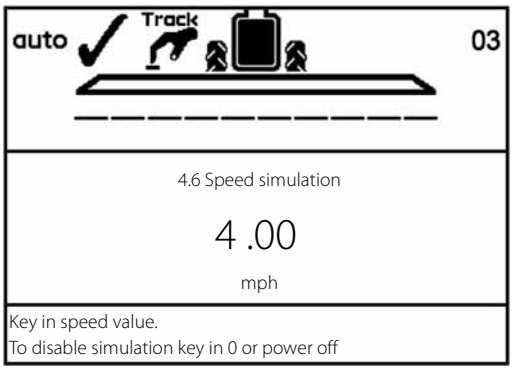
1. Go to menu [4.5 Test].
2. Choose the item to be tested and open the menu.
3. Activate sensor and see if the signal is detected.

[4.5.1 Flow Speed Optional sensors]	Activate function to monitor sensor (e.g. drive forwards, start flow).
[4.5.2 Active keys]	Push key to see if a count is registered. If yes, the key or switch function is OK.
[4.5.3 PrimeFlow test]	Not used in North America.
[4.5.4 Input test]	See computer readings of sensors. Frequency, switch, analog inputs.
[4.5.5 Valve test]	Self test.
[4.5.6 Reset PrimeFlow counters]	Not used in North America.

Menu 4.6 Speed simulation

How to use speed simulation

Speed may be simulated for certain purposes. A two figure value may be entered. The state remains valid until the Controller is restarted or the value is set to “0”.



Menu 4.7 Emergency Track

Menu 4.7 Emergency Track

When this menu is entered, the “bypass” function is active, so that all sensors are ignored. The system can be operated manually so it is possible to fold the boom and drive home. In the menu, the sensor status and voltages can be checked, which is useful for HARDI® service to solve the problem.

4.7 Emergency Track	
>> Front sensor	2.38 Volt
Front sensor	1.9 Degree
Rear sensor	Volt
Rear sensor	Degree
Boom sensor 1	5.00 Volt
Boom sensor 2	Folded
Lock sensor	0.80 Volt
Lock sensor	Locked

Emergency only.
Align sprayer and fold boom in case a sensor is defect.

Status for following sensors are shown in the menu:

Front sensor

Rear sensor

Lock sensor

Boom sensor

Lock sensor:

If the lock sensor indicates “released” (high voltage) and the track selection switch is in either “auto” or “manual”, it is possible to use the “Left/Right steer” and “Fold inner in” switches, regardless of any other inputs the Controller receives from sensors.

If the lock sensor indicates “locked” (low voltage) and the track selection switch is in either “auto” or “manual”, it is possible to use “Fold inner in” switch regardless of any other inputs the Controller receives from sensors. Manual or automatic tracking is not possible.

If the track selection switch is switched to “align”, the trapeze lock will attempt to lock regardless of any sensor reading. No automatic align is attempted. Manual or automatic tracking is not possible.

Once the boom is folded into transport position, exit the menu. This will activate the track lock if it is not damaged. As extra security, switch power for HC 6500 to OFF and stop oil flow to the sprayer.

⚠ DANGER! Emergency only. Don’t track with the boom folded! Safety system is disabled.

Menu 4.8 Computer CAN status

Menu 4.8.X Computer CAN status

In this menu you can see if there is communication between the units, Controller, Jobcom and Track. See part “Emergency operation”.

Following submenus are available:

[4.8.1 Operating status all computer]	Show operating status details in case of faults.	
[4.8.2 Software versions all computer]	Show software versions details in case of faults.	
[4.8.3 Hardware versions all computer]	Show hardware versions details in case of faults.	
[4.8.4 Work status Terminal HC 6500]	Show faults occurred since power-up.	Press | key to reset counters.
[4.8.5 Work status JobCom HC 6100]	Show faults occurred since power-up.	Press | key to reset counters.
[4.8.6 Work status Grip HC 6300]	Show faults occurred since power-up.	Press | key to reset counters.
[4.8.7 Work status SetBox HC 6400]	Show faults occurred since power-up.	Press | key to reset counters.
[4.8.8 Work status FluidBox HC 6200]	Not used in North America.	Press | key to reset counters.

Menu 5.1 Print

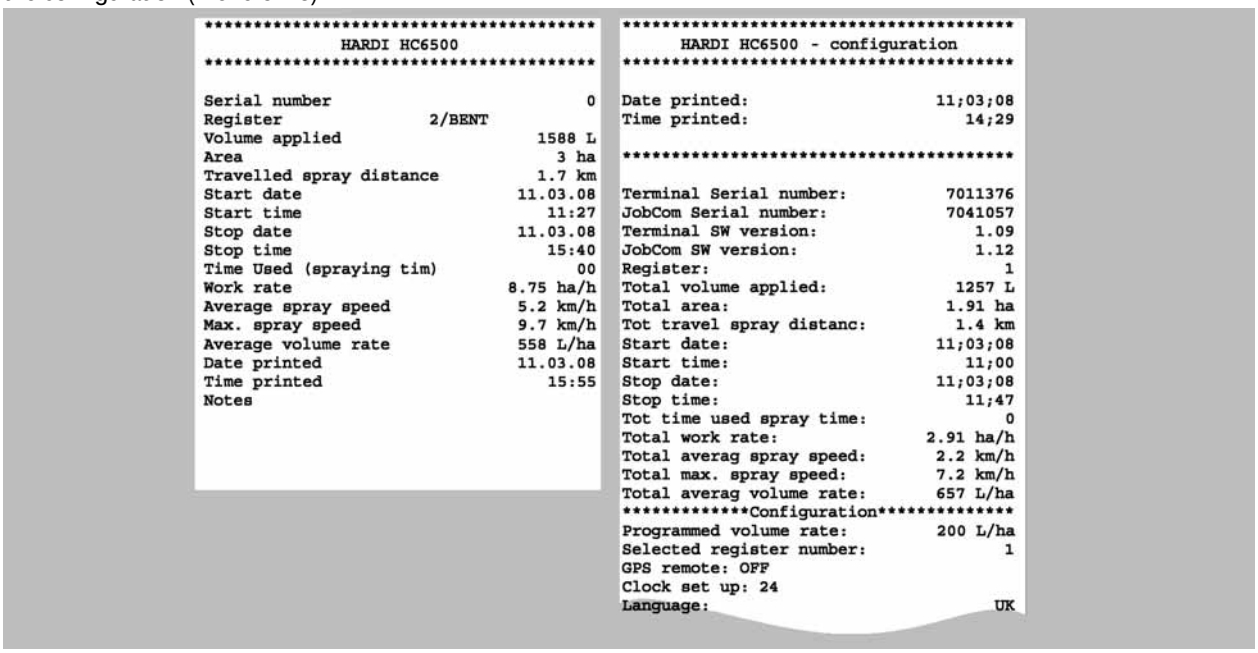
What you can print

This menu has to do with printing of data.

The following can be printed via the 12 volt printer.

[5.1.1 Register number] A specific register
[5.1.2 All registers] Register 1 to 99. Only active ones will be printed.
[5.1.3 Configuration] This records all the parameters of the Controller.

Two examples of printouts are shown. To the left is a printout of a specific register (menu 5.1.1). To the right is a printout of the configuration (menu 5.1.3).



```
****************************************
            HARDI HC6500
****************************************

Serial number                         0
Register              2/BENT
Volume applied                   1588 L
Area                                3 ha
Travelled spray distance          1.7 km
Start date                     11.03.08
Start time                        11:27
Stop date                      11.03.08
Stop time                         15:40
Time Used (spraying tim)             00
Work rate                    8.75 ha/h
Average spray speed           5.2 km/h
Max. spray speed              9.7 km/h
Average volume rate           558 L/ha
Date printed                   11.03.08
Time printed                      15:55
Notes
```

```
****************************************
      HARDI HC6500 - configuration
****************************************

Date printed:                  11;03;08
Time printed:                     14;29

****************************************

Terminal Serial number:         7011376
JobCom Serial number:           7041057
Terminal SW version:               1.09
JobCom SW version:                 1.12
Register:                             1
Total volume applied:           1257 L
Total area:                     1.91 ha
Tot travel spray distanc:        1.4 km
Start date:                    11;03;08
Start time:                       11;00
Stop date:                     11;03;08
Stop time:                        11;47
Tot time used spray time:             0
Total work rate:             2.91 ha/h
Total averag spray speed:     2.2 km/h
Total max. spray speed:       7.2 km/h
Total averag volume rate:     657 L/ha
*************Configuration**************
Programmed volume rate:       200 L/ha
Selected register number:             1
GPS remote: OFF
Clock set up: 24
Language:                            UK
```

9 - Menu 5 Logbook

Menu 5.2 Data dump

How to dump data

Enables data dump to an office printer. This could be done, for example, by using the Hyper Terminal function in Microsoft Windows. Note the Hyper Terminal has to be activated and a communication cable (ref. no. 72271600) and 12 volt power supply to the Controller and Spray Box is needed.

The Hyper Terminal baud rate should be set at one of the following before transmitting data:

19200 baud

9600 baud (HC 6500 default)

4800 baud

2400 baud

1200 baud

If only the display unit is to be removed from the tractor, a 12 Volt power supply cable (ref. no. 72244500) is necessary.

The following can be printed to an office printer.

[5.2.1 Data dump of raw data]
[5.2.2 Hyperterminal service report] Permits data to be set up with a column header.

Soft keys

Soft keys menu tree

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
F1 Not used in NA*	F1 Not used	F1 Not used	9 Not used
		F2 Not used	
	F2 Not used	F1 Not used	15 Not used
		F2 Not used	
	F3 Not used	F1 Not used	39 Not used
		F2 Not used	
F2 Not used in NA*	F1 Not used	Not used	
	F2 Not used		
F3 EndNozzles	F1 Left ON	Work screen	
	F2 Left OFF		
	F3 Right ON	Work screen	
	F4 Right OFF		
F4 Not used in NA*	F1 Not used		
	F2 Not used		
	F3 Not used		
	F4 Not used		

* Function not used in North America

ATTENTION! See paragraph “Auto function” in the chapter Description.

Off-season storage

Storage

When the tractor and sprayer are parked, disconnect the power supply to the SetBox. This will stop the system from using power.

The Controller, SetBox and Grip should be protected from moisture and should be removed if the tractor does not have a cabin.

Emergency operation

In an emergency situation

If an error occurs in the system, choose Computer CAN status. This test will show if there is communication between the units. The menu will be as shown.

4.8 Computer CAN status
>> 4.8.1 Operating status all computer 4.8.2 Software versions all computer 4.8.3 Hardware versions all computer 4.8.4 Work status Terminal HC6500 4.8.5 Work status JobCom HC6050 4.8.6 Work status Grip HC6300 4.8.7 Work status SetBox HC6400
Computer detail screens show details in case of faults

12 - Fault finding

Operational problems

Fault finding - HC 6500

Under these menus you can check if the communication is ok. The units can also be checked by looking at the LED on the units. It will light up when the units are turned on. If there is an error, a signal will show in a morse code if the CAN connection is damaged to that specific unit.

Each computer unit has an LED, which indicates condition and status of this computer. This is used when trouble shooting in field and CAN communication works. This is used both by technicians and skilled operators.

Following is a full table of Alarms, Warnings etc. that will or can be shown on Terminal display.

Note that ID is the fault identifier, and Pr is alert priority. These are useful for service staff.

ID	Pr	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text
01	1	Alarm	Sensor 12V supply failure	While the short circuit is present. SafeTrack shifted to manual. Auto is disabled.	Sensor 12V supply failure
02	2	Alarm	Sensor 5V supply failure	While the short circuit is present. SafeTrack shifted to manual. Auto is disabled.	Sensor 5V supply failure
03	3	Alarm	Track Lock sensor failure	Sensor signal is less than 0.5V. All SafeTrack keys are disabled. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.	Track Lock sensor failure. All SafeTrack keys are disabled. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.
04	4	Alarm	Trapeze lock locked illegally	Lock is detected locked unintentionally. All SafeTrack keys are disabled. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.	Lock is detected released unintentionally. Missing hydraulic pressure on lock cylinder. Misadjusted lock sensor. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.
05	5	Alarm	Trapeze lock not locking	Attempt to lock, but no "lock" signal on sensor input. All SafeTrack keys are disabled. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.	Attempt to lock, but no "lock" signal on sensor input. Lock sensor mis adjusted. Mechanical defect prevents lock to penetrate hole. Mis adjusted rear angle sensor. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.
06	6	Alarm	Trapeze lock released illegally	Lock is detected released unintentionally. All SafeTrack keys are disabled. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.	Lock is detected released unintentionally. Poor lock sensor adjustment. Lock cylinder fallen off. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.
07	7	Alarm	Trapeze lock not released	When pressing auto to release lock but no "release" signal from lock sensor. Auto and manual are disabled.	Trapeze lock not released. Attempt to release lock, but no "release" signal from lock sensor. No hydraulic pressure. Misadjusted lock sensor. Mechanical defect.
08	8	Alarm	Track Boom sensor failure	The boom sensor signal is less than 0.5V. The boom sensor changes state, without "Boom fold inner" button is active. Auto and Manual is disabled. Only "Align" function is possible	Track Boom sensor failure. Automatic and manual tracking is aborted. Only "Align" function is possible.
09	9	Alarm	Track Front sensor failure	The alarm is generated, if the sensor signal is less than 0.2V or exceeds 4.8V. Automatic tracking is aborted until the system has been rebooted. SafeTrack shifted to manual. Auto is disabled.	Track front sensor failing. Automatic tracking is aborted. Manual tracking and "Align" function is possible. Pressing "Enter will remove the alarm from the display until the system has been rebooted.

ID	Pr	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text
10	10	Alarm	Track Rear sensor failure	The alarm is generated, if the sensor signal is less than 0.5V or exceeds 4.5V. SafeTrack shifted to manual. Auto and Align is disabled.	Track Rear sensor failure. Automatic tracking is aborted until the system has been rebooted. If "Align" mode is selected no movement takes place, but trapeze is attempted locked. Manual tracking still possible.
11	11	Alarm	Agitation valve fault	Error detection on. AutoAgitation valve in self test and during spray work.	Agitation valve fault. Motor disconnected. Motor short circuit or blocked. Sensor failing.
12	12	Alarm	Fill valve fault	Error detection on Fill valve in self test. On fault following occurs: AutoWash allowed. AutoFill disabled.	Fill valve fault. Motor disconnected. Motor short circuit or blocked. Sensor failing.
13	13	Alarm	Fluid system fault	When suction SmartValve is on other port than RinseTank and RinseTank flow exceed 10 l/min. On fault following occurs: AutoWash disabled. AutoFill disabled.	Illegal flow is detected in Sections line or in RinseTank line.
14	14	Alarm	No RinseTank flow	Error detection. On fault following occurs: AutoWash disabled. AutoFill allowed.	RinseTank empty or no rinse water flow due to other reasons.
15	15	Alarm	Pressure valve fault	Error detection not active, proofed error detection not used. On fault following occurs: AutoWash disabled. AutoFill disabled.	PressureValve fault. Motor disconnected. Motor short circuit or blocked. Sensor failing.
16	16	Alarm	Regulation valve fault	Error detection not active, proofed error detection not used. On fault following occurs: AutoWash disabled AutoFill allowed.	Regulation valve fault. Motor disconnected. Motor short circuit or blocked. Sensor failing.
17	17	Alarm	Suction valve fault	Error detection not active, proofed error detection not used. On fault following occurs: AutoWash disabled. AutoFill disabled.	SuctionValve fault. Motor disconnected. Motor short circuited or blocked. Sensor failing.
18	18	Alarm	TankGauge fault	When TankGauge is enabled and frequency is below 50Hz. AutoWash is disabled. AutoFill is disabled.	TankGauge fault. TankGauge frequency is detected below 50Hz.
19	19	Warning	Software error Terminal	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.
20	20	Warning	Software error JobCom	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.
21	21	Warning	Software error Grip	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.
22	22	Warning	Software error SetBox	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.
23	23	Warning	Software error FluidBox		Turn off PTO to stop spray. Turn off power to stop hydraulics.
24	24	Warning	CAN bus failing to JobCom	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.
25	25	Warning	CAN bus failing to SetBox	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.

12 - Fault finding

ID	Pr	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text
26	26	Warning	CAN bus failing to Grip	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.
27	27	Warning	CAN bus failing to FluidBox		Turn off PTO to stop spray. Turn off power to stop hydraulics.
28	28	Illegal action	Track Boom fold. Align sprayer	User starts to fold the boom, and the sprayer trapeze is not locked. Boom Fold Inner is disabled.	Track Boom fold Align sprayer. The alarm is present while the sprayer is not locked, and a "fold inner" button is pressed. No folding takes place.
29	29	Illegal action	Track unfold Boom	Alarm for attempt to switch to "Manual" or "Auto" mode in a situation where boom is not detected unfolded. When the boom is detected unfolded the trapeze lock is unlocked and the message disappears. Auto and manual is disabled.	Track unfold Boom. Alarm for attempt to switch to "Manual" or "Auto" mode in a situation where boom is not detected unfolded. Unfold the boom.
30	30	Illegal action	Main on/off is on	When pressing softkey for BoomFlush, FastFlush, MultiRinse while Main on off is on. Keypress does not start process.	Main on off is on. Turn Main ON OFF to off before starting AutoWash.
31	31	Illegal action	MainTank not empty	When pressing softkey for BoomFlush, FastFlush, MultiRinse while MainTank is not empty. Keypress does not start process.	MainTank not empty. AutoWash cannot be started.
32	32	Illegal action	No rinse water	When pressing softkey for either BoomFlush, FastFlush, MultirRinse while RinseTank is calculated too empty for that program. Keypress does not start process.	Not enough rinse water for selected program. AutoWash cannot be started.
33	33	Illegal action	Steering not active - Over speeding!	When speed is too high for steering (SafeTrack ESP). SafeTrack is disabled. Steering is enabled upon keypress SafeTrack auto.	Speed too high for steering - slow down!
34	34	Waiting	Start pump 2	Valves are positioned as in AutoWash table. After press on softkey computer continues to next step. See also screen layouts.	Double pump must be started to flush hoses. Stop and start Double pump with hydraulic lever, as Warning prompts you to.
35	35	Waiting	Stop pump 2	Valves are positioned as in AutoWash table. After press on softkey computer continues to next step. See also screen layouts.	Double pump must be stopped to avoid chemical in boom. Stop and start Double pump with hydraulic lever, as Warning prompts you to.
36	36	Waiting	Pause	Upon press of softkey. See also screen layouts.	AutoWash is paused by keypress.
37		Warning	PrimeFlow Comm fault		Communication to PrimeFlow SMCU's are failing. Fault is probably due to broken cable or bad connectors for power or data.
38		Warning	Output failing to sect 1	Detected by H-bridge on I2C bus	Output failing to sect 1
39		Warning	Output failing to sect 2	Detected by H-bridge on I2C bus	Output failing to sect 2
40	40	Warning	Output failing to sect 3	Detected by H-bridge on I2C bus	Output failing to sect 3
41	41	Warning	Output failing to sect 4	Detected by H-bridge on I2C bus	Output failing to sect 4
42	42	Warning	Output failing to sect 5	Detected by H-bridge on I2C bus	Output failing to sect 5
43	43	Warning	Output failing to sect 6	Detected by H-bridge on I2C bus	Output failing to sect 6
44	44	Warning	Output failing to sect 7	Detected by H-bridge on I2C bus	Output failing to sect 7
45	45	Warning	Output failing to sect 8	Detected by H-bridge on I2C bus	Output failing to sect 8
46	46	Warning	Output failing to sect 9	Detected by H-bridge on I2C bus	Output failing to sect 9
47	47	Warning	Output failing to sect 10	Detected by H-bridge on I2C bus	Output failing to sect 10
48	48	Warning	Output failing to sect 11	Detected by H-bridge on I2C bus	Output failing to sect 11

ID	Pr	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text
49	49	Warning	Output failing to sect 12	Detected by H-bridge on I2C bus	Output failing to sect 12
50	50	Warning	Output failing to sect 13	Detected by H-bridge on I2C bus	Output failing to sect 13
51	51	Warning	Output failing to bypass		Output failing to bypass
52	52	Warning	Electronic fuse 1 is on	Measurement of voltage drop over electrothermal fuse.	
53	53	Warning	Electronic fuse 2 is on	Measurement of voltage drop over electrothermal fuse.	
54	54	Warning	Electronic fuse 3 is on	Measurement of voltage drop over electrothermal fuse.	
55	55	Warning	Electronic fuse 4 is on	Measurement of voltage drop over electrothermal fuse.	
56	56	Warning	RinseTank not full	When main tank has been filled and rinse tank is empty.	Remember to re-fill rinse tank.
57	57	Warning	Main tank nearly empty	Main tank empty (tank gauge value set in menu 2.5.2).	Main tank is nearly empty. Consider distance left before leaving field.
58	58	Warning	Sections OFF	If main ON/OFF is switched ON and one or more sections are OFF.	Note that one or more sections are switched OFF.
59	59	Warning	Spray pressure too high	Spray pressure too high (limit set in menu 2.5.3.1).	Decrease speed or change to nozzles with larger capacity.
60	60	Warning	Spray pressure too low	Spray pressure too low (limit set in menu 2.5.3.2).	Change to nozzles of less capacity or increase speed if safe.
61	61	Warning	Speed too high	Speed too high (limit set in menu 2.5.5.1).	Decrease speed. Pressure will be too high.
62	62	Warning	Speed too low	Speed too low (limit set in menu 2.5.5.2).	Increase speed if safe. Pressure will be too low.
63	63	Warning	Application volume too high	Application volume too high (% limit set in menu).	Increase speed if safe or change nozzle size.Check regulation valve hoses and filters.
64	64	Warning	Application volume too low	Application volume too low (% limit set in menu).	Decrease speed or change nozzle size. Check regulation valve.
65	65	Warning	Fan speed too high	Fan speed too high (limit set in menu 2.5.4.1).	Reduce fan speed
66	66	Warning	Fan speed too low	Fan speed too low (limit set in menu 2.5.4.2).	Increase fan speed
67	67	Warning	PTO speed too low	PTO rev. too low (limit set in menu).	Increase PTO speed
68	68	Warning	PTO speed too high	PTO rev. too high (limit set in menu).	Decrease PTO speed
69	69	Warning	Ladder not up		Raise ladder, to avoid damage to ladder or crop.
70	70	Warning	Wind Speed too high	Wind Speed too high (limit set in menu).	Stop spraying or consider other nozzle types like HARDI® LowDrift.
71	71	Warning	Air Temperature too high	Air Temperature too high (limit set in menu).	Stop spraying or consider other nozzle types.
72	72	Warning	Air temperature too low	Air Temperature too low (limit set in menu).	Air Temperature too low
73	73	Warning	RH too high	RH too high (limit set in menu).	Relative humidity too high
74	74	Warning	RH too low	RH too low (limit set in menu).	Relative humidity too low
75	75	Warning	Opt. sensor 1 too high	Limit set in menu.	This will be help text
76	76	Warning	Opt. sensor 1 too low	Limit set in menu.	This will be help text
77	77	Warning	Opt. sensor 2 too high	Limit set in menu.	This will be help text
78	78	Warning	Opt. sensor 2 too low	Limit set in menu.	This will be help text
79	79	Warning	Opt. sensor 3 too high	Limit set in menu.	This will be help text
80	80	Warning	Opt. sensor 3 too low	Limit set in menu.	This will be help text
81	81	Warning	Opt. sensor 4 too high	Limit set in menu.	This will be help text
82	82	Warning	Opt. sensor 4 too low	Limit set in menu.	This will be help text
83	83	Reminder	Aborted by keypress	Upon press of softkey	AutoWash is Aborted by keypress.
84	84	Reminder	AutoWash completed	When program is completed	AutoWash is completed

ID	Pr	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text
85	85	Reminder	FastFiller valve high friction	After valve self test	AutoAgitation valve has high friction or poor cabling. Valve will fail within some time. Arrange repair.
86	86	Reminder	Pressure Valve high friction	After valve self test	PressureValve has high friction or poor cabling. Valve will fail within some time. Arrange repair.
87	87	Reminder	Suction Valve high friction	After valve self test	SuctionValve has high friction or poor cabling. Valve will fail within some time. Arrange repair.
88	88	Reminder	Check filters and brakes	Periodically, period defined in extended menu. (Only checked at power up)	It is now time to check the suction and pressure filters. The Cyclone pressure filter is hidden under the grey right-hand cowling at the front of the sprayer. Check line and nozzle filters too. Check brakes.
89	89	Reminder	Grease boom and track	Periodically, period defined in extended menu. (Only checked at power up)	The boom now needs to be lubricated. Yellow labels indicate lubrication points otherwise see operators manual.
90	90	Reminder	Grease misc.	Periodically, period defined in extended menu. (Only checked at power up)	The track system now needs to be lubricated. Yellow labels indicate lubrication points otherwise see operators' manual.
91	91	Reminder	Miscellaneous service	Periodically, period defined in extended menu. (Only checked at power up)	See operators' manual for specific sprayer service.
92	92	Reminder	Check nozzles	Periodically, period defined in extended menu. (Only checked at power up)	You need to check the individual nozzle flow per minute. A stopwatch and good quality measuring jug is needed. Do the test with clean water. Nozzles with over 10% of rated new capacity must be discarded.
93	93	Reminder	Stop watch is zero		Stop watch is zero
94	94	Changed	Track in manual		Operator has put Track in manual
95	95	Changed	Track in auto		Operator has put Track in auto
96	96	Changed	Track is locked		Operator has locked Track
97	97	Changed	Reversing		Operator is reversing
98	98	Changed	Track unlocked		Lock is detected released. Hydraulic pressure established. Mis adjusted lock sensor.
99	99	Alarm	PrimeFlow data cable weakness	JobCom does not receive the data it sends. Shift the relay to Full duplex (transmit to both ends). Data cable defect is only detected at Half Duplex (listen only right end). No further Data cable defect are detected at Full duplex (transmit to both ends).	PrimeFlow bus cable fault is detected. A failure handling circuit is enabled. PrimeFlow is in full operation.
100	100	Alarm	Low PrimeFlow voltage	JobCom measure PrimeFlow supply voltage after fuse for left and right boom part at AI11 and AI12. Alarm occur when voltage is below 14 volt.	A fuse is open or too many rapid shifts on and off of sections has drained the power supply.
101	101	Warning	PrimeFlow power cable defect	Low power warning from SMCU, when supply is reestablished. First low power warning received after power up of system is not valid. First low power warning received after "Low voltage on supercap" is not valid.	Poor power wiring to PrimeFlow computers. One of the 2 power lines are disconnected or connectors are corroded and gives high resistance.
102	102	Warning	PrimeFlow computer defect	SMCU does not reply on status. No status request while "Low voltage on supercap" occurs.	Internal fault in PrimeFlow computer. Can also be caused by 2 or more defects in PrimeFlow data cable. Check for PrimeFlow data cable weakness.
103	103	Warning	Fold with unlocked pendulum	When pressing FoldCenterIn, FoldLeftIn or FoldRightIn and pendulum is unlocked.	Fold with unlocked pendulum.

ID	Pr	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text
104	104	Warning	Boom wing loose	Buttons FoldLeftIn or FoldRightIn are not pressed but the 4 sensors on outer boom wings change from "In spray" to "Not in spray" respectively when they change from "In transport" to "Not in transport".	Boom wing loose.
105	105	Changed	Agitation in Auto	Forward speed > 0.3 mph (0.5km/h) and Main On/Off = On	Agitation in Auto
106	106	Warning	Regulation valve in end stop	Warning appears when pressure regulation algoritm tries to close Regulation valve to increase pressure, but encoder does not give any signals, as micro switch has turned of motor. Alarm should not appear at self test at start up. Pressure regulation is unchanged.	JobCom detected that pressure regulation valve does not turn and cannot close and increase pressure and flow any further. Increase PTO RPM. Review flow used for agitation. Check for internal leakages.
107	107	Alarm	Slant angle sensor fault	Alarm is active when 2.2.4.3 Slant mirror is enabled and/or if 2.2.4.4 Slant in steps is enabled. The alarm is generated, if the sensor signal is less than 0.2 Volt or exceeds 4.8 Volt.	Check sensor and cable on pendulum. Disable HeadLandAssist. Disable Slant in steps.
108	108	Alarm	Boom height sensor fault	Alarm is active when 2.2.4.2 Boom height at headlands is enabled. The alarm is generated, if the sensor signal is less than 0.2 Volt or exceeds 4.8 Volt.	
109	109	Alarm	Pressure sensor alarm	The alarm is generated, if the sensor signal on AI26 (J10_33, J11_33) is less than 3mA or exceeds 21mA.	Check connection to boom pressure sensor at distribution valve junction box.

Testing and fine tuning

Fine tuning the flow constant - PPU

Calibration of the flow transducer is carried out with clean water, but small changes may occur when adding pesticides or fertilizer. This will effect the final readings. This is typically noted when the volume displayed on the display does not equal the actual known volume that was sprayed out. The formula below can be used to “fine tune” the flow transducer PPU.

New PPU = (Original PPU x Displayed Volume) / Sprayed Volume

For example, the spray tank is filled with 1000 gallons of spray liquid. When sprayed out, the display showed a total of 900 gallons. (Original PPU = 485.0)

New PPU = (485.0 (Original PPU) x 900 (Displayed Volume)) / 1000 (Sprayed Volume) = 436.5

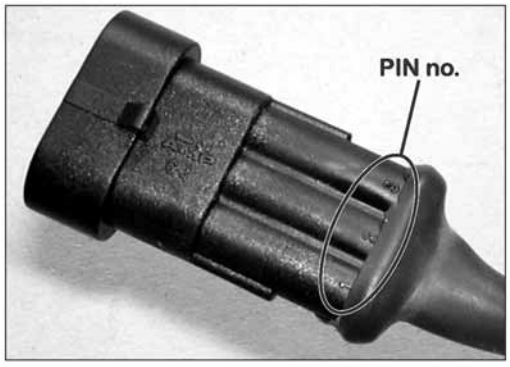
Note the relation is inverse:

To raise the displayed volume, the PPU is lowered.

To lower the displayed volume, the PPU is raised.

Pin & Wire connection

AMP Super Seal	Box	Color coding
2	+	Brown
3	Sig.	Blue
1	-	Black



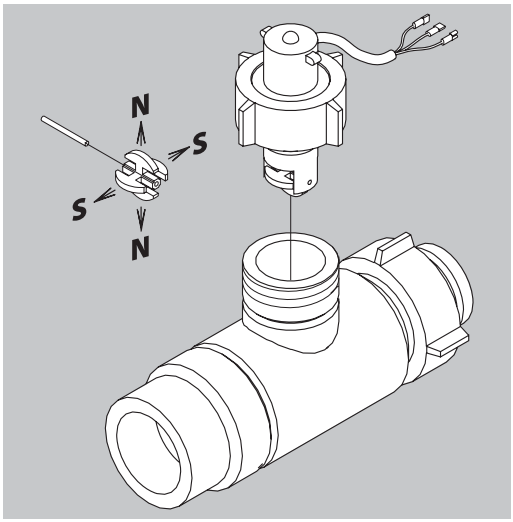
Testing flow transducer

BROWN wire to positive of 12 volt battery.

BLACK wire to negative.

BLUE wire to multimeter positive.

1. Check the rotor turns freely.
2. Each vane in the rotor has a magnet in it with the pole facing out. Check that the 4 magnets are present.
3. Use a magnet to check that every second magnet in the rotor has the same pole orientation. The rotor magnets must be N - S - N - S.
4. Connect negative from multimeter to negative of battery.
5. Set multimeter to DC volt.
6. By turning the mill wheel slowly, this will register approx. 8.0 +/ 1 volt with the diode on and 0.3 +/- 0.1 volt with the diode off with every second magnet.



Testing speed transducer

BROWN wire to positive of 12 volt battery.

BLACK wire to negative.

BLUE wire to multimeter.

1. Connect negative from multimeter to negative of battery.
2. Set multimeter to DC volt.
3. Bring a metallic object within 1/8" to 3/16" (3 to 5 mm) from the transducer. This will register 1.4 +/- 0.2 volt and the diode will turn on.
4. By removing the object, this will register 12.0 +/- 1.0 volt. Diode is OFF.

Specifications

Specifications

Supply voltage	12 Volt DC
Controlled shutdown "low battery":	9 Volt DC
Maximum supply:	16 Volt DC
Maximum peak:	28 Volt DC
Ambient temperature:	23°F to 158°F (-5°C to +70°C)
Memory:	Flash PROM non-volatile
Digital transducers (option 2, 3 and 4):	Square signal
Frequency:	0.5 Hz to 2 kHz
Trigger high:	4.0 to 12.0 Volt DC
Trigger low:	0.0 to 2.0 Volt DC
Analog transducers (option 1):	
Supply:	12 V
Input:	4 to 20 mA
Minimum speed for volume regulation	0.3 mph (0.5 km/h)

Flow ranges for the flow transducers

Housing	Housing identification (A)	Flow range g/min	Orifice mm	PPU value
S/67	One outside groove	2 - 30	13.5	485.00
S/67	No groove	4 - 70	20.0	225.00
S/67	Two outside grooves	20 - 160	36.0	60.00

14 - Technical specifications

Electrical connections

Types of plugs and fuses

Fuses are located into the JobCom:15 A auto fuse, for TWIN versions also 2x 10 A auto fuse.

Breakout PCB: 2x 10 A auto fuse.

DAH PCB: 10 A slowblow fuse.

PrimeFlow power PCB glass fuse 10 A slowblow.

Plugs AMP Super Seal 1.5 with 2, 3 and 4 pins.

13 pin plug ISO 11446.

Materials and recycling

Disposal of electronics

Cardboard: Can recycle up to 99% and therefore should be put into the waste collection system.

Polyethylene: Can be recycled.

When the operating unit has completed its working life, it must be thoroughly cleaned. The synthetic fittings can be incinerated. The printed circuit boards and metallic parts can be scrapped.

Packaging information

Materials used for packaging are environmentally compatible. They can be safely deposited or they can be burnt in an incinerator.

14 - Technical specifications

Charts

Chart for recording values

Menu	Function	1 - Values	2 - Values	3 - Values
[3.2.1 Flow constant]	Flow PPU			
[3.1.X.1 Speed constant]	Speed PPU			
[3.4 Regulation constant]	%			

Warranty policy and conditions

HARDI® NORTH AMERICA INC. , 1500 West 76th Street, Davenport, Iowa, USA and 337 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 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)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. 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.

5. 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.

6. No warranty is given on second-hand products and none is implied.

7. HARDI® reserves the right to incorporate any change in design in its products without obligation to make such changes on units previously manufactured.

8. 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.

9. 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.

10. 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.
11. 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.
12. Parts which are requested for return by the HARDI® Service Department must be returned prepaid within thirty (30) days for warranty settlement.
13. 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.

Notes

Notes

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

Visit us online at: www.hardi-us.com

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