



Sprayer Boom Height Control System

Installation and User Manual

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1 Introduction

The AutoGlideXR Sprayer Boom Height Controller system is intended for use on agricultural sprayers and other equipment where a constant height needs to be maintained. The AutoGlideXR Controller automatically adjusts the sprayer's booms up and down to maintain a fixed distance above the ground or crop canopy. This relieves the operator of the need to constantly adjust boom height in uneven or hilly terrain. It also allows the operator to select the optimal spraying height to maintain an even spray pattern.

The AutoGlideXR system consists of the following major components:

- ⌘ Controller, for mounting in the cab.
- ⌘ Interface box, for mounting on the sprayer.
- ⌘ Two or more sonar (ultrasonic) range sensors, mounted on the booms.

The Controller has a backlit LCD display to show information messages to the operator. It uses a simple operator interface, and an alarm buzzer to alert the operator when an alarm condition occurs. The Controller has a detachable power cable to connect to +12V in the cab, and a detachable communication cable to connect to the Interface box on the sprayer.

The Interface box connects to the sonar sensors, and to the hydraulic valves that control the up and down motion of the booms. The Interface box also requires a power connection to supply the current needed to operate the hydraulic valves. Connections inside the Interface box are made using individual wire terminals. All cables enter the Interface box through liquid-tight cable glands to protect the Interface box electronics from moisture and dust.

The sonar sensors have a quick-disconnect connector to simplify sensor installation and replacement. Mounting brackets are supplied for the sonar sensors to facilitate easy mounting.

2 Installation

CAUTION: While installing the AutoGlideXR kit and while doing tests on the installed kit, you MUST follow all safety precautions as listed in the operator's manual for your machine model. These safety precautions are designed to keep you, any bystanders, and the equipment itself safe while doing repairs, installing components, and testing various functions.

WARNING: *If you are installing on a late model **John Deere** or **Hardi** sprayer, be sure to read the warning note in section 2.5 below!*

2.1 Overview of Installation Procedure

To install the AutoGlideXR system on your sprayer, follow these steps:

1. Install the Controller in the cab, and connect it to 12V DC power.
2. Install the Interface Box near the valve bank, and connect it to 12V DC power.
3. Route the Controller-to-Interface cable from the Interface Box to the Controller.
4. Connect the solenoid valves to the Interface Box.

5. Mount the sonar sensors on the booms, and route their cables to the Interface Box.
6. Test the sensor and solenoid connections.
7. Run the Self Calibration procedure to calibrate the system to your sprayer.
8. Test the system, and adjust its response to suit your needs.

Please read through all of the installation instructions before starting the installation work. You will also need to read section 3 to learn how to operate the Controller.

If you have excess length on any of the cables, you can simply coil it up and tie it in place in any convenient location. Alternatively, you can cut off the excess cable length at the Interface box, cut back the cable jacket, and strip the wire ends. However, note that the shielded cable to the Controller (part # RH229) uses a bare drain wire. You will need to insulate this bare wire using heat shrink tubing or similar insulating sleeve to avoid accidental short circuits in the Interface Box.

2.2 Controller Installation

The Controller should be mounted in a position where the operator can easily see the display. A RAM mount is provided with an adhesive pad to mount to the rear of the Controller. Use the supplied alcohol wipe to clean both surfaces before installing the adhesive pad.

Connect the Controller to 12V power using the supplied power cord (part # RH230). Connect the black wire to Ground and the red wire to +12V. It is usually preferable to use a source of power that turns off with the ignition to avoid draining the vehicle battery if the Controller is accidentally left on. To protect against short circuits in the power cable, a fused power source should be used. Recommended fuse rating is in the range of 1A to 5A.

Be sure to turn off power to the Controller before connecting the cable to the Interface Box. Working with the power on can result in sparks, blown fuses, and destroyed electronics.

Section 3 explains the user controls of the Controller.

2.3 Interface Box Installation

NOTE: When replacing the Interface Box lid, be careful to align it correctly. Although the lid is square, it must be rotated correctly so that the gasket fits with the box edge.

The Interface Box should be mounted in a location that minimizes the distance to the +12V power and hydraulic valve connections.

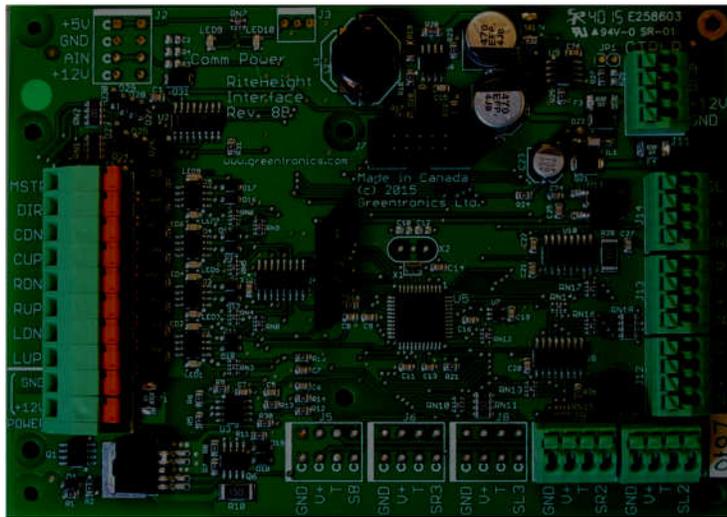
The Interface Box should be protected as much as possible from the elements and from pressure washing.

Mount the Interface Box using the supplied mounting brackets. The mounting brackets provide pre-drilled mounting ears on either side of the case that make it easy to mount the case. To use the brackets, first remove the lid from the Interface box. There are 4 mounting holes near the corners of the box. Use the supplied 1/4" #6 machine screws (with lock washers) to attach the mounting brackets to the Controller.

NOTE: The Interface Box is supplied with all necessary cables pre-wired, eliminating the work of connecting each wire inside the Interface Box. The following detailed

instructions are included in case you need to disconnect one or more cables during installation.

Take a look at the circuit board in the Interface Box, and the labels beside the various terminal blocks. These labels match the wiring instructions in this manual and on the inside of the



Interface Box Circuit Board

Interface Box lid.

All wiring connects to the circuit board using spring clamp terminals. To insert or release a wire from a terminal, push down on the button for the terminal using a small screwdriver.

Route the Interface cable (part # RH229) from the Controller to the Interface Box. The 4-pin connector of this cable will plug into the Controller. Run the other end of this cable into the Interface Box using the top right cable gland. Connect the four wires to the 4-position “CTRLR” terminal block as follows:

A	Black
B	White
+12V	Red
GND	Bare wire

The Interface Box requires its own source of +12V power to provide power to drive the hydraulic valve solenoids. Use the supplied 2-conductor cable (RH224) to connect to a source of +12V power, connecting the red wire to +12V and the black wire to Ground. To protect against short circuits in the power cable, a fused power source should be used. Recommended fuse rating is in the range of 10A to 15A. Run the power cable into the Interface Box through the bottom left cable gland. Connect the two wires to the 2-position POWER terminal block as follows:

GND	Black
+12V	Red

NOTE: *Some equipment (eg. **Brandt, Spudnik, Double L**) uses a common +12V connection for the hydraulic solenoids instead of the usual common ground. If your equipment has this kind of electrical setup, you will need to install the Active Low add-on circuit board in the Interface Box. Please refer to the instructions included with the*

Active Low circuit board.

Use the 6-conductor cable (RH225) to connect to the hydraulic solenoid valves that control raising and lowering of the booms. Run this cable into the Interface Box through the left cable gland and connect it to the output terminal block as follows:

CDN	Blue	Lowers the center boom (<i>or Secondary Dir. Valve</i>)
CUP	Brown	Raises the center boom (<i>or Raise/Lower w. Dir. Valve</i>)
RDN	Green	Lowers the right boom
RUP	White	Raises the right boom (<i>or Raise/Lower with Dir. Valve</i>)
LDN	Black	Lowers the left boom
LUP	Red	Raises the left boom (<i>or Raise/Lower with Dir. Valve</i>)

The CDN and CUP outputs are only used in installations where the center rack height is to be controlled.

NOTE: For Lift/Tilt control (primarily used for combine header height control), the “Left” outputs are used to control lift, while the “Right” outputs are used to control tilt.

If your sprayer has an open center hydraulic system or uses a directional valve, use the remaining 2-conductor cable (RH226) to connect these valves:

MSTR	Black	Master valve (for open center systems)
DIR	Red	Directional valve (also known as Shuttle Valve, or SH)

If your sprayer has only one of these valves, connect only one wire, and cut off the other wire end.

The *Master valve* output is used in open center hydraulic systems. In an open center hydraulic system, when no valves are activated, the oil is permitted to flow freely through the center of the valve block. When a valve is activated, the valve block's center opening must be closed to force the hydraulic oil through the activated valve. This is done by activating a solenoid valve that blocks this center flow. The *Master* output is provided to activate this solenoid. It can also be used to drive the “jam valve” or “priority valve” used in some hydraulic systems.

A *directional valve* (labelled “SH” on older AutoGlide systems) is used in some hydraulic valve blocks to choose the direction of oil flow. With this arrangement, a bank of non-directional valves is used to select which cylinder to move, while the directional valve chooses the direction the selected cylinder will move. In this configuration, outputs LUP, RUP, and CUP are used to power the valves that select the Left, Right, and Center boom cylinders, respectively. Each output will be activated for both raising and lowering of its boom. The directional valve output will determine whether the boom is raised or lowered.

If your sprayer's directional valve uses two solenoid valves, connect one solenoid to DIR, and the other to CDN. One valve is activated to raise the booms, and the other to lower the booms. DIR is the primary directional output, and will be activated according to your Directional configuration (see “Directional Valve” in section 10). Whenever a boom function is raised or lowered, CDN will be activated if DIR is not, mirroring the action of the primary directional output.

There are some (rare) machines that use a directional valve as well as two solenoid valves per boom. In this case, connect the Raise and Lower outputs to each solenoid pair, and the Directional output (DIR) to the directional solenoid.

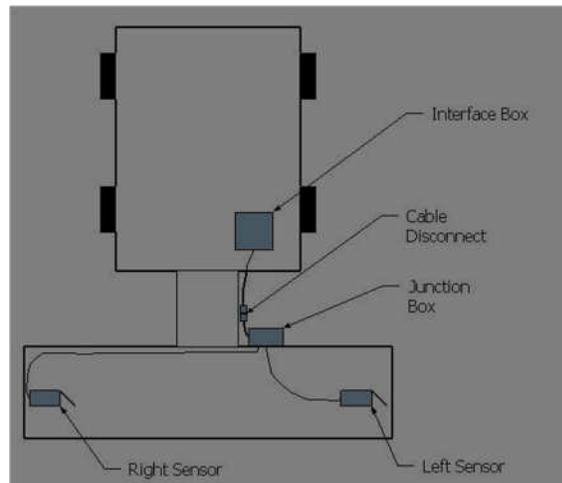
If not all wires in each cable are used, insulate the unused wire ends with electrical tape.

If not all of the cable entry glands of the Interface Box are used, be sure to “plug” each unused gland with a short piece of cable. This prevents dirt and moisture from entering the Interface Box.

2.4 Sonar Junction Box Installation (optional)

On a combine header installation the sonar sensors are installed on the header, while the Interface Box is installed on the combine. To provide a single disconnect cable, a small sonar Junction Box is supplied. The Junction Box is mounted on the header, and all the sonar sensors cables run to the Junction Box.

A single cable (WA1026) runs from the Junction Box to the center of the header. The connector on the WA1026 cable mates with the connector on the WA1027 cable, which runs to the Interface Box on the combine. This provides a single disconnect for all the sonar sensors installed on the header.



Sonar junction box on combine header

Mount the Junction Box using two #6 screws through the integral mounting holes in the back of the box.

2.5 Wiring the Control Solenoids

WARNING: If you are installing on a late model **John Deere** or **Hardi** sprayer, you need to install a diode kit. Failure to use the diode kit **may result in damage** to the sprayer's control electronics as well as to the AutoGlideXR system. As of this writing, the diode kit is known to be required on John Deere models 4630, 4730, 4830, 4920, 4930, and 4940, and all Hardi sprayer models made since 2009. If in doubt, contact Bestway before proceeding with the installation.

After connecting the 6-conductor solenoid cable to the Interface Box, you must connect the wires at the other end of the cable to the respective solenoids.

You can make these wire connections at the control switches you use to manually control the boom height. However, these switches are often mounted on a control joystick or console that is difficult to open or work within.

It is therefore generally much easier to connect directly to the hydraulic solenoid valves. You can determine which solenoid valve controls which function from a diagram of the hydraulic connections on the sprayer, which might be found in the owner's manual for the sprayer. Alternatively, you can follow the hydraulic lines from the control cylinders back

to the solenoid valves to find out which solenoid controls which function. Or you can work with an assistant in the cab pressing the control switch for each function, and use a meter or test light to identify the solenoid wire that goes live for that function. Label each solenoid as you identify it (Left Up, Left Down, Right Up, Right Down, and optionally Center Up and Center Down).

Once you have located all the solenoids, connect the respective wires from the RH225 cable to each of the solenoids. There is just one wire per solenoid valve. If your solenoid valves have two wires, one wire is common (usually ground), while the other wire is switched (usually to +12V). Connect the RH225 wires to the switched wire of each solenoid.

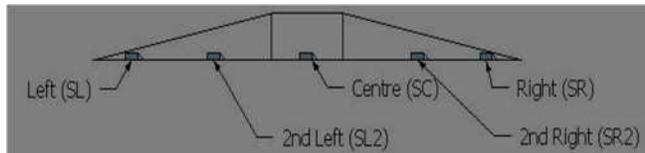
Sometimes these wires can connect directly to the terminals on the solenoids. You can also splice into the existing wires using self-stripping tap connectors, crimp connectors, or by soldering the wires together. Make sure that all connections are secure, and that all exposed conductors are insulated with electrical tape or heat shrink tubing.

If you have a Center sensor, connect the Center Up and Down wires. If you do not have a Center sensor, there is no need to connect these wires. Simply cut off and insulate the wire ends.

If your sprayer uses an open center hydraulic system, or a directional valve, you may need to refer to the owner's manual for your sprayer to determine the location of these solenoid valves. If your sprayer uses a directional valve, be sure to read the “Directional Valve” description in section 10.

2.6 Sonar Range Sensor Installation

The sonar range sensors measure the distance between each boom and the ground or crop canopy. The sonar sensors are mounted horizontally inside a protective bracket, with a sound “mirror” to deflect the sonar beam down toward the ground.



Sensor locations on boom (rear view)

The sensors are mounted horizontally inside a protective bracket, with a sound “mirror” to deflect the sonar beam down toward the ground.

The sensors should be mounted near the tip of each boom. To reduce the possibility of damage to the sensors, it is best not to mount the sensors right at the boom tip, but to mount them some distance from the tip. If the boom has a break-away section, a good location for the sonar sensors is usually just inside the break-away section.



Sensor mounted within boom

If you have purchased a 4-sensor system, install the additional sensors near the mid-point of each boom.

If you have a sensor for the center section, mount it anywhere on the center section that gives the sensor a clear view of the ground.

To minimize the possibility of interference from spray, it is best to mount the sonar sensors midway between spray nozzles.

The sonar sensors are supplied pre-installed in their mounting brackets. The sensor mounting brackets provide for easy mounting on most sprayer booms.



Sensor on rear of boom

When deciding where to mount the sonar sensors, keep in mind that the sensors need an unobstructed view of the ground. Also note that the sensors cannot measure any distance less than 10 inches. If you plan to operate very low above the crop canopy, you may wish to mount the sonar sensor brackets to the top of the boom.

To protect the sensors from damage, it is best to mount them within the boom, or protruding from the rear of the boom.

The sensor mounting brackets provide a simple two-plate clamp to fit around the square or round tubing used in the construction of most sprayer booms. Position the top and bottom clamp plates around the boom's tubing in the selected location, and insert the rear bolt through the plates as close as possible to the tubing. Use one or two of the supplied P-clamps to mount the sensor bracket to the clamp plates. Tighten the nuts on both clamp bolts until the bracket assembly is held securely in place.

The cable to the Interface Box plugs into the connector on the sonar sensor's short cable.

Route the sensor cables (WA1022) to the Interface Box, and insert them into the Interface Box using the cable glands on the right and bottom of the box. There are five sonar terminal blocks inside the Interface Box. Connect the 4 wires of each sonar cable to the matching sonar terminal blocks as follows:

S*	Green
T	White
V+	Red
GND	Black

Connect each sensor cable to the terminal block with the matching sensor input:

SL	Left
SR	Right
SC	Center
SL2	Left 2
SR2	Right 2

2.7 Test the Connections

Once everything is installed and connected, use the MACHINE SETUP menu to configure the AutoGlideXR system for your machine (see section 10). Then use the

TEST menu to check that each part of the system is connected correctly and working (see section 9). Refer to the Troubleshooting section (section 12) for more information about how to diagnose and correct problems.

Before starting any tests, extend the sprayer's booms in a safe area, and set the boom at normal working height.

Use the SENSORS option of the TEST menu to check the sonar sensors (see section 9.1). All sonar sensors should show correct distance readings. Ensure the Sensitivity is set to at least 25%. If a sensor does not show a good reading, check the connection to that sensor.

To check the connections to the solenoids, use the VALVE WIRING option (see section 9.2). Activate the up and down controls for each boom in turn, and watch the display. As you activate each function, the corresponding signal name should appear: LU for Left Up, LD for Left Down, etc. If you have connected a Master and/or Directional solenoid, its status will be indicated in the top line of the display (showing MSTR and DIR).

If you have a Directional solenoid, configure its operation in the Directional Valve option of the Machine Setup menu (see section 10).

If all the solenoid connections look right, use the TRY VALVES option (see section 9.3) to test the AutoGlideXR system's ability to raise and lower each boom section (Left, Right, Center).

2.8 Perform Self-Calibration

After you have confirmed that all the system connections are correct, run the Self-Calibration procedure to calibrate the AutoGlideXR system to your sprayer. Refer to section 11 for more information.

2.9 Test and Adjust Operating Parameters

Once you have confirmed all the connections, ensure that both booms are extended in a safe area and put the system in Automatic mode. Both booms should move to the target height automatically. You can use the Up and Down buttons to adjust the target height.

As the final installation step, take your sprayer for a test drive. Extend the booms and activate Automatic mode. Watch the control of the booms as you drive, and see how the booms respond to changes in the terrain. You can speed up or slow down the response to changes by adjusting the DELAY parameters of the CONFIG menu (see section 7.2 and 7.3). You can change how closely the system maintains the target height by adjusting the DEAD BAND parameter (see section 7.1). Refer to section 7 for information on various other parameters you may wish to adjust to maximize performance.

3 How to Use the Controller

3.1 User Controls

The Controller has a membrane keypad with 7 buttons.

The PWR button is used to turn the system on and off. When the Controller is off, briefly pressing the PWR button will turn on power to the Controller. To turn off Controller power, press the PWR button and hold it down for 2 second until the Controller displays:

Power off...

When you see this message, release the PWR button, and the Controller will turn off.
The left and right arrow buttons are used to move to the previous or next item in a menu.
The up and down arrow buttons are used to change the value of a parameter.
The ENT button is used to accept the current selection.
The ESC button exits the current menu without saving the current selection.

3.2 Using the Menu System

During normal operation, you will generally not need to make any changes to the Controller's configuration settings. However, for initial configuration and adjusting operating parameters, and for problem diagnosis, you will need to use the Controller's menu system.

To get the most out of the instructions below, read through them with the Controller in front of you and powered up.

When the Controller is powered up, it starts in the main menu. Use the left and right arrow buttons to highlight the desired menu option, and then press ENT to select that menu option.

You can always return to the main menu by pressing ESC several times.

In the main menu the first option is named "Enable Auto". Selecting this option will put the Controller into Automatic mode, where it controls boom height. *Be sure to have both booms fully extended in a safe area before engaging Automatic mode.*

The Controller's display has two lines of text. In each menu, the top line is used to display the name of the menu. The bottom line is used to display the currently selected menu item. As you choose different menu items, the bottom line changes to show the newly selected item. Arrows at the far left and right of the bottom line indicate whether there are more items to be selected to the left or right.

Changing a parameter value works in a similar way to selecting a menu item. Use the Up and Down arrow buttons to choose the desired value, and then press ENT to save that value and return to the previous menu.

4 Automatic Mode Operation

When you turn on the Controller, it will start up showing the main menu "Enable Auto" option. Pressing ENT will put the Controller into Automatic mode. *Be sure to have both booms fully extended before engaging Automatic mode.* In Automatic mode the Controller will raise or lower the booms to maintain the desired height above the ground or crop canopy.

You can exit Automatic mode by pressing ESC. If the OVERRIDE configuration option is set to "Exit Auto", then you can also exit Automatic mode by manually briefly raising or lowering a boom.

In Automatic mode, the display will show something like the following:

```
AUTO: 38.0  
37      39      40
```

The first line of the display indicates the Controller is in AUTO (Automatic) mode, and shows the target height. The AutoGlideXR system will move the booms to keep them

close to the target height.

In Automatic mode the up and down arrow buttons are used to adjust the target height up or down. This is useful for making on-the-go height adjustments.

If the center sonar sensor is used as the height reference, the target height is set by the center sensor, and cannot be adjusted manually. No separate target height is displayed in the top line in this configuration. Instead, the center sensor height displayed on the second display line defines the target height.

The second line of the display is the status line. The status line is used to display the status of the system, or to display alarm messages. In normal operation, the height measured by each sonar sensor is displayed (Left, Left 2, Center, Right 2, Right).

If a sensor cannot provide a good distance reading, it will show "--". If a sensor does not provide a good distance reading, the Controller will normally not adjust the height of that boom, and may sound an alarm (depending on the SENSOR ALARM setting). If the NO-RANGE LOWER option is enabled, the Controller will lower the boom in an attempt to get the sonar sensor back in range.

When the Controller activates one of its outputs to raise or lower a boom, it will indicate this by showing U or D (for "Up" or "Down") beside the respective sensor distance reading on the status line.

If the OVERRIDE configuration option is set to "Enable/Disable" or a time-out value, each sensor reading will be replaced by "Man" (for "Manual") whenever the respective boom is not under automatic control (see Configuration OVERRIDE).

If the Controller encounters an error condition, an alarm message will be displayed on the status line, and the alarm buzzer will sound. In most cases the control outputs are turned off when an alarm is active. Refer to section 5 for details about each error.

5 Error Messages

Following is a list of error messages you may encounter, and their meaning.

Output FAULT: Open on LUP

This message may be displayed upon entering Auto, Test, or Self-calibration. It indicates the respective output (LUP in this example) is not connected to a solenoid. Press ESC to clear this message.

Output FAULT: Short on RDN

This message may be displayed upon entering Auto, Test, or Self-calibration. It indicates the respective output (RDN in this example) is shorted to ground. Note that some equipment requires installation of a diode kit to isolate the AutoGlideXR's outputs from the manual controls. Contact Bestway for details. Press ESC to clear this message.

Output FAULT: Conflict on LDN

This message may be displayed upon entering Auto, Test, or Self-calibration. It indicates the respective output (LDN in this example) is connected to another control circuit that does not allow a shared connection to the solenoid valve. This may necessitate the installation of a diode kit to isolate the AutoGlideXR's outputs from the manual controls. Contact Bestway for details. Press ESC to clear this message.

Output FAULT: RUP

The system attempted to activate the output, but the output did not show the expected voltage. The line following the message lists the affected output(s). This may indicate a missing or inadequate power supply to the Interface Box. It may also indicate a short circuit in the output wiring. Press ESC to clear this message.

L Lower time-out

May appear for Left (L), Right (R), or Center (C) boom section. The measured boom height is too high, but the controller was unable to lower the boom to correct it within the time set by the LOWER timeout configuration parameter (see section 7.10). The boom may have reached its minimum height. This alarm can be disabled by the TIMEOUT ALARM configuration option (see section 8).

Comm. error

The Controller is not receiving data from the Interface Box. If you see this message, check that the Interface Box cable is correctly connected to the Controller, and that the cable has not been pinched or damaged. Refer to section 12 for more information.

Valve power low

The Interface Box requires a separate power supply connection to supply the high current needed to drive the hydraulic solenoid valves. This error message indicates that this power supply voltage is too low (or missing altogether). Check that the Interface Box power supply is connected to a good source of power with sufficient current supply to drive all the solenoids. If this message appears briefly whenever an output is activated, there may be too much voltage drop in the power supply wiring to the Interface Box. Ensure that the power supply cable is as short as possible.

--

When a sonar sensor reading shows dashes, it means that sensor is not getting a valid distance reading. This usually happens when the boom is too far above the ground, or the sonar sensor sensitivity is set too low. It can also happen if dirt or debris build up on or in front of the sensor.

XX

A sonar sensor reading of XX indicates the sonar sensor is not responding. Check the wiring to the sonar sensor.

WW

If a VALID WINDOW is configured, this display means the sensor reading is outside the valid range. See section 7.12 for more information.

6 Main Menu

When the Controller is in Automatic mode, pressing the ESC button brings up the main menu, which has the following options:

Main:

Enable Auto
CONFIG
ALARM CONFIG
TEST
MACHINE SETUP
SELF CAL.

The CONFIG menu is used to configure various operating parameters of the Controller. The ALARM CONFIG menu controls what alarm conditions are reported. The TEST menu provides options to test sensors and connections to help in diagnosing problems. The MACHINE SETUP menu is used to set the Controller up for the connections made to the sprayer. The SELF CAL. option is used to initiate automatic calibration of the controller to optimize its performance on your sprayer.

7 Configuration Menu

Selecting CONFIG from the main menu brings up the configuration menu:

Config:

DEAD BAND
DELAY FOR UP
DELAY FOR DOWN
HEIGHT
ALT. HEIGHT
QUICK RAISE HT
SONAR TARGET
NO-RANGE FILTR
OVERRIDE
LOWER T.O.
MOTION CONTROL
VALID WIN. LO
VALID WIN. HI
REF. FILTER
NO-RANGE LOWER

All height parameters are in units of inches. Time parameters are in units of seconds.

7.1 Config Dead Band

The DEAD BAND option of the CONFIG menu allows you to change the amount of error allowed in the measured boom height before the Controller will adjust the boom. The Controller will not raise or lower the boom unless the measured height is greater than the Target Height plus the Dead Band or less than Target Height minus the Dead Band.

```
Dead band=  
5.0"
```

Choose the desired maximum error in the range of 0.5" to 10.0", in steps of 0.5", and press ENT to save the new value. The default value is 6.0". Typical values are in the range of 4.0" to 8.0".

7.2 Config Delay for Up

The DELAY FOR UP option of the CONFIG menu allows you to change the time the Controller waits before raising the boom when it is too low. When the system sees the distance is below the acceptable range, it will wait this amount of time before raising the boom. This avoids responding to momentary impulses, such as a tall weed.

```
Delay for up=  
0.9 secs
```

Choose the desired delay in the range of 0.2 seconds to 5.0 seconds, in steps of 0.1 second, and press ENT to save the new delay time. The default value is 1.0 secs. Typical values are in the range of 0.5 to 1.5 secs.

7.3 Config Delay for Down

The DELAY FOR DOWN option of the CONFIG menu allows you to change the time the Controller waits before lowering the boom when it is too high. When the system sees the distance is above the acceptable range, it will wait this amount of time before lowering the boom. This avoids too-frequent adjustments and ensures stable boom control.

```
Delay for down=  
0.9 secs
```

Choose the desired delay in the range of 0.1 seconds to 5.0 seconds, or choose "default", and press ENT to save the new delay time. If you choose "default", the Delay for Down will be the twice the "Delay for Up" value (see above).

7.4 Config Target Height

The HEIGHT option of the CONFIG menu allows you to change the default target height. This is the height of the sensors above the ground or crop canopy that the Controller attempts to maintain in Automatic mode.

```
Target height=  
23.5"
```

Choose the desired distance in the range of 12.0" to 90.0", in steps of 0.5", and press ENT to save the new target distance. The default value is 40.00".

Note that the minimum possible value is reduced if an Offset value is set in the Machine Setup menu.

7.5 Config Alternate Target Height

The ALT. HEIGHT option of the CONFIG menu allows you to set the alternate target height. When enabled, this allows you to quickly switch between two target height settings.

```
Alt. height=  
30.0"
```

The default value is Disabled. If set to any other value (up to 90.0"), the alternate target height is enabled. In Auto mode you can then switch between Target Height and Alt. Height by pressing the Next button. In some Control Type settings you can also switch by pressing a manual Down switch on your machine controls.

7.6 Config Quick Raise Ht.

The QUICK RAISE HT option of the CONFIG menu allows you to change the minimum height the Controller will accept for normal operation. If a sonar sensor reads a height smaller than this height, the Controller will immediately raise the boom without waiting for the usual DELAY FOR UP time.

```
Quick Raise ht.=  
15.0"
```

Choose the desired height in the range of 12.0" to 90.0", in steps of 0.5", and press ENT to save the new minimum height. Selecting "Disabled" will turn off the Quick Raise feature. The default value is 15.0".

Note that the minimum possible value is reduced if an Offset value is set in the Machine Setup menu.

***NOTE:** The Quick Raise Height is intended as a kind of emergency override when the boom gets too close to the ground. It should normally be set at least 10" lower than the Target Height. Setting Quick Raise Height close to the Target Height may result in unstable operation.*

7.7 Config Sonar Target

The SONAR TARGET option of the CONFIG menu allows you to choose whether the sonar sensors read off the crop canopy or the ground.

```
Sonar target=  
BARE GROUND
```

Choose from three options:

- ⑩ BARE GROUND: Use this option when working over bare ground. The sonar sensors will read the distance to the ground with maximum range.
- ⑩ PARTIAL CANOPY: Use this option when working in an immature crop with a partially closed canopy. The sonar sensors will read the distance to the ground that is visible between the plants, ignoring the plants. Maximum range may be reduced.

- ⑩ FULL CANOPY: Use this option when working over a crop with a full canopy, with little or no ground visible. The sonar sensors will read the distance to the crop canopy with maximum range.

Note that the Sonar Target can also be adjusted in the Test Sensors display screen.

WARNING: In PARTIAL CANOPY mode, at close range, it is possible for the sonar sensors to occasionally show a false reading of double the actual distance. This happens only if the ground surface is hard and smooth. See the warning in section 9.1.

7.8 Config No-Range Filter

The NO-RANGE FILTR option of the CONFIG menu determines how the Controller deals with out-of-range readings from a sonar sensor.

```
No-range filter=  
0.0 secs
```

Choose the desired setting in the range of 0.0 to 1.0 secs, and press ENT to save the new value. The default value is 0.0 secs. Typical values are 0.0 to 0.3 secs.

Normally the Controller will not take any action (raise or lower a boom) when a sonar sensor reads out-of-range. The No-Range Filter option allows you to configure the Controller to tolerate brief out-of-range conditions. This allows the Controller to adjust boom height even when the sonar is only barely getting distance readings. The selected time determines how long a time period a sonar is allowed to be out-of-range before the Controller stops making height adjustments.

7.9 Config Override

The OVERRIDE option of the CONFIG menu allows you to change how the Controller responds when you manually activate the boom hydraulics in Automatic mode. Choose from the following options for Override:

```
Override=  
Exit Auto  
Enable/Disable  
1 sec  
2 secs  
3 secs  
4 secs  
5 secs
```

The simplest setting is “Exit Auto”. This means that when the Controller detects manual activation of the boom hydraulics it will exit Automatic mode and return to the main menu. You will need to press ENT to re-engage Automatic mode.

The default setting is “Enable/Disable”. In this mode the Controller interprets manual activation of the boom hydraulics as a trigger to enable or disable automatic control of each boom. Pressing the Up switch for a boom will disable automatic control of that boom. The sonar distance display for that boom will be replaced by “Man.” to remind you that the boom is under manual control, and automatic control of that boom is

disabled. Pressing the Down switch will re-enable automatic control.

You can also select a time-out value (in the range of 1 to 5 seconds). This is useful if you frequently need to temporarily override the operation of the AutoGlideXR system to deal with obstructions or other unusual features in the field. If a time-out value is selected, the Controller will temporarily suspend automatic control of a boom when it detects manual activation of the boom hydraulics. The sonar distance display for that boom will be replaced by “Man.” to remind you that the boom is not under automatic control. After the time period expires, it will resume automatic control of the boom.

Every time automatic mode is disabled or enabled for a boom, a short beep will sound to alert you to the change in control mode. If these beeps are unnecessary, you can disable them by disabling the Sensor Alarm (see below).

7.10 Config Lower Time-Out

This feature prevents needlessly burdening the hydraulic system when a boom cannot be brought low enough, such as when the sprayer is on top of a ridge.

The LOWER T.O. option of the CONFIG menu allows you to change the maximum amount of time the Controller will keep its Lower output on to try to achieve the desired target distance. If the measured distance is not within the target distance range after the time set by Lower timeout, the Controller will turn off its Lower output and raise an alarm to alert the operator (unless disabled by the Time-Out Alarm option).

```
Lower timeout=  
8 secs
```

Choose the desired time-out in the range of 1 second to 20 seconds, in steps of 1 second, and press ENT to save the new value. The default value is 10 secs.

7.11 Config Motion Control

The MOTION CTRL option of the CONFIG menu allow you to change how aggressively the Controller makes upward and downward corrections to the boom height. This option presents a sub-menu that will cycle through the MOTION CTRL UP and MOTION CTRL DN option for each active boom corresponding to the Machine Setup Control Type (seen in section 10.1). For instance if the setup is for Left/Right operation the following options are seen:

```
MC UP LEFT (Motion control up for left boom)  
MC DN LEFT (Motion control down for left boom)  
MC UP RIGHT (Motion control up for right boom)  
MC DN RIGHT (Motion control down for right boom)
```

Other options that may appear are MC UP/DN CENTER for modes that allow for height adjustment on the center section. If running in Lift/Tilt mode, the LEFT/RIGHT options will be replaced with LIFT/TILT respectively. For each option, you press ENT and then choose from the following options:

```
Boom Control=  
1 (fastest)  
2
```

- 3 (default)
- 4
- 5
- 6
- 7 (slowest)

Choose the desired value and press ENT to save the new value. The default value is 3, which strikes a balance between quick corrections and stable boom control. With Motion Control set to “3”, the system will typically make two or three corrections to return the boom to the target height.

Note that stable operation requires running the Self Calibration procedure! See section 11.

On some sprayers a faster setting or 2 or 1 can be used, which returns the boom to the target height with one or two larger corrections, and therefore returns the boom to the target height more quickly. However, this quicker operation can result in unstable operation, with a continuous back-and-forth rocking motion. If you see this happen, change the Motion Control back to a slower setting.

If the operation of the system is unstable at a setting of 3, choose a slower setting. This will cause the Controller to make height corrections in smaller steps, leading to reduced overshoot and less back-and-forth rocking. The drawback is that it will take somewhat longer to reach the target height.

7.12 Config Valid Window Low / High

NOTE: These options are not intended for sprayer boom height control!

The VALID WIN. options of the CONFIG menu limit the range of sonar sensor height readings that are accepted. Any height reading outside the valid range will be rejected. Two options allow configuring the valid range below and above the target height.

Valid Window Lo=	Valid Window Hi=
Disabled	Disabled

The Lo value sets the range of valid height readings below the target height, while the Hi value sets the range of valid height readings above the target height. Choose “Disabled” or a value in the range of 0.5” to 40.00”, in steps of 0.5”, and press ENT to save the new value. The default value is “Disabled”.

When set to “Disabled”, the Valid Window has no effect. When set to some other value, the valid range of heights is calculated based on the current Target Height plus the High value and minus the Low value. For example, if the Target Height is 35.0”, the Valid Window Lo is set to 4.0”, and the Valid Window Hi is set to 8.0”, only height readings between 31.0” and 43.0” will be accepted. Readings outside this range will be treated as out-of-range.

This feature is intended for height control applications with a limited range of operation. For example, when controlling header depth on a potato harvester, the Valid Window Lo can be used to exclude too-short readings due to tall weeds.

7.13 Config Reference Filter Time

NOTE: *This option is only available when using the center sonar sensor as reference.*

When Control Type is set to “L/R Center Ref” (in the Machine Setup menu), the center sonar height reading is used as the target height for the left and right sensors. Because it is not generally desirable to have the target height fluctuate rapidly, the center sensor readings can be filtered in this mode. The REF. FILTER option of the CONFIG menu controls the degree of filtering of the center sonar sensor.

This option provides the following display:

```
Ref. Filter T=  
0.8 secs
```

Choose a value from 0.0 secs to 1.6 secs, and press ENT to save the new value. The longer the time chosen, the more slowly the center sensor height reading will change. The default value is 0.8 secs.

7.14 Config No-Range Lower

NOTE: *This option is not available for sprayer boom height control.*

The NO-RANGE LOWER option of the CONFIG menu controls the behaviour of the system when a sonar sensor does not report a distance reading (“No Range”). This usually happens when the boom swings too high above the ground. When the distance to the ground is beyond the sonar sensor's range, or if the received echo is too weak, the sonar sensor will not be able to provide a distance reading. This shows up on the Controller display as “--”.

This option provides the following display:

```
No-Range Lower=  
Disabled
```

Choose “Disabled”, or a value in the range of 0.5” to 10.00”, in steps of 0.5”, and press ENT to save the new value. The default value is “Disabled”.

When No-Range Lower is set to “Disabled”, the AutoGlideXR system will take no action when a sonar sensor reports No Range.

If a different value is chosen, the AutoGlideXR system will lower the boom whenever the sonar sensor reports No Range. The larger the value selected, the more quickly the boom will be lowered.

CAUTION: *Be careful in using this option. It is possible for a sonar sensor to report No Range for other reasons, such as dirt or moisture build-up on or near the sensor. This could cause the boom to be lowered unexpectedly!*

8 Alarm Configuration Menu

Selecting ALARM CONFIG from the main menu brings up the alarm configuration menu:

```
Alarm Config:  
  SENSOR ALARM  
  OVERRIDE ALARM
```

TIMEOUT ALARM

LOW-PWR ALARM

8.1 Alarm Config Sensor Alarm Delay

The SENSOR ALARM option of the ALARM CONFIG menu allows you to change how quickly the Controller sounds an alarm when it encounters an out-of-range sensor reading. Choose from the following options:

Sensor alrm dly=

0 secs

1 sec

2 secs

3 secs

4 secs

5 secs

Never

The default setting is 1 sec. This means that when the Controller detects an out-of-range sensor reading, it will wait 1 second before sounding an alarm. Brief out-of-range readings will therefore not cause any activation of the alarm, avoiding nuisance alarms.

Choose the alarm delay setting that best suits your operation. Choosing “Never” means the Controller will never sound an alarm to indicate an out-of-range condition (and you may therefore have to keep an eye on the readings).

8.2 Alarm Config Override Alarm

The OVERRIDE ALARM option allows you to control whether an alarm beep is sounded when manual override turns automatic mode off or on for a boom. Choose from the following options for Override Alarm:

Override alarm=

Disabled

Enabled

The default setting is “Enabled”. If you find the beeps more annoying than useful, change this option to “Disabled” to turn off these audible alerts.

8.3 Alarm Config Time-Out Alarm

The TIMEOUT ALARM option of the CONFIG menu controls whether or not the Controller sounds an alarm when the Lower or Raise Time-Out expires. If the Time-Out alarms are disabled, the Controller will not sound an alarm when a time-out occurs, but will display a “T” behind the sensor reading.

Time-Out Alarm=

Disabled

Enabled

Choose the desired option and press ENT to save the new value. The default value is Enabled.

8.4 Alarm Config Low-Power Alarm

The power supply voltage to the Interface Box is monitored by the Controller to ensure there is sufficient voltage to drive the solenoid valves. If the voltage is too low, the Controller sounds an alarm with the message “Valve power low”.

In some installations, the solenoid valves operate fine even though the power supply voltage dips below the minimum threshold when a valve is activated, causing nuisance alarms. The LOW-PWR ALARM option allows you to disable the Low-Power alarm:

```
Low-power alarm=  
  Disabled  
  Enabled
```

Choose the desired option and press ENT to save the new value. The default value is Enabled.

9 Test Menu

Selecting TEST from the main menu brings up the test menu:

```
Test :  
  SENSORS  
  VALVE WIRING  
  TRY VALVES
```

9.1 Test Sensors

Selecting the SENSORS option from the test menu brings up the Sensors display:

```
Full Canopy  
 38 41 36 29 33
```

The top line shows the sonar sensor operating mode (*Full Canopy*, *Bare Ground*, or *Partial Canopy*). You can change the operating mode using the Left and Right arrow buttons. This allows you to experiment with different modes while viewing the sensors' distance readings.

The second line of the display shows the distance measured by each of the sonar sensors (Left, Left 2, Center, Right 2, and Right). When a sonar sensor reading shows dashes (--), it means that sensor is not getting a valid distance reading. This usually happens when the boom is too far above the ground. It can also happen if dirt or debris build up on or in front of the sensor.

If a sensor reading shows XX, there is a problem communicating with the sensor. Check the connections and wiring to the sensor.

Sonar Operation in Partial, Full Canopy and Bare Ground Modes

The sonar sensors use sound pulses to measure the distance from the sensor to the ground or crop canopy. The sonar sensor sends out a short sound pulse and then waits for the echo to return to the sensor. The longer it takes for the echo to return, the farther away

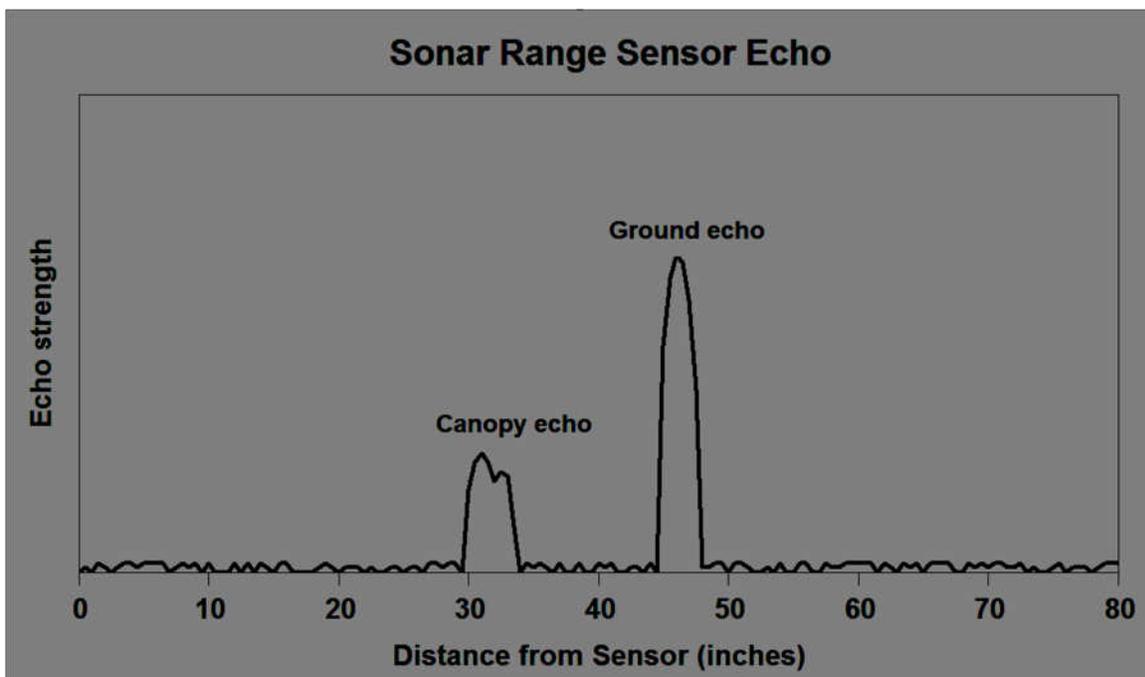
the object that reflected the sound back to the sensor.

The diagram shows a sample graph of the sound echo signal received by a sonar sensor. In this case, there is partial crop canopy, so there are echoes from both the canopy and the ground.

The first echo received is from the canopy, at a distance of 30 inches. Because it's a partial canopy, the echo is relatively weak. A little later the sensor receives a second echo, which was reflected by the ground, at a distance of 45 inches. Because the ground offers a bigger surface to reflect the sound, this echo is much stronger.

Given the two different echoes, how does the sonar sensor determine whether the correct distance is 30 inches or 45 inches? This is determined by the Sonar Target setting. In Full Canopy mode, the sonar sensor uses the *first* echo it receives, so it will report a distance of 30 inches. In Partial Canopy mode, the sonar sensor uses the *last* echo it receives, and therefore will report a distance of 45 inches. Note that Bare Ground mode also uses the first echo received, so the sonar sensor would report 30 inches in Bare Ground mode.

Distinguishing between the crop canopy and the ground works well in crops with partial canopies. In a mature crop with a full crop canopy, the sound pulses will not be able to penetrate the canopy, and therefore the sonar sensors will not get any echo from the ground. It is therefore best to use Full Canopy mode when there is a full or nearly full crop canopy.



False Readings in Partial Canopy Mode

Partial Canopy mode can lead to problems if the sensor is very close to the ground and the ground surface is smooth and hard. In this situation it is possible for the sonar sensor to sometimes report a false reading of twice the actual distance. If the actual distance is 13" but the sensor reports 26" that could cause the AutoGlideXR system to move the

boom down instead of up!

To avoid this problem the AutoGlideXR system provides automatic sonar sensitivity adjustment in Partial Canopy mode. This “Auto” mode keeps the sonar sensitivity high enough to ensure that the sensors get good distance readings, but low enough to minimize the occurrence of false double readings.

9.2 Test Valve Wiring

The VALVE WIRING option of the test menu shows whether there is voltage on the solenoid wiring to the Interface Box. This is useful to confirm that all the connections have been made correctly. The Controller does not activate any outputs in this mode. Instead, you activate solenoid valves using the manual controls, and observe whether the expected signal name appears on the display. This can also be used to determine how the Directional valve should be controlled.

Selecting VALVE WIRING brings up the following display:

```
VALVES:  MSTR DIR
          RD
```

The top line shows the state of the Master (MSTR) and Directional (DIR) solenoids.

The bottom line shows the state of the six Up and Down solenoids: LU for Left Up, LD for Left Down, RU for Right Up, RD for Right Down, CU for Center Up, and CD for Center Down.

In the example above, the right boom is being lowered, and both the Master and Directional valves are active. As you activate each hydraulic function in turn, you should see the corresponding name appear on the display.

9.3 Test Try Valves

Selecting the TRY VALVES option from the test menu brings up the Try display:

```
TRY
Left      12.5V
```

The TRY VALVES option is used to activate the hydraulic valves through the AutoGlideXR system to confirm that the system is able to raise and lower the booms.

The bottom line shows the currently selected boom section. Use the Left and Right arrow buttons to select the Left, Right, or Center boom section.

Press the Up or Down arrow button to raise or lower the selected boom section. If all connections are correctly made and the AutoGlideXR system is configured correctly, the selected boom section should respond.

If there is no response, or an incorrect response, check the connections from the Interface Box to the solenoids.

If there is no response at all, you may have an open-center hydraulic system that requires the Master output to be connected to the Master valve.

Incorrect response may also be due to incorrect configuration of the Directional valve.

The bottom right of the display shows the solenoid power supply voltage at the Interface Box. Normally this should be between 12V and 14V. It may drop somewhat when an

output is activated. If this voltage dips too low when activating outputs, check the power connection to the Interface Box.

10 Machine Setup Menu

Selecting MACHINE SETUP from the main menu brings up the following menu:

```
Machine Setup:
CONTROL TYPE
OFFSET LEFT
OFFSET RIGHT
OFFSET LEFT 2
OFFSET RIGHT 2
OFFSET CENTER
DIR. VALVE
DIR. SECOND
DIR. LEFT
DIR. RIGHT
DIR. CENTER
MASTER
PROP. CONTROL
```

NOTE: *If operating in Lift/Tilt Mode, DIR. LIFT/TILT options will appear*

10.1 Machine Setup Control Type

The CONTROL TYPE option of the MACHINE SETUP menu defines the number of booms to be controlled. Choose from the following options:

```
Control Type=
Left/Right
L/R Center Ref
L/R Center Ctrl
Left
Right
Lift/Tilt
```

Each option is used for a different type of installation.

Most options allow using either 1 or 2 sensors to control each function. After you select an option, you will be prompted to select 1 or 2 Sensors. If you select 2, height will be controlled based on the shortest of the two sensor readings.

Left/Right: Controls the left and right booms of a sprayer, with manually selected target height. When the center section is raised or lowered, the target height must be adjusted to match.

L/R Center Ref (Left/Right control with Center Reference) : Controls the left and right

booms of a sprayer, and uses a center sonar sensor (mounted on the center section) as a reference to set the target height. When the center section is raised or lowered, the system will automatically adjust to the new target height, so the left and right booms always work at the same height as the center section.

L/R Centr Ctrl (Left/Right and Center control) : Controls the left and right booms of a sprayer, as well as the center section, using a center sonar sensor mounted on the center section. Simply set the desired target height and the system will keep all three sections at that height.

Left: Primarily intended for non-sprayer applications, this option controls a single function, with manually selected target height. The Left sonar sensor is used to measure height, and the Left control outputs are used to adjust the height of the controlled function. This control mode can also be used on a sprayer to temporarily operate only the left boom in automatic mode.

Right: This control mode can be used on a sprayer to temporarily operate only the right boom in automatic mode. The right sonar sensor is used to measure height, and the Right control outputs are used to adjust the height of the right boom.

Lift/Tilt: This option is primarily intended for automated control of combine headers that have the ability to tilt the header. The “Left” outputs are used to control lift, while the “Right” outputs are used to control tilt. One sensor is mounted near each end of the header. Lift and tilt are controlled to keep both sensors at the selected distance above the ground. This control mode can also be used on sprayer booms with a single tilt cylinder that controls the entire boom angle.

10.2 Machine Setup Offset Left / Right / Left 2 / Right 2 / Center

The OFFSET options of the MACHINE SETUP menu set the height offset of each sonar sensor above the spray tips. This offset is subtracted from the sensor readings so that the Controller displays the net height of the spray tips above the ground or crop canopy.

Left Offset=

14.5"

Measure the vertical distance (in inches) between the spray tips and the bottom of the sonar sensor. Select the measured distance, in steps of 0.5", and press ENT to save the new target distance. The default value is 0.0".

Note that unused sensors are not shown in the Machine Setup menu.

10.3 Machine Setup Directional Valve

The DIR. VALVE option of the MACHINE SETUP menu allows you to define how the Directional valve output works. Choose from the following options:

Dir. Valve=

None

1 Valve/Cyl.

2 Valves/Cyl.

Option “None”, the default setting, means the system will not activate its Directional output. Use this option if your sprayer does not have a directional valve. This means the

booms operate independently, so that they can be activated simultaneously. Selecting either of the other Directional options will force the system to operate only one boom at a time.

If your sprayer does have a directional valve, you will most likely use the “1 Valve/Cyl.” option. This is for sprayers with a single valve to select each hydraulic function, and a directional valve to determine the direction of flow. The “Up” output is activated for both raising and lowering the boom, with the Directional output determining the direction. To support directional valves with two solenoids, the Center Down output is used to drive the secondary directional solenoid (if enabled by the DIR. SECOND option).

There are some (rare) machines that use two solenoid valves per hydraulic function in addition to the directional valve. Use the “2 Valves/Cyl.” option for this situation. The Up and Down outputs will be operated to Raise and Lower each boom, in addition to the Directional output. Because the Center Down output is used to control the center section, no secondary directional output is available in this mode.

10.4 Machine Setup Directional Secondary

If the Directional valve output is enabled, the DIR. SECOND option of the MACHINE SETUP menu determines whether or not the CDN output is activated as a secondary directional output. Choose from the following options:

```
Dir. Left=  
  Disabled  
  Enabled
```

The default value is disabled. Choose Enabled if your sprayer has two separate solenoid valves to control hydraulic flow direction.

10.5 Machine Setup Directional Left

The DIR. LEFT option of the MACHINE SETUP menu defines how the Directional valve works to operate the left boom. The Directional valve will be activated for one direction, and not activated for the other. Choose from the following options:

```
Dir. Left=  
  Down  
  Up
```

Choose “Down” if the Directional valve needs to be activated to move the left boom down. Choose “Up” if the Directional valve needs to be activated to move the left boom up.

10.6 Machine Setup Directional Right

The DIR. RIGHT option defines how the Directional valve works to operate the right boom, just like the DIR. LEFT option described above.

10.7 Machine Setup Directional Center

The DIR. CENTER option defines how the Directional valve works to operate the center

section, just like the DIR. LEFT option described above.

10.8 Machine Setup Master

The MASTER option of the MACHINE SETUP menu allows you to define how the Master valve signal works. Choose from the following options:

```
Activate Master=  
All outputs  
Up outputs  
Disabled
```

By default, the MASTER option is set to “All Outputs”, which means the Master valve output is activated whenever the AutoGlideXR system activates any of its control outputs. This is useful in open-center hydraulic systems to activate the master valve.

The “Up outputs” option is useful in hydraulic systems that require activation of a central valve or pump only when a boom needs to be lifted. With this option selected, the Master output will be activated only when the system makes an up adjustment to one of the booms.

Select “Disabled” if the Master output is not needed.

10.9 Machine Setup Proportional Control

NOTE: This option applies only to machines that have proportional solenoid valves. If unsure, leave all values at default value of 100%

The PROP. CONTROL option of the MACHINE SETUP menu allows you to adjust the speed at which the booms raise and lower by adjusting the flow rate of the proportional solenoid valves. The flow rate of each solenoid valve can be adjusted individually by choosing from one of the following sub-menu options:

```
LEFT UP  
LEFT DOWN  
RIGHT UP  
RIGHT DOWN  
CENTER UP  
CENTER DOWN  
DIR. VALVE  
MASTER
```

After pressing ENT for one of the sub-menu options, you are then allowed to adjust the flow rate by choosing a percentage between 10% - 100%. Default value is 100% (full flow rate). Press ENT to save the new value.

11 Self Calibration

NOTE: Do not attempt Self-Calibration in a rough field. The uneven surface will produce erratic sensor readings that make it impossible to obtain an accurate calibration.

The SELF CAL menu is used to initiate the Self Calibration procedure. This procedure is used by the Controller to learn how quickly the booms respond when the hydraulics are activated, and how far the booms continue to travel after the hydraulics are turned off. Without running the Self Calibration, the controller may move the booms too quickly, resulting in excess adjustments. In some cases the booms may go into a constant back-and-forth rocking motion. It is therefore imperative to run Self Calibration before attempting to use the AutoGlideXR system.

Note that on some sprayers with loosely suspended booms, the Self Calibration may not correctly gauge the response of the booms. If you find the booms are still overshooting or rocking back and forth after Self Calibration, try adjusting the Motion Control parameters (in the CONFIG menu) to a slower setting (see section 7.11).

When you select SELF CAL you are prompted to select which boom to calibrate:

```
Start Self Cal:
```

```
LEFT/RIGHT
```

```
LEFT ONLY
```

```
RIGHT ONLY
```

```
CENTER
```

For the most part only the left boom need to be calibrated, because the left and right booms behave the same way. Choosing the LEFT/RIGHT mode will calibrate the left boom, and when finished, copy all the Control parameters for the left boom into the right boom. This mode will also calculate any interaction between the left and right booms.

For machines with hydraulics that differ greatly between the Left and Right boom, you can choose to calibrate each boom separately to set each boom's individual Control parameters. If you have a center sensor to control the center rack, you should also calibrate the center rack by selecting CENTER.

Note that for Lift/Tilt control of a combine header, the SELF CAL menu shows the options LIFT and TILT to calibrate the two header control functions.

After selecting the function you want to calibrate, press ENT to proceed with Self Calibration (or ESC to return to the main menu).

Before you initiate Self Calibration, ensure that both booms are fully extended, are reasonably level, and are 36 to 48 inches above the ground. The booms should be able to move both up and down from the starting position. If the boom cannot go below level, then start it 18 to 24 inches above level. The hydraulic fluid should be at normal working temperature, and the hydraulic pump should be running at normal operating speed.

Self Calibration is performed with the sprayer standing still. Ensure that the sonar sensors are pointed to clear level ground. A paved yard is ideal.

Once you initiate Self Calibration, the system will begin a series of up and down motions of the boom. Each successive up and down cycle will be a little larger than the preceding one. After several cycles the Controller will save the calibration values for your sprayer and display a message indicating successful completion. The entire procedure typically takes 2 to 3 minutes.

You can interrupt the Self Calibration procedure at any time by pressing the ESC button. This will leave the calibration values unchanged.

11.1 Testing for Control Stability

After running the Self Calibration, you should check the stability of the system's boom control.

CAUTION: *Be careful when testing the boom operation, as the booms can move up and down rapidly. Be sure to stay clear of the boom when the AutoGlideXR system is engaged, and always be prepared to disengage the AutoGlideXR system (by pressing ESC).*

For best results, perform the test over a fairly flat surface such as a paved yard. Extend both booms and raise the booms to normal working height. Engage Automatic mode on the Controller, and set the target height to normal working height so that the booms are at rest and the system is not making any corrections.

Now use some large flat object to trick the sensor into seeing a reduced height. A cardboard box works well. Have a helper place or hold the object about 12 inches off the ground. The AutoGlideXR system should raise the boom to maintain the target height above the object. The boom should move up to its new position with very little overshoot. Depending on the boom construction, the other boom may move up and down somewhat, but it should stay close to its target position.

Now withdraw the object. The boom should move back to its original height, again without much overshoot, and without much action of the other boom.

If there is a lot of overshoot, or if the booms start rocking back and forth, boom control needs to be stabilized. Refer to section 12 for information on how to correct instability.

12 Troubleshooting

12.1 Connection between Controller and Interface Box

The Controller communicates with the Interface Box to obtain sensor data. If there is a problem with the communication with the Interface Box, the status line will show:

```
Comm. error
```

If you see this message, check that the Interface Box cable is correctly connected to the Controller, and that the cable has not been pinched or damaged.

In the Interface Box, check the red and green LEDs. The red LED is on whenever power is applied to the Interface Box. If the solenoid power supply connected to the Interface Box has too low a voltage (or is missing altogether), the red LED will blink.

The green "Comm" LED is on during normal operation. If the "Comm" LED is off or is blinking, there is a problem with communication. Check that the A and B wires are correctly connected.

12.2 Sensor Operation

You can check the operation of the sonar range sensors in the Test Sensors display (see section 9.1). If some sensors are not showing a reading, try increasing the sensor sensitivity.

Note that sonar sensors have a limited range. If there is no object within 99" of the sensor, it will not show a reading ("--"). Even if there is an object closer than 99 inches, the sensor may still not show a reading because some objects do not provide a good

reflection. A typical soil surface or crop canopy should provide reliable readings out to 80 inches or more.

If you get a reading of "--" even when there is an object close to the sensor, there may be dirt or debris very close to the sensor. The sensors cannot reliably detect objects closer than about 10 inches, and may not give a reading when there is an object closer than 10 inches.

Similarly, if the reading seems to be stuck at a very low value, check for dirt or debris in front of the sensor.

If the displayed distance readings are still incorrect, check that the sensors are correctly plugged into their respective sensor cables. Check that the wires of the sensor cable are connected to the correct terminals in the Interface Box. Also check for damage to the sensors and their cables.

If a sensor reading shows "XX", there is a problem communicating with the sensor. Check the connections and wiring to the sensor.

12.3 Boom Rocking or Overshooting

On some sprayers you may find that the AutoGlideXR system is moving the booms too far when making height adjustments. This produces poor height control, and can result in a back-and-forth rocking motion of the booms. There are a number of ways to correct this behaviour:

- ⑩ First make sure you have run the Self Calibration procedure (refer to section 11).
- ⑩ Ensure that the Delay configuration parameters are not set too low (see sections 7.2 and 7.3). For an unstable boom, the Delay for Up should be at least 1.0 seconds. Also try setting the Delay for Down to a bigger value than Delay for Up (eg. 2.0 seconds).
- ⑩ Try changing the Motion Control settings to a slower setting (see section 7.11)
- ⑩ Check the Quick Raise Height setting and make sure it is not set too close to the target HEIGHT (see section 7.6).
- ⑩ You can help stabilize boom control operation by minimizing uncontrolled motion of the boom. Ensure that any shock absorbers are in good condition, and replace them if necessary. If the boom has an auto-leveling feature, adjust it for minimum action or consider locking it out completely.
- ⑩ If your boom hydraulics are very fast, it may be necessary to install flow restrictors. This reduces the hydraulic flow rate, helping to achieve stable control. You can use one-way flow restrictors to reduce the downward speed of the boom hydraulics but maintain fast upward speed.

12.4 Boom Height Corrections Too Slow

If you are finding that the booms are not brought back to the correct height quickly enough, there are a number of things you can check:

- ⑩ Reducing the CONFIG Delay for Up and Down settings will cause the AutoGlideXR system to initiate height corrections more quickly.
- ⑩ Setting the CONFIG Quick Raise Height to 10" below the target height will cause

the AutoGlideXR system to lift the boom immediately when it gets too close to the ground.

- ⑩ The AutoGlideXR system can only move the booms as fast as the hydraulics will go. If your sprayer's booms seem to move too slowly, contact your sprayer dealer to see if the hydraulic speed can be adjusted. On some sprayers, restrictor orifices are installed in the lines to the boom lift cylinders. Removing these orifices or replacing them with less restrictive orifices can speed up boom movement.
- ⑩ If the booms move faster going down than up, consider installing one-way flow restrictors to reduce downward speed but maintain full upward speed.

13 System Components

61417	RH4050	Controller Monitor
61409	RH4051-B	Interface Box
61403	RH4020-B	Sonar Sensor Assembly
61404	HW4021	Hardware kit for Sonar Sensor
61411	WA1022-90	Sonar Sensor Cable - 90'
61412	WA1022-50	Sonar Sensor Cable - 50'
61307	RH224	Cable: Interface Box Power, 2-conductor, 20'
61313	RH225B	Cable: Interface Box to Solenoids, 6-conductor, 20'
61314	RH226	Cable: Interface Box extra Solenoids, 2-conductor, 20'
61319	RH229	Cable: Interface to Controller, 50'
61316	RH230	Cable: Controller Power, 2-conductor, 10'
61302	RH231	Cable: Extension and disconnect for RH229, 20'(optional)
AB883		Cable, Interface Power Disconnect Harness
70801		Monitor & Power Disconnect Kit (includes 61302 & AB883)
61308		2 pin Deutsch Y-Cable Harness
61320		2 pin Weatherpack Y-Cable Harness
61419		Sensor Mount Plate, Bestway Booms
61406		Sensor Mount Plate Hammer strap
B56.6C		Carriage Bolt, 5/16NC x 6 (for 61419)
LN56NYLSS		Lock Nut, 5/16NC

14 Specifications

Controller supply voltage: +12VDC, 1A max.

Interface Box supply voltage: +12VDC, 15A max.

Sonar sensors:

Type: Ultrasonic sonar range sensor, 10 degree beam angle

Range: 10" to 99" (range depends on field conditions)

Environment: Sealed to IP67, mounted in protective casing

Temperature: -25C to +85C

Solenoid Control Outputs: Normally open, +12VDC, 4A max. current

Controller Case: 160 x 90 x 65 mm (6.3 x 3.5 x 2.5 inches)

Interface Box Case: 160 x 160 x 65 mm (6.3 x 6.3 x 2.5 inches)

Liquid tight cable glands for all cable entries

Cases are made of impact resistant and flame retardant ABS, with gaskets to seal out moisture and dirt.

