GREENTRONICS

Conveyor Scale and Yield Monitor

Installation
and
User
Manual

CS430, CS431
YM431

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CE Declaration of Conformity

Greentronics Ltd. declares that the products covered by this manual have been tested and found to conform with the requirements of European Council directive 2009/64/EC for EMC. Contains a Bluetooth radio module.

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Table of Contents

1. Introduction

Thank you for purchasing the Greentronics in-line Conveyor Scale or Yield Monitor.

The CS430 Conveyor Scale is an in-line weighing system that weighs any product as it is moved on a conveyor to a truck, bin, or pile. The system is simple to install, calibrate, and use.

By continually measuring the weight of a small section of the conveyor belt, the Conveyor Scale computes the accumulated weight of product that passes over the conveyor. The Conveyor Scale also measures the speed of the conveyor drive shaft, thereby taking into account any variations in conveyor speed.

The quick and simple tare calibration allows the system to subtract out the weight of the conveyor belt, leaving only the net product weight.

The same Conveyor Scale technology forms the basis of the Yield Monitor system. The YM430 Yield Monitor requires only an external source of DGPS data to provide a complete integrated yield monitoring solution on any harvesting machinery that uses a conveyor to carry the harvested crop.

Alternatively the YM430 can be configured to output real time yield data to a third party yield monitor for display and storage.

The Conveyor Scale system consists of the following parts:

- **Console –** Displays weight, provides keypad to control calibration etc.
- **Load Cells** – Mounted under conveyor belt to weight product
- **Drive Shaft Sensor** – Mounted at drive shaft to measure conveyor speed
- **Tilt Sensor** – Optional sensor to measure the tilt angle of the conveyor.
- **Junction Box** – Connects to load cells and shaft sensor; connects to Console through single cable to allow remote mounting of the Console

The YM430 Yield Monitor provides one or more additional components to make serial connections and transfer data:

- **Yield Data Serial Cable** – Cable to connect Console to third party yield monitor
- **Flash Socket –** Located on top of the Console case, for yield data transfer
- **Flash Drive –** Stores up to 4 GBytes of yield data
- **USB Adapter –** Adapter to plug a Flash drive into a standard computer USB port
- **GPS Serial Cable** – Cable to connect Console to external DGPS receiver

2. Installation Instructions

This section provides installation instructions for components to be mounted on the conveyor. Should you need further information, please contact your dealer or Greentronics.

Please read through the following instructions. It is important you have a basic understanding of the steps involved before you begin the work.

You will be installing load cells. Please note that the standard load cells in the Greentronics Conveyor Scale system have a maximum load capacity of 250 lb. You can exceed this when using a long wrench

to tighten a connection to the load cell, or when an average size person hops onto the conveyor. There is some safety margin built into the design of the cell, but once it is over-stressed, the damage is irreparable, and the load cell must be replaced.

The following instructions may be used as a guide for the installation of the in-line weighing system in a conveyor. Points listed below describe in general terms how each component of the system may be installed. Note that no dimensions are given. Each installation varies from the next. You will have to adapt the information here to suit your own situation. When choosing materials and deciding on dimensions, keep in mind that it is better to have as little "dead" weight as possible. Dead weight is the weight on the load cells with an empty conveyor. More dead weight usually means a reduction in accuracy.

2.1 Installation of load cells

NOTE: Be sure to mount the load cells with the arrow on the end of the load cell pointing down!

Conveyor Types

The in-line weighing system can be used on solid belt conveyors where the belt is supported by a continuous slide or on tube rollers. It can also be used on belted chain conveyors supported by individual rollers at the edges of the conveyor.

The conveyor in which the load cells are to be installed should have a sturdy frame, providing rigid support for the conveyor and the load cells. Any flexing of the conveyor's support frame will affect weight measurement accuracy.

The section of the conveyor in which the load cells will be installed should be supported at both ends. An "overhanging" conveyor inevitably experiences a lot of stress, which will affect measurement accuracy.

The conveyor does not have to be level, since the calibration steps will account for any tilt of the conveyor. However, if the conveyor's tilt angle is too steep, the crop being carried on the conveyor may experience roll-back or shifting, which will affect the accuracy of the weight measurements.

If the conveyor tilt angle changes during operation, you will need to install the optional tilt sensor. The tilt compensation automatically adjusts load cell output for the angle of the conveyor.

The next three sections describe installation of the load cells in the three different types of conveyors: belted chain, flat belt on a continuous support, and flat belt on tube rollers.
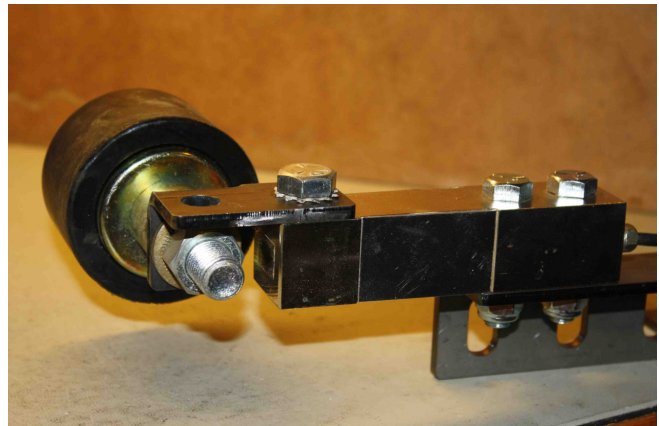
Belted Chain Conveyors

Select the most appropriate location for the load cells. Try to select a spot at least two support rollers away from the drive rollers.   This avoids errors due to possible "wobble" or dirt build-up on the drive roller.

If the conveyor is inclined, it is best to install the load cells near the bottom of the conveyor. This minimizes the tension in the belt, which reduces weight errors due to any mechanical misalignment.

Remove the support rollers at the selected location. Note that in some conveyors rollers are not exactly opposite each other. In such cases, it is necessary to add a location (drill a hole) for a roller so that rollers mounted to the load cells end up opposite each other, perpendicular to the conveyor web. Adjoining rollers (the rollers before and after the rollers on the load cells) should also be moved opposite each other.

Carefully inspect the rollers you just removed. If they are in good condition, and revolve easily on their bearings, you can use them for installation on the load cells. If you are not satisfied, install new rollers.

You received roller mounting brackets with the load cells. Attach these to the load cells with the 1/2 inch fine threaded bolts. Also attach the load cell to the angle brackets provided in the kit. Be sure to mount the load cells with the arrow on the end of the load cell pointing down. Now position the load cells on the outside of the conveyor frame in such a way that the bolt hole through the bracket is exactly in line with the bolt hole of the roller
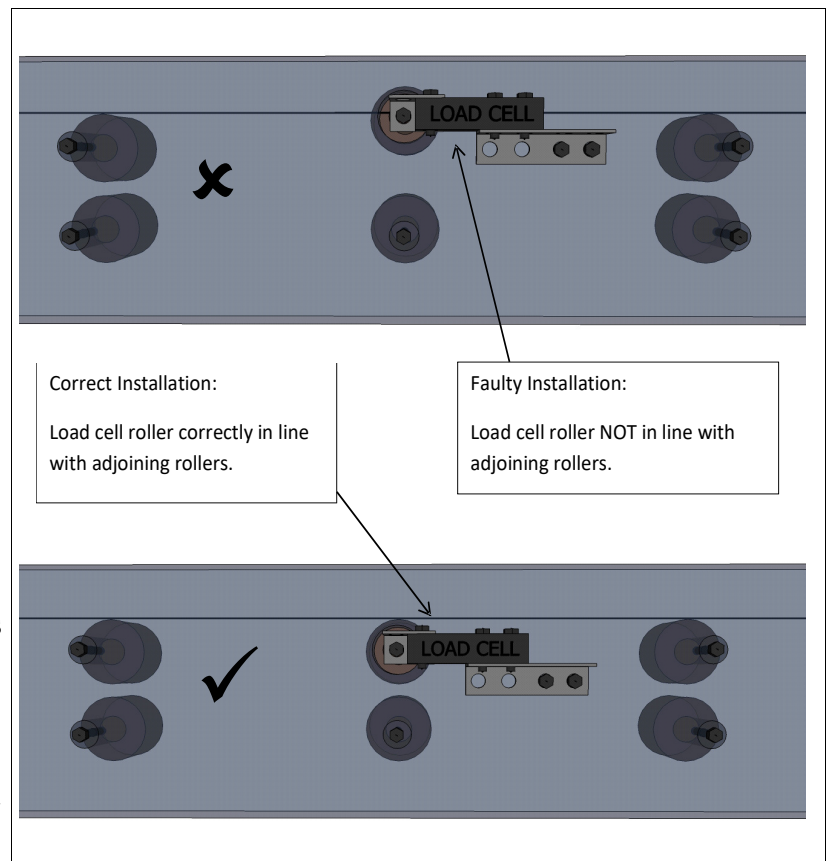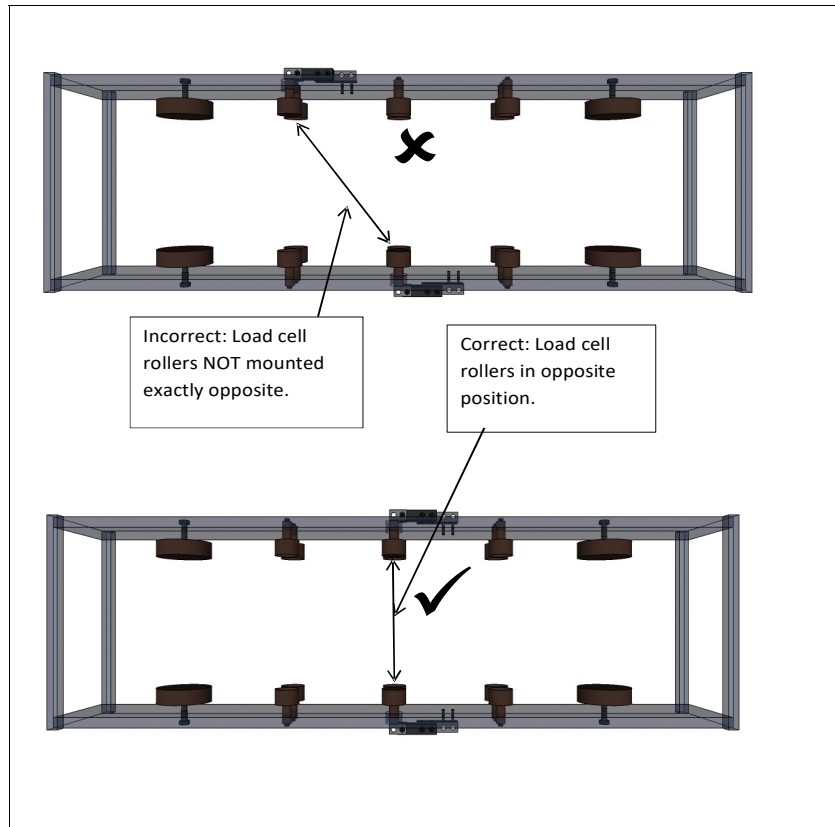
Incorrect: Load cell rollers NOT mounted exactly opposite.

Correct: Load cell rollers in opposite position.

Correct Installation:

Load cell roller correctly in line with adjoining rollers.

Faulty Installation:

Load cell roller NOT in line with adjoining rollers.

you removed. Measure the length of bolt you need through the bracket, conveyor frame, and roller so that the roller ends up back in its original position beneath the belt. You will need bushings or washers to achieve the proper distance.

Enlarge the original bolt holes in the conveyor frame so that there is at least 0.25 inches play around bolts and/or bushings. The larger hole size allows for the minute amount of movement in the load cells as loads are applied. It will also allow aligning the load cell/roller combination by shifting it up or down slightly.

To align the load cell/roller assembly for height, use a straight edge and place it over the support rollers on either side of the load cell roller. The load cell roller should just touch the straight edge. Now mark the mounting holes for the load cell brackets, drill holes, and mount the load cells.

Flat Belt on Continuous Support

In this type of conveyor, a solid belt is supported by a continuous flat slide. In order to do in-line weighing on this type of conveyor, it is necessary to cut out section of the slide and support it on the two load cells.

Select the most appropriate location for the load cells. They should not be located too close to the end of the conveyor, as imperfections in the drive roller or dirt build-up can cause the belt to lift and drop slightly.

The section to be weighed should generally be 2 to 4 feet in length. In general, the longer the weighed section, the better the accuracy of the system. However, making the weighed section too long will make it harder to keep the weighed section rigid. Also, the weight limit of the load cells must be respected.

Weighing panel in conveyor with solid belt.
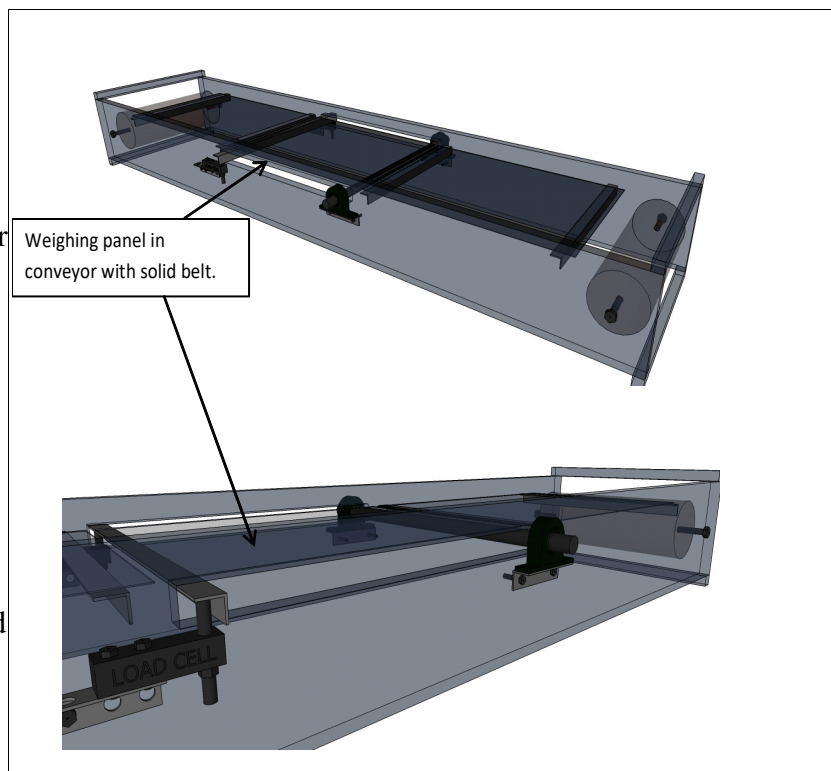
Cut out the section of the slide that will be supported by the load cells. Shorten the cut section slightly to ensure there will be a gap at its front and back edges when it is installed back into the conveyor. You should leave gaps of at least 1/4", so cut the section about 1/2" short.

Attach a length of angle iron under one of the cut edges of this section. The angle iron should be long enough to protrude through the side walls of the conveyor.

Attach a similar length of round rod under the other cut edge of the slide section.

If the slide material is not sufficiently rigid, mount some lengths of angle iron lengthwise under the slide section to keep the slide section rigid.

Cut out openings in the conveyor side walls to allow the angle iron and rod ends to pass through.

Place the cut section back into the conveyor to align the mounting brackets.

The round rod end must be able to"hinge", which is accomplished using pillow block bearings mounted on simple angle iron brackets mounted to the outside of the conveyor side walls. The round rod will fit into the pillow block bearings (which must match the diameter of the rod). Mount the bearing support brackets slightly low, so that you can use some washers to adjust the final height of the slide section.

The angle iron end of the weighed slide section will be supported by the load cells. Mount the load cells to the outside of the conveyor wall using the supplied brackets. Position the load cells so they are slightly (1" or so) below the angle iron. This allows adjustment of the slide section height using the lengths of 1/2" fine threaded rod screwed into the load cell end.

Be sure to mount the load cells with the arrow on the end of the load cell pointing down.

After you have installed all the brackets and installed the pillow block bearings and the load cells, adjust the height of the weighed slide section. The goal is to have the weighed section line up exactly with the fixed section before and after it. At the pillow block bearing end, insert or remove washers to adjust the height of that end of the weighed section. At the load cell end, adjust the threaded rod in the load cells.

Once the weighed section is nicely aligned, check that the two load cells are sharing weight evenly. Do this by checking the Load Cells display in the Test menu. The readings do not need to be identical, but should be fairly close (within 500 counts or so). Small adjustments to the threaded rod will balance the weight between the two load cells.

After completing the adjustments, fix the threaded rod on the load cells in place by tightening a nut on the threaded rod against the load cell.

Flat Belt on Tube Rollers

In this type of conveyor, a solid belt is supported by a series of supporting tube rollers. In order to do in-line weighing on this type of conveyor, it is necessary to remove one of the support rollers and re-mount it on the two load cells.

Select the most appropriate location for the load cells. They should not be located close to the end of the conveyor, as imperfections of the drive roller or dirt build-up can cause the belt to lift and drop slightly.

Select the most appropriate location for the load cells. Select a roller at least

Correct Installation:

Load cell roller correctly in line with adjoining rollers.

Faulty Installation:

Load cell roller NOT in line with adjoining rollers.
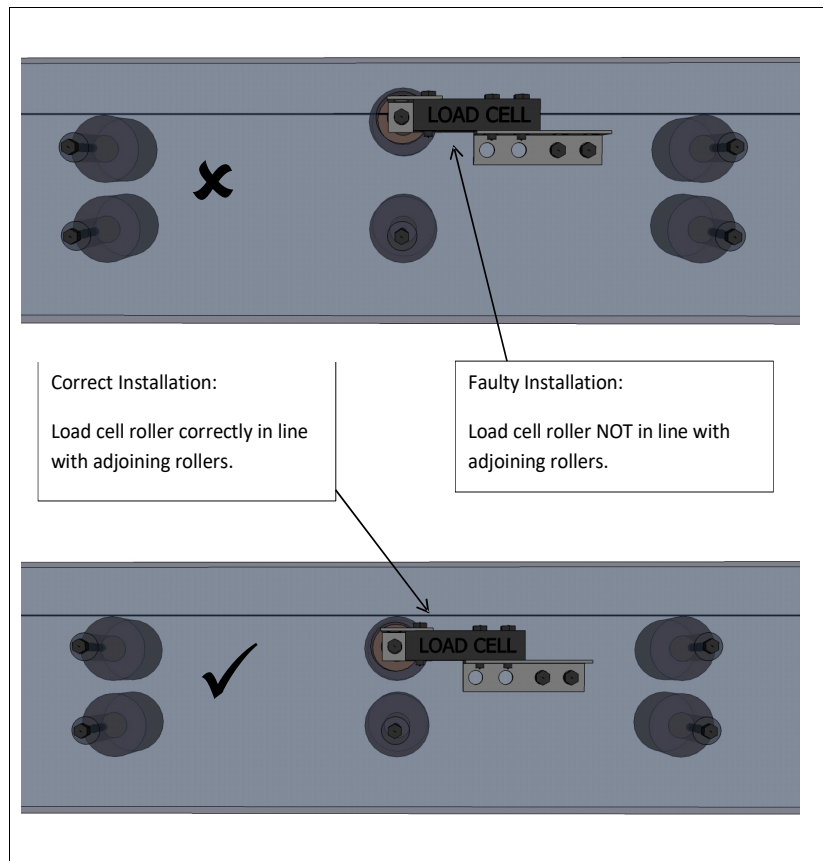
two support rollers away from the drive roller. Imperfections of the drive roller or dirt build-up can cause the belt to lift and drop slightly.

Remove the support roller at the selected location. Carefully inspect the roller you just removed. If it is in good condition, and revolves easily on its bearings, you can use it for installation on the load cells. If you are not satisfied, install a new roller.

You received roller mounting brackets with the load cells. Attach these to the load cells with the 0.5 inch fine threaded bolts. Also attach the load cell to the angle brackets provided in the kit. Be sure to mount the load cells with the arrow on the end of the load cell pointing down. Now position the load cells on the outside of the conveyor frame in such a way that the bolt hole through each bracket is exactly in line with the bolt hole of the roller you removed. Measure the length of bolt you need through the bracket, conveyor frame, and roller so that the roller ends up back in its original position beneath the belt. You will need bushings or washers to achieve the proper distance.

Enlarge the original bolt holes in the conveyor frame so that there is at least 0.25 inches play around bolts and/or bushings. The larger hole size allows for the minute amount of movement in the load cells as loads are applied, and also allows for alignment by shifting the entire load cell/roller combination.

NOTE: To avoid creating stress between the load cells, one end of the roller must be left free to move in the load cell's angle bracket!

When attaching the support roller to the load cells via the angle brackets, the bolts must be securely fastened to the roller. However, there needs to be some play at the angle bracket of one of the two load cells. This allows for some small side-to-side movement. If both ends of the roller are bolted solidly to the two load cells, there will be a great deal of lateral stress between the load cells. This stress will affect accuracy, and can damage the load cells.

To align the load cell/roller assembly for height, use a straight edge and place it over the support rollers on either side of the load cell roller. The load cell roller should just touch the straight edge. Now mark the mounting holes for the load cell brackets, drill holes, and mount the load cells.

2.2   Mounting Shaft Sensor and Magnets

Conveyor speed has to be measured to measure the total crop weight. We use very simple and reliable magnets and sensors for measuring conveyor speed. Small round disk magnets are provided in the kit. These magnets should be mounted to the conveyor drive shaft, held in place using a stainless steel hose clamp (supplied).

Stack 2 of the disk magnets on top of each other and stick them to the shaft. Place the hose clamp over the shaft and magnets, positioning the adjustment screw on the opposite side of the shaft from the magnets. Tighten the hose clamp so the magnets are held firmly in place, but do not over-tighten or the magnets might break. If there is a long tail of excess length on the hose clamp, cut it off to avoid problems with hitting the magnet sensor.

Next, prepare a sensor mounting bracket. Generally, a short piece of one inch flat bar (1/8 inch material) works well. Drill a hole in one end to fit the sensor, then bend this end to the correct angle so that the sensor ends up about 1/4" away from the magnets. The sensors are threaded so that fine adjustment is possible. Make sure the hose clamp adjustment screw clears the sensor.

2.3　Mounting the Tilt Sensor

If you purchased the tilt compensation option, a tilt sensor is used to measure the tilt angle of the conveyor so that weight readings can be corrected at varying tilt angles.

The tilt sensor (part # STXY002) must be mounted in the same plane as the load cells. In other words, the tilt sensor should be horizontal when the load cells are horizontal.

2.4　Mounting the Temperature Sensors

If you purchased the temperature sensor option, two sensors are provided to measure the temperature of the crop and the air temperature.

The air temperature sensor is mounted in a spare cable entry in the Junction Box. The picture shows it mounted in the bottom right cable gland.

The air temperature sensor should be positioned so that it is not exposed to direct sunlight, and it should not be placed near any source of heat (such as hot hydraulic lines).

The air temperature sensor has two black wires. One wire goes to AIN2, and the other wire goes to the EXC+ terminal of the unused Load Cell 4 terminal block.
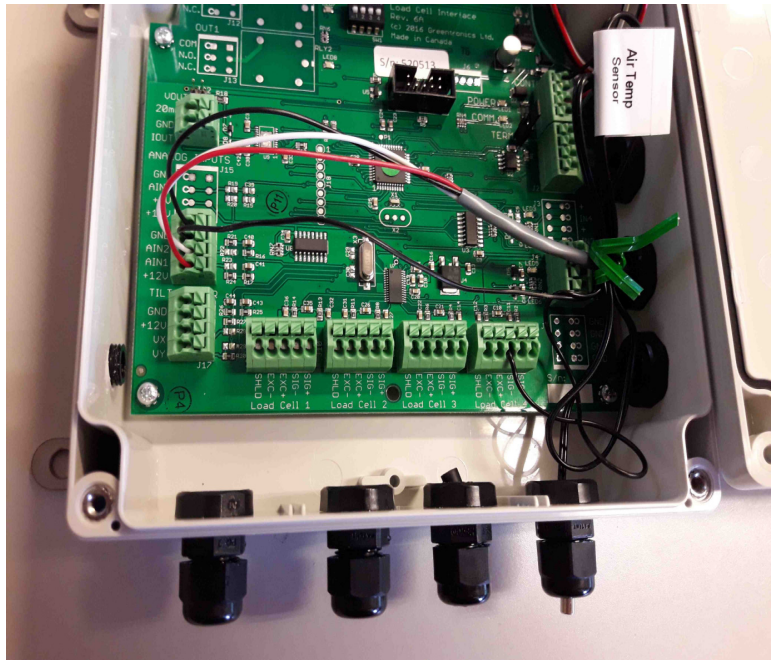
The crop temperature sensor must be mounted above the conveyor carrying the crop. It is best to position it 18 to 36 inches (50 to 100 cm) above the maximum crop level. The sensor's field of view is a circle that is ¼ the diameter of the distance between the sensor and the crop. For example, if the sensor is mounted 24 inches (60 cm) above the crop, its field of view will be a 6 inch (15 cm) diameter circle.

The crop temperature sensor connects to the Junction Box through a WA1073 cable. This cable connects to the ANALOG INPUT terminal block: black to GND, white to AIN1, and red to +12V.
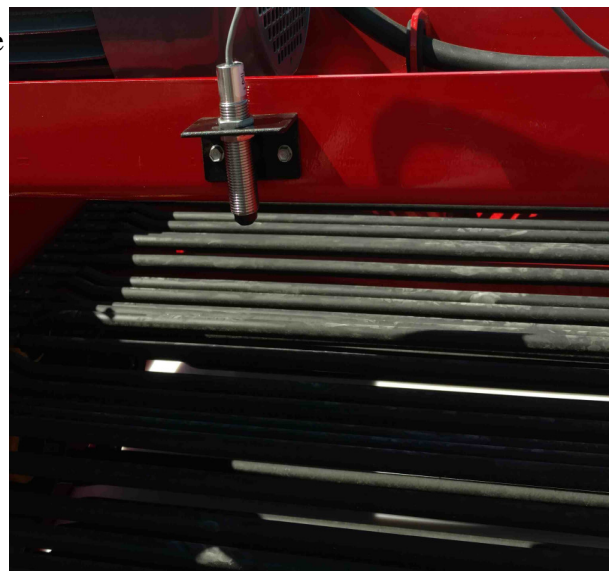
2.5   Mounting the Console

The Console 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 Console. Use the supplied alcohol wipe to clean both surfaces before installing the adhesive pad.

Once the Console is mounted, connect it 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 Console is accidentally left on.

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

Connecting the Yield Monitor Console to ISOBUS

If you have purchased the ISOBUS option for the YM430 yield monitor, the Console does not need to be mounted in the cab. Mount it in any convenient location with easy access to the ISOBUS connector.

The Console's ISOBUS "Tee" harness provides two Deutsch DT 4-pin connectors, one plug and one receptacle. This allows inserting the Console into an existing ISOBUS daisy-chain connection.

If the ISOBUS you are connecting to is not terminated, you can enable the Console's internal terminator. Remove the lid from the Console, and locate the four small switches. Set switch 3 ON (up) to enable the ISOBUS terminator.

You can also configure the Console to always turn on when power is applied. This is done by setting switch 1 ON.

2.6   Mounting the Junction Box

CAUTION: When replacing the Junction 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 load cells and drive shaft sensor will connect to the Junction Box. A single cable then connects the Junction Box to the Console. This allows the Console to be mounted away from the conveyor.

Choose a safe location for the Junction Box. Ideally, it should be mounted in a spot where it can not be hit by crop debris, stones, etc. It should also be in a dry spot, away from oil and grease. Keep in mind that load cells come with 20 ft of shielded wiring. The Junction Box should be mounted within this distance.

Mount the Junction 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 Junction 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 Junction Box.

NOTE: Make sure to mount the Junction Box so that the side on top has no cable entry glands. This side has a sticker "This side up".

2.7 Wiring

Run the load cell and magnet sensor cables to the Junction Box. Do not cut the load cell cables! It is difficult to add cable later if that becomes necessary. Also, adding connections later can reduce precision. Left-over cabling is easily coiled up and tucked away in a safe corner.

Choose the most direct and safest route. Keep cables well away from rotating shafts, sprockets, chains, sharp edges, etc. Also keep wiring away from work areas, or areas where dirt and stones pile up. Use cable ties to secure the wiring.

Use the cable glands on the right side of the Junction Box for the cable to the Console and the shaft sensor cable. Use the cable glands on the bottom of the case for the load cell cables.

Make sure that any unused cable glands are plugged. This can conveniently be done using a short piece of spare cable.

Following are instructions for connecting the various wires. A summary of these instructions is also included inside the Junction Unit. Please follow these instructions carefully, since incorrect wiring could result in damage to the sensors and/or the electronics.

All the wires connect to the terminal blocks inside the Junction Unit. Push the button on top of each terminal using a small screwdriver to release the contact, and insert the wire. Ensure each wire is fully inserted into the terminal, and no loose strands are exposed. Test each connection by gently pulling on the wire. Insulate bare wires with a sleeve or electrical tape.

Load Cell 1 to 4 (bottom of Junction Box circuit board)

SHLD	Bare wire
EXC-	BLACK
EXC+	RED
SIG-	WHITE
SIG+	GREEN

Magnet Sensor 1 – Drive shaft magnet sensor (bottom right of circuit board)

+	RED
IN1	BLACK

Magnet Sensor 2 – Various uses (near bottom right of circuit board)

+	RED
IN2	BLACK

Tilt Sensor – Tilt sensor (bottom left of circuit board)

GND	BLACK
+12V	RED
VX or AIN1	WHITE
VY or AIN2	GREEN

CONTROLLER - Cable to Console Unit (top right of circuit board)

COMA	BLACK
COMB	WHITE
+12V	RED
GND	Bare wire

Air Temperature Sensor – AIN2 (bottom left of circuit board)

AIN1	One wire of thermistor temperature sensor
+5V	Second wire of thermistor temperature sensor

NOTE: If the +5V terminal is not available, use the EXC+ terminal of an unused load cell terminal block.

Crop Temperature Sensor – AIN1 (bottom left of circuit board)

GND	BLACK
AIN2	WHITE
+12V	RED

Output OUT1 – optional Alarm output (top left of circuit board)

COM	Common connection of relay contacts
N.O.	Normally Open relay contact
N.C.	Normally Closed relay contact

4-20mA OUT – optional analog current loop output (left of circuit board)

GND	Ground (return) connection for current loop
IOUT	Current output (4 to 20mA)

After completing all wire connections, replace the cover on the Junction Box. The cover screws should be snug, but not over tightened.

2.8 Alarm Output (Optional)

The Junction Box may be equipped with an optional alarm output to indicate when the accumulated weight for a load exceeds the configured weight limit. This output is intended to activate an alarm indicator to tell the operator to stop loading a truck. The alarm output can also be used to automatically turn off power to a conveyor when the weight limit is reached.

The alarm output consists of an uncommitted relay contact, with access to the common, normally open (N.O.) and normally closed (N.C.) contacts. When the alarm output is active, it activates the relay, which closes the N.O. contact and opens the N.C. contact. The relay contacts are rated for up to 24VDC or AC at up to 2A.

Refer to "Run" in section 5 for information about how to set weight limits.

2.9 20mA Current Loop Output (Optional)

The system may be equipped with an optional 4 to 20mA analog current loop output. This output can be configured to provide an indication of accumulated weight, or of the rate at which material is passing by on the conveyor. This can be used to provide data to a PLC or other controller that requires weight information. Refer to the Config section for information on how to configure the output.

Connect a 2-wire cable to the 4-20mA OUT terminal block. The IOUT terminal should connect to the positive terminal of the PLC, while the GND terminal should connect to the negative terminal.

If the PLC requires a voltage input rather than a current input, install a jumper on the VOUT header. This will provide a voltage output of 1.0V to 5.0V on the IOUT terminal.

2.10 Connecting Cables

Following is a description of each of the cables in the system and where it should be connected.

Console Power Cable (RH230): This 10 ft long cable has a 2-pin round female connector on one end, which plugs into the matching 2-pin male power connector on the Console. Depending on the power option you selected, the other end of the power cable has an AC power adapter which plugs into a standard 120VAC outlet, or two stripped wire ends to connect to a +12V DC power source. Connect the red wire to +12V, and the black wire to Ground.

Magnet Sensor to Junction Unit (WA1039): This cable is for the conveyor drive shaft sensor. The cable has a round 2-pin male connector on one end (to connect to the magnet sensor), and 2 stripped wires (red and black) at the other end. If the magnet sensor cables are much too long, you can cut off the excess at the Junction Unit, or you can just coil it up somewhere.

Tilt Sensor to Junction Box (WA1020): This cable is for the optional external tilt sensor. The cable has a round 4-pin male connector on one end (to connect to the tilt sensor), and 4 stripped wires at the other end.

Crop Temperature Sensor to Junction Box (WA1073): This cable is for the optional crop temperature sensor. The cable has a 4-pin Deutsch receptacle on one end (to connect to the crop temperature sensor), and 3 stripped wires at the other end.

Junction to Console Cable (WA1055): This 50 ft long cable has a 4-pin round female connector on one end, which plugs into the matching 4-pin male connector on the Console. The other end of this cable has 4 stripped wire ends that connect to the MONITOR terminal block in the Junction Box.

Console Communication Harness (WA1040): This 10 ft long cable has a 14-pin Ampseal connector that plugs into the Console. It also has a pair of 4-pin Deutsch DT connectors for connecting to an optional ISOBUS Virtual Terminal. And it has a 3-pin Deutsch DTM connector for serial communication.

Yield Data Output Cable for Yield Monitor (WA1043): This 10 ft long cable has a 3-pin Deutsch DTM connector on one end, which plugs into the matching 3-pin connector on the WA1040 harness. The other end of this cable has a female DB-9 connector that plugs into the serial port of a third party yield monitor that collects yield data.

GPS Input Cable for Yield Monitor (WA1042): This 10 ft long cable has a 3-pin Deutsch

DTM connector on one end, which plugs into the matching 3-pin connector on the WA1040 harness. The other end of this cable has a male DB-9 connector that plugs into the serial port of a suitable DGPS receiver.

Y-Cable Assembly for GPS Input and Data Output for Yield Monitor (WA1044): This cable assembly has 3 connectors. It is used to connect to both a GPS receiver and an external data logging monitor. The 3-pin Deutsch DTM connector plugs into the matching 3-pin connector on the WA1040 harness. The male DB-9 connector plugs into the serial port of a suitable DGPS receiver. The female DB-9 connector plugs into the serial port of a third party yield monitor.

2.11 What Next?

You are now ready to start calibration. Refer to the "Initial Calibration Steps" below for a quick run-down of the necessary calibration steps.

If you have questions, please contact your dealer. You can also call Greentronics directly at (519)669-4698, or e-mail support@greentronics.com.

3. Initial Calibration Steps

The following calibration steps must be performed before the conveyor weighing system can be used:

1. Set the clock and Machine ID. Refer to section 9.35 and 9.34.

2. Tare length calibration.

3. The optional tilt sensor is normally pre-calibrated at the factory. If you are adding a tilt sensor to an existing system, perform Tilt calibration.

4. Tare calibration.

5. After running the system to load a truck, get the truck weighed and use that weight to perform Span calibration.

4. Operating the System with the Console User Interface

NOTE: If you are using an ISOBUS Virtual Terminal (VT) for the Yield Monitor, refer to section 5.

4.1 Console Keypad and LCD User Controls

The Console has a backlit LCD display, and a membrane keypad with 7 buttons.

The PWR button is used to turn the system on and off. When the Console is off, briefly pressing the PWR button will turn on power to the Console. To turn off Console power, press the PWR button and hold it down for 1 second until the Console displays:

```
Power off...
```

When you see this message, release the PWR button, and the Console will turn off.

NOTE: With the ISOBUS VT option, the Console may be configured to turn on when power is applied (see section 2.5). In this configuration the Console can only be turned off by removing power.

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.

Holding a key will auto-repeat the button press. This is especially useful when scanning through long lists using the Up and Down arrow button.

4.2   LCD Contrast Adjustment

You can adjust the contrast of the LCD display. In the Main menu, the up and down arrow buttons change the LCD contrast. Press down for a darker display, or up for for a lighter background.

4.3   Navigating the Menu System

The user interface is based on a hierarchy of menus. From the main menu, a number of options are available, many of which bring up sub-menus with more options.

The Console'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 press the Left and Right arrow buttons to 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.

When the menu item you want is displayed, press ENT to select it.

To exit a menu and return to the previous menu, press ESC.

4.4   Choosing Parameter Values

Some options are chosen from a list of values. The currently selected value is displayed. Choose the desired new value just like you would choose a menu item, and press ENT to save your choice. If you decide you don't want to change the parameter value, press ESC to exit without saving any change you made.

4.5   Entering Numeric Data

Sometimes you will need to enter a number (for example, to enter Load Cell Range data). The current value will be displayed. If you are satisfied with this value, press ENT. If not, you can edit the value one digit at a time. An underline cursor will indicate the selected digit, which will initially be the 1's digit. Use the Up and Down buttons to increase or decrease the value of this digit. To select another digit, use the Left and Right buttons to select the digit to be changed, and then use the Up and Down buttons to change that digit.

When you are satisfied with the new value, press ENT to save it.

Pressing ESC at any point will cancel the new entry and keep the old value.

4.6   Entering Alphabetic Data

In a few places you have the option to supply a name (for a field). Entering a name is similar to entering a number, except that the selection list for each character includes letters as well as numbers. The Up and Down arrow buttons are used to choose each letter. Pressing the Down arrow when an 'A' is displayed will change the character to a blank (space). Pressing the Up arrow when a 'Z' is displayed will change the character to a '0' (zero).

When you enter an alphabetic entry field, the default value will be displayed. A blinking cursor will be shown after the last character to indicate the character position you are editing.

If you are satisfied with the default value, press ENT.

To add a new character, use the Up and Down arrow keys to choose the desired letter.

To edit other character positions, use the Left and Right arrow buttons to select each character position to be edited.

When you are satisfied with the new value, press ENT to save it.

Pressing ESC at any point will cancel the new entry and keep the old value.

4.7   Run Mode Operation with Console Keypad and LCD

The Run mode is the normal operating mode for the monitor. To enter Run mode, select "Run" at the main menu and press ENT. You will see the Run display, which will look something like:

```
L  2:    141.3 cwt*
Yld:     350 cwt/a
```

The first line shows the current load number (2) and the total weight accumulated for that load (141.3 cwt). You can switch to the next load number whenever you start filling a new truck. To select the next load number, press the NEXT (right arrow) key. The load number will go up by 1, and the previously accumulated weight (usually 0.0) for that load will be displayed. You can switch back to the previous load number by pressing the PREV (left arrow) key. The monitor can store individual weights for up to 999 separate loads. The load weights will be retained until you clear them (see the "Data" menu below).

You can clear the current load weight in Run mode by pressing the down arrow key.

The second line of the display is used to show a variety of messages. If more than one message is displayed on the second line, the display will cycle through the list of messages, with each message displayed in turn for one second.

The Config -> Display Opt menu is used to select whether current yield or flow rate (weight-per-second) is displayed, as well as optional analog input data. For a logging yield monitor, the current yield can be shown on the second line. For a conveyor scale, flow rate can be displayed.

If a weight limit has been entered, the second display line shows the weight limit. When the accumulated weight for the load exceeds the set limit, the Alarm relay output will be activated and the message "> weight limit" will be displayed on the bottom line of the display.

The second display line is also used to display error messages. If any error conditions occur, one or

more messages will be displayed on the last display line to indicate the nature of the problem.

To exit Run mode, press the ESC key.

WARNING: Always exit Run mode before turning off power to the monitor. This ensures that the Console is not writing data to memory when the power is turned off, which could result in data corruption.

Setting a Flag

While in "Run" mode you can "flag" a spot in the field by pressing the up arrow key. This inserts a "Flag" message into the yield data file.

You might use this to mark an area with poor crop, or an obstruction in the field. You can look for these flags in the yield data file to locate the problem areas later.

Changing Number of Rows

For many Yield Monitor installations it is necessary to frequently change the number of crop rows being picked up. The Console provides an easy way to do this without exiting the Run screen.

Press the ENT button and the display will change to:

```
Number of rows:
 4
```

Use the Up and Down buttons to change the number of rows, and press ENT to save the change.

4.8   LCD Menu Tree Overview

This section provides a summary of all the menu options in the Console keypad and display user interface. Details of these options are provided in later sections of this manual.

All the various options are organized into a menu tree. At the root of the menu tree is the main menu, which provides the following options:

```
Main:
  Run
  Field
  Crop
  Bin
  Tare
  Calibrate
  Config
  Data
  Test
  Update
```

Some of these options have sub-menus. Some options are only available in certain product configurations.

Calibrate:
  Tare
  Span
    Span Cal
    Edit Span
    Factory Default
  Tare Length
  Load Cells
    Number
    Range
    Sensitivity
      Load cell 1
      Load cell 2
  Tilt
    Sensor
    Level
    Load Cell Tilt
      Mounted
      Not mounted
      Default

Config:
  Operations
    Rows
    Row width
    Load Wt. Limit
    Minimum Weight
    Min. Speed
    Crop Delay
    Display Opt
      Yield (or Rate)
      AIN1 / AIN2 / AIN3
    GPS Alarm if
    Log to Memory
    Update Freq.
    Rate Filter T
    Units
      Weight Unit
      Area Unit
      Length Unit
      Time Unit
      Speed Unit
      Temp. Unit
  Input/Output
    Use IN2 for
    IN2 pulse/rev
    IN2 min. on T
    IN2 min. off T

```
        Ser. Baud Rate
        Serial Output
        Serial Display
        Belt Sensor
        Analog Inputs
           AIN1 / AIN2 / AIN3
        20mA Output
        20mA FullScale
        20mA Delay
     Tracking
        Tracking Enable
        Set Truck ID
        RF Channel
     Clock
     User Controls
     Machine ID
     Power-on Run
```
Data:
```
     Copy Files
     Delete Files
     View Weights
        Loads
        Fields
        Total
     Clear Weights
        Loads
        Fields
        Total
     Read NAMES.TXT
```
Test:
```
     Test Tare
     Load Cells
     Speed sensor
     Input IN2
     Tilt sensor
     Analog Sensors
     Relays
     20mA output
     GPS
     Simulate yield
```
Update:
```
     Console ID
     New License
     List Options
     Product Info
     Firmware
```

4.9   Reduced LCD Menu in ISOBUS VT Mode

When using an ISOBUS VT as the user interface, the Console presents a reduced set of options through the LCD user interface. These options are required for configuration of the VT interface and for system updates.

```
Main:
   USER CONTROLS
   VT DIAGNOSTICS
   VT NUMBER
   VT START DELAY
   DEVICE INDEX
   UPDATE:
     Console ID
     New License
     List Options
     Product Info
     Firmware
```

5.   Operating the System with the ISOBUS VT User Interface

The Yield Monitor provides the option of using an ISOBUS Virtual Terminal (VT) for the user interface. The VT display provides an intuitive graphical user interface, with soft keys to select menu options, and on-screen fields to display and change values.

5.1   VT Diagnostics

In ISOBUS VT mode, the LCD menu includes a VT Diagnostics option. This option shows the status of the ISOBUS communication bus as an aid to troubleshooting problems on the ISOBUS connection.

5.2   VT Number

The ISOBUS protocol allows multiple Virtual Terminal servers to be present. Each VT server is identified by an index number ranging from 1 to 16. By default the Greentronics console will connect to VT number 1. The VT Number option lets you connect to a different VT server. After changing the VT Number you must reboot the console to connect to the new VT server.

5.3   VT Start Delay

After the Yield Monitor is powered up, its display will appear on the VT. Some VT's require a delay for reliable start-up of communication with the Yield Monitor system. The start-up delay can be adjusted using the Yield Monitor's LCD interface to change the VT START DELAY setting.

5.4   Device Index

If you are are operating two or more identical devices with the same VT, you need some way of identifying each device. Set the Device Index of each device to a unique number. The VT will display the index along with the device name so you always know which device you are controlling.

Device Index can be set to any value from 0 to 9. Default is 0.

5.5   Run Mode Operation with ISOBUS VT

When the Yield Monitor is powered up, it starts up in the main menu screen. Press the RUN button to begin operation.

This will first open the SELECT FIELD/CROP screen. In this screen, select the Field number in which you are harvesting, as well as the crop being harvested. Press CONT to accept your selections and proceed to the main Yield Monitor Run screen.

The RUN screen shows a display something like this:

```
Yield:     350 cwt/acr     Run

Load Weight:  141.3 cwt [Clear]

Load #  [ - ]  7  [ + ]

# of Rows  [ - ]  4  [ + ]

Field #  16 Home Farm

Crop #    1 Burbank

      AIN1 - IR Temp: 18.1C
```

The first line shows the current yield, and whether the harvester is running ("Run" or "Idle").

The second line shows the total weight accumulated for the current load (141.3 cwt). You can clear the current load weight in Run mode by pressing the [Clear] button.

The current load number is shown on the third line. You can switch to the next load number whenever you start filling a new truck. To select the next load number, press the [+] button beside the load number. The load number will go up by 1, and the previously accumulated weight (usually 0.0) for that load will be displayed. You can switch back to the previous load number by pressing the [-] button. You can also enter a load number directly. The monitor can store individual weights for up to 999 separate loads. The load weights will be retained until you clear them (see the "Data" menu below).

The "# of Rows" determines how many crop rows the harvester is picking up. You can change this on the fly using the [+] and [-] buttons or by directly entering a new number. It is important to keep this up to date with the correct number of rows being picked up in order to generate accurate yield maps.

The next lines show the field number and name (if assigned) and the crop number and name. If data logging is enabled, the field number determines the file to which the yield data is saved. The crop name is saved along with the yield data. The selected field and crop cannot be changed in the Run screen. If you move to a different field or change crops, you need to exit the Run screen, and then select the new field and crop when you re-enter Run mode.

If one or more analog input sensors are enabled for display, these are displayed below the crop name.

If any errors occur, error messages are displayed at the bottom of the Run screen.

To exit Run mode, press the HOME button.

WARNING: *Always exit Run mode before turning off power to the Yield Monitor. This ensures that the Console is not writing data to memory when the power is turned off, which could result in data corruption.*

5.6   ISOBUS VT Menu Tree Overview

This section provides a summary of all the menu options in the Yield Monitor ISOBUS VT user interface. Details of these options are provided in later sections of this manual.

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

All the various options are organized into a menu tree. At the root of the menu tree is the main menu, which provides the following options:

```
Main Menu:
  RUN
  TARE
  SETUP
  CFG
  CAL.
  TEST
  DATA
  OPT
```

Many of these options have sub-menus to provide access to all the options.

```
SETUP:
  F/C (Fields & Crops)
    Field #
    Field Name
    Crop #
    Crop Name
  Clock Setup
  Analog Inputs Setup
    Sensor type
    Display on Run Screen
    Filter Time
  Truck ID Setup
CFG:
  Number of Rows
  Row Width
  Load Wt Limit
  Min Weight
  Weight Unit
  Area Unit
  Length Unit
  Speed Unit
  Temp Unit
```

```
        Log to Memory
        Count Inputs
        Enable Count
        Use IN2 for
        IN2 min. on T
        IN2 min. off T
        IN2 Pulse/Rev
        Min Speed
        Crop Delay
        Ser. Baud Rate
        GPS Source
        GPS Alarm if
        Update Freq.
        Rate Filter T
        Power-on Run
        Tracking
        RF Channel
        Machine ID
```
CAL.:
```
      Load Cell Cal.
         Range
         # of Load Cells
         Sensitivity
      Tare Length Calibration
      Tilt Calibration
         Level Calibration
         Tilt Calibration
      Tare Calibration
      Span Calibration
```
TEST:
```
      Tare
      Load Cells
      Speed Sensor
      Tilt Sensor
      Input IN2
      GPS
      Simulate Yield
      Test Truck IDs
```
DATA:
```
      View/Clear
         Load Weights
         Field Weights
         Total Weight
      File
         Copy Files
         Delete Files
         Read NAMES.TXT
```

```
OPT:
  Console ID
  License
  Options
```

6. Error Messages

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

```
Span Needed
```

>   For a new installation this message will appear to remind you that a Span calibration
>   needs to be performed.

```
Clock not set
```

>   The Real Time Clock is not set. A new installation requires you to set the Clock to the
>   correct local date and time. For an existing installation this message may indicate that
>   the clock's backup battery needs to be replaced. Refer to section 15 for details.

```
Mach ID not set
```

>   Go to the Config menu Machine ID option and enter a unique name for this machine.

```
Comm. error
```

>   The Console is not receiving data from the Junction Box. If you see this message, check
>   that the Junction Box cable is correctly connected to the Console, and that the cable has
>   not been pinched or damaged. Refer to section 15 for more information.

```
No GPS
```

```
GPS Error
```

>   The Yield Monitor is not receiving GPS data, or data with errors. Check that the Serial
>   Baud Rate is correct, that the GPS receiver is connected, and that the correct GPS
>   NMEA sentences are enabled on the GPS receiver (see section 14.1).

```
GPS poor signal
```

```
GPS no DGPS
```

>   The GPS data received has poor accuracy or no differential correction. If the problem
>   persists, check your GPS receiver for problems.

```
Data not logged
```

>   Yield data cannot be logged. This usually happens because the power supply voltage is
>   too low. Check the power supply connections.

```
Data write err
```

>   There was a problem writing yield data. If the problem persists, please contact
>   Greentronics.

```
Power low
```

> The supply voltage to the Console is too low for reliable operation. Check the power supply connections.

```
IF Power low
```

> The supply voltage to the Junction Box is too low for reliable operation. Check the power supply connections, and the WA1055 cable from the Console to the Junction Box.

```
 > weight limit
```

> This message is displayed when the current load weight exceeds the configured Load Wt. Limit.

```
No 20mA output
```

> The 20mA option is not installed in the Junction Box. Contact Greentronics to order an upgrade.

```
20mA open cct.
```

> The 20mA output does not have the required load resistance. To use voltage output instead of a current loop, install the VOUT jumper in the Junction Box.

```
Tilt error
```

> The tilt sensor is not connected, or is tilted at greater than 60 degrees.

The following error messages pertain to automatic Tracking of trucks being loaded through Greentronics RF Transponders.

```
RF No Device
```

> No truck transponder in range.

```
Load Truck Gone
```

> The transponder of the truck that was being loaded has gone out of range.

7. Selecting Field, Crop and Bin

When you enter Run mode, the Field setting determines the file to which yield data is logged. Accumulated weight is also added to the selected field weight total. This is useful to track the accumulated total weight for different fields.

The selected Crop and Bin (storage bin) names are stored along with the yield data for later reference. Individual weight totals are maintained for each Crop and Bin.

In the LCD display, the Field, Crop, and Bin options are accessed from the main menu. When you select Field, Crop or Bin, you will see a display similar to:

```
FIELD: 3
"SMITH FARM"
```

Select the field, crop, or bin number you want to use (1 to 99) by using the Left and Right arrow keys.

To enter or change the name, press ENT. A flashing cursor will appear between the quotation marks on the second line. Enter the name for the field, crop, or bin and press ENT to store the new name. For instructions on how to enter the name, refer to section 4.6.

After you have selected the desired field, crop, or bin number, press ESC to return to the main menu. When you next enter Run mode, accumulated weight will be added to the new field, crop, and bin numbers, and the new crop and bin names will be stored in the yield data file.

8. Calibration

All calibration functions are accessed through the Calibration menu. Most of the calibration is performed at installation time and should not need to be repeated. If no changes are made to the conveyor, only a periodic Tare calibration is needed to keep the system operating accurately.

For convenient access, Tare is accessible from the main menu as well as from the Calibration menu.

8.1 Tare Calibration

Tare calibration is used to re-calibrate the system's tare (empty) weight measurement. Over time, the load cells and the conveyor belt may accumulate dirt, causing a shift in the tare weight measured by the system. To remove this error, a tare calibration must be performed.

To recalibrate the tare level, run the conveyor until it is completely emptied. Then select Tare at the main menu (or from the Calibration menu). The display will show a time count as well as a count of the belt's progress. When the belt has made one or more complete revolutions (as set by the Tare Length calibration explained below), the calibration ends and you will be prompted whether you want to save the new data. Press ENT (or Yes on the VT) to save the new tare level.

If you need to interrupt the calibration at any time, press the ESC key (or Cancel on the VT).

8.2 Span Calibration

Span calibration is used to calibrate the system with a measured truck weight. You can perform an approximate calibration by running a test weight over the conveyor, but a full truck load should be used to get an accurate calibration.

Once you have performed an accurate Span calibration, you will not need to re-do the Span calibration unless there is a physical change to the conveyor (such as a new drive mechanism).

NOTE: Performing several span calibrations in quick succession will not improve accuracy. If weight accuracy is poor after a full truck load span calibration, check the tare calibration and the load cell installation alignment. Only after making corrections to these should you perform another span calibration.

How to Perform a Span Calibration

To perform a Span calibration, first do a Tare calibration. Then start with an empty conveyor, and go into the Run screen. If you see a warning that a Span calibration is required, press ENT to proceed to the Run screen. Fill up a truck, and run the conveyor empty again into the truck. Record the load

weight displayed by the monitor. Get the truck weighed, and record the actual weight of crop in the truck.

Now select the Span Cal option. You will be prompted to enter two numbers. The first number is the accumulated weight that was displayed by the monitor (the default is the current load weight). The second number is the actual weight reported by the truck scale. Note that both numbers should be entered in the same units. That is, if the monitor weight is reported in tons, the scale weight should also be entered in tons.

On the LCD, after typing in the first number (monitor weight), press ENT. You will be prompted to enter the actual (scale) weight. After entering this second number, press ENT again. You are then prompted whether you want to save the new calibration data. Press ENT to save the new calibration information. You can press ESC at any time to exit without saving the changes.

On the VT, enter both weights in the SPAN screen, and press the Save Data button to store the new calibration data.

The Span Value

On the LCD, the Span Menu displays the current Span Value at the top right of the display. On the VT, the Span Value is shown at the bottom of the Span screen.

The Span Value determines the amount of weight accumulated by the monitor.

The factory default value for the Span Value is 1.0000.

After you perform a Span calibration, the Span Value displayed will change to show the amount by which you have adjusted the span calibration.

Edit Span

Normally a Span calibration is performed by entering two weights, as described above. However, sometimes you may want to change the Span Value directly. For example, you may want to restore a previous Span Value.

On the LCD, choose Edit Span and change the value. On the VT, simply tap the Span Value at the bottom of the Span screen and enter a new value.

Factory Default

The LCD Span Menu has a Factry Default option that resets the Span Value to 1.0000. This is useful if a calibration error has resulted in a false very high or low Span Value.

8.3   Belt Length Calibration

The Tare Length option is used to set how long the conveyor runs during a Tare calibration.

First attach a marker (such as a piece of tape) to the conveyor belt so that you can see the marker as it comes around. Then select the Tare Length calibration function, and press ENT to start (on the VT, press Start).

Now start the belt running. Watch the belt until the marker is back to its starting position, indicating one complete belt revolution. At this point, press ESC. You are then prompted whether you want to save the new calibration data. Press ENT to save the new tare length. On the VT, press Stop, and then Save Data.

If the conveyor belt is short, one revolution may not be long enough to provide an accurate tare calibration. *It is recommended that the tare calibration run for at least one minute.* You can increase the tare calibration time by letting the belt make several complete revolutions during tare length calibration.

8.4   Load Cells Calibration

The Load Cells option is used at installation to set the number of load cells, their full load weight rating, and the sensitivity of each individual load cell. On the LCD display these options are accessed in the Load Cells sub-menu within the Calibration menu. On the VT these options are all in the LOAD CELL CAL. screen.

The Number option sets the number of load cells used. Enter the number of load cells installed (in the range of 1 to 4) and press ENT. The standard Conveyor Scale system uses 2 load cells. The dual conveyor option uses 4 load cells. Note that using more than 2 load cells requires a separate product license.

The Range option sets the full load weight rating of the load cells. All load cells should have the same full load rating. Enter the full load rating and press ENT. The standard conveyor scale system uses 250 lbs rated load cells.

The Sensitivity option is used to set the individual sensitivity of each load cell. Even load cells with identical full load ratings have small differences in the level of their output voltage. Load cell sensitivity is expressed in "mV/V". This sensitivity is printed on each load cell. In most cases the default value of 3.0000 is close enough for accurate operation. For optimal accuracy, enter the individual sensitivity of each load cell. After selecting the Sensitivity option, select the desired load cell (1 to 4). The number selected matches up with the load cell number printed beside each load cell terminal block inside the Junction Box. For each load cell, enter the corresponding sensitivity (e.g. 3.0025).

8.5   Tilt Calibration

NOTE: If you do not have a tilt sensor, the Tilt Sensor option must be set to None (on the VT it should be Disabled).

If you have purchased the tilt sensor option, a two-axis tilt sensor is used to correct weight readings on sloping ground. The tilt sensor connects to the Junction Box. The tilt sensor must be configured and calibrated before it can be used. This is done using the Tilt Calibration menu.

NOTE: If you ordered the Conveyor Scale or Yield Monitor complete with the tilt compensation option, the tilt sensor and load cells have been pre-calibrated at the factory. No load cell tilt calibration is necessary. Level calibration is required only if the tilt sensor is not installed in the same plane as the load cells. If you are adding a tilt sensor to an existing system, you will need to perform both Level and Load Cell Tilt calibrations.

There are three steps to calibrating the tilt sensor: Sensor enable, Level calibration, and Load Cell Tilt calibration. On the LCD display these options are accessed in the Tilt sub-menu within the Calibration menu. On the VT these options are in the TILT screen.

Tilt Sensor

The Sensor option must be set to Enabled in order to use the tilt sensor.

Tilt Level Calibration

NOTE: Level calibration is required only if the tilt sensor is not installed in the same plane as the load cells.

Ideally the tilt sensor is mounted in exactly the same plane as the load cells (see section 2.3). The Level calibration accounts for any misalignment between the tilt sensor and the load cells.

To perform the Level calibration, first position the conveyor so that the load cells are exactly level. Use a spirit level to check this. Then initiate the Level calibration. After a few seconds the display will indicate the calibration is completed.

Load Cell Tilt Calibration

There are two different ways to perform tilt calibration: before the load cells are installed, or after the load cells are installed.

NOTE: It is much simpler and more accurate to calibrate the load cells before they are installed. This is the recommended calibration procedure. If the load cells are already installed, and it is impractical to level the conveyor, use the Default tilt calibration.

Procedure for Calibrating Load Cell Tilt Before Installing Load Cells

NOTE: This method requires that the load cells be unmounted from the conveyor, so this calibration step must be performed before mounting the load cells.

To use this procedure, place the load cells on a flat level surface, and position them so they are lying on their side (product label facing up).

Then select the Load Cell Tilt option, select Not Mounted, and press ENT to begin the calibration procedure.

On the VT, set the "Load Cells Installed" field to No, and press the "Start Tilt Calibration" button.

The display will prompt you to set the load cells on their side. Press ENT (or OK) to proceed. After a

few seconds the display will report the new load cell tilt adjustment values have been saved.

Procedure for Calibrating Load Cell Tilt After Installing Load Cells

First level the load cells. That means moving or tilting the machine so that *the load cells are exactly level*. If the conveyor is inclined, this may require tilting the machine. Use a spirit level to check that the load cells are level on both axes. That is, check the level along the length of the load cell, and also across the load cell. It is important to level the load cells accurately. Once you are satisfied the load cells are level on both axes, select the TILT CALIBRATION Level option to set the new level position.

You must now perform Tilt calibration. For this step it is necessary to place some weight on the load cells, ideally 25 to 50 pounds. Place the weight in the middle of the belt, between the two load cells.

IMPORTANT: Ensure the weight does not shift during the calibration!

Select the Load Cell Tilt option, select Mounted, and press ENT to begin the calibration procedure.

On the VT, set the "Load Cells Installed" field to Yes, and press the "Start Tilt Calibration" button.

The display will prompt you level the load cells, and will show the tilt angle on the two tilt axes. For this part of the calibration, the load cells need to be near level (at 0 or 1 degree). They should both show zero if the load cells are still leveled from the preceding Tilt Level calibration. When both tilt angles are at or near zero, press ENT (or OK on the VT). The Console will take a few seconds to record the load cell readings.

The display will then prompt you to tilt the load cells in the range of 10 to 30 degrees (positive or negative). It's best if you can get both tilt angles into the 10-30 degree range. *Be careful that the weight on the conveyor belt does not move.* Once you are satisfied with the tilt angles, press ENT (or OK on the VT). The Console will record the new load cell readings, and then calculate and store the tilt adjustment factor for each load cell.

Default Load Cell Tilt Calibration

If the load cells are already installed, and it is impractical to level the conveyor, you can use the Default tilt calibration. This sets default tilt calibration values, which does not require any particular positioning of the load cells.

Default tilt calibration assumes the load cells have no zero balance offset. For most load cells this will provide reasonably good tilt compensation, but it is not as accurate as performing tilt calibration before the load cells are installed.

9. Configuration and Setup Options

This section describes all the options accessed through the CONFIG menu, as well as the SETUP menu of the VT. Note that not all of these options are available, depending on the type of weighing system you purchased.

9.1 Config Rows

The Rows option sets the number of rows that the harvester is picking up. This can also be changed in

the Run screen for on-the-go changes.

9.2   Config Row Width

The Row Width option sets the width of one row in the field, in inches or cm. This number is multiplied by the Rows setting to calculate the total swath width for yield calculations.

9.3   Config Load Weight Limit

The Load Wt. Limit option sets the weight limit for a truck load. When the load weight exceeds the limit, an alarm message is displayed. If the Relay Output option is installed, the relay will be activated, which can be used to sound an alarm horn, or to shut off the loading conveyor. Setting the Load Weight Limit to 0.0 disables the alarm.

9.4   Config Minimum Weight

The Minimum Weight option sets a low-weight threshold to avoid false weight accumulation when the conveyor is running empty. If the weight per second is below the threshold, the monitor will not add the weight to the total. Setting the Minimum Weight to 0.0 disables this function.

9.5   Config Display Opt

In the LCD display, Config Display Opt lets you select what data is displayed in the Run screen on the second line of the LCD. Each item can be set to Yes or No. If multiple items are enabled, the display will rotate through the various messages.

Yield	yield per acre or hectare (for Yield Monitor)
Rate	weight per second (for Conveyor Scale)
AIN1	analog input 1 (if enabled)
AIN2	analog input 2 (if enabled)
AIN3	analog input 3 (if enabled)

9.6   Config Analog Inputs

The Junction Box is equipped with up to three general purpose analog voltage inputs: AIN1, AIN2, and AIN3. These are used to connect one or more optional Infrared (IR) temperature sensors. Future software updates may also provide for other types of sensors.

For each analog input, select the sensor type:

Disabled	Nothing connected
IR Temp.	Infrared crop temperature sensor connected
Air Temp.	Air temperature sensor connected

For each enabled analog input, there is a Filter Time setting that determines how much smoothing is done of the sensor reading. The default is 1 second. Select 0 seconds for no filtering. A higher value will produce smoother readings, but slower response to changing temperature.

On the LCD display, use Config Display Opt (see section 9.5) to display analog input readings in the Run screen. On the VT, this is selected in the Analog Inputs screen.

9.7   Config Weight Unit

The Weight Unit option is used to set the weight unit used to display weight data on-screen. Select from the following list:

kg   kilograms
lbs   pounds
cwt   hundred weight (100 pounds)
ton   imperial ton (2000 lbs)
tne   metric ton (1000 kg)

9.8   Config Area Unit

The Area Unit is used to select whether yield is expressed per acre or per hectare. Select from the following list:

ha   hectare
acr   acre

9.9   Config Length Unit

The Length Unit option is used to select the unit used for row width. Select from the following list:

cm   centimetre
in   inch

9.10 Config Speed Unit

The Speed Unit option sets the unit used to display speed. Select from the following options:

km/h   kilometres per hour
mph   miles per hour

9.11 Config Temperature Unit

The Temp. Unit option is used to select the unit used to display data from optional temperature sensors. Select from the following list:

Celsius
Fahrenheit

9.12 Config Log to Memory

The Log to Memory option determines whether or not yield or weight data is logged internally by the Console. This option is available only if the Data Logging license has been purchased. Choose from these options:

Disabled	Do not log data
Enabled	Log yield or weight data to internal data storage

NOTE: To copy data from internal storage the removable Flash drive option must be installed on the Console.

9.13 Config Update Freq.

This option determines how often the Console updates and logs yield data. Default is 1 second.

9.14 Config Weight Filter T

In many installations, the weight per second varies considerably from one second to the next. To get a more stable reading of product flow rate (or yield), weight readings can be averaged over several seconds.

Set Rate Filter T to the number of seconds you want to average. The default is 1 second, which provides no filtering.

9.15 Config Rate Filter T

In many installations, the weight per second varies considerably from one second to the next. To get a more stable reading of product flow rate (or yield), weight readings can be averaged over several seconds.

Set Rate Filter T to the number of seconds you want to average. The default is 1 second, which provides no filtering.

9.16 Config Belt Sensor

This option lets you set the minimum speed of the conveyor drive shaft that is measured by the magnet sensor. Enter the lowest operating speed, in RPM. The default is 30.0 RPM.

After the RPM, enter the number of magnets installed on the shaft (default is 1). If, for example, you have installed two magnets on opposite sides of the shaft, so that the magnet sensor sees two pulses for each shaft revolution, then change this to 2.

9.17 Config Use IN2 for

The IN2 sensor input in the Junction Box can be used for a variety of functions:

Not used	Input IN2 not used
Next load	Activating IN2 switches to next load
Clear load	Activating IN2 clears current load weight
Enable yield	Yield data is output only when IN2 is active
Boom Running	For Tracking, IN2 detects when boom is running
Log RPM	IN2 connects to a shaft sensor for logging RPM

The Next load and Clear load options can be used to allow a remote switch to select a new load number, or to clear the load weight.

Normally the Console records yield data whenever the conveyor is running. If you select the Enable yield option, the Console will instead log (or output) yield data whenever input IN2 is active. You can connect a signal to Input 2 that is active (+12V) whenever the machine is running. That way the system will continue to output active yield data even while the conveyor is momentarily stopped, providing continuous location mapping.

9.18 Config IN2 min. on/off T

The IN2 min. on T and IN2 min. off T options set the minimum on and off time for input IN2, in seconds. The Next load and Clear load options act whenever input IN2 becomes active. To prevent false triggering of these actions due to short input pulses, the IN2 min. on T option sets the minimum time the IN2 input must be on before the action is taken, and the IN2 min. off T option sets the minimum time the IN2 input must be off before the event can be triggered again.

9.19 Config IN2 pulse/rev

This option is used when IN2 is used to Log RPM. It sets the number of pulses the shaft sensor produces for each revolution of the shaft. The default is 1.

9.20 Config Min. Speed

The Min. Speed option sets the minimum ground speed (in km/h) for calculating yield. At ground speeds below this setting a value of 0 will be recorded for yield. Default value is 0.5 km/h.

9.21 Config Crop Delay

The Crop Delay option sets the time it takes the crop to travel from the harvester's pick-up to the point where the crop is weighed by the load cells. Select a value from 0 to 25 seconds. Default is 0.

9.22 Config Ser. Baud Rate

The Ser. Baud Rate option sets the baud rate used to connect with the GPS receiver, third party yield monitor, or remote display. Select from 4800, 9600, 19200, or 38400.

9.23 Config Serial Output

The Serial Output option is used only for a Conveyor Scale. It selects what optional device is attached to the serial port. Choose one of these options:

Remote Display	external weight display (WS400-DISP)
Remote 2-Line	external 2-line weight display
Remote 4-Line	external 4-line weight display
Rate Control	rate data for third party device

9.24 Config Serial Display

Determine the number of decimal places displayed on the optional remote display device. Choose one of these options:

Default   Automatically select optimal number of decimal digits
0 - XXXXXX   No decimal digits
1 – XXXXX.X   One digit after the decimal point
2 – XXXX.XX   Two digits after the decimal point
3 – XXX.XXX   Three digits after the decimal point

9.25 Config GPS Source

Choose whether GPS data is provided through a Serial port (RS-232) or through a CAN bus connection.

9.26 Config GPS Alarm if

The "GPS Alarm if" option controls whether an alarm message is displayed when the Console is not receiving good GPS data. Choose from these options:

Never   Never show GPS error messages
No GPS   Show error message if no GPS data is received at all
No DGPS   Also show error message if no differential correction

9.27 Config 20mA Output

The 20mA Output option selects how the optional 20mA analog current output signal is used.

Disabled   20mA output not used
Load Weight   20mA output indicates accumulated weight of current load
Weight per sec 20mA output indicates weight per second passing on conveyor

9.28 Config 20mA FullScale

The 20mA FullScale option sets the range of the 20mA analog current output signal. The current output will be at exactly 20mA once the full scale weight (or weight per second) is reached. At zero weight (or weight per second), the output will be at 4mA.

9.29 Config 20mA Delay

When the 20mA Output is configured for Weight per second, the 20mA Delay option sets the lag time applied to the output, in seconds. The default value is 0, for no lag.

This feature is useful when the 20mA output is used to control the flow rate of a pump applying a chemical treatment to the crop downstream of the conveyor scale. Set the 20mA Delay to the time it takes the crop to travel from the scale to the treatment area to ensure the pump always applies the correct amount of chemical.

9.30 Config Power-on Run

The Power-on Run option determines whether or not the Console automatically initiates Run mode at power-up. This is useful for unattended operation, when the Console is wired for always-on operation.

Enabled	automatically start Run mode at power-up
Disabled	Start in the main menu at power-up (default)

9.31 Config Tracking Enable

If the Yield Monitor is equipped with a RiteTrace Scanner this option determines whether or not automatic tracking is performed of the trucks being loaded. Set to "Yes" to enable tracking, or "No" to disable truck tracking.

9.32 Config Tracking RF Channel

If Tracking is enabled, this option sets the RF channel used by the RiteTrace Scanner. The default value is 13. Do not change this unless there are RF interference problems.

NOTE: All Scanners in a RiteTrace system must use the same RF channel.

9.33 Config Tracking Set Truck ID

This screen lets you change the name and weight capacity of a truck transponder.

In the LCD screen, press ENT to see the nearest truck Transponder, and then follow the prompts to update its information.

In the VT screen, press Scan to see the nearest truck Transponder. Update its information and press Set to write the information to the Transponder.

If more than one truck Transponder is in range the display will show a warning, and will then proceed to show the Transponder with the strongest signal. Usually that will be the closest truck, but if you're not sure you should move other trucks out of range or disconnect power from their Transponders.

9.34 Config Machine ID

The Machine ID option allows you to enter a unique name for the harvester on which the yield monitor is installed. This machine ID is included in the yield data logged to the Flash drive.

9.35 Config Clock

This option sets the Console's built-in real time clock. Set the year, month, day, hour (24-hour clock), and minute.

The Console has an internal backup battery so the clock keeps time even when the Console is powered off.

9.36 Config User Controls

If the ISOBUS option is installed, the User Controls option is used to switch between the ISOBUS VT

user interface and the standard user interface using the Console's LCD and keypad.

While in ISOBUS mode, the User Controls option is available at the main menu in the limited LCD menu. While in standard mode, the User Controls option is available in the Config menu.

When you select a new User Controls option, the Console will reboot to initialize the new user interface.

10. Data

The Data option of the main menu is used to view and clear load and field weights, to copy data to the external Flash drive, and to delete yield data files from internal storage.

10.1 Data Copy Files

This option copies all internal data files to the external Flash drive. Files copied include all yield data files and the calibration log file (named CAL-LOG.TXT and CFG-LOG.TXT).

This option also generates a weight summary file. This file is named WEIGHTS.TXT, and includes the weight data for all loads, fields, crops, bins, and the total weight.

Before starting, insert a Flash drive into the socket. Note that the Flash drive can be inserted in two orientations – both work equally well.

Copying the yield data files can take several minutes per file, depending on the amount of data that has been stored.

The data on the Flash drive can be read on any standard computer with a USB port. The supplied USB adapter allows the Flash drive to be plugged into a computer. The Flash drives use a standard FAT32 file system.

IMPORTANT: Do not reformat the Flash drives with any other file system. The Console will only recognize a FAT32 file system.

10.2 Data Delete Files

This option is used to delete all the yield data files from internal storage. The calibration log and weight summary are not deleted.

WARNING: Be sure to use Copy Files to copy all yield data files to external Flash before deleting the yield data from internal storage.

10.3 Data View Weights

On the LCD display, the View sub-menu allows you to view the accumulated weight for each load, field, crop, and bin, as well as the total weight harvested to date. Each weight can be cleared by pressing the Down arrow. This total is not affected by the clearing of individual weights.

On the VT the View screen provides access to the same information, and provides a Clear button for each type of data. It also provides buttons to clear all Loads or Fields.

10.4 Data Clear Weights

On the LCD display, the Clear sub-menu allows you to clear the weights for all Loads, Fields, Crops, or Bins, as well as the Total weight.

10.5 Data Read NAMES.TXT

This option is used to load a set of names for Fields and Crops. When this option is selected, the Console looks for a file named NAMES.TXT on the external Flash drive. If the file is found, all the Field and Crop names defined in the file are stored in the Console's internal memory.

The file NAMES.TXT can be created on any computer using a text editor such as Notepad. The format of the file is simple:

> **F1 Home Farm 1**
>
> **F2 Smith Farm**
>
> **F3 16th Line**
>
> **C1 Yukon Gold**
>
> **C2 Trial B**

Each line starts with an "F" or a "C" to indicate whether it's a Field or Crop name. Immediately following this letter is a number from 1 to 99, indicating the field or crop number. After the number there must be one or more spaces or tabs, followed by the name assigned. If no name is given, the name for the respective field or crop will be cleared from the Console's memory.

11. Test

The Test menu is used to verify that the load cells, the drive shaft magnet sensor, and any other sensors and connections are functioning correctly.

11.1 Test Tare

This option is used to evaluate the accuracy of the current Tare calibration. The display is very similar to the Run display, but no data is recorded by the Test Tare function. The top line shows cumulative weight, while the bottom line shows the weight per second.

If you suspect the Tare calibration for your conveyor may be off, run Test Tare for a few minutes to see if the cumulative weight gradually increases or decreases. You can then decide to run a Tare calibration if necessary.

NOTE: The Run display cannot be used for evaluating Tare accuracy if Minimum Weight has been set in the Config menu.

11.2 Test Load Cells

This screen shows the gross weight reading of each load cell (in lbs or kg, depending on the configured Weight Unit). No tare level is subtracted from these readings.

With the conveyor belt empty and stopped, these numbers should be stable, and typically within 1

pound of each other. As you press on each load cell, its reading should increase. If either load cell does not respond correctly, check for dirt build-up around the load cells, and check that the load cell wiring is correct.

The LCD display shows only 2 load cell readings. If you have 4 load cells, press the Right arrow button to see load cells 3 and 4.

11.3 Test Speed Sensor

This screen displays the status of the conveyor drive shaft speed sensor.

The display shows shaft RPM as well as a count of the number of revolutions of the shaft.

You should see the count increase by 1 for every revolution of the drive shaft. If the belt count does not increase, or the RPM varies a lot, check that the magnet on the drive shaft and the magnet sensor are both firmly mounted, and the space between the sensor and magnet is about 1/4" at closest approach. Also check for nearby build-up of grease, as lubricating grease can affect the operation of the magnet sensor.

11.4 Test Input IN2

This display shows the state of input IN2, either "OFF" (no voltage) or "ON" (+12V).

11.5 Test Tilt Sensor

This display shows the two tilt angles measured by the 2-axis tilt sensors, in degrees.

11.6 Test Analog Sensors

This display shows the temperature measured by each enabled temperature sensor.

11.7 Test GPS

This option shows whether the Console is receiving good GPS data. The display shows whether GPS is being received, the number of satellites in view of the GPS receiver, the ground speed, and the latitude and longitude. On the LCD display, use the Left and Right arrow buttons to see all the information.

If no GPS data is being received, check the connection to the GPS receiver, check the baud rate setting, and make sure that the GGA, RMC, and VTG sentences are enabled in the GPS receiver.

11.8 Test Serial

This option shows data being received on the GPS serial port.

Good data will show continually updating strings of letters and numbers separated by commas.

If you see a lot of question marks, the baud rate is likely wrong.

If you see nothing at all, there may be a problem with the connection to the GPS receiver. Check the

connections to make sure everything is plugged in securely. Then confirm that the Transmit signal from the GPS receiver is connected to the Receive line of the Console (pin 2 of the male 9-pin connector of the WA1042 harness, which connects to pin 3 of the Deutsch DTM3 connector).

11.9 Test Simulate Yield

This option is used to test the serial port connection to an external yield monitoring device (eg. Trimble or GreenStar), or the logging of yield data to internal data storage.

The Console will output simulated yield data, without the need for any actual input from load cells or a drive shaft sensor. The Junction Box does not need to be connected to the Console. This allows you to make a test run using just the Console and the data logging device (and GPS receiver) to ensure that yield data is correctly logged.

The display shows the yield weight data being output (weight per second). You can increase or decrease this, allowing you to see whether the logging device correctly tracks changes in yield weight.

On the LCD display use the Up and Down arrow buttons to change the yield weight. On the VT, enter the number directly.

11.10 Test Relays

This option allows you to activate the optional relay outputs of the Junction Box to test their operation. Initially both relays will be off.

On the LCD display, the top line shows the selected relay. Use the right and left arrow keys to choose relay 1 or 2. Use the up and down arrow buttons to turn the selected relay ON or OFF.

11.11 Test 20mA Output

This option allows you to test the operation of the optional 20mA analog current output in the Junction Box.

On the LCD, use the up and down arrow buttons to adjust the percentage of full scale output. On the VT, enter the percentage directly.

The initial value of 0% corresponds to an output current of 4mA, while 100% corresponds to 20mA.

11.12 Test Truck Ids

If the Yield Monitor is equipped with a RiteTrace Scanner, this test screen shows all truck transponders within range. Each transponder shows its assigned name as well as the signal strength. The signal strength indicates how strong a signal is being received from the transponder (0 if very weak, and 255 is strongest). A "*" behind the signal strength indicates that the truck's unload conveyor is running.

12. LCD Update Menu and VT OPT screen

The Update menu provides facilities for installing optional features and new firmware.

The VT Software Options (OPT) screen also allows viewing and installing optional features, but not

installing new firmware.

12.1 Update Options

Optional product features can be added by entering a license key.

The available features can be viewed in the List Options menu. Currently available options include:

- ISOBUS VT – enables ISOBUS communication with external Virtual Terminal
- Tracking – enables truck tracking as part of the RiteTrace system
- Max L/C – for installations requiring more than two load cells
- Logging – enables data logging
- File DwnLd – enables Bluetooth wireless file transfer to an Android device
- Yld Out – enable yield data output to a Trimble or John Deere monitor
- CAN2 Yld – enable yield data output on the secondary CAN bus
- 20mA Output – enables 4-20mA current loop output
- Relay Output – enables relay contact output to indicate weight limit reached
- Weight Info – enables Bluetooth communication with Android weight display app
- 4-Line Disp – enables use of external 4-line display to show weight, rate, and other info

Contact Greentronics or your dealer to purchase options.

In order to obtain a license key, you must provide the Console ID of your Console. Go to the Console ID option, and write down the 10-digit number displayed (eg. 1234-567-890). Provide this Console ID along with the name of the option you wish to add to your system.

In return you will receive a 10-digit license key. Enter this key in the New License screen.

12.2 Update Firmware

Feedback from customers and dealers often results in firmware updates. The Console allows in-field firmware upgrades via Bluetooth connection to an Android device using a specific App. This section explains the process of obtaining the Update File and the required App to update Firmware on the Console.

To obtain the Firmware Update File, contact Greentronics or your dealer and provide your email address. The file will be emailed to you. Save the file on your Android device   in a location that is easy to remember and find.

To obtain the App, open up the Google Play Store app on your android device, search for "Greentronics" and select and install the Greentronics In-Field Update App. The App allows your Android device to connect to the Greentronics' Console via Bluetooth and upload the Update File.
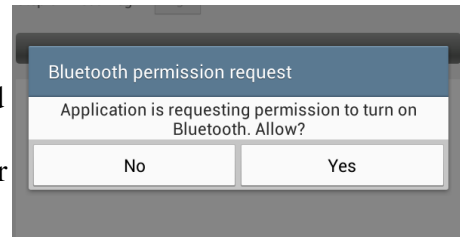
Steps to update Firmware:
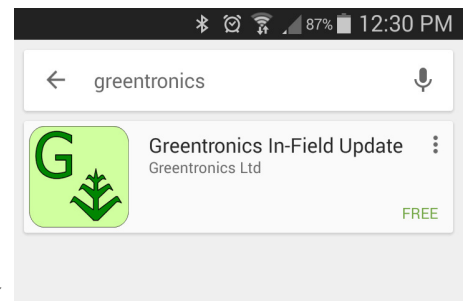
1) On the Console, at the main menu go to the Update menu and select Firmware. Press ENT to prepare the Console to receive the new firmware. The screen will show the Bluetooth address of the console.
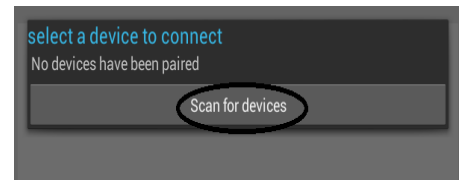
2) Launch the Greentronics App, and select "Yes" to continue if a "Bluetooth permission request" window pops up.

3) Press the "Select Bluetooth device" button. A dialogue window will appear asking you to select from a list of paired Bluetooth devices. 3.1) If the device "GRT-CONTROLLER" is in the list, select it, then wait for another dialogue window confirming the Bluetooth device is paired. Press OK and proceed to step 4.

   3.2) If "GRT-CONTROLLER" is not in the list, press "Scan for devices". After a moment, you will see "GRT-CONTROLLER". Select it.

   3.3) At this point the device needs to go through the pairing process, you will see a message asking you to either accept a passkey, or to enter a PIN.

   3.4) If a PIN is required, type in the default pin number 1234 and press OK to continue. If a passkey is required, a dialogue box asking to confirm passkey will appear. Simply press OK to confirm. (Note: in both cases the device name of GRT-CONTROLLER should appear in the dialogue box.)
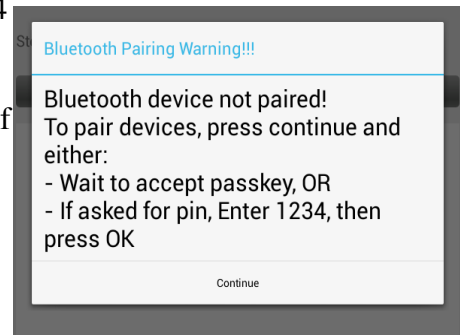
   3.5) Wait for the dialogue box to confirm pairing was successful. Once a device is paired once, it should not need to be paired again.

4) In the App, press "Select Update File" button. This opens a dialogue box to navigate through the file system on your Android device to the location where you saved the Update File. Update files from Greentronics have a special file extension. For convenience, the App only displays sub-folders to navigate into and files with that extension to select. Select the most recently saved file and the App will exit the dialogue box.
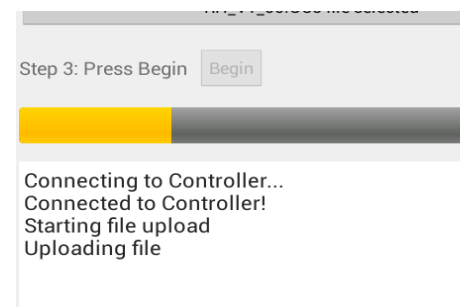
5) To begin the process of uploading the Update File to the Console, press the "Begin" button. The App will display the step by step progress of connecting and uploading the file to the Console. A progress bar indicates the progress of the file upload.

6) With upload in progress, the Begin button is disabled.

7) When the upload is complete, the App will the instruct you to use the Consoles' keypad to activate the new Firmware.

8) To upgrade the Firmware, press ENT on the Console. The Console will install the new firmware and reset itself.

9) On your android device, exit the App by clicking "X Close" or just "X" at the top right corner

of the screen. Closing the App will delete it from your Recent App Activity history folder.

NOTE: These screen shots were taken on a device where the app was able to completely fit within the screen. On devices that have a smaller screen size the contents will extend to the height of the screen. In this case, the app will allow you to scroll the screen up and down to the various parts of the content.

13. Yield Data Output

The Yield Monitor outputs yield data on a serial port. The serial port is intended to connect to a Trimble FmX or TMX, or a John Deere GreenStar 2630. Other third party devices make use of the Greentronics yield data sentence output. Together with a DGPS receiver, this can provide a complete yield mapping solution with on-the-go yield map display for any harvesting machinery that uses a conveyor to carry the harvested crop.

To use the yield data output from the Console, connect the serial cable's 3-pin connector to the Console harness 3-pin connector (see section 2.10). The other end of the serial cable has a standard female DB-9 connector to plug into a standard RS-232 serial port.

For a John Deere GreenStar monitor, use the WA1045 cable to plug into the John Deere 12-pin AmpSeal connector.

The Console normally outputs data at 9600 baud, using 8 data bits, 1 stop bit, and no parity. The baud rate can be changed using the Serial Baud rate setting in the Config menu.

Yield data is output only while the Console is in Run mode, or in Simulate Yield mode (in the Test menu). At each sample interval (as set by the Config Update Freq. option) the Console outputs a new data string.

If Trimble FmX output is selected, data is output in a format proprietary to Trimble. The Trimble monitor should be configured for yield monitor type "AgLeader YM2000" or "Serial Data Input". Contact Greentronics for settings appropriate for current Trimble software.

If GreenStar 2630 output is selected, data is output in a format proprietary to John Deere. The GreenStar 2630 monitor must be equipped with the Yield Documentation Specialty Crop option, including the appropriate application controller and software to interface to the YM430. Contact Greentronics for details.

If the Greentronics yield data output option is used, detailed weight and yield data is output in a custom data sentence defined by Greentronics. Contact Greentronics for details.

For more information about configuring your Trimble or John Deere monitor, please consult the relevant product manual, or contact Trimble or John Deere technical support.

14. Yield Data Logging to Internal Storage

The Yield Monitor can log yield data to its internal data storage. This provides a complete stand-alone yield monitoring solution.

This feature requires installing the Data Logging license, and setting the Log to Memory option to Yes. A GPS receiver must be connected to provide location data.

IMPORTANT: To prevent data corruption, always exit Run mode before powering off.

All data is stored in the Console's internal data storage. To move the data to a computer for processing into yield maps, copy the data from the Console's internal memory to the external Flash drive (see section 10.1).

The Flash drive will have a separate yield data file for each field that has been selected. For example:

FIELD09.CSV

Each entry in the file consists of a single line of data. The data fields in each line are separated by commas, making it very simple to import the data into any spreadsheet program or yield mapping program. The first line of the file provides a title for each data field.

14.1 GPS Receiver Configuration

A good quality DGPS (Differential GPS) receiver should be used to ensure high quality yield maps.

Serial RS-232 GPS Data

Many GPS receivers provide output through an RS-232 serial data connection.

These GPS receivers provide position and speed data by outputting different types of data strings, or "sentences", defined by the NMEA standard. The Greentronics Yield Monitor requires at least three NMEA sentences:

GGA

VTG

RMC and/or ZDA

The GPS receiver must be configured to output the GGA and VTG sentences, and either the RMC or the ZDA sentence (or both). Refer to the documentation for your GPS receiver for information on how to configure the GPS receiver.

The GPS receiver connects to the Console through an RS-232 serial port. The baud rate (communication speed) of the GPS receiver and the Yield Monitor must match (see section 9.22).

To avoid overloading the serial port, it is best to set the GPS receiver output rate to 1 Hz (once a second).

CAN GPS Data

Some GPS receivers output GPS data through a CAN bus connection. This is especially convenient if the Yield Monitor is using an ISOBUS VT display, since the GPS receiver is generally connected to the same CAN bus used for ISOBUS communication.

The Greentronics Yield Monitor requires these two CAN messages:

PGN 65267   GPS position

PGN 65256   Speed and Direction

15. Troubleshooting

15.1 Connection between Console and Junction Box

The Console communicates with the Junction Box to obtain sensor data. If there is a problem with the communication with the Junction Box, you will see this error message:

    Comm. error

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

In the Junction Box, check the red and yellow LED's. The red POWER LED is on whenever power is applied to the Junction Box. The yellow 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.

15.2 Real Time Clock Battery Replacement

The Console has a built-in Real Time Clock (RTC) that keeps time using a backup Lithium battery.

The backup battery will keep the RTC up to date for 5 years or more. When the backup battery is depleted, you will see the "RTC not set" error message. It is important to replace the battery as soon as possible, since all logged data is time stamped using the RTC.

The backup battery is a standard Lithium coin cell of type 1225.

To replace the backup battery, first disconnect power from the Console. Then remove the 4 screws holding the cover on the Console and remove the cover. You will see the battery in a vertical holder near the bottom right corner of the circuit board. The battery is held in place by a metal holding tab. Gently push this tab to one side and pull the battery out of the holder. You may need to use pliers to grasp the small battery.

Now insert the new battery, with the + side facing toward the holding tab. Make sure the holding tab ends up back in position over the battery to hold it in place.

Replace the cover on the Console, and power the Console on. Set the Real Time Clock using the Clock option of the Config menu.

16. System Components

YM4050   Console

WS4051   Junction Box

LC250   Load cell, 250 lbs rating

SM002   Magnet sensor (drive shaft speed sensor)

WA1030   Magnet sensor cable

SNS-TLTXY Tilt Sensor

WA2010   Cable for tilt sensor

WA1055   Cable: Junction to Console, 50ft

RH230   Cable: Console power, 2-conductor, 10ft

RH231   Cable: Extension and disconnect for WA1055, 20ft (optional)

17. Specifications

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

Load cells:

> Rated load: 250 lbs, 50% max. overload

> Sensitivity: 3.0 mV/V

> Environment: Sealed to IP65, -18C to +65C

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

Junction 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.

18. Abbreviated End-User Firmware License Agreement, Warranty and Limited Liability Statement

Full length version is available at www.greentronics.com/Downloads/.

Greentronics Ltd. (or "Company") reserves the right to update its policies and agreements from time to time at its sole discretion and without prior notice to dealers and customers.

IMPORTANT! PLEASE READ BEFORE YOU INSTALL OR USE A PRODUCT OR SERVICE FROM GREENTRONICS LTD.: Your installation or use of a product(s) or service(s) provided by Greentronics Ltd. will constitute your agreement to all terms and conditions contained in the "**Policies"**. The **Policies** include the expanded full length End-User License Agreement for the use of Firmware as well as the Product Return, Warranty and Limited Liability Statements. Company will repair or replace Products in accordance with this Abbreviated End-User License Agreement, Warranty and Limited Liability Statement and our expanded **Policie**s available on our website. Greentronics Ltd. is pleased to provide a hard copy of the expanded **Policies** on request.

   1. DEFINITIONS

"Firmware" shall mean software which is embedded or otherwise written in to the Read-Only Memory of the computer contained within a Greentronics Ltd. product.

"Product" shall mean any item of hardware or software, created by or for Greentronics Ltd. exclusively for the economic use and benefit of same through sale or licensing to customers and the general public.

"Service" shall mean action(s) taken by Greentronics Ltd. in support of its products including installation assistance, troubleshooting and technical support in person, by phone, email, fax or any other method.

   2. WARRANTY

Greentronics Ltd. warrants to the End-User of each Product that such Product will be free from defects in materials or

workmanship from the date of purchase for a period of one (1) year (the "Warranty Period").

During this warranty period, the Company will, at its option, repair or replace defective Products or defective components thereof. This warranty is limited to the cost of the repaired or replaced product and does not cover time, labour, travel, shipping or any other expenses incurred by the Company and its OEM partners, distributors, dealers, customers and suppliers in meeting obligations herein. This warranty also does not cover damage due to external causes, including wear and tear, accident, abuse, misuse, or use or care not in accordance with Product documentation. Products for repair or replacement must be returned to Company in accordance with our Return Policy. Repair or replacement will not extend warranty except as referenced in the Return Policy. Additional warranties may be provided by suppliers of non-Company branded Products in the documentation for such Products. Company is not liable or responsible for such warranties.

3. LIABILITY

THE ABOVE LIMITED WARRANTY IS THE ONLY WARRANTY APPLICABLE TO THE PRODUCTS. TO THE MAXIMUM EXTENT PERMITTED BY LAW, COMPANY DISCLAIMS ALL OTHER WARRANTIES AND CONDITIONS, EXPRESS OR IMPLIED, IN RESPECT OF PRODUCTS OR SERVICES, INCLUDING, IMPLIED WARRANTIES, CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NO ORAL OR WRITTEN INFORMATION, GIVEN BY COMPANY, ITS AGENTS OR EMPLOYEES WILL IN ANY WAY INCREASE THE SCOPE OF THIS LIMITED WARRANTY.

COMPANY'S SOLE LIABILITY AND RESPONSIBILITY IS LIMITED TO REPAIR OR REPLACEMENT AS SET FORTH IN THIS STATEMENT. COMPANY WILL NOT BE LIABLE FOR LOST PROFITS, LOSS OF BUSINESS, LOST DATA OR DIRECT, INDIRECT, CONSEQUENTIAL, SPECIAL OR PUNITIVE DAMAGES, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BY ANY THIRD PARTY. YOU AGREE THAT FOR ANY LIABILITY RELATED TO THE PURCHASE OR SUPPLY OF PRODUCTS OR SERVICES, COMPANY IS NOT LIABLE OR RESPONSIBLE FOR ANY AMOUNT OF DAMAGES ABOVE THE AGGREGATE DOLLAR AMOUNT PAID BY YOU FOR THE PRODUCT OR SERVICE IN QUESTION.

SOME JURISDICTIONS DO NOT PERMIT SOME OF THE FOREGOING EXCLUSIONS, CONDITIONS OR LIMITATIONS. THEREFORE THE FOREGOING DISCLAIMERS MAY NOT APPLY TO YOU.

4. Agreements Incorporated by Reference

This Abbreviated End-User License Agreement, Warranty and Limited Liability Statement and the "**Policies**" including their respective terms form parts of the same Agreement. Together, the "**Policies**" constitute the entire Agreement between You and Greentronics Ltd. in respect of warranties, representations and liability.

5. Inconsistencies and Avoidance of Conflicts

Notwithstanding section 4, in the event that any provision of this Abbreviated version conflicts or is inconsistent with our "**Policies**", the "**Policies**" will govern to the extent of the inconsistency.

19. Important Notes Related to Product Return Process

Return of Goods procedure

The details below, as well as other details, are available under "Policies" at www.greentronics.com/Downloads.

During the first 30 days from the invoice date, the User may apply for an agreement to return goods for credit. Goods may only be returned with the prior written consent of Greentronics Ltd. The steps to follow are described under "What to do in case of unsatisfactory performance or defects?" below.

Greentronics Ltd. reserves the right to withhold a 25% restocking fee. Returned goods must be in "as new" condition. Further deductions may be applied for goods returned in unsatisfactory condition. Damaged goods will be rejected.

To return Products, you must ship the Products to Company in their original condition, and in original packaging or other packaging suitable for that purpose, prepay shipping charges and accept the risk of loss or damage during shipment. Shipping goods to Company for return will constitute your understanding and acceptance of the foregoing.

What to do in case of unsatisfactory performance or defects?

Sometimes problems are not due to product limitations or defects, but due to incorrect wiring connections, set-up issues, or wrong installation or operation. Most of those problems can be solved quickly and without any expense by re-reading the installation and operation manual and, failing that, with technical assistance via telephone or email from your dealer or Greentronics Ltd.

User satisfaction with our product is of primary importance to Greentronics Ltd. From time to time, a product may not perform as expected. If one of its products fails to perform as needed, User may apply for a Return Merchandise Authorization ("RMA") number during the first 30 days from invoice date. An RMA will only be issued if User has made use of all the technical support that the retailing dealer and/or Greentronics Ltd. has been able to provide. No RMA will be issued and no credit offered prior to the request for, and the provision of technical assistance by either dealer or Greentronics Ltd. Once User has received an RMA, the steps described below must be followed to return the product and be eligible for a credit.

In the event a product proves defective within the warranty period, complete the simple steps described below to qualify for repairs, replacement, or credit as applicable under warranty. Note that the identical process must be followed if you want to have defective products repaired **outside** the warranty period, or if you are returning complete products within 30 days from the invoice date.

1. Within 30 days of reporting the problem, User must request an RMA (Return Merchandise Authorization) number. If you purchased your product through a dealer, you must send this request to the dealer who will complete the steps below for you. If your product was purchased direct from Greentronics Ltd., call or email Greentronics Ltd. with your request. Provide the following details with each RMA request and keep copies with the items you are planning to return:

·Product name, model, serial number, purchase date and invoice number.
·A brief written description of the reason for the return.

2. Once Greentronics Ltd. consents and issues an RMA#, you, the User or your dealer must complete the next few steps:
·Prepare the return shipment by ensuring the items are clean and free of any chemical contamination. This is important! Dirty or contaminated items will not be accepted, and will be returned to the sender at their expense.

·Package the item(s) in a proper box complete with the details you prepared in Step 1.

·Clearly write the RMA# on the outside of the package and send it freight pre-paid to Greentronics Ltd., **75 Arthur St N, Elmira, ON N3B 2A1 Canada.**

3. Once the parcel arrives at Greentronics Ltd., the items will be examined within a reasonable amount of time to categorize the return as:

A) New merchandise return due to unsatisfactory performance
B) Warranty Repair
C) Out of Warranty Repair.

For A): The item(s) will be examined for cleanliness, contamination and damage, then tested thoroughly to determine functionality. If necessary, repairs and adjustments will be made to bring the item(s) back to original specifications. Labour and parts costs plus a restocking fee will be applied against any credit. A cheque for the net credit will be issued to you.

For B): The item(s) will be examined for cleanliness and contamination. At its discretion, Greentronics Ltd. will repair or replace the item(s) with a comparable item at no charge and prepare a return to the customer via prepaid freight. The returned item(s) will carry the remainder of the warranty period. Note, labour and return freight charges will be invoiced in cases where items returned under warranty show no fault after diagnostic tests.

For C): After an examination for cleanliness and contamination, the item(s) will go through diagnostic tests to determine the reason for the defect. A repair estimate Including estimated return freight costs will be prepared and communicated to you. At that point you must decide and inform Greentronics Ltd. within five business days whether the item(s) are to be repaired, returned "as is", or scrapped. Any repairs must be prepaid according to the estimate. Greentronics Ltd. will not return repaired items until all taxes and charges have been paid in full. All repaired or replaced out of warranty item(s) will carry a 90-day warranty from the date of return to you.