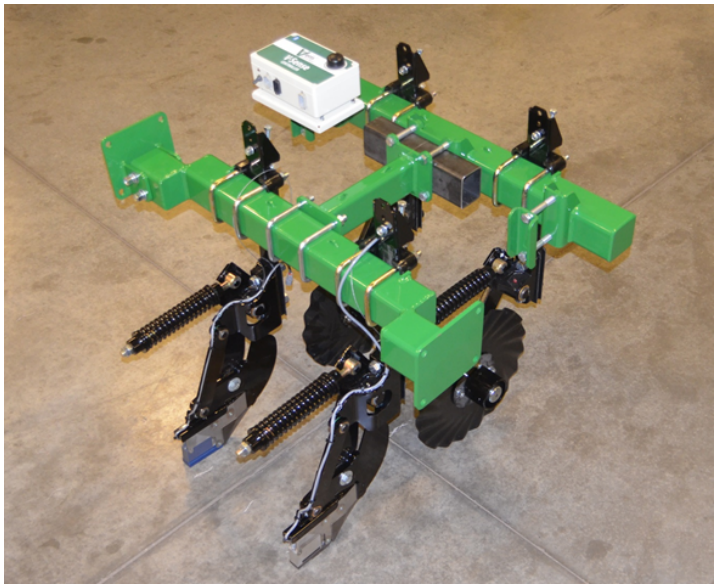
Operator & Service Manual

TrueView

Great Plains Manufacturing, Inc.

www.greatplainsmfg.com

Read the operator manual entirely. When you see this symbol, the subsequent instructions and warnings are serious - follow without exception. Your life and the lives of others depend on it!



Illustrations may show optional equipment not supplied with standard unit or may depict similar tillage models where a topic is identical.

ORIGINAL INSTRUCTIONS

EN

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589-467M

Operating & Service Instructions

TrueView

Table of Contents

TrueView
SoilViewer Version 4.0 or Above

Section 1
Warranty

Veris Technologies warrants this product to be free of defects in materials and workmanship for a period of one (1) year from the date of delivery to the purchaser. Veris Technologies will repair or replace any product returned to Salina, Kansas, which appears upon inspection to be defective in materials or workmanship. Veris Technologies shall have no obligation under this warranty for the cost of labor, down-time, transportation charges, or for the repair or replacement of any product that has been misused, carelessly handled, modified, or altered.

ALL OTHER WARRANTIES OF ANY KIND, WHETHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WAR RANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE AND ALL CLAIMS FOR CONSEQUENTIAL DAMAGES, ARE SPECIFICALLY DISCLAIMED AND EXCLUDED.

Safety

Look for Safety Symbol

The SAFETY ALERT SYMBOL indicates there is a potential hazard to personal safety involved and extra safety precaution must be taken. When you see this symbol, be alert and carefully read the message that follows it. In addition to design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of equipment.

Be Aware of Signal Words

Signal words designate a degree or level of hazard seriousness.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Important! Read the following SAFETY PROCEDURES before operating the TrueView system:

• Read and understand all instructions on safety decals

⚠ WARNING

• Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic lines. Use a piece of paper or card-board, NOT BODY PARTS, to check for suspected leaks.
• Wear protective gloves and safety glasses or goggles when working with hydraulic and high-pressure wash systems.
• If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.

⚠ WARNING

• Pinch point hazard: to prevent injury, stand clear when raising or lowering any part of the implement.
• Install all transport locks before transporting or working underneath.
• Detach and store implements in an area where children normally do not play. Secure implement by using blocks and supports.

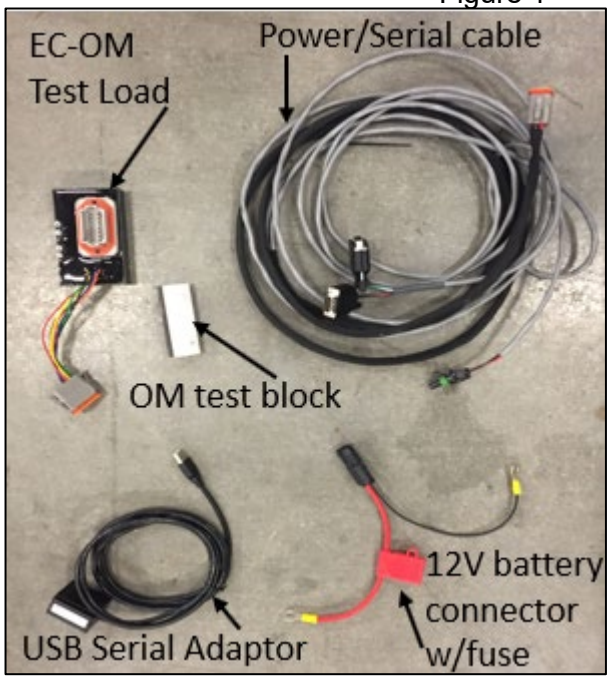
⚠ CAUTION

• Read Operations Manual before operating machine
• Review safety instructions with operators before operating machine and at least annually
• Riders obstruct the operator's view. They could be struck by foreign objects or thrown from the machine.
• Never allow children to operate equipment.
• To prevent possible electrical shock, or damage to the instrument, do not connect to any power source greater than twelve (12) volts DC.
• Do not grease or oil implement while it is in operation.
• Disk edges are sharp. Be careful when working in this area.
• Disconnect battery ground cable (-) before servicing or adjusting electrical systems or before welding on implement.

Section 2

V-Sense Controller and Electronics Overview

Figure 1



V-Sense Controller and cables will be attached to TrueView module AFTER TrueView module is attached to implement. After the V-Sense Controller is mounted on the TrueView it can remain on the implement due to weatherproofing, unless opened by operator and lid seal is damaged. If the implement is stored outside for long-term storage, remove Controller and store it indoors.

V.Sense controller with Bluetooth connection, and integral Garmin 15x GPS. The controller will give preference to any external GPS source connected to the GPS input. If no external GPS is recognized, the controller will automatically source the internal GPS for signal.

GPS/Bluetooth Antenna

Figure 2-2

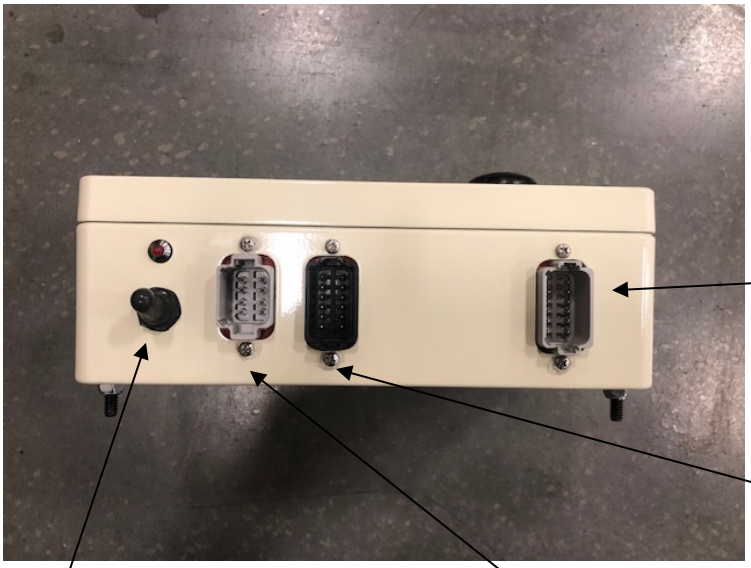


Figure 2-3

EC/Optical connection. EC Signal wires, and optical sensor power connect here.

Auxiliary connection. Soil Moisture and temperature sensors connection.

On/Off and power light
Turns power to V-Sense Controller On/Off. LED blinks once per second to indicate power and communication

12V Power and communications port
Power cord uses 2 amp fuse. External GPS input and serial output are optional connections for this

Software Installation (units are shipped with software installed—this section for installing on another computer)

Note: For computers outside the United States of America, please make the following change to the computer's regional settings before installing the Veris SoilViewer Software.

Step 1: Open control panel and double click on **Region**

Step 2: Click on **Additional Settings**, the following screen will appear. The **Decimal symbol** needs to be a "." while the **Digit grouping symbol** needs to be a ",". The will ensure proper operation of the software. Once the changes have been made click **OK** and proceed with installation.

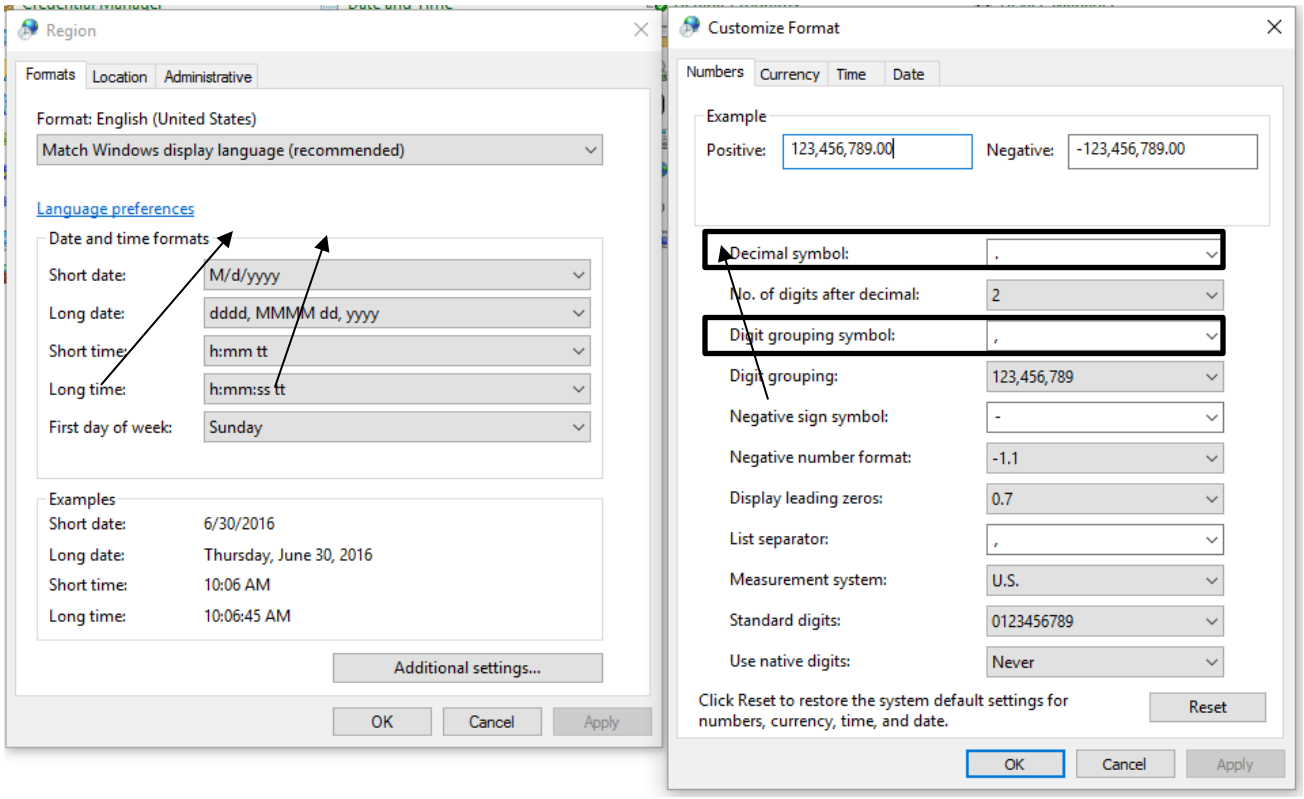
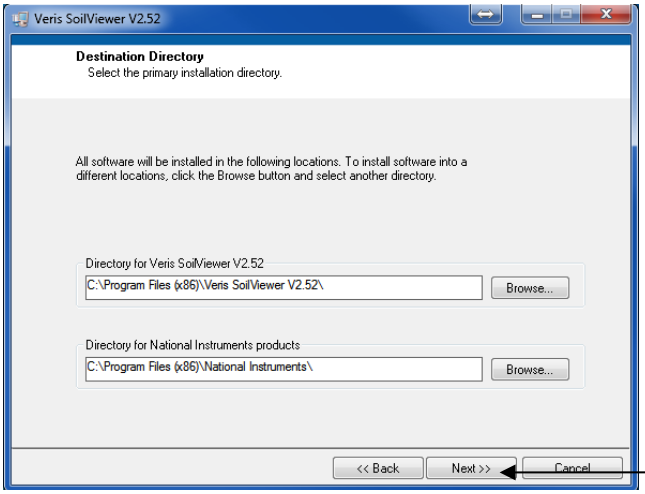


Figure 7



Open Veris flash drive and double click on setup.exe to start the installation.

Click **Next** to continue through installation

Figure 8

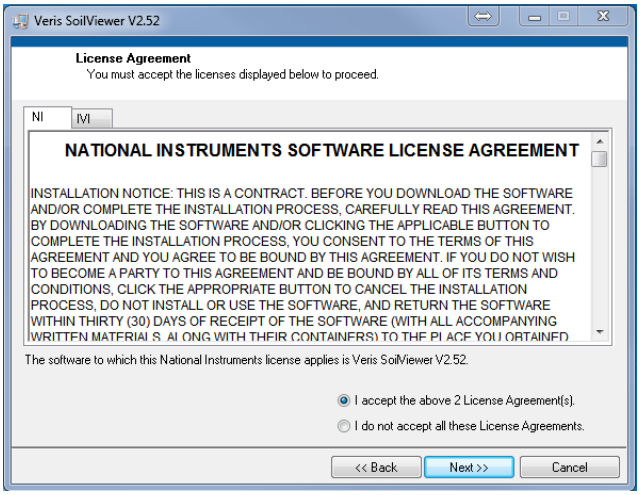
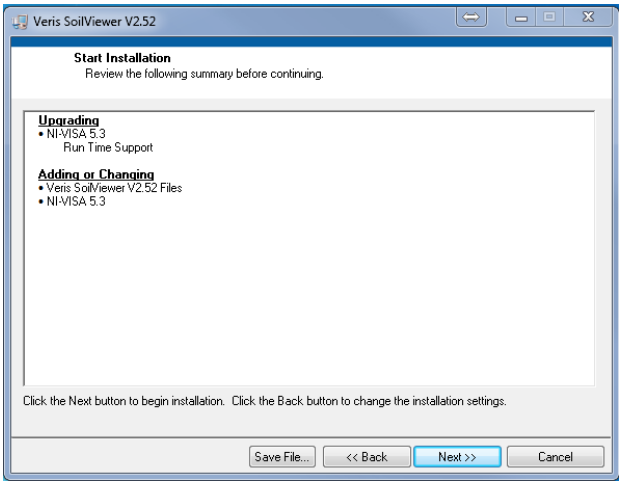


Figure 9

Next two license agreements will need to be accepted before continuing.



Figures 10

Click **Next** to continue through installation

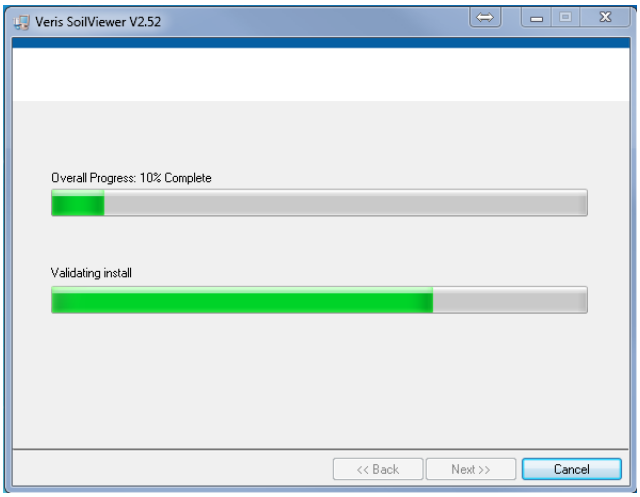


Figure 11

The installer will install all necessary components.

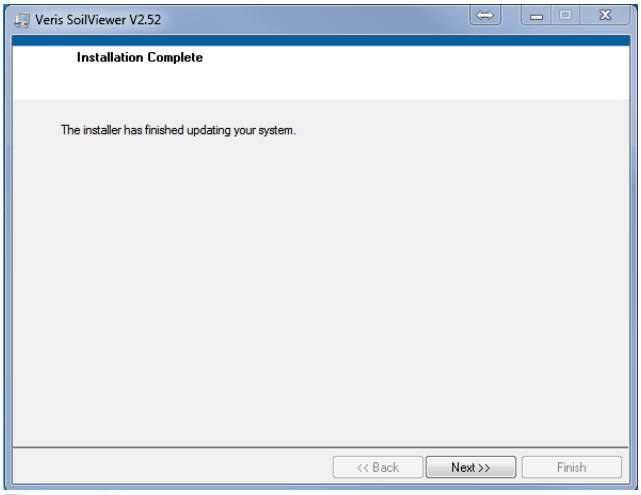


Figure 12

Click Next to install the USB drivers.

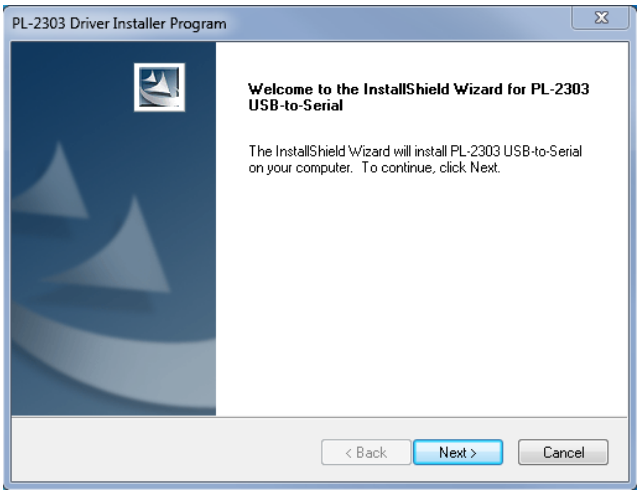


Figure 13

Click **Next** to continue through installation

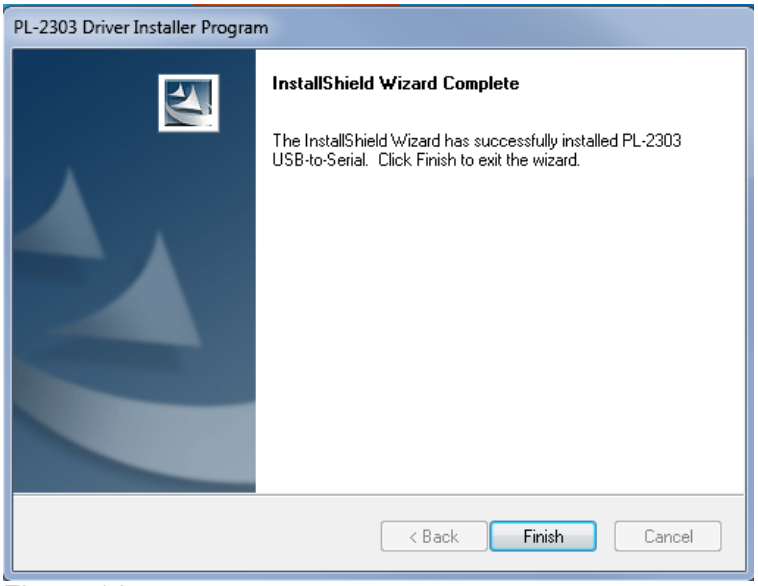


Figure 14

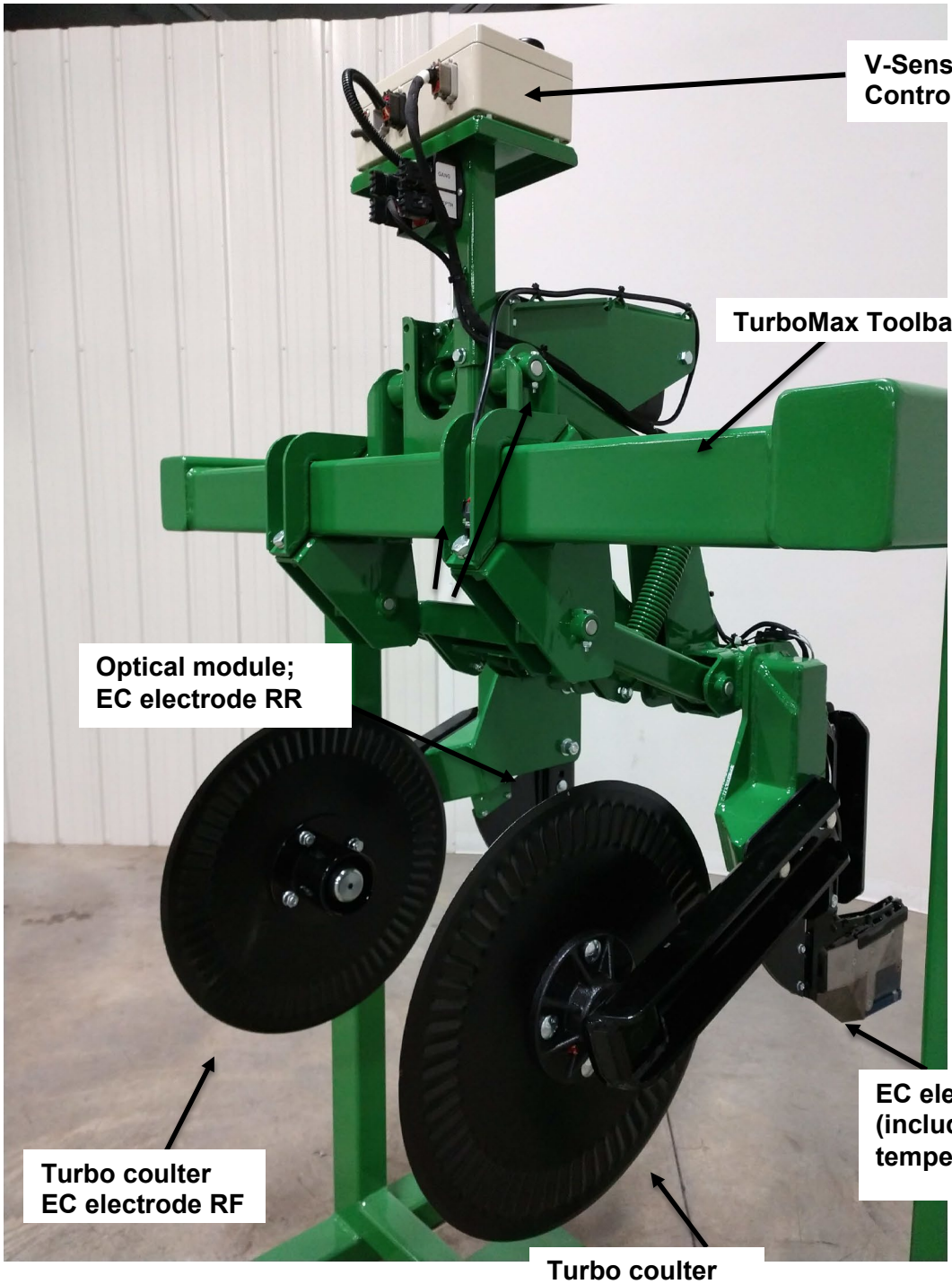
Click **Finish** to complete the installation of SoilViewer.

Section 3

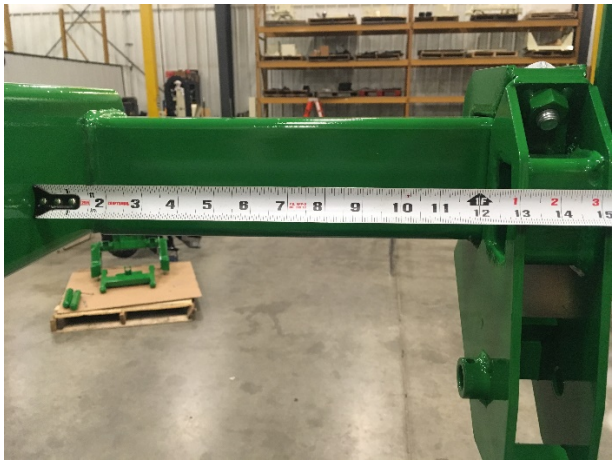
TrueView Overview and Set-up

**Units manufactured 2020 and later*

If the unit is crated, some assembly may be required. To do so, please take precautions to ensure that the framework is properly supported to ensure safety. Figures 1 and 2 show the key components of the unit.

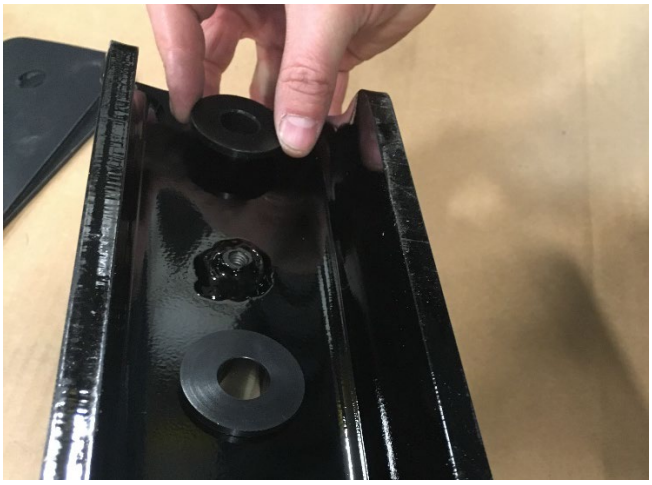


TrueView Quick Install Guide



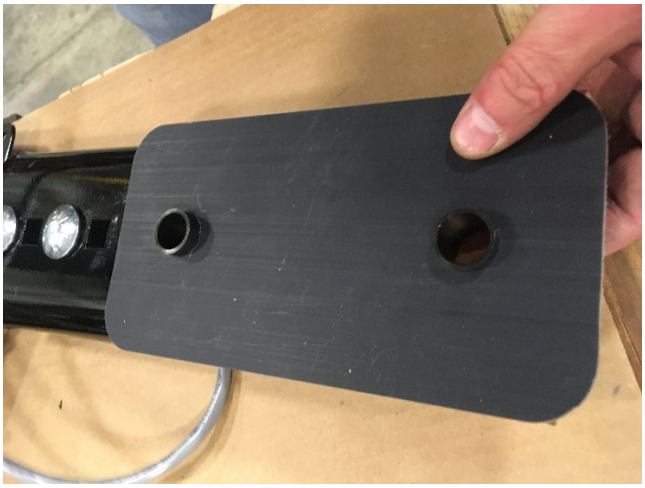
Install TrueView mounting clamps centered on TurboMax toolbar.

Fasten bolts to toolbar



If arms have been removed, ensure plastic bushings are inserted before installing.

Also, ensure plastic insulator is installed between arm and mount.



Install bushings and plastic insulator on rear runners.

Install rear runners

Install V.Sense Controller mount

Carefully secure wiring

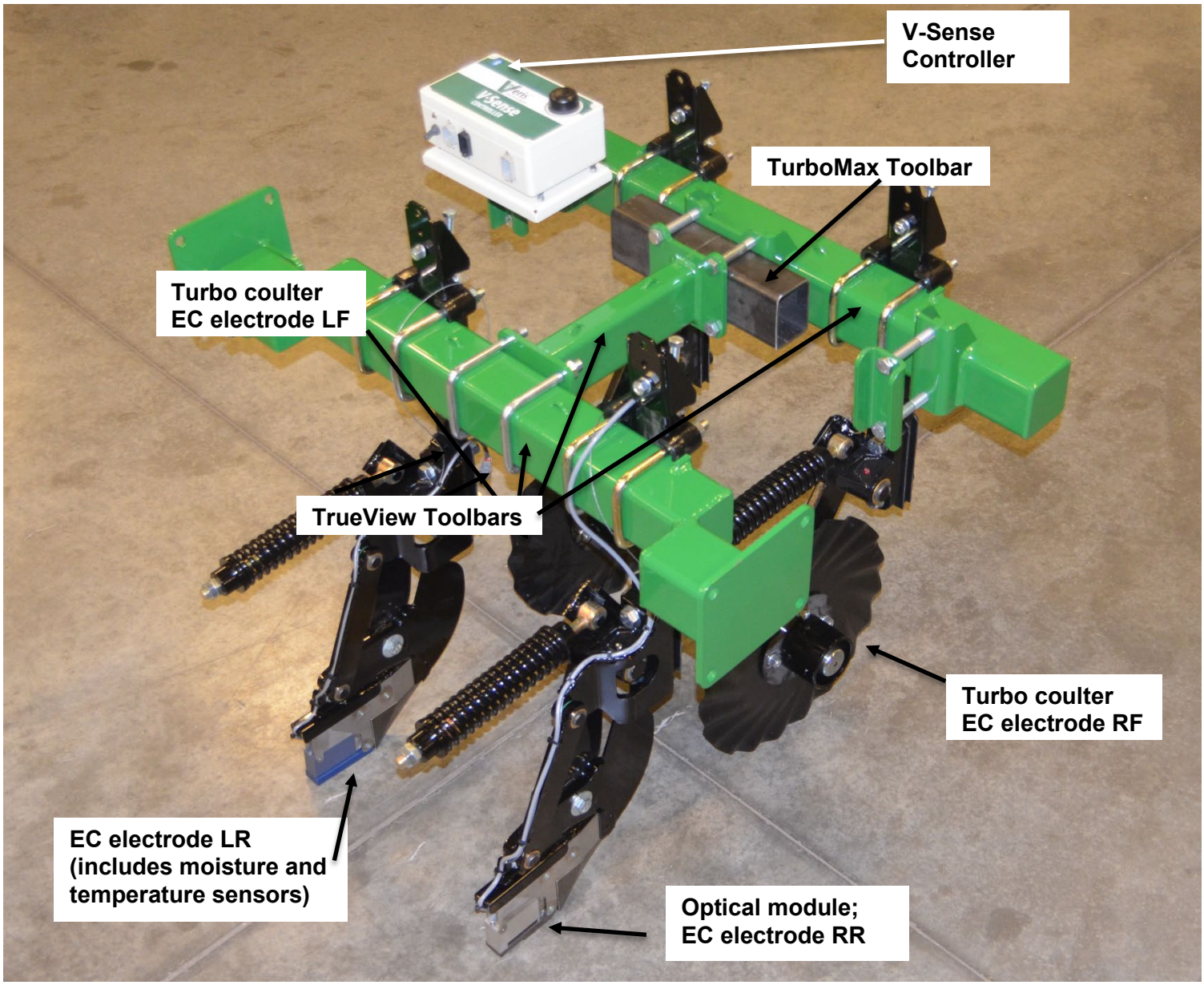
Secure EC wiring harness to terminal bolts on front coulter discs and rear runners.

*Depending on level of disassembly for shipping you may need additional support than provided above. Including installation and use of the lift/lower electric actuator. Please call Veris Technologies for additional support at +1-785-825-1978 or email support@veristech.com

TrueView Overview and Set-up

**Units manufactured before 2020*

If the unit is crated, some assembly may be required. To do so, please take precautions to ensure that the framework is properly supported to ensure safety. Figures 1 and 2 show the key components of the unit.



TrueView Quick Install Guide

If more than one set of weights is installed, remove extra weights.

Follow standard procedures for removing weights.

Follow standard procedures for removed weights.

Only one set of weights can be installed with this TrueView system

Install front toolbar. Ensure it is fitted tight against the right tubing of the TurboMax (passenger side)

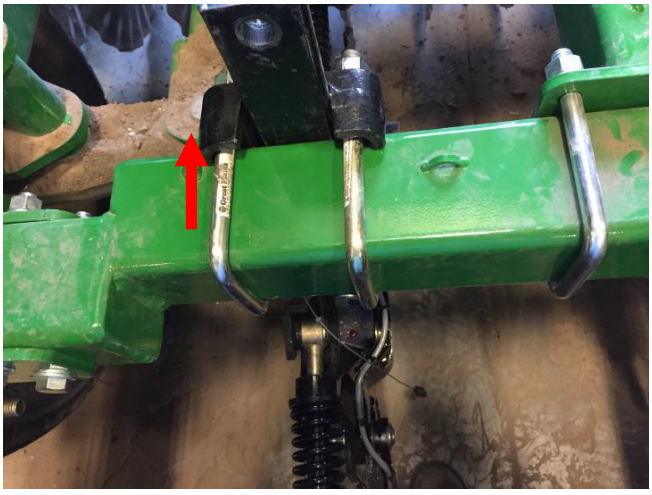
Install center toolbar with cable guides on the top.

Install rear toolbar. Align tight against the right tubing (passenger side).

Fasten U-Bolts

Install left side bracket with adjustment for proper fit.

Install the VSENSE Controller mount

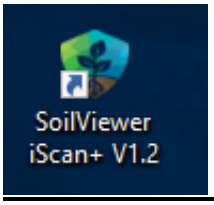


Install coulters with coulter clamps exactly aligned with marked arrows.

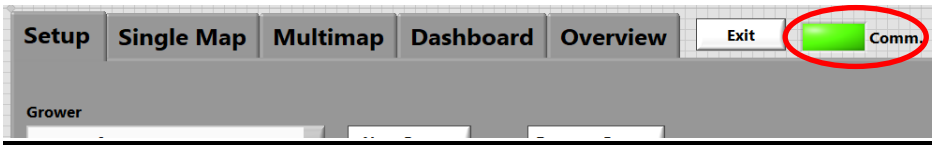
Install VSENSE and run cabling for communication and 12V power.

Section 4

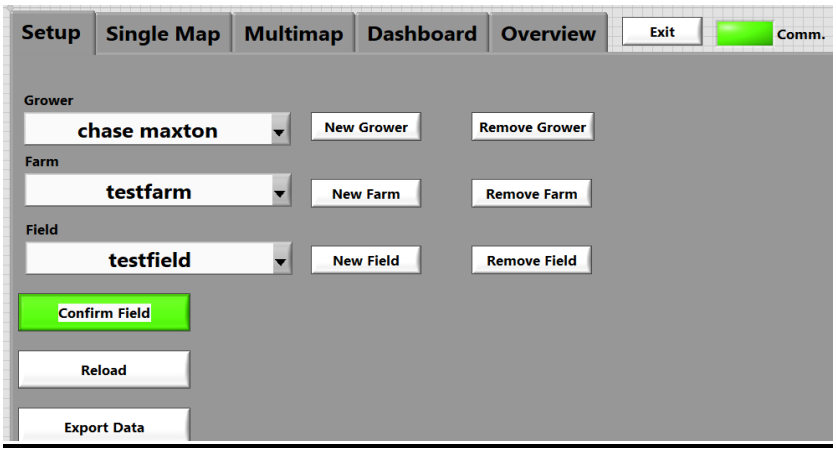
SoilViewer and V-Sense Controller Set-up



1. Power on V.Sense Controller
2. Select SoilViewer iScan+ icon
3. Verify communication is established, by checking for a green Comm. light

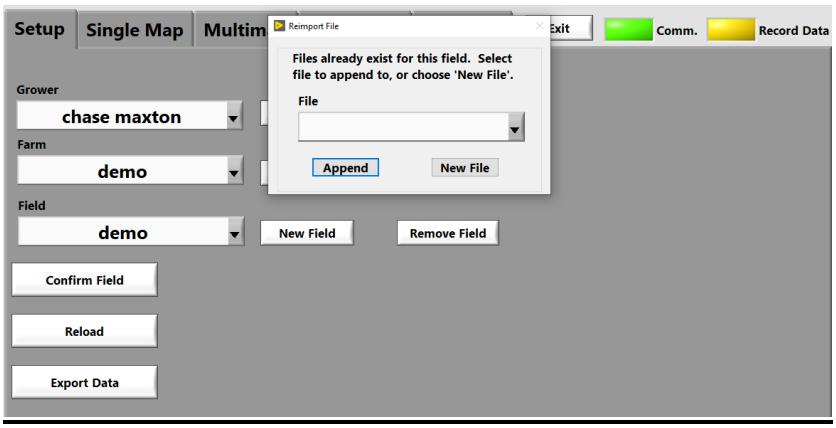


Figures 4- 1,2,3



4. Select or create Grower, Farm, and Field, then press '**Confirm Field**'.

Figure 4-4



If completing fieldwork on a partially completed field, you can append to the existing field. Select the field from the drop-down list and then click Confirm Field

Figure 4-5

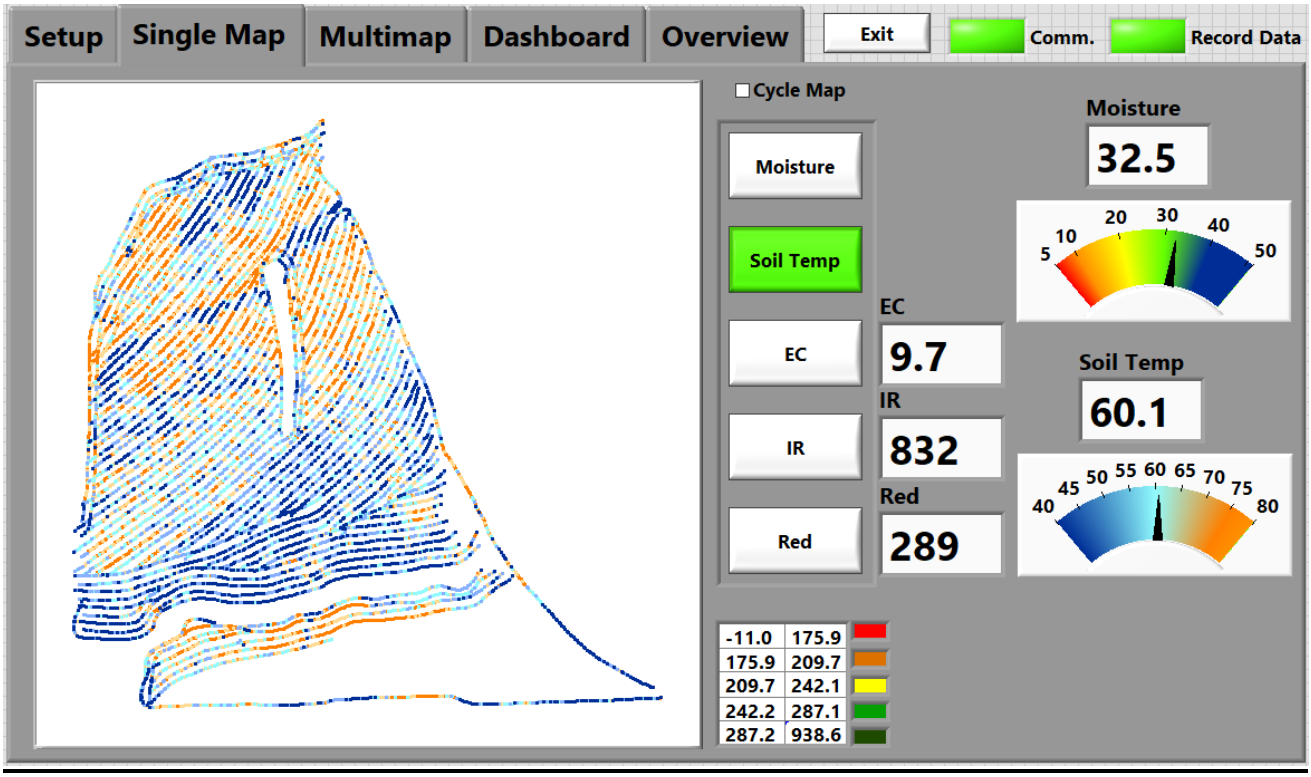


Figure 4-6

Click on the tabs to view: **Single Map**: a single sensor map—and select which map, or cycle thru all, **Multimap**: several maps at the same time, **Dashboard**: a dashboard dial of soil moisture and temperature, or **Overview**: a status of GPS, and sensor indicators

The conditions for mapping and recording data are as follows:

- The unit must be traveling a speed greater than 1 mph
- There must be a GPS signal received
- The Comm Light must be green, indicating the PC and V-Sense controller are communicating properly
- The EC value must be greater than -1.

When all these conditions are met, the Record Data light will be green and the sensor maps will be generated.

If mapping has stopped, files may be appended by selecting a previous file when prompted at the startup of the software. Do not append to a previous day's file or if equipment or soil conditions have changed. Start a new file on each field.

SoilViewer OM System Check

Perform this check every 50 hours and especially at beginning of use season.

Select Optical from the Sensor Checks menu of the **Overview** tab.

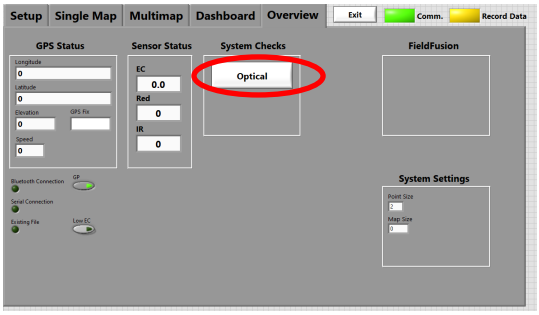


Figure 4-7

After clicking the button the following will appear:

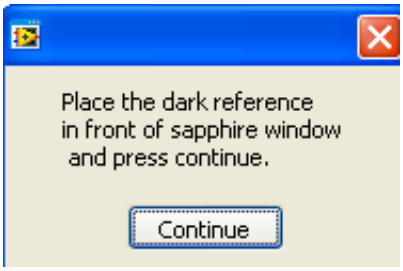


Figure 4-8

Make sure the window is clean and in good condition. (see below) Place the dark side of the reference block under the window, and click continue. Then the next message will appear.

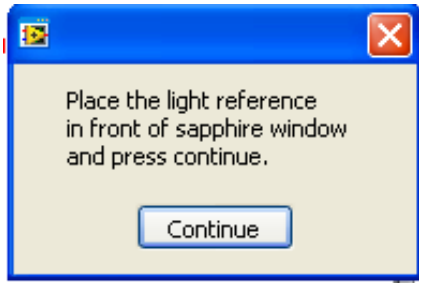
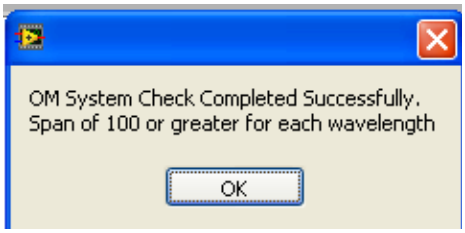


Figure 4-9

Flip the reference block over to the light side and place under the window, and click continue. Then this message will appear:



or

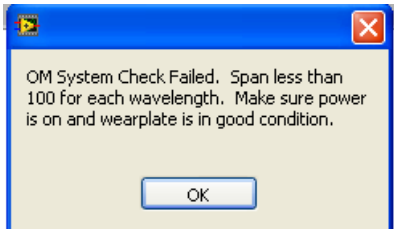


Figure 4-10

The reference values have been stored, and the system is ready for mapping

Optical Wear plate

Below is a comparision of two wear plates. The left is a brand new wear plate, and the right has about 2500 acres on it. Inspect the leading edge,shown below, as the steel wears the window can chip or crack. As this contiues to wear it will eventually need replaced.

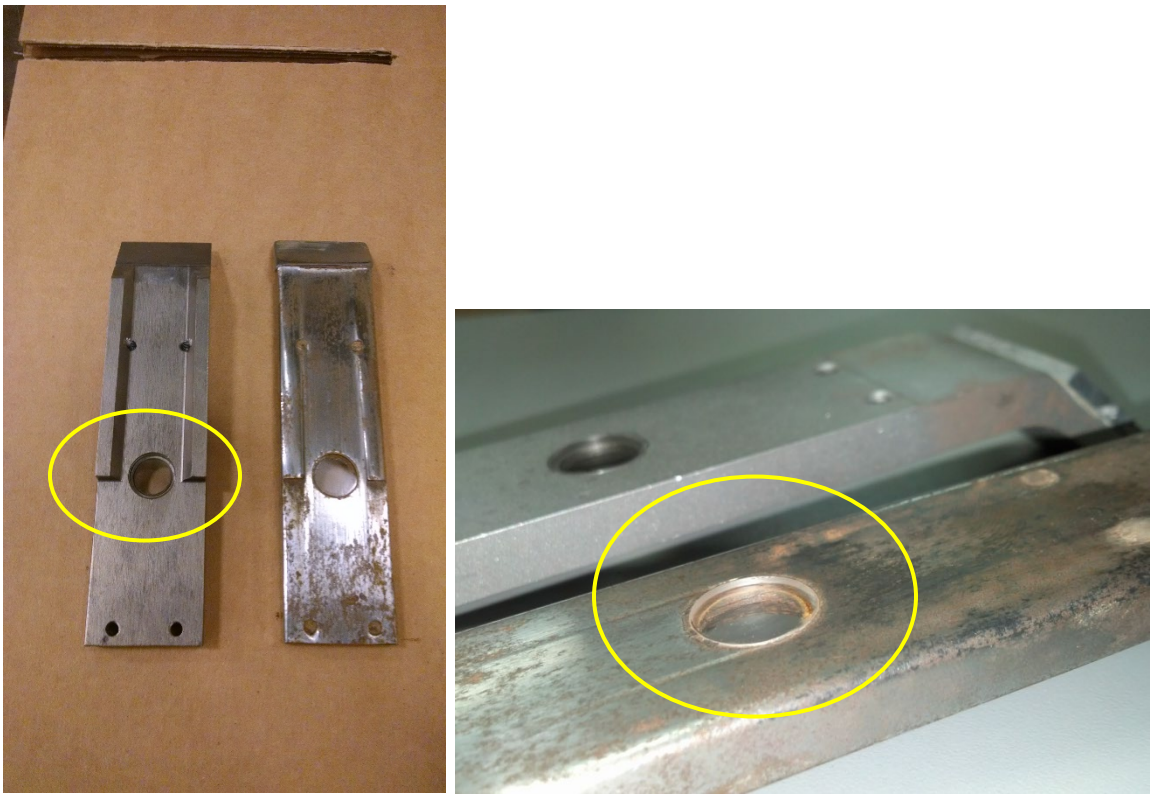


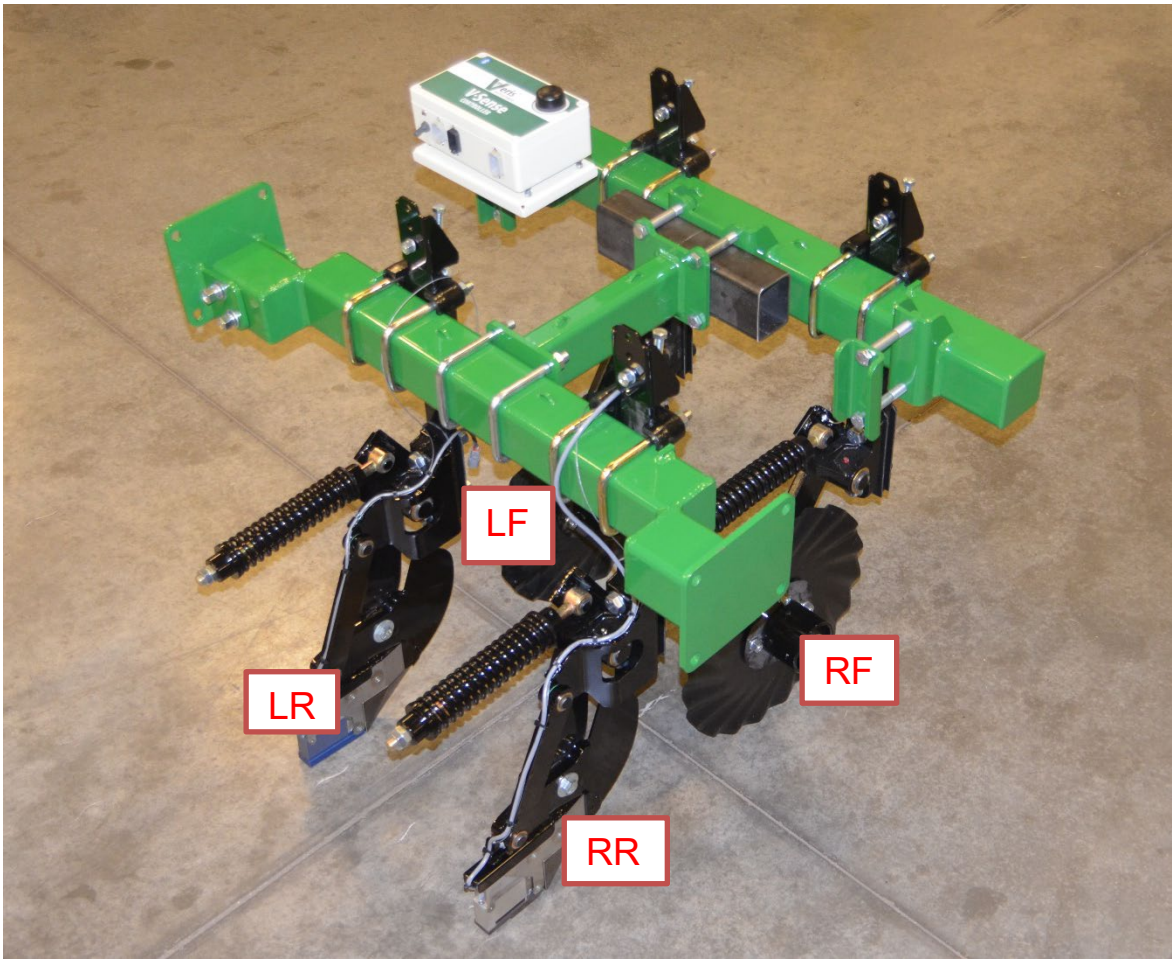
Figure 10

Wear plates will wear differently in every type of soil, so check it daily during heavy use season. To replace wear plate refer to Procedure #9

Section 5: Field Operations

Checking Electrical Signal Continuity and Electrode Isolation

It is recommended that you perform the Electrical Signal Continuity and Electrode Isolation test procedure before first field use (see Service Procedure 3). While these tests were made at the factory, there is the possibility a problem developed during shipping. Performing these tests on the new implement allows you to get familiar with the process under ideal conditions. It is advised that you perform this test after long periods of non-use and on a routine basis (every 40 hours of data collection) to ensure you are obtaining reliable data. **KEEP OHMMETER, TEST LOAD AND TEST BOX WITH THE MACHINE AT ALL TIMES.**



Proper Operating Depth

Begin field operation by lowering implement into soil. TrueView module must be operated in level position. For good electrical conductivity readings, all four electrodes must be in direct contact with moist soil. A depth of 1.5-3” (3-6 cm) is recommended.

Collecting High Quality Soil Data--Tips

1. Observe maps in SoilViewer as data is being collected. High quality data has good pass-to-pass repeatability and soil zones have distinct, natural shapes that follow known field soil properties. Poor data is jumpy or streaky, and maps don't appear as soil's natural continuum.
2. Observe the depth sensor readings for proper depth and for TrueView stability. If depth is inconsistent check airbag pressure and coulter settings.
3. Make sure EC values read -1 on headlands or whenever implement is raised. This code ensures data is only logged when the TrueView is engaged in the soil. If data points are evident when implement is raised, some EC troubleshooting is needed.

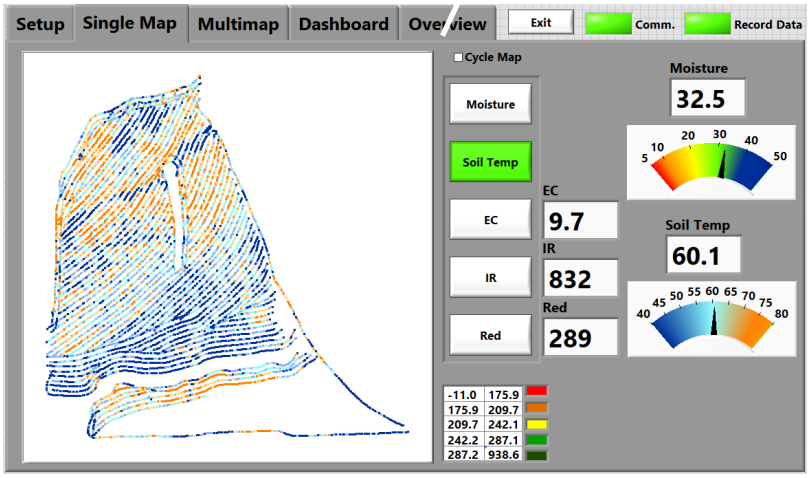


Figure 5-2

Data Quality Troubleshooting: EC

If there are positive EC values appearing when implement is raised (should be -1), or if the EC values are extremely erratic, conduct Service Procedure #4. If the EC readings for the most part are acceptable but are noisier than desired:

1. Make sure all soil engaging components are in consistent contact with moist soil.
2. Perform Signal tests
   - at least once a week during mapping season
   - every 50 hours of mapping
   - after extended periods of non-use
   - after replacing or repairing electrode components or wiring
   - whenever readings are questionable

Data Quality Troubleshooting: Optical

1. Inspect window for possible breakage or soil buildup
2. Check angle of implement: is system running level?
3. Verify optical module is firmly pressing into moist soil at a 1.5-3" (3-6 cm) depth.
4. Check plant residue buildup around TrueView sensors; remove if necessary

Data Quality Troubleshooting: Moisture

1. Check wear for possible wear plate replacement
2. Check angle of implement: is system running level?

Data Quality Troubleshooting: Temperature

1. Check window for damage
2. Check wear for possible wear plate replacement

Section 6: Service and Troubleshooting Procedures

Procedure #1 EC/OM Signal Testing

Perform this test **monthly or every 100 hours of data collection** and whenever OM data is questionable. The purpose of this test is to ensure the instrument is performing properly.

The V-Sense Controller is shipped with an **Instrument Test Load** (Part No. 233924) that will enable you to quickly check the instrument to ensure that it is functioning properly. To perform this test:

1) Disconnect the optical power cable from the V-Sense Controller.
2) Connect the test load to the Optical Power port.
3) Switch on the Controller and view display on SoilViewer.
4) The display should show:
   Red: 833 +/-10
   IR: 289+/-10
   EC: 9.5+/-1
5) If the readings vary significantly contact Veris service department.
6) Two green LEDs will light up on testload to indicate its receiving power
7) Once the test is complete, remove the test load and reinstall the optical power cable.

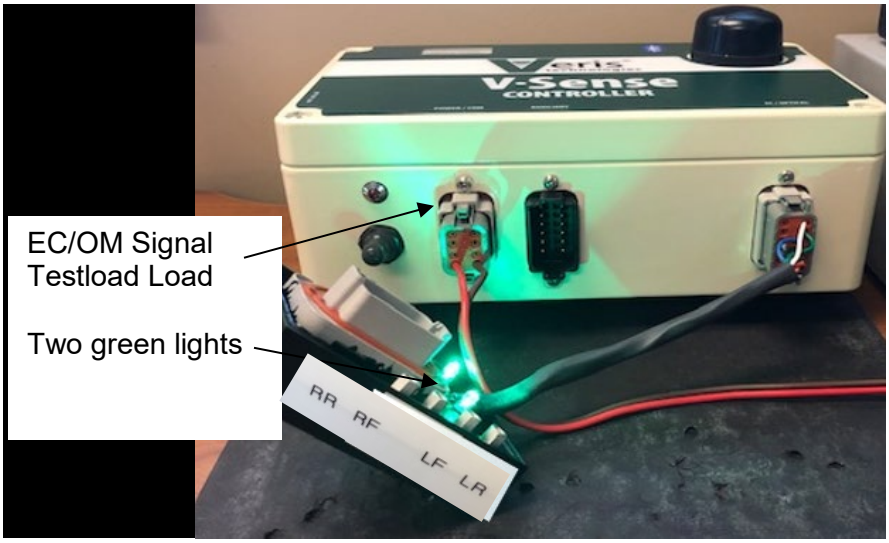


Figure 6-1

Procedure #2: Testing Electrical Continuity

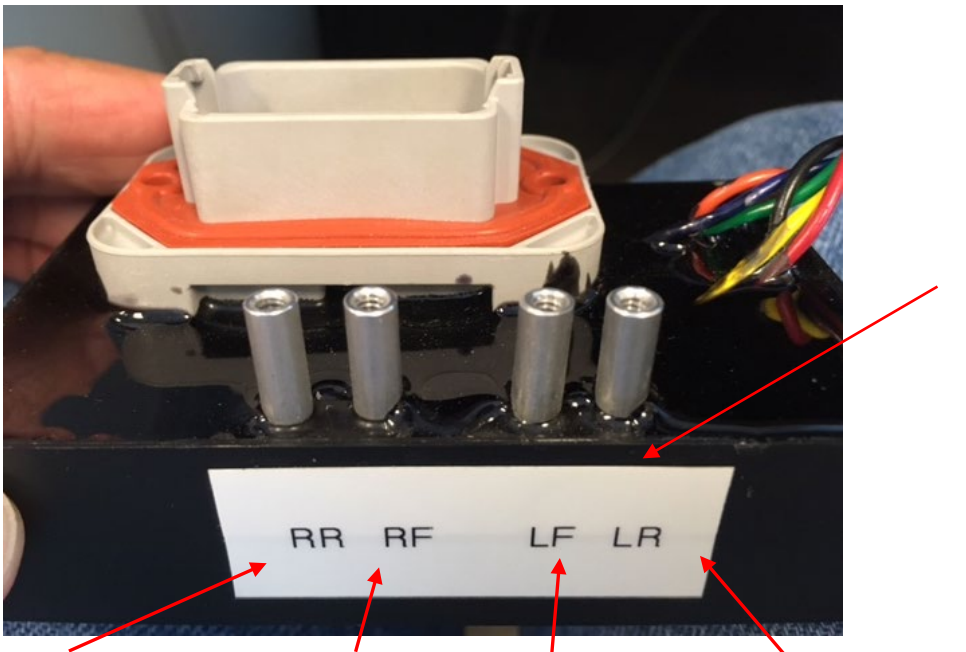
Perform this **test weekly or every 50 hours of data collection** to ensure you are obtaining reliable data, and whenever EC data is questionable.

The purpose of this test is to ensure that each EC electrode has an uninterrupted signal path from the V-Sense controller to the sensor. Think of each shank-mounted sensor and its wire path as a 'channel'. On an TrueView, there are 4 signal channels that must be clear and isolated from one another. You will first test the complete pathway for each channel—each electrode. One easy-to-take reading for each channel tests the cable, wiring harness, and each electrode. If no problems surface during this test, there is no need to test individual components. This test should take only a couple of minutes to perform.

To perform this test, you will need the EC Signal Test Box and an ohmmeter (sometimes referred to as a multi-meter or voltmeter). Make sure the meter is set to ohms, **Ω**. If a range of ohms is available, choose the lowest setting--ohms rather than kilo or mega ohms. If unfamiliar with 'ohming-out' or resistance testing, make a few trial tests before performing the Veris signal test procedure. Touching the meter leads together will display a zero resistance reading, touching two places on the same piece of metal will produce a nearly zero reading, touching nothing will produce an OL (overload or over limit) reading—meaning complete resistance, and no continuity.

Remove the signal cable from the V-Sense Controller and connect it to the terminal on the test box. This cable attaches to the signal cable end and allows you to position the Signal Test Box in close proximity to the coulter-electrodes.

Figure 6-2



Terminal pins for TrueView are labeled on the side of the box

Right Rear runner electrode

Right Front coulter electrode

Left Front coulter electrode

Left Rear runner electrode

Firmly press one lead of the ohmmeter to the #4 electrode (furthest left) and the other lead to the #4 terminal on the test box (pins are labeled below the terminals). Maintain firm pressure on the ohmmeter lead touching the sensor. A reading of less than 2 ohms is normal. Flex sensor as you view the ohmmeter. Any jump in the readings above 2 ohms indicates a problem. Next, move to pin number 1 on the test box and touch ohmmeter lead to electrode #1; then #2, and #3

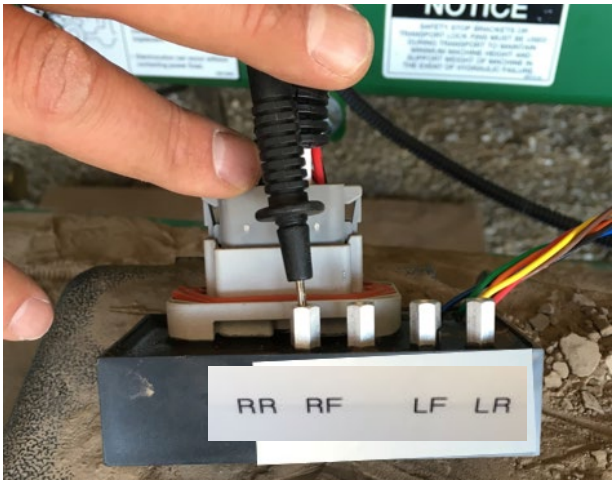


Figure 6-3

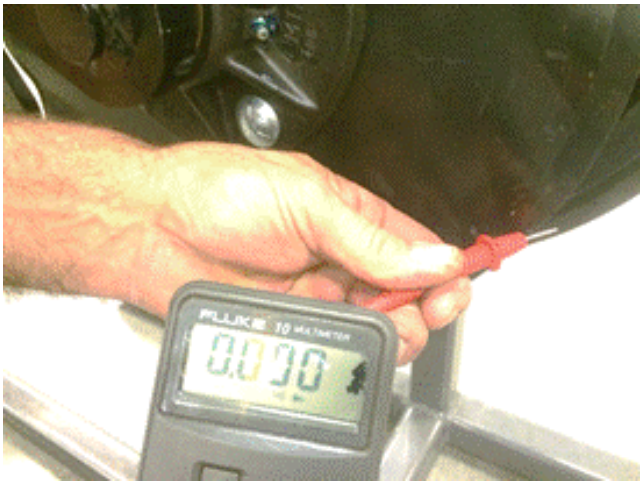


Figure 6-4

If any electrode exhibits no continuity or shows resistance higher than 2 ohms, refer to Procedure #4 Diagnosing EC Signal Problems.

Procedure #3: Diagnosing and Correcting EC Signal Problems.

Electrode Functions-

Each coulter electrode is part of a pair, and each pair has a distinct function.
On an TrueView:

Coulters on the left are the receptors—they measure voltage drop.
Coulters on the right are the "charged" coulters that inject the current into the soil. If you are getting no (or intermittent) readings -- continuity to one of these two coulter-electrodes is likely the cause.

If the continuity ohm test indicates a problem on a channel, you will need to determine where the interruption is located. Listed below are detailed instructions on how to determine exactly where a continuity or isolation problem is located:

A. Testing Cable and Wiring continuity:

1. To test all cable and wiring, place one ohmmeter lead in the Test Box terminal pin for that channel and the other on the corresponding electrode wire terminal bolt (Figure 6-2 and 6-3). Repeat process on all electrodes.

2. If you see <2 ohms on all, the cable is likely ok

3. If you see a > 2ohms reading on any channel from the test in A above, inspect the wires and cable for that channel for obvious breaks; field repair if possible. If none are found or are repairable, replacement of wiring harness may be required.

Note: intermittent electrical problems are difficult to diagnose. Flex wiring and connectors while checking continuity.

B. Testing Electrode continuity

1. It is unlikely that a continuity problem could exist between the terminal bolt and the soil engaging electrodes on electrodes 2 and 3, as the terminal bolt is tapped directly into the shank member for that electrode. If a non-cable related continuity issue arises, it most likely would be found on the rotating electrodes—electrode #1 front turbo coulter or electrode #4 rear closing wheels. Because electrical signals cannot be sent consistently through a bearing, Veris has designed a more reliable path for the EC signal to travel. A special hub with a spring plunger presses against the spindle of the coulter, serving as a commutator. Shown below is a cut-away view of the hubcap and plunger assembly. When ohm readings jump during blade rotation, it is due to the greased rollers on the bearing making intermittent and inconsistent contact.

2. Place ohmmeter lead on terminal wire bolt and other lead on rotating electrode. Rotate electrode ¼ turn. If readings are consistently above 2 ohms, check for excessive corrosion at the coulter blade mounting bolts, or the terminal located near the coulter pivot. Make sure that high ohm readings are not due to poor contact between blade and ohmmeter lead. Re-test holding lead firmly against edge of blade, removing rust or paint if necessary.

3. If ohms jump over 2 ohms when the blade is rotated, and you were careful to maintain good contact between the lead and the blade, the problem is likely inside the hub. See Maintenance and Service procedure #5: Spring Plunger adjustment and replacement on adjusting and replacing spring plungers.

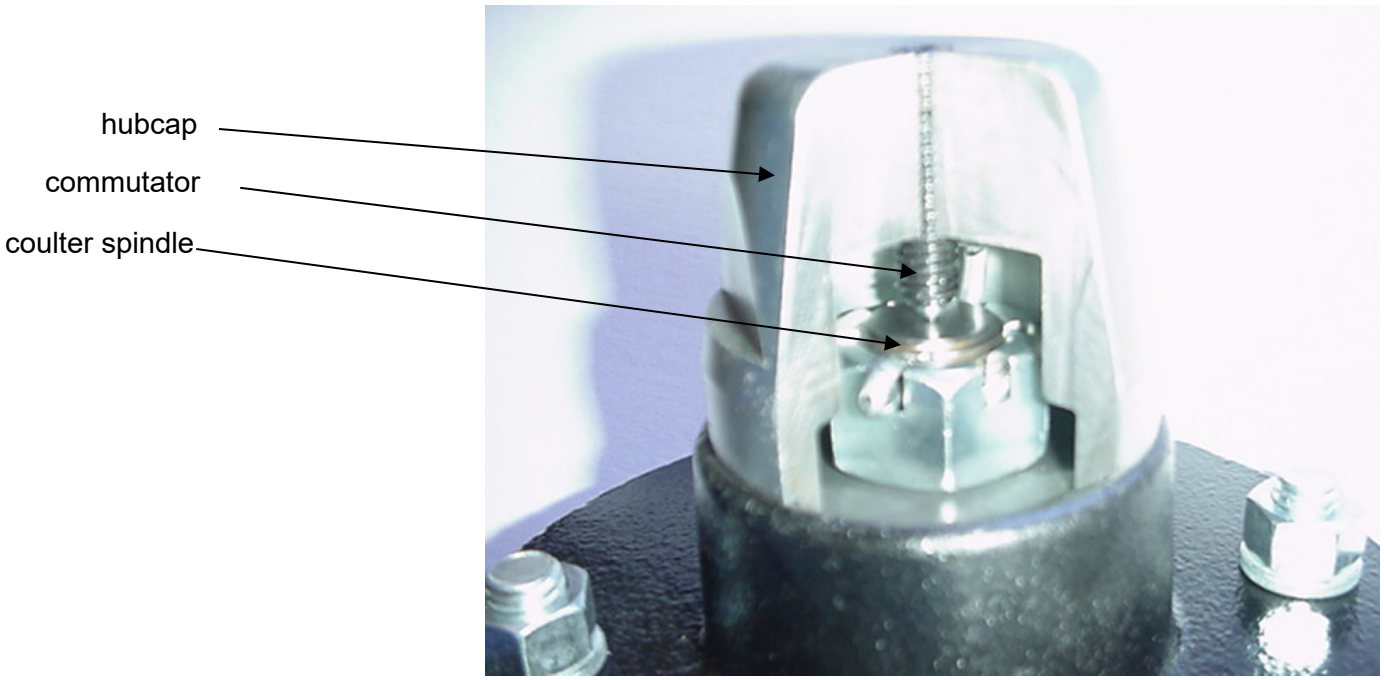


Figure 4.3

C. Testing Electrode isolation

If continuity tests show no excessive resistance on any channel, yet erratic soil EC readings continue, or if EC readings do not drop to –1 when unit is out of the soil, it is possible that the channels are not isolated. This could be the result of a pinched wiring cable, causing channels to short out. Or, one of the electrodes is no longer insulated properly from the frame or adjacent electrodes.

1. Electrode isolation. The TrueView electrodes have insulators installed between each electrode. If mud builds up on the TrueView module, the wet soil could bridge across an insulator and allow a signal pathway between electrodes other than only through the field soil. To correct this, first identify which electrodes are exhibiting continuity. (Note: if there is no wet soil buildup, the problem may be a pinched cable—in which case you may want to begin with Step 2 below)

Test each electrode isolation by checking resistance between each of the electrodes. Ohm meter should show OL (overload), or very high ohm response (Mega Ohms). A low value would indicate a short between two electrodes.

Any continuity from one electrode to another is not acceptable. Remove buildup of wet soil, especially if it bridges across insulators. It may be necessary to remove electrode and clean insulator if problem persists.

Figure 6-6

To easily check isolation use testbox with signal extension cable connected while ohming between pins. This tests the entire signal system.

2. If EC readings do not drop to –1 when unit is not in the soil, and no wet soil bridging across insulators is evident, the wires inside the EC signal cable may be shorting. Begin by ruling out any problem with the V-Sense controller: disconnect signal cable from V-Sense controller. If readings don't drop to -1, the problem is with the controller. If readings show -1 with the signal cable disconnected from the controller, re-connect the signal cable into the controller. Then disconnect each terminal connector wire from each electrode and keep terminal wire from contacting any metal—wrap with electrical tape if needed. If readings don't drop to –1, the problem is with the wiring harness. If this is the case, replacement of the wiring harness is needed. If readings do drop to -1 with all terminal wires disconnected and isolated, re-insert the signal cable extension into the implement. The problem is with one or more of the electrodes. Return to Step 1 above.

Procedure #5 Spring Plunger adjustment and replacement

The spring plungers are located in the center of each rotating electrode hub cap and are vital to maintain good continuity through the coulter hub bearings. They are factory preset and should not need routine adjustment. If a continuity test shows abnormally high resistance, the plungers should be checked. This may be performed in the following manner:

Front Turbo Coulters

1) Check coulter hub bearing preload by grasping coulter blade and pushing from side to side. If there is any noticeable movement, bearing preload is incorrect, or bearings are failing --and this can damage the spring plunger; see procedure #8 for adjustment or replacement.
2) Remove the 3/8" allen head set screw.
3) Remove the plunger by turning counter-clockwise.
4) Depress the spring-loaded tip on a hard surface to determine if plunger has adequate tension and can move freely.
5) If the plunger will not move freely, replace. Coat the threads with di-electric silicone grease before installation.
6) If the plunger appears to be in good working order, reinstall in the hub, and adjust until it bottoms against the spindle end. Rotate 1/2 turn backward to allow adequate clearance. Improper adjustment will result in premature failure (too little tolerance) or poor continuity (too much tolerance). See below to view proper clearance.
7) Reinstall locking set screw and tighten firmly on top of plunger. The top of the setscrew should be even with the face of the hub. If not, remove and adjust the plunger inward or outward as necessary.
8) Re-test coulter electrode continuity

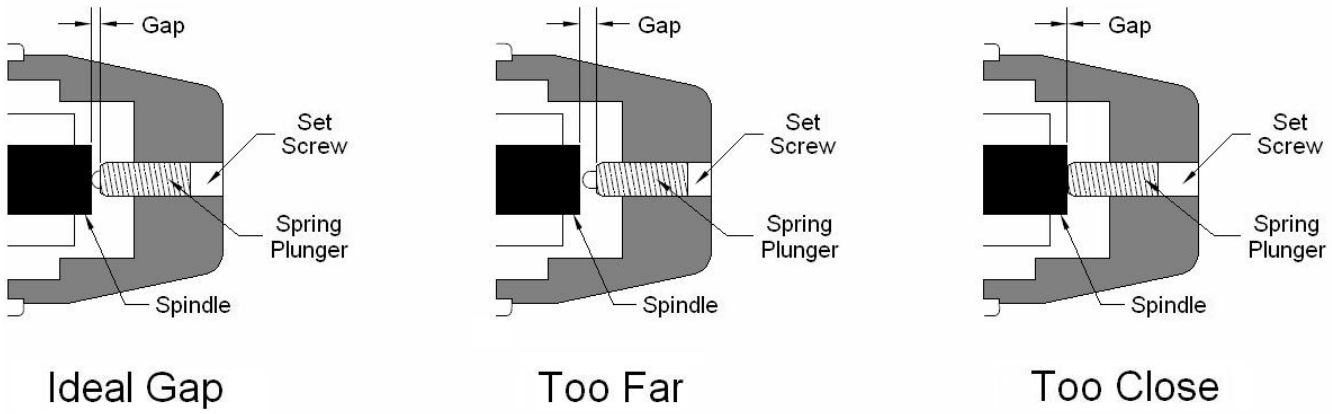


Figure 5.1

In some cases, you may have to remove the hub cap to service the spring plunger, if the plunger is rusted in the cap, or if the readings are still unsatisfactory with the new plunger installed.

Procedure:

1) Remove hub cap by turning clockwise with a pipe wrench or large adjustable wrench – these caps have left hand thread to prevent loosening during field rotation.
2) If plunger is frozen in cap, remove allen head set screw on top of plunger and apply penetrating oil on both sides of plunger. Let this stand for a few minutes and try to remove. If it will not back out with allen wrench, lock vise grips on the inside portion and turn out through inside of hub.
3) Clean all hub cap surfaces, install new o-ring, coat plunger and set screw with di-electric grease and install as outlined above.
4) Re-install hub cap and tighten firmly. You may have to re-set the plunger to compensate for the reduced length on the newly ground spindle. Re-adjust as outlined above.

Note: If you are still unable to obtain favorable resistance readings, check for excessive corrosion at the coulter blade mounting bolts, or at the terminal connection on the back of the main TrueView body.

Procedure #6: Diagnosing GPS-related problems

If you do not see a GPS, DGPS, or RTK on SoilViewer screen, you do not have GPS coming in, and no data will be recorded.

Figure 6.1(No GPS)

Figure 6.2 (With DGPS fix)

Insure your GPS receiver is powered and outputting NMEA strings GGA, and either VTG or RMC at a 1hz rate; 4800 baud, 8 data bits, no parity, 1 stop bit. Verify that your GPS cable is sending GPS data through pin 2, pin 5 is ground, and no other pins have signal or power on them. The most common issue is hz rate. If the GPS has been used for lightbar guidance it may have been set to a 5 or 10 hz rate. It will need to be changed to 1 hz in order for the controller to accept it.

Shown below is a Troubleshooting tree for diagnosing GPS signal problems. It is not meant to replace your GPS receiver user manual—it merely shows how to determine if your receiver is sending the GPS signal that the EC Surveyor needs.

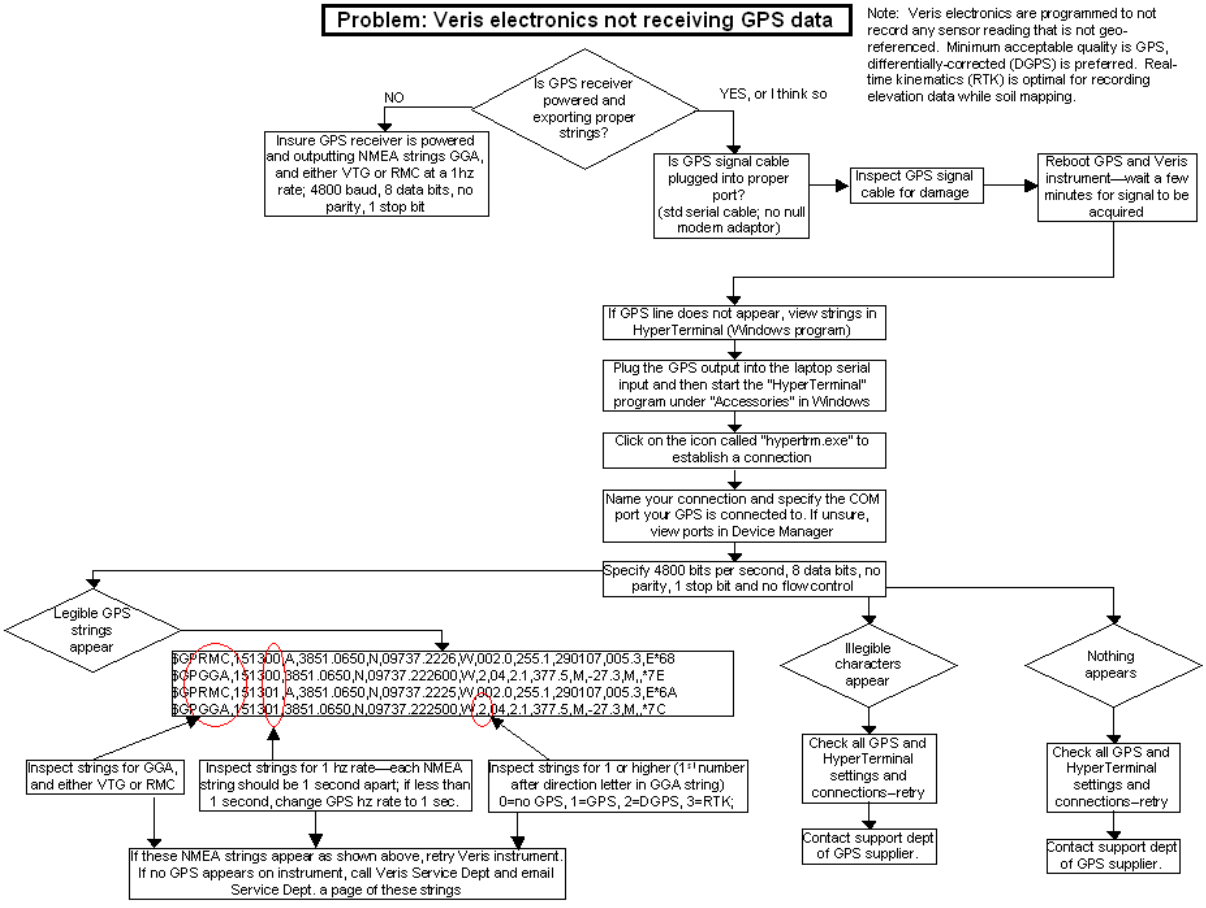


Figure 6.3

Procedure #7: Lubrication

⚠ WARNING Install all transport locks before transporting or working underneath.

Turbo coulter hub: Use good quality wheel bearing or lithium grease for lubrication, but we suggest that you grease the hub sparingly. Over-lubricating the hub will result in pre-mature seal failure, and an excessive amount of grease in the hub cap/commutator. On an interval of **150 hours,** 1-2 strokes of grease should be sufficient.

Figure 7.2

Procedure #8: Bearing Repair and Replacement

The turbo coulter (electrode #1) hub operates in a significantly harsh environment, and annual inspection is of utmost importance. The double-lip seals are designed to keep grease in, and contaminates out, but they are the cause of practically all hub failures. It is advisable to disassemble, clean and repair annually. To perform this maintenance, do the following:

1) Remove hub cap by turning in a **clockwise direction** (left-hand thread prevents loosening in operation).
2) Remove cotter pin, castle nut, thrust washer, and remove hub.
3) Remove outer bearing and knock out inner bearing and both races (cups)
4) Veris recommends that you purchase our Coulter Hub Repair Kit (PN 32641) that includes new bearings, races, seal, o-ring and cotter pin.
5) Thoroughly wash hub in solvent and dry.
6) Spindle end may need grinding—see spring plunger replacement Procedure #5
7) Reassemble and adjust bearing pre-load by fully tightening spindle nut, then backing off until you can turn the hub fairly easily with one hand– normally this involves backing off 1- 2 slots on the castle nut, and inserting cotter pin. Excessive pre-load may cause plugging in extremely loose soil conditions, and excessive endplay may damage the spring plunger. Hub should have no side play when assembled, but should turn with little resistance. Drive round end of cotter pin firmly into nut, and bend upper portion of cotter pin upward and trim of excess length of both top and bottom with cutting pliers. **Do not bend cotter pin over the end of spindle as it will interfere with spring plunger.**

8) Fill hub via grease zerk until grease pushes through outer bearing.
9) Install hub cap by threading counter-clockwise on the hub. Check to make sure that hub still rotates freely. If not, the cotter pin may too long, and is contacting hubcap –remove cap and check cotter pin length.
10) Adjust spring plunger clearance as mentioned in Procedure #5.

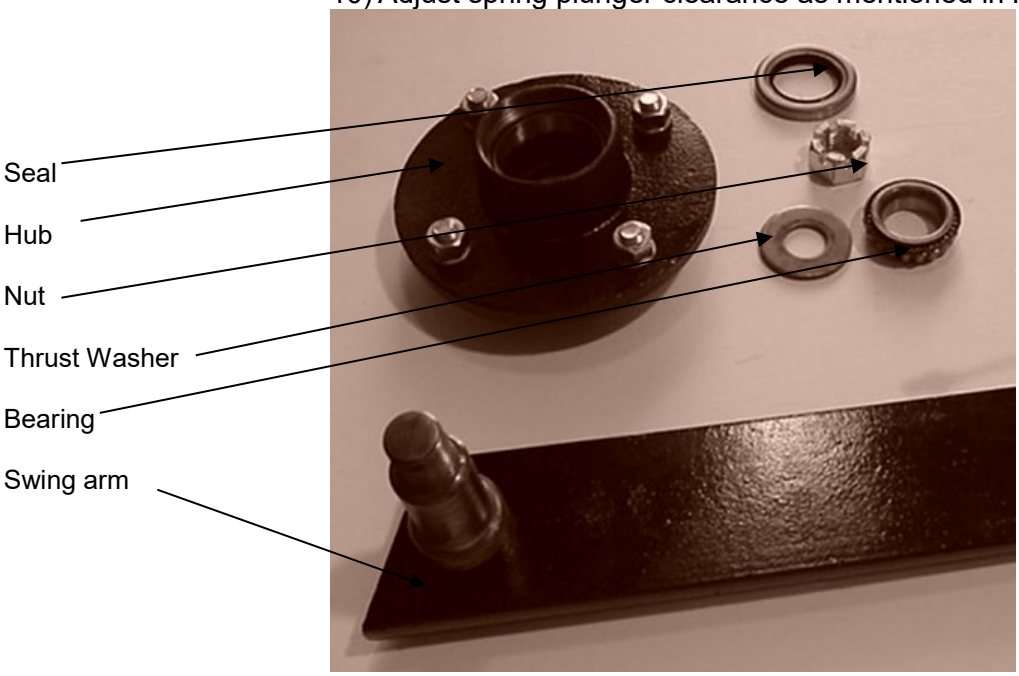


Figure 8.1

Procedure #9: Optical Wear plate and Side Wear plate replacement.

1. Remove the two 3/8” nuts on top edges of i-Scan side plate

2. Remove the two Torx screws attaching the side plates to the runner. (Figure 9.1)

3. To remove wear plate, unscrew the hex bolts on the top of the optical sensor as shown in figure 9.2

4. To replace the wear plate, ensure the O-ring is seated in the O-ring grove as shown in figure 9.3.

5. Install the wear plate, then mount the assembly back to the row unit. **Do not allow any dust or moisture to enter the optical module.**

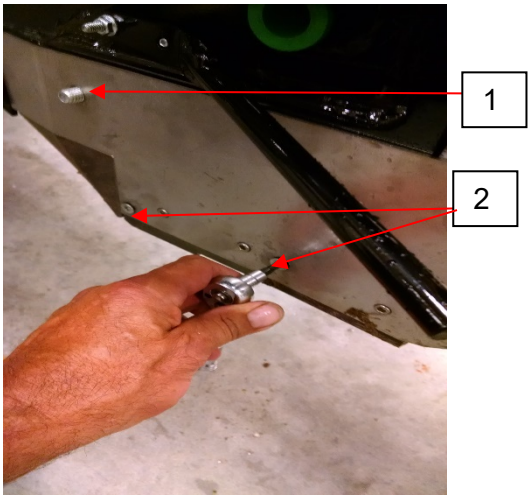


Figure 9.1

Figure 9.2

Figure 9.3

"Harvest Starts Here."

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