



Installation Guide CropScan 3300H On Combine Grain Analyser CaseIH Combines



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CropScan 3300H On Combine Grain Analyser: Installation Guide

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1.0 Product Description

1.1 Overview

This chapter gives you an overview of the CropScan 3300H On Combine Grain Analyser's features and a description of the operation.

1.2 Description

The CropScan 3300H On Combine Grain Analyser has been developed in Australia, for use in measuring Protein, Oil, Moisture, Starch and Fiber in grain sampled from the clean grain elevator of a combine harvester.

The CropScan 3300H comprises a Sampling Head, a Fibre Optic cable, a NIR Spectrometer and an in-cabin Display. The Sample Head is mounted onto the clean grain elevator. A hole is cut into the up side and the down side of the elevator. As grain travels up the elevator, it falls through the top hole and fills the sample chamber of the Sampling Head. A steel flap and outlet motor controls the flow of the grain in and out of the chamber.

The grain is trapped in the chamber where light passes through the sample of grain. The transmitted light is collected by a Fibre Optic Cable that connects the Sample Head to the NIR Spectrometer, located inside the cabin of the combine, where it is kept at a stable temperature. The light that passes through the grain is transmitted back through the Fibre Optic Cable to the NIR Spectrometer which separates the light into the NIR spectrum. The CropScan Display applies the calibration models for Protein, Oil and Moisture and displays the data in the CropScan Display's run screens.

The outlet flap opens and the grain drops out and returns to the down side of the elevator. The chamber refills with grain and the next NIR scan is collected. The CropScan 3300H scans a sample of grain every 5-8 seconds or 11-17 meters, as the combine travels down the row.



Figure 1.1 CropScan 3300H On Combine Analyser components.



Figure 1.2 Sample Head mounted to the Clean Grain Elevator.

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1.3 Technology

The CropScan 3300H is a full spectrum NIR Spectrophotometer. The CropScan 3300H uses a linear diode array detector and a spectrograph to provide the NIR transmittance spectrum from 720-1100 nm. Within this region of the electromagnetic spectrum, compounds such as Protein (1020nm), Moisture (970nm), Oil, (910nm) sugars (830nm), and other organic compounds absorb infrared energy. By measuring the intensity of the infrared energy that passes through a sample of grain, Protein, Oil and Moisture can be measured.

The NIR Spectrometer is based on a flat field spectrograph and a silicon photodiode array detector as shown in figure 1-3.

The advantage of the diode array spectrometer lies in that there are no moving parts. The spectrometer is robust enough to work in the harsh environment of a combine harvester, compact enough to fit inside the cabin of the combine and powerful enough to provide data as good, if not better, than a bench top analyser used in a laboratory. The Fibre Optic Cable allows the NIR spectra to be collected remotely thus removing the spectrometer from the Sampling Head.

1.4 Analysis Software

The 10.1 inch CropScan display controls the entire system. The CropScan 3300H Analysis Software user interface controls the motor flap operation, the lamp, the auger sensor and the sample sensor. The CropScan 3300H Analysis Software computes the Protein, Moisture and Oil data for each sample and the results are presented to the combine operator in a number of formats:

- Field Data
- Field Map
- Graph
- Tank Data
- Truck Data
- Field Storage
- Site Storage

The CropScan Display includes a solid state hard drive for storing large amounts of field acquired data. The CropScan Display has an internal SIM Card and Wi-Fi antenna to connect to a supported network or Wi-Fi Hotspot where available in the field. This device allows data to be transmitted to the Cloud and a remote TABLET DISPLAY, Smart Phones or Tablet.

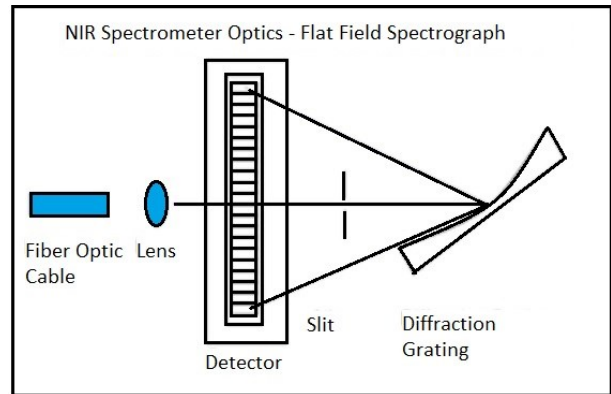


Figure 1.3 Schematic of the NIR Spectrometer Optics Layout.

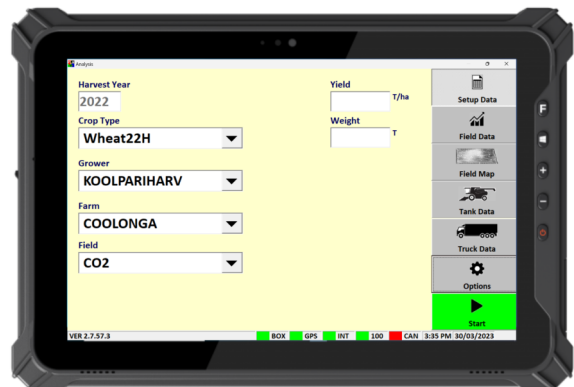


Figure 1.4 CropScan Display.

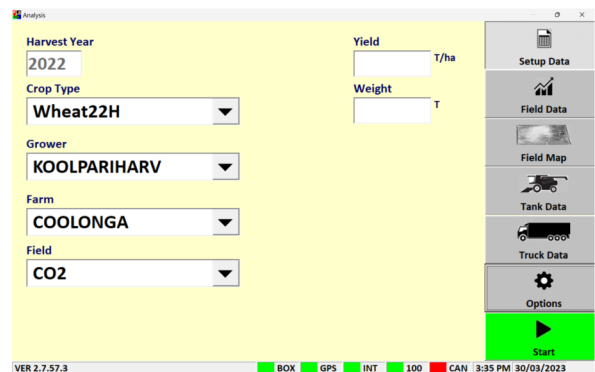


Figure 1.5 CropScan 3300H Analysis Software.

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1.5 What to expect from a NIR Analyser

NIR Analysers are becoming more popular as on farm tools to measure the Protein, Moisture and Oil in wheat, barley and canola. So what should you expect from a NIR Analyser?

Accuracy: Accuracy is defined as the difference between a reference method and the NIR Analyser . Typically 50 samples of grain are analysed in duplicate by the reference method and then using the NIR Analyser. The Standard Deviation of Differences between the reference method and the NIR Analyser is referred to as the Standard Error of Prediction (SEP). The following values represent 95% confidence levels or 2 x SEP.

Wheat: Protein +/- 0.5%
Moisture +/- 0.4%

Barley: Protein +/- 0.6%
Moisture +/- 0.5%

Canola: Oil +/- 1.0%
Moisture +/- 0.5%

This means that for 95 samples out 100, the difference between the reference method and the NIR Analyser will lie between these figures.

Precision: Precision is defined as the ability of an Analyser to measure the same sample twice. Typically 10 samples of grain are analysed in duplicate on the NIR Analyser. The Standard Deviation of the differences between the duplicate readings is referred to the Standard Deviation of Differences (SDD). The following values represent 95% confidence levels or 2 x SDD.

Wheat: Protein +/- 0.3%
Moisture +/- 0.2%

Barley: Protein +/- 0.3%

These data are intended as guides only. Under laboratory conditions, using clean grain samples that are of good quality, then you should be able to achieve similar results. However temperature variations of the sample and the instrument have big effects on SEP and SDD. Weather damaged grain or dirty grain will give rise to larger errors. Poor mixing of a sample can result in excessive errors.

It should be noted that analyzing the same sample 5 or 10 times will cause the sample temperature to rise and the NIR predicted results will change dramatically. Precision tests should be performed on at least 3 clean samples in duplicate only.

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1.6 Components

The CropScan 3300H On Combine Analyser is provided with the following equipment:

- NIR Spectrophotometer with an IP66 rated enclosure
- Sample Head
- CropScan display
- 4 inch Ram Arm
- Tablet Bracket and Ball Mount
- Sample Head Outlet Port
- Sample Head Gasket
- Fibre Optic Cable
- Sample Head Cable
- Spectrometer Cable
- CANBUS Harness
- Accessories Kit
- Instruction Manual

A packing list is included in the parts kit. Please tick off the items after opening the box. Any shortages should be referred to the CropScan technical support team member via: support@nextinstruments.net

	
NIR Spectrometer PN C3H0228	Sample Head, PN C3H219
	
CropScan display PN C3H0289	Fibre Optic Cable PN C3H0370
	
RAM Mount Base PN C3H0273A	Outlet Port PN C3H0231
	
4 inch RAM ARM PN C3H0093	Sample Head Gasket PN C3H0190
	
Tablet Power Supply PN C3H0298	Sample Head Cables PN C3H0475 + PN C3H0349
	
2.0m Spectrometer Cable PN C3H0368 (CIH)	2.0m Spectrometer Cable PN C3H0402A (CIH)
	
Accessories Kit, P/N C3H0601	CaseIH User Manual PN C3H3512

Figure 1.6 CropScan 3300H Parts.

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2.0 Installation

Unpack the CropScan 3300H packing box and check off the parts against the packing list.

Warning: Turn the combine harvester isolation switch off before attempting installation.

2.1 Sample Head Installation

The Sample Head is fitted onto the outboard side of the clean grain elevator. The Sample Head is positioned so that it crosses the up and down side of the elevator. The Sample Head inlet hole is on the left side of the elevator divider and the outlet hole is on the right side of the elevator divider. Check that the Sample Head positioning does not interfere with any doors or latches. To install the Sample Head, follow the instructions below:

- 1) Position and attach the sample head cardboard template so that the bottom horizontal line is 700mm from the bottom of the clean grain elevator housing. Refer to the dimensions provided in figure 2.1, (see Appendix 5.3 for a full size drawing).
- 2) Mark out and center punch holes 1, 2, 3, and 4.
- 3) Mark out and center punch the 4 inlet and outlet corners.

Note: Check hole 1 & 4 for rivet line clearance before drilling.

- 4) Drill holes 1, 2, 3 and 4 using an 8mm drill bit as shown in figure 2.1 and Appendix 5.3. This will give clearance for the square neck of the coach bolt to sit flush against the inside of the clean grain elevator.
- 5) Drill out the four corners of the inlet and outlet cutouts using a 8mm drill.
- 6) Mark out the 4 outer edges of the inlet and outlet holes with a marker pen for cutting guidance.
- 7) Using an angle grinder with a thin cutting blade, cut out the rectangular inlet and outlet cutouts. File the edges so they are flush with the marked lines and deburr all holes and edges.

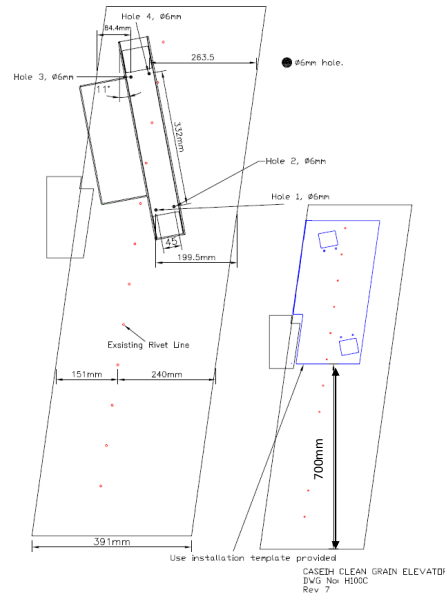


Figure 2.1. Layout for mounting the Sample Head to the Clean Grain Elevator.



Figure 2.2. Cutting inlet and outlets of the clean grain elevator.



Figure 2.3. Clean grain elevator cut outs.

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- 8) Insert the 4 x M6-20 bolts from the inside of the elevator so the threads are facing outwards.
- 9) Fit the supplied gasket onto the 4 x M6-20 bolts.

Note: Gasket orientation. Place thick edge to the top inlet hole and thin edge to the outlet hole as shown in figure 2.4.

- 10) Install the Sample Head onto the 4 x M6-20 bolts. Install the 4 x M6 washers and 4 x M6 nuts. Tighten nuts to secure the Sample Head to the clean grain elevator.



Figure2.4. Sample Head Gasket installation.



Figure 2.5. Sample Head attach bolt.



Figure 2.6 Sample Head installation.

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2.2 NIR Spectrometer Installation

The NIR Spectrometer is to be located inside the cabin. The NIR Spectrometer is housed in a black enclosure, 260mm x 250mm x 120mm. The box is to be mounted to the top side of the UCM cover panel located to the right side of the driver's seat. To install the NIR Spectrometer follow the instructions below:

- 1) Remove the right side UCM panel by unscrewing the three fasteners and move it to an outside bench for drilling.
- 2) Place the supplied cardboard template on the top side of the UCM Panel using the dimensions in figure 2.9 See Appendix 5.4 for a larger drawing reference.
- 3) Drill a 40mm half hole notch in the aft inboard corner of the UCM panel as shown in figure 2.9 for the Sample Head and Fibre Optic Cables to feed down underneath the UMC panel.
- 4) Mount the NIR Spectrometer box, to the UCM cover panel using the three supplied M5 screws and washers. Do re install the UCM panel with Spectrometer until the wiring installation is completed.

Note: A loose Spectrometer box could cause excessive vibration cause internal damage to the Spectrometer Optics.



Figure 2.7. NIR Spectrometer Box.



Figure 2.8 NIR Spectrometer Box fitted UCM Panel.

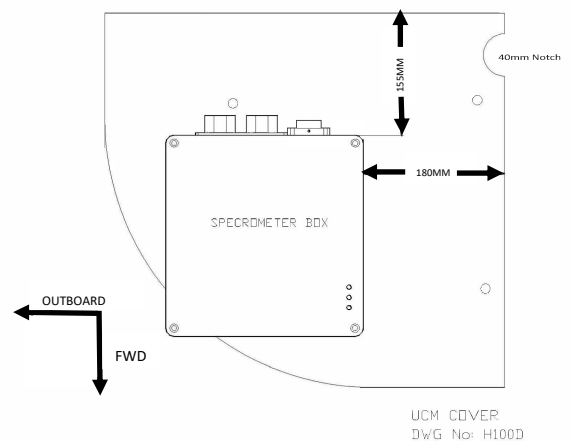


Figure 2.9 NIR Spectrometer installation drawing.

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2.3 CropScan Display Installation

The CropScan Display is to be installed inside the cabin by attaching the supplied display bracket with ball mount to the Pro 700 rail mounting structure. The CropScan Display is then supported and held by the supplied RAM Arm to the display bracket with ball mount. To install the CropScan Display, follow the instructions below:

- 1) Remove the 2 X rail mount M8 bolts at the forward position as shown in figure 2.14.
- 2) Install the supplied 2 x M8-35 Bolts to secure the display bracket with ball mount to the display rail structure shown in figure 2.14.
- 3) Install the 4 inch RAM Arm to the tablet PC bracket.
- 4) Install the CropScan Display to the RAM Arm and tighten the RAM Arm handle to secure the CropScan Display as shown in figure 2.14.

Note: Another installation position for CropScan Display mounting is at the middle or rear rail attach holes.



Figure 2.13. CNHi Cabin Layout forward screen mounting.



Figure 2.14. Display rail mounting position.



Figure 2.15. Optional CropScan Display mounting.

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2.4 Wiring Installation

See figure 2.16 and Appendix 5.2 for detailed Block Diagram showing the connections between components.

Warning: Turn the combine harvester isolation switch off before attempting installing any wiring. Incorrect wiring installation could damage the Spectrometer.

Note: The Fibre Optic Cable is 5m in length, this length will dictate the Fibre Optic Cable routing and may change on different models.

2.5 Sample Head to NIR Spectrometer

- 1) Disconnect Combine power at the battery isolation switch.
- 2) Insert the Fiber Optic Cable into the Fiber Optic light guide on the Sample Head. Insert the Fibre Optic Cable ferrule so that the groove aligns to the locking screw. Push the Fibre Optic cable to the end of the probe. Tighten the locking screw on the barrel of the fiber optic probe.

Note: Install the end of the Fibre Optic Cable with the serial tag into NIR Spectrometer.

Note: Place a bead of silicone around the Fiber Optic cable and light guide to prevent water entering the light guide.

- 3) Connect the Sample Head cable plug to the sample head connector as shown in figure 2.17. Feed the Sample Head cable in behind the elevator and then forward towards the front side of the elevator.
- 4) Run the Fibre Optic Cable, Auger Cable and Sample Head Cable up the front side of the elevator and secure with cable ties using the existing holes running up the vertical edge of the clean grain elevator. Feed the cables over to the combine's main cable harness.

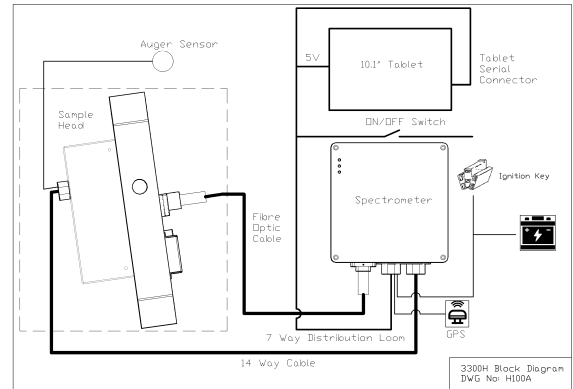


Figure 2.16. CropScan Wiring Block Diagram



Figure 2.17. Sample Head Connectors.



Figure 2.18 CropScan 3300H Sample Fibre Optic Cable.

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Sample Head to Spectrometer Cont.

- 5) Run the Fibre Optic and Sample Head cables forward along the main combine wiring harness to the back wall of the cabin as shown in figure 2.20 and 2.21. Secure with cable ties every 500mm .
- 6) Remove the UCM cover panel under the right side of the drivers seat to gain access the cabin back wall.
- 7) Locate and drill 2 x 5mm pilot holes on the back wall of the cabin for the Sample Head Cable and the Fibre Optic Cable to enter the cabin. Drill the 5mm pilot holes from the inside/out to make sure no wiring and brackets are damage while drilling through the cabin back wall.
- 8) Over size 1 x pilot hole using a 38mm diameter hole saw for the Sample Head cable. Deburr the hole.
- 9) Over size 1 x pilot hole using a 30mm diameter hole saw for the Fibre Optic Cable grommet. Deburr the hole and remove any metal swarf inside the cabin.
- 10) Insert the 1.5m Sample Head cable bulkhead fitting into 38mm drilled hole and secure cable to cabin using the supplied bulkhead nut.
- 11) Insert the Fibre Optic Cable through to 23mm grommet and the 30mm drilled hole in the cabin wall to stop chaffing of wires. Apply a bead of silicone to seal off any gaps.
- 12) Connect the 1.5m Sample Head cable to the Spectrometer box as shown in figure 2.22.
- 13) Insert the Fibre Optic Cable ferrule to the NIR Spectrometer so that the groove aligns to the locking screw. Push the Fibre Optic Cable inwards until the cable ferrule bottoms out and the key way is not seen. Tighten the locking screw as per figure 2.22.

Note a loose Fibre Optic Cable could cause erratic results.



Figure 2.19. Sample Head and Fibre Optic Cable Run.

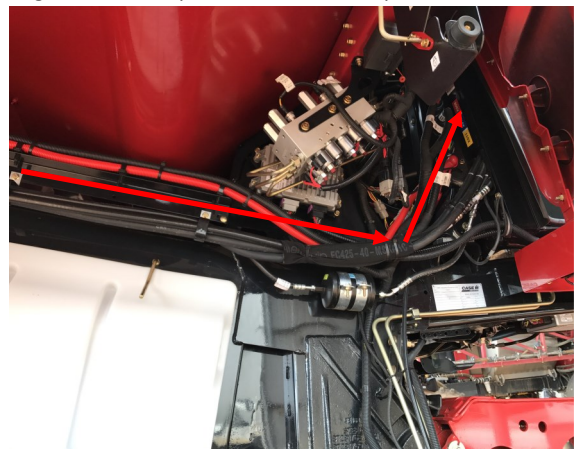


Figure 2.20. Sample Head and Fibre Optic Cable Run.



Figure 2.21. Sample Head Cable and Fibre to Cabin.

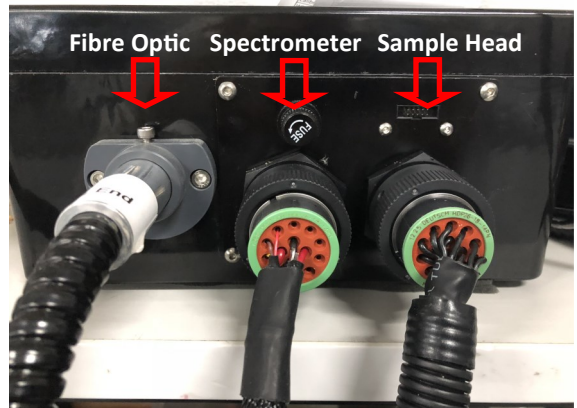


Figure 2.22. Spectrometer Connectors.

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2.6 Spectrometer to CropScan Display

- 1) Install and route the Spectrometer cable (battery connections, GPS connector and On/Off switch) behind the cabin trim to the fuse access panel. Feed the cables up so there is enough length to connect to the NIR Spectrometer mounted on the UCM panel.
- 2) Remove the cabin radio overhead panel to gain access to the overhead switch panel.
- 3) Install the Spectrometer CropScan rocker ON/OFF switch in the overhead panel. Remove the spare blanking plate. Disconnect the rocker switch wiring and install the switch into panel. Reconnect the rocker switch wiring.
- 4) Connect the CropScan GPS plug into Combine GPS plug located in the fuse access panel behind the drivers seat.

Note: 392 Receivers will require to use the new GPS splitter cable provided in the kit. See Appendix 5.6 for detailed drawings.

- 5) Connect the medium gauge red ignition ring terminal main cabin ignition power stud inside the fuse panel. **(AFT STUD in Fuse Panel)**
- 6) Connect the CropScan Display black DB9 serial connector to the Tablet Dock serial port on the bottom left side as shown in figure 2.24.
- 7) Connect the 2 pin power plug to the CropScan display socket. Insert the display power input pin to the display dock as shown in figure 2.24.
- 8) Connect the CANBUS Harness USB to the Tablet Dock USB port. Connect the CANBUS 3 pin connector to the CABBUS terminator 3 pin connector under the UCM panel as shown in figure 2.24.and 2.25.
- 9) Connect the Spectrometer power and ground terminals to the main cabin battery power stud and factory ground bolt. Tighten to secure terminals. Ref to figure 2.26 and Drawing 5.1 for more detail. **(FWD STUD in Fuse Panel)**



Figure 2.23, Spectrometer Power Switch installation

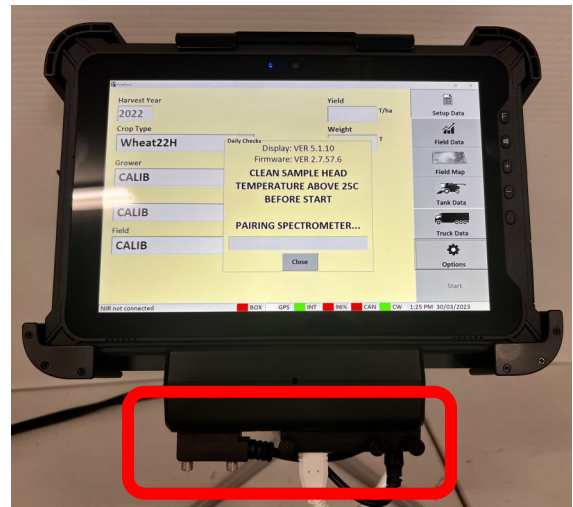


Figure 2.24. NIR COMS 1 and 12VDC Power Connections to CropScan display.

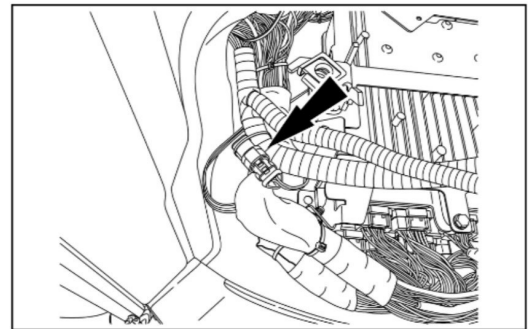


Figure 2.25. CANBUS Cable termination. Under the UCM.

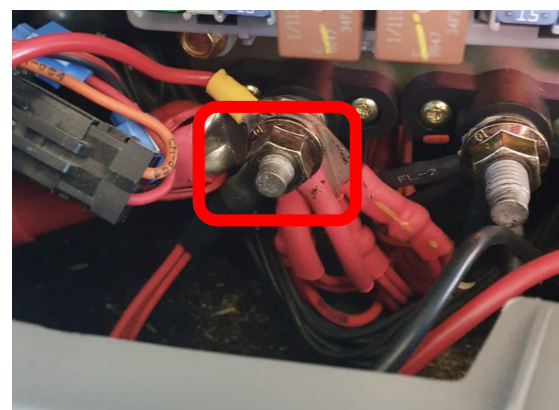


Figure 2.26, Battery Power connection.

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2.7 GPS Interface

CaseIH Pro 700 GPS NMEA Tx Set Up

- 1) Configure the baud rate and NMEA settings in the Combines NAV options menu in CaseIH Pro 700.

NMEA Output: ON
Baud Rate: 19200 or 38400
Interval: 5Hz
Message: GGA

- 2) Press on the **Tool Box Icon** in the Pro 700 display and then the press on the **NAV-S Tab** to access the NMEA set up menus.

NMEA Output Settings:

- Press the **Edit NMEA Output Setup**
- Select NMEA Output ON
- Set Baud Rate to 19200 or 38400
- Press OK to confirm new settings

NMEA Message Setup

- Set GGA NMEA Output to 5Hz
- Press OK to confirm new settings

CropScan Display GPS NMEA Rx Setup

To change the GPS RX baud rate of the Spectrometer, use the **Configurations Settings** window (enables the Spectrometer baud rate to be changed) as shown in figure 2.30. *Note the **GPS ON** tick box is required to be ticked to scan GPS messages.*

- 1) Press **Option/Setup/GPS/Setup** buttons to access the Configuration Settings window.
- 2) Press **Update GPS Baud Rate** button to view the Configuration Settings window and access the GPS baud rate parameter as shown in figure 2.30.
- 3) Click on the baud rate white box and enter the new baud rate (19200 or 38400). Press Enter to confirm.
- 4) Press the **Download** button to save the new baud rate.
- 5) Press the **Close** button to return to the GPS Test page to test NMEA output message.
- 6) Press the **Test GPS** button to test the CropScan RX NMEA message condition.

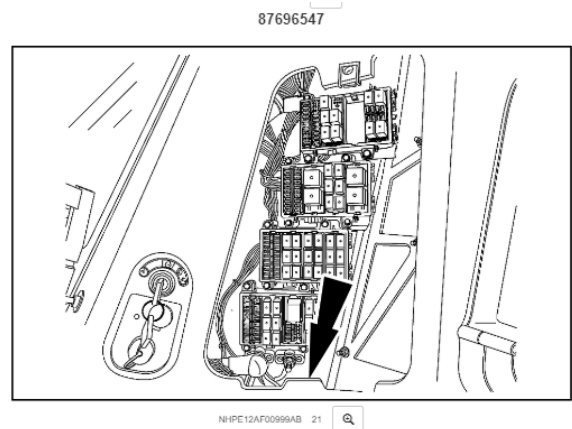


Figure 2.27. GPS Interface connection for 372 and 392 receivers.



Figure 2.28. NMEA Setup Window.



Figure 2.29. NMEA Setup Window.

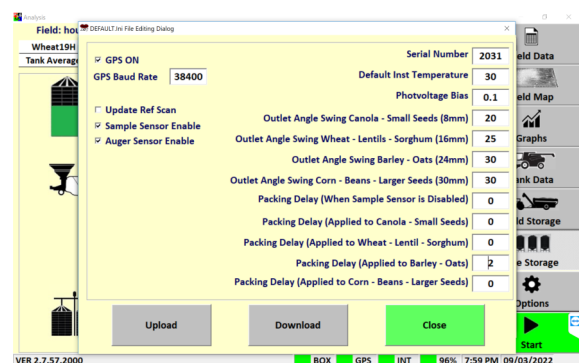


Figure 2.30. Setup - Configuration window.

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2.8 CropScan 3300H Installation Check List

Item	Installation	Carried Out
1	Install Sample Head to Clean Grain Elevator	
2	Install Spectrometer to UCM panel	
3	Install CropScan Display to display rail	
4	Install Sample Head Cable	
5	Install Fibre Optic Cable (Tighten lock screw and seal cabin feed through hole)	
6	Connect CANBUS Harness	
7	Install Spectrometer Cable	
8	Connect GPS connector to PCM	
9	Connect Ignition battery relay terminals	
10	Power Up 3300H	
11	Check Diagnostics Status Box is Green	
	Software Setup	
12	Enter User's Client/Farm/Field ID's (CN1, AgGPS or Shape Files)	
13	Enter User's Storage Location Names and Volumes	
14	Configure NMEA GPS Baud Rate	
15	Configure Grain Logistics Window	
16	Tether Wi-Fi Hotspot	
17	Set Up CropScanAg Cloud	
	Calibration Verification	
18	Warm up CropScan 3300H to 30°C	
19	Run 3 Samples in Auto-Calibration Routine	
20	Adjust Crop Type Bias if Required	
21	Export Data and Save Data	

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3.0 Display Setup

The **Setup Menu** allows operators to setup the CropScan Display to suit the operators farming operation. The operator can import Field ID's, create Storage ID's and storage icons, adjust display time, manage data calendar folders, setup and test GPS messages, add a Wi-Fi Hotspot sign in to the CropScanAg Cloud account.

3.1 SIM Card Activation

(NOTE: SIM Card is pre installed to this display, follow the steps below to extend subscription)

- Contact your local dealer for pricing and subscription terms.
- Supply the SIM Serial Number (SIM Card is located inside the accessories kit) to your dealer for activation/recharge.

3.2 Wi-Fi and Hotspot Setup

(NOTE: fields are case sensitive. i.e. "iPhone" and the software rejects apostrophe i.e. Tom's iPhone.)

- Press **Scan Network** to search for Wi-Fi Hotspot
- Select the Wi-Fi Hotspot you wish to tether
- Click in the white password box and Enter Hotspot password

3.3 Wi-Fi and Hotspot Connection

(NOTE: A Hotspot Setup is require prior to connection)

- Press **Scan Network** to search for Wi-Fi Hotspot
- Select the Wi-Fi Hotspot name
- Press the **Connect** button and wait for a Wi-Fi Connection Request notification as shown in figure 3.3.

3.4 CropScanAg Cloud Sign In

(NOTE: Sign up at app.cropscanag.com)

- Press the Sign In button to access the User Credential setup window.
- Enter the Username email address used to create an CropScanAg Cloud account.
- Enter the Password used to create an CropScanAg Cloud account.
- Press the Sign In button to link the CropScan Display to your CropScanAg Cloud account. Wait for a Authentication Successful notification as shown in figure 3.5.

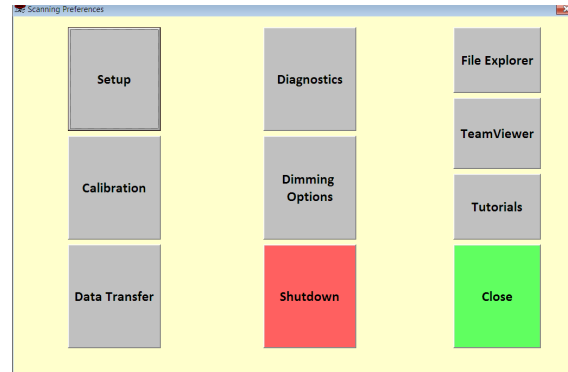


Figure 3-1. Setup - Options Window.



Figure 3-2. Setup—Wifi

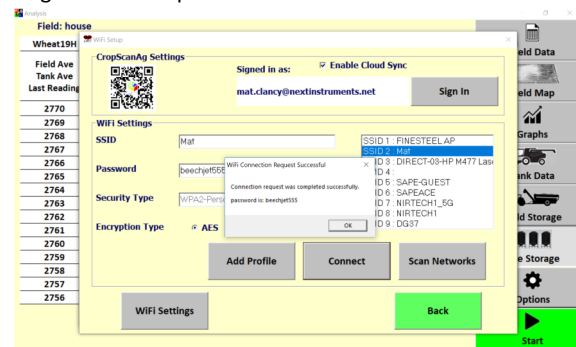


Figure 3-3. Wifi Hotspot Connection

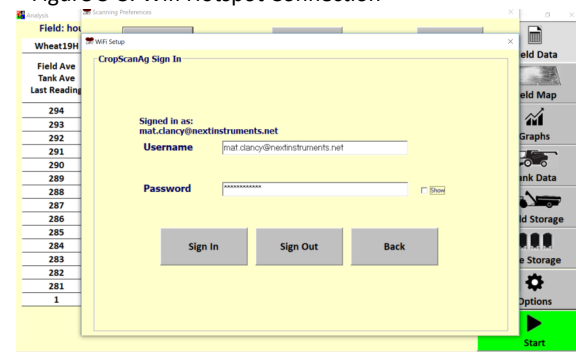


Figure 3-4. CropScanAg Cloud Sign In

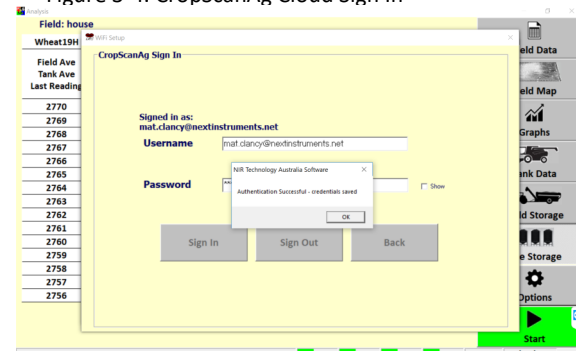


Figure 3-5. CropScanAg Cloud Authentication

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3.5 Field ID's

The CropScan Display can import 4 Client Farm Field formats to make setting up the Field ID's easy:

1. CropScanAg Cloud API—Geojson from CNHi and John Deere Portals.
2. CN1 Folder –CNHi Format
3. AgGPS—Trimble Format
4. JD Boundary Shape Files—JD Format

Note: The API connection is preferred to reduce the duplication of field names and machinery set up data.

Client Farm Field Import—API

- Press the **Field ID's** tab to import or edit the Field ID's list.
- Press the **Import GFF Cloud** button to import the sync the Grower Farm and Field ID's from the CropScanAg Cloud.

Client Farm Field Import

- Save a CN1 Folder, AgGPS or JD Boundary Shape Files to a USB Stick for importing.
- Insert the USB Stick into the CropScan Display USB port located on the left side of the display.
- Press the **Field ID's** tab to import or edit the Field ID's list.
- Press the Client Farm Field tick box as shown in figure 4.2 to activate Client Farm Field format.
- Press the **Import Fields** button to import the CN1 Folder, AgGPS and JD Boundary Shape files from the loaded USB Stick. Wait for the import process to complete.

Edit—Client Farm Field

- To manually add a new client, farm or field, press the Edit button and select the option Add New. To change or remove a client, select it from the list, then press Edit Client and press the appropriate option

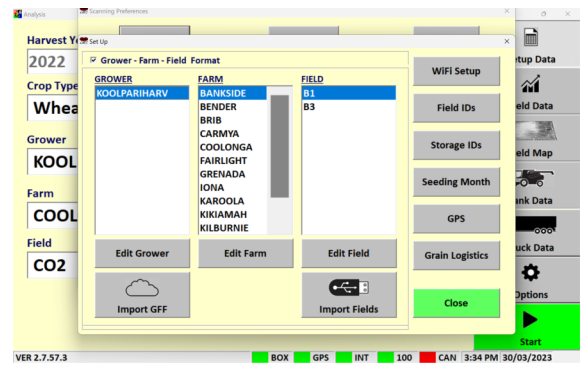


Figure 3.6. Setup - Field IDs in Client-Farm-Field format.

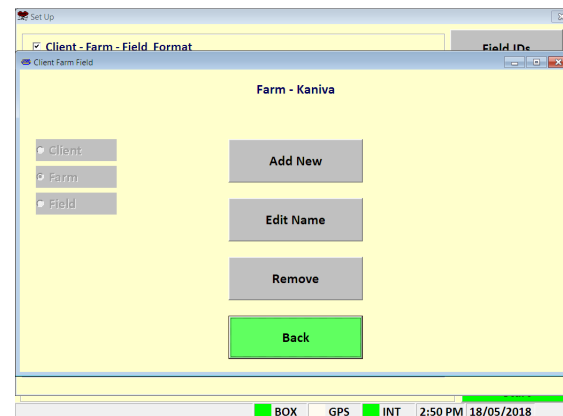


Figure 3.7. Setup - Editing Client-Farm-Field Information.

CropScan 3300H On Combine Grain Analyser: Installation Guide

3.6 Storage ID's

- Press the **Storage ID's** button and setup the names for the different grain storage locations. This is only needed if the CropScan is used for **In Field Storage** or when outloading grain to a silo/bin.
- To add a new storage, select the desired type and press **Add Storage**. Tap on the white boxes to enter the name and the volume, check that the storage type is correct and press the **Add Storage** button to confirm.
- To change the storage name or volume, select it from the list and press **Change Storage**.

Note: Changing the storage name will remove the grain associated to that storage. Make sure to change the name when the storage is empty.

- To remove a storage, select it from the list and tap on the **Remove Storage** button.

3.7 Harvest Start Date

- Select the month the harvesting season begins. The CropScan 3300H Analysis Software will manage the harvest data in a 12 month period from this selected month.

Note: Select January for Northern Hemisphere users and June for Southern Hemisphere users.

- Select current time zone from the drop down list and confirm time zone by pressing the **Change Time Zone** button.

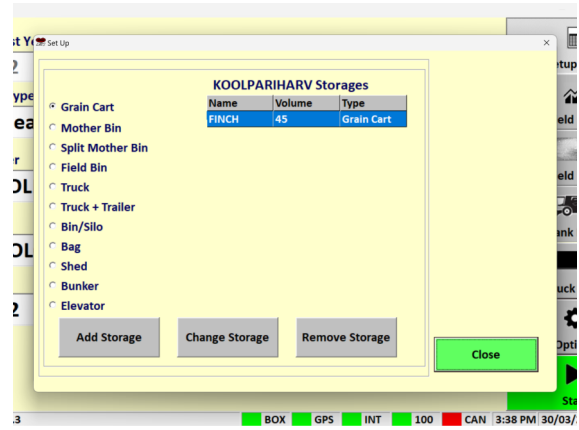


Figure 3.8. Setup—Storage ID's.

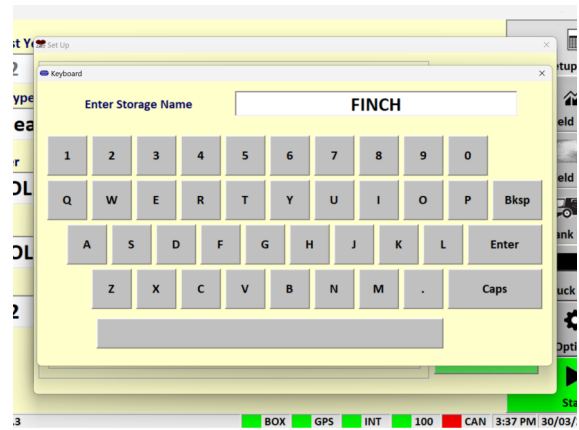


Figure 3.9. Setup - Adding a new storage.

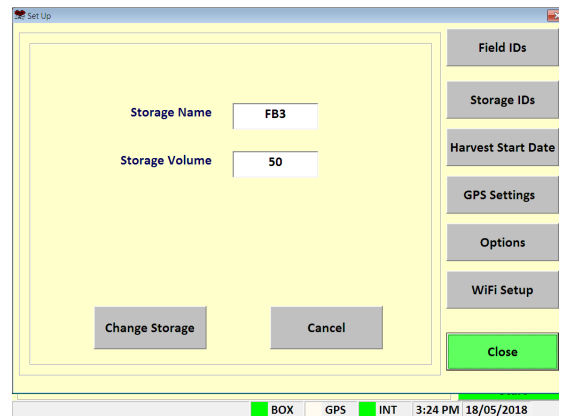


Figure 3.10. Setup - Changing a valid storage.

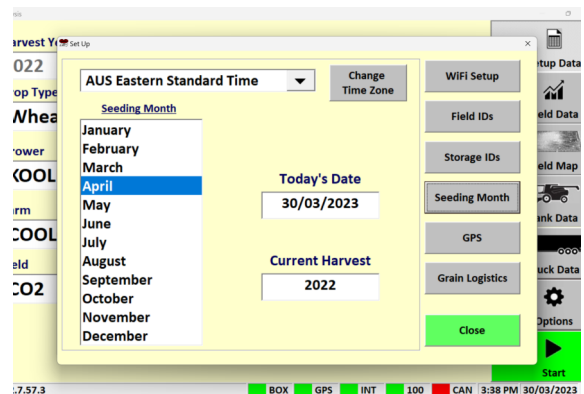


Figure 3.11. Setup - Harvest Start Date Screen.

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3.8 GPS Settings

The CropScan 3300H interfaces to the combine's GPS receiver. The CropScan Spectrometer Cable provides a serial cable connection between the combine's GPS receiver and the CropScan 3300H Spectrometer. The GPS receivers NMEA message and baud rate must be set up to output a message and rate. Please refer to the combine manufacturer's GPS setup instructions for NMEA Message and Baud Rate output setup.

Note: The Tablet has a built in GPS which can be used in replacement of the receivers GPS if an GPS input was not available.

GPS Activation

- Press **Options** Menu button
- Press **Set Up** Menu button
- Press **GPS Settings** button

GPS Configuration Settings

Activate GPS Ticked = GPS ON
Active GPS Un Ticked = GPS OFF

GPS Message Test

- Press the **Setup** button to access the GPS Message test window as shown in figure 3.9 and 3.10.
- Press the **Test GPS Data** button to test NMEA message and baud rate Setting from Combine receiver to CropScan Display.

GPS Received = Pass
GPS Not Received = Fail

If a **GPS Not Received** code is displayed then the NMEA message received was blank or incorrect. A possible cause could be the incorrect baud rate setting.

Baud Rate Configuration

CropScan Baud Rate setting must match the baud rate of the Combine GPS receiver. See the combine harvester manual for GPS receiver baud rate settings and adjustments.

- Press **Update GPS Settings** button as shown in figure 3.9 to open the Configuration window.
- Confirm **GPS On** is ticked
- Set GPS baud rate to match the GPS receiver baud rate. Press in the baud rate white text box and enter to new baud rate and press Enter.
- Press the **Download** button to confirm new the settings.

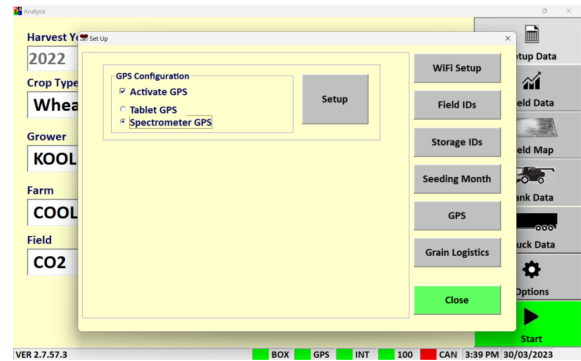


Figure 3-12. Setup - GPS Settings Screen.

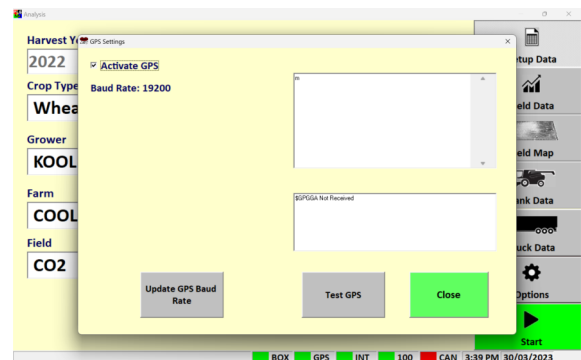


Figure 3-13. Setup - Spectrometer GPS Test Window

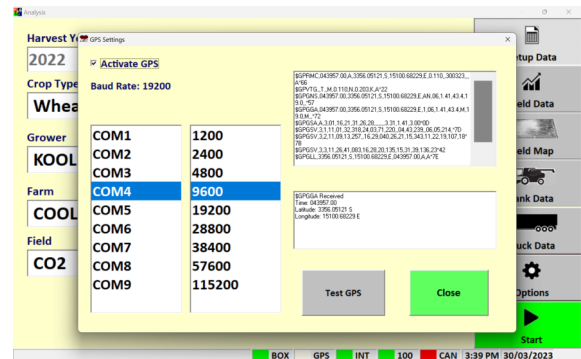


Figure 3-14. Setup - Tablet GPS Test Window

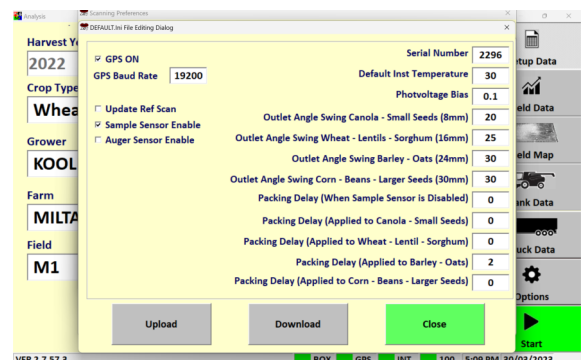


Figure 3-15. Setup - Configuration window.

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3.9 Grain Logistics

Description

The CANBUS Integration is design to automate and improve the operation of the CropScan Display. The CropScan Display will read the following CAN Messages to automate the selection for:

- Crop Type Selection (CNHi Telematics' installed)
- Grower Selection (CNHi Telematics' installed)
- Farm Selection (CNHi Telematics' installed)
- Field Selection (CNHi Telematics' installed)
- Header Up/Down Position
- Thrashing Engaged/Dis-engaged
- Auger Engaged/Dis-engaged

Note: Crop Type, Grower, Farm and Field ID's only available when a PCM modem is fitted to the combine. Manual selection on the CropScan display is needed to enter the Crop Type and GFF if a modem is not fitted.

Additionally, the CAN Messages for the crop flow, provide real-time yield data and grain tank weight accumulation. The CAN messages are recorded to help automate the tracking of grain transfers from the field to the grain buyer.

CANBUS Set Up and Configuration

- Press the Options Menu button
- Press the SetUp Menu button
- Press the Grain Logistics Tab
- Select Tank Data Logistic View (Combine Mode) or Storage Logistic View (Cart Mode)
- To active the CropScan CANBUS Integration press on the CANBUS tick box.
- Press on the CAN Test button to open CANBUS Configuration Menu.
- The CANBUS system can be configured to activate:
 - CAN Auger messages (Recommended)
 - CAN Weight Counter (Recommended)
 - Rotor Dis engage timer (Recommended 5 mins)
- To test the CANBUS messages Press the Test CAN button to test Can messages are received.
- No License and registration is required with Analysis Software Version 5.1.10 and higher.

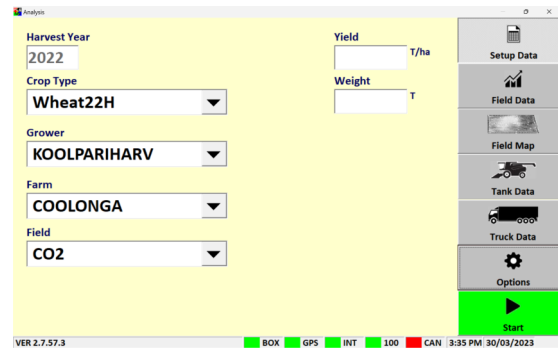


Figure 3-16. Setup Data

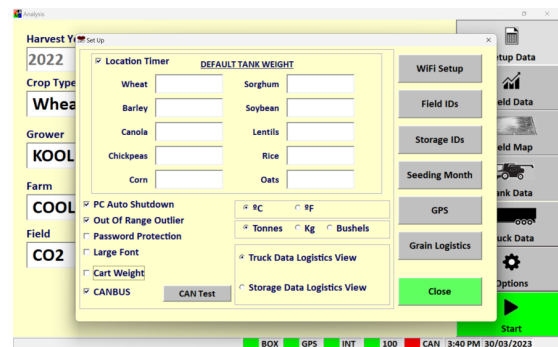


Figure 3-17. Grain Logistics Menu

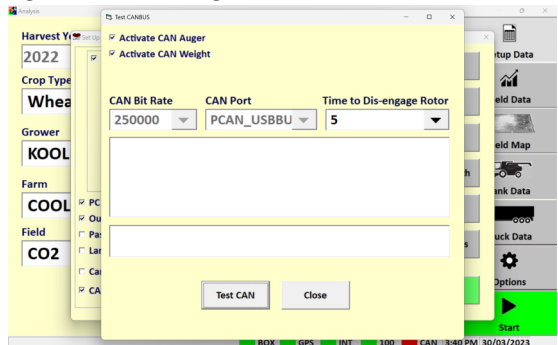


Figure 3-17. CANBUS Test window.

CropScan 3300H On Combine Grain Analyser: Installation Guide

Operation

The CANBUS Integration sync's Crop Type, Grower, Farm, Field inputs from the CNHi Combine Displays'. These CAN messages are scanned when the CropScan Display is in the inactive mode (**Start Button Green**) and the Combine is in a non work mode (**Rotor Dis Engaged**).

Once the Combine is put into a Work Mode Status, Header Down and the Rotor Engaged the CropScan START button will switch to the active mode and begin to operate. The CropScan Sample Head Outlet Door will close and wait for the sample head chamber to fill and trigger the Sample Sensor to initiate a scan.

During the scanning process of the CropScan the Display will scan for CANBUS messages related to the Crop Flow and Yield to populate the real-time Yield and field accumulative weight on the CropScan Field Data Run Screen.

Yield Maps will be available via the Field Map Run Screen by pressing on the Map Layer and toggling through the different layers. Note the Yield Data collected within the CropScan is presented at the cycle rate of the CropScan.

Note: Yield data from the CN1 file will have a high cycle rate for yield.

When the Auger is extended the CropScan will record the field accumulated weight, subtract this from the previous tank weight to give a new net weight for the last tank.

The operator can choose between the two Grain Logistics Modes:

1. Tank Data Logistics View

The Tank Data Logistics Mode will auto-populate the Grain Tank weight for each outload. This will be displayed in the Tank Data Run Screen and in the N-GAUGE Harvest Manager App as a Combine/Serial Number.

2. Storage Data Logistics View

The Storage Data Logistics Mode will auto-populate the Grain Tank weight for each outload into the Grain Logistics Tank Weight Counter window as shown in figure 3.3. This advanced function will allow the operator to select the storage location (Cart, Truck, Field Bin etc.) and the grain will transfer to and use the pre populated weight from the CANBUS Weight. This will be displayed in the Storage Data Run Screen and in the N-GAUGE Harvest Manager App as a nominated storage location.

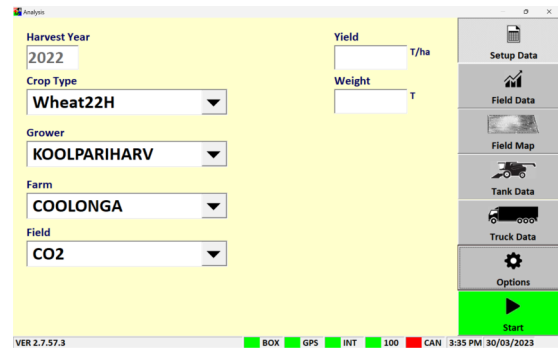


Figure 3-16. Setup Data

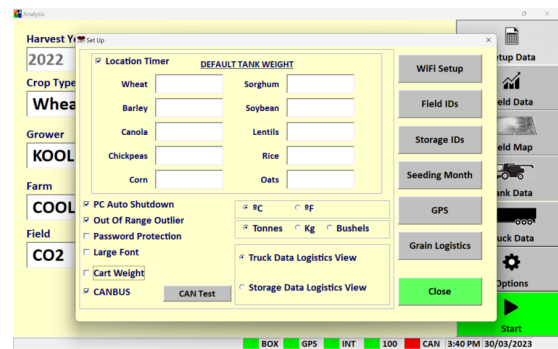


Figure 3-17. Grain Logistics Menu

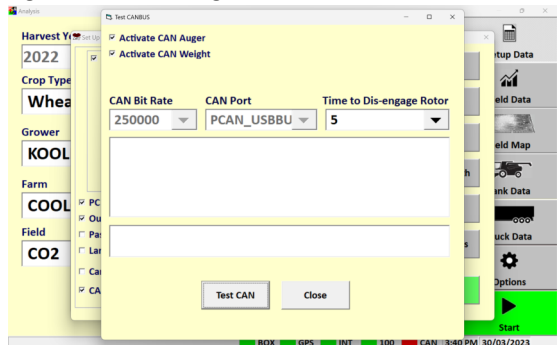


Figure 3-17. CANBUS Test window.

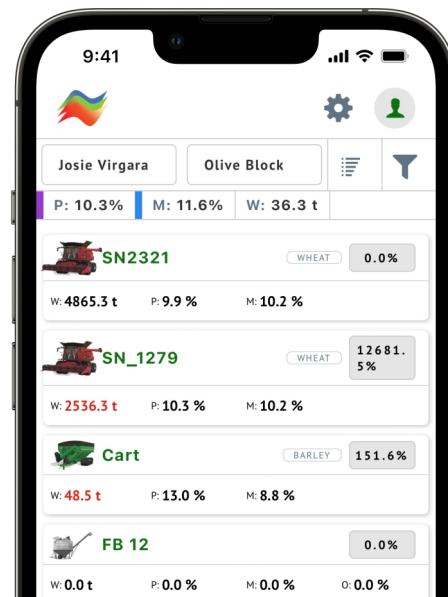


Figure 3-18. N-GAUGE Harvest Manager App

CropScan 3300H On Combine Grain Analyser: Installation Guide

Grain Logistics Set Up

Default Tank Weight

- (Optional) Enter the max Tank Weight for each Crop Type. When a Default Tank Weight is entered the Grain Logistics Software will populate the nominated default tank weight into the Tank Weight Counter as shown in figure 3.21.

Location Timer

- When the Location Timer is ticked the Grain Tank Weight Counter page will auto close after 60 seconds.

PC Auto Shutdown

- When the PC Auto Shutdown option is selected the CropScan display will shut down automatically after 45 seconds when no power input is sensed at the display.

Out of Range Outlier

- (Recommended) The Out of Range Outlier option applies a filtering method to reject any samples where the result are below or above the Crop Type minimum or maximum range. Wheat (5-20%)

Password Protection

- Tick the "Password Protection" option to lock out non approved operators to the Options Menu.

Large Front

- Tick the "Large Front" option to active a larger font in the Data Views.

Temperature Unit

- Select displayed Temperature units (C or F)

Volume Unit

- Select Crop Weight units (Tonnes, Kg's or Bushels)

CANBUS MODE Activation

The CropScan 3300H On Combine Analyser has the ability to read CNHi CANBUS messages to improve the operation of the CropScan 3300H. The following messages are read from the CANBUS harness to provide:

1. Crop Type
2. Grower Farm Field ID's
3. Rotor Engage
4. Auger Cycle
5. Crop Yield
6. Tank Weight Counter

These messages automate the Crop Type and Grower Farm Field inputs to the CropScan Display. The Rotor Engage message starts the CropScan. The data can be accessed by the N-GAUGE Harvest Manager App.

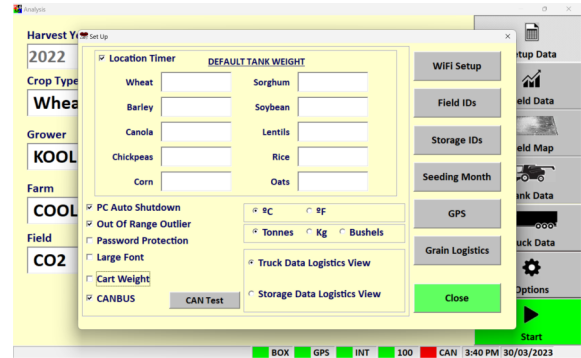


Figure 3-19. Setup - Options Window.

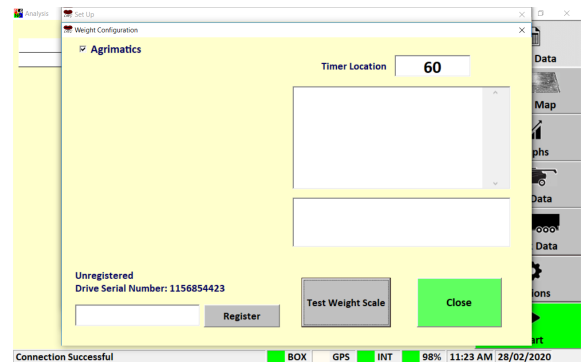


Figure 3-20. Setup - Cart Weight.

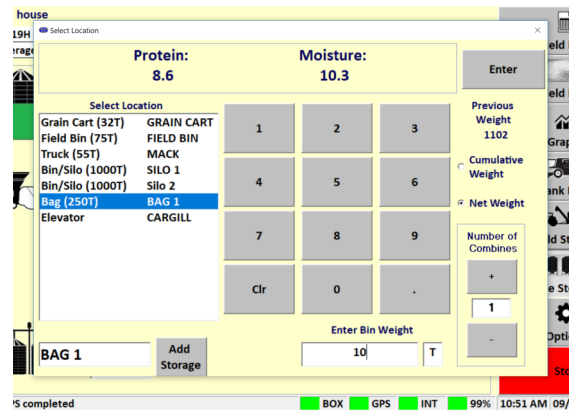


Figure 3-21. Grain Logistics Grain Tank Weight Counter.

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3.10 Grain Logistics - Cart Weight Integration

Grain Logistics Activation

The CropScan 3300H On Combine Analyser has a unique software option called Grain Logistics. As grain is harvested, the Logistics Software provides a means of managing the quantity and quality of grain directly from the combine. To activate the Grain Logistics Field Storage and Site Storage Run Screens, the user will need to select:

- “Storage Data Logistics View”

To de-activate the Grain Logistics Field Storage and Site Storage Run Screens the user will need to tick:

- “Select Truck Data Logistics View”

Note: The Cart Weight feature requires special hardware and setup for operation. Contact your local dealer for information and pricing. The Weight Cart Option is design to interface with the Cart’s Display Agrimatics, Digi Star and Elmer Cart Scales are approved.

When a grain cart pulls alongside the combine, the data from the Cart Weigh Scale is read via Bluetooth or Lora to Serial converter into the CropScan Display. A proximity sensor mounted on the combine’s out loading auger triggers the CropScan Logistics Software to automatically read the Grain Cart weight as the auger is extended. When the auger returns to its cradle, the CropScan Logistics Software automatically reads the Grain Cart Weight again and calculates the difference between the starting weight and finished weight and populates the Grain Tank weight.

Cart Weight Setup

- Press the **Options** Menu button
- Press the **Set Up** Menu button
- Press the **Grain Logistics** button
- To activate the CropScan Libra Cart or CropScan Digi Star Weigh Scales Integration license press on the **Cart Weight** tick box to activate
- Click on the **Weight Settings** button to open Weight Configuration Menu
- Enter your License Registration number by pressing into the white box and using the pop up keyboard to enter the registration key, contact your dealer for Registration Key.
- Select the Cart Scale Type from the brand options at the top of the window.
- Select the Cart Scale Weight Unit (Tonnes, Kg’s or Bushels)
- Park the Combine with in 20 meters off the Grain Cart. Use the **Test Weight Scales** button to read and verify



Figure 3-22. Setup - Cart Weight Settings

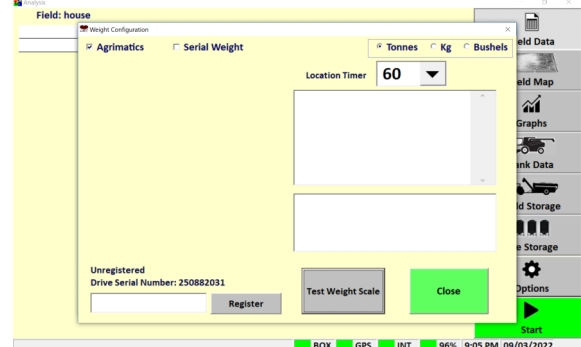


Figure 3-23. Setup - Cart Weight—Bluetooth

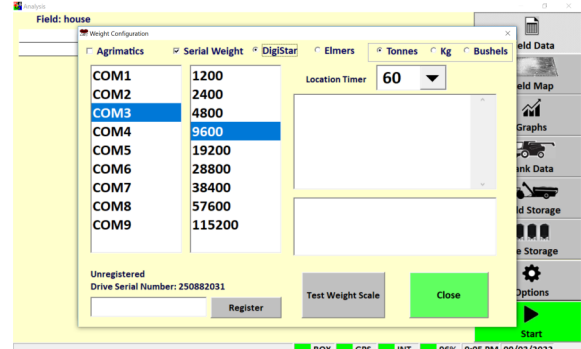


Figure 3-24. Setup - Cart Weight—Lora to Serial.

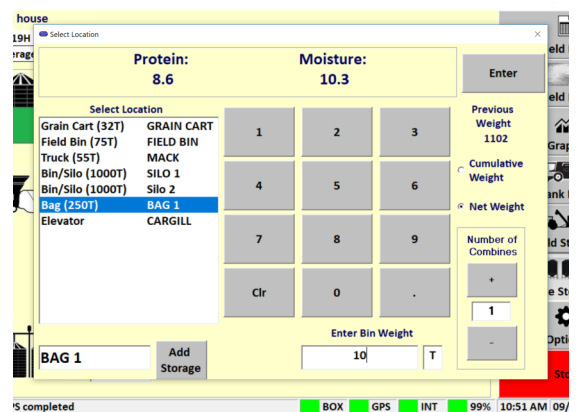


Figure 3-25. Grain Logistics Grain Tank Weight Counter.

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4.0 Calibration Verification

4.1 Auto-Calibration

The CropScan 3300H is pre calibrated with 3 Crop Types: Wheat, Barley and Canola. Due to the CropScan requiring installation which involves re-fitting of the Fibre Optic Cable which is a major optical component, a Crop Type validation is required.

A pre-harvest Crop Type validation is suggested to check and fine tune the CropScan 3300H to a set of 5 grain samples, much the same way as any NIR Bench Top Analyser is checked at installation or annually by a certifier.

The Auto-Calibration routine is suggested to be used as it is a simpler way of analysing 5 samples in a row and entering the samples actual values after all the samples have been analysed. The Auto-Calibration routine saves the data so that it can be easily exported after the Auto Calibration routine is completed. The Raw Data results are saved in a file called "Calibration" and stored in the CropScan Display under the C:\WGA\DATA folder directory. The entered sample values for Protein and Moisture are stored in a file called LogDat stored the CropScan Display under the C:\WGA folder directory. These two files can be Exported to a USB when using the Data Transfer function. These two files should be provided to CropScan support for any technical support regarding calibration support@nextinstruments.net.

Tools Required:

1. 5 x Wheat Samples,
2. 5 x Barley Samples,
3. 5 x Canola Samples,
4. 5 x Other Crop Types
5. 1 x Funnel, 2 x 1 Litre plus sized containers
6. 1 x Outlet Port

Operation:

Note: Allow the CropScan to warm up prior to running the Auto Calibration routine.

- 1) Press the **Options** Menu button.
- 2) Press the **Calibration** Menu button to open the Calibration menu window as shown in figure 4.1.
- 3) Press **Auto-Calibration** button and Select the Crop Type to validate. figure 4.2 and figure 4.3
- 4) Enter the number of samples to check (1-5) figure 4.4
- 5) The Auto-Calibration routine will run the software for the selected number of samples. The operator needs to go down to the Sample Head on the clean grain elevator and pour in the samples.

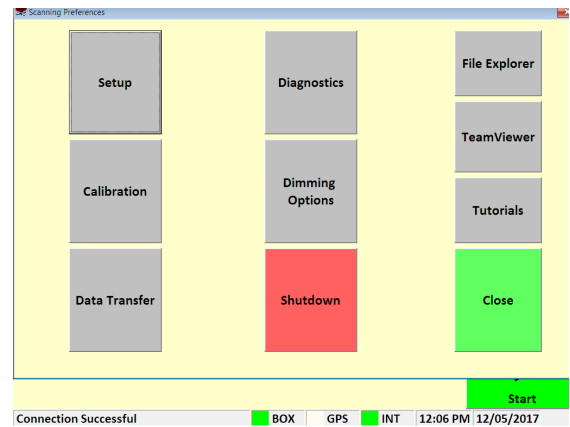


Figure 4.1. Options Window.

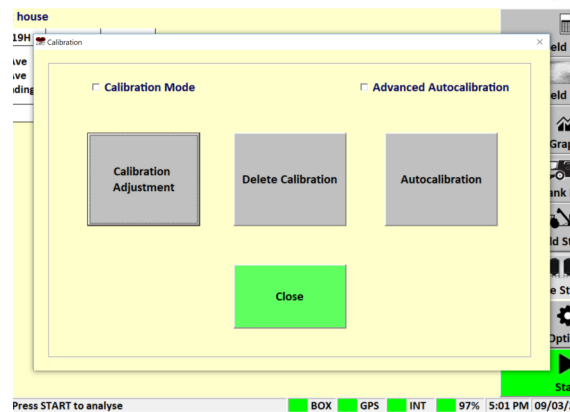


Figure 4.2. Calibration Menu.

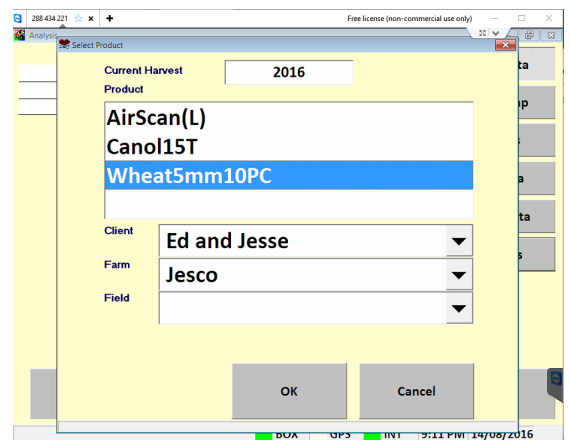


Figure 4.3. Select Product Menu.

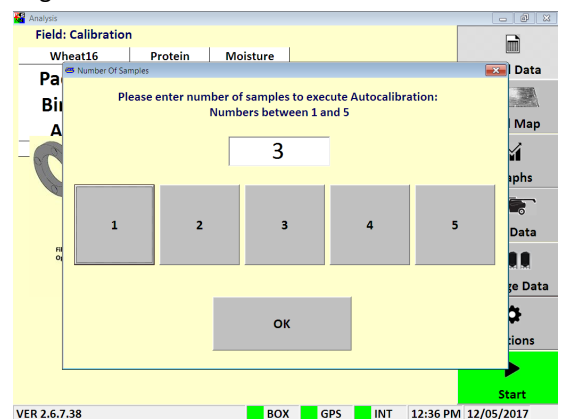


Figure 4.4. Number of samples for Auto-Calibration.

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- 6) Remove Inlet and Outlet cover plates.
- 7) Install Outlet Port on bottom side of sample head.
- 8) Install funnel in the top side of the sample head.
- 9) Pour sample 1 into the funnel, catch the scanned grain using the 1 litre container, keep filling the funnel until sample 1 has been scanned 10 times. After the 10th scan the Outlet Flap will open fully and dump the remaining sample into the 1 litre container. Pour sample 1 back into the jar. Note the Sample Headlamp will flash 4 times to let the operators know to pour in sample 2.
- 10) Carry out the above steps for the required number of samples.
- 11) After the last sample has been scanned, pour the sample back into its jar. Return back to the CropScan display to view the results.
- 12) Read the pop up instructions on the CropScan Display and press continue to view the results.
- 13) Press the yellow box to enter corresponding value as shown in figure 4.6.
- 14) When all the reference values have been entered, the results table will calculate and display the differences for Protein, Oil and Moisture and calculate and report the following:
 - SEP (Standard Error of Prediction)
 - Average Error
 - Old Bias
 - New Bias
- 15) If the SEP box is Green and differences are within 0.3% press the **Close** button and to maintain the original Bias setting.
- 16) If the SEP box is Green and the results are greater than 0.3% press the **Save New Bias** button and this will apply the New Bias setting shown in the New Bias table.
- 17) If the SEP box is Red the CropScan requires a Slope and Bias Adjustment, contact CropScan support for assistance: support@nextinstruments.net.
- 18) Access the **Data Transfer** menu and export the CropScan Data to the USB stick so the results can be emailed if CropScan technical support if required.



Figure 4.5. Pouring a sample through the CropScan sample head.

SampleID	Actual Values			Reference Values			Differences			
	Protein	Moisture	Color	Protein	Moisture	Color	Protein	Moisture	Color	
1	11.4	9.8	60.8	9	10.2		-2.4	0.4	0.0	
2	11.6	9.8	61.1	9.8	10.5		-1.8	0.7	0.0	
3	14.9	10.6	59.6	13	11.0		-1.9	0.4	0.0	
4	14.1	9.6	61	12.2	10.1		-1.9	0.5	0.0	
5	14.2	10.9	61.5	12.8	11.6		-1.4	0.7	0.0	
							SEP	0.36	0.15	0.00
							Average Error	-1.88	0.54	0.00
							Old Bias	0.0	0.0	0.0
							New Bias	-1.9	0.5	0.0

Figure 4.6. Auto-Calibration Window.

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4.2 Calibration Adjustment

Calibration Adjustments enables operators to increase or decrease Calibration Model's Bias settings to align with local elevator sites. Operators can toggle the Protein bias settings up or down to align or carry out a 5 sample Slope and Bias Adjustment via the Advanced Autocalibration mode. The follow steps explain how to change the Slope and Bias values in the CropScan Display.

- 1) Press the **Calibration** menu button to open the calibration options.
- 2) Click on **Calibration Adjustment** menu. figure 4.8
- 3) Select the Crop Type you wish to adjust and press OK.
- 4) Highlight the value to adjust. figure 4.9
- 5) Press the Bias Up or Down button to increase or decrease the Protein, Oil or Moisture level from Low to High.
- 6) The Slope settings are password protected:, enter the password ADMIN to make changes. Note: Changing the Slope factor can dramatically effect the calibration settings.
Contact support@nextinstruments.net if a Slope change is required
- 7) Press OK to save new Calibration Adjustment settings.
- 9) Run 2-3 check sample to confirm adjustment was successful.

4.3 Delete Calibration

Once a new calibration has been Imported to the CropScan Display delete the old calibration model from the Display. Deleting a calibration model will remove the model name from the Select Product menu.

- 1) Click the **Calibration** Menu button.
- 2) Click on **Delete Calibration** figure 4.8
- 3) Select the **Crop Type** you wish to delete.
- 4) Press **OK** to confirm.

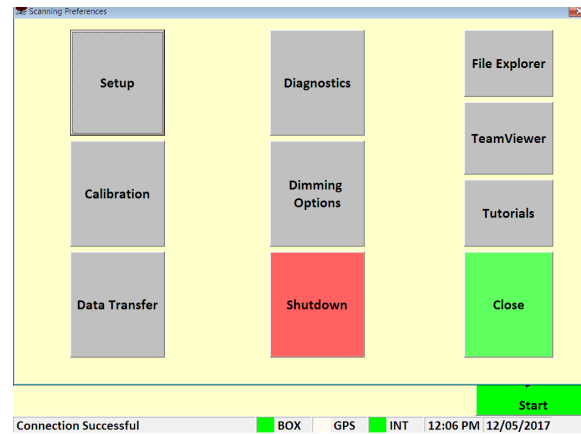


Figure 4.7. Options Window.

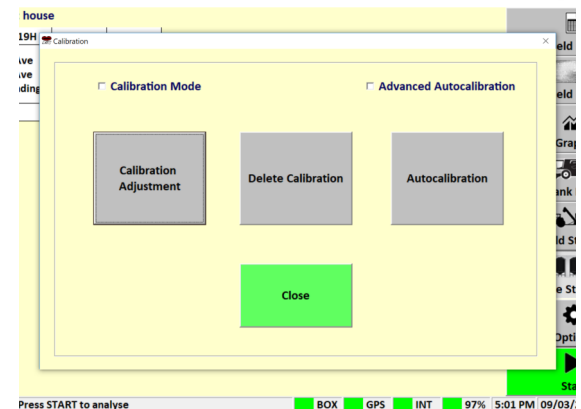


Figure 4.8. Calibration Menu.

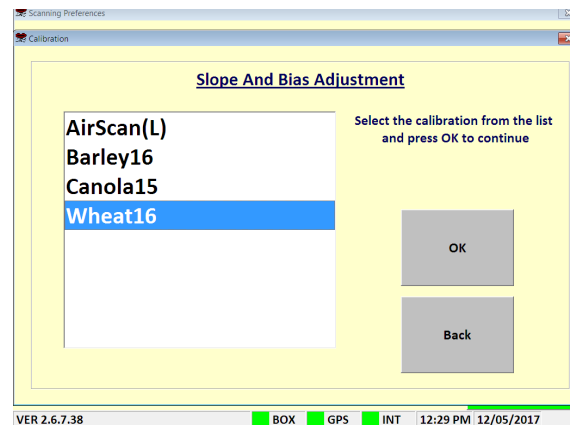


Figure 4.9. Select Calibration Window .

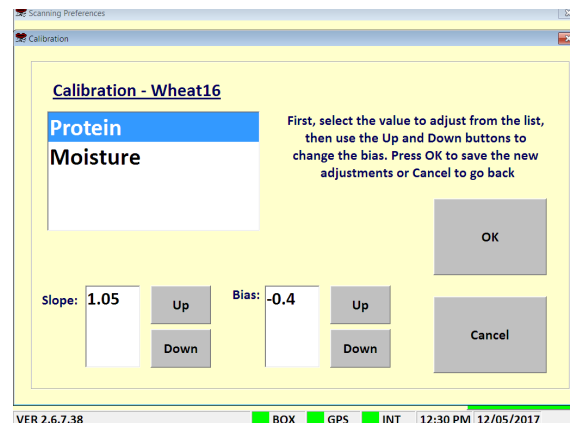


Figure 4.10. Bias Adjustment Window.

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5.1 CropScan 3300H Wiring Diagram

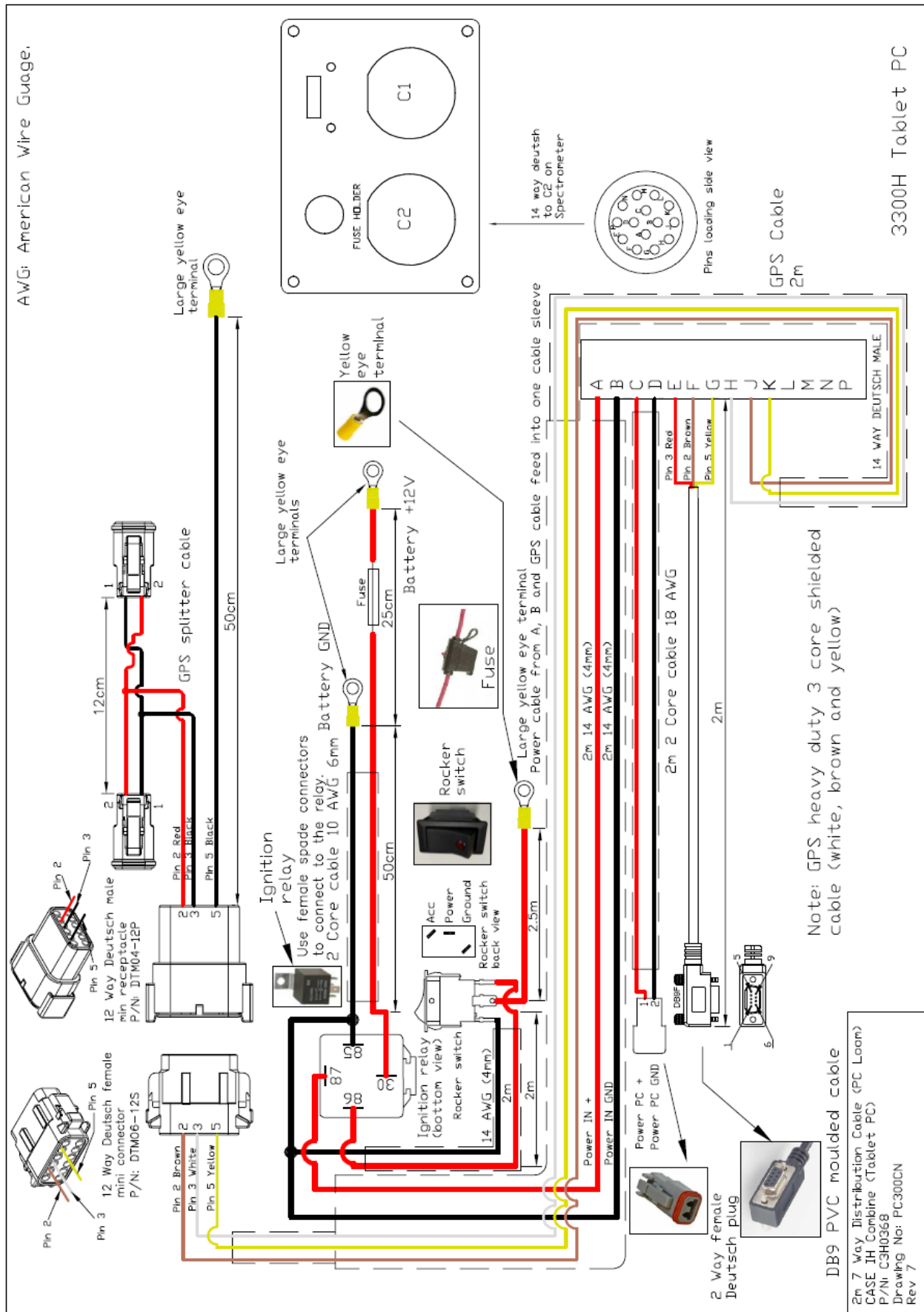


Figure 5.1. CropScan 3300H Spectrometer Cable Wiring Diagram.

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5.2 CropScan 3300H Block Diagram

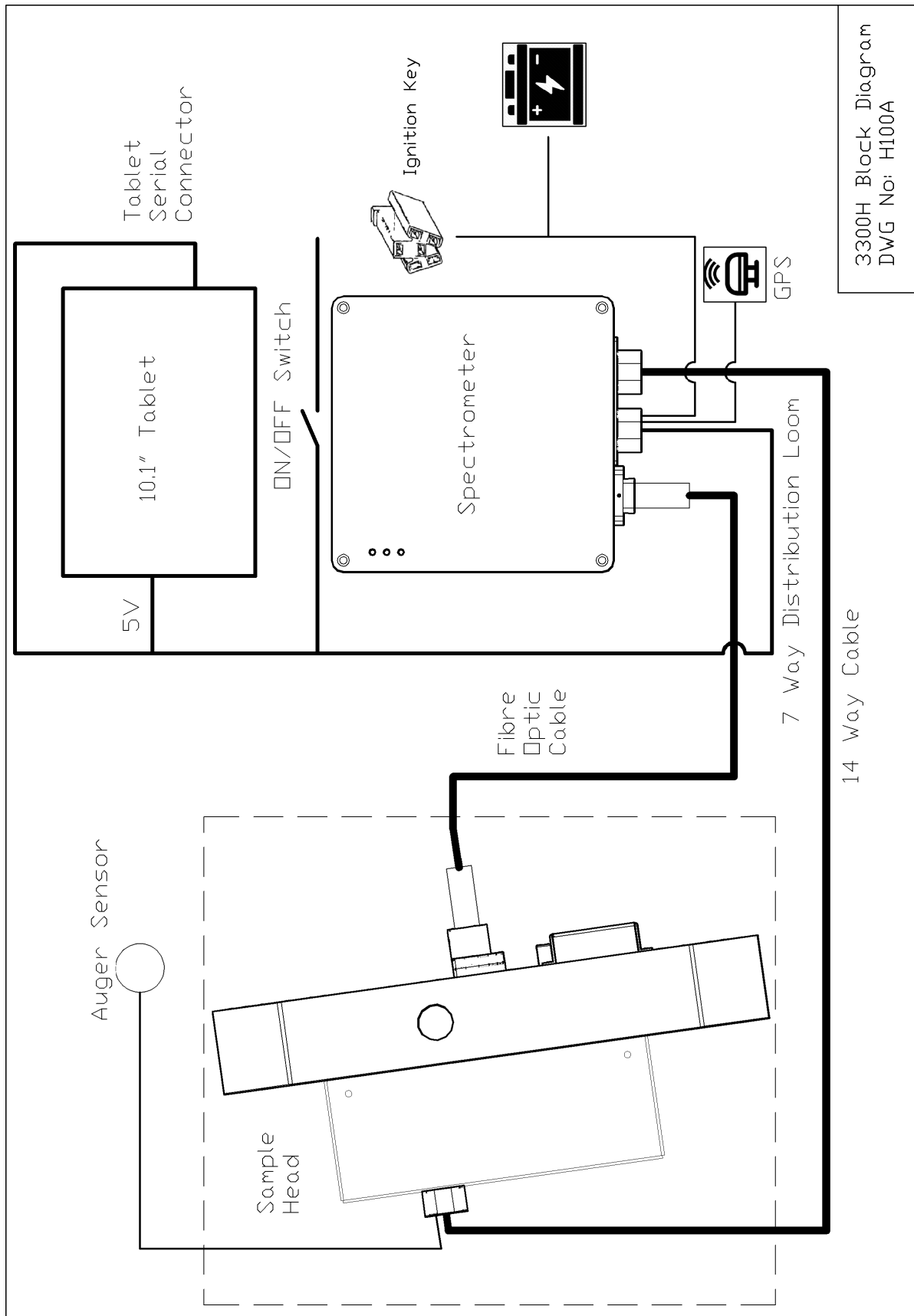


Figure 5.2. CropScan 3300H Component schematic.

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5.3 Sample Head Mounting Diagram for Caselh Combine's.

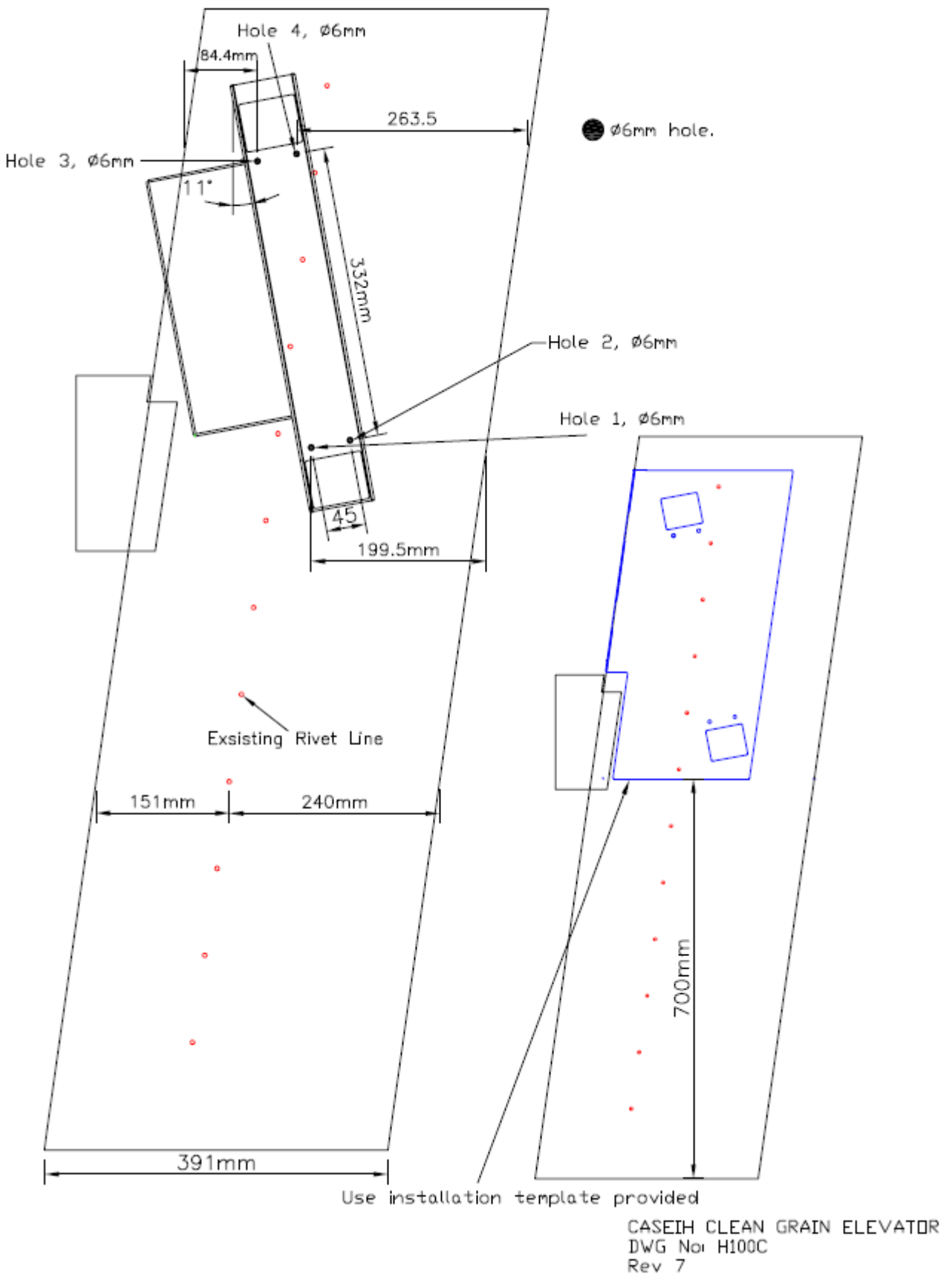


Figure 5.3. Caselh Grain Elevator Drawing

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5.4 Spectrometer Mounting Diagram for CNHi Combine's.

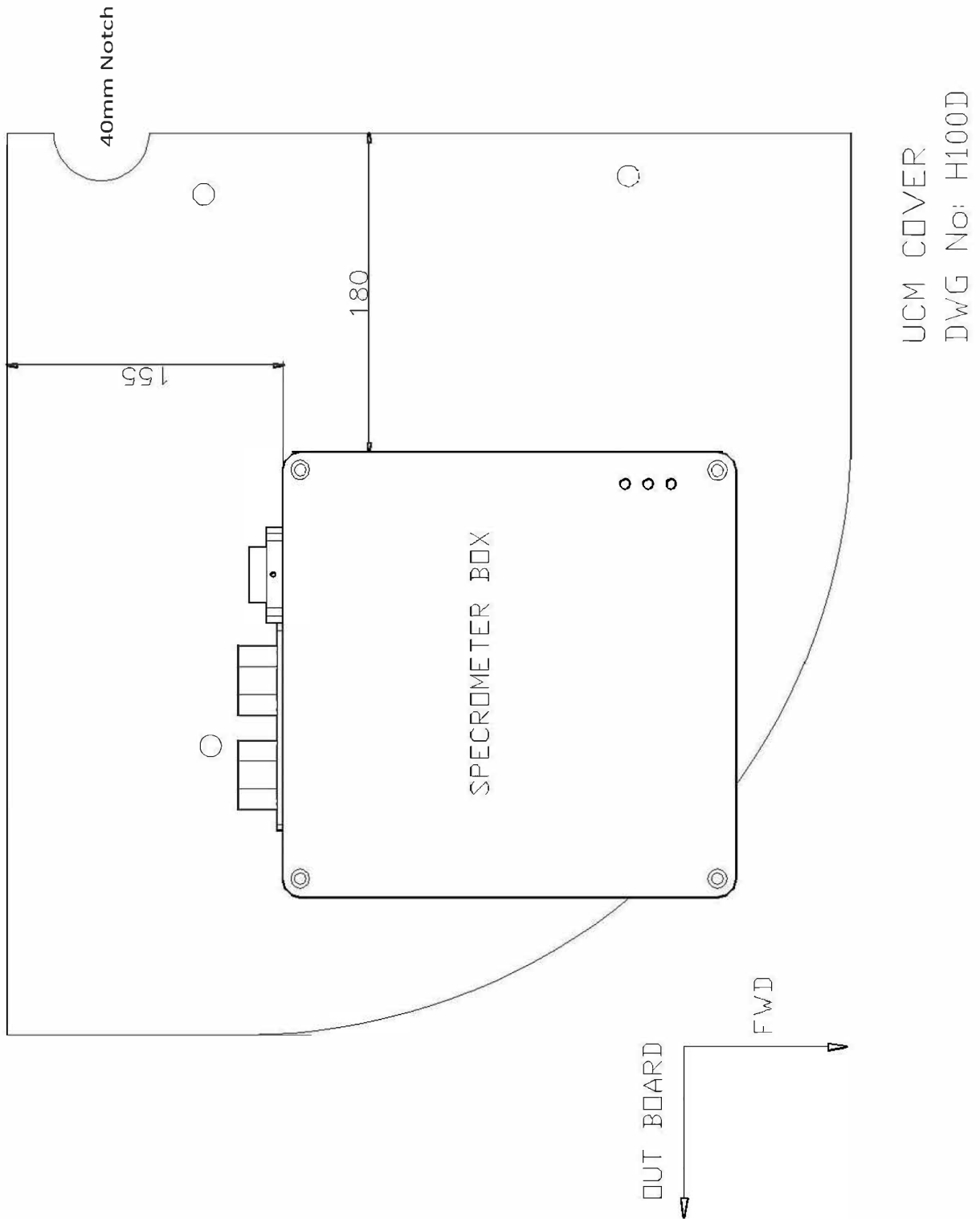


Figure 5.4. CNHi UCM Cover Panel Drawing

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5.4 Spectrometer Mounting Diagram for CNHi Combine's.

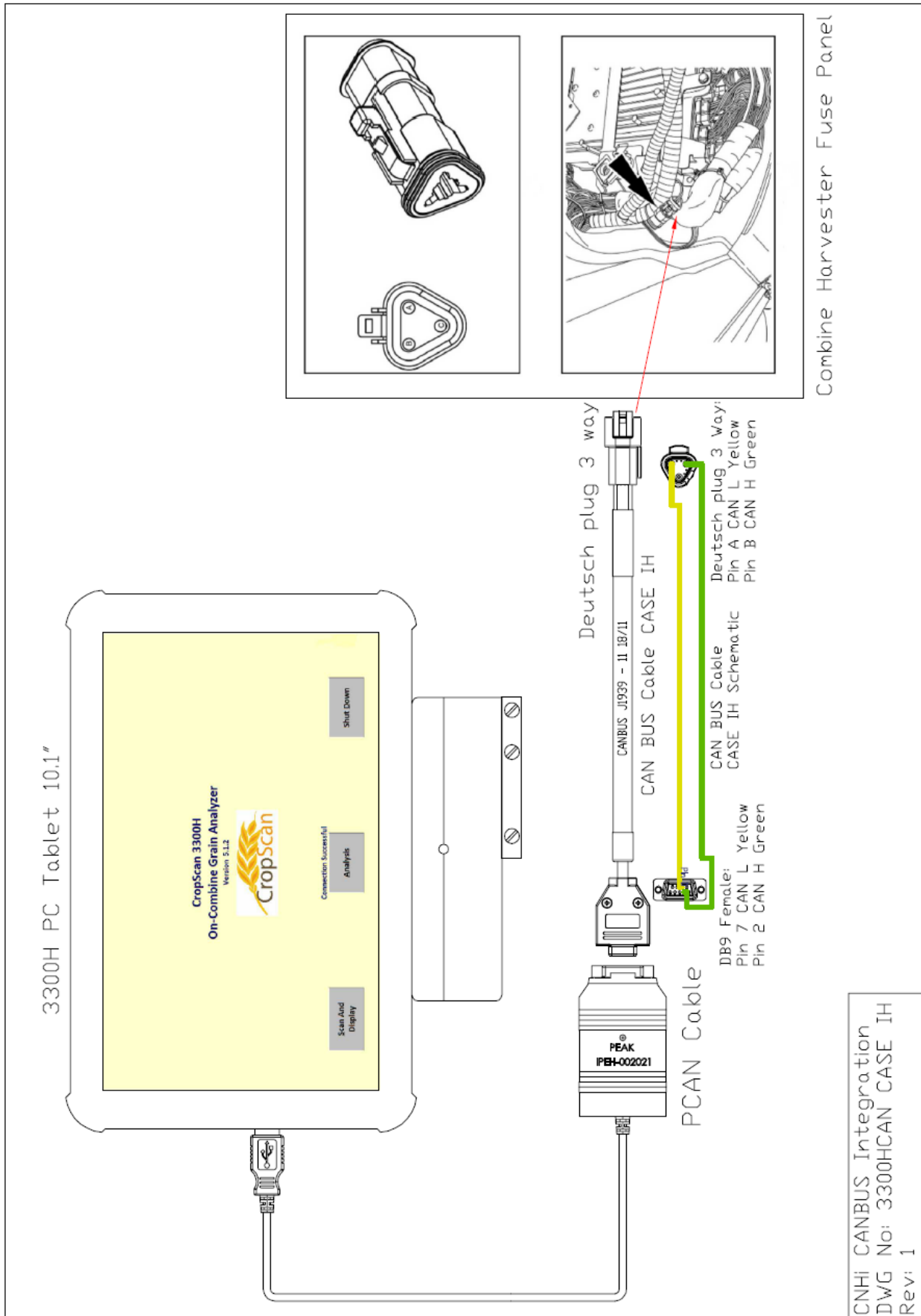


Figure 5.4. CANBUS wiring diagram

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5.4 Spectrometer Mounting Diagram for CNHi Combine's.

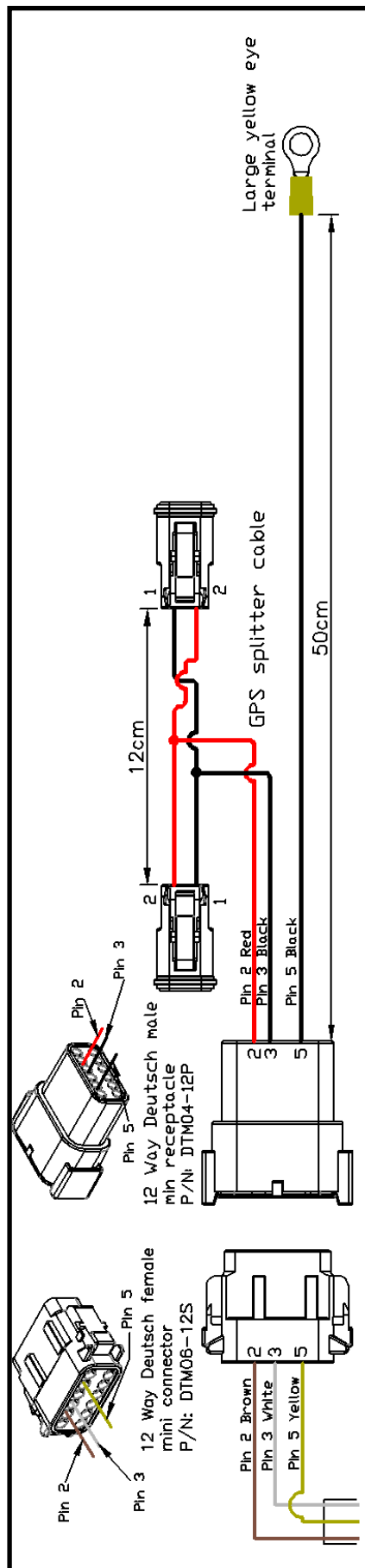


Figure 5.4. CaseIH GPS Splitter Cable