

April 2020

Revision 0305



AgGuide

• VARIABLE RATE • AUTOSTEER • LAND LEVELLING • MONITORING • CONTROL

GPS Guidance | AutoSteer | LevelGuide

V 4.5

Operation Manual

**** THIS VERSION CURRENTLY EXCLUDES SPRAY & SEEDER CONTROL ****





Please Read Before Continuing...

Do not operate, perform adjustment or conduct maintenance on this equipment, until you have fully read and understood all of the information contained within this manual.

Improper operation, maintenance and repair of this product can be dangerous and could result in injury or death.

This manual is to be an additional guide that details the safe use instructions for the appropriate equipment fitted to this vehicle by Farmscan Ag and/or one of its dealers and is to be used in conjunction with the OEM operation manual supplied with the vehicle.

Safety precautions and warnings are provided in this manual and/or on the supplied equipment. Failure to heed these warnings may result in equipment damage, serious injury or death.

The warnings in this manual and/or on the equipment are, therefore, not all-inclusive. If a tool, procedure, work method or operating technique that is not specifically recommended by Farmscan* is used you must satisfy yourself that it is safe for you and for others. Farmscan cannot anticipate every possible potentially hazardous situation. Please ensure that the supplied equipment will not be damaged or be made unsafe by the alternative operation, modification or repair procedures that you choose.

TABLE OF CONTENTS

| | |
|--|-----------|
| GPS Guidance AutoSteer LevelGuide ... | 1 |
| V 4.2..... | 1 |
| OPERATION..... | 1 |
| MANUAL..... | 1 |
| 1 OVERVIEW | 5 |
| 1.1 AgGuide V4 Options | 5 |
| 2 GPS & HOW IT WORKS..... | 6 |
| 2.1 GPS Basics..... | 6 |
| 2.2 GPS Accuracy | 6 |
| 2.3 GPS Correction Signals | 7 |
| 2.3.1 Correction using Satellite or long distance land based stations..... | 7 |
| 2.3.2 Local base stations | 7 |
| 2.3.3 Base Stations (local) | 8 |
| 2.3.4 Base Stations (mobile)..... | 9 |
| 2.3.5 Community Base Stations | 10 |
| 3 EQUIPMENT..... | 13 |
| 3.1 PC..... | 13 |
| 3.2 Wheel Angle Sensor | 13 |
| 3.3 SD Module | 14 |
| 3.4 UniPOD..... | 14 |
| 4 AGGUIDE SOFTWARE | 15 |

| | |
|---|-----------|
| 4.1 Overview | 15 |
| 4.1.1 General Information | 16 |
| 4.2 GPS Definitions | 22 |
| 4.2.1 Other Definitions..... | 23 |
| 4.4 GPS Configuration..... | 24 |
| 4.4.1 GPS Config Definitions | 25 |
| 5 SETTING UP THE GPS | 26 |
| 5.1 VEHICLE | 27 |
| 5.1.1 GPS TYPE : Novatel..... | 28 |
| 5.1.2 GPS TYPE : Topcon | 29 |
| 5.1.3 Accuracy Warning Setup..... | 31 |
| 5.2 Base station setup | 34 |
| 5.2.1 Base Station Setup - Manual Setup (Autolocate not activated)..... | 34 |
| 5.2.2 Base Station Setup - Automated Setup Autolocate activated..... | 41 |
| 6 INSTALLING ACCESS CODES..... | 42 |
| 7 AGGUIDE V4.0 QUICK SETUP SCREEN .. | 43 |
| 8 AGGUIDE UTILITIES..... | 44 |
| 9 AGGUIDE OTHER SCREEN..... | 44 |
| 9.1.1 Warnings | 44 |
| 9.1.2 Coverage Recording | 45 |
| 9.1.3 Perimeter Recording..... | 45 |
| 9.1.4 Languages..... | 46 |
| 9.1.5 Cameras | 46 |
| 10 AGGUIDE EXIT | 46 |

| | | | | |
|-------------|--|------------|--|--|
| 11 | SETTING UP THE NAV MODULE | 47 | | |
| 11.1 | Calibration | 47 | | |
| 11.2 | Zero Tilt | 48 | | |
| 12 | SETTING UP THE WHEEL ANGLE SENSOR..... | 49 | | |
| 13 | SETTING UP THE HYDRAULICS | 51 | | |
| 13.1.1 | Minimum Voltage..... | 51 | | |
| 13.1.2 | Offset Voltage | 52 | | |
| 13.1.3 | Maximum Voltage..... | 53 | | |
| 13.1.4 | Span..... | 54 | | |
| 13.1.5 | Manual Override | 55 | | |
| 13.1.6 | Turn Threshold | 56 | | |
| 14 | SETTING UP THE GAINS/INTEGRAL ... | 56 | | |
| 14.1.1 | XTrack..... | 57 | | |
| 14.1.2 | XHeading | 57 | | |
| 14.1.3 | Combining and Fine Tuning..... | 58 | | |
| 14.1.4 | Offset Tuning..... | 58 | | |
| 14.1.5 | Integral | 59 | | |
| 14.1.6 | XHeadingRate-Gain (XH-Rate Gain) .. | 59 | | |
| 14.1.7 | LookAhead..... | 59 | | |
| 15 | TROUBLESHOOTING & FAQ..... | 60 | | |
| 16 | FARMS, FIELDS, BOUNDARIES, RUNLINES, JOBS, MARKED POINTS..... | 63 | | |
| 16.1 | General | 63 | | |
| 16.2 | Creating or Editing a Farm | 64 | | |
| 16.3 | Creating or Editing a Field..... | 66 | | |
| 16.3.1 | Importing Fields From Shape Files | 66 | | |
| 16.3.2 | Creating Field By Driving the Boundary | 67 | | |
| 17 | CREATING A RUNLINE | 75 | | |
| 17.1.1 | Racetrack Mode | 76 | | |
| 17.1.2 | Parallel Runlines..... | 81 | | |
| 17.1.3 | Managing Runlines..... | 86 | | |
| 18 | MARKING POINTS..... | 87 | | |
| 19 | CREATING OR EDITING A JOB..... | 90 | | |
| 20 | JOB APPLICATION MAPS | 95 | | |
| 21 | PRINTING COVERAGE MAPS | 97 | | |
| 22 | COPYING FILES TO/FROM USB MEMORY..... | 98 | | |
| 23 | LEVELGUIDE | 99 | | |
| 23.1 | Front screen Overview | 100 | | |
| 24 | GPS CONFIGURATION..... | 101 | | |
| 25 | SETTING UP LEVELGUIDE | 104 | | |
| 26 | LEVELGUIDE FRONT SCREEN..... | 110 | | |
| 27 | JOB APPLICATION MAPS AND GRADER PLANES..... | 112 | | |
| 27.1.1 | LevelGuide Plane..... | 113 | | |
| 27.1.2 | EziGrade Cut/Fill Map | 115 | | |
| 27.1.3 | LevelGuide Contour | 116 | | |
| 28 | TILT SENSOR SETUP | 117 | | |

| | |
|---|------------|
| 29 RECORDING FIELD DATA FOR PROCESSING BY EZIGRADE | 118 |
| 30 SETUP A NEW IMPLEMENT..... | 119 |
| 31 GETTING THE BEST JOB..... | 120 |
| 31.1 Transferring Files..... | 121 |
| 32 SETTING UP THE HYDRAULICS FOR LEVELGUIDE - UNIPOD CONTROLLER..... | 122 |
| 32.1 Minimum Voltage | 124 |
| 32.2 Offset Voltage | 126 |
| 32.3 Maximum Voltage..... | 127 |
| 32.4 Span - maximum and minimum | 128 |
| 32.5 Manual Override and Wheel Angle sensor | 128 |
| 32.6 External Manual Control switch..... | 128 |
| 32.7 Additional Setup Information | 129 |
| 32.8 Setting up the Cross levelling..... | 130 |
| 32.9 Minimum Voltage | 131 |
| 32.10 Offset Voltage | 132 |
| 32.11 Maximum Voltage..... | 133 |
| 33 SETTING UP THE GAINS | 134 |
| 33.1 Setting up the XTrack Gain | 134 |
| 33.2 To set the XTrack Gain..... | 135 |
| 33.3 Setting up the XTilt Gain..... | 136 |
| 33.4 To set the XTilt Gain | 137 |

| | |
|---|------------|
| 33.5 Integral Control..... | 137 |
| 33.6 Other Settings..... | 137 |
| 34 TROUBLESHOOTING HYDRAULICS.. | 138 |
| APPENDIX A - QUICKSTART GUIDE..... | 141 |
| APPENDIX B - GENERAL TROUBLESHOOTING | 143 |
| APPENDIX C - UTM ZONE MAP | 147 |

1 OVERVIEW

Congratulations on your purchase of AgGuide V4. This manual covers the use of the product either for use as visual guidance, steering assist, spray control, GPS controlled land levelling or combinations of two or more of these options.

This manual and be used in conjunction with Farmscan Ag hydraulic steering kits and GPS systems of varying accuracies. This purchase will almost certainly include a ruggedized Windows based touch-screen computer (Itronics, Panasonic ToughBook, DLI or CA10 are used for demonstration purposes in this manual), which will become the central component of your AgGuide system.

This manual will cover all of the essential topics regarding the setup, operation, adjustment and troubleshooting of your new system.

1.1 *AgGuide V4 Options*

GPS Guidance

AgGuide V4 can be used, in conjunction with a suitable GPS receiver, to provide visual guidance solutions to the user. When used in this mode only, auto-steer and spray control functions are not available.

Auto-steer or FlexiSteer™

AgGuide V4 can be used to assist in steering of the vehicle when used in conjunction with a suitable kit enabling secondary control over the steering. Once this option has been enabled, GPS guidance (as above) is automatically available.

Spray Control

AgGuide V4 can be used to automate various aspects of the spray applications. This includes full variable rate control of up to two parallel spray booms together with sectional boom control.

Variable Rate Control

LevelGuide

AgGuide V4 can be used to assist in grading of fields using single plane or multi-plane cut-fill designs.

- By selection of which of the above options are required at the time of purchase, you are able to use any or all of the above functionality to best suit your application.
- Options can be enabled later by contacting your nearest sales representative.

2 GPS & HOW IT WORKS

2.1 GPS Basics

GPS (Global Position System) is a generic term used to refer to a system that uses satellite constellations that circle the earth to obtain a position on, or close to the earth's surface.

This manual is not meant to provide a comprehensive description of the operation of GPS systems, however a basic understanding will enable the user of the AgGuide V4 system to better understand and operate the system.

2.2 GPS Accuracy

GPS accuracy is a much-maligned term. Over recent years, many suppliers have supplied their own interpretation of the term, often to suit their commercial needs. Terms such as "Pass to Pass" accuracy may be relevant where only short term accuracy is required, however it is often misleading to the new user and so, for the purposes of this manual, we will refer to GPS accuracy as surveyors and other professional users of GPS do.

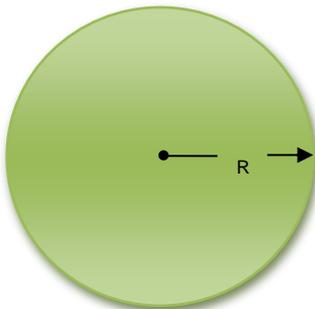


Diagram 1

GPS accuracy is traditionally split into three ranges. These are as follows

- Sub-meter (defined as accuracies less than a meter but greater than 15cm)
- 10cm (usually defined as accuracies between 10 and 15 cm this includes suppliers such as OmniSTAR HP & Terrastar-D)
- 2cm (also referred to as RTK)

To further understand GPS accuracy, substitute the value of accuracy that you require e.g. 10cm for the value shown as "R" in Diagram 1

The green circle represents the area in which your selected GPS will place you and still be within its design parameters regardless of time elapsed.

e.g. In the example shown above using 10cm accuracy, the GPS will conform within its designed accuracy provided that it gives a position within the 10cm (radius) 20cm (diameter) circle.

2.3 GPS Correction Signals

Standalone GPS, often referred to as autonomous GPS will only provide an accuracy (see above) of between 5 and 8 meters. For most applications using AgGuide V4, a better accuracy is required and therefore a correction signal is needed to enhance the autonomous or stand alone accuracy.

Correction signals traditionally take two (generic) forms:

1. Satellite or long distance land based stations (10cm to 1M accuracy) or
2. Local base stations (2cm to 10cm accuracy)

Your supplier based on your requirements will make your selection of correction signal, however the following may assist in understanding your system further.

2.3.1 Correction using Satellite or long distance land based stations

These signals are sometimes available free of charge such as those provided in coastal Australia (sometimes called Marine Beacon signal), however traditionally in agricultural areas, it is necessary to subscribe to a commercial alternative requiring an annual subscription such as the OmniSTAR system or Terrastar. (Compatible hardware ONLY)

OmniSTAR & Terrastar offer both sub – meter (VBS) and 10cm (HP) correction signals and can be efficiently received in most agricultural areas within Australia and NZ.

OmniSTAR can be contacted on 1800 062 221

2.3.2 Local base stations

Using a local base station enables high accuracy correction without the need for annual subscription. This must be offset by the capital cost of a base station. Traditional payback periods can vary between 2 and 7 years depending on selection criteria. This period can be further reduced by sharing a base station with neighbours as one base can service many vehicles (rovers)

If you have selected a GPS system that requires a base station, the base will be set up by a Farmscan Ag representative however some understanding of the system will ensure trouble free operation and also assist if adjustments are to be made under the supervision of Farmscan Ag.

The basic RTK GPS system consists of two parts - a GPS base station and the vehicle GPS (sometimes called a rover). It is essential that these components are setup correctly before configuring and operating AgGuide V4 to ensure the best possible performance.

2.3.3 Base Stations (local)

There are two types of base station - **fixed** and **mobile**.

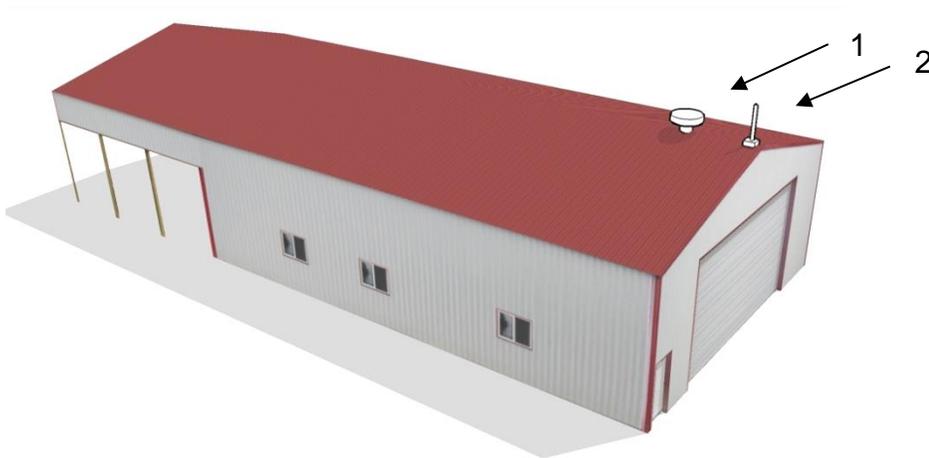
A fixed base station is typically located in a high position such as a shed roof or property pole that has access to mains power.

The base station GPS and base radio together with GPS antenna, radio aerial and cabling are housed in a heavy duty *Pelican*[™] case. With the addition of a tripod and a mobile power source (12volt battery) your fixed base station can become mobile with minimal impact to your fixed base station setup.

Points to consider with fixed base stations:

1. Mounting the radio aerial as high as possible will get best possible performance
2. The GPS antenna must be mounted so that it has a clear 360° view of the horizon – any obstacles may create performance problems (e.g. black spots)
3. When using a 2 Watt UHF radio, mount the UHF radio aerial and GPS antenna at least 2 metres apart
4. When using a 35 Watt UHF radio, mount the UHF radio aerial and GPS antenna at least 5 metres apart

CAUTION: Do not start the base station until the UHF aerial is connected



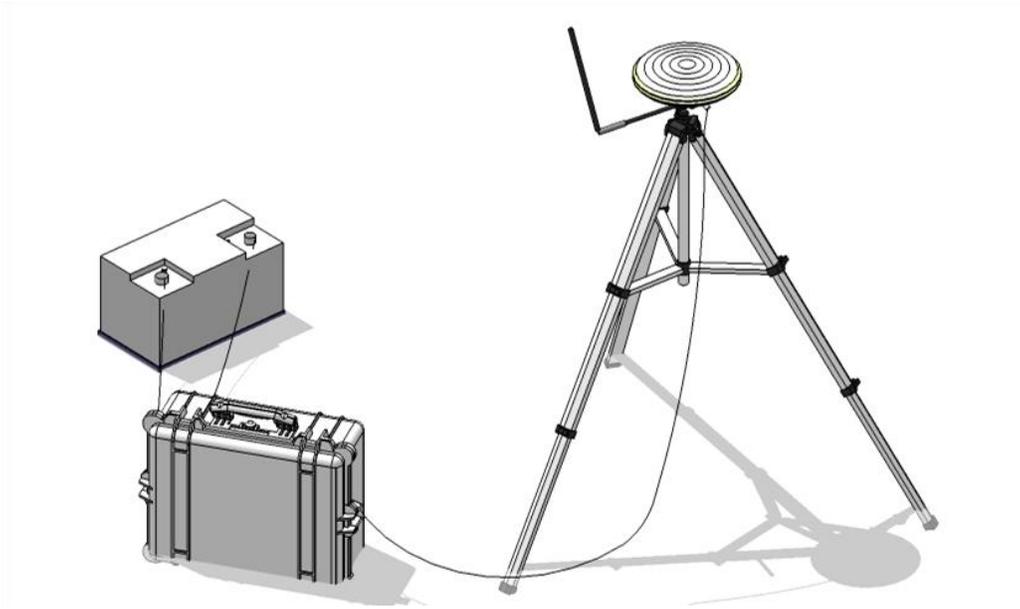
Typical fixed base station located on a shed roof, showing the GPS antenna (1) and the Radio aerial (2)

2.3.4 Base Stations (mobile)

Contractors generally prefer a mobile base station as it allows them the freedom to move the base station from farm to farm.

The GPS antenna can be attached preferably to a tripod but a post or star-picket can be used as long as the GPS antenna is suitably secured.

Provided that the GPS antenna is returned to the exact position at a later time, accuracy will be maintained year after year.



Example of a mobile base station

2.3.5 Community Base Stations

Community base stations are collaborative fixed GPS base stations that are accessed by a group of farmers that work their properties in the same area. They are typically set up by a co-operative of private farmers to maximize GPS coverage and minimize cost.



Figure 1: Example of community base station network coverage

2.3.5.1 Local base stations and how they work

First some descriptions of the components

1. Base Station

The GPS base station provides the correction signal (see GPS Correction Signals above) to the GPS receiver in the vehicle.

It then transmits the GPS satellite positioning data to the vehicle using the base radio.

2. Tractor GPS (Rover)

The Rover GPS receives the corrected signal information from the GPS Base Station via the base radio as shown in the diagram on the next page.

This then enables the Rover GPS to pinpoint the position according to the receivers' accuracy.

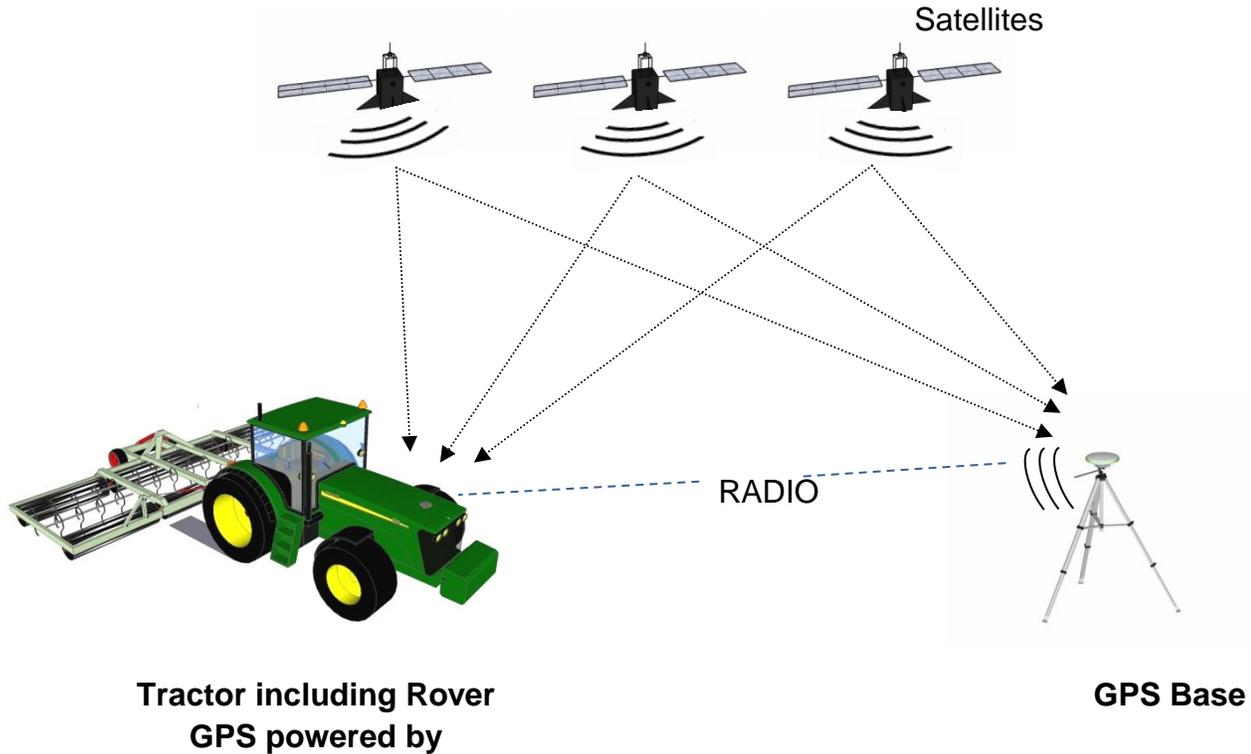
This positioning information is then used by the AgGuide software, to deliver the guidance, auto steer or spray control functions of the system.

3. AgGuide V4

This is the latest version of the Windows based software that controls your tractor and manages all of your customised farm specific data including farms, fields and boundaries.

It calculates and translates the GPS positioning data allowing you to enjoy the benefits of high accuracy steering and spray control.

EXAMPLE



Satellites send GPS data that is received simultaneously by both the GPS in the vehicle and the GPS in the base station.

As the base station is fixed and has been given an accurate or calculated 'fix', the calculated variation (correction) from this position is transmitted via radio to the vehicle GPS which then calculates the corrected position of the vehicle.

Correction data is usually transmitted via radio once per second and the vehicle GPS uses this data to calculate the position of the vehicle every $\frac{1}{3}$ of a second.

3 EQUIPMENT

3.1 PC

The AgGuide V4 software requires a touch-screen Windows® based PC, which is generally included as part of your purchase. It is mounted in the cab of the vehicle during operation and can be moved between a fleet of vehicles as required.

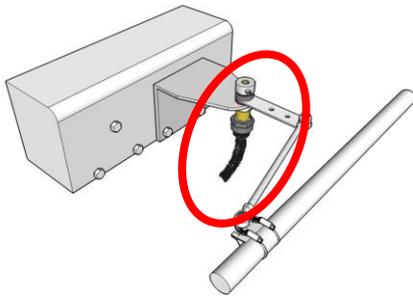


Figure 2: Example of xPRO 5800 DLI tablet



Figure 3: Example of xLite 5700 tablet

3.2 Wheel Angle Sensor



OR



The Wheel Angle sensor is an integral part of the auto steer system and will need to be both fitted and commissioned correctly for the system to operate.

Its prime job is to define accurately to the AgGuideV4 system, exactly where the wheels or articulation point of the vehicle is at any time. This feedback is critical to the effective operation of the system and periodic checks should be made to ensure it's correct calibration.

3.3 *SD Module*

The SD module provides the interface that enables the brains of the AgGuide system (PC and AgGuide software) to talk effectively with the remote components on the vehicle.

These components, such as Wheel Angle Sensor, Navigation Module (not fitted to all vehicles) provide information to the PC or others such as Hydraulic Control valves, accept control decisions from the PC via the SD module.



3.4 *UniPOD*



The Farmscan Ag UniPOD is the newest multipurpose and purpose built interface on the market today. The UniPOD can be pre programmed for Spray Control, Seeder Control, Spreader control, Steering & levelling control.

4 AGGUIDE SOFTWARE

4.1 Overview

Before you can use your AgGuide V4 system, you must ensure the following components are installed:

For all AgGuide V4 options

- A suitable GPS receiver capable of providing the desired accuracy

for Auto Steer

- A suitable auto-steer kit installed on your vehicle – refer to your Farmscan Ag Dealer for further information

for Spray Control

- A suitable Spray Control Pod/UniPOD or existing Spray Controller installed on your vehicle – refer to your Farmscan Ag Dealer for further information

for Seeder Control

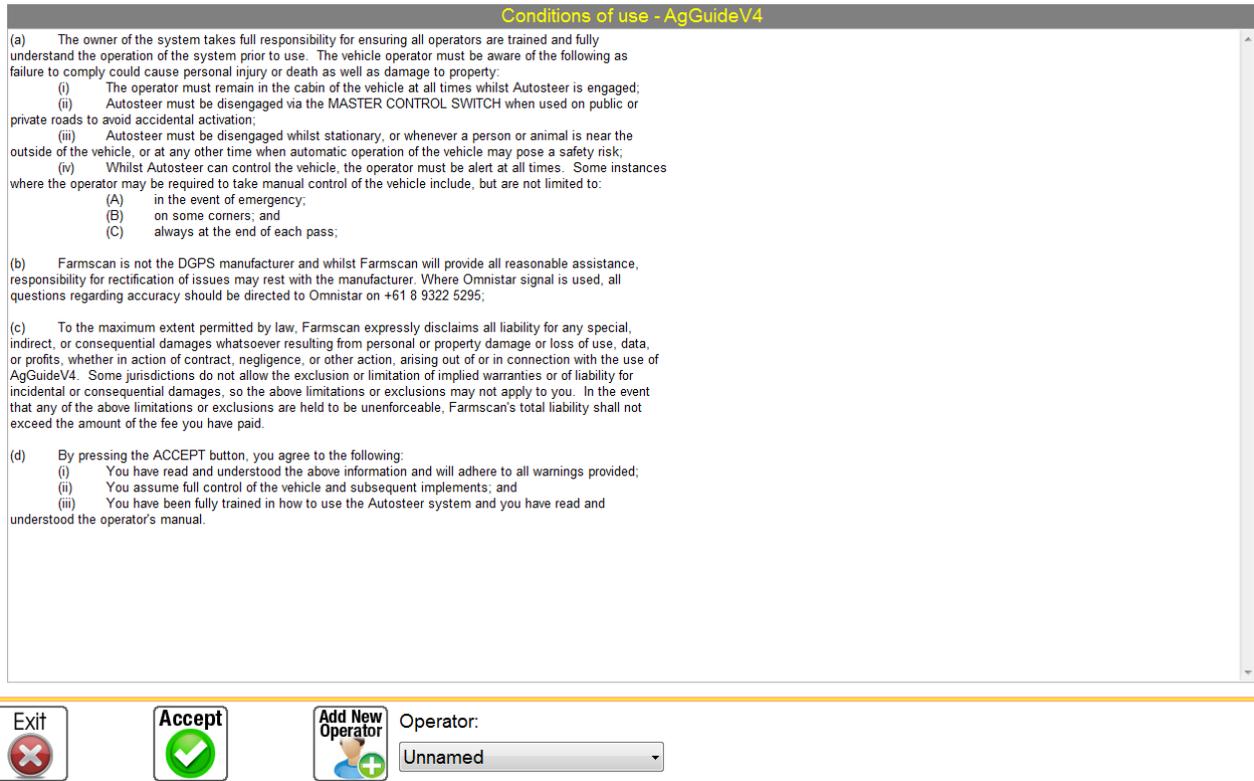
- A suitable Rate Control Pod/UniPOD or existing hardware installed on your vehicle – refer to your Farmscan Ag Dealer for further information

for GPS Land Levelling

- A suitable hydraulic controlled bucket & existing hardware installed on your vehicle – refer to your Farmscan Ag Dealer for further information

4.1.1 General Information

4.1.1.1 Start-up Screen



When AgGuide V4 is first turned on, the following screen will appear.

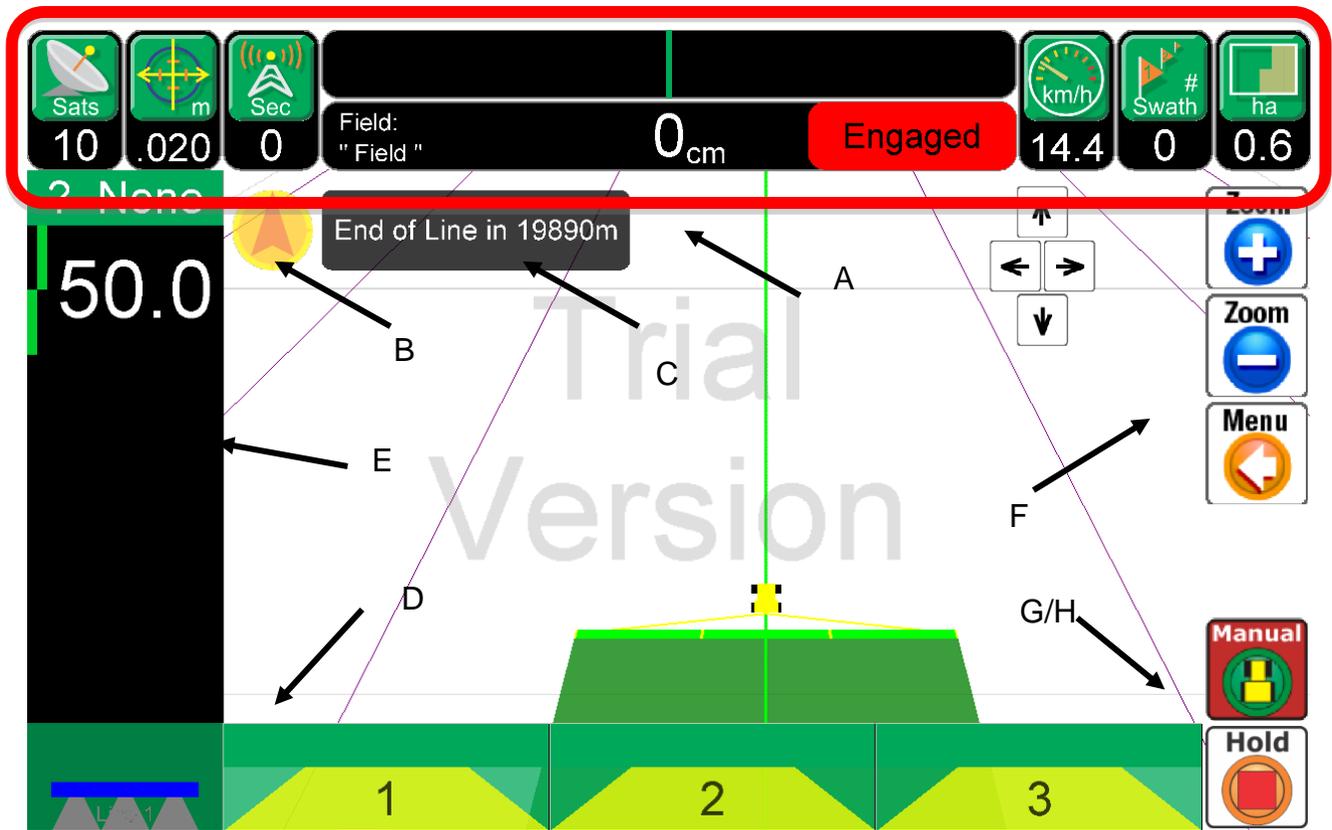
This screen will appear every time that the program is started to ensure that the operator at the time is familiar with the conditions of use.

This screen is also used to input or add the operator's name. This information will be used later in the program where association of operators and tasks is required.

Please read the Conditions of Use carefully, select or add an existing operator from the drop down box and click .

4.1.1.2 Main Screen

This is the default view that will appear whenever you first enter the AgGuide V4 operating program. Information displayed may vary depending on circumstances & add-ons installed & activated.

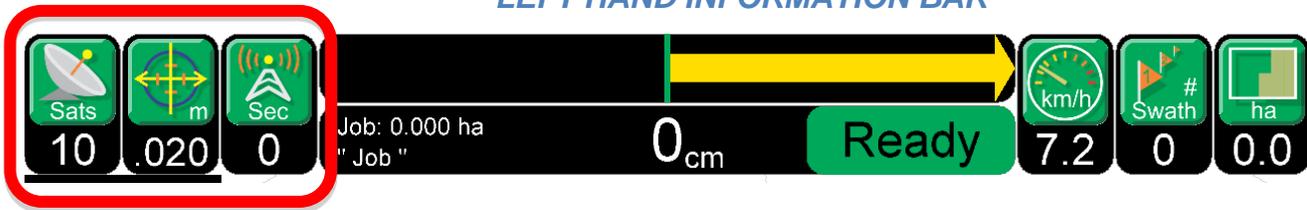


The information bar shown in red above provides information constantly to the operator and will remain on screen throughout operation of the of AgGuide V4 system.

Details of the information shown in this bar are shown on the next page.

- A) Information Bar
- B) Defines the NORTH UP icon
- C) The distance to the end of the runline onto which the system is now locked if a field boundary is defined (used in conjunction with Swath #).
- D) Spray/Seed Bar override (If Section control is used)
- E) SPRAY/VRC/TANK information notice bar
- F) Menu & System setup
- G) AutoSteer Manual/Auto control
- H) Run/Hold (Coverage map)

LEFT HAND INFORMATION BAR



Satellites

- Indicates the number of satellites currently being used by the vehicle GPS for navigation

Accuracy

- Shows the GPS accuracy (in meters) to 3 decimal places

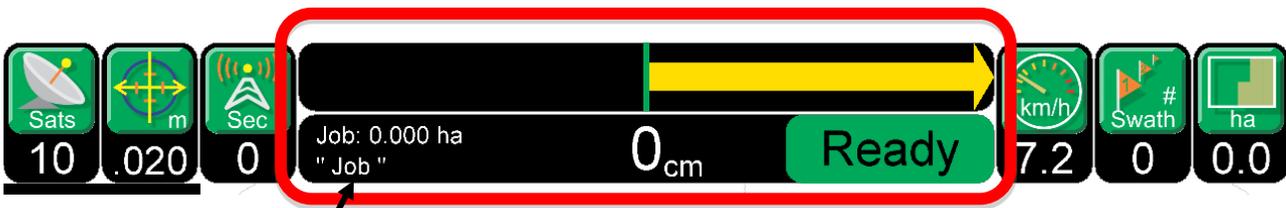
Base Status

- Indicates the number of seconds since a correction signal has been received from the base.

NOTE – this value will read '0' if local base is not used

If all the boxes are RED, this indicates NO gps input to the terminal – check connections and com port settings.

CENTRE INFORMATION BAR



The left hand section of this Information Bar provides SCROLLING specifics of the current job as follows:

- Farm name
- Field name
- Job name
- Swath Width

The large **YELLOW** arrow indicates which way the vehicle must be turned to return to the line, with the internal figure being the distance (in cm) off the line.

Ready or **Engaged** indicates if the auto-steer is “ENGAGED” or “READY” to be engaged.

RIGHT HAND INFORMATION BAR



Speed (km/hr)

- Indicates the speed the tractor is travelling

Swath

- Shows the current swath number. Negative Swath numbers are to the left of the original swath with positive swath numbers to the right.

Field (Ha)

- Shows the size (in Hectares) of the current field.

Coverage

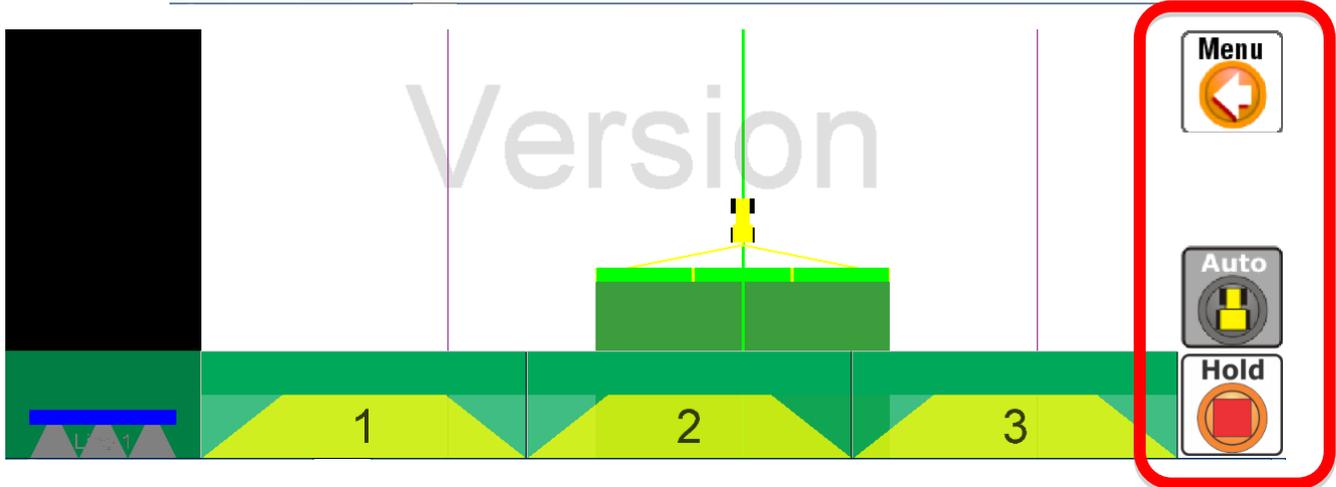
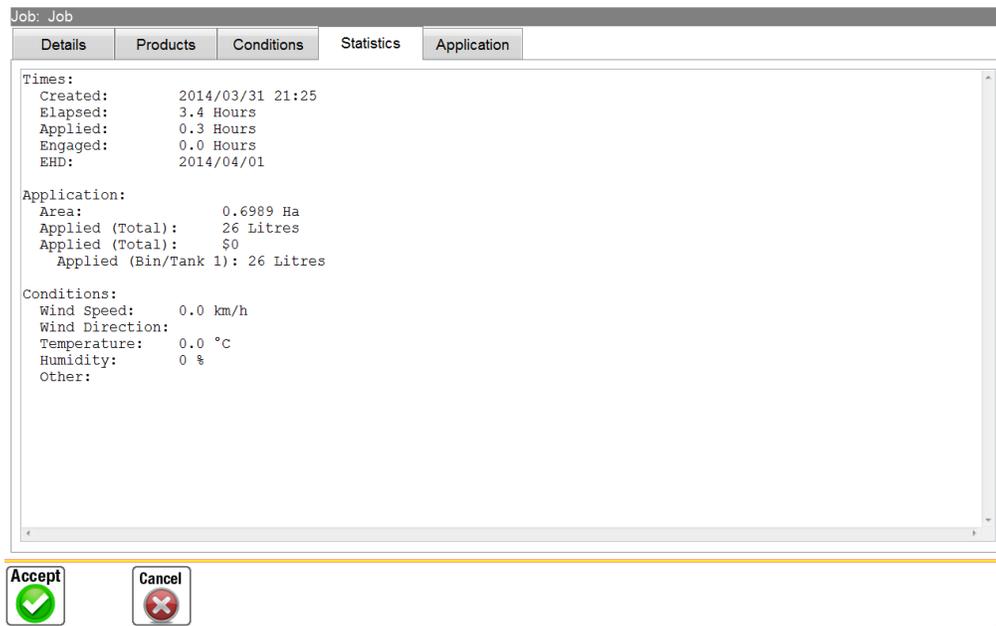
- Shows the Coverage Area (in Hectares) when coverage map in enabled.

DID YOU KNOW

Quickly view the job status by selecting the centre lightbar.

Job Stats

By simply clicking (or touching) anywhere within the centre information bar, the job information is displayed



 and  are the only two buttons displayed on the start up screen so as to enable maximum screen viewing area.

 when pressed will display all of the primary icons allowing access to all set up and operational features of AgGuide V4.

 engages the auto-steer when pressed, providing that  is shown in the right hand information bar & AutoSteer is setup & installed.

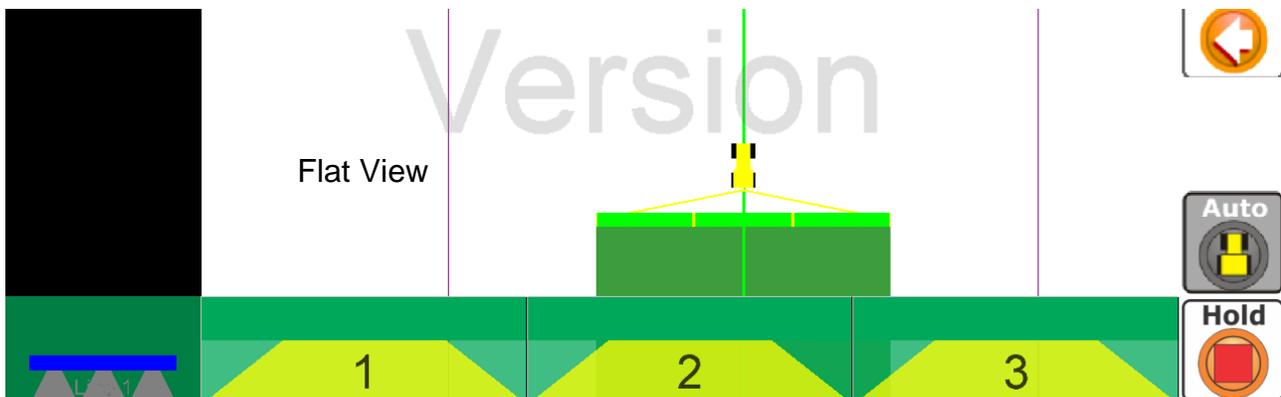
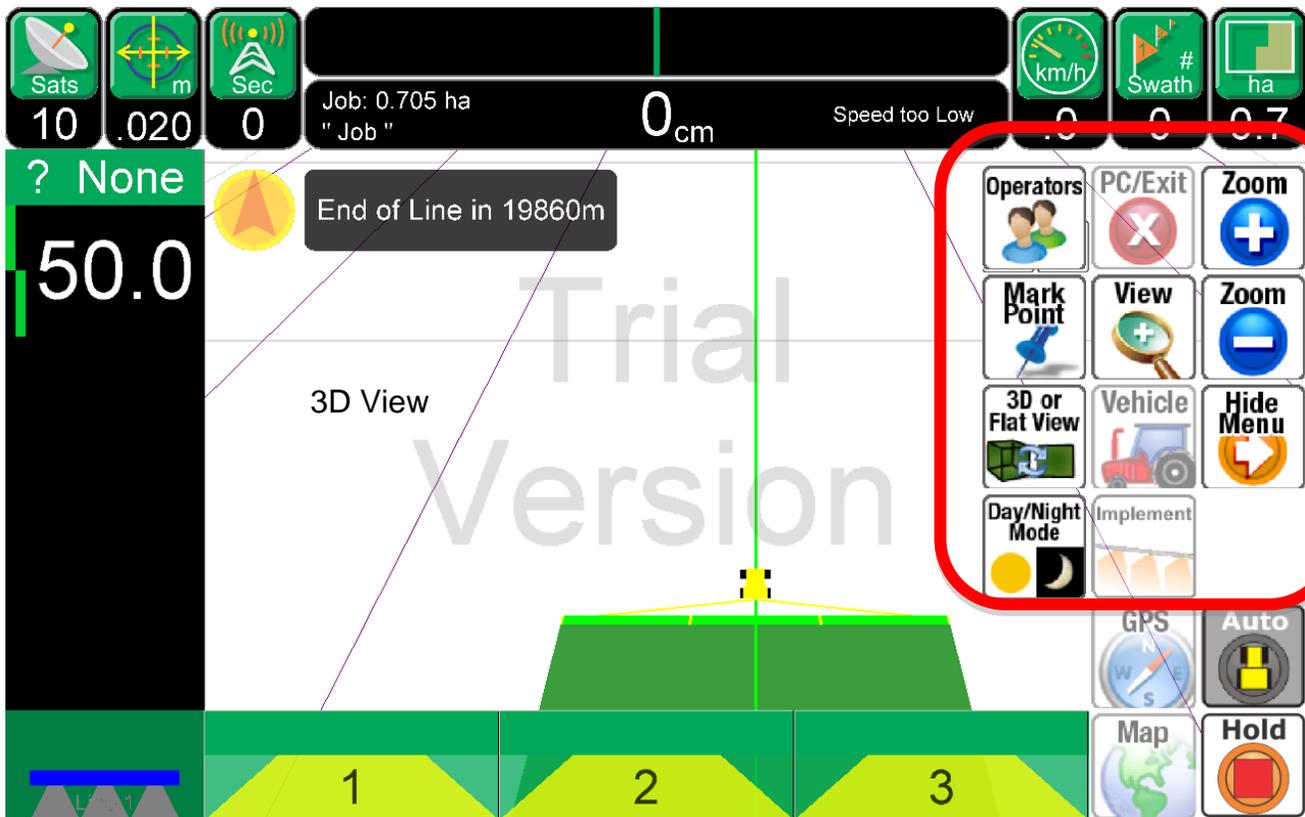
4.1.1.3 Map Zooming and Rotation

To zoom and/or rotate the view of AgGuide V4, perform the following:

Press the  button show the full menu array and then the  button to enter the View screen
Select the desired view button and adjust as required

Press the  button until you return to the main screen

- Also available is the Zoom + & Zoom – which can be access directly from the front screen.
- You can also change the perspective view by selecting 3D of Flat View



4.2 GPS Definitions

Below is a basic overview of some GPS definitions used in Agguide. Our technicians may refer to some of these terms when troubleshooting your system.

BASE STATION

Refers to the stationary GPS component of an RTK system.

ROVER

Refers to the mobile GPS component of an RTK system.

DGPS

Stands for Differential GPS and refers to a GPS system using a differential correction.

FIXED SOLUTION

Used to describe the GPS accuracy of an RTK system when equal or better than 2cm accuracy has been achieved.

FLOAT SOLUTION

Used to describe that status of an RTK GPS system that is receiving correction signals from the Base but has not yet reached a FIXED solution.

GLONASS

- The name of the Russian satellite constellation.

GPS

- The name of the US Government owned satellite constellation

LATITUDE

- Lines of Latitude are a series of circles which start at the equator (0°) and end at each pole at (90°).

LONGITUDE

- A line of Longitude runs from one pole to the other and divides the earth into 360°. These are described as being 0° to 180° East or West of the Prime Meridian which runs roughly through London, England.

EASTING

- An alternative method of showing Latitude without the need of Zones

NORTHING

- An alternative method of showing Longitude.

ZONE

- The earth is divided from North to South into 60 zones - each 6° wide.

RTK

- Stands for Real Time Kinematics and refers to dual frequency GPS systems having a fixed accuracy of <2cm.

PDOP : HDOP : VDOP

- DOP (Dilution of Precision) is a mathematical value that describes inaccuracies caused by positioning of satellites.
 - (H)DOP - horizontal (X & Y axis)
 - (V)DOP - vertical only (Z axis)
 - (P)DOP - position (X, Y & Z axis)

ELEVATION MASK

- A numerical value in degrees that defines the angle above horizontal and projected to the horizon above which satellites will be used by the GPS for position calculation.

4.2.1 Other Definitions

These are explanations of the structure used by AgGuide to organise your data

FARM

- Is the term used in AgGuide V4 to describe major entities of which minor entities (fields) can be a part

FIELD

- Is the term used in AgGuide V4 to describe minor entities of which form part of a major entity (farms)

RUNLINE

- Is a straight or curved line along which the AgGuide V4 system is providing guidance or steering control.

SWATH

- Is a term used to describe the position and characteristics of the Runline

JOBS

- Is a term used to describe and record specific actions and characteristics for later reference.

4.4 GPS Configuration

NOTE – Many functions of the GPS setup rely on effective communication between the PC on which AgGuide V4 is loaded, and the GPS.

Please ensure that the correct serial communication has been established before proceeding.

Please refer to the appropriate section of the manual for more detailed instructions.

To enter the GPS setup section of the program select  ,  and the following screen will appear.

| | Vehicle GPS | Implement GPS (If Used) |
|-------------------|-------------------------|-------------------------|
| GPS Status | GPS COM Error | GPS COM Error |
| Date:Time | 140331:213208.2 | 140331:213208.2 |
| Easting (m) | 0.000 | 0.000 |
| Northing (m) | 585.910 | 581.160 |
| Elevation (m) | 0.200 | 0.200 |
| Heading / Speed | 0 ° 7.2 km/h | 0 ° 7.2 km/h |
| H Accuracy (m) | 0.020 | 0.000 |
| V Accuracy (m) | 0.000 | 0.000 |
| Sats GPS:Glonass | 10:00 | 0:00 |
| Latitude (°) | 0.0000000000 | 0.0000000000 |
| Longitude (°) | 0.0000000000 | 0.0000000000 |
| WGS84 Zone | GPS:31 Farm:(Undefined) | GPS:31 Farm:(Undefined) |
| PDOP:HDOP:VDOP | 0.00: 0.00: 0.00 | 0.00: 0.00: 0.00 |
| GPS Quality | (Auton) 0 | (Auton) 0 |
| Radio Latency (s) | 0.0 | 0.0 |
| Radio Data (kb) | 0.000 | 0.000 |
| Base | 0.0km ID: | 0.0km ID: |
| Temperature(°) | 0.00 | 0.00 |

Menu
Back

Setup

Other
60

Comms
Settings
810
1010

Comms
Terminal

Details of the current status of the GPS input to the AgGuide V4 program are displayed in detail on this page.

4.4.1 GPS Config Definitions

Explanation of previous page

Vehicle GPS Status

- the current general status of the GPS input.

Implement GPS Status

- the current general status of the GPS input on the implement (GPS Land Level or Implement guidance)

•

Date : Time

- Provides the current Date and Time (GMT) in the following format:

YYYYMMDD : HHMMSS : 1/10 seconds,

where:

| | | |
|---|---|--------|
| Y | - | year |
| M | - | month |
| D | - | date |
| H | - | hour |
| M | - | minute |
| S | - | second |

Elevation

- Distance above sea level in meters (M)

Speed

- Speed in km/h

Heading

- Heading in degrees (°)

H Accuracy

- Horizontal accuracy in meters.

V Accuracy

- Vertical accuracy in meters.

Sats (GPS : GLONASS)

- Shows the current available satellites in the following format:

No of GPS satellites : Number of Glonass satellites

Latitude

- see [Latitude](#) in GPS Definitions

Longitude

- see [Longitude](#) in GPS Definitions

WGS 84 Zone

- Identifies Zone number based on WGS84 datum. See [ZONE](#) in GPS definitions.

PDOP : HDOP : VDOP

- See [PDOP : HDOP : VDOP](#) in GPS definitions.

GPS Quality : Also from GGA string

- Is a numerical value applied to identify differing GPS accuracy limits
0 - Autonomous
2 - DGPS (Sub Meter)
4 - RTK : Old (<2cm accuracy)
5 - DGPS Float solution (HP 10cm)
17 - RTK : New (<2cm accuracy)

Radio Latency

- Shows the number of seconds elapsed since a radio correction was received.
- Applies **ONLY** to systems using local base stations

Radio Good Messages

- Shows the cumulative total of good radio messages received.
- Applies **ONLY** to systems using local base stations

Radio Bad Messages

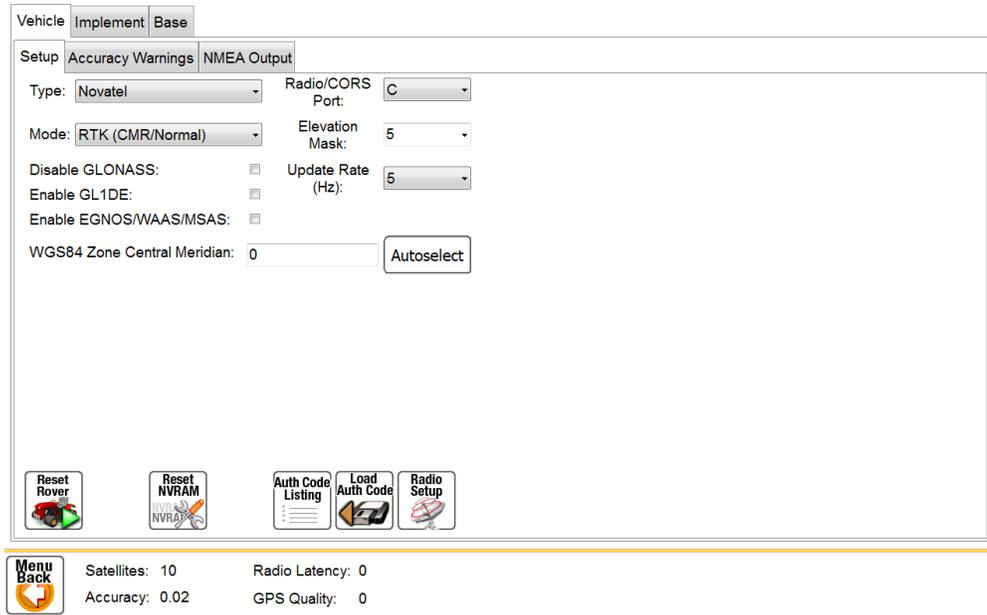
- Shows the cumulative total of bad radio messages received.
- Applies **ONLY** to systems using local base stations

5 SETTING UP THE GPS

The AgGuide V4 system can operate with a wide array of GPS systems and must be set to correctly interpret the various characteristics of each brand / model.

Before entering the GPS setup menu please ensure that Serial Communications have been correctly set up – refer note under GPS Configuration above

To enter the GPS setup menu select :  >  > 

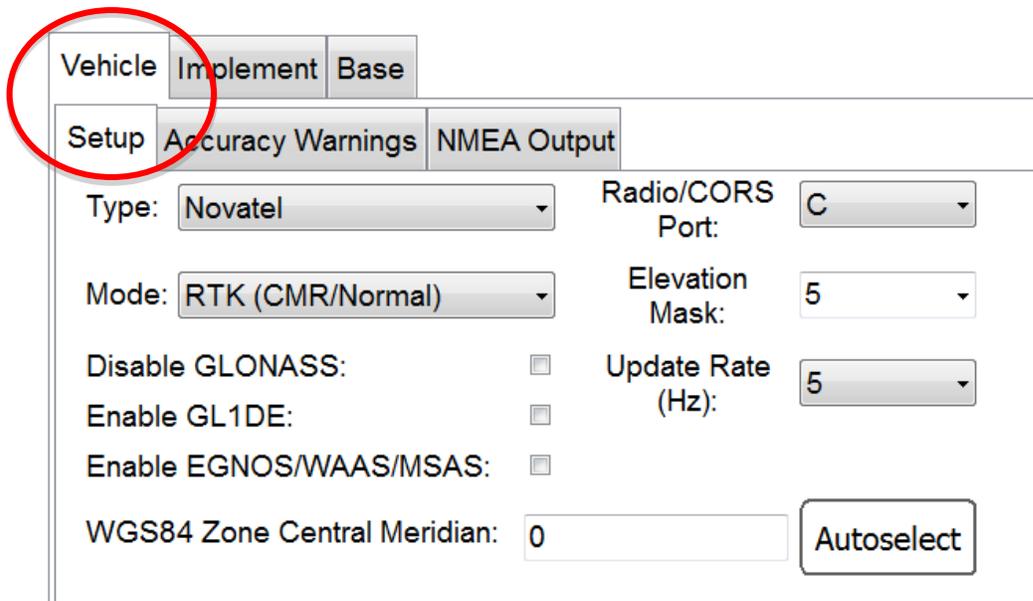


-  can be used to identify available GPS functions.
-  can be used to Load a new or replacement Novatel Authorization Code
-  should **ONLY** be used as directed by Farmscan Ag service personnel or experienced Dealers.
-  should **ONLY** be used as directed by Farmscan Ag service personnel or experienced Dealers.
-  can be used to reset the NVRAM in Topcon receivers. – Farmscan Ag use **ONLY**

5.1 VEHICLE

Select both **VEHICLE** and **SETUP** Tabs as shown below

This screen can now be used to set up the characteristics of the Vehicle Rover (tractor mounted GPS) and the Base (if used). Each component of this setup is described in more detail as below.



The screenshot shows a software interface with three main tabs: 'Vehicle', 'Implement', and 'Base'. The 'Vehicle' tab is selected and circled in red. Below these tabs are three sub-sections: 'Setup', 'Accuracy Warnings', and 'NMEA Output'. The 'Setup' section contains the following fields:

| | | | |
|------------------------------|--------------------------|-------------------|---|
| Type: | Novatel | Radio/CORS Port: | C |
| Mode: | RTK (CMR/Normal) | Elevation Mask: | 5 |
| Disable GLONASS: | <input type="checkbox"/> | Update Rate (Hz): | 5 |
| Enable GL1DE: | <input type="checkbox"/> | | |
| Enable EGNOS/WAAS/MSAS: | <input type="checkbox"/> | | |
| WGS84 Zone Central Meridian: | 0 | Autoselect | |

TYPE

- under this heading choose the brand of GPS receiver that you are using.
 - Current options in Include NOVATEL & TOPCON
- If the specific receiver brand is not shown in this selection, choose NMEA / Other. This is normally selected if you have chosen to bring your own receiver. – Ensure your receiver is correctly setup for a GGA, VTG, 5hz & minimum baud rate of 19200.
- If you have chosen an option other than NMEA /Other, use the following set up details as described.

5.1.1 GPS TYPE : Novatel

| | | | |
|-------------------------|--------------------------|-------------------|---|
| Type: | Novatel | Radio/CORS Port: | C |
| Mode: | RTK (CMR/Normal) | Elevation Mask: | 5 |
| Disable GLONASS: | <input type="checkbox"/> | Update Rate (Hz): | 5 |
| Enable GL1DE: | <input type="checkbox"/> | | |
| Enable EGNOS/WAAS/MSAS: | <input type="checkbox"/> | | |

MODE

- RTK (CMR/Normal) – This is the default setup for Farmscan Ag Rover/Base
- RTK (RTCM2.x) – Farmscan Ag use only
- RTK (RTCM3.x) – Farmscan Ag use only
- Omnistar – Sets the unit to accept OmniSTAR subscription
- RTK Slave (RTCA) – Used to set Rover up as slave for implement or Levelguide

DISABLE GLONASS

- This tick box provides the opportunity to disable Glonass satellite signals.

NOTE – this tick box will only be effective if your receiver is capable of and has been configured for

Glonass signal. Select  on this page to confirm availability.

ENABLE GL1DE

- GL1DE allows for autonomous L1 smoothing. Only available on unlocked receivers.

ENABLE EGNOS/WAAS/MSAS

- Only available for receivers in Europe/USA & China

RADIO PORT

- Please use the default **Radio Port C**

ELEVATION MASK

- Please refer to the GPS definitions section of this manual and adjust as required – recommended default 5°

UPDATE RATE (Hz)

- 5hz is the default rate at which the messages are sent from the receiver to the PC.

IMPORTANT

After making changes to the above settings,

press  to activate the changes.

5.1.2 GPS TYPE : Topcon

Type: 

and

Type: 

MODE

- Select either RTK (CMR/Normal) depending on the differential correction signal used.
- RTK (RTCM2.x) – Farmscan Ag use only
- RTK (RTCM3.x) – Farmscan Ag use only
-

DISABLE GLONASS

- This tick box provides the opportunity to disable Glonass satellite signals.
-

NOTE – this tick box will only be effective if your receiver is capable of and has been configured for Glonass signal.

Select  on this page to confirm availability.

WGS84 CENTRAL ZONE MERIDIAN

Please input this data if you have this information or use the  button to automatically select.

RADIO PORT – ALL TOPCON RECEIVERS

Please use the default **Radio Port C**

ELEVATION MASK

- Please refer to the *GPS definitions* section of this manual and adjust as required – recommended default 5°

IMPORTANT

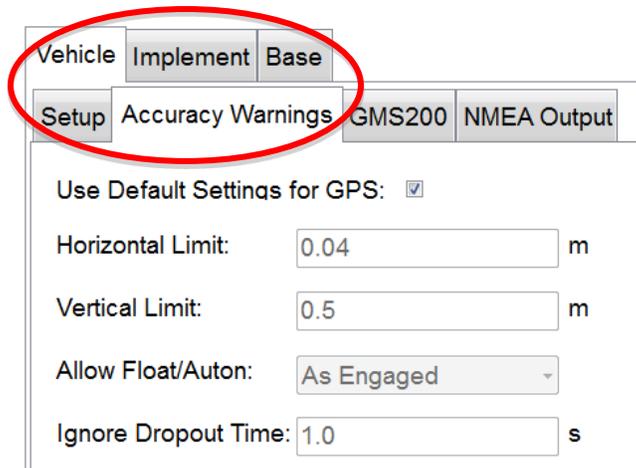
After making changes to the above settings,
press  to activate the changes.

-  can be used to identify available GPS functions.

-  can be used to reset the NVRAM in Topcon receivers. – Farmscan Ag use ONLY

5.1.3 Accuracy Warning Setup

- Each GPS input can have their own Accuracy Warning
- Select either **Vehicle or Implement** and **Accuracy Warnings** Tabs as shown below



Many GPS systems have Default Settings preloaded that will suit general applications. If you are unsure of how to set the above settings, please tick the *Use Default Settings for GPS*

Otherwise use the following to guide you in selecting these settings

HORIZONTAL LIMIT

- Calculated GPS accuracies above this limit will result in a GPS warning message and, if used, disengagement of both auto-steer and spray control functions

VERTICAL LIMIT

- Calculated GPS accuracies above this limit will result in a GPS warning message and, if used, disengagement of both auto-steer and spray control functions

ALLOW FLOAT/AUTONOMOUS

- Will not result in an alarm or disconnect auto-steer or spray control when a float solution (refer Definitions for more detail) is current.

Always will always allow float solutions

Never will never allow float solutions

As engaged will only allow float solutions when auto-steer or spray control functions are engaged.

IGNORE DROPOUT TIME

- GPS systems can experience short term (<2 sec) drop outs for various reasons. By selecting a time period here, you are authorizing the AgGuide V4 system to ignore the accuracy alarm for the defined period in the hope of it re-establishing. This can provide better work continuity where GPS drop outs are prevalent.

5.1.3.1.1 TOPCON GMS 200 Specific

Select both **VEHICLE** and **GMS 200** Tabs as shown below

NOTE – the following setup functions are ONLY available on the Topcon GMS200 product.

The screenshot shows a software interface with several tabs: 'Vehicle', 'Implement', and 'Base'. Below these are sub-tabs: 'Setup', 'Accuracy Warnings', 'GMS200', and 'NMEA Output'. The 'Vehicle' tab and the 'GMS200' sub-tab are circled in red. The 'GMS200' sub-tab is active, displaying the following settings:

- Stay-On: 0.0 minutes
- Pre-Start:
- Pre-Start Day: 24 Hours (dropdown menu)
- Hour: 0
- Minute: 0

This product is capable of receiving Omnistar VBS and HP signals. The following set up is designed to enable the system to remain active or automatically restart using its own internal batteries, so avoiding the significant time taken to obtain the desired accuracy after shut down.

STAY ON

- Enables the operator to de-power the AgGuide V4 system whilst maintaining power to the GPS system using it's internal batteries.

PRE-START

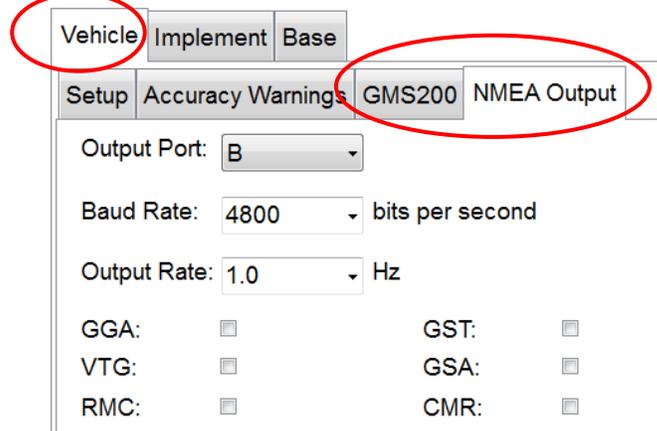
- Allows the GPS to restart automatically and acquire a fix before the operator arrives to use the equipment.

IMPORTANT

After making changes to the above settings,

press  to activate the changes.

Select both **Rover** and **GMS200 NMEA Output** Tabs as shown below



These settings enable configuration of the Serial Data being transmitted from the Ports on the TOPCON GMS200.

NOTE: Port A is traditionally used to output corrected GPS data to the AgGuide V4 system. Providing that Ports B,C and D have been enabled in the Authorization Code, configuration of these ports will be possible. – i.e. Data output for a yield monitor

IMPORTANT

After making changes to the above settings,

press  to activate the changes.

5.2 Base station setup

For Base Stations with a Novatel Receiver manufactured after August 2012, an autolocate function has been added to the software. It is important to understand how this function works and its limitations. These limitations are described further on in this section. Setup for autolocate activated and not activated are described separately.

5.2.1 Base Station Setup - Manual Setup (Autolocate not activated)

This procedure is for all Base Stations manufactured before August 2012 and optional if manufactured after that date.

1. Ensure that the Base Station is switched OFF.
2. Connect the Base Receiver to the serial A port on the Interface module and the serial A port on the Base Station receiver using the Db9 serial cable that has been supplied. Turn on the xPRO Terminal in the Cab of the vehicle.

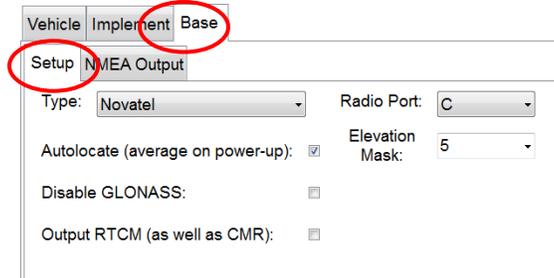
Alternative

Instead of using the interface module plug, the cable into serial port 1 on the terminal don't forget to set the correct port under 'Comms Settings' in the software.

3. When the Agguide V4 software is open

4. Press    This will take you to the screen shown below.

5. Select both **Base** and **Setup** Tabs as shown below



For all selectable **TYPE** options (Novatel, Topcon and GMS 200) the following options will be available for selection .

DISABLE GLONASS: this tick box provides the opportunity to disable Glonass satellite signals.

NOTE – this tick box will only be effective if your receiver is capable of and has been configured for

Glonass signal. Select  on this page to confirm availability.

OUTPUT RTCM (AS WELL AS CMR)

- This option enables the base to output both CMR and RTCM formats. This should ONLY be used where one or more ROVERS operating off the base are configured to require RTCM format.

RADIO PORT

- Please use the default Radio Port C

ELEVATION MASK

- Please refer to the *GPS definitions* section of this manual and adjust as required – recommended default 8°

IMPORTANT

After making changes to the above settings,

press  to activate the changes.



Can be used to identify available GPS functions.



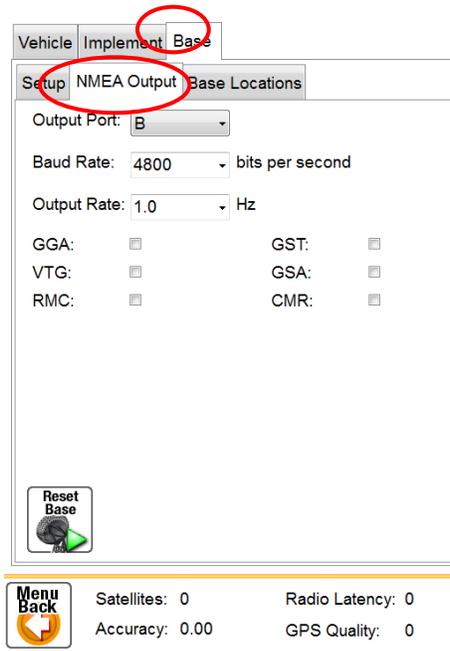
Can be used to reset the NVRAM in Topcon receivers.

NOTE: Do not use this function unless directed by Farmscan Ag service personnel or experienced Dealers.



should ONLY be used as directed by Farmscan Ag service personnel or experienced Dealers .

Select both **Base** and **NMEA Output** Tabs as shown below



These settings enable configuration of the Serial Data being transmitted from the Ports on the GPS base.

NOTE – Port C is traditionally used to output GPS data to the radio modem.

IMPORTANT

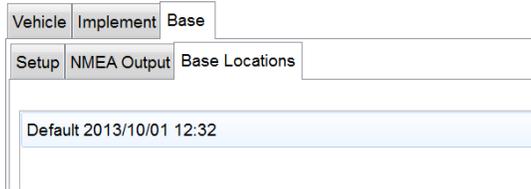
After making changes to the above settings, press



to activate the changes.

Note that *Reset Base* will overwrite the settings AND BASE LOCATION currently in the base, with the settings and location selected in AgGuideV4. Make sure (if you don't want to lose the current base location) that you have already taken a copy of the base's current location using *Load Existing Location*

6. Check that the tick box beside Autolocate (average on power-up) is unticked. If it isn't, untick it by pressing on the box. The screen will change to display Base Locations as well.



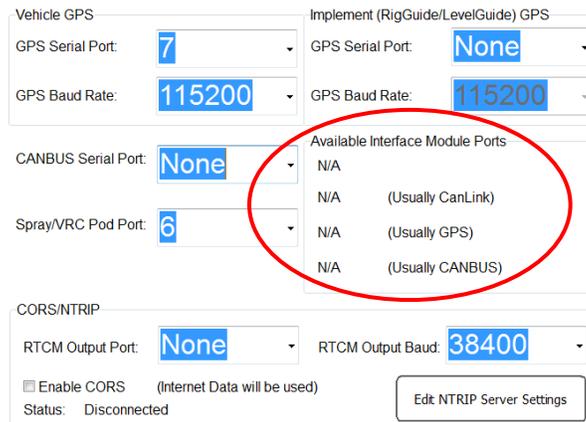
7. Power up the base station.

8. Press  which will return you to the screen below.

| | Vehicle GPS | Implement GPS (If Used) |
|-------------------|-------------------------|-------------------------|
| GPS Status | GPS COM Error | GPS COM Error |
| Date:Time | 131118:143925.1 | 131118:143925.1 |
| Easting (m) | 321637.680 | 321637.680 |
| Northing (m) | 6990551.725 | 6990546.975 |
| Elevation (m) | 374.231 | 374.231 |
| Speed (km/h) | 0.0 | 0.0 |
| Heading (°) | 0 | 0 |
| H Accuracy (m) | 0.020 | 0.000 |
| V Accuracy (m) | 0.000 | 0.000 |
| Sats GPS:Glonass | 10:00 | 0:00 |
| Latitude (°) | 0.0000000000 | 0.0000000000 |
| Longitude (°) | 0.0000000000 | 0.0000000000 |
| WGS84 Zone | GPS:31 Farm:(Undefined) | GPS:31 Farm:(Undefined) |
| PDOP:HDOP:VDOP | 0.00: 0.00: 0.00 | 0.00: 0.00: 0.00 |
| GPS Quality | (Auton) 0 | (Auton) 0 |
| Radio Latency (s) | 0.0 | 0.0 |
| Radio Data (kb) | 0.000 | 0.000 |
| Base | 0.0km ID: | 0.0km ID: |

Check that the Base Station is connected - Date:Time should be showing under Vehicle GPS and should be updating. **IF IT IS NOT** proceed to Step 9.

9. Press  This will take you to the screen shown below.



| | | | |
|---|--------|-------------------------------------|--------|
| Vehicle GPS | | Implement (RigGuide/LevelGuide) GPS | |
| GPS Serial Port: | 7 | GPS Serial Port: | None |
| GPS Baud Rate: | 115200 | GPS Baud Rate: | 115200 |
| CANBUS Serial Port: | None | Available Interface Module Ports | |
| Spray/VRC Pod Port: | 6 | N/A | |
| | | N/A (Usually CanLink) | |
| | | N/A (Usually GPS) | |
| | | N/A (Usually CANBUS) | |
| CORS/NTRIP | | | |
| RTCM Output Port: | None | RTCM Output Baud: | 38400 |
| <input type="checkbox"/> Enable CORS (Internet Data will be used) | | | |
| Status: Disconnected | | Edit NTRIP Server Settings | |

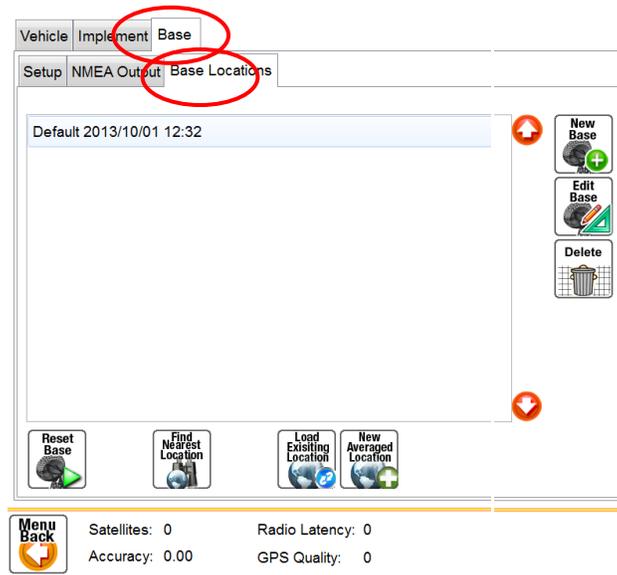
This is the screen where the connection ports are viewed. In the screen box above the ports that the software has assigned to each serial port are shown, these serial ports are associated with the Interface module and may change if another interface module is attached.

They will only be visible and present if an interface is attached and the connecting is made between the xPRO terminal and the interface module.

The ports and baud rates must be assigned to each of the Ports for the Vehicle GPS, the Implement GPS, and the CANBUS if they are attached. If they are not attached the setting should be set to None. Change the port number by pressing the drop down box and selecting the appropriate port number.

If the GPS is being attached directly to the xPRO Terminal serial port then the GPS serial port should be set to Port 1.

Select both **Base** and **Base Location** Tabs as shown below



ADD NEW BASE: Use this button when you want to define a new base location and you already know the Latitude, Longitude and Elevation of the location. For example when a field has been surveyed and the Base Station is being setup to use Levelguide.



EDIT BASE: use this to *edit* an existing base location.



DELETE: use this to *delete* an existing base location.



will select the **NEAREST BASE LOCATION** to the current geographic coordinates, from the base locations shown on screen



will load the existing base location into AgGuideV4 from the GPS base to which it is connected. Use this if your GPS is already set up at a location, and you want to copy that location into the location list in AgGuideV4 so you can use it again.

If you don't do this, then the location in the GPS will be lost when you perform a *Reset Base*, *Find Nearest Location*, or *New Averaged Location*.



will perform an averaging of coordinates received by the base GPS receiver over a 60 second period and input this averaged position as a new location



will reset the base and use the selected base location. Note (as described above) that this will overwrite the current base location being used by the base, with the currently selected location in AgGuideV4.

IMPORTANT

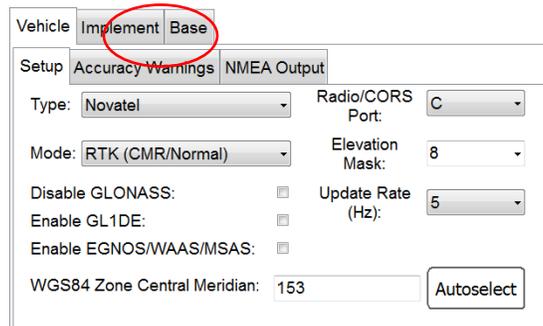
If an existing location is being set into the Base, ensure that a Base Location is in the software by pressing the Edit Base.

If Average location is used, after completing the average check that it has been successful by pressing Edit to view the location.

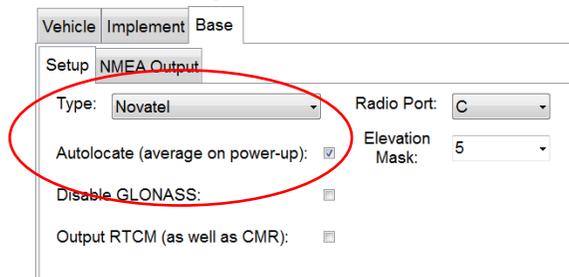
5.2.2 Base Station Setup - Automated Setup Autolocate activated

1. Ensure that the Base Station is switched ON.
2. Turn on the xPRO Terminal in the Cab of the vehicle.
3. When the Agguide V4 software is open,

4. Press  >  >  This will take you to the screen shown below.



5. Press the Base Tab and this will take you to the screen shown below.



Check that the GPS Type is set to Novatel, if it isn't, use the dropdown menu to select Novatel.

6. Check that the tick box beside Autolocate (average on power-up) is ticked. If it isn't, tick it by pressing on the box.

7. Press  this will signal to the Base Station to change to Auto locate mode.

Open the lid of the Base Station. What you will see happening is:-

1. The light on the Base Station receiver will begin by flashing red. As it acquires GPS satellites it will flash green. As Glonass satellites are acquired as well it flash green and orange.
2. The base station will then start averaging its position when it has enough satellites acquired. This averaging will take 60 seconds.
3. When this averaging is complete, the GPS will have a position with Latitude, Longitude and Elevation.
4. The GPS Receiver will compare the position that it has averaged to other locations that it has in its memory (it can retain up to 10 positions then will over write the oldest position)
5. If the new averaged position is close to a stored position, the stored position will be used otherwise the new position will be used.
6. This position will be used and the Radio will start transmitting the GPS information - Tx light on the radio will start flashing.

NOTE: These Base Station positions cannot be viewed. To get position of the Base Station. Go to **XX** and follow the steps to Load Existing Base Location.

6 INSTALLING ACCESS CODES

To install Access codes or review option validity of AgGuide V4, perform the following:

Press  >  >  to enter the Access Codes screen.

From here you can either view an existing Access Code status or press  to enter a new code.

| Unlock Access Codes | | | |
|---------------------|--------|-------|---------|
| Option | Loaded | Valid | Expires |
| Guidance | No | No | |
| AutoSteer | No | No | |
| SprayControl | No | No | |
| VariableRate | No | No | |
| Spreader | No | No | |
| LevelGuide | No | No | |
| RigGuide | No | No | |

Site ID: 59E6-24F3

Loaded YES if option loaded – NO if not loaded

Valid YES if Unlocked – NO if locked

Expires Shows only if Unlock Code has an expiry date. i.e. demonstration purposes etc.

Site ID This is the unique code associated with the PC on which AgGuide V4 has been loaded.

IMPORTANT

This code MUST be provided to Farmscan to enable an Unlock code to be generated. Simply ring or email Farmscan Service on 07 4602 4150 or sales@farmscanag.com with proof of purchase, provide you Site ID number and you will be given an Unlock Code. This code is used in the following steps.

To install your Access Code use the keyboard to enter the Access Code provided by Farmscan and

select .

If the words INVALID ACCESS CODE appear, please contact Farmscan Service on the numbers given previously.

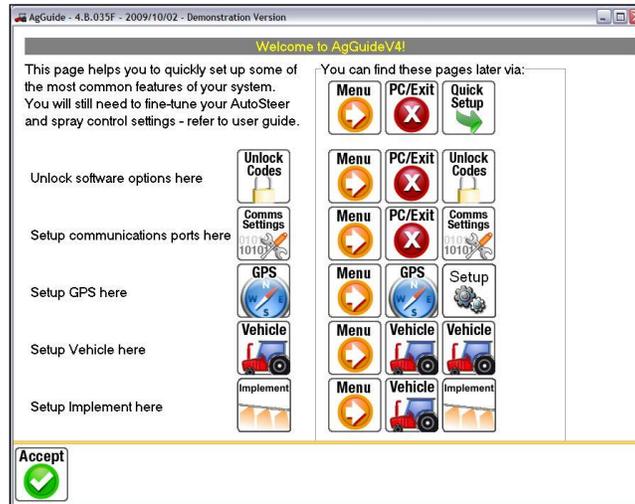
Press the  button until you return to the main screen.

7 AGGUIDE V4.0 QUICK SETUP SCREEN

To access the AgGuide V4.0 Quick Setup screen, perform the following:

Press  >  >  to enter the 'Quick Setup' screen.

From here you can access the setup settings for AgGuide V4.0 by clicking on the required button- refer to the relevant sections elsewhere in this manual for further information on the individual setup items.



8 AGGUIDE UTILITIES

AgGuide provides calculator, Farm data copying, comms diagnostics and windows explorer utilities. To access the AgGuide V4.0 Utilities, perform the following:

Press  >  >  to access 'Utilities'

Click on the required icon to access the corresponding utility:



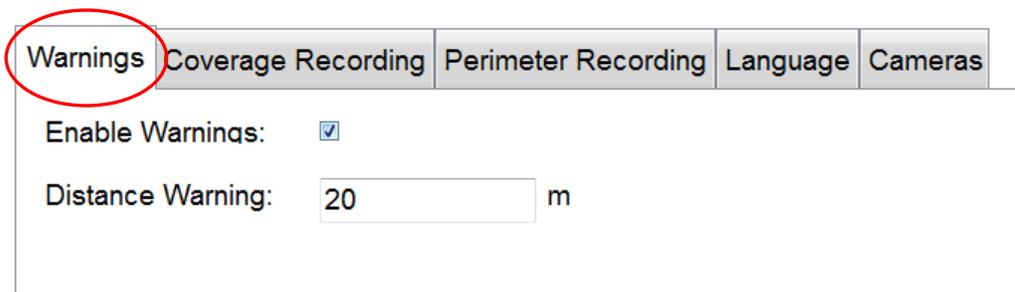
Press either the  and/or  buttons until you return to the main screen.

9 AGGUIDE OTHER SCREEN

To access the AgGuide V4.0 Other (Warnings/Recording) screen, perform the following:

Press  >  >  to enter the 'Other' screen.

9.1.1 Warnings



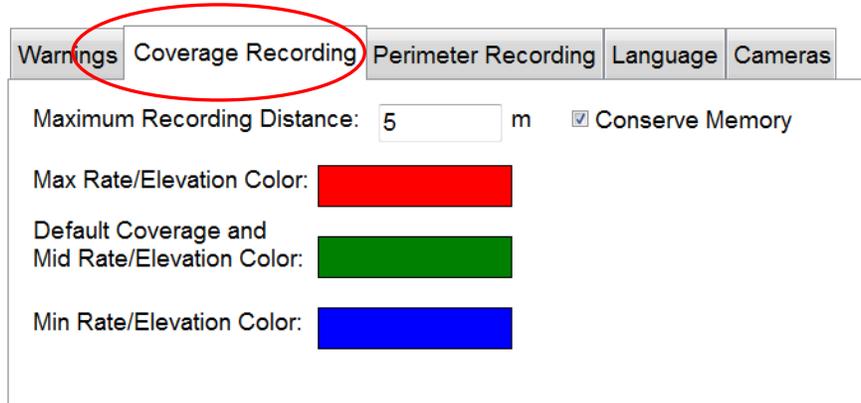
To turn 'Warnings:' on or off, click in the 'Warnings:' selection box- a '✓' means it is turned on/enabled.



To set a distance warning value (to warn the operator when approaching the end of a runline), click in the 'Distance Warning:' box, enter the desired warning distance in metres using the On Screen

Number Pad- press .

9.1.2 Coverage Recording

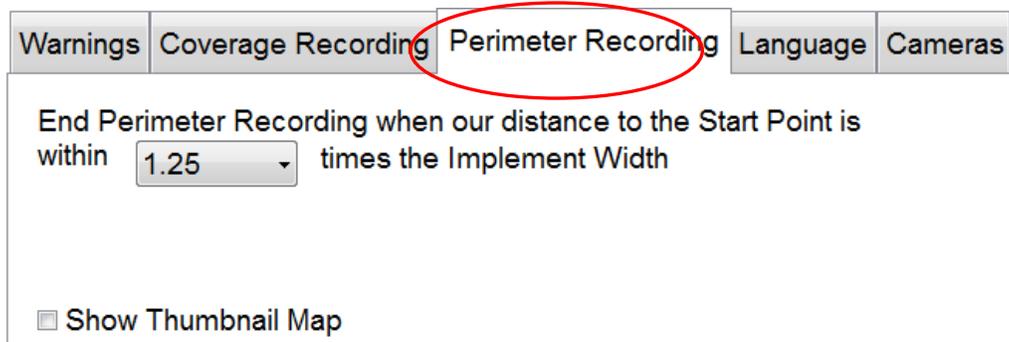


Click in the 'Maximum Recording Distance:' box, enter the desired maximum distance in metres using the On Screen Number Pad- where 'Maximum Recording Distance:' is the maximum distance

between coverage record segments used by AgGuide V4.0- press . (5m is normally default.

- Conserve Memory is ticked as default. This allows AgGuide to handle the amount of data recorded to each file. – No need to touch this unless advised by a technician.
- Max Rate/Elevation Color : Allows for a color scale to be mapped for elevation
- Default Coverage & Mid Rate/Elevation Color : This can also be used to allow color mapping of spray rate control onto a map.
- Min Rate/Elevation Color : Allows for a minimum color scale to be mapped for elevation.

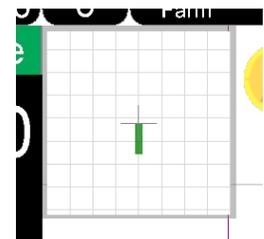
9.1.3 Perimeter Recording



Click in the 'End Perimeter Recording' box, select and click the desired distance in multiples of the implement width- where 'End Perimeter Recording' is the value used by AgGuide V4.0 to determine when to close off the

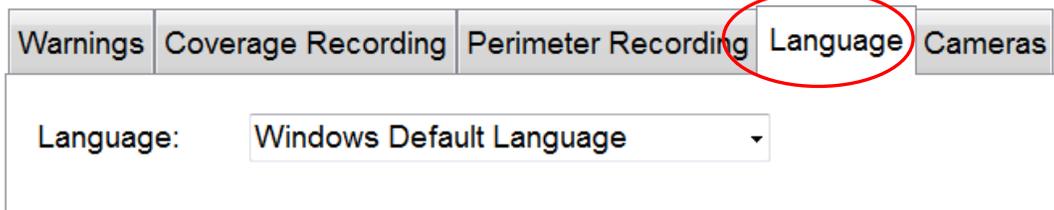
perimeter runline when approaching the perimeter start point- press .

** You also have the ability to SHOW THUMBNAIL MAP. This displays a small box on the front guidance screen for a full map view.



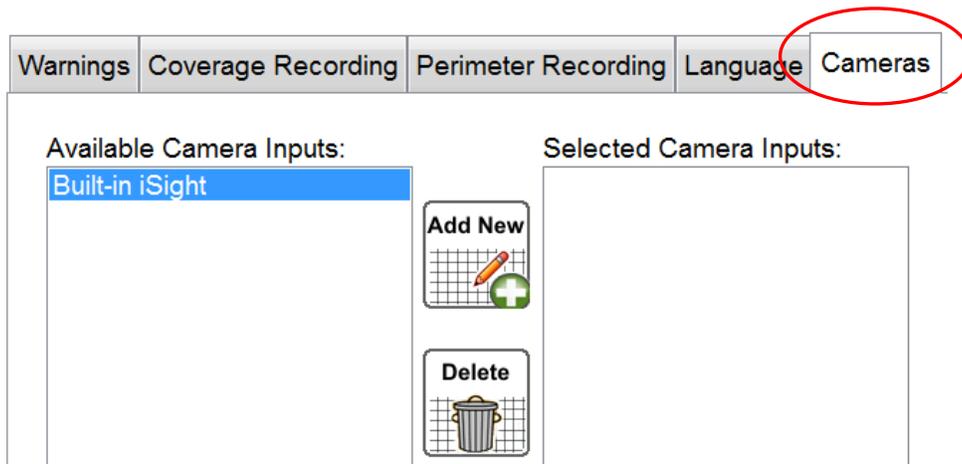
9.1.4 Languages

Allows the operating to choose AgGuide's multiple language features:



9.1.5 Cameras

AgGuide is still under development regarding camera inputs. Currently one Camera input is available for use. In the future you will be able to add upto 4 camera on the front screen for quick viewing.



Press the  button until you return to the main screen.

10 AGGUIDE EXIT

To exit from AgGuide V4.0 perform the following:

Press  , 

Press  to close AgGuide V4.0 and return to the Windows Operating System- OR

Press  to close AgGuide V4.0 and turn off power to your PC.

11 SETTING UP THE NAV MODULE

NOTICE: Ensure that on the GPS Page the 'GPS status' shows 'GPS ready' with a 'GPS Quality' of '17' before commencement of these tuning procedures. Check that the vehicle tyres are evenly filled with air, and that there are no loads (grain bin, water tanks etc) which may be unevenly loaded on the left/right sides of the vehicle/implement.



11.1 Calibration

Why is this important?

Gyroscopes mounted on different axes interact between axes. This is what causes a spinning top to remain upright – a tilt in any direction translates into a right angle tilt force – which causes the top to remain upright.

AgGuide V4's Nav Module contains two gyroscopes – one for the heading and one for the tilt – and since they are mounted at right angles there is an interaction between them which needs to be compensated for.

Step 1: Press ; ;  (When AgGuide V4 powers up, a message will display indicating the vehicle must be kept stationary while the Nav Module is initializing. It is *not* necessary for the vehicle to be level, but it *does* need to be stationary.)

Step 2: Turn the vehicle in a 360° circle (in either direction) and stop in exactly the same place, as instructed on the screen, press ; 

- An easy way to do this is to use a fixed object like a post or tree etc. (Or make a mark on the ground) as a reference start/stop point- drive up to the post/mark and line it up with a part of the tractor (side window pillar/wheels etc.), turn the wheels full lock in one direction and drive a 360° circle

and stop when you are lined up with the post/mark again then press ; 

Tilt Correction Setup Utility:

| | | | | |
|-----------------------|-----------|---------|-------|---|
| Tilt Angle (Degrees): | 00.00 | Change: | 00.00 |  |
| HeadingRate (Deg/s): | 00.00 | Change: | 00.00 | Averaging... |
| Coupling Ratio: | 0.0000000 | | | |

 Turn the vehicle in a 360 Degree circle and stop in exactly the same place

11.2 Zero Tilt

Why is this important?

When a tractor tilts the GPS antenna is moved off line (because it is mounted several metres above the ground). The tilt sensor provides a tilt angle which is used to correct for this movement off line.

If the tilt angle is not correctly zeroed, then AgGuide V4 thinks the vehicle is always at an angle, and therefore the receiver is always a little bit off line – so it puts in an offset to compensate, even if no offset is warranted.

If not zeroed, then consistent wide/narrow rows will result because the on-Screen Cross Track Error (SXTE) reads zero but the on-the-Ground Cross Track Error (GXTE) is not zero.

Step 1: Move the vehicle to a *perfectly flat place* (e.g. a concrete shed floor) and stop,



Tilt Setup Utility: **Vehicle** **Implement**

| | | | | |
|-------------|----------------------------|-------|------|-------|
| XTrack (cm) | Tilt Angle (Degrees): | 00.00 | Raw: | 00.00 |
| -473 | N/A | N/A | N/A | N/A |
| | Zero Tilt Angle (Degrees): | 00.00 | | |



12 SETTING UP THE WHEEL ANGLE SENSOR

Why is this important?

AgGuide V4 needs to accurately know when the wheels are straight ahead (Centre Wheels) so it can keep the vehicle accurately on line.

AgGuide V4 also needs to know the approximate number of measurement counts which correspond to 20° left and 20° right turns- this is so it knows how far to turn the wheels when making steering corrections.

Step 1: Use an assistant to make the sensor adjustments (or monitor the screen) for the following steps if possible.



ALWAYS ENSURE THAT PERSONEL ARE CLEAR OF THE WHEELS WHEN THE TRACTOR IS OPERATING AS CRUSHING INJURY HAZARD MAY EXIST!

Step 2: Turn the steering wheel both to the left and right- look at the 'Angle: Counts' value- it should go *negative* when the wheel is turned to the *left*,

Angle: Deg -90.0 Counts -5709

positive when the wheel is turned to the *right*

Angle: Deg 19.7 Counts 5632

and be close to zero when the wheels are straight ahead. Angle: Deg 0.0 Counts 0

If the value for *left is positive* and *right is negative* - go to step 3- If the values for left and right are correct - go to step 4.

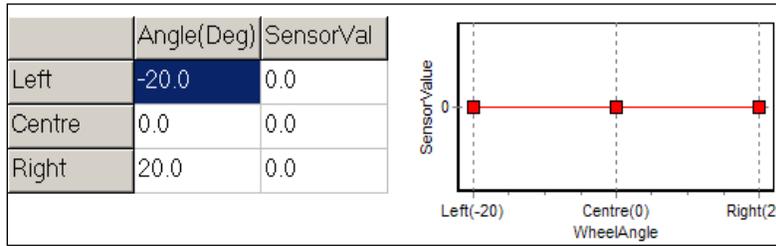
Step 3: Loosen the grub screw on the Wheel Angle Sensor and rotate the sensor 180° (half turn), re-tighten the grub screw and repeat step 2.

Step 4: Drive the tractor straight ahead for a short distance- aim at a stationary object to assist (pole/tree etc.) - stop the tractor when satisfied that *the wheels are pointing exactly straight ahead*. (then don't touch the steering wheel until instructed)

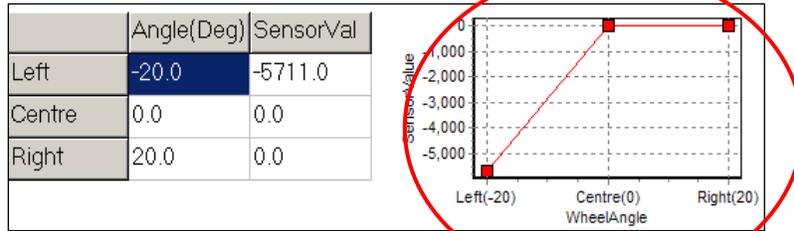
Step 5: Centre Angle. Look at the 'Angle: Counts' value- it need to be as close to zero as possible- loosen the grub screw on the Wheel Angle Sensor and rotate the sensor until the 'Angle: Counts' value is as close to zero as you can get it- less than 250 if possible (on some tractors you may be unable to get it quite this close), re-tighten the grub screw.



Step 6: Press ; take note of the 'Angle: Counts' value. Turn the steering wheel to the left and to the right- ensure that the value still goes *negative* when the wheel is turned to the *left* and *positive* when the wheel is turned to the *right*. (if not- repeat from step# 3) Return the steering wheel to the straight ahead position until the counts equal the 'Centre Angle' value.

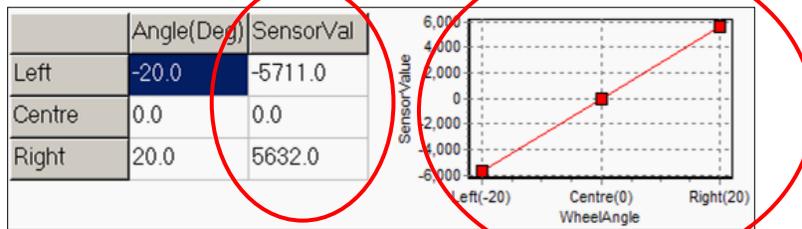


Step 7: *Left Angle*. Turn the steering wheel one full turn (360°) to the left and press , return the wheel to the straight ahead position until the counts equal the 'Centre Angle' value.

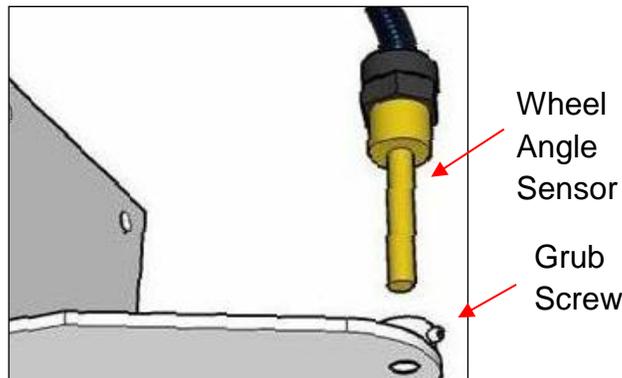


Step 8: *Right Angle*. Turn the steering wheel one full turn (360°) to the right and press 

Step 9: Check that the table and graph are similar to the ones below- the left and right 'SensorVal' counts in the table should be approximately 5000 to 7000 negative and positive; the left and right values normally won't be identical.



Step 10: Re-check that the grub screw is fully tightened. (Also re-check during each tractor service)



13 SETTING UP THE HYDRAULICS



Step 1: To begin setting up the hydraulic control, press

13.1.1 Minimum Voltage

Why is this important?

The Minimum Voltage sets the minimum turn rate of the wheels- it is necessary for it to be slow, but fast enough to allow AgGuide V4 to make minor adjustments to the wheel angle.

If the 1% (minimum) turn rate is too low- when the vehicle is a few centimetres off line AgGuide V4 won't be able to turn the wheels fast enough to bring it back to line.

If the 1% (minimum) turn rate is too high- then the wheels will jerk back and forth across the line rather than providing a smooth ride.

Changes in terrain (deep furrows), a heavy implement dragging the vehicle around, jumping hydraulics, hot oil, are all factors when trying to select the best minimum voltage- try to set it so that the wheels are just turning- and then a little bit.

Step 2: to 'Minimum Voltage', press , set the minimum voltage to 3.0V, press

Step 3: Press - to return to the Hydraulic Test page

Step 4: Press once- the 'Test turn rate:' should now be 1% %

Step 5: Press - did the wheels turn to the left by approximately 50-75mm (2-3inches)?

Step 6: If insufficient movement was detected- press to 'Minimum Voltage', press , and increase the minimum voltage value by '0.5', press

Step 7: Press ; press - if no movement- repeat step 6 until the front wheels make a very slow turn to the left of approximately 50-75mm.

Step 8: Apply the same procedure to the right hand side: Press . Did the wheels turn to the right?

Step 9: If insufficient movement was detected- press , ,  to 'Minimum Voltage', press , , and increase the minimum voltage value by '0.5', press .

Step 10: Press ; press . Repeat step 9 until the front wheels make a very slow turn to the right of approximately 50-75mm.

13.1.2 Offset Voltage

Why is this important?

Some vehicles (particularly John Deere's) turn quicker to one side, so it may be necessary to compensate using the Offset Voltage.

The *Offset Voltage* is really only relevant to equalise the turn rate at the bottom end of the scale (1% to 20% turn rate). At the *Maximum Voltage* (100%) end of the scale it is not really important.

Note that if the turn rate is not equalised it may show up as a Cross Track Error (XTE). This is because the wheels turn rapidly away from the line, but struggle to turn back towards the line.

Step 11: Now that the front wheels turn left and right – do they turn at the same rate? e.g. does one turn faster than the other? If there is a noticeable difference- press ,  to 'Offset Voltage', press , . If there is no noticeable difference, proceed to step 15.

Step 12: If the steering is turning quicker to the right side- add a small negative value to decrease the speed of the right turn, press , .

Step 13: If the steering is turning quicker to the left side- add a small positive value to increase the speed of the right turn, press , .

Step 14: Keep testing and adjusting the 'Offset Voltage' as described in step 12 and 13 until the Left and Right turn rates are equal.

13.1.3 Maximum Voltage

Why is this important?

The Maximum Voltage sets the fastest turn rate that AgGuide V4 will allow- It needs to be fast enough to allow AgGuide V4 to hunt the line while starting off, but low enough to ensure the vehicle cannot turn too quickly while travelling at speed.

Maximum Voltage is less critical than Minimum Voltage- Set it to be the maximum turn rate at which you'd feel comfortable turning the wheel at driving speed (i.e. limit speed for safety reasons).

If the driver wants AgGuide V4 to hunt the line from some distance away then it may be necessary to have a higher maximum voltage so the system can turn the wheels vigorously to hunt the line

Step 15: Press  until the 'Test turn rate:' equals 100%

Step 16: Press  - did the wheels turn to the left by approximately 50 to 75% of full steering lock?

Step 17: Press  - did the wheels turn to the right by approximately 50 to 75% of full steering lock?

If too much or too little movement was detected- press , ,  or  to 'Maximum

Voltage', press ,  and either decrease (if too much turn) or increase (if too little turn) the

voltage, press ,  - continue testing until 50 to 75% of full steering lock is achieved.

13.1.4 Span

Why is this important?

The *Span* is the number of steering counts of difference between the current wheel angle and the demanded wheel angle AgGuide V4 is aiming for, until the Hydraulic Module applies *Maximum Voltage*.

i.e. if a small turn is required then the Module will apply the *Minimum Voltage*, if a turn larger than the *Span* is required then the *Maximum Voltage* is applied.

If you have a vehicle which has few angle sensor counts for a half-turn of the steering wheel, then you may need to reduce the span.

Conversely, if you have many angle sensor counts for a half-turn of the steering wheel, then you may need to increase the span.

Span is only relevant on vehicles with a wheel angle sensor – it is irrelevant on tracked vehicles.

Step 18: Press , ,  to 'Span', press , and either decrease (if too few angle sensor counts) or increase (if too many angle sensor counts) the value, press , . The default Span value is '1280'.

13.1.5 Manual Override

Why is this important?

The *Hydraulic Module* is constantly watching the wheel angle to ensure it matches the angle AgGuide V4 is demanding- If the angle does not match- then something else must be turning it (i.e. the driver has turned the steering wheel).

The *Manual Override* value is basically the number of steering counts of variation allowed before disengaging- its value should be set high enough to prevent false disengagements, but not so high as to require a vigorous turn of the steering wheel to disengage.

An **increased** value requires a **more vigorous** turn of the wheel to disengage.

Manual Override is generally only relevant on vehicles with a wheel angle sensor – some tracked vehicles will detect Manual Override, some will not.

Step 19: Press ,  to 'Manual Override Threshold'; press ; set the counts to '100'; press , , 

Step 20: Drive forwards at approximately 1 to 2 km/hr and press  to engage the AutoSteer. Ensure that the AutoSteer remains engaged. If the AutoSteer keeps disengaging in when there is no manual movement of the steering wheel- repeat step 19 and *decrease* the counts value by a small amount- continue adjusting until the AutoSteer doesn't disengage during AutoSteer.

Step 21: Move the steering wheel 1/8th of a turn by hand at a normal rate and ensure that the AutoSteer disengages.

Step 22: If the steering wheel movement doesn't disengage the AutoSteer- repeat step 19 and *increase* the counts value by a small amount- continue adjusting until the AutoSteer does disengage each time the steering wheel is turned.

Step 23: Repeat step 20 and ensure that the AutoSteer still disengages.

NOTE: If you are having occasional spurious disengagements, try increasing the Manual Override value.

NOTE: If you are unable to find a value that works successfully for both steps 20 and 21 then repeat step 19 to set the counts to '0' and contact Farmscan support for further help

 **WARNING:** When the 'Manual Override Threshold' value is set to '0' you will be unable to disengage the AutoSteer by manually turning the steering wheel- it MUST be disengaged with either the 'Auto' button on the screen or the 'Engage/Disengage' switch!

Step 24: Press 

13.1.6 Turn Threshold

(Also known as Dead Band)

Why is this important?

If the Wheel Angle Sensor is subject to electrical noise or interference the Wheel Angle Centre counts may vary rapidly even though the actual sensor counts aren't changing- to overcome this a small number of counts can be set to be ignored by AgGuide V4- this is called the 'Dead Band'.

Value should normally be set to '0'

Step 25: Press ,  to 'Turn Threshold (Dead Band)', press , and enter a small value, press ,  - test and fine-tune setting till satisfied,  until  is visible.

14 SETTING UP THE GAINS/INTEGRAL

Why are these important?

At its most basic level, AgGuide V4 is trying to balance two sliding scales.

If the vehicle is *offset from the line* (you have a Cross Track Error value), then it needs to turn the wheels *towards the line*. How vigorously it does this is controlled by the XTrack Gain (XTG).

If the vehicle is *heading towards the line* at an angle, then it needs to turn the wheels *away from the line*. How vigorously it does this is controlled by the XHeading Gain (XHG).

AgGuide's AutoSteer system balances these two actions.

At slow speeds the XTrack Gain is more important- At high speeds the XHeading Gain is more important.

Because of variations in driving conditions and because the Hydraulic setup should not change just because conditions change, we can achieve the same result by adjusting the XTG.

When we need more vigorous wheel movement (rough ground or heavy implement), then increasing the XTG forces AgGuide V4 to demand a larger wheel angle sooner, per cm of XTE.

Step 1: Mark out an A-B runline. (Refer to section 6.4.2 for how to do this).

14.1.1 XTrack

Step 2: Press ;  to 'XTrack Gain'; press ; set the value to '1.0'; press 

Step 3: Press  to 'XHeading Gain'; press ; set the value to '0.1'; press 

Step 4: Engage the system at slow speed, close to (or already on) the line and see how well it stays on the line. Increase or decrease the XTG as necessary (in small amounts of 0.2), but don't get too fussy yet as it will need to be fine tuned. **Note this XTG value.**

Step 5: Without any XHG, it will oscillate back and forward across the line if you increase the speed. This is because if the vehicle is left of the line it will turn the wheels to the right- even if we were only 1cm off line and hurtling back towards it at right angles- it would keep turning right.

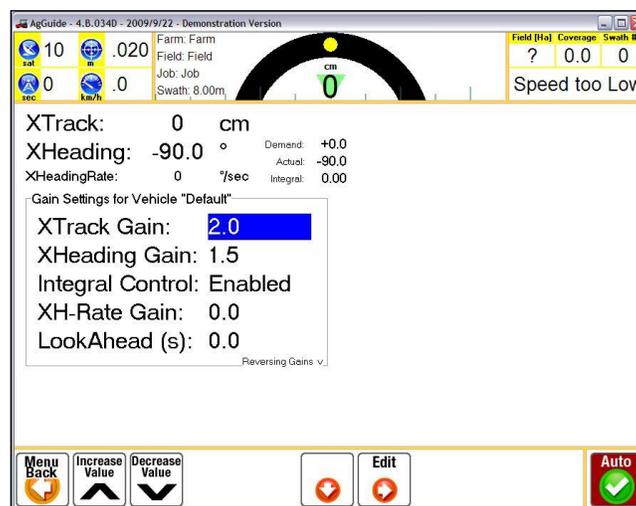
14.1.2 XHeading

Step 6: Reduce the XTG to a small value (eg. '0.1' or even '0'), and set the XHG to 1.0 as described in steps 2 and 3.

Step 7: Engage the system at slow speed and then ramp up the speed to that of normal operation (or just above).

Step 8: Because the XTG is low, AgGuide V4 doesn't care how far off line we are, but is only trying to keep the vehicle parallel to the line.

Step 9: Increase or decrease the XHG as necessary (in small amounts of 0.2) until it keeps the vehicle parallel to the line at speed without oscillating. **Note this XHG value.**



14.1.3 Combining and Fine Tuning

Step 10: Set the XTG and XHG to the values you found and noted in steps 4 and 9.

These will most likely be a little too high, but are the best initial guess. Engage the system at a moderate speed.

Step 11: If the vehicle is drifting off line altogether, try increasing the XTG and maybe the XHG.

Step 12: If the vehicle drifts off line for a time, comes back and crosses the line, and then drifts off to the other side to repeat the cycle (i.e. this is a “slow oscillation”), then you may need to increase the XTG and or XHG so it tries harder to stick with the line. You may also need to increase the minimum voltage in the Hydraulic setup section.

Step 13: If the vehicle goes left of the line, then right, then left, doing a “fast oscillation”, then it is likely that either the XHG is too low, or both the XTG and XHG are too high.

IMPORTANT

There is a “sweet spot” of gains, either side of which (too high or too low) the system can drift or oscillate.

When you find the stable “sweet spot” at one speed, you may need to adjust the ratio of XTG/XHG to find this stable spot at a different speed.

In theory, you should be able to find a value for XTG and XHG which is good at all or most speeds.

14.1.4 Offset Tuning

Step 14: Find a flat, straight location and mark an ‘A-B’ runline approximately 50 to 100 metres long; engage AutoSteer and drive for another 50 to 100 metres; turn around and re-engage AutoSteer- return down the same line.

Step 15: Stop the tractor at the approximate half way point of the line and check that the wheels are exactly on the original line.



Step 16: If the wheels are off to one side- press

Step 17: Measure the distance that the wheels are offset from the original centre line in cm- use the on-screen keypad to enter half the measured distance in cm. If the offset is to the left of centre enter a positive value and if the offset is to the right of centre add a negative value. i.e. If the tractor is offset 4cm to the left of the centre line enter a value of ‘2’



Step 17: Press ; repeat steps 14 – 17 until the tractor consistently tracks the centreline when returning on the same runline.

14.1.5 Integral

Step 18: There are several factors which can make the vehicle hang out to one side of the line. Some of the factors are due to incorrect set up of system elements previously discussed in this section, whilst other factors are purely operational. Ensure that none of the following factors are present before proceeding to subsequent steps:

1. Centre wheels value is not correct- because it was not set correctly, or because it has drifted, as can occur with the Case Sprayers and Accusteer double-articulated vehicles.
4. Hydraulics is quicker turning one way versus the other.
5. Tractor is operating on a slope and wants to slide down hill.
6. Implement is dragging the vehicle offline- either because the implement needs adjustment, or because there is an offset sub-surface soil compaction from old beds/wheel tracks.
7. Operating in an offset furrow.
8. Tilt sensor is not correctly zeroed.

Step 19:  to 'Integral Control'; press  to turn Integral on or  to turn Integral off.

NOTE: Only enable Integral after all the previous setups and tuning have been performed.

IMPORTANT

Integral works by adding up the XTE value over time (while engaged) and adjusting up (or down) the demanded wheel angle to compensate.

When the system is not engaged, it gradually reduces the integral value back to zero.

14.1.6 XHeadingRate-Gain (XH-Rate Gain)

With the Nav Module providing fast heading updates, AgGuide V4 watches the rate of turn and using this gain value can limit the turn rate. This will most likely only be relevant on tracked vehicles since they can turn rapidly- *It should be set to zero for all other vehicles.*

Step 20:  to 'XH-Rate Gain'; press , set a value and press 

14.1.7 LookAhead

LookAhead allows the vehicle to follow a curved Runline more accurately during high speed broad-acre operations by looking ahead of the vehicle by approximately 1 to 2 seconds. It should be set to 0 seconds for slow speed row- cropping operations.

 to 'LookAhead'; press , set a value of '1.5' seconds and press ,  - test and fine-tune setting till satisfied with the curve.

15 TROUBLESHOOTING & FAQ

Problem:

The on-screen XTrack reading is always off to one side

Possible Causes:

This can be caused by an incorrect centre wheels value, or an implement which is misaligned, or working on the side of a hill.

Potential Solutions:

1. Check the centre wheels value by using AutoSteer on the flat with the implement out of the ground. If there is still an XTrack error, re-calibrate the centre wheels (Refer to 'Setting up the Wheel Angle Sensor' in this manual).
9. If performing the re-calibration doesn't solve the problem perfectly, then use the small left/right centre wheels adjustments to get it spot-on.
10. If you get XTrack down to zero while driving along a row, but after turning around there is an XTrack error, then the phasing on the steering rams may be altering as the vehicle turns (this can occur on some self-propelled sprayers because there is no mechanical coupling between the front wheels).
11. In this instance, the best approach is to turn on "Integral" on the gain screen. This will progressively adjust the centre wheels while driving along a row – however you may still see some XTE at the start of each row before it corrects.
12. Integral is a "last resort" option to try and correct for other things, try and get all other settings as close as possible first.
13. If you're working on a hill and the vehicle and implement are being dragged downwards by gravity, then it may be necessary to turn on "Integral". You'll probably see an error when you turn around, but this will correct while driving along.

Problem:

I'm getting wide/narrow rows on-the-ground, but my on-screen XTrack reading is consistently close to zero

Possible Causes:

This is generally caused by the zero/average Tilt being incorrect, *or* the GPS antenna being misaligned, *or* the implement being dragged off to one side, either by sliding down a hill or because it is misaligned, *or* because it is up against the hill formed by the previous row.

In such cases, AgGuide V4 is faithfully keeping the GPS antenna on the runline, but the implement is causing the vehicle to crab sideways at a slight angle.

Potential Solutions:

To check what is causing the issue, perform the following tests:

Test 1

1. Drive the vehicle along a fresh row (i.e. skip over so you are not next to a previous row) *on flat ground, with the implement out of the ground*. As you drive, ensure that the XTrackError remains around zero – if it doesn't then you need to re-calibrate your centre wheels values etc. as listed above.
2. Return along another fresh row, two rows over (i.e. skip a row)
3. Measure the row spacing – it should be double your swath width.

If Correct:

If the row spacing is correct then this confirms that the tractor is set up correctly. Go onto Test# 2

If Incorrect:

If the row spacing is incorrect then check that either:

The zero tilt angle may need to be set again. Follow the procedure listed above to re-set the zero angle for the tilt sensor. Also remember to calibrate the tilt-coupling.

The GPS antenna must be aligned perfectly in the centre of the vehicle. On some vehicles there is a slight offset between the bonnet and the chassis, so the centre of the bonnet may not always be the centre of the vehicle.

You can correct for this offset by entering an 'X' value into the "GPS Offset" part of the vehicle settings as listed above.

Test 2

1. Undertake the same test on a *flat fresh row*, but this time *with the implement in the ground*.
2. Return along another fresh row – two rows over.
3. Measure the row spacing – it should be double your swath width.

If Correct:

If the row spacing is correct then this confirms that the implement seems to be set up correctly – although note that implements and vehicles can drive differently depending on loading (seed, water etc.) and also soil conditions. Go onto Test# 3

If Incorrect:

If the row spacing is not correct then this confirms that the implement requires adjustment.

Even if an implement looks or measures evenly, there can still be subtle differences in angle, mismatched hitch arms, a misaligned drawbar (or missing sway blocks), or one side is digging deeper into the soil than the other.

Test 3

Now undertake the same test on *the next row over, with the implement in the ground*. Measure the row spacing – it should be the swath width.

If Correct:

If the row spacing is correct then this confirms that the implement and vehicle do not seem to be being affected by the hill from the previous row. Go onto Test# 4

If Incorrect:

The hill from the previous row must be influencing the vehicle and implement.

Check that the wheels of the vehicle, and the wheels and tines of the implement are not being pushed across by the previous row's hill.

If this cannot be resolved, it may be necessary to do "skip row" – where the next row is two swaths over, and then return and "fill in" the in-between row.

Test 4

Now repeat test 3 in hilly conditions, *with the implement in the ground*.

Measure the row spacing – it should be the swath width.

If Correct:

If the row spacing is correct then you should be right to go.

If Incorrect:

The implement must be dragging itself and the rear of the vehicle down hill.

Moving the GPS antenna from the bonnet to the cab roof may help a little, as AgGuide V4 will keep the GPS antenna on line – and if the antenna is closer to the implement then it should be closer to line as well. This won't get it perfect though.

Entering a "Runline Offset" up-the-hill may help to move the vehicle over, and hence place the implement in its correct place.

16 FARMS, FIELDS, BOUNDARIES, RUNLINES, JOBS, MARKED POINTS

16.1 General

AgGuide structures data in the following manner: Farm > Field > Actions within field. The actions within a field are Jobs, runlines and marked points. This structure is used because the Farm is the most permanent feature of work performed, fields are a semi - permanent feature of the farm, delineated by boundaries, and runlines, marked points and Jobs occur within fields and will change most frequently. This allows runlines and marked points to be easily retained across different Jobs.

Due to this structure an operator must create a Farm and a Field within that farm before a Job can be initiated. This is covered in subsequent sections.

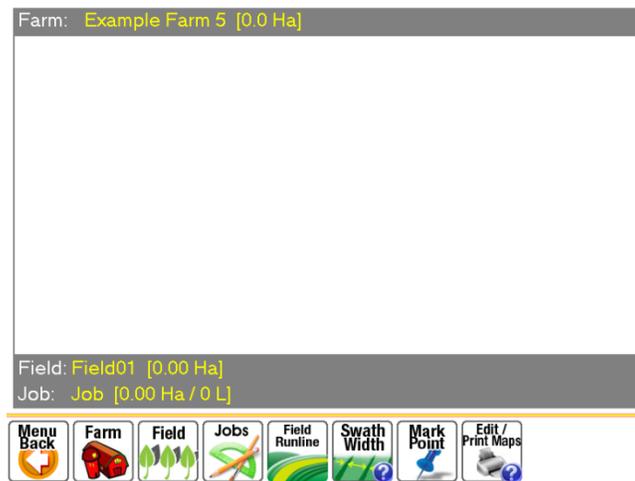
From the Main screen of AgGuide, to navigate to the Farm, Field and Job section of AgGuide, press



then



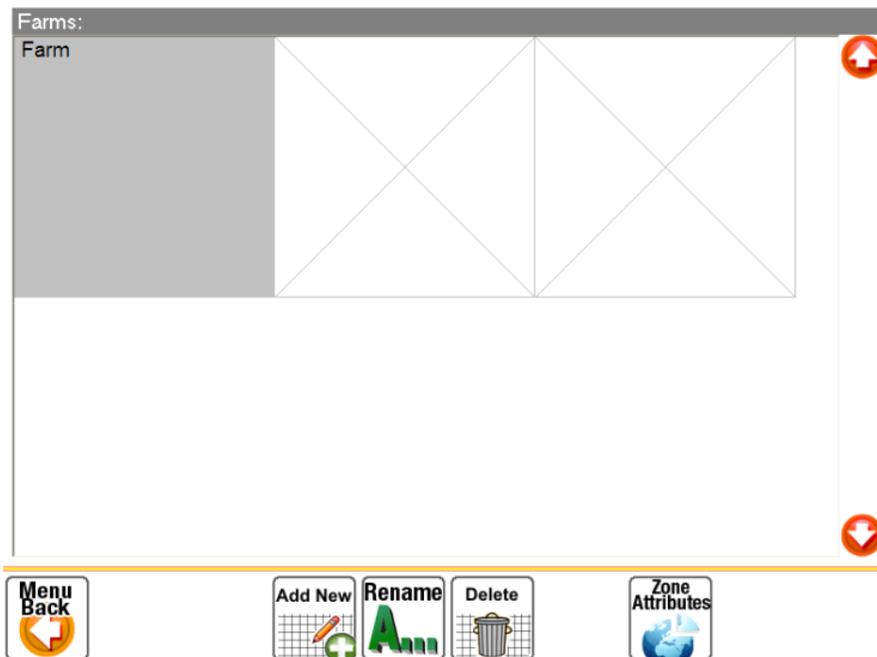
and the screen will display as shown:



This menu is the starting point for creating all spatial data: Farms; Fields; Jobs; Runlines; Mark Points and prepare maps for printing. Therefore it will also be the starting point for most descriptions in this section.

16.2 Creating or Editing a Farm

To create a Farm press the Farm icon in the map menu described previously. If no farms have been previously created the screen should display as shown below:



The menu options are

- Add New,
- Rename;
- Delete;
- Zone Attributes.

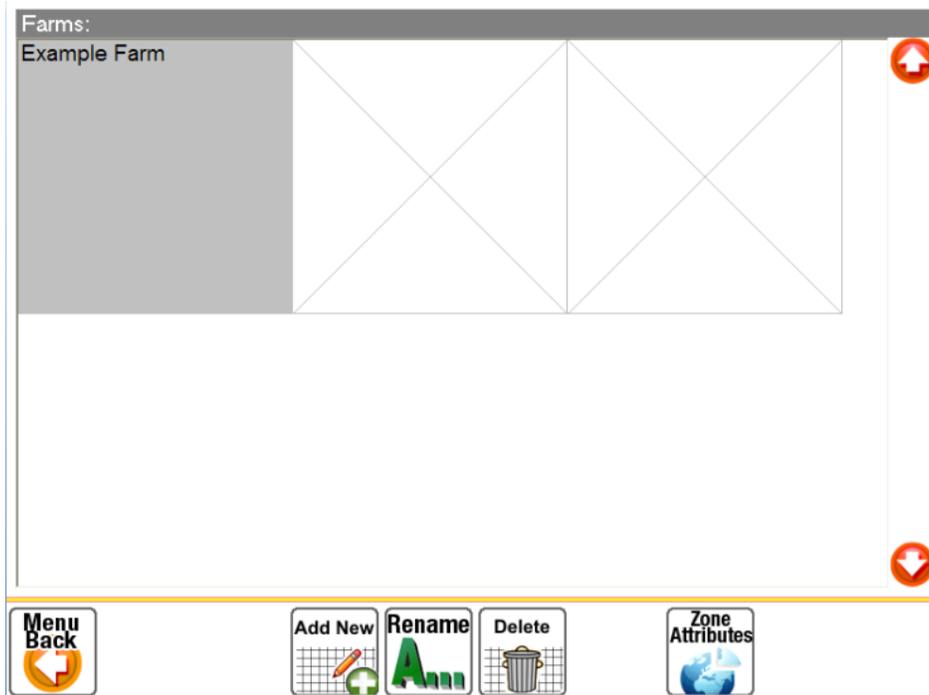
Add New creates a new farm, which the operator can then define fields within.

Delete removes the farm and all associated fields, job and runline information.

Zone Attributes allows the user to manually enter the WGS84 Zone (1 – 60) in which the farm is located. If a value of 0 is entered AgGuide will automatically detect the correct Zone. AgGuide can define the zone by the following:

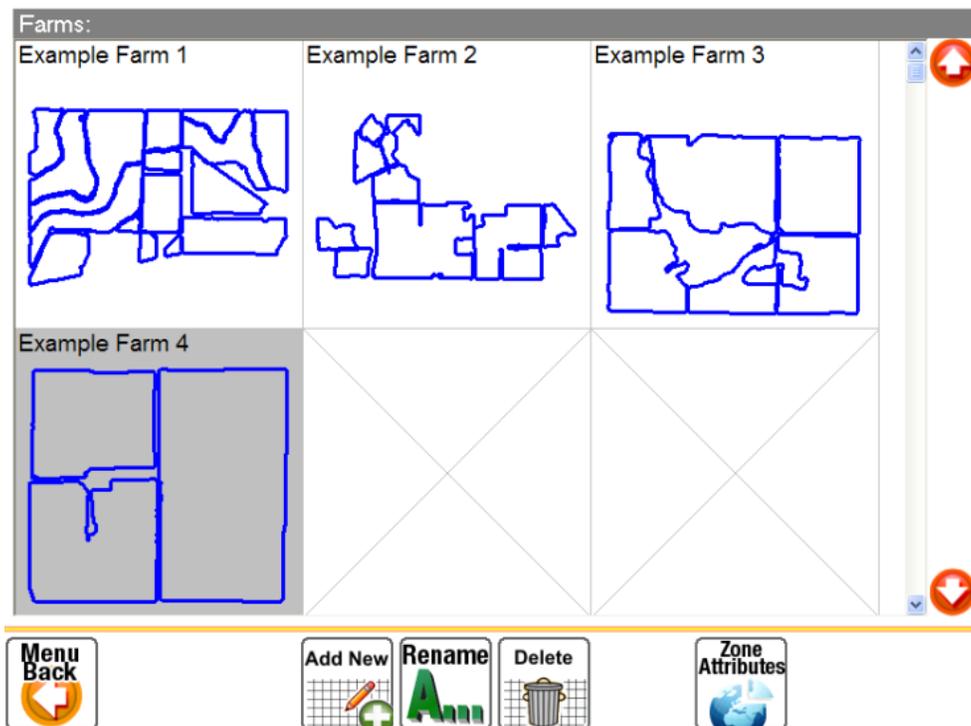
1. Importing a shape file to define a field, discussed in section 6.3.1
2. Automatically determining zone from GPS information. This will work for any user not close to or overlapping the boundary of a zone.
3. If you are unsure of your UTM zone, refer to Appendix D or resources on the internet.

The AgGuide program automatically creates a Farm called “Farm” if there are no existing Farms. Press on the Add New icon and enter the name of the farm that you are intending to create fields within and press Accept. For this example the name “Example Farm 1” was entered and the original “Farm” was deleted. The screen will display as shown below.



The selected Farm has a grey background whilst other Farms have a white background. Since there are no fields currently defined within “Example Farm 1” it remains a blank grey area. Creation of Fields is described in the next section.

When a farm has fields defined within it, the boundaries of the fields are shown, allowing the user to easily recognise the farm as shown below.



16.3 Creating or Editing a Field



To enter the field creation and editing area from the main screen select , , . The field menu, shown below, has the following options:

- Import Files,
- Add New,
- Rename;
- Delete;
- Edit / Print Maps.

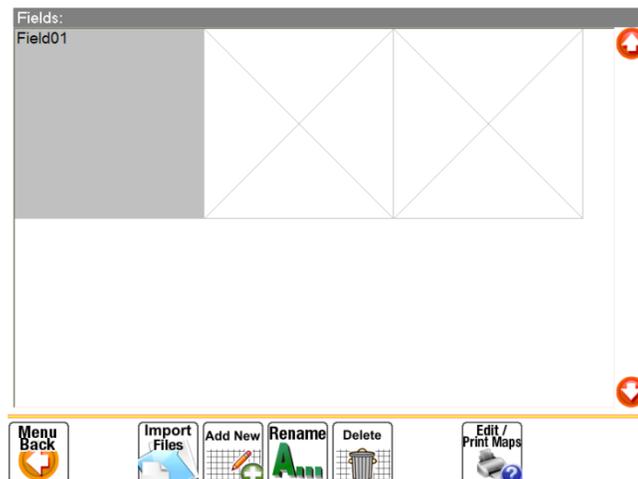
Import Files allows a shape file to be used to define a field boundary and is described in section 6.3.1.

Add New creates a new field, which the operator should then define a boundary on.

Delete removes the field and all associated job and runline information.

Edit / Print Maps allows the user to prepare job information for printing, described in section 6.7.

Continuing from the previous example, in which no fields have yet been created, the screen should display as follows:



AgGuide will create a default field if none exist, named “Field01”. This can be renamed or deleted once other fields are created.

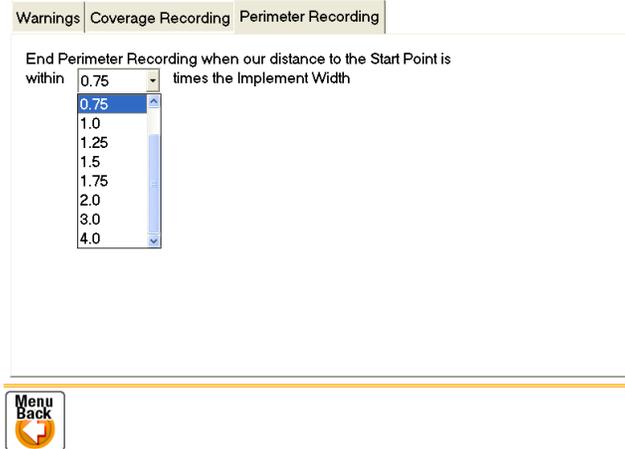
16.3.1 Importing Fields From Shape Files

If the operator has a shape file of the Field boundary this can be imported using the Import Files icon. A standard windows dialog box will open, allowing the selection of the relevant shape file for importing.

16.3.2 Creating Field By Driving the Boundary

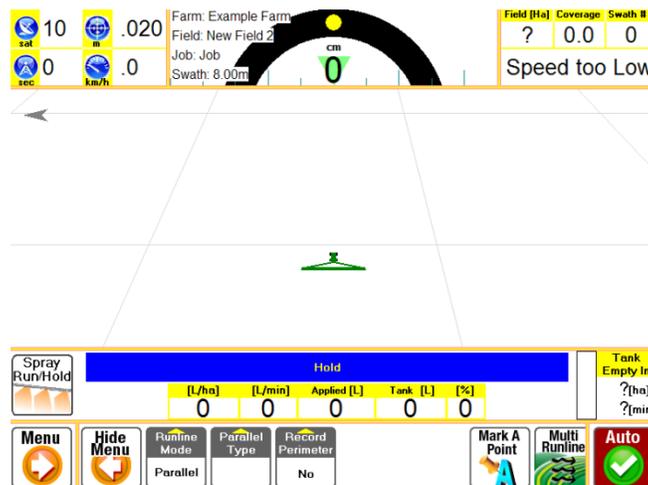
Creating the field boundary can be done when jobs, such as spraying the headlands, are done and therefore do not require any extra time to set up.

AgGuide will automatically close a boundary when the vehicle returns to within a defined radius of the starting point. This radius is defined relative to the implement width and is set in    and pressing on the Perimeter Record tab. The radius can then be set by choosing from the available options in the drop down menu as shown below:



It is recommended that several implement widths are used if the vehicle will be manoeuvring to avoid. Following on from the previous example, Field01 was renamed to a recognisable name that is commonly used by farm personnel employed on “Example Farm 1”, in this case “Middle Paddock”.

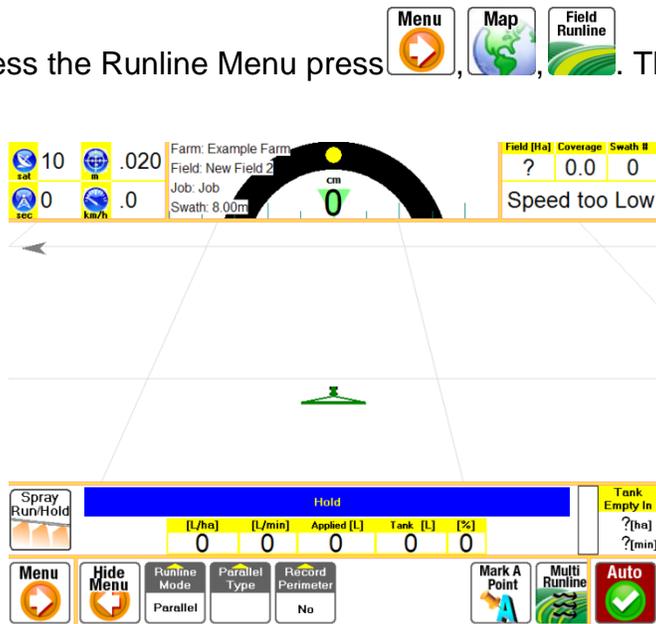
Press on the  icon. You will be returned to the Main screen with the Runline menu displayed as shown below:



Press the Runline Mode Icon. This will produce icons to select either Parallel or Racetrack mode as shown to the left.

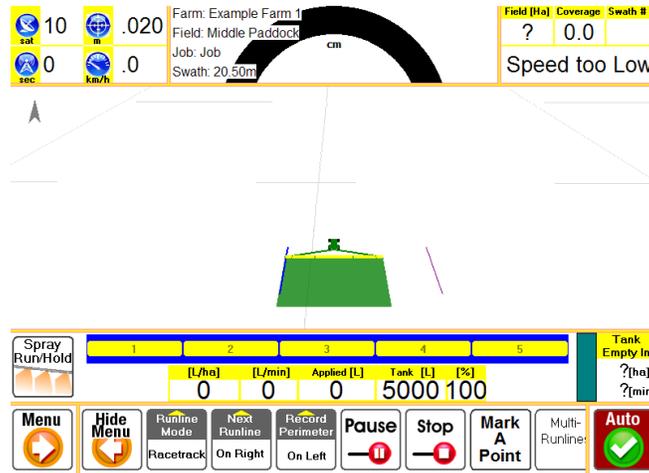
16.3.2.1 Creating a Boundary in Racetrack Mode

From the Main Screen access the Runline Menu press , , . The screen will display as shown below:



1. To record a boundary we need to be in Racetrack mode, accomplished by pressing  and .
2. Define which side the next Runline will be on using , and either  or . If no Runline is required, due to a single “headlands” lap select .
 - a. If a Runline has been defined the boundary is therefore on the opposite side to the next Runline, as indicated by the icon. The perimeter record option must be enabled by pressing  and .
 - b. If no Runline was selected, the side of the vehicle which the boundary is on must be set using  and  or .

In the following example the choices were  and . To initiate Racetrack Runline and Boundary recording the  icon was pressed. This was done when spray was operating and therefore coverage is also displayed. The boundary will begin to be recorded, displaying a blue line. The next racetrack Runline is also recorded, displayed as a purple line as shown below:



The operator should then drive a complete lap of the whole field, taking note of the following when finishing the lap.

Closing the Boundary

When AgGuide closes a boundary it does so by drawing a straight line between the current boundary point and the first boundary point. Therefore it is best to start midway down a straight section of fence or at a corner of two straight sections of fence.

The boundary can be closed by three methods:

- Automatic Closure;
- Stopping the Racetrack Recording;
- Turning Perimeter Record off.

Automatic Closure is when AgGuide recognises a complete lap has been finished. Adjusting automatic closure settings is described in section 6.3.2. This is the recommended option, since it requires minimal operator intervention, and in general the completion of the first lap will require the user to be performing other tasks at the time.

Stopping Racetrack recording is stopped by pressing the  icon. This should be used if the racetrack is only used for headlands and you do not want to use it for further guidance.

Turning Perimeter Record off is achieved by pressing  and . This is best used if the vehicle will not return sufficiently close to the start point to trigger the Automatic Boundary Closure and racetrack is desired to be continued for guidance purposes.

When approaching the end of the 'first lap' the display should look somewhat like this:



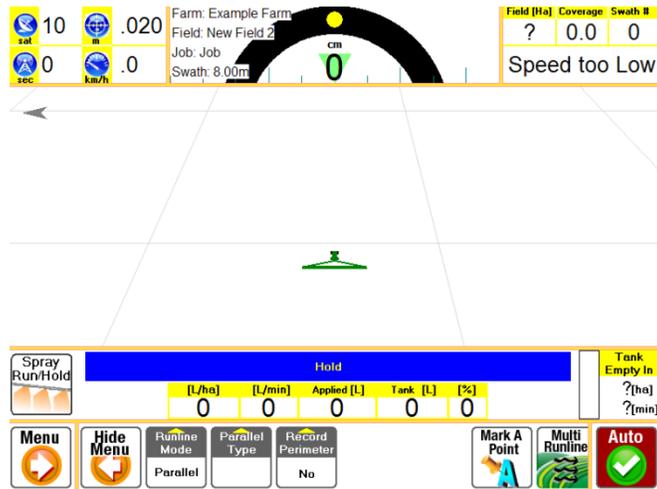
In this case all boundary completion methods will have the same result, shown below:



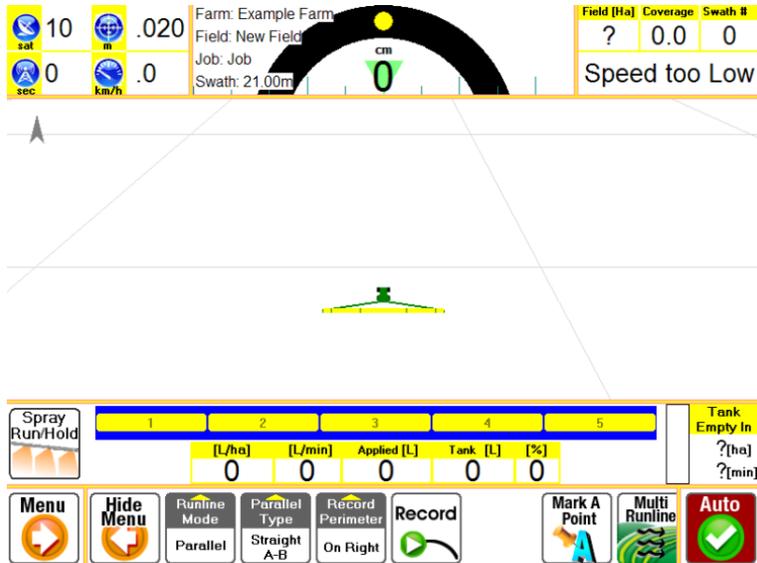
The operator can then complete the coverage for the first lap and, if appropriate, steer toward the Racetrack Runline and engage autosteer.

16.3.2.2 Creating a Boundary in Parallel A-B Mode

From the Main Screen access the Runline Menu press , , . The screen will display as shown below:



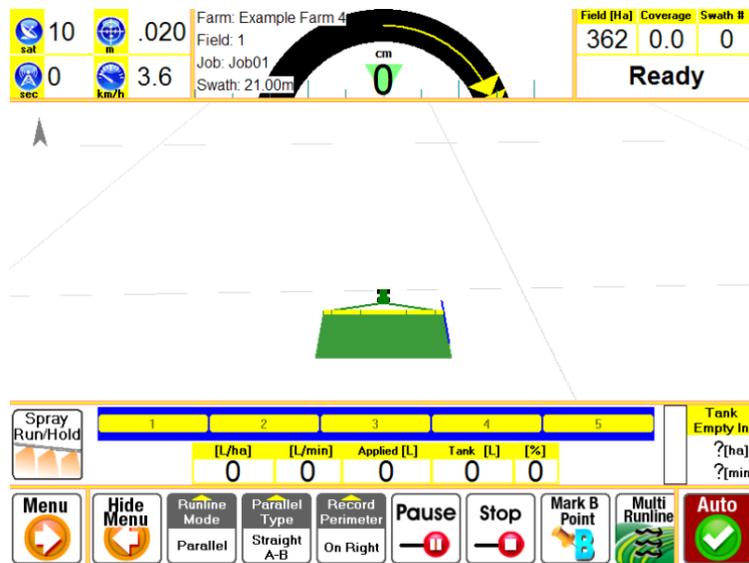
1. To select parallel mode, press  and .
 2. Select either  or . Refer to section 6.4.2 for more detail. This example uses A-B runlines.
- NOTE:** Do not use parallel Contour mode to record boundaries.
3. Turn boundary, or perimeter recording on by pressing  and selecting which the perimeter is on using  or .
 4. Manoeuvre the vehicle such that the GPS antenna is in line with the field boundary, the position is suitable for the A point of the first Runline you want to mark in the Field, and the vehicle is facing the direction of the Runline. The screen will display as shown below:



5. To start the boundary recording press .

6. To mark the A point press .

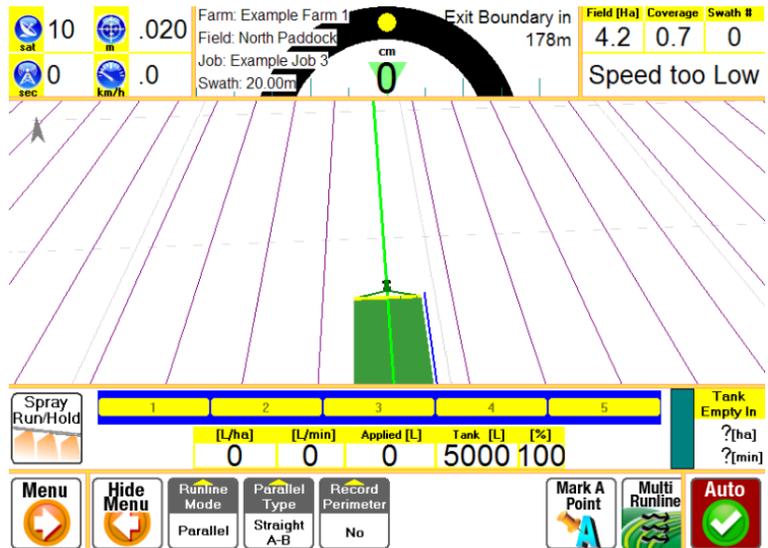
7. Start driving the field boundary toward the desired end point (B point). The screen should display similar to that shown below:



8. Ensure that the boundary is being recorded, shown as a blue line on one edge of the implement.



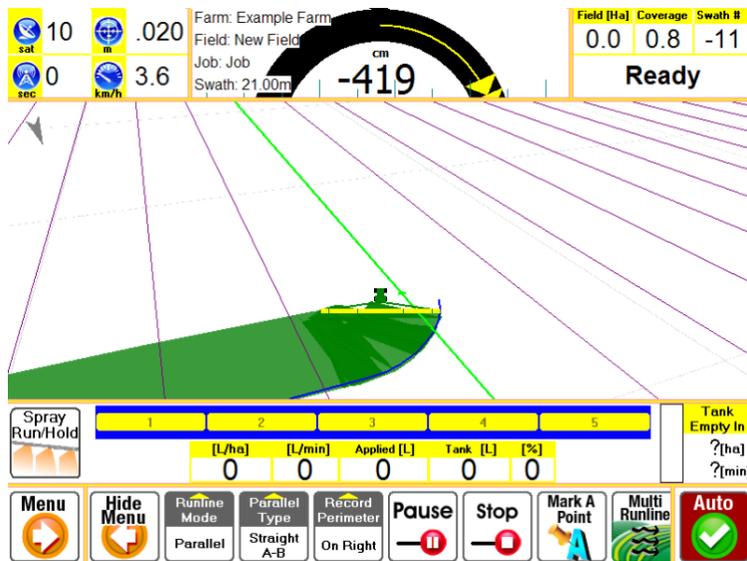
9. When the end of the runline is approaching mark the end point (B) by pressing . The runline is now defined and should display as shown below:



10. Turn the corner and drive the boundary section that crosses the runlines.

11. Approach the final Runline of the field and turn onto the Runline and engage Autosteer by

pressing . The screen should display as shown below when turning onto the Runline. Note that the Blue boundary line is still being recorded.



12. Drive the parallel Runline and disengage autosteer by pressing to drive the remaining section of the boundary.

13. When the boundary lap is almost complete the screen should display similar to as shown below:



14. The final step is closing the boundary. When AgGuide closes a boundary it does so by drawing a straight line between the current boundary point and the first boundary point. Therefore it is best to start midway down a straight section of fence or at a corner of two straight sections of fence.

The boundary can be closed by three methods:

- Automatic Closure;
- Stopping the Racetrack Recording;
- Turning Perimeter Record off.

Automatic Closure is when AgGuide recognises a complete lap has been finished. Adjusting automatic closure settings is described in section 6.3.2. This is the recommended option, since it requires minimal operator intervention, and in general the completion of the first lap will require the user to be performing other tasks at the time. Make sure the Automatic closure radius is larger than the distance required to manoeuvre the vehicle when approaching the closure point.

Stopping Racetrack recording is stopped by pressing the  icon. This should be used if the racetrack is only used for headlands and you do not want to use it for further guidance.

Turning Perimeter Record off is achieved by pressing  and . This is best used if the vehicle will not return sufficiently close to the start point to trigger the Automatic Boundary Closure and racetrack is desired to be continued for guidance purposes.

17 CREATING A RUNLINE

AgGuide has two types of runlines: Racetrack and Parallel. Racetrack or “round and round” allows the operator to drive in one continuous path, starting from the outside of the field, spiralling in toward the centre of the paddock. This mode can also be used for work on headlands. Parallel operation allows straight (either A-B or A + Heading) or contour paths to be used repeatedly over the whole field until the entire field has been worked.

- Runline Types and Uses
- Racetrack
- Parallel
- A-B
- A+Heading
- Contour



All Runline types are accessed, from the main screen, by pressing   . This will return you to the main screen with the following Runline menu displayed as shown below:

| | | | | | | | |
|-----|----|------|------|-----------------------|---------------|----------|---------|
| sat | 10 | m | .020 | Farm: Example Farm 1 | Field [Ha] | Coverage | Swath # |
| sec | 0 | km/h | .0 | Field: Middle Paddock | ? | 0.0 | |
| | | | | Job: Job | Speed too Low | | |
| | | | | Swath: 20.50m | cm | | |

| | | | | | | |
|----------------|--------|---------|-------------|----------|-----|---------------|
| Spray Run/Hold | Hold | | | | | Tank Empty In |
| | [L/ha] | [L/min] | Applied [L] | Tank [L] | [%] | ?[ha] |
| | 0 | 0 | 0 | 5000 | 100 | ?[min] |

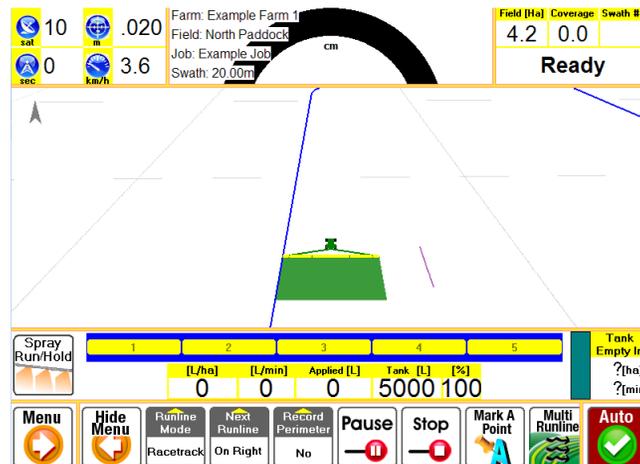
| | | | | | | | | |
|------|-----------|--------------|--------------|------------------|--------|--------------|---------------|------|
| Menu | Hide Menu | Runline Mode | Next Runline | Record Perimeter | Record | Mark A Point | Multi-Runline | Auto |
| | | Racetrack | On Right | On Left | | | | |

17.1.1 Racetrack Mode

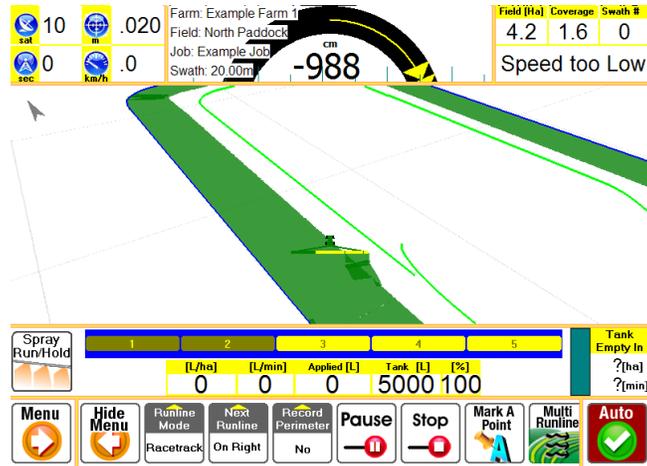
To enable Racetrack mode press  and then . Select which side of the vehicle the Next Runline should be placed using  and  , or for no Runline if, for example, only one lap of the headlands is required. To record a boundary in Racetrack mode press  and , as described in the previous section **Creating a Boundary in Racetrack Mode**.

In this example the choices were Racetrack Mode, Next Runline: On Right, Record Perimeter: No. The field being worked is called “North Paddock” has already been defined.

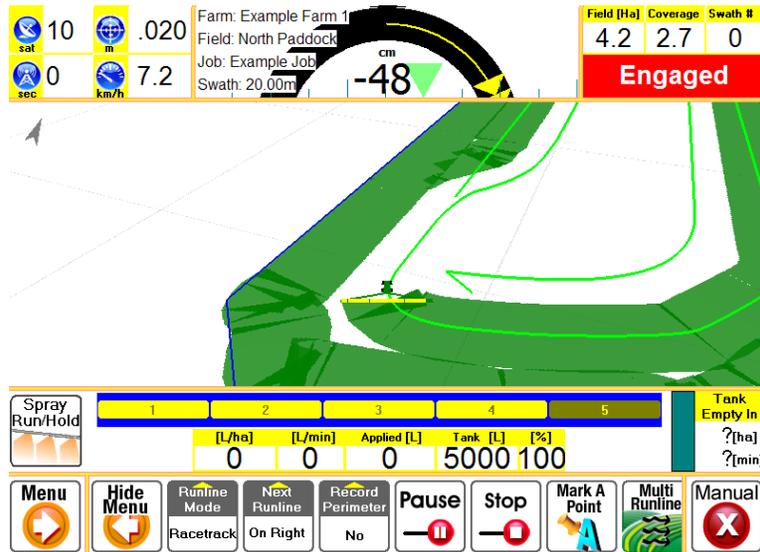
To initiate recording the racetrack Runline press  and start driving. The next racetrack Runline will be shown as purple as shown below:



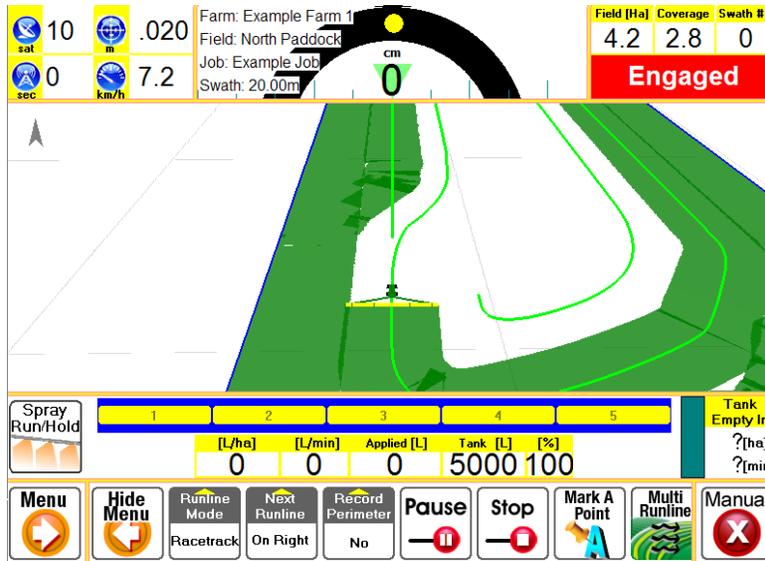
When the lap is finished the Next Runline will turn from purple to green and the operator should smoothly approach the Racetrack Runline and engage Autosteer by pressing the  icon. This is shown below.



When turning tight corners the inside tip of the boom will often travel backwards due to the tight turn. The operator will notice in this scenario that the Next Runline develops a kink as shown below:



AgGuide applies smoothing and minimum turn radius calculations such that inappropriate turns are not created in the Next Runline. The operator should observe that when a corner has been completed the Next Runline has been appropriately smoothed, as shown below:



17.1.1.1 Stop Function

The Stop Racetrack Record function, ceases generating a new racetrack Runline as soon as  is pressed. This is useful when approaching the end of a racetrack. Press  when completing the second last lap, or if there is no logical Runline left within the Field being worked. Autosteer functionality will still operate after  is pressed until the end of the recorded Racetrack is reached. A situation where the Stop function should be used is shown below:

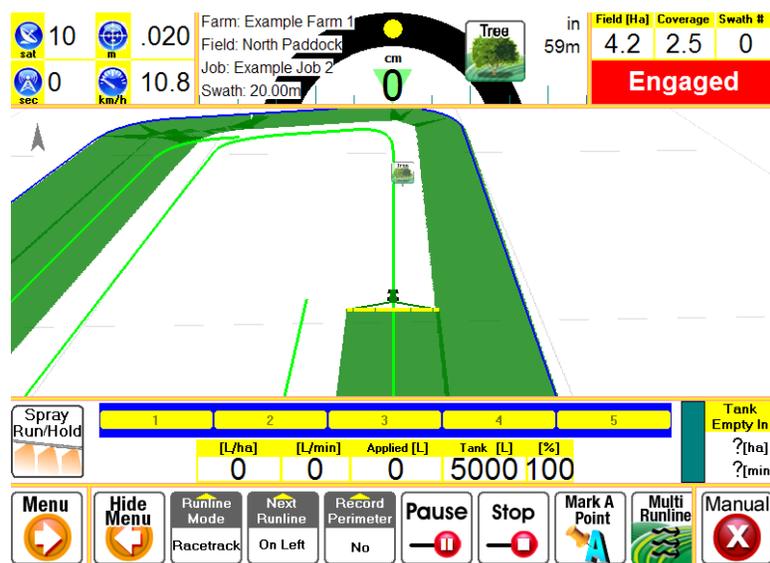


17.1.1.2 Pause Function

NOTE: This function is intended for advanced users only. Operators must remain focused on engaging and disengaging the pause function at appropriate times if the runlines of subsequent laps are not to be distorted.

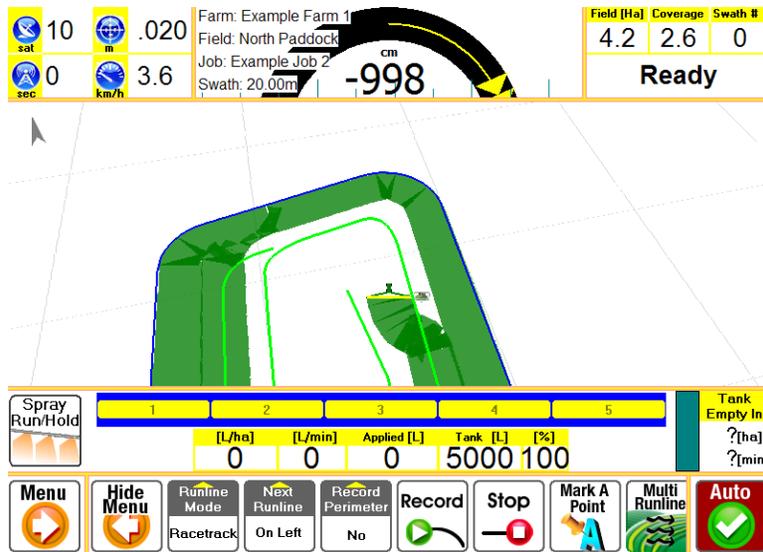
The pause function temporarily stops recording racetrack and boundary points. This is designed for two specific scenarios: Minimising the accumulation of driver error when driving straight sections of a racetrack; or driving around an obstacle which you do not want to modify the Runline of subsequent Racetrack laps.

In the case of driving around an obstacle, a tree has been marked (Mark Points are discussed in subsequent sections) in the “North Paddock” used in the previous example. The operator encounters this obstacle on the second lap of the racetrack as shown below:

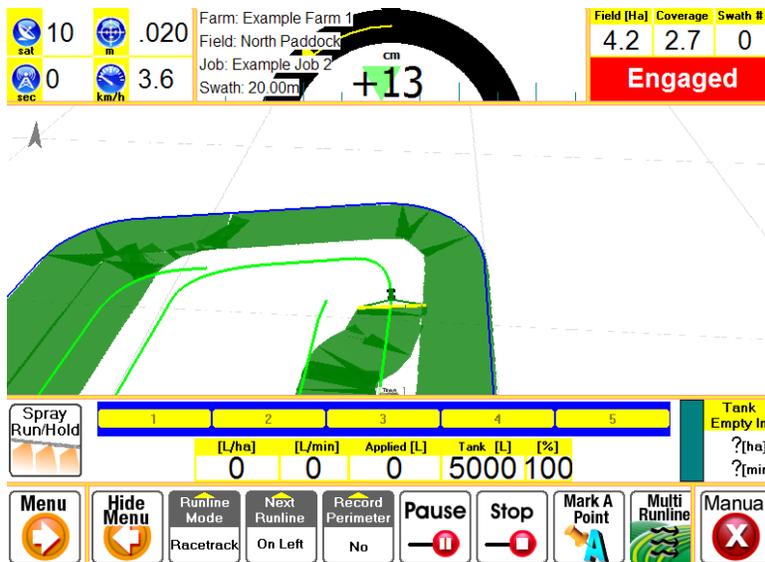


When appropriate to start turning to avoid the object the operator presses , disengages

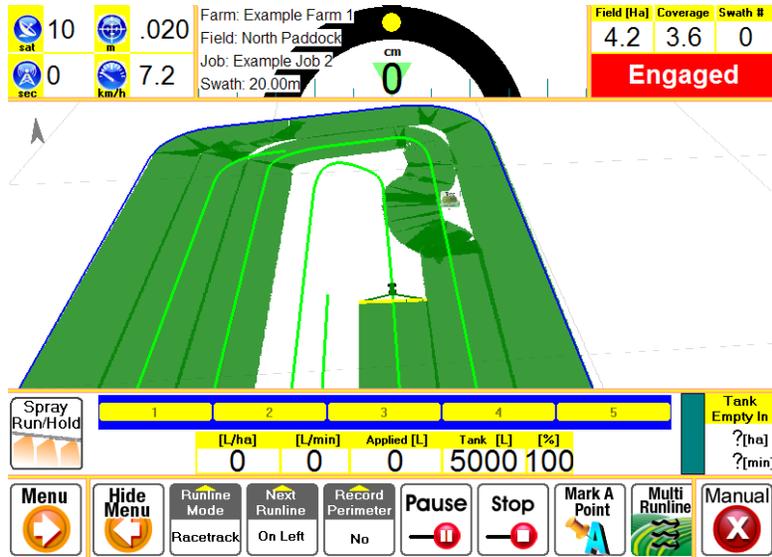
Autosteer by pressing  and drives around the object as shown below:



As no points are recorded until  is pressed a straight line is drawn from the last recorded point to the current.



The operator then approaches the Runline and presses  and engages Autosteer . When the operator approaches the same region on the subsequent lap the runline remains straight (as shown below), and, if spraying, the Autoboam function will control the sections appropriately.



17.1.2 Parallel Runlines

There are three types of parallel runlines:

A – B, where the operator marks the Runline start (A) and end (B) points.

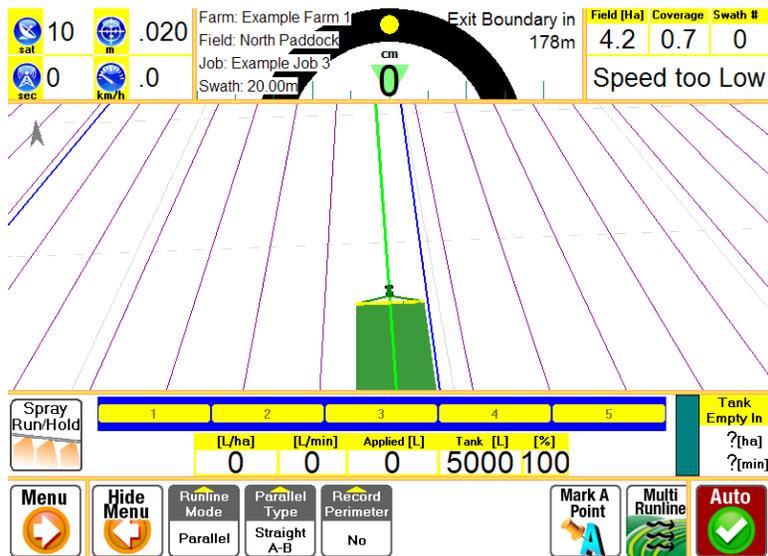
A + Heading, where the operator marks the Runline start point (A) and the heading from that point.

Contour, where the user drives a curved path that is then repeated, separated by a swath width.

These types are described in the following sections.

17.1.2.1 Parallel A-B

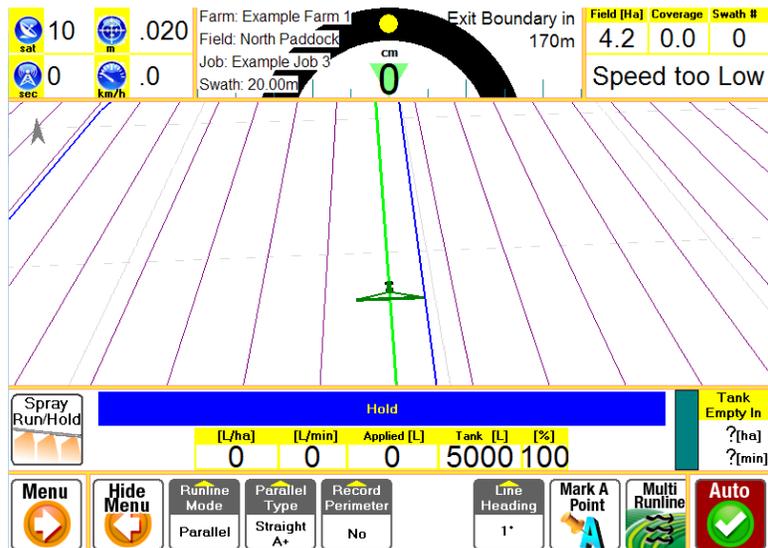
After accessing the Runline Menu by pressing   , select parallel mode by pressing  and . Select A-B by pressing  and . Manoeuvre the vehicle to the desired A point and press . Drive a suitable long distance, ideally the entire the length of the field and press . This will generate a series of runlines, separated by the implement swath width, as shown below. Engage the Autosteer function as appropriate.



17.1.2.2 Parallel A + Heading

Parallel A+ heading function is used when the orientation of the desired parallel Runline is already known, due to surveying or information from prior Runlines. Access the Runline Menu by pressing

  . Manoeuvre the vehicle to the desired A point and press select parallel mode by pressing  and . Select A+ Heading by pressing  and . The runlines are created using the default heading of true north. To edit the heading press  and select either  to use the current GPS heading information, or  to manually enter the heading in degrees. Valid headings are between -180 and 360 degrees. The display should be as follows:

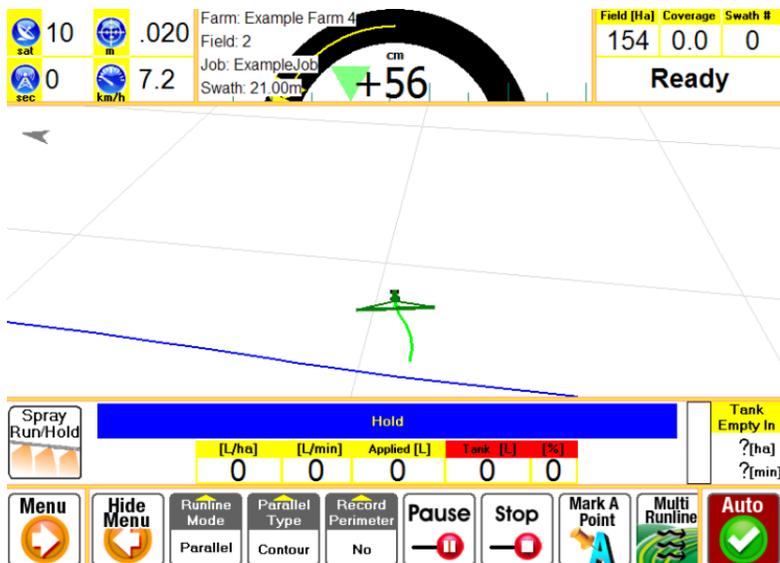


17.1.2.3 Parallel Contour

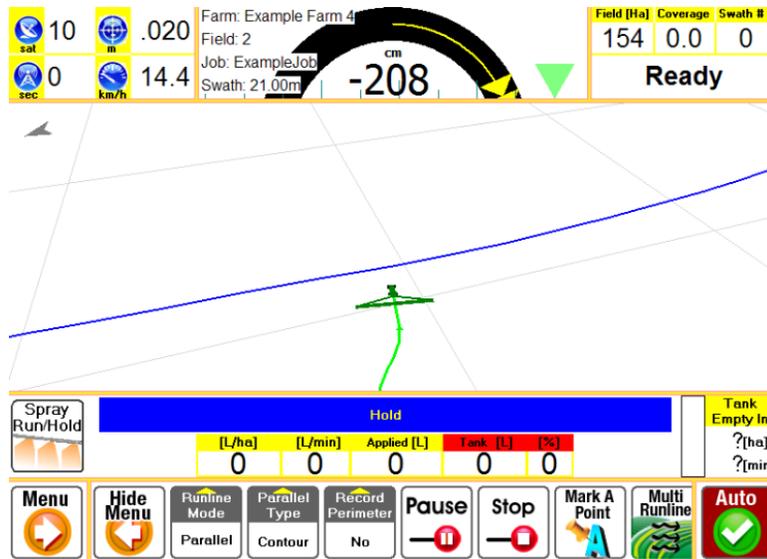
After accessing the Runline Menu by pressing   , select parallel mode by pressing  and . Select contour by pressing  and . Manoeuvre the vehicle to the desired starting point of the master contour, typically on the boundary as shown below:



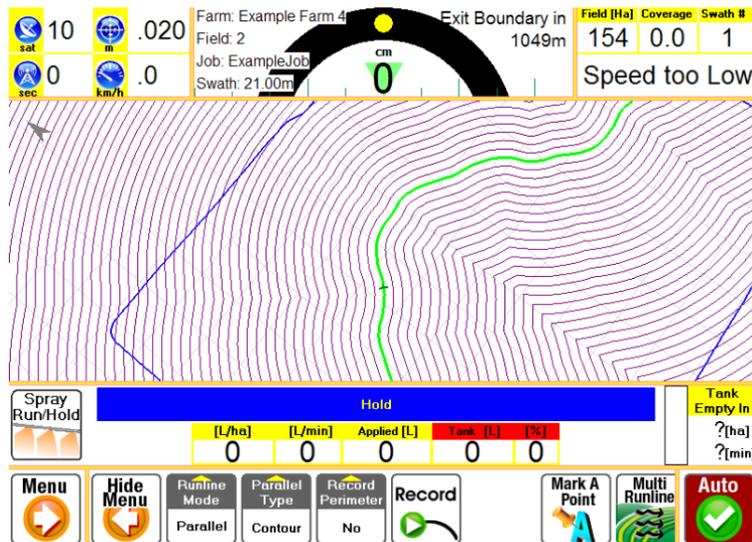
Press the  icon to start recording the contour and start driving the contour path. The Runline will be displayed as a green line, as shown below.



Drive a complete contour and press  to stop the contour recording when approaching the opposite boundary as shown below:

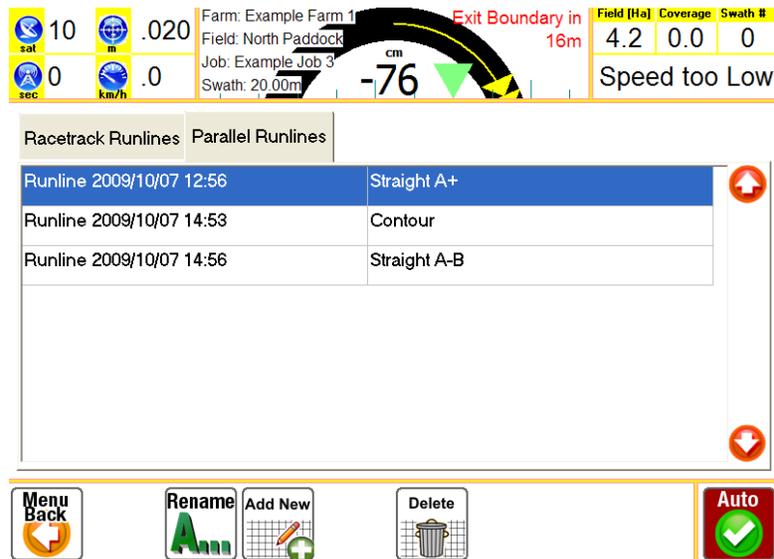


AgGuide will then generate a series of contours that cover the entire field. The display below is zoomed out to show a large section of the field, the generated contour runlines and the master contour, shown in green as it is the current runline.



17.1.3 Managing Runlines

Multiple Runlines can exist within the same Field. To change the current Runline, add, delete or rename an existing Runline press  and the following display will be shown:



| Field (Ha) | Coverage | Swath # |
|------------|----------|---------|
| 4.2 | 0.0 | 0 |

| Runline | Runline Name |
|--------------------------|--------------|
| Runline 2009/10/07 12:56 | Straight A+ |
| Runline 2009/10/07 14:53 | Contour |
| Runline 2009/10/07 14:56 | Straight A-B |

Pressing on the tabs allows selection of either racetrack or parallel modes and the   icons are used to select the desired Runline.

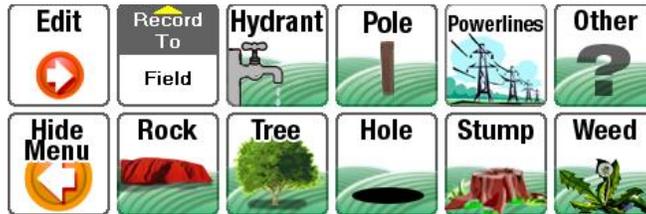
Highlight the desired Runline and press  until you have returned to the main menu.

18 MARKING POINTS

When undertaking a job there are many things that may want to be marked on the map to remind operators of obstacles that may not be very visible, such as holes, or important for subsequent work, such as weed patches. AgGuide has the following classes of points to mark:

1. Rock
2. Hydrant
3. Tree
4. Pole
5. Hole
6. Powerlines
7. Stump
8. Weed
9. Other

Mark points is accessed from the main screen by pressing , then , then . This will return you to the main screen with the following set of icons displayed:



If you do not want the Mark Point icon set to remain on screen press the  icon.

Mark Points can be stored in either the Field or Job. The storage mode is displayed by the  icon, and is toggled between the two modes using the same icon. Permanent features such as powerlines and rocks should be stored in the field and will therefore appear in any future Jobs. Points such as weeds are generally more appropriately stored in the Job as these will change over time.

When a Mark Point icon is pressed, such as , the icon is placed on the map at the current GPS point.

Each mark point has a radius associated with it, measured in meters. The size of the icon on the map is proportional to the radius associated to the point. To edit, delete or manually add mark points press



the  icon in the Mark Point group of icons shown above. This will display the Mark Point Edit screen shown below. This lists the Mark Points for the current field, their position and the radius associated with the point. For simplicity of display the radius is only displayed in 1m increments whilst the radius used within the program can be more accurate.

| Point | Type | Radius | Detail |
|-------|---------|--------|-----------------|
| 0 | Tree | 3 | E20.79.N270.00 |
| 1 | Stump | 1 | E-0.41.N101.90 |
| 2 | Hydrant | 4 | E17.61.N132.20 |
| 3 | Pole | 1 | E108.28.N110.37 |
| 4 | Rock | 8 | E70.28.N38.20 |

* Marked point is joined to previous point

The menu options are shown below:



The Edit Mark Point screen only displays mark points and boundary information. The display is centred on the currently selected Mark Point. Zoom functions are accessed by the  icon, and then   icons. In the above screen shot 5 Mark Points have been created within the “Top Paddock” field of “Example Farm 1”. By using the zoom function we can view all mark points in the current field: “Top Paddock” and where they are in relation to the field boundary.

| Point | Type | Radius | Detail |
|-------|---------|--------|-----------------|
| 0 | Tree | 3 | E20.79.N270.00 |
| 1 | Stump | 1 | E-0.41.N101.90 |
| 2 | Hydrant | 4 | E17.61.N132.20 |
| 3 | Pole | 1 | E108.28.N110.37 |
| 4 | Rock | 8 | E70.28.N38.20 |

*Marked point is joined to previous point

Menu Back Zoom Zoom

Use the icons to select the Mark Point you wish to edit, joint to previous point, manually add a point, or delete. The Currently selected point will be highlighted blue, as shown above. To edit a point press the icon. This will display the following information.

| | |
|----------|------------|
| Easting | 20.793591 |
| Northing | 192.105604 |
| Radius | 2.70 |
| Text | Tree |

Use the icons to select the parameter of the Mark Point you wish to edit and press the icon. This will display either a text or numeric entry display screen depending on the kind of input required.

If the position and type of Mark Point is known points can be added manually using the icon. This will create a new point and display the Mark Point Edit screen, described previously, allowing the data for the point to be entered.

If two or more points are part of an exclusion zone, ie a row of trees, the Mark Points can be linked to each other. To link Mark Points use the icons to select the Mark Point of interest and press the JOIN TO LAST POINT icon. This will link the selected Mark Point to the previous point in the list of Mark Points. An asterisk will appear next to the point radius, indicating that AgGuide has linked the two points and considers the exclusion zone defined by the point to be more than a simple radius.

19 CREATING OR EDITING A JOB

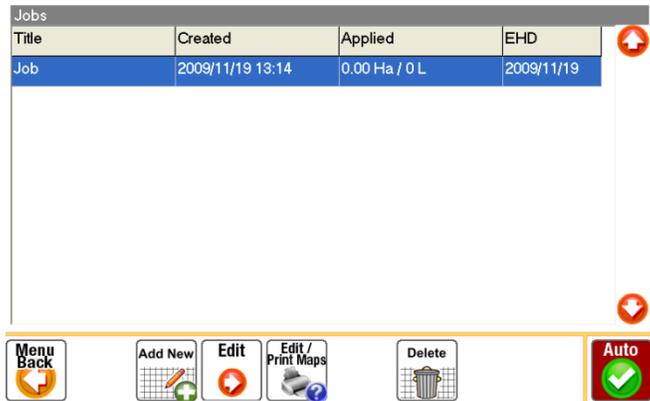
Performing Jobs requires that the Vehicle and Implement have been previously configured.

IMPORTANT
Do not create jobs before configuring the vehicle and implement.

From the Main Screen, press    and the Jobs window will display as shown below when there are no Jobs recorded in the field:



To create a new Job press the  icon. The screen will then display as follows:



To select the job you want to edit use the   and then press the  icon, which will bring up the Job Edit screen, as shown below, which is used to input Job information.

Job: Job

| Details | Products | Conditions | Statistics |
|------------|----------------------------------|------------------------------------|------------|
| Title: | <input type="text" value="Job"/> | | |
| Operator: | <input type="text" value=""/> | <input type="button" value="..."/> | |
| Vehicle: | <input type="text" value=""/> | <input type="button" value="..."/> | |
| Implement: | <input type="text" value=""/> | <input type="button" value="..."/> | |
| Comments: | <input type="text" value=""/> | | |

Job information is separated into four categories: Details; Products; Conditions; and Statistics. Pressing on the text field will either present a numeric or text input screen, or present a drop down menu of previously input data (ie operator names etc). If your desired entry is not in the drop down menu press on the icon to allow another option to be entered. In this example the job name was entered as “Example Job” and our operator is called “Bob”. The vehicle and implement are the defaults, which have previously been set up by the operator.

Job: Job

| Details | Products | Conditions | Statistics |
|------------|--|------------------------------------|------------|
| Title: | <input type="text" value="Example Job"/> | | |
| Operator: | <input type="text" value="Bob"/> | <input type="button" value="..."/> | |
| Vehicle: | <input type="text" value="Default"/> | <input type="button" value="..."/> | |
| Implement: | <input type="text" value="Default"/> | <input type="button" value="..."/> | |
| Comments: | <input type="text" value=""/> | | |

To set up the products used in the Job, press the products tab. The screen should display as follows:

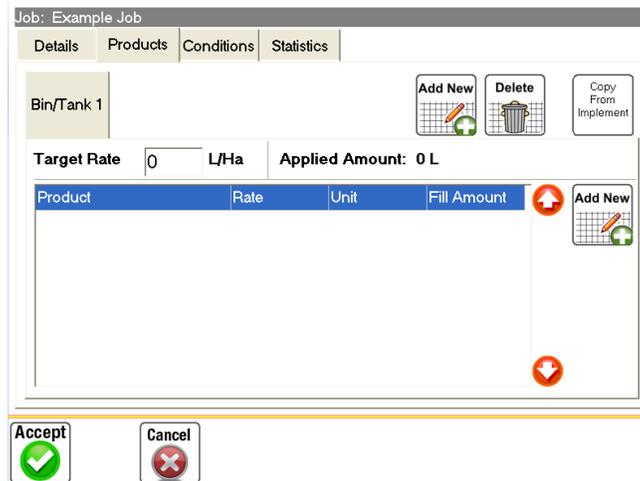


If you have setup the implement previously (best practise) you can copy the relevant properties from the implement, eg number of tanks. In this example the implement was created with one tank and the

Copy From Implement function was used. A bin or tank can also be created by pressing the



icon. The screen should display as shown below:



For this example a typical knockdown combination of Glyphosate, Ester and a wetting agent is used.

The products are added to the Job using the



icon. Showing the following display:

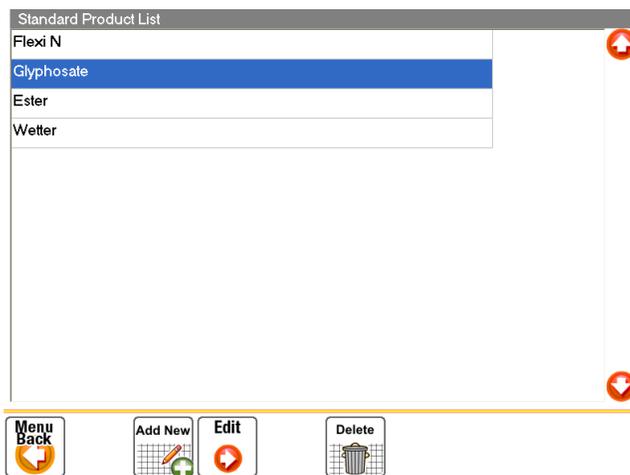
| | | |
|-------------------|---|--|
| Product: | <input type="text" value="Glyphosate"/> | <input type="button" value="Edit Name"/> |
| Application Rate: | <input type="text" value="1.00"/> | <input type="text" value="L/Ha"/> |
| Retail Supplier: | <input type="text" value="Ag Shop"/> | |
| Batch #: | <input type="text" value="GP123 456"/> | |
| Manufacture Date: | <input type="text" value="1/1/09"/> | |
| Withholding Days: | <input type="text" value="30"/> | |
| \$/Unit: | <input type="text" value="17.50"/> | |
| Refill Amount: | <input type="text" value="500"/> | |



If no products have been previously entered press on the relevant text boxes to enter the required information and then press the  icon. If product details were previously entered then the product drop down menu provides a list of all previously used products as shown below:

| | | |
|-------------------|--|--|
| Product: | <input type="text" value="Glyphosate"/> | <input type="button" value="Edit Name"/> |
| Application Rate: | <input type="text" value="Flexi N"/> <input type="text" value="Default"/> | <input type="text" value="L/Ha"/> |
| Retail Supplier: | <input type="text" value="Glyphosate"/> <input type="text" value="Ester"/> <input type="text" value="Wetter"/> | |
| Batch #: | | |
| Manufacture Date: | <input type="text" value="1/1/09"/> | |
| Withholding Days: | <input type="text" value="30"/> | |
| \$/Unit: | <input type="text" value="17.50"/> | |
| Refill Amount: | <input type="text" value="500"/> | |

The list of products can be managed by pressing the Manage Products icon. This displays a list of all products entered into AgGuide as shown below:



Use the   icons to select the product and press either  or  as appropriate. Editing products is identical to the process previously described in this section. Creating new products using



will add them to the end of the list.

Returning to the product details display using the  and  icons as appropriate the product details should be shown as follows:

Job: Example Job

Details Products Conditions Statistics

Bin/Tank 1   

Target Rate L/Ha Applied Amount: 0 L

| Product | Rate | Unit | Fill Amount |  |  |
|------------|------|------|-------------|---|---|
| Glyphosate | 1.00 | L/Ha | 500 | |  |
| Ester | 0.50 | L/Ha | 250 | |  |
| Wetter | 1.00 | L/Ha | 500 | |  |

The Target Rate is the rate in L/Ha for water and chemical. To enter the desired rate press on the Target Rate text box, enter the desired rate and press . In this example the Target Rate is 50L/Ha.

To enter the weather conditions press on the Conditions tab and enter the data using either drop down menu choices, or inputting values using the  icon as shown below:

Job: Example Job

Details Products Conditions **Statistics**

Wind Speed: 5 km/h

Wind Direction: NNE

Temperature: 25 °C

Humidity: 40 %

Other: No cloud cover

Accept Cancel

The Statistics tab, shown below, contains information about the Job such as work hours, chemicals applied etc. This information is extracted from machine operation and is not editable by the user.

Job: Example Job

Details Products Conditions **Statistics**

Times:

| | |
|----------|------------------|
| Created: | 2009/09/25 12:05 |
| Elapsed: | 2.0 Hours |
| Applied: | 0.0 Hours |
| Engaged: | 0.0 Hours |
| EHD: | 2009/10/25 |

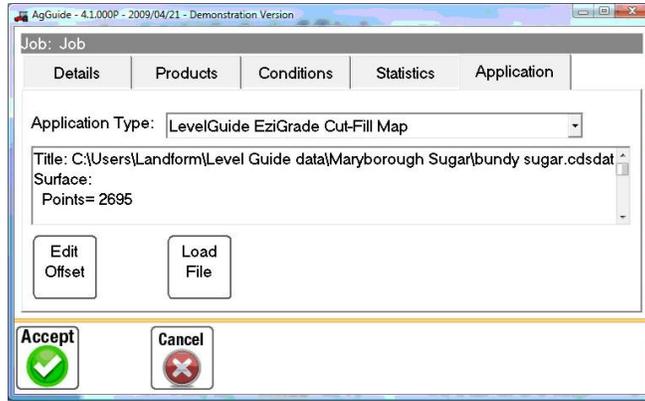
Application:

| | |
|-----------------------|---------------|
| Area: | 0.0 Ha |
| Applied (Total): | 0 Litres |
| Applied (Total): | \$0 |
| Applied (Bin/Tank 1): | 0 Litres |
| Glyphosate | 0 Litres, \$0 |
| Ester | 0 Litres, \$0 |
| Wetter | 0 Litres, \$0 |

Accept Cancel

20 JOB APPLICATION MAPS

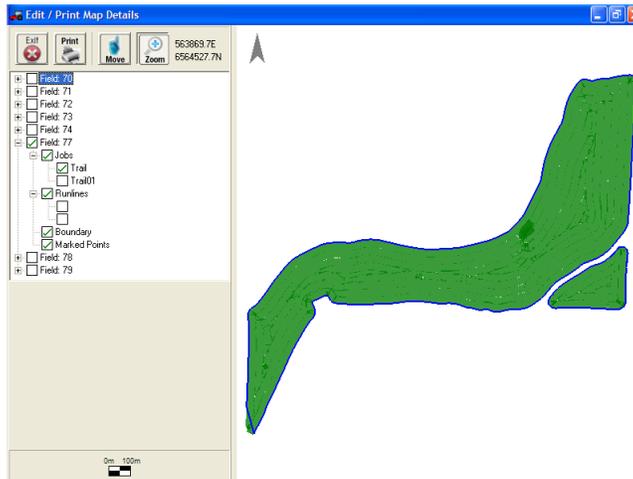
For “laser”-levelling control in LevelGuide mode, it is possible to import a cut-fill map. It is also possible to create simpler grading planes. In both cases this is all done through the “Application” tab within the Job. See Section 11.0 about LevelGuide.



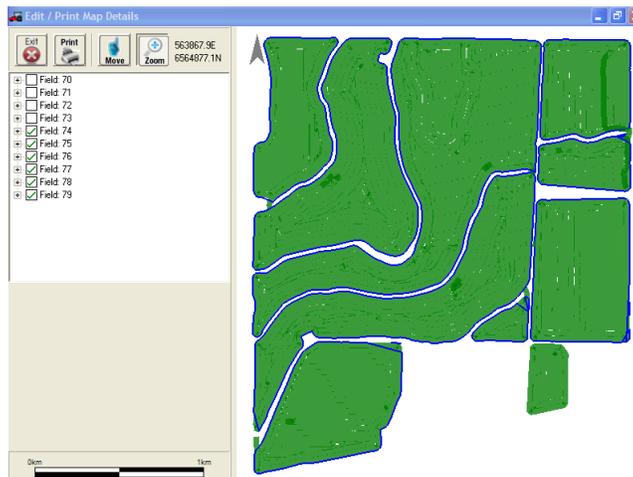
21 PRINTING COVERAGE MAPS



Maps are prepared for printing by pressing, from the Main Screen,   . A printer must be installed and connected to the computer running AgGuide in order to print. If no printer is installed on the machine this feature can be used to get an overview of completed or current Jobs. If Farms, Fields and Jobs all exist the screen will display something similar to that shown below:

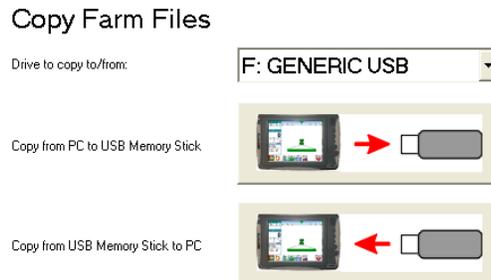


The icons on the top left allow the user to  the print function and return to other features of AgGuide,  print the map as currently displayed, and manipulate the map using  and . The list on the left panel shows all Fields within the currently selected Farm. Information that is to be displayed and therefore printed has a tick in the associated box. Note that if a specific Job is ticked, but the Jobs or Field is not ticked it will not display or print. All recorded information for each field can be overlaid: coverage for Jobs; Runlines; Boundaries; and Marked Points. This can also be done for several fields at a time:



22 COPYING FILES TO/FROM USB MEMORY

To Copy files to or from a USB Memory stick, from the Main Screen, press   . If a USB memory stick is connected to the computer the screen will display as follows:



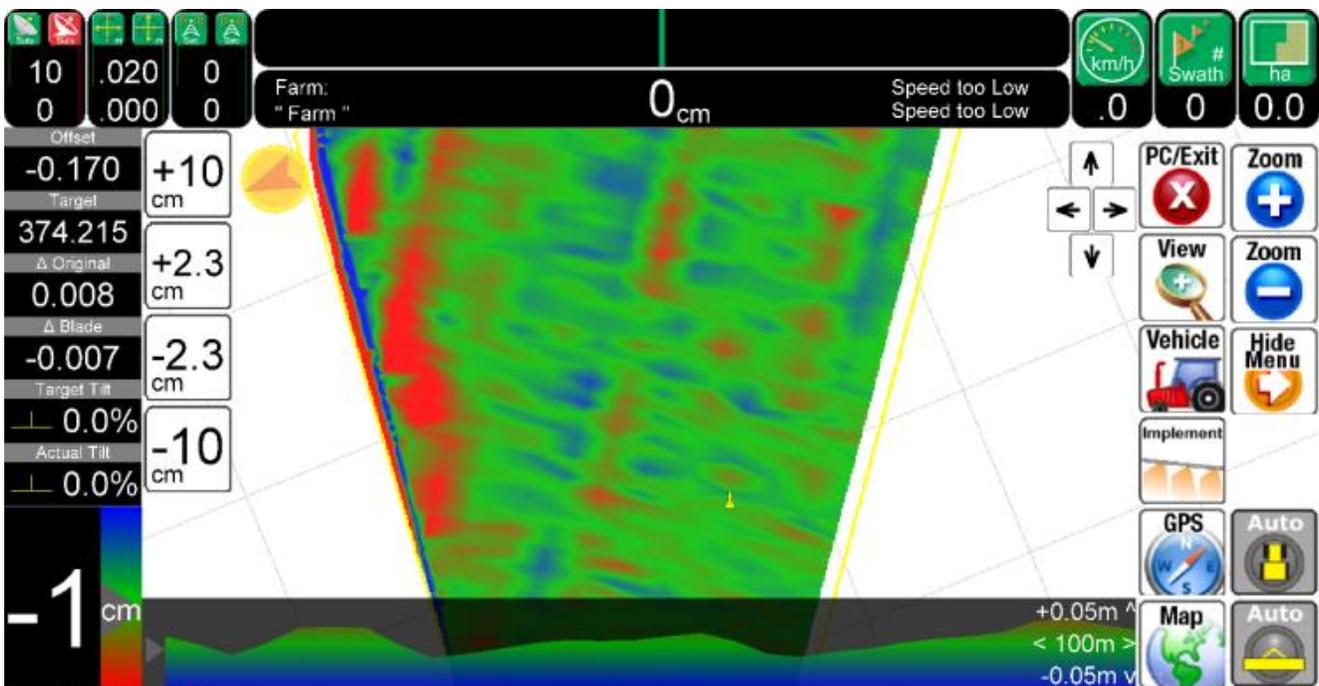
There are three options: The USB Drive to copy to/from; Copy all files from AgGuide PC to USB stick; Copy all files from USB stick to AgGuide PC.

Copy all files from USB stick should be used with caution as it can overwrite files already on the computer. This is primarily meant for updating Farms data when several different installations of AgGuide are used in conjunction within a single farming operation. The operator must make absolutely sure that they have the most up to date set of files on the USB stick.

If no USB stick is inserted the copy icons will not be displayed and the dropdown box will display “No Available Disks”.

LEVELGUIDE

GPS CONTROLLED LAND LEVELLING SYSTEM



23 LEVELGUIDE

The LevelGuide facility provides the ability to grade field surfaces to match a designed surface (via imported cut-fill map), or to a simple plane.

Adding Cross levelling to LevelGuide will add the ability to trim batters to a design slope or a pre-set slope.

23.1 Front screen Overview



1. Available GPS and Glonass Satellites. Top line is the vehicle GPS Receiver, bottom line is Implement GPS Receiver.
2. GPS accuracy. Top line is the Horizontal accuracy of the vehicle GPS Receiver, bottom line is the Vertical accuracy of Implement GPS Receiver.
3. Radio Latency (time between messages from the Base Station).
4. X track error. This the distance left or right of the line the vehicle GPS antenna is positioned.
5. Speed in Kilometres per hour.
6. Swath number of the runline
7. Area covered if coverage area is being recorded
8. Distance above or below the target plane
9. Offset buttons - user definable
10. Design map
11. Message Bar
12. Auto steer button/status indicator
13. . Auto levelling button/status indicator

24 GPS CONFIGURATION

NOTE – Many functions of the GPS setup rely on effective communication between the PC on which AgGuide V4 is loaded, and the GPS Receiver or GPS Receivers if the software is being configured to steer the tractor as well as do LevelGuide control.

Please ensure that the correct serial communication has been established before proceeding.

Settings for this can be accessed by selecting



The following screen will appear.

The Ports in the software need to be changed to match the Ports that have been assigned for the interface module. If only the GPS Receiver for LevelGuide is being setup, set it up to look like the following screen.

IMPORTANT

Note that if there isn't a vehicle GPS Receiver then that serial port is set to **None**. The CANBUS Port is also being setup as well. The GPS Baud Rate is set to 115200 for Novatel GPS Receivers.

Vehicle GPS

GPS Serial Port: **None**

GPS Baud Rate: **115200**

CANBUS Serial Port: **11**

Spray/VRC Pod Port: **None**

Bluetooth Port: **None**

CORS/NTRIP

RTCM Output Port: **None**

RTCM Output Baud: **38400**

Enable CORS (Internet Data will be used)

Status: Disconnected

Implement (RigGuide/LevelGuide) GPS

GPS Serial Port: **9**

GPS Baud Rate: **115200**

Available Interface Module Ports

COM12

COM10 (Usually CanLink)

COM9 (Usually GPS)

COM11 (Usually CANBUS)

Edit NTRIP Server Settings



If the vehicle also has the capability of being auto steered with Aggvide V4 at the same time as Levelguide is being used the Comms Ports will need to be setup to look like the following screen.

Vehicle GPS

GPS Serial Port: **9**

GPS Baud Rate: **115200**

CANBUS Serial Port: **11**

Spray/VRC Pod Port: **None**

Bluetooth Port: **None**

CORS/NTRIP

RTCM Output Port: **None**

RTCM Output Baud: **38400**

Enable CORS (Internet Data will be used)

Status: Disconnected

Implement (RigGuide/LevelGuide) GPS

GPS Serial Port: **12**

GPS Baud Rate: **115200**

Available Interface Module Ports

COM12

COM10 (Usually CanLink)

COM9 (Usually GPS)

COM11 (Usually CANBUS)

Edit NTRIP Server Settings



IMPORTANT

Note that when a vehicle GPS Receiver is connected then Implement GPS is connected to the serial port that is not assigned. The CANBUS Port is also being setup as well. The GPS Baud Rate is set to 115200 for Novatel GPS Receivers and 19200 for Topcon GPS Receivers.

When this is complete Press  to return to the GPS diagnostic screen.

GPS Diagnostic Screen below :

| | Vehicle GPS | Implement GPS (If Used) |
|-------------------|-------------------------|-------------------------|
| GPS Status | GPS Inadequate | GPS Inadequate |
| Date:Time | 140315:175236.4 | 140315:175236.4 |
| Easting (m) | 321637.680 | 321637.680 |
| Northing (m) | 6990546.452 | 6990541.702 |
| Elevation (m) | 374.038 | 374.038 |
| Heading / Speed | 0 ° 0.0 km/h | 0 ° 0.0 km/h |
| H Accuracy (m) | 0.020 | 0.000 |
| V Accuracy (m) | 0.000 | 0.000 |
| Sats GPS:Glonass | 10:00 | 0:00 |
| Latitude (°) | 0.0000000000 | 0.0000000000 |
| Longitude (°) | 0.0000000000 | 0.0000000000 |
| WGS84 Zone | GPS:31 Farm:(Undefined) | GPS:31 Farm:(Undefined) |
| PDOP:HDOP:VDOP | 0.00: 0.00: 0.00 | 0.00: 0.00: 0.00 |
| GPS Quality | (Auton) 0 | (Auton) 0 |
| Radio Latency (s) | 0.0 | 0.0 |
| Radio Data (kb) | 0.000 | 0.000 |
| Base | 0.0km ID: | 0.0km ID: |
| Temperature(°) | 0.00 | 0.00 |

Menu
Back

Setup

Other
60

Network

Comms
Settings
010
1010

Comms
Terminal

If the connection to the GPS Receivers has been successful, the date and time will be changing at 5 times per second. If no numbers appear in Date and Time check the Trouble Shooting section Appendix B.

Once the connection to the GPS Receiver has been established, enter the GPS setup section of the program by pressing  Refer to Section 4.2.1 for more information regarding GPS setup.

25 SETTING UP LEVELGUIDE

Step 1 Press  >  >  to access the Implement selection/setup page.

To setup a new Implement

Step 2 Create a new Implement by pressing  then set up the grader bucket. Go to step 4

To edit an existing Implement

Step 3 If the implement is already created, select, and press the  button to edit the Implement's settings.

The following screen will appear.

| Details | Measurements | Control | LevelGuide |
|------------------|--|---------|------------|
| Name: | <input type="text" value="Grader Bucket"/> | | |
| Control Mode: | <input type="text" value="LevelGuide"/> | | |
| Coverage Record: | <input type="text" value="When Engaged"/> | | |

Step 4 Change the name of the Implement (as you would when setting up any new implement).

Step 5 Press on the box to the right of 'Name', a virtual keyboard will appear and the name of the implement can be typed in here. Press  to return to the previous screen.

Step 6 Press the down arrow to the right of "Control Mode" to see the drop down box. The screen will appear as below

| Details | Measurements | Control | LevelGuide |
|------------------|--|---------|------------|
| Name: | <input type="text" value="Grader Bucket"/> | | |
| Control Mode: | <input type="text" value="LevelGuide"/> | | |
| Coverage Record: | <input type="text" value="When Engaged"/> | | |

Step 7 Select 'LevelGuide'

Step 8 Press the down arrow to the right of 'Coverage Record' to see the drop down box. The screen will appear as below

The screenshot shows a software interface with four tabs: 'Details', 'Measurements', 'Control', and 'LevelGuide'. The 'LevelGuide' tab is selected. Below the tabs, there are three configuration fields:

- Name:** A text input field containing 'Grader Bucket'.
- Control Mode:** A dropdown menu with 'LevelGuide' selected.
- Coverage Record:** A dropdown menu with 'No Recording' selected.

- **No Recording** no recording will be made
- **When Engaged** when the implement is Engaged in Auto mode a Coverage record is created. This is displayed on the screen to show where the implement has travelled while engaged.
- **When Hitch Down** not relevant and does not operate in Levelguide mode.
- **Always** will record a continuous coverage record where ever the implement travels. This displayed on the screen to show where the implement has travelled.
- **Run/Hold Button** a Run/Hold button appears on the operating screen. When the 'Run' button is pressed a continuous coverage map is recorded wherever the implement travels. This is displayed on the screen to show where the implement has travelled. To stop the recording and display, the 'Hold' button is pressed and the recording stops until the 'Run' button is pressed again.

IMPORTANT

Recording a coverage map creates a file that contains a series of points with Easting, Northing, Elevation and Vertical accuracy at the time of the recording. If this is recorded 'When Engaged' while final trimming, this will create a file showing the finished elevation of the field and could be used for quality assurance purposes.

The Always or Run/Hold recording features can be used for surveying functions.

Step 9 Press the “Measurements” tab to set the Implement’s measurements. The screen will appear as below.

| Details | Measurements | Control | LevelGuide |
|----------------------|--|---------|---|
| Hitch Type: | <input type="text" value="Drawbar (1 Pivot)"/> | | |
| Width: | <input type="text" value="0.000"/> | m | |
| Overlap: | <input type="text" value="0.00000000"/> | m | (Automatically reduce swath width by this amount) |
| Drawbar Length: | <input type="text" value="3.00"/> | m | (Distance from vehicle linkage to toolbar) |
| GPS Antenna Position | | | |
| X: | <input type="text" value="0.00"/> | m | (Distance right of implement centre line) |
| Y: | <input type="text" value="0.00"/> | m | (Distance in front of tool/scrapper bar) |
| Z: | <input type="text" value="0.00"/> | m | (Height above tool/scrapper bar) |

- **Hitch Type** refers to the configuration of the vehicle and the implement. Most levelling buckets are drawbar implements. Selecting this only effects the graphic on the operating screen.
- **Width** this width is used in the calculation of areas in the coverage recording and also effects the dimensions of the graphic on the operating screen.
- **Overlap** not relevant unless Agguide V4 auto steer is also being used in conjunction with LevelGuide. This is the amount the swath width in Field setup is reduced to create an overlap between swaths. (Refer to Section 6.3 for Field setup)
- **Drawbar length** the distance from the vehicle drawbar to the toolbar. Effects the graphic on the operating screen.
- **GPS position** X, Y and Z relates to the position the antenna is mounted in relation to the blade. If the Antenna is mounted directly over the blade and in the centreline of the implement, then the values for X and Y are 0.00. The Z value which is the height of the Rim of the GPS antenna above the Blade.

IMPORTANT

The Z value is used in the calculation of the position of the target plane. With cross levelling, it is used in the calculation of the tilt.

Setting up the Control Type

Press the 'Control' tab to set the Implement's hydraulic control kit type.

The following screen will appear.

The screenshot shows a software interface with four tabs: 'Details', 'Measurements', 'Control', and 'LevelGuide'. The 'Control' tab is active. Below the tabs, there is a 'Control Kit Type' dropdown menu currently showing 'Farmscan (Separate Left & Right plugs)'. Underneath, there is a 'Speed Limits' section with three input fields: 'Maximum' (30.0 km/h), 'Minimum' (3.0 km/h), and 'Minimum Time' (0.0 allowed seconds below min speed). At the bottom of this section, there is a checked checkbox labeled 'Disengage when Hitch Raised'.

- **None/Visual** - This is chosen if there is no hydraulic control to be used i.e. the height of the blade is controlled manually by the operator.
- **Farmscan (separate Left & Right plugs)** - this is not relevant to LevelGuide, not generally used for this application.
- **Case/NH/JD Remote(5V)** - This is chosen if:
 - the Auto Hydraulic function of the Case New Holland tractors is used ie. hydraulics are operated through the remote hydraulics of the tractor
 - control of the John Deere tractor's remote hydraulics (SCV) is done via the Farmscan Ag armrest controller.
- **SD Ratiometric Proportional (%)** - This is chosen if an external Sauer Danfoss valve is used with a single hirschman plug.
- **SD Left/Right Proportional (single Left & Right plugs)** this is not relevant to LevelGuide, not generally used for this application.

Setting the Implement Parameters

Press the “LevelGuide” tab to set the Implement’s following parameters.

The following screen will appear.

| Details | Measurements | Control | LevelGuide |
|---|--------------|---------|------------|
| Lookahead Time: <input type="text" value="0.0"/> s | | | |
| Allowed Height Variation:(Dead Band) <input type="text" value="0.0"/> cm <input checked="" type="checkbox"/> Height Control | | | |
| Allowed Tilt Variation: (Dead Band) <input type="text" value="0.00"/> % <input type="text" value="Disable"/> | | | |
| Cut/Fill Display Scale: <input type="text" value="1.00"/> m | | | |
| Cut/Fill Display Width: <input type="text" value="100"/> m | | | |
| Manual Override Threshold: <input type="text" value="0.0"/> cm (0 to disable) | | | |
| Offset Adjustment | | | |
| Minor: <input type="text" value="1.0"/> cm | | | |
| Major: <input type="text" value="10.0"/> cm <input type="checkbox"/> Enable | | | |
| Also Offset Original Heights: <input checked="" type="checkbox"/> | | | |

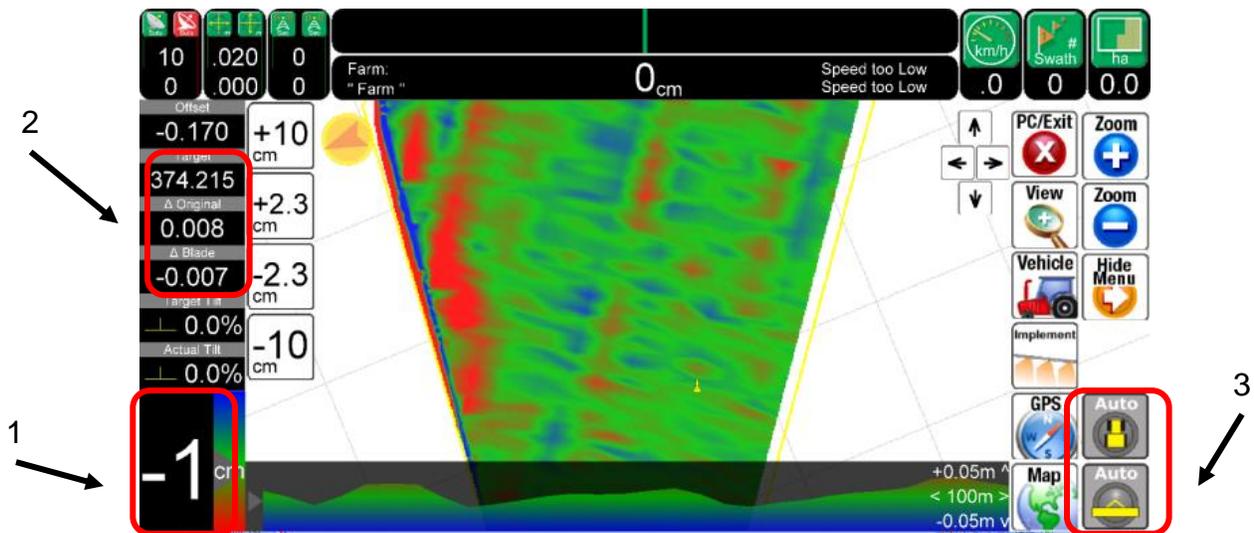
- **Lookahead Time** – is the number of seconds to look ahead of the grader blade when making decisions about target grader height. Use this if there are delays in the movement of the blade due to the hydraulics. Normally this can be left as zero.
- **Allowed Height Variation** – is the number of centimetres variation between the target and current height of the grader blade which LevelGuide will allow before moving the blade. This allows for smooth operation without the system making constant up/down movements which can wear out the hydraulics. Normally this ought to be set on 1 centimetre but may be as low as 0.5 centimetres.
- **Height Control** – If Tilt control has been installed, this 'tick box' allows the height control to be disabled so that only Tilt control is used.
- **Allowed Tilt Variation** – is the number of centimetres variation between the target and current tilt of the grader blade which LevelGuide will allow before moving the tilt of the blade. This allows for smooth operation without the system making constant up/down movements which can wear out the hydraulics. Normally this is set on 0.1 %.
- **Cut/Fill Display Scale** – is the height scale on the “fish-finder” scale on the front screen. It is for display purposes only, and does not affect automatic control. This scale changes the colouring of the display in regards to Cut and Fill depths. e.g. if this scale is set to 0.05m then areas with cut/fills of 0.05m or less will be shown as green, cuts greater than 0.05m will be shown as red, fills greater than 0.05m will be shown as blue.
- **Cut/Fill Display Width** – is the width scale showing the distance of the profile ahead of the grader blade on the “fish-finder” scale on the front screen. It is for display purposes only, and does not affect automatic control.

- **Manual Override Threshold** – is the height that the auto function of the hydraulics disengages at above the target plane. This will occur if the blade is either raised manually or if the bucket is driven to a point higher than the target plane. Normally set on 10cm but can be set by the operator. *Setting the value to 0 disables the function.*
- **Offset adjustments** – These are adjustments up or down that can be made to the target plane. The choice of either one or two offset buttons are available by ticking and unticking the 'Enable' box. These can be set by the operator.
- **Also Offset original heights** – This allows the Offset display on the operating screen to be set to zero after the target plane has been adjusted.

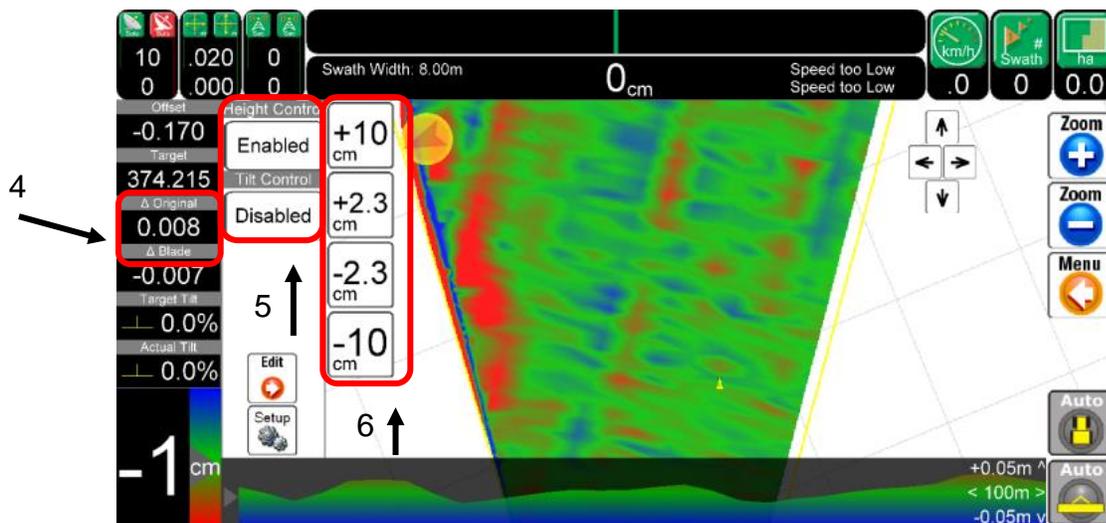
Press  and keep pressing  to return to the front screen.

The front screen will now show extra information relating to LevelGuide.

26 LEVELGUIDE FRONT SCREEN



1. On the bottom left side of the screen a coloured gradient scale shows the height of the grader blade above or below the target grade.
2. To the left side of the screen are indicators showing the *Target*, *Blade* and *Original* heights at the blade.
3. On the bottom right corner of the screen will be visible the engage/disengage buttons for both the Vehicle and the Implement.



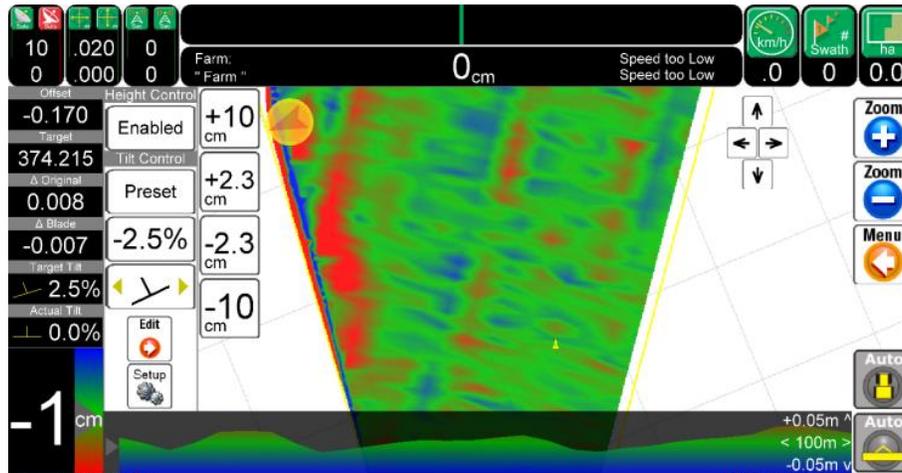
4. The *Original* height will only be visible if a cut/fill map is used. Below this the Target and actual tilt information is displayed.

Touch this area and the screen changes as shown above.

5. Buttons move out to allow the **Height Control** to be disabled and enabled by pressing the disable or enable button.

6. The Offset Buttons are used to move the Target Plane up or down by discrete amounts. These amounts are 'user defined', as is the choice of having two or four buttons visible at once. These can be edited by pressing  Refer to Section 7.3 **Offset adjustments**

The **Tilt Control** can also be disabled, enabled or preset by pressing the Disable, Enable or Preset button. When the Preset button is selected. The following screen appears.



Pressing  allows the operator to preset a target grade either positive or negative.

The graphic in the button below this displays the direction to which the tilt has been preset. Pressing this button will reverse the direction of the preset tilt. 

Pressing  enters the screen to edit the current job. Or this can be reached by editing the current Job by Pressing  then  then 

Along the bottom of the screen is the “fish-finder” display which shows the cut/fill gradient ahead of the grader blade. This will only be visible if a cut/fill map is used.

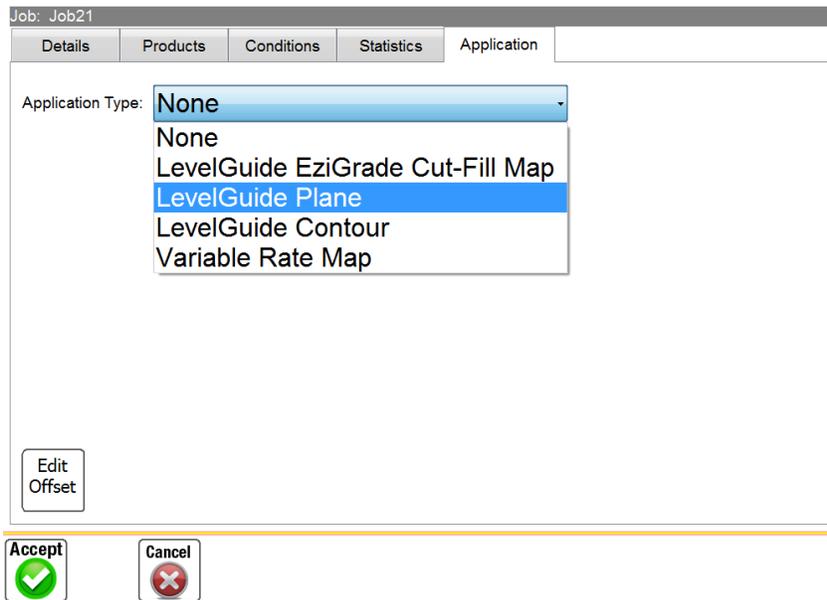
Press  to adjust the scaling of the graph.

Or this can be reached by Pressing  then  then  to edit the current Implement.

27 JOB APPLICATION MAPS AND GRADER PLANES

You adjust grader planes and import cut/fill maps by either pressing on the *Target/Blade/Original* section of the front screen, or by pressing    and then either  to create a new Job, or  to edit an existing Job.

Go to the “Application” tab.



Set the “Application Type” to match the type of target height map you want to work with. Options are:
None – Automatic height control not available.

LevelGuide EziGrade Cut/Fill Map – Import a cut/fill target height map generated by EziGrade software. This software can be used to turn pre-measured heights into multiple grade planes and a cut/fill map. This option requires more preparation of data prior to starting work within a field, but provides an on-screen cut/fill map and the “fish-finder” gradient display.

More information about types of designs that can be imported into Levelguide can be obtained from your dealer.

LevelGuide Plane – Use this to define a single simple grade target height plane using a Reference Point and two other points or a Main and Cross Slope.

LevelGuide Contour – Use this to define a rising or declining contour line.

27.1.1 LevelGuide Plane

The screenshot shows a software window titled "Job: Job - Copy" with tabs for "Details", "Products", "Conditions", "Statistics", and "Application". The "Application" tab is active, showing "Application Type: LevelGuide Plane".

Reference Point

Get from GPS

X: 525010.392
Y: 7809348.661
Z: 296.430

Main Slope (relative to Reference Point)

Get from GPS

Rise: 0.629356 %
Bearing: 168.70 °

Cross Slope (relative to Main Rise)

Get from GPS

Rise: 1.180369 %
(+ve to right of Main Rise)

Zero

Edit Offset

From Reference Point: Distance: 194 m, Bearing: 349 °, Rise: -1.230 m
Elev: 295.200 m, HAcc: 0.000 m, VAcc: 0.000 m

Accept (green checkmark icon) Cancel (red X icon)

Reference Point – Begin by moving the grader blade to a known position and height on your target plane, then press the “*Get from GPS*” button. This sets the reference point for the design plane.

Main Slope (relative to Reference Point) – Next drive to another point within your field, adjust the blade height as desired and press the “*Get from GPS*” button. This sets the Main Slope between the Reference Point and this point. *You can manually enter a Main Slope if you prefer, but you need to know the bearing.*

Cross Slope (relative to Main Point) – Finally drive to another point within your field (away from the Main Rise line) and adjust the blade height as desired, then press the “*Get from GPS*” button. This sets the Cross Slope between the Main Slope line and this point. *You can manually enter a Cross Slope if you prefer.*

IMPORTANT

If you wish to adjust the Main slope of the plane - the plane 'hinges' on the Reference point so elevation is the same there when the grades are changed until the offset is altered and will only change in the line of the Main slope.

Use the “*Edit Offset*” facility to shift the design plane up or down.



For example, an offset of -10.0cm will lower the design plane by 10cm – causing the blade to cut/fill lower.

An offset of +10.0cm will raise the design plane by 10cm – causing the blade to cut/fill higher.

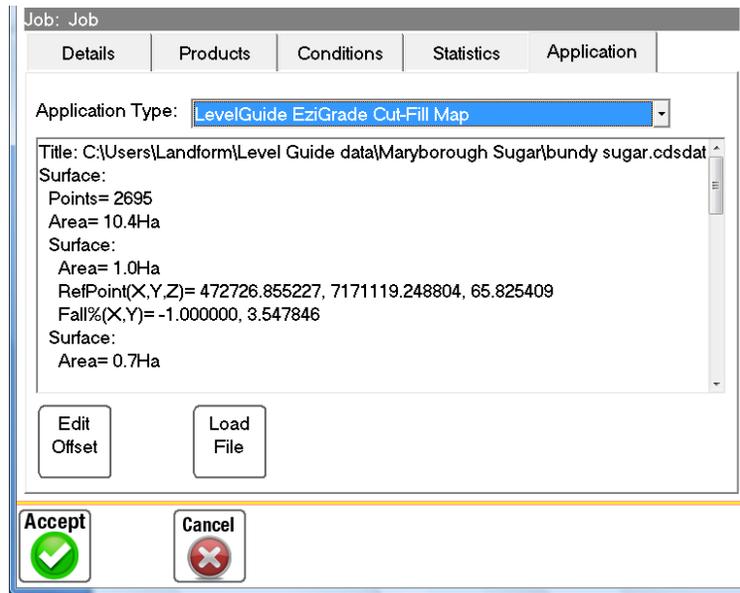
“*Set to GPS height*” will adjust the design plane up or down so that the current blade height will be considered as being “on grade”.



This offset is displayed on the front screen

If this offset is accepted as the new Target grade. Press  to make the offset permanent. This will add the Offset to the Target Plane and set the Offset to Zero.

27.1.2 EziGrade Cut/Fill Map



Use the “Load File” button to load an *.ezigrade file generated by the EziGrade software. Once successfully loaded, details about the EziGrade cut/fill design will show on screen.

Use the “Edit Offset” facility to shift the design plane up or down.



For example, an offset of -10.0cm will lower the design plane by 10cm – causing the blade to cut/fill lower.

An offset of +10.0cm will raise the design plane by 10cm – causing the blade to cut/fill higher.

“Set to GPS height” will adjust the design plane up or down so that the current blade height will be considered as being “on grade”.



This offset is displayed on the front screen

If this offset is accepted as the new Target grade. Press  to make the offset permanent. This will add the Offset to the Target Plane and set the Offset to Zero.

27.1.3 LevelGuide Contour

Job: Job - Copy

Details Products Conditions Statistics Application

Application Type: LevelGuide Contour

Reference Point

Get from GPS

X 525010.392
Y 7809348.661
Z 296.430

Main Slope (relative to Reference Point)

Get from GPS Rise: 0.629356 %

Edit Offset

| | |
|-----------------------|-----------------|
| From Reference Point: | Elev: 295.200 m |
| Distance: 194 m | Bearing: 349 ° |
| Rise: -1.230 m | Rise: -0.634 % |
| | HAcc: 0.000 m |
| | VAcc: 0.000 m |

Accept Cancel

Use contour mode to create a rising or falling contour.

Reference Point – Begin by moving the grader blade to a known position and height within your field, this would normally be the point at which you want your contour bank to channel water into a table drain. Then press the “*Get from GPS*” button. This sets the starting point and elevation of your contour.

Main Slope – Next you either enter the slope (+ve for rise, -ve for fall) that you want your contour bank to be, or drive a certain distance and press the “*Get from GPS*” button. This will automatically set the slope to be the elevation change divided by the distance travelled.

Back on the front screen, as you drive from the reference point the target height will rise or fall as you drive. It is up to the driver to direct the vehicle up or down a slope to maintain that target height.

28 TILT SENSOR SETUP

The Tilt Sensor is an optional extra to the LevelGuide Kit. Follow the instructions in the Installation Manual for the appropriate positioning of the Tilt Sensor.

The tilt sensor setup is found under the Vehicle setup.

Press  >  >  Press the Implement tab at the top of the screen

Tilt Setup Utility: **Vehicle** Implement

| | | | |
|-------------|----------------------------|-------|------------|
| XTrack (cm) | Tilt Angle (Degrees): | 00.00 | Raw: 00.00 |
| 0 | N/A | N/A | N/A |
| | Zero Tilt Angle (Degrees): | 00.00 | |

Ensure that the blade of the machine is level - use a builder's spirit level to check this. Press 

IMPORTANT

Ensure that the machine is on level ground as well as the blade being level. Otherwise the operator may find that the machine will load unevenly.

Calibrating the tilt coupling will be done next. When the  is pressed some instructions will appear on the screen which will ask for the machine to be driven 360 degrees and return to the same place. Ensure that there is sufficient room to do this before proceeding.

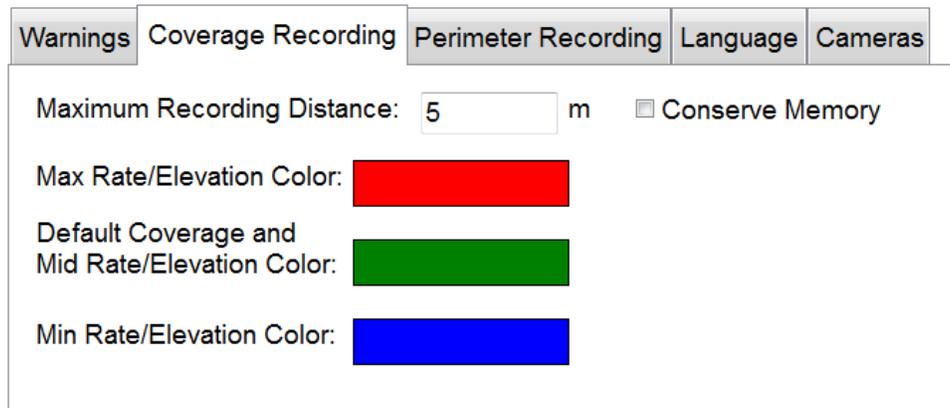
When the machine is in a position to do this Press  and follow the instructions.

Press   to return to the working screen.

29 RECORDING FIELD DATA FOR PROCESSING BY EZIGRADE

It is recommended that you set the default coverage map recording distance to 20 metres. Do this by

going into   , the following screen will appear and then select the “Coverage Recording” tab. The following screen will appear



Warnings Coverage Recording Perimeter Recording Language Cameras

Maximum Recording Distance: 5 m Conserve Memory

Max Rate/Elevation Color: 

Default Coverage and Mid Rate/Elevation Color: 

Min Rate/Elevation Color: 

Set the “Maximum Recording Distance” to 20 metres, also untick the 'Conserve Memory' Box.

30 SETUP A NEW IMPLEMENT

- It is recommended that you create a new Implement for recording operations.
- Remember to select this Implement type each time you want to record data to send to your landform consultant for generating a cut/fill map.

- Create the new Implement under   .

- Then  Implement. Refer to Section 7.3
- Under the “Details” tab, name the Implement “EziGrade Recording”.
- Set the “Control Mode” to “Levelguide”.
- Set the “Coverage Record” to “Run/Hold”.
- Under the “Measurements” tab, set the GPS antenna position Z should be the distance from the rim of the GPS antenna to the Natural surface.
- Set a nominal width for the machine so that the coverage map can be easily seen on the operating screen while the survey operation is performed.

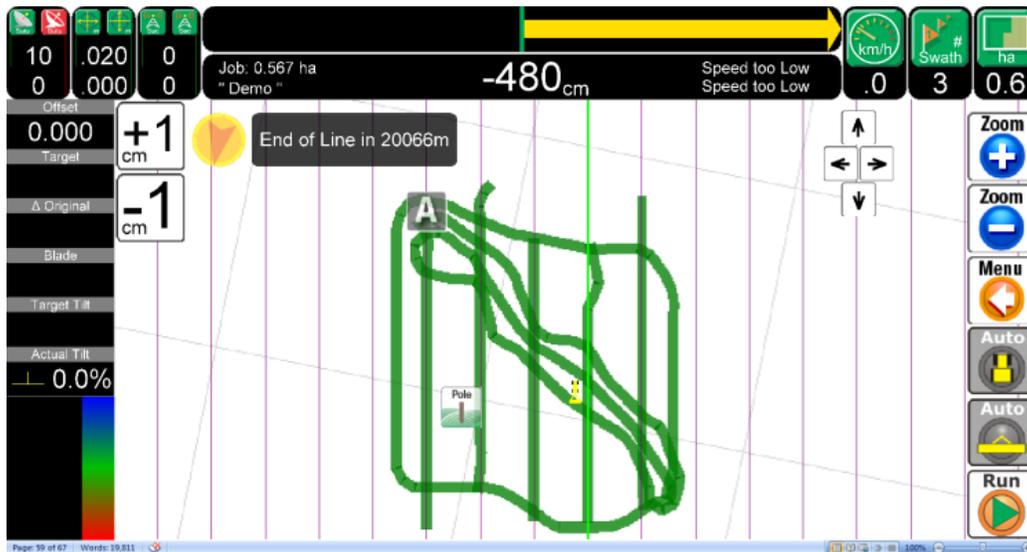
IMPORTANT

If the distance from the Rim of the GPS antenna is measured to the natural surface correctly, then the target height will be the same as the design height when the earthmoving commences, as long as the Base GPS antenna is at the same height for both survey and earthmoving operations.

- None of the other settings are of any importance for this implement.
- Press  and keep pressing  to return to the front screen.
- A Run/Hold button will now be visible at the bottom right of the screen. Use “Run/Hold” to turn on/off coverage recording, and then drive the field in swaths about 20 or so metres apart.

31 GETTING THE BEST JOB

1. It is recommended that a new Job be created for each field you want to record.
2. The best accuracy is achieved by having the Base Station as close as possible to the survey area - the recommendation is a maximum of 4 Kilometres. The radio is capable of transmitting much further than this, but the GPS vertical accuracy deteriorates quickly.
3. For best repeatability a Base point should be established so that the Base Station can be returned to it when the levelling is to take place. This might be as simple as a star picket driven firmly into the ground that the GPS antenna can be mounted on.
4. Placement of the Base Station is important. Avoid high voltage powerlines and electrical transformers.
5. The spacing of the swaths depends upon the resolution of terrain in the field – our recommendation is to collect points no further apart than 20 metres. This should be discussed with your landform design consultant, different design packages may have different requirements.



6. As well as up and down the field, you should also drive along the edge and if possible along the centre line of any banks or channels which are pertinent to the field design.
7. Make sure that the boundary of the field is also surveyed so that the area to be levelled is defined. This will assist in eliminating survey points which may have accidentally been collected.
8. If individual features that require single points such as trees or stakes are required use the mark



points feature Press  and  and group of set points will be displayed. Chose the point which is the most appropriate to describe the feature or press 'other' and give it a name. Don't be alarmed that it continues to call this point 'Other', in the file the name that it was given will be there. Note that the 'Mark Points' file is separate to the 'Coverage' file.

9. Photographs (including aerial ones) will also be helpful to the consultant.

31.1 Transferring Files

To send the recorded coverage file and mark points file to your consultant you will need a USB memory stick. Insert this into the computer.

Go into     and find the correct folder containing the files to copy.

If you are working in a Farm called “**Valley**” in a Field called “**Blacksoil**” and have recorded a Job called “**Original**”, then the files you want to copy to the USB memory stick will be (starting in the folder where you have AgGuide.exe stored):

Farm**Valley****Blacksoil**\Job**Original**\Job.path for the coverage, and :

Farm**Valley****Blacksoil**\mark.path

These are simple text files that can be opened and viewed in 'Notepad' software.

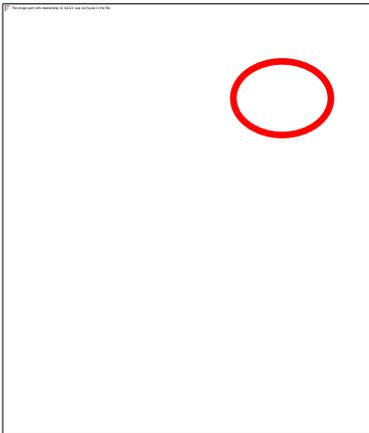
Note to clarify this, the points that were marked are part of the Field information so every time that this field is opened the points will appear but the coverage record is in the job folder specific to the job that was carried out.

32 SETTING UP THE HYDRAULICS FOR LEVELGUIDE - UNIPOD CONTROLLER

There are basically three different types of hydraulic systems that will be encountered with levelguide.

- The Case New Holland internal auto hydraulic system that allows ports 1 or 3 to be operated as a proportional valves. Port 1 raises and lowers the blade. Port 3 will be used to operate the crossleveller.
- The John Deere system where Farmscanag uses a specific SCV outlet as a proportional valve to raise and lower the blade and another to operate crosslevelling. These SCVs are chosen during installation.
- External proportional valves such as Sauer Danfoss valves to raise and lower the blade and operate the crossleveller.

For **Case New Holland** internal auto hydraulic systems, refer to the Operator Manual under the section Remote Hydraulic automatic operation for the initial setup of the tractor hydraulics. Note that the flow rate for the remote hydraulic outlet that is being used to control the blade height should be set to approximately 50% to 70%. Higher flow rates may result in the blade being difficult to control. **Before proceeding to step 1 below engage the auto function of the hydraulic remote that controls the blade.**



On older tractors this will be a rocker switch.

For **John Deere** tractors, the internal auto hydraulic systems are not used. Refer to the Operator Manual under the section Hydraulic Selective Control Valve to set the flow rate for the SCV. Note that the flow rate for the remote hydraulic outlet that is being used to control the blade height should be set to approximately 50% to 70% of flow. Higher flow rates will result in the blade being difficult to control. The levelguide software controls the SCV 'levers' in the console similar to the way the operator does. **Before proceeding to step 1 below set the SCV that is used to a flow rate of approximately 50% to 70% of maximum.**

For other external proportional valves the flow rate from the tractor may need to be adjusted if the flow is coming directly from the tractor remotes. For Sauer Danfoss valves the flow rate may also need to be adjusted. It is suggested that SD Valves with low hysteresis be used - these are more easily controlled.

Step 1: To begin setting up the hydraulic control, press



The screen should look like this with a number beside hydraulic under the Implement CANBUS Modules.

WARNING: Proceed with extreme caution. Ensure personnel are safely away from all hydraulic actuators before performing any hydraulic tests or wheel turns. Return to normal operation mode (main screen) before leaving driver's seat.

| Vehicle | Implement | #2 | #3 | #4 |
|--------------------|-----------|--------|--------|----|
| Valve state: | | | | |
| Switch state: | | | 0x0000 | |
| Module Status: | | 0x0000 | | |
| Wheel angle: | | 000.0 | | |
| Wheel angle (Raw): | | 000.0 | | |
| XTrack (cm): | | 000.0 | | |
| Temperature: | | -1.0° | | |
| Supply Voltage: | | 0.00V | | |
| Label133 | | +0 | | |
| | | +0 | | |
| | | +0 | | |
| Test turn rate: | | 100 | | % |

| Vehicle CANBUS Modules | |
|------------------------|-----|
| Hydraulic: | N/C |
| Wheel Angle: | N/C |
| Console Switch: | N/C |
| Nav: | N/C |
| Temperature: | N/C |
| Lightbar: | N/C |
| External Inputs: | N/C |

| Implement CANBUS Modules | |
|--------------------------|-----|
| Hydraulic: | N/C |
| Console Switch: | N/C |
| Wheel Angle: | N/C |
| Nav: | N/C |
| Sectional Boom: | N/C |
| VRC: | N/C |

If there isn't a number like this – check that the auto engage switch is in the 'ON' position and the red light is on. If the red light is not on – check the power supply. If there is number there, continue.



32.1 Minimum Voltage

Why is this important?

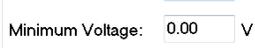
The Minimum Voltage sets the minimum raise and lower rate of cutting blade - it is necessary for it to be slow, but fast enough to allow AgGuide V4 to make minor adjustments to the height.

If the 1% (minimum) turn rate is too low- when the blade is a few centimetres off grade AgGuide V4 won't be able to move the blade fast enough to bring it back to grade.

If the 1% (minimum) turn rate is too high - then the blade will jump above and below the grade rather than providing a smooth ride.

Minimum Voltage Why is this important? (cont)

Changes in terrain, a wet soil, jumping hydraulics, hot oil, are all factors when trying to select the best minimum voltage - set it so that blade moves a small amount and then add a small amount to the minimum voltage.

Step 2: Select 'Minimum Voltage' by pressing it on the screen,  set the minimum voltage to 3.0V

Step 3: Press  - to return to the Hydraulic Test screen

Step 4: Press once  - the 'Test turn rate:' should

now be 1% 

Step 5: Press  - did the blade raise by approximately 20-30mm.

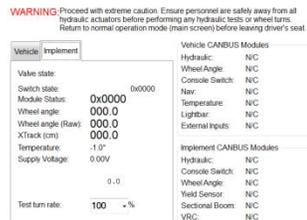
Step 6: If insufficient movement was detected - press

 to 'Minimum Voltage', press  and increase the minimum voltage value by '0.5', press 



Step 7: Press - if there is no movement, repeat step 6 until the blade makes a very slow movement up of approximately 20-30mm.

Note: Pressing the turn right button should cause the blade to rise and left turn should lower the blade. If right turn lowers the blade then the UniPOD controller needs to be reversed.



Needs a new graphic with Unipod plugged in - need set up screen

Step 8: Apply the same procedure to the lowering of the blade Press . Did the blade lower?

Step 9: If insufficient movement was detected –

Press to 'Minimum Voltage', press v and increase the minimum voltage value by '0.5', press .

Step 10: Press press Repeat step 9 until the blade makes a very slow movement down of approximately 20-30mm.

32.2 Offset Voltage

Why is this important?

Some buckets raise or lower at different rates, with wetter soil or when the blade is cutting hard the blade will need an offset voltage to compensate and assist the hydraulics to lift the blade to keep it on grade.

The *Offset Voltage* is really only relevant to equalise the rate of movement at the bottom end of the scale (1% to 20% turn rate). At the *Maximum Voltage* (100%) end of the scale it is not really important.

Note: If the turn rate is not equalised, it may show up as the grade error, indicating the blade is hanging low. This is because the blade falls rapidly below the line, but struggles to rise to grade. If the Offset Voltage is set too high then the opposite is true.

Step 11: Now that the blade raises and lowers –

Does it move at the same rate? e.g. does it lower faster than it raises – gravity can do that!

If there is a noticeable difference - press 

press Offset Voltage: v

If there is no noticeable difference, proceed to step 15.

Step 12: If the blade rises quicker - add a small negative value to decrease the speed of the rising.

blade press 

Step 13: If the blade lowers quicker - add a small positive value to decrease the speed of the

lowering. blade, press 

Step 14: Keep testing and adjusting the 'Offset Voltage' as described in step 12 and 13 until the Lower and Raising rates are equal.

This will need to be checked again as the machine is being operated because it could be different under load.

Step 15: Press  until the 'Test turn rate:' equals

100% Test turn rate: %

32.3 Maximum Voltage

Why is this important?

The Maximum Voltage sets the fastest rate that AgGuide V4 will allow the blade to move - It needs to be fast enough to allow AgGuide V4 to raise or lower the blade quickly enough to get the blade back to grade without travelling past it.

Maximum Voltage is less critical than Minimum Voltage - Set it to be the maximum rate at which you'd feel comfortable with the blade moving.

Step 16: Press  did the blade lower by 10 to 15% of full travel? This will only be 60 to 80 mm.

Step 17: Press  - did the blade raise by approximately 10 to 15% of full travel?

If too much or too little movement was detected – press 

Maximum Voltage: V increase the Maximum Voltage if the movement was too slow and reduce it if the movement was too fast. Press  - continue testing until 10 to 15% of full travel of the blade is achieved.

32.4 Span - maximum and minimum

Why are these important?

Its not, it is irrelevant for Levelguide. Move on please, there is nothing here to see.

32.5 Manual Override and Wheel Angle sensor

Why are these important?

Its not, it is irrelevant for Levelguide. Move on please, there is nothing here to see.

32.6 External Manual Control switch

Why are these important?

If a proportional solenoid valve such as a Sauer Danfoss is used to raise and lower the blade then these settings should be used to control the speed of raising and lowering.

External Manual Switch Control

Enable:

Turn Rate (0-100): %

Step 1: To Enable the External Manual Switch Control Press in the tick box next to Enable:

External Manual Switch Control

Enable:

Turn Rate (0-100): %

Step 2: Press

set the Turn Rate to 100%

Step 3: Press  to return to the Hydraulic test page.

Step 4: Press the Raise and Lower buttons on the External manual switch to test the rate of raising and lowering to determine if these are acceptable.

If the rate is too fast, Press  to re-enter the setup screen and repeat Steps 2 – 4 at a lower Turn Rate percentage.

Note: The  button must be pressed each time a change is made before testing to write these new settings to the controller.

32.7 Additional Setup Information

Because it is difficult to gauge from the vehicle seat the movements of the blade described in the setup procedure, it may be helpful to digress for a moment.

Return to the Hydraulic test screen.

WARNING: Proceed with extreme caution. Ensure personnel are safely away from all hydraulic actuators before performing any hydraulic tests or wheel turns. Return to normal operation mode (main screen) before leaving driver's seat.

| Vehicle | Implement | #2 | #3 | #4 |
|--------------------------|-----------|----|----|----|
| Valve state: | | | | |
| Switch state: 0x0000 | | | | |
| Module Status: 0x0000 | | | | |
| Wheel angle: 000.0 | | | | |
| Wheel angle (Raw): 000.0 | | | | |
| XTrack (cm): 000.0 | | | | |
| Temperature: -1.0° | | | | |
| Supply Voltage: 0.00V | | | | |
| Label133 +0 | | | | |
| +0 | | | | |
| +0 | | | | |
| Test turn rate: 100 % | | | | |

| Vehicle CANBUS Modules | |
|------------------------|-----|
| Hydraulic: | N/C |
| Wheel Angle: | N/C |
| Console Switch: | N/C |
| Nav: | N/C |
| Temperature: | N/C |
| Lightbar: | N/C |
| External Inputs: | N/C |

| Implement CANBUS Modules | |
|--------------------------|-----|
| Hydraulic: | N/C |
| Console Switch: | N/C |
| Wheel Angle: | N/C |
| Nav: | N/C |
| Sectional Boom: | N/C |
| VRC: | N/C |

This XTrack (cm) number can show how much the blade is moving up and down but can only do so if there has already been a plane setup in the Jobs menu. Refer to **Section 7.3.1** Levelguide Plane to find how to do this. Once a plane has been setup then a number other than 000.0 will appear next to the XTrack (cm) - move the blade up and down manually to see it change.

32.8 Setting up the Cross levelling

IMPORTANT

Note before starting this procedure

- In the Agguide software the tilt is measured from the left hand side of the machine. The software assumes that the crossleveling ram is on the left side of the machine. If the ram is on the right side of the machine then lowering the tilt in test mode means that the right side will rise.

The same general procedure applies to setting up the tilt hydraulics as the blade hydraulics.

Step 1: To begin setting up the hydraulic control, press



Then press the **#2 tab**

The screen should look like this with a number beside hydraulic under the Implement CANBUS Modules.

WARNING: Proceed with extreme caution. Ensure personnel are safely away from all hydraulic actuators before performing any hydraulic tests or wheel turns. Return to normal operation mode (main screen) before leaving driver's seat.

| Vehicle | Implement | #2 | #3 | #4 |
|--------------------------|-----------|----|----|----|
| Valve state: | | | | |
| Switch state: 0x0000 | | | | |
| Module Status: 0x0000 | | | | |
| Wheel angle: 000.0 | | | | |
| Wheel angle (Raw): 000.0 | | | | |
| XTrack (cm): 000.0 | | | | |
| Temperature: -1.0° | | | | |
| Supply Voltage: 0.00V | | | | |
| Label133 +0 | | | | |
| +0 | | | | |
| +0 | | | | |
| Test turn rate: 100 % | | | | |

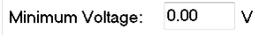
| Vehicle CANBUS Modules | |
|------------------------|-----|
| Hydraulic: | N/C |
| Wheel Angle: | N/C |
| Console Switch: | N/C |
| Nav: | N/C |
| Temperature: | N/C |
| Lightbar: | N/C |
| External Inputs: | N/C |

| Implement CANBUS Modules | |
|--------------------------|-----|
| Hydraulic: | N/C |
| Console Switch: | N/C |
| Wheel Angle: | N/C |
| Nav: | N/C |
| Sectional Boom: | N/C |
| VRC: | N/C |

If there isn't a number like this – check that the auto engage switch is in the 'ON' position and the red light is on. If the red light is not on – check the power supply. If there is number there, continue.

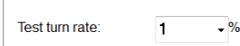


32.9 Minimum Voltage

Step 2: Select 'Minimum Voltage' by pressing it on the screen,  set the minimum voltage to 2.0V

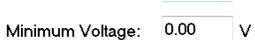
Step 3: Press  - to return to the Hydraulic Test screen

Step 4: Press once  the 'Test turn rate:' should

now be 1% 

Step 5: Press  - did the right side of the blade should fall by approximately 30-40mm. This will be seen as a tilt of approximately 1% on the screen.

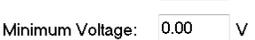
Step 6: If insufficient movement was detected - press

 to 'Minimum Voltage', press  and increase the minimum voltage value by '0.5', press 

Step 7: Press  - if there is no movement, repeat step 6 until the right side of the blade makes a very slow movement up of approximately 30-40mm.

Step 8: Apply the same procedure to the lowering of the blade Press . Did the right side of the blade rise?

Step 9: If insufficient movement was detected –

Press  to 'Minimum Voltage', press  and increase the minimum voltage value by '0.5', press .

Step 10: Press  press  Repeat step 9 until the blade makes a very slow movement up of approximately 30-40mm.

32.10 Offset Voltage

Step 11: Now that the blade raises and lowers –
Does it move at the same rate? e.g. does it lower faster than it raises – gravity can do that!

If there is a noticeable difference - press 

press **Offset Voltage:** V

If there is no noticeable difference, proceed to step 15.

Step 12: If the blade rises quicker - add a small negative value to decrease the speed of the rising.

blade press 

Step 13: If the blade lowers quicker - add a small positive value to decrease the speed of the

lowering. blade, press 

Step 14: Keep testing and adjusting the 'Offset Voltage' as described in step 12 and 13 until the Lower and Raising rates are equal.

This will need to be checked again as the machine is being operated because it could be different under load.

Step 15: Press  until the 'Test turn rate:' equals

100% **Test turn rate:** %

32.11 Maximum Voltage

Step 16: Press  did the blade lower by 10 to 15% of full travel? This will only be 60 to 80 mm.

Step 17: Press  - did the wheels turn to the raise by approximately 10 to 15% of full travel?

If too much or too little movement was detected – press 

Maximum Voltage: V

and increase the Maximum Voltage if the movement was too slow

and reduce it if the movement was too fast. Press  - continue testing until 10 to 15% of full travel of the blade is achieved.

Step 11: Now that the blade raises and lowers –

Does it move at the same rate? e.g. does it lower faster than it raises – gravity can do that!

If there is a noticeable difference - press 

press Offset Voltage: V

If there is no noticeable difference, proceed to step 15.

Step 12: If the blade rises quicker - add a small negative value to decrease the speed of the rising.

blade press 

Step 13: If the blade lowers quicker - add a small positive value to decrease the speed of the

lowering. blade, press 

Step 14: Keep testing and adjusting the 'Offset

Voltage' as described in step 12 and 13 until the Lower and Raising rates are equal.

This will need to be checked again as the machine is being operated because it could be different under load.

Step 15: Press  until the 'Test turn rate:' equals 100%

Test turn rate: %

33 SETTING UP THE GAINS

33.1 Setting up the XTrack Gain

Why are these important?

AgGuide V4 is trying to balance the speed at which the valve moves the hydraulic rams that control the blade to reaching the target plane.

If the blade is *offset from the target plane* (you have a Cross Track Error value), then it needs to move the blade *towards the plane*. How vigorously it does this is controlled by the XTrack Gain (XTG).

Because of variations in field conditions and because the Hydraulic setup should not change just because conditions change, we can achieve the same result by adjusting the XTrack Gain.

When we need more vigorous blade movement (rough ground or heavy implement), then increasing the XTrack Gain forces AgGuide V4 to demand a larger blade movement per cm of XTE.

The *maximum voltage* determines the fastest oil flow the valve can deliver to the hydraulic ram that controls the blade height when it is a long way from the target plane when a large adjustment is required.

The *minimum voltage* determines the smallest oil flow the valve can deliver to the hydraulic ram that controls the blade height when it is close to the target plane when only a small adjustment is required.

The XTrack Gain determines what the software regards as the blade being a 'long way' from the target plane. For example :-

If the XTrack Gain is set on 1.0 the software determines that any distance greater than 10 cm is a long way from the Target plane and opens the valve fully until the blade is less than 10 cm from the target plane then proportionally closes the valve until it reaches 1 cm from the Target plane by which time the valve will be at its minimum flow rate.

If the XTrack Gain is set on 2.0 the software determines that any distance greater than 5 cm is a long way from the Target plane and opens the valve fully until the blade is less than 5 cm from the target plane then proportionally closes the valve until it reaches 1 cm from the Target plane by which time the valve will be at its minimum flow rate.

So increasing the XTrack Gain reduces the distance from the Target Plane that the software opens the valve to its maximum setting.

The closer to the Target plane the valve is opened to its maximum flow rate then the more chance it has of not being able to close to its minimum flow in time to stop the blade overshooting the target plane.

The XTrack Gain is the parameter that is used to balance speed of movement of the blade and the overshooting of the blade on the Target plane.

Note: The default value for the XTrack Gain is 2.0, this is a good place to start.

33.2 To set the XTrack Gain

Step 1 Press    The following screen will appear.



To increase the XTrack Gain, press , to decrease the Xtrack Gain, press . Alternatively press  and a virtual keyboard will appear where the number can be set.

AgGuide V4 is trying to balance the speed of the hydraulic rams that control the blade, without overshooting the target plane.

Since there is an interaction between Gain and the Hydraulic setup, do not try changing the Gain until

33.3 Setting up the XTilt Gain

Why are these important?

AgGuide V4 is trying to balance the speed at which the valve moves the hydraulic rams that control the blade to reaching the target plane.

If the blade is *offset from the target tilt* (you have a Cross Track Error value), then it needs to move the blade *towards the plane*. How vigorously it does this is controlled by the XTilt Gain.

Because of variations in field conditions and because the Hydraulic setup should not change just because conditions change, we can achieve the same result by adjusting the XTilt Gain.

When we need more vigorous blade movement (rough ground or heavy implement), then increasing the XTilt Gain forces AgGuide V4 to demand a larger blade movement per percentage of Tilt error.

The *maximum voltage* determines the fastest oil flow the valve can deliver to the hydraulic ram that controls the blade tilt when it is a long way from the target tilt when a large adjustment is required.

The *minimum voltage* determines the smallest oil flow the valve can deliver to the hydraulic ram that controls the blade height when it is close to the target plane when only a small adjustment is required.

The XTilt Gain determines what the software regards as the blade being a 'long way' from the target tilt.

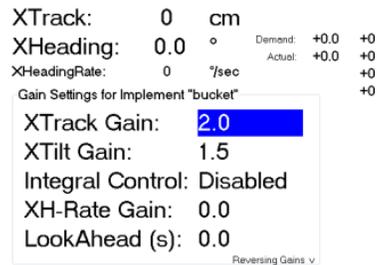
So as with the XTrack Gain, increasing the XTilt reduces the distance from the Target tilt that the software opens the valve to its maximum setting.

The closer to the Target tilt the valve is opened to its maximum flow rate then the more chance it has of not being able to close to its minimum flow in time to stop the blade overshooting the target tilt.

The XTilt Gain is the parameter that is used to balance the speed of movement of the blade and the overshooting of the blade on the Target tilt.

33.4 To set the XTilt Gain

Step 1 Press    The following screen will appear.



Step 2 Press  to move down to the XTilt Gain. To increase the XTilt Gain, press , to decrease the XTilt Gain, press . Alternatively press  and a virtual keyboard will appear where the number can be set.

Note: The default value for the XTilt Gain is 1.5, this is a good place to start.

33.5 Integral Control

While the Integral Control is not used in the control of the blade for height or tilt. **Integral Control must be set to Disabled.**

Step 1 Press   

Step 2 Press  to move down to Intergral Control.

Step 3 Press 

33.6 Other Settings

None of the other settings on the Gains screen have any relevance to Blade control and should all be set to zero.

34 TROUBLESHOOTING HYDRAULICS

Auto will not engage

- Using the Case hydraulic interface cable to control the blade, check auto has been engaged for the Tractor hydraulics. Also check the speed settings in Implement setup are within the operating range.
- Using the John Deere hydraulic interface cable to control the blade, check the speed settings in Implement setup are within the operating range.
- Using a proportional valve such as a Sauer danfoss to control the blade, check the speed settings in Implement setup are within the operating range.
- Check that Blade control hasn't been accidentally disabled, press the left hand side of the working screen to see this setting near the top of the screen.

Hydraulic error appears on the Tractor gauge panel and the blade cannot be raised or lowered.

- Check that the valve settings are within the range indicated at the beginning of the section on Hydraulics.
- Check in the Implement setup under Control that the Control Mode is set to Case / JD.
- Check that the auto engage switch has not been switched to the off position.

The blade is hanging low below the grade – change the offset voltage so that the blade rises faster than it lowers.

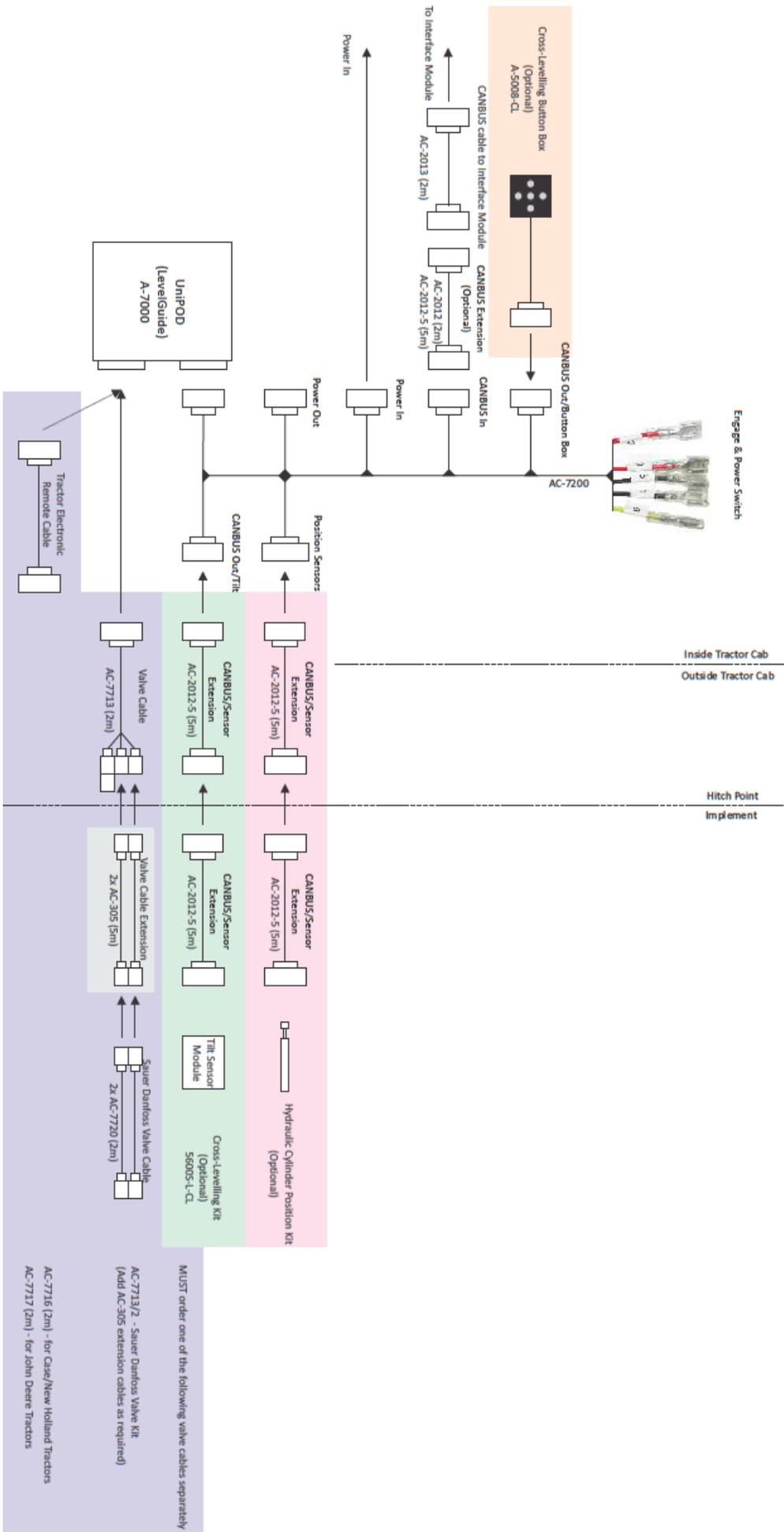
The blade is hanging low below the grade in heavier cuts – change the minimum voltage so that the blade rises faster than it lowers.

The blade is hanging high above the grade – change the offset voltage so that the blade lowers faster than it rises.

The blade is moving above and below the grade quickly – lower the maximum voltage so that the blade height changes slower. The blade is moving too quickly when it is further away from the grade and is passing through the grade without being controlled.

Increasing the dead band may also help here.

The blade is moving above and below the grade slowly – reduce the maximum and minimum voltages and increase the X track Gain setting



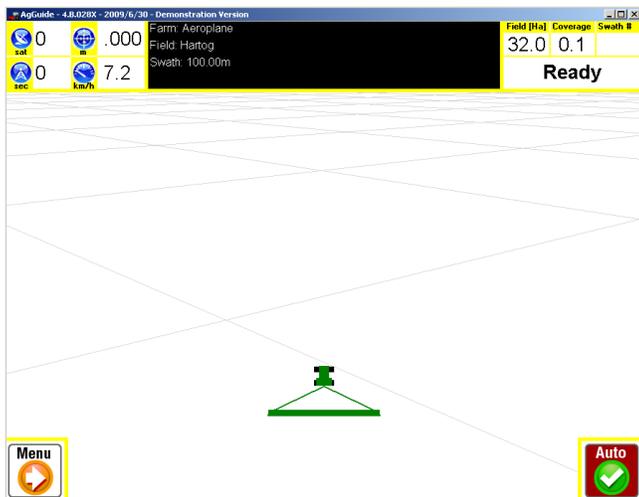
APPENDIX A - QUICKSTART GUIDE

NOTICE: This quickstart guide gives you the basic steps required to successfully use your AgGuide V4 system AFTER the initial setup and adjustments have been done. If you attempt to operate the system without correctly following the initial setup instructions outlined in this manual, your system will not work.

WARNING: CRASH HAZARD - DO NOT have the AgGuide V4 touchscreen PC turned on whilst travelling on public access roads, parking or performing maintenance on the tractor. Failure to do so may result in equipment damage, personal injury or death.

NOTE: The tractor must be in the field and stationary prior to AgGuide V4 start-up.

Power up the touch-screen PC



After a few seconds the PC will start-up and the default main screen will be shown. The

system will “remember” the last Farm and Field you were working with.

If you are continuing from the previous days work – drive the tractor to the required position in the field and simply press the

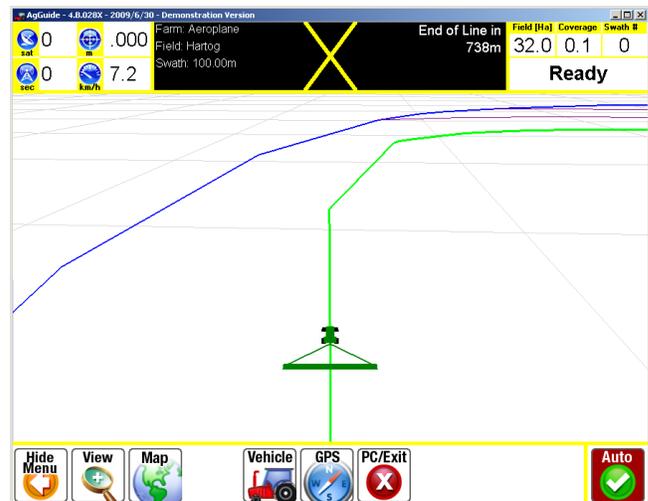


button to engage the auto-steer function.

If you require to work a different farm and/or field you will need to load the necessary farm and field information

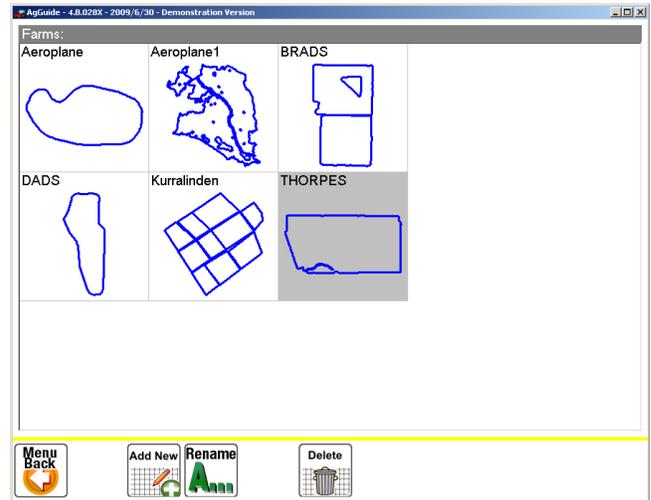
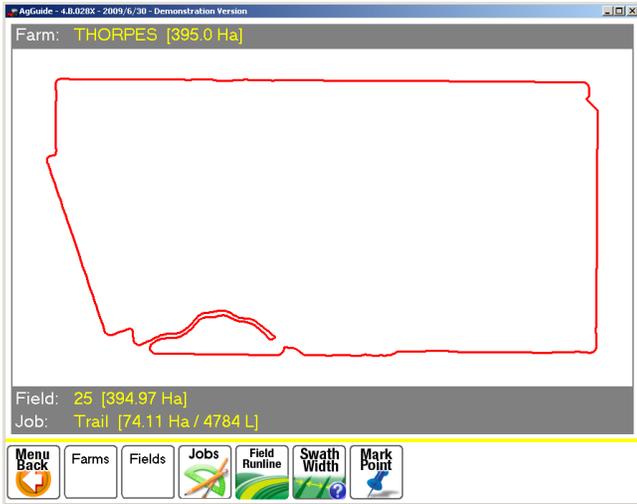


Select the button on the main screen and then select the MAP button



Select the Farms and/or Fields button as required





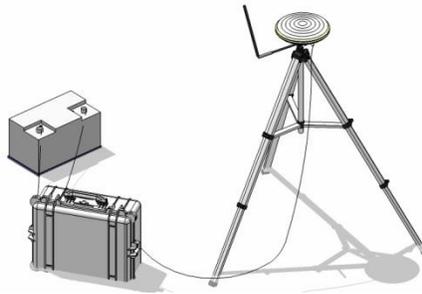
Select and highlight the desired FARM or FIELD and then press the  button until you return to the main screen

You are now ready to work the new Farm and/or Field - press the  button to engage the auto-steer function.

APPENDIX B – GENERAL TROUBLESHOOTING

WARNING: Ensure the tractor has been isolated in accordance with site specific safety procedures prior to carrying out any troubleshooting, adjustment and/or maintenance of this equipment.

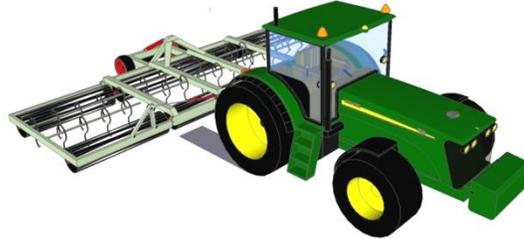
Base Station and GPS



| Problem | Action |
|---|--|
| Pelican Case : No Green light blinking | Check GPS antenna cable/connection |
| Red light is blinking once per second | Check GPS antenna cable/connection |
| Fast blinking red light | OAF has expired – Contact your local Farmscan dealer |
| External radio has no light | Check power to the radio (Press ON/OFF button) |
| External radio has constant red power light | Check the base station position and reset if necessary |
| External radio RX light is active | There is interference from another base station (Reset the base station position) |
| TX light not blinking | Check the base station position and reset if necessary |
| No blinking light on the external radio | Check the base station position and reset if necessary |
| Low power light is active | Check the power source Check all power cables and connections) |

| | |
|-----------------------------|---|
| Temperature light is active | Open the Pelican Case and put in a cool shady location to avoid overheating |
|-----------------------------|---|

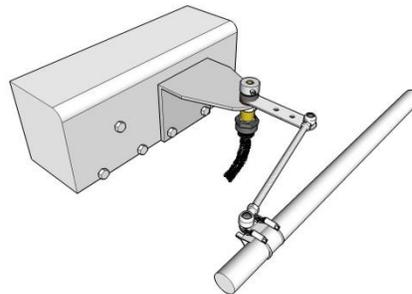
Tractor and/or Implement GPS



| Problem | Action |
|---|---|
| No Green light blinking on GPS | Check GPS antenna cable/connection |
| Red light is blinking once per second | Check GPS antenna cable/connection |
| Fast blinking red light | OAF has expired – Contact your local Farmscan dealer |
| No GPS data showing on the Align PC | Check the * pin cable connection at the PC and the GPS (Perform Reset Rover on the PC) |
| The words NO GPS appear in the message bar on the front screen | Check the Date and Time appear on the GPS Diagnostic Screen and are changing at 5 times per second - Incorrect Serial Port settings have been selected, or incorrect Baud Rate has been selected for the GPS. Refer to Section 4.2.1 Setting Up GPS. |
| No Date and Time appear on the GPS Diagnostic Screen | Incorrect Serial Port settings have been selected, or incorrect Baud Rate has been selected for the GPS. Refer to Section 4.2.1 Setting Up GPS. Problem usually occurs when a new Interface Module has been installed or the setting have been lost. |
| The words GPS Serial Fault appear in the message bar on the front screen | Check the Green light is blinking on GPS Receiver - Check above |

| | |
|--|---|
| <p>The words GPS Serial Fault appear in the message bar on the front screen</p> | <p>Check the Date and Time appear on the GPS Diagnostic Screen and are changing at 5 times per second - Incorrect Serial Port settings have been selected, or incorrect Baud Rate has been selected for the GPS. Refer to Section 4.2.1 Setting Up GPS.</p> <p>Problem usually occurs when a new Interface Module has been installed or the setting have been lost.</p> |
| <p>The words INADEQUATE GPS appear in the message bar on the front screen</p> | <p>If the GPS Reciever has recently been changed - check the GPS setup.</p> <p>Problem usually occurs when a new Interface Module has been installed or the settings have been lost.</p> |
| | |

Wheel Angle Sensor



| Problem | Action |
|--|--|
| Tractor not steering in a straight line | Reset the Centre Wheels on the PC. Refer to Section 3.2 |
| Tractor steering parallel to the runline | Perform a Fine Adjustment of the Centre Wheels on the PC. Refer to Section 3.2 |
| Tractor steering parallel to the runline | Increase the X-track gain on the PC |
| Centre Wheels constantly requires adjustments | Physically check the Wheel Angle Sensor (check for a loose grub screw in particular) |
| Tractor appears to move off the runline when first engaged, then gradually | Reset the Centre Wheels on the PC. Refer to Section 3.2 |

| | |
|-----------------|--|
| returns to line | |
|-----------------|--|

CAN Bus

| Problem | Action |
|--|--|
| Auto-Steer will not engage | Reset the CanBus– Wait 30 secs and retry |
| Wheel Angle Sensor CanBus values are showing - NC or a large number like 32000 | Reset the CanBus – Wait 30 secs and retry |
| Wheel Angle Sensor CanBus values are showing - NC or a large number like 32000 | Physically check the CanBus cable and connections - Reset the CanBus – Wait 30 secs and retry |
| The words Canbus Serial Fault appear in the message bar on the front screen. | Check that the engage switch is in the middle position - red light in the middle of the switch should be on. |
| The engage switch is in the middle position and the red light in the middle of the switch is not on. | Check that the wires to the engage switch are connected. Check that there is power to the system. |
| The words Canbus Serial Fault appear in the message bar on the front screen | Incorrect Serial Port settings have been selected in the Coms Settings. |

PC Terminal



| Problem | Action |
|--------------------------------------|---|
| PC Freezes | Reboot the PC (Hold down “POWER” until it turns off and then turn back on again |
| PC does not turn on | Physically check the power cable and connection to ensure PC is plugged in to the power supply |
| No lights showing on the PC Terminal | Probably lost power. Check the Vehicle fuse the power cable is connected to. Check the fuse in the PC Terminal power cable near the |

APPENDIX C – UTM ZONE MAP

