



# Operator's Manual

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**Caution****CAUTION !!**

PRO Steer is an automated steering system that must only be operated by a trained operator at all times.

Whilst PRO Steer will automatically steer the vehicle to a predetermined line, the operator must be alert and manually take control from time to time. Failure to adhere to this and the following points may result in the damage of property, personal injury and even death.

PRO Steer is not to be used on public or private roads, and whilst on the roads and in transport mode, PRO Steer must be disabled via the MANUAL OVER-RIDE SWITCH. This is to stop inadvertent activation of the automated steering.

The operator must never leave the vehicle steering station whilst PRO Steer is activated.

When in "**PARALLEL**" mode, the operator **MUST** manually turn the vehicle at the end of rows.

When in "**CONTOUR, or RACETRACK**" modes the operator **MUST** manually turn the vehicle on sharp corners.

Whilst every effort has been made to ensure the manual contents are correct, some makes and models of vehicles and DGPS units change periodically, and therefore the manufacturer warns that the purchaser may have to purchase extra hydraulic fittings for their particular vehicle, and that the electrical connections of DGPS units and radios may not be correct at the time of fitment .

The manufacturer of PRO Steer does not manufacture DGPS units and cannot guarantee the accuracy or service of the DGPS units.

However, all reasonable time and effort has been spent on ensuring reputable signal transmitting and receiving devices have been procured for the PRO Steer system.



## 1.0 GPS AND PRO STEER BACKGROUND

### Sub Metre

Sub Metre correction is derived from five possible sources.

- 1- **Omnistar VBS**, recognized as accurate to less than one metre 95% of the time. This is a signal broadcast from base stations via the OPTUS satellite, which corrects the position from the raw GPS satellites. Available worldwide, it is recognized as the benchmark in sub metre corrections. This is a subscription based signal, paid yearly to OMNISTAR.
- 2- **Marine Beacon**, commonly regarded as accurate to less than three metres 95% of the time. This signal is derived from Marine Base stations (BEACONS) that transmit the corrected signal to Marine capable receivers. It is restrictive in distance from the base transmitter, although there have been reports of acceptable signal receivers of up to 500kms from the transmitting base. The signal will deteriorate and be less accurate the further away from the transmitting base station that you travel. This signal is free to the end user, providing you are within the range of the transmitting beacons.
- 3- **WAAS**, is only available in North America. This is a signal that uses numerous land based transmitters and satellites to transmit corrections. It is regarded as sub metre, with the accuracy closer to the Marine Beacon status. This is a free signal, and compatible receivers must be used.
- 4- **EDIF**, is utilising technology in the form of software to enable the GPS to determine its own accuracy of position. Whilst it is better than autonomous signal ( raw GPS ), it does require resetting as satellite constellations change. The accuracy is around the same as the Marine Beacon signal. This signal attracts a one off cost and is only available on receivers manufactured by CSI, such as the KEE Triple X.
- 5- **Starfire**, is a signal operated by John Deere, and is widely recognized as a 10cm signal. It is in fact a sub metre signal that has "pass to pass" accuracy of 10cm. This is the same for all of the above signals. Pass to pass means the travelling past the same point within 15 minutes.



## HP

HP is an industry standard terminology for the "HIGH PRECISION" accuracy signal derived from the Omnistar service.

The GPS engine used is of far better quality than the standard sub metre, and is therefore retailed at a greater cost.

The HP signal is a sub 10cm signal, which means that the scatter plot will be within 10cm for a minimum of 90% of the time.

In trials conducted over the past year a "pass to pass" accuracy of less than 5cm (2 inches) was experienced, which seems more than acceptable for the majority of broadacre applications.

This accuracy gives the operator the ability to come back to the same guidance lines (within 10cm) year after year.

The "nudge" feature within the PRO Steer ensures accurate repeatability without the problems that base stations sometimes incur: range, power demands, damage etc.

The HP signal is not confined to a small area, so large farmers are able to roam the farm from one end to the other without signal failure

The HP signal covers the same area as the VBS signal. It is a yearly subscription, and farm packages are available to allow more than one unit to be subscribed under the one license.  
(Omnistar is to be contacted for more exact costing)

John Deere also has a 10cm repeatable signal that is referred to as SF2 receiver.



## RTK

RTK is generally referred to as the sub 2cm, or sub 1inch accuracy signal. This system works by having two DGPS units operating together. One being the "Base" unit and the other being the "Rover" unit.

The Base unit has the co-ordinates "locked" and receives the normal satellite signal, measures the difference, and sends the corrections to the Rover via an external radio. Both of the DGPS units have radios and antennas for the transmission of corrections.

This system is widely regarded as giving the most accurate repeatable signal due to the Base and the Rover being in close proximity to one another. Thus reducing the atmospheric changes that can distort satellite signals.

The Base station can be either be fixed, or be moved around from one spot to another. Each time it is moved, the DGPS has to be configured, and "locked" into position. It is important to have the Base DGPS antenna placed in exactly the same position each time you return to a spot, otherwise the repeatability will be lost.

The radios are the limiting factor to the RTK system, as typical reception is 5-10 km's (3-6 miles), due to the "line of sight" capabilities of the radios. This is why the Base station must be able to be moved.

With some radios ( operating on VHF signal) there is a yearly license fee payable. This system gives far greater distance and less chance of dropping signal due to trees etc. For the small yearly license fee, these radios are worth the extra cost. The transmitting radio antenna must be mounted as high as possible. HEIGHT IS EVERYTHING.

There are two types of RTK depending on the type of DGPS receivers used.

Single Frequency(SF) RTK, uses only the L1 band of satellite information, is cheaper, but signal can drop out easily from trees etc.

Dual Frequency(DF) RTK, uses L1 and also L2 bands. This gives greater accuracy, and also has less chance of the signal dropping. If the signal does drop out, the reacquisition time is quicker than the SF RTK system.





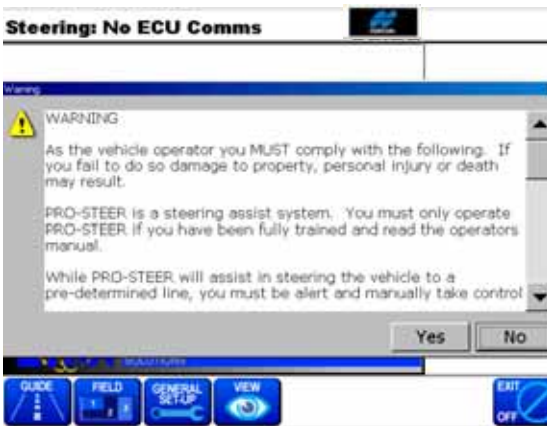
**Guidance Startup**

When the KEE Ag software gets to this screen, select the **STOP** button at the bottom left of the screen.



This allows you to select the software functions you wish to control. For the PRO Steer function, select the **GUIDANCE/STEER ASSIST** button. This icon will appear highlighted, and will be selected when the **START** button is selected, which is located in the bottom right hand screen corner.

This is also where you select any other simultaneous functions that you require to utilise. For further instruction on the other software available, refer to the relevant application manuals.



On startup a **DISCLAIMER** will appear. If **YES** is selected, **STEERING ASSIST** will be allowed. If **NO** is selected then steering will not be allowed. **The operator must read and accept the conditions to use the Steering Assist**

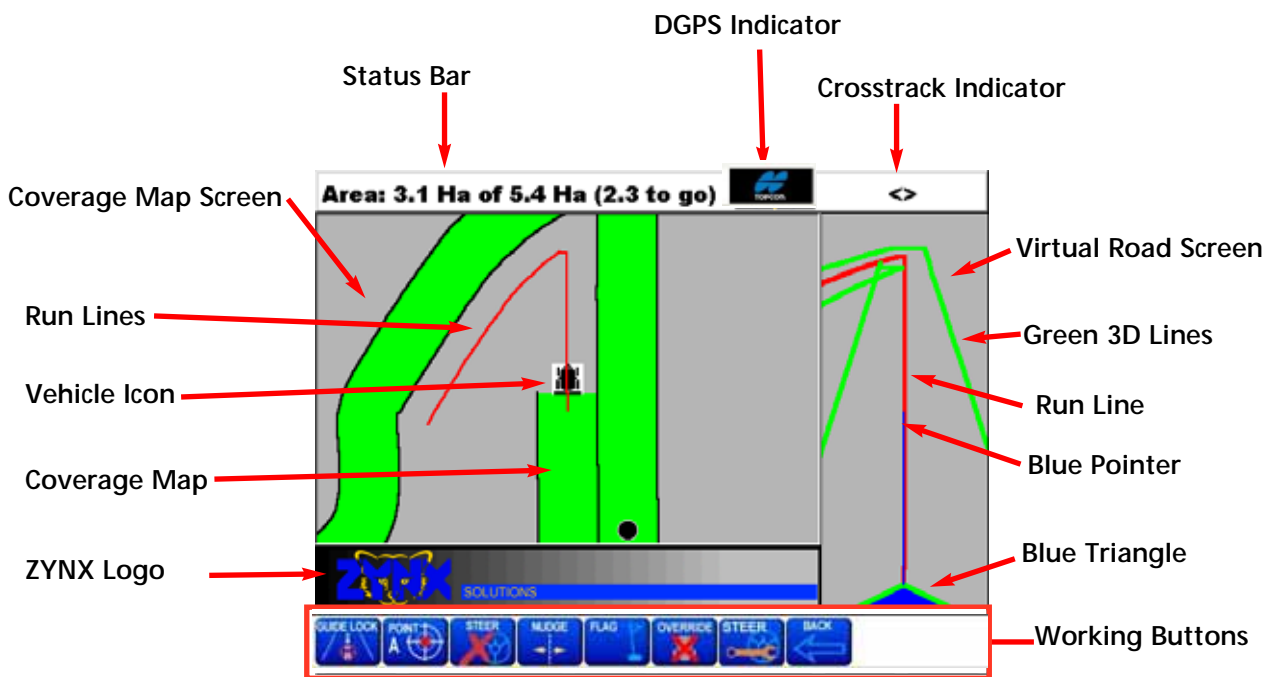


Once the PRO Steer software has loaded up ( shown left), there is several settings that should be entered prior to use.

With this screen showing, select the **GENERAL SETUP** button.



## Guidance Overview



**Figure 1: Guidance Screen**

### Status Bar

The "Status Bar" allows the operator to observe information such as Speed; Area Covered, Boundary Area; DGPS Position; Current Field Number, Current Swath Width. The different items can be shown by selecting "Status Bar".

### Coverage Map Screen

The "Coverage Map Screen" displays the green coverage map showing the areas that have been treated.

The "Coverage Map Screen" displays vehicle position, shows the current "Run Line", the operator is driving to; displays "Flag Points", displays the Parallel Points, if the points where selected.

### Coverage Map

The machine width is displayed with Green swaths, enabling the operator to determine which areas that have been treated and the areas that are yet to be covered.

### Vehicle Icon

The "Vehicle Icon" represents the vehicle in relation to the paddock, the vehicle shows whether the Guidance is mapping or not. The "Vehicle Icon" is shown at all times whether the mapping is turned ON or OFF. By selecting the "Vehicle Icon" the mapping can be switched ON; by selecting the "Vehicle Icon" again the mapping will switch OFF.

### ZYNX Logo

The "Zynx Logo" allows access to:

- 1- X20 Console Audio Volume adjustment.
- 2- Setting Up a Boom Sensing Interface Kit. (Optional Extra).
- 3- Setting Up a GuideLock Switchbox. (Optional Extra).

## Guidance Overview

### Run Lines

The "Run Lines" represent the path the vehicle has to follow.

The "Run Lines" when in "Round and Round" mode were setup whilst mirror-imaging the previous lap. While the vehicle is following the current "Run Line", the "Run Lines" are being setup for the next lap. So when in "Round and Round" mode the Guidance is continually giving the operator a Virtual Road to follow and setting up "Run Lines" for the next lap.

The "Run Lines" are setup for "Parallel Mode" by selecting an "A" and "B" point and selecting the "PARALLEL" button. Then the closest Parallel Line is shown in the "Virtual Road" screen.

The "Run Lines" shown in the "Coverage Map" screen are represented in the "Virtual Road" screen as the "Red Line" in the middle of the road.

### Virtual Road Screen

The "Virtual Road" gives the operator the fine adjustment for driving to the screen. The Virtual Road shows any curves, bends or corners coming up and allows the operator to accurately drive to the road.

The "Green '3D' lines" gives the appearance of looking into the distance and represents the outside edges of the implements swath.

The "Blue Pointer" projecting out of the "Blue Triangle" is like an imaginary line coming out of the vehicle giving the operator an idea how the vehicle is positioned to the "Red Run Line". Whether the vehicle is running parallel to the "Red Run Line" or at an angle. The "Blue Pointer" projects an estimated path of approximately 10-20m from the vehicle.

The "Blue Triangle" represents the vehicle. The apex of the triangle represents the DGPS antenna, on the vehicle. The Base of the triangle represents the swath of the implement.

When driving to the "Virtual Road" the operator should be driving to where the apex of the triangle is and NOT where the "Blue Pointer" is projecting to.

### Crosstrack Indicator

The "Crosstrack Indicator" shows the operator how accurately he is driving to the "Virtual Road" screen. Arrows (<) are displayed and each '<' represents a distance; the more arrows displayed the more inaccurately the operator is driving to the "Virtual Road". The distance each arrow (<) represents can be changed.

### DGPS Indicator

The 'Flashing' icon appears when a Differential GPS (DGPS) Correction is present. By selecting the "DGPS Indicator" a "GPS Details" window appears displaying GPS information, ie.

No of Satellites, PDOP, GPS heading etc.

### Function Buttons

The "Function Buttons" gives the operator access to all the operations needed whilst using the guidance. There are 4 different views of the "Function Buttons" they are:

1. Guidance Startup buttons, see Figure 2.
2. Field/Restart buttons, see Figure 5.
3. Guidance Working buttons, see Figure 4.
4. View buttons, see Figure 3.

The different views, display different buttons, the next section will show the operator what the different views look like and how to switch from one view to another. The section will also give a brief explanation of the Function buttons.

The "Function Buttons" that are shaded out are not accessible, ie. "NUDGE".



## Function Buttons Overview



Figure 2: Guidance Startup buttons

The Guidance Startup buttons are displayed when:

1. The Guidance screen is first started.
2. The BACK button from the FIELD/RESTART buttons, (Figure 5) is selected.
3. The BACK button from the Guidance Working buttons (Figure 4) is selected.
4. GUIDE button- when selected will display the Guidance Working buttons, Figure 4.
5. FIELD button- when selected will display the FIELD/RESTART buttons, Figure 5.
6. GENERAL SET-UP button- when selected will display the 'General Setup' window, this allows the Guidance settings to be entered.
7. VIEW button- when selected will display VIEW buttons, Figure 3.
8. EXIT/OFF button- when selected will allow to shut down the Guidance.



Figure 3: VIEW buttons

The VIEW buttons in Figure 3 are displayed when the VIEW button is selected from the Guidance Startup buttons Figure 2, is selected.

1. Select the BACK button, to display the Guidance Startup buttons, Figure 2.

A brief description of the VIEW buttons:

1. The "VIEW IN" button 'zooms in' on the coverage map.
2. The "VIEW OUT" button 'zooms out' on the coverage map.
3. The "VIEW ALL" button is only accessible when the "VIEW MODE" button is selected. This button sizes the coverage map to fit within the Coverage Map screen.
4. The "VIEW MODE" button switches the Coverage Map screen from "LIVE MODE" to "VIEW MODE".
5. The "LIVE MODE" button displays actual Coverage map screen receiving updated DGPS positions. The "LIVE MODE" is the default mode.
6. HEADS UP button displays the coverage map so the vehicle is always facing up the screen no matter what direction the vehicle is facing, the map moves around under the vehicle. Heads Up is the default setting.
7. NORTH UP button displays the coverage map so the vehicle icon changes and will face the degree direction that the DGPS is reading at the particular time. The map is stationary and the vehicle moves around the map. The top of the console screen is due north.

## Function Buttons Overview



Figure 4: Guidance Working buttons

STEER Engage and STEER Disengage button. (STEER Disengage status shown.)

STEER Setup button

The Guidance Working buttons in Figure 4 are displayed when the GUIDE button is selected from the Guidance Startup buttons Figure 2, is selected. The Guidance Working buttons are the buttons normally displayed when using the guidance.

1. Select the BACK button, to display the Guidance Startup buttons, Figure 2.

A brief description of the Guidance Working buttons:

1. The "GUIDE LOCK" button allows the operator to activate the "Virtual Road" when within a swath of the last lap, when in "Round and Round" mode. Allows the operator to switch from "Parallel" mode back to "Round and Round" mode.
2. The "POINT A" button allows the setup of Parallel lines so the operator will have guidance in Parallel mode. When the "POINT A" button is selected it sets an "A" point and the button changes to "POINT B". When the "POINT B" button is selected this sets up an "B" point then the button changes to "PARALLEL". When the "PARALLEL" button is selected switches the mode from "Round and Round" mode to "Parallel" mode. If no Parallel Points have been setup then the "A" button is displayed indicating the Parallel points have to be setup.
3. The "STEER" button has two states:
  1. Engage (green tick)
  2. Disengage (red cross).

The STEER- Engage button is displayed when there is valid RunLine. When the STEER-Engage is pressed and the steering engages, the button changes to STEER-Disengage. Then when the STEER-Disengage button is pressed this dis-engages the auto-steer and displays the STEER-Engage button.
4. The "NUDGE" button becomes accessible when the Guidance is set up for Parallel Mode. The NUDGE feature corrects changes and 'drift' in DGPS position. The NUDGE feature when selected will correct DGPS positions of the 'Coverage map', Parallel Lines and Flag Points.
5. The "FLAG" button allows the operator to flag points of interest while using the Guidance. The operator can name 10 different Flag points to suit your operation.
6. The "OVERRIDE" button is only displayed when selected in "General Setup". This is used in conjunction with the Sprayer Interface (Optional) when using Auto Section Control (ASC). This allows the operator, by selecting the "OVERRIDE" button, ( a X is displayed on the "Vehicle Icon" to show the "OVERRIDE" button is being used), to drive over and treat areas that have already been treated. When using ASC in normal mode the ASC will not allow the operator to treat areas that have already been treated previously..
7. The STEER-Setup button accesses the 'ProCal Setup' window (this allows settings to be changed) while on the Guidance Working screen. *Note: the STEERING button in the Guidance/General Setup accesses the same 'ProCal Setup' window, as the STEER- Setup button either can be used.*

## Function Buttons Overview



Figure 5: FIELD/RESTART buttons

The FIELD/RESTART buttons displayed in Figure 5 are displayed when the FIELD button is selected from Guidance Startup buttons, see Figure 2.

1. FIELD button- when selected will access the 9 Field screens.
2. RESTART/SWATH button- select this button to clear the current field and/or set a new swath value.
3. BACK button- select this button to display the Guidance Startup buttons, Figure 2.

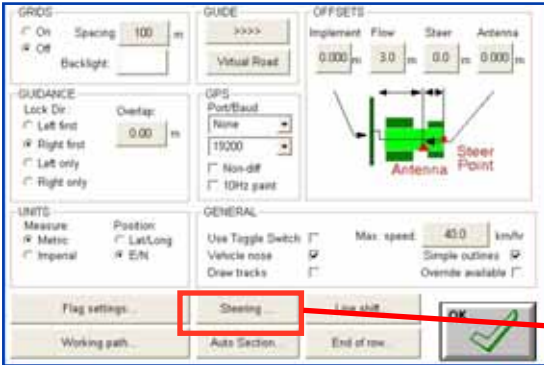
PRO Steer Settings

This page is where all of the normal GUIDANCE settings are configured, and once these settings have been set there will be little need to access this page.

These settings will be covered from page 21.

The PRO Steer settings are accessed by selecting the **STEERING** button.

*Note: The ProSteer settings can also be accessed using the STEER-Setup button from the Guidance Working screen buttons, see Figure 4.*

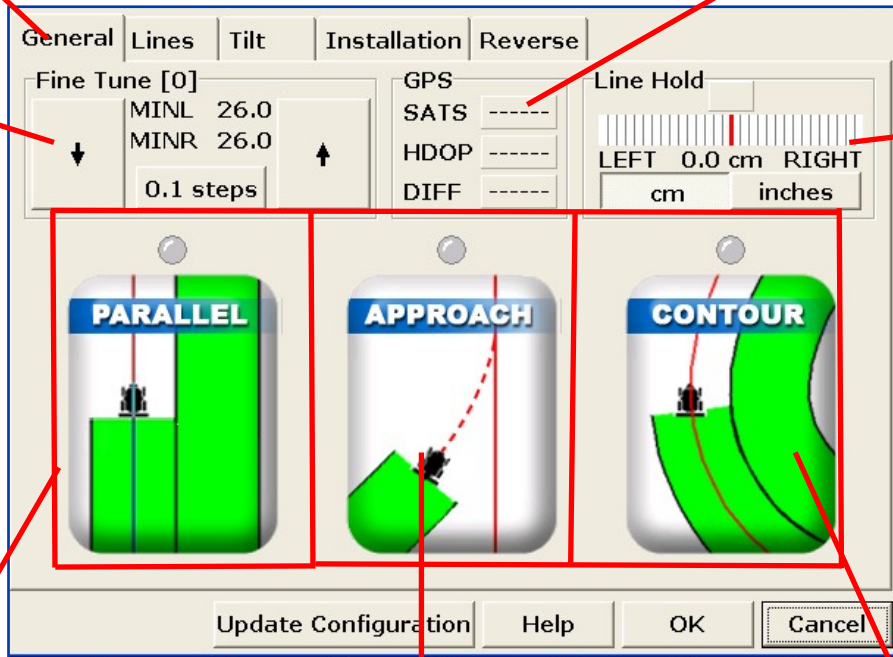


General

GPS

Fine Tune

Line Hold



Parallel

Approach

Contour

1. Press the Parallel button to set up the ProSteer for Parallel mode.
2. Press the Approach button to setup the ProSteer as the vehicle approaches the RunLine.
3. Press the Contour button to setup the ProSteer for round and round mode



## General:

**Fine Tune:** The Fine Tune feature allows the operator to change the Minimum Valve adjustments ( step # 5 within ProCal) while the machine is in the steering assist mode. The increments are in 1/10th, which allows for exact tuning of the minimums. This is used when the machine is first used and the oil is cold, the minimums can be adjusted to counteract the effects of the cold oil. When the oil heats up, they can be manually adjusted to give better control.

**GPS:** This area allows the operator to see at a glance when tuning the PRO Steer the GPS conditions at the same time. For example, the machine moves to the left 300mm (10") suddenly. The cause could be from a satellite change if using a sub meter GPS receiver.

**SATS** indicate the number of satellites the DGPS unit is using.

**HDOP** is indicating the amount of atmospheric "clutter" causing bad positioning. A figure of 1 and lower is good, higher than 1.5 is indicating that the GPS positioning is of poor accuracy.

**Diff** indicates what type of differential fix is being received by the GPS.

1 = No differential, 2 = Sub Meter, 5 = HP (10cm) & RTK Float, 4 = RTK Fixed.

**Line Hold:** This graph allows the operator to tune the steering so that the steering is controlling to the line that is required. The graph goes from RED LINE ( Steering exactly on the line), to Green (From zero to 1" (2.5cm)), to Blue ( 1" to 4" (2cm to 10cm)), to YELLOW (4" to 6" (10cm to 15cm)) and out to RED, which is over 6" (15cm) from the desired line.

Once the machine is tuned, this graph should be on the RED LINE with occasional flickers of GREEN and BLUE

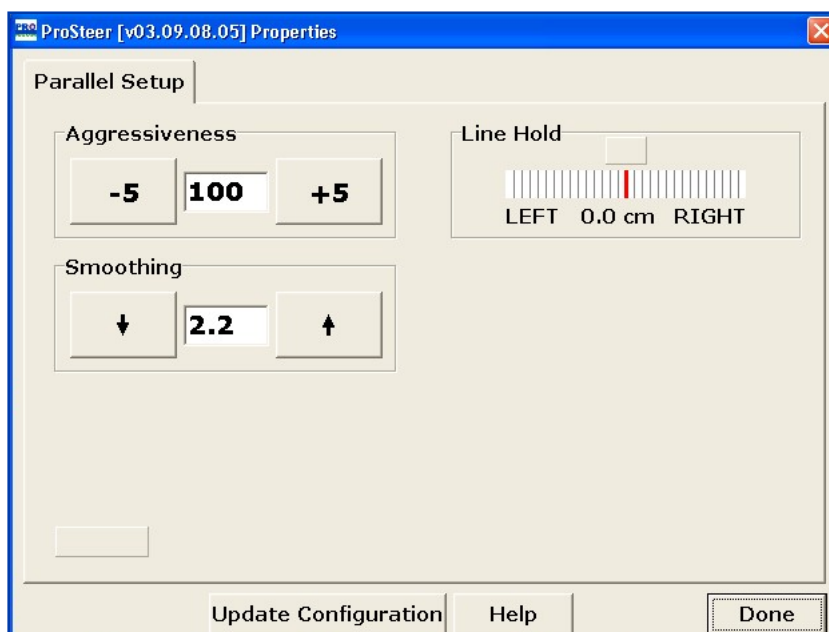




## PRO Steer Settings - General (Parallel)

### General: PARALLEL

**Parallel** This is the first step in tuning the steering to a line.



- 1 - With a parallel line set within the steering runtime screen, engage the steering and steer on the parallel line.
- 2- Press the STEER-Setup button.
- 3- Press the PARALLEL button.
- 4 - Adjust the aggressiveness up until a slight quick oscillation appears, then back it down slightly until the oscillation disappears.
- 5 - Adjust the Smoothing to the lowest value without the steering being overaggressive.

Once this has been set, you must save the settings by selecting the **Update Configuration** tab (at the base of the screen), and follow the prompts to save the settings.

### **Aggressiveness:**

Adjusts the reactivity of the hydraulics. Higher the value, the quicker the steering wheels react. The lower the number, the slower the wheels react. The aim is to have the number as high as possible without the wheels oscillating. The aggressiveness is factory set at 100, and rarely requires changing.



## PRO Steer Settings - General (Parallel)

### Smoothing :

This setting allows the software to automatically tune the steering to the line in relation to travel speed.

If the factor is set at 0.0, the auto smoothing is turned off and will have zero effect.

For spray vehicles the suggested start point is 1.2. Increase the factor will slow the reaction time of the steering and give a "smoother" steering appeal. Lowering the factor will increase the aggressiveness to the line.

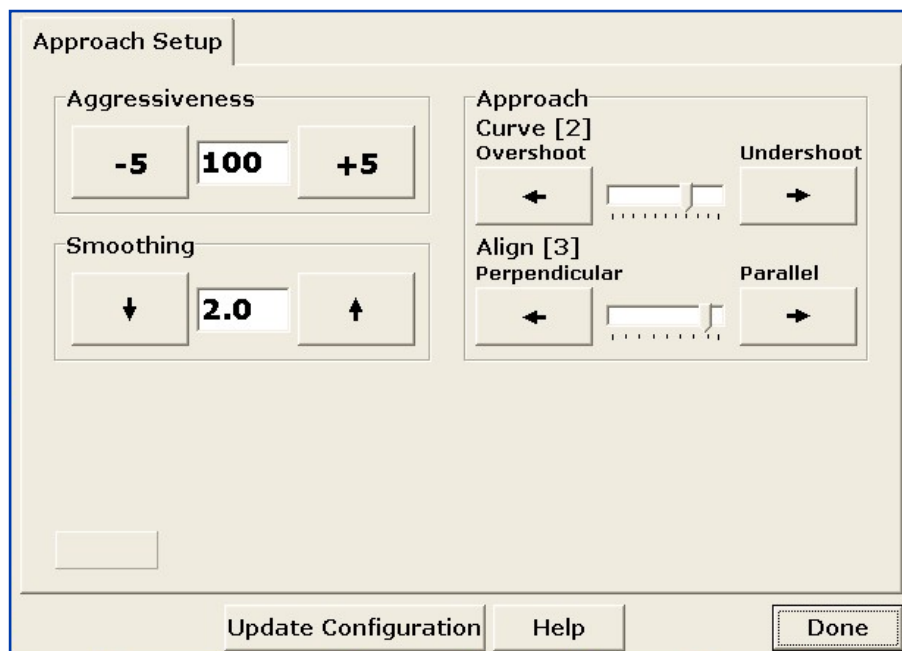
Tillage vehicles suggested starting point is 1.0. The same effect of raising and lowering the factor will occur as previously explained.



## PRO Steer Settings - General (APPROACH)

**Approach:** This is the first step in tuning the steering to the line.

Once the vehicle is steering to the parallel line, the **AGGRESSIVENESS** and **SMOOTHING** of the vehicle approach can be set. The approach is "how the vehicle steers to the line, once the steering assist has been engaged".



### Aggressiveness

Adjusts the reactivity of the hydraulics. Higher the value, the quicker the steering wheels react. The lower the number, the slower the wheels react. The aim is to have the number as high as possible without the wheels oscillating. The aggressiveness is factory set at 100, and rarely requires changing.

### Smoothing

This setting allows the software to automatically tune the steering to the line in relation to travel speed.

If the factor is set at 0.0, the auto smoothing is turned OFF and will have no effect.

For spray vehicles the suggested start point is 1.2. Increase the factor will slow the reaction time of the steering and give a "smoother" steering appeal.

Lowering the factor will increase the aggressiveness to the line.

Tillage vehicles suggested starting point is 1.0. The same effect of raising and lowering the factor will occur as previously explained.



## PRO Steer Settings - General (APPROACH)

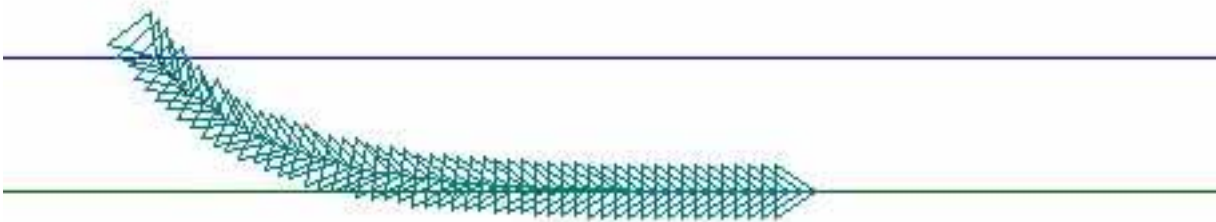
The **Approach** settings Curve and Align are adjusted to suit the application that is required.

### Curve:

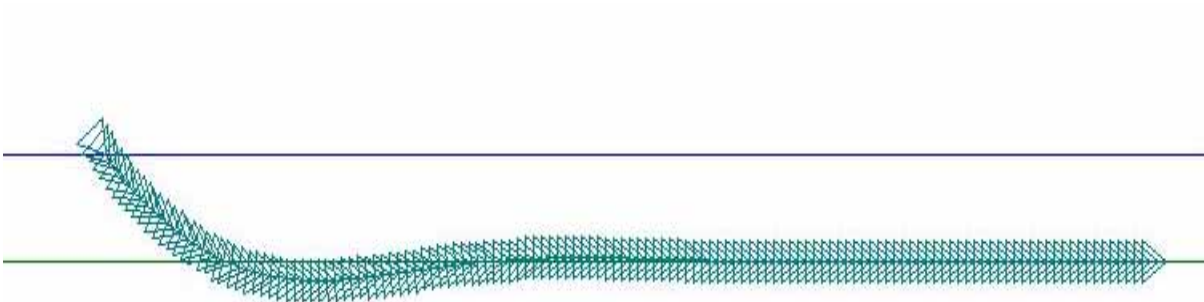
This setting has adjustments from +5 to -5. The factory default is 0, which allows a smooth approach to the steering line.

The higher the figure entered will result in an “undershoot” approach to the steering line.

The lower the number, will result in “overshooting” of the steering line upon approach. This may be required when operating broadacre tillage etc.



**UnderShoot\_** Showing the turning Curve on the inside of the required line



**OverShoot\_** Showing the turning Curve over shooting the required line.

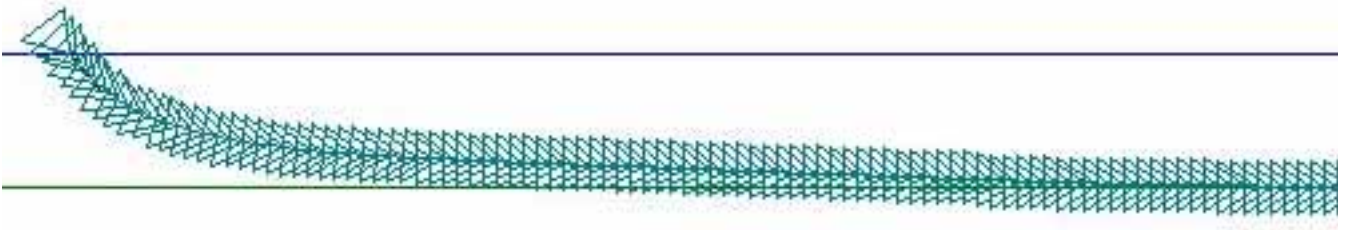


## PRO Steer Settings - General (APPROACH)

### Align:

This allows the operator set the angle at which the vehicle will approach the steering line. The lower the number allows for a slow, "drift" onto the line. Ideal for sprayers etc.

The higher the number will promote a more aggressive approach to the steering line, almost perpendicular.



**Parallel\_** Showing the turning Curve approaching the required line in a slow manner, more suited to sprayers.

**Perpendicular\_** Showing the turning Curve coming onto the line in a more aggressive manner, more suited to row cropping at slower operating speeds.



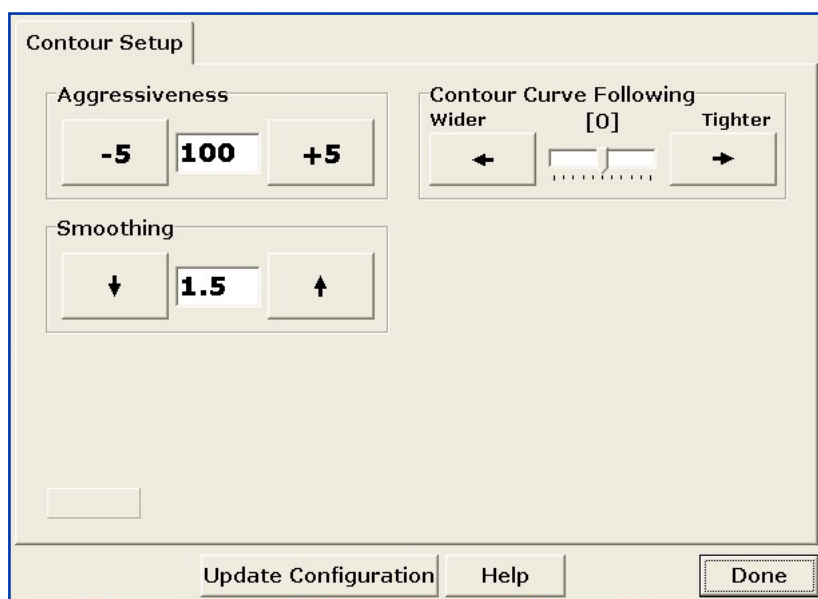
Once this has been set, you must save the settings by selecting the Update Configuration tab, and follow the prompts to save the settings.

## PRO Steer Settings - General (CONTOUR)

### Contour

A "curve line" must be set on the runtime screen and the GUIDELock button selected.

Once the vehicle is steering acceptably to the parallel line, the **AGGRESSIVENESS** and **SMOOTHING** of the vehicle contour can be set. The contour adjustments allow the vehicle to be adjusted separately to the **PARALLEL** adjustments. When "GUIDE LOCK" is selected on the runtime screen, the steering will assume the contour settings.



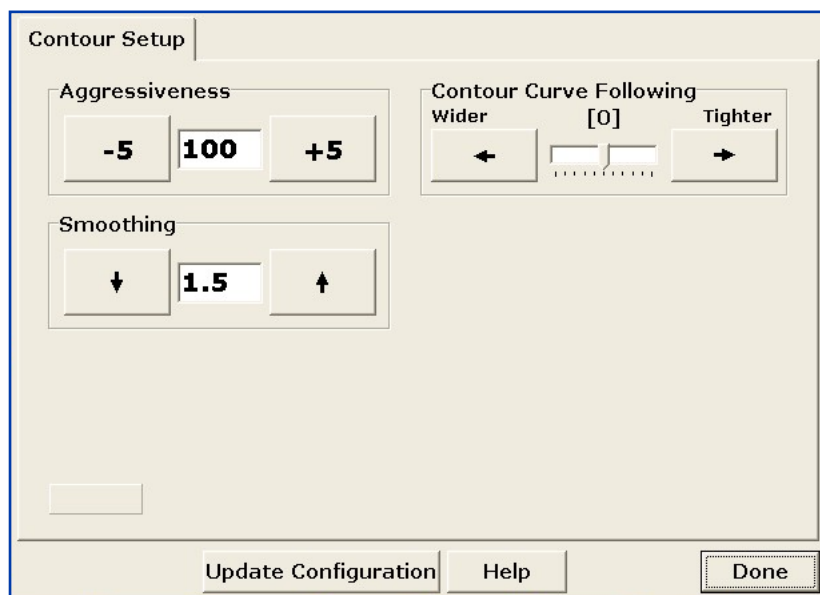
- 1 - With a GUIDELock line set within the steering runtime screen, engage the steering and steer on the 'round and round' runline
- 2- Press the STEER-Setup button.
- 3- Press the CONTOUR button.
- 4 - Adjust the aggressiveness up until a slight quick oscillation appears, then back it down slightly until the oscillation disappears.
- 5 - Adjust the Smoothing to the lowest value without the steering being overaggressive.

### Aggressiveness:

Adjusts the reactivity of the hydraulics. Higher the value, the quicker the steering wheels react. The lower the number, the slower the wheels react. The aim is to have the number as high as possible without the wheels oscillating. The aggressiveness is factory set at 100, and rarely requires changing.



## PRO Steer Settings - General (CONTOUR)



### Smoothing:

This setting allows the software to automatically tune the steering to the line in relation to travel speed.

If the factor is set at 0.0, the auto smoothing is turned OFF and will have no effect.

For spray vehicles the suggested start point is 1.2. Increase the factor will slow the reaction time of the steering and give a "smoother" steering appeal.

Lowering the factor will increase the aggressiveness to the line.

Tillage vehicles suggested starting point is 1.0. The same effect of raising and lowering the factor will occur as previously explained.

### Contour Curve Following:

This adjustment allows the tuning in of the contour to be more "reactive"

This is the last adjustment to be done in contour mode.

Once the vehicle is steering to the line, the "speed" in which the vehicle reacts can be adjusted by the following.

- 1- **Wider:** Slows the "reactiveness".
- 2- **Tighter:** Speeds the reactivity. ie: tries to keep on the line, hold a tighter line.

Once this has been set, you must save the settings by selecting the **Update Configuration** tab (at the base of the screen), and follow the prompts to save the settings.



## PRO Steer Settings - Installation - Tilt



### Installation:

These values are as you entered into the PRO Cal software, and is available for viewing through this screen so as the operator does not have to close out of the steering to check any settings.

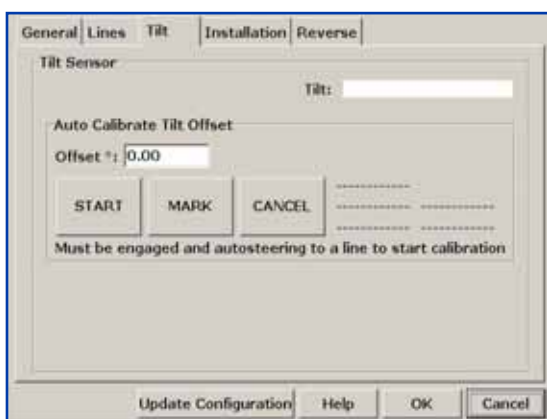
**Good Differential Status:** Set this to the quality of GPS that you have connected to the PRO Steer.

2= Sub-meter Omnistar/WAAS/Marine Beacon/EDIF

5= Omnistar HP 10cm (4inch)

4= RTK

If the GPS quality drops from the required level, one audible warning will occur, and visual warnings will be seen every 20 seconds or so.



### Tilt:

**The tilt calibration must be done once the vehicle is steering acceptably to the parallel line. Failure to calibrate the tilt sensor will result in inaccurate steering offsets.**

Calibrate the tilt sensor by setting an A/B line and engage the steering so that the vehicle is steering to the line.

Press START (whilst moving) and drive for 100m ( 330feet) and press MARK. Drive for a further 50m (165 feet) and turn the vehicle around so that the vehicle will traverse the same line that it has just driven on.

Engage the steering so that the vehicle is steering the line, ensuring that the vehicle is properly on the line before the vehicle reaches the position where mark was selected.

With the steering engaged, drive down the line to the start position.

The offset will automatically appear once this process has been completed.

**Once this has been set, you must save the settings by selecting the Update Configuration tab, and follow the prompts to save the settings.**



Lines\_ Reverse

**Lines:** This feature allows the operator to save multiple series of start lines for each particular field. ie: North/South, East/West etc.

They can be saved in by setting A and B points, Naming the line, and then saving them to the GDX files. They can be recalled at any stage for later work, by selecting Load Line From File, and selecting the saved file.

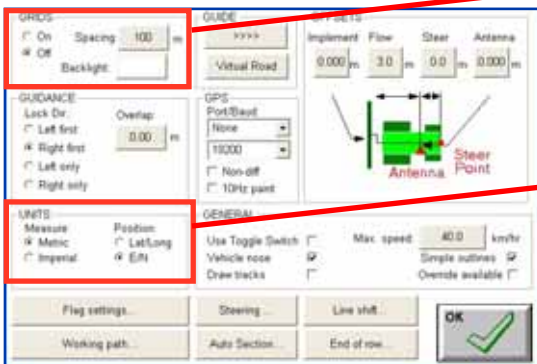
They also can be set by simply setting a bearing from a particular position within the field.

This feature is used when repeatability is required, inter-row planting using RTK GPS equipment.

**Reverse** is selected only if the machine is required to be steered in reverse. ( row crop situation) The setting of the reverse, and installation of the reverse interface is covered in the reverse manual supplement supplied when the reverse option is ordered.

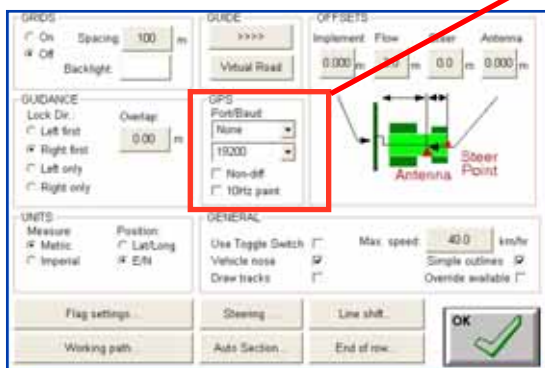


## General Setup



**GRIDS:** Either select ON or OFF to view grids on the Guidance screen. This is for the operators personal preference.

**UNITS:** Choose either Metric or Imperial to be displayed on the application screen. You are also able to choose between Easting/Northings and Latitude/Longitude. These are personal preferences only, and have no effect on the performance of PRO Steer.



**GPS:** The setting for the Port/Baud should be '**None**' and **19200** in the Guidance software when ProSteer is being used. The Port/Baud settings are setup in the ProCal software.

**Note:** See Section 3.0 if connecting a 'Remote Master' using the A1901 cable, to select the correct 'COM port'.

### Non-Diff

DO NOT select this option when using ProSteer, as this will disable the Auto Steer functions.

### 10 Hz

Selecting the '10Hz' option has the effect of allowing the extra resolution of a 10Hz DGPS for all operations, most notably auto-section control (ASC).

This option should only be selected if an X20 console and 10Hz DGPS receiver are being used, together with (ASC).

**Note: Do Not select if an X15 or X10 console is being used.**



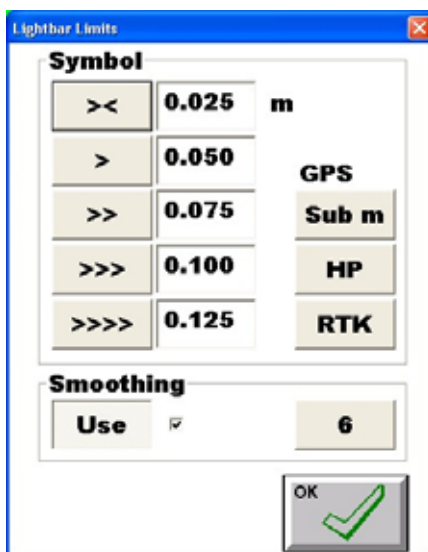
## General Setup

### GUIDE



The '>>>>' button shows the current settings of the 'Crosstrack Indicators' located above the 'Virtual Road' on the Guidance screen.

Select the '>>>>' button to display the 'Lightbar Limits' window, displayed below.



Select ONE GPS option button either:

1. 'Sub M' if using a Sub-metre (sub 3 foot) DGPS receiver. See Page 5.
2. 'HP' if using a 'High Precision' DGPS receiver, see page 6.
3. 'RTK' if using a RTK DGPS receiver, see page 7 for details.

Selecting one of the GPS buttons will setup the 'Crosstrack Indicator' values to best suit the DGPS being used.

### Smoothing

This setting effects the displayed crosstrack. A setting of '5' means that the last five crosstrack values are averaged before being displayed. This setting will not affect the steering of the vehicle, only how the Crosstrack Indicator is displayed.

#### Enable Smoothing

1. Select the 'Use' button (tick).
2. The current smoothing value is displayed.
3. To change the current setting, select current setting and enter in the new value. A setting of '5' is recommended.

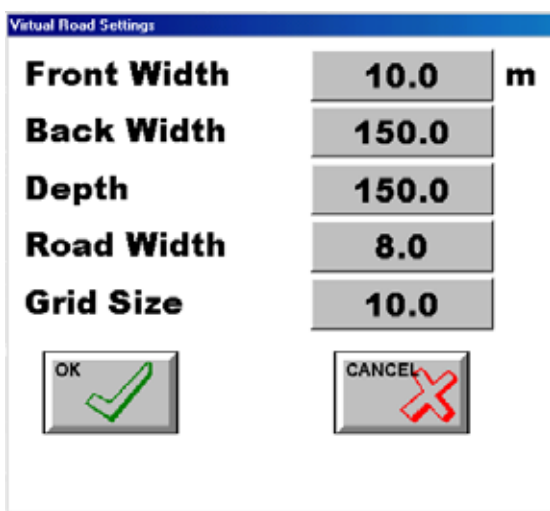
#### Disable Smoothing

1. Select the 'Use' button (no-tick). Then no smoothing will be applied to the Crosstrack Indicator

General Setup

**GUIDE:**

Select the 'Virtual Road' , button to display 'Virtual Road Settings' window. The operator is able to customise the virtual road appearance.

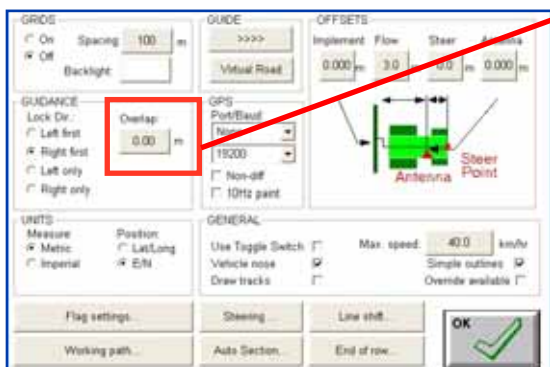


The default settings for the Virtual Road are displayed. These settings are factory set and give a good visual appearance of the Guidance road. It is recommended that they are left as set by the factory.

**OVERLAP:**

Below are described several scenarios of how overlap and swath width can affect your use of the system during for example a spraying operation.

*Note: It is recommended the OVERLAP be set at '0' and the swath width reduced.*



**Overlap** set at '0' and swath width 1/2 metre narrower than the actual

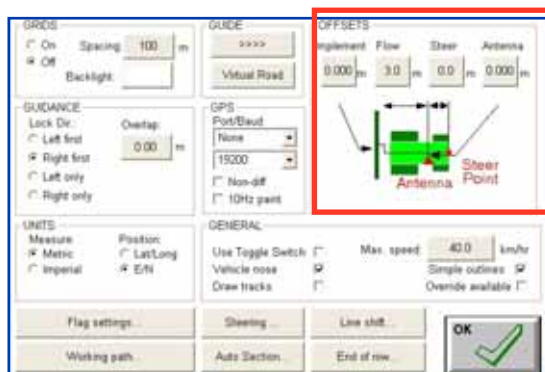
implement. This will give you accurate field areas after completion of the job with a lesser likelihood of missed strips.

**Overlap** set at 0.5 metres and set swath to actual width. This will give you a greater than actual field area with a lesser likelihood of missed strips.

Set **Overlap** to '0' and set swath width at actual width. This will give you correct field area but possibly leave strips of unapplied area.



## General Setup



### OFFSETS

Adjusts the distances between the DGPS antenna and the geometry of implement whether the implement is towed or front mounted.

To adjust any of these measurements, press the adjacent **number key**, and type in the measurement. Don't forget the decimal points and (-) minus values if required.

Select **OK** when finished

**Flow:** Sets the distance from the antenna to the working point. If the implement is being towed (eg. spray boom or air seeder), behind the DGPS Antenna, the the value to be entered will be positive (+). If the implement is in front of the DGPS antenna (eg. combine harvester) then the value will be negative (-).

*Note: Setting the 'Flow' offset is important when using the Guidance with Automatic Section Control (ASC).*

**Steer:** Sets the distance from the antenna to the steering point. (usually the steering axle). If the steering axle is in front of the DGPS antenna then enter a 'positive' (+) value.

**Antenna:** Sets the distance of the DGPS antenna to the centre line of the implement. Normally the Antenna offset is set to '0.0' and the DGPS antenna is placed in the centre of the vehicle, which usually is the centre-line of the implement; this is recommended.

If the antenna is offset to the left then enter a 'negative' (-) value.

If the antenna is offset to the right then enter a 'positive' (+) value.

**Implement Offset-** see next page



## General Setup

### Implement Offset

The Implement Offset allows to set an offset when the implement is not central to the DGPS antenna. If the implement is offset to the **left** (more implement hanging to the left) then enter a 'positive' (+) value. If the implement is offset to the **right** then (more implement hanging to the right) then enter a 'negative' (-) value.

The following is an example using a combine harvester, the same principle can be used to measure the implement offset of any implement:

1. Mount the antenna in the centreline of the vehicle.
2. Measure the distance from the Antenna to the far left effective working width of the comb, (LEFT HANG).
3. Measure the distance from the Antenna to the far right effective working width of the comb, (RIGHT HANG). Then use the following formula to obtain the implement offset.

$$\text{Implement Offset} = \frac{(\text{LEFT HANG} - \text{RIGHT HANG})}{2}$$

4. Enter the 'Implement' Offset value. Normally this value for a combine harvester is negative value; ensure a minus (-) sign is used.

### Checking the Implement Offset Value

5. Drive down the straight edge of the crop, **ensuring the unharvested crop is on the comb's left hand side**. Then set your A/B points.
6. Select the 'PARALLEL' button, to change to Parallel mode.
7. Select the 'STEER' button, to engage the auto steer.
8. Drive for a distance of 100m (300ft).
9. Then turn right out of the crop and drive back down the same line in the opposite direction.
7. Select the 'STEER' button, to engage the auto steer. Then drive a distance, until the combine is steering straight.
8. Stop the combine and check where the comb position in relation to the unharvested crop and determine whether the implement offset has to be changed.
9. If the comb is missing (leaving a gap) in the unharvested crop, measure the gap and enter the value using the following formula.

$$\text{New Implement Offset} = \frac{(\text{current implement offset} + \text{gap distance})}{2}$$

- OR
- If the comb is overlapping the unharvested crop, then measure the distance, the comb is overlapping into the crop. Then enter the value using the following formula.

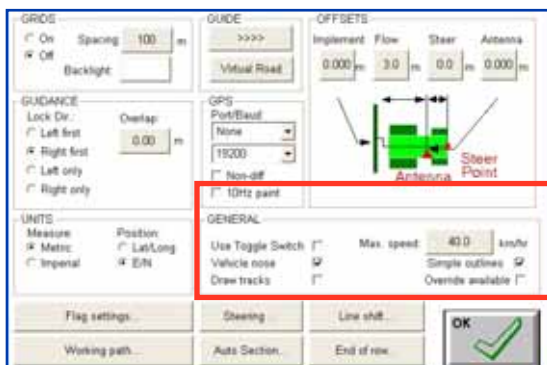
$$\text{New Implement Offset} = \frac{(\text{current implement offset} - \text{overlap distance})}{2}$$

10. Then enter in the new Implement Offset value (this has measurement to 3 decimal points) ,into the X20 console.

*Note: Remembering to enter the (-) minus if required.*



## General Setup



### Vehicle Nose:

Default leave this option selected (tick)

Leave selected to ensure that you have a direction indicator when using the coverage screen in "North Up" mode.

### Toggle Switch:

Default leave this option unselected (no tick).

Select this option, if connecting the A1901 cable to an X20 console and connecting the 'red wire' to 'third party' controller's Master switch. See Section 3.0 to connect a 'Remote Master' using the ProSteer.To install the (A1901) cable, select a 'COM port' and select 'Use Toggle Switch'.

### Draw Tracks:

Default leave this option unselected (no tick).

If this option is checked, you will see "hashed" lines for the applied area instead of a coloured-in area. Most operators prefer the coloured area ie. not selected "Draw Tracks" box.

### Simple Outlines:

Default leave this option selected (tick).

When some outside boom sections are OFF, the black outlines can either be drawn at the ends of the boom (Simple Outline, selected) or drawn into the outermost section that are still ON, (Simple Outline, unselected) Unselect 'Simple Outline' if using Automatic Section Control (ASC).

Select 'Simple Outline' if you are not using a sectional controller as there is no visual difference.

### Max Speed:

Enter the fastest speed that you intend to use the application map at.

This will not affect the "cutout speed" that disables the PRO Steer, but relates to how the map is drawn on the application screen

The "Max Speed" can be left at 40km/hr (25mph) if using Guidance only.

If using Automatic Section Control (ASC) then select the speed to be about 10km/h (6 mph) higher than the normal vehicle working speed.

The lower the speed selected the more efficient the drawing of the sections on the coverage map when using ASC.



## General Setup

### Override Available:

Default the option is unselected (no tick).

Only select "Override Available" when the Guidance is used in conjunction with other KEE Ag software using Automatic Section Control (ASC).

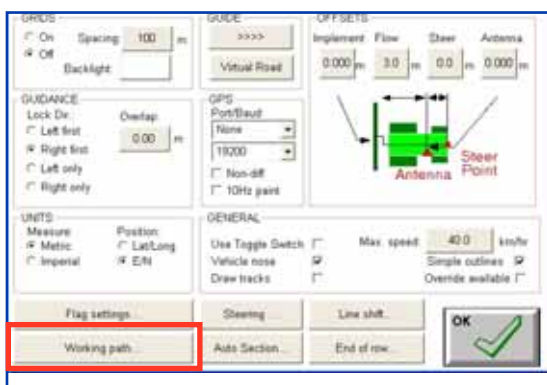
When selected the "OVERRIDE" button will be displayed with the other 'Guidance Working' buttons.

In Normal ASC mode the Guidance will not allow the implement (eg. sprayer or seeder) to switch ON over an area already treated.

There maybe some occasions when this is necessary; to go over areas already treated.

Select the "OVERRIDE" button. A (X) is displayed on the "Vehicle Icon" to show the "OVERRIDE" button is being used, the operator can now drive over areas already treated and the controller will now switch ON, also the Area will not accumulate when the Override function is selected

Select the "OVERRIDE" button again, the (X) will disappear from the "Vehicle Icon". The ASC will now control the controller (ON and OFF) as per normal.



### Working Path:

This is the location on your hard drive where the Guidance application program is running from.

**Note: This must be C:\Lynx\Field\_Data**

This directory should not be changed as this is where the '9 Field Screens' reside. If the "Working Path" is changed the Guidance will not be able to display and load the 9 Field Screens.





## General Setup



### Automatic Section Control:

Select the 'Auto Section..' button to display the Automatic Section Control (ASC) window.

This section allows for the utilisation of the DGPS to control the switching of boom sections by GPS data.

**Disable:** Select this option to disable the ASC.

To Enable ASC select **one** of the 3 modes:

1. **Avoid Gaps:**Total coverage, No Gaps.
2. **Avoid Overlap:**The controller will switch OFF sections without overlapping.
3. **Ignore small gaps:** The 'Ignore Small Gaps' mode is a setable mode in between 'Avoid Gap' and 'Avoid Overlap'. The 'Ignore small gaps' is set by the value entered into the 'Small Gap Size' option.

The following page shows how the different modes (Avoid Gaps and Avoid Overlap) will switch boom sections OFF driving into a headland.

**Small Gap Size:** The 'Small Gap Size' is a value which determines the 'gap size' when 'Ignore small gaps' is selected as the ASC mode. The recommended setting is '8.0'.

**Then set an 'On Time' and 'Off Time' value**

*Note: If the Sprayer Software version 1.98 or later is installed, then the 'On Time' and 'Off Time' settings will be inaccessible here and will have to be entered in OPTIONS/GPS page in the Sprayer software.*

**On Time:** The time it looks ahead to switch ON each boom section.

**Off Time:** The time it looks ahead to switch OFF each boom section.

The 'On Time' and 'Off Time's' takes into account the time it takes to switch ON or OFF each section valve. Different types of section valves take different times to go from fully closed to fully open. The typical range is '0.1' second (for solenoids) to up to 4 seconds for motorised valves.

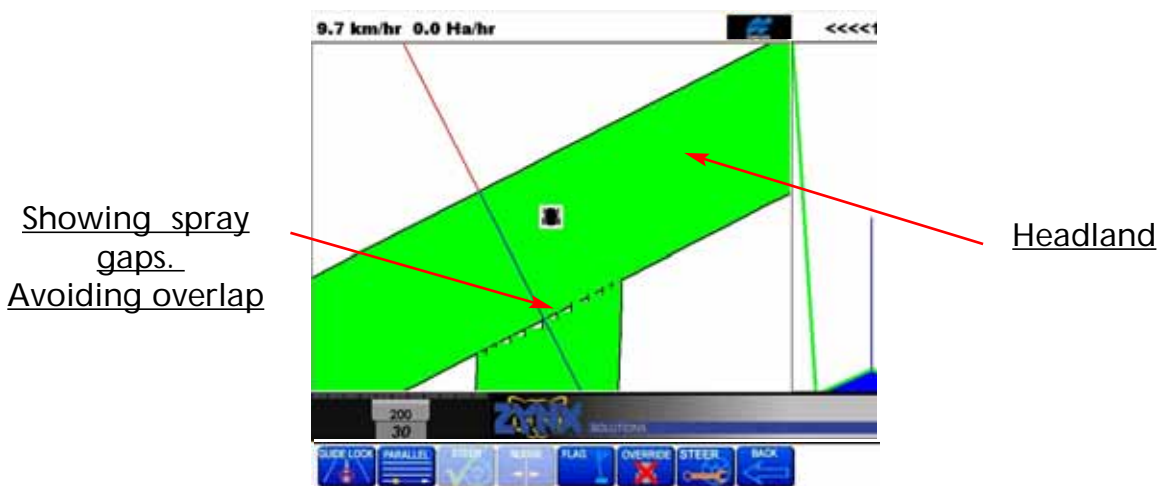
## General Setup

The ASC will only operate with software that is compatible with the Guidance/PRO Steer system. Some other makes of controllers will interact with X20 console. See your dealer for further information. All of these settings are able to be adjusted, simply by touching the icon, and entering in the time/size that you require on the calculator screen.



Showing 'Avoid Gaps' selected in ASC

The above screen shows a 11 section sprayer, spraying into a headland with 'Avoid Gaps' selected in the ASC Mode window. The above screen shows the trailing edge of each boom section will fully spray the headland before switching each section OFF; thus leaving **no** 'gaps'. The 'Avoid Gap' mode would be selected ensuring the field is fully sprayed with no misses.



Showing 'Avoid Overlap' selected in ASC

The above screen shows a 11 section sprayer, spraying into a headland with 'Avoid Overlap' selected in the ASC Mode window. The above screen shows the leading edge of each boom section switching OFF as the headland approaches. This has the effect of leaving 'gaps' coming into the headland. This mode would be selected to avoid double spraying an area.



## General Setup

### To setup the 'Automatic Section Controller (ASC):

1. Requires an 'ASC mode' to be selected from the ASC window.
  - a) Avoid Gaps  
OR b) Avoid Overlap  
OR c) Ignore Small Gaps, then set a 'Small gap size'.
2. Requires the 'On Time' and 'Off Time' settings to be entered, either in the Guidance software, or the controllers software (Sprayer, Seeder or Spreader) depending on software versions.
3. Enable the ASC option in the controller software being used.
4. Requires a 'FLOW' offset to be entered.

**Limit of Boundary-** The 'Limit of Boundary' option when selected and a boundary lap completed, will automatically switch OFF the sprayer or air seeder when they travel outside the boundary.

This is particularly useful when a sprayer completes one boundary lap, then starts spraying in Parallel mode.

Therefore when the sprayer is turning on the ends most times a few of the boom sections will travel outside of the boundary, normally these sections would switch ON, because they are travelling over areas not sprayed, and therefore spraying areas that are not supposed to be sprayed.

With the 'Limit of Boundary' option selected, those sections which travel outside of the boundary will not switch ON.

### For the 'Limit of Boundary' to function:

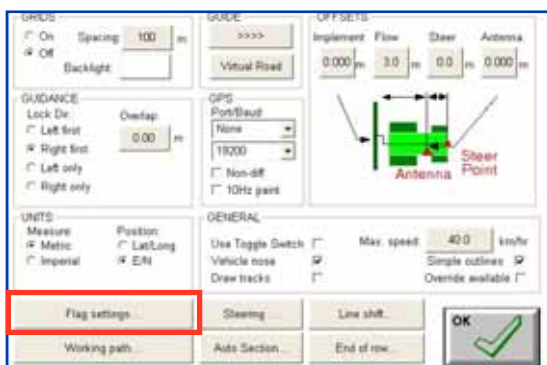
1. Requires a ASC mode to be selected and set up correctly.
2. 'Limit of Boundary' option selected.
3. Requires the controller software (Sprayer, Seeder or Spreader) to be have the ASC option Enabled.
4. Requires a boundary lap to be completed.

Because the 'Limit Of Boundary' doesn't allow the implement to switch ON outside the boundary. To start another field:

1. The operator will have to select another field from the 9 FIELD screens window; or
2. Press the RESTART/SWATH button and clear the current field.



## General Setup



### Flag settings:

Press the 'Flag Settings' button to display the 'Flag Settings' window

You are able to name 10 obstacles that you wish to navigate back to after you have finished your guidance work.

1. Press the 'Flag Setting' button (eg Flag 04), that you wish to change.
2. Type in the name of the obstacle (eg. STONES), using the 'Screen Keyboard'.
3. Press the 'OK' button to close the screen keyboard and save the changes.

Keep selecting the 'Flag' buttons you wish to change following steps 1,2 and 3 until all Flag buttons have been changed.

**Show Flags-** when this option is selected will show the Flag 'targets' on the Coverage map screen.

**Show text-** when this option is selected will show the flag description on the Coverage map screen; as named in steps 1,2 and 3.

*Note: If the 'Show Flag' and 'Show Text' options are NOT selected the flag points are still in the guidance file and can be displayed at any time. Also the operator can still record new flag points, but they won't be displayed on the Coverage map screen.*

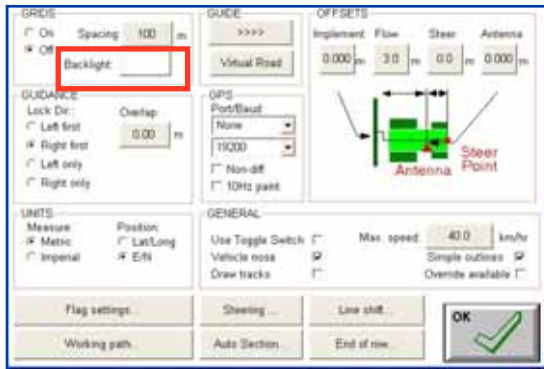
**Play Sounds-** when this option is selected, the system will play a 'Windows' 'Event' or play Flag.wav sound.

The sound will play once, every time a 'flag point' enters the coverage map screen when the screen is redrawn. Therefore every time the Flag point (eg. STONES) is enters the coverage map screen, a sound will be played.

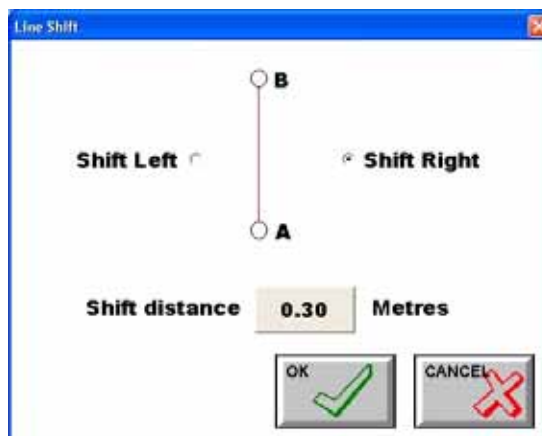
## General Setup

**Backlight:**

This function (by touching the colour indicator), allows you to select from five different shades, ranging from white to black. This reduces screen glare whilst using guidance at night time.



## General Setup



### Line Shift:

Press the 'Line Shift' button, the 'Line Shift' window will be displayed. This feature is used to move the current parallel lines. This is particularly helpful when working within irrigation bays, and the operator wishes to move the line 1m (3feet) or more. Or if the operator wants to fertiliser in between the rows of the last operation.

### To Shift the Line to an existing Parallel Line:

1. Load an existing Guidance file for the current field.
2. Don't select the option to 'KEEP THEGUIDELINES' (unticked).
3. Check the swath width of the implement, is correct.
4. Select the PARALLEL button, from the Guidance Working buttons, to switch to parallel mode.
5. Determine that you are on a parallel line facing in the A----->B direction, that the parallel lines was originally setup, as displayed in the 'Line Shift' window.
6. Select whether the implement needs to be shifted left or shift right in relation to the current parallel line by selecting either:
  - a) Shift Left
  - OR b) Shift Right
7. Enter in a distance value, to shift the implement, using the units displayed, the current distance entered, is displayed.
8. Press the OK button to accept and save the new settings and accept the new Line Shift ; or CANCEL to close the window without saving the settings.
9. Line the implement up on the new shifted Parallel line.
10. Drive-off and Press the STEER button to engage the auto steer.

## General Setup



### End Of Row

Press the "End Of row" button, the 'End of row detection' window will be displayed.

This feature is used to warn the operator when the end of a run or row is approaching. The alarm is sounded through the X20's internal speaker or external speaker if fitted. The alarm is a \*.wav file, which when sounded will say "End of Row is Near". The volume of the alarm is control through the 'X20 Manager' program.

See the X20 Console manual to adjust the volume.

**Use-** select this option (tick) to **Enable** the 'End of Row' warning.

Un-select the box (no tick) to Disable the 'End of Row' warning

**Only when engaged-** when this option is selected the 'End of Row' warning will only appear when the auto steer is Engaged.

When the this option is not selected (no tick), the end of row warnings will be sounded whether the auto steer is engaged or not. This option would be used when the 'End of Row' warning is required for Visual Guidance.

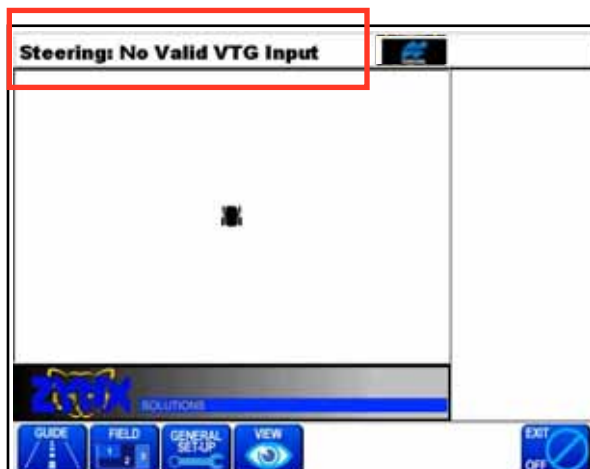
**Detection distance-** is the distance before the end of the row the vehicle icon reaches before the alarm starts to sounds.

**Repeat time-** is the time between alarms.

**No of alarms-** this is the number of alarms that will be sounded when each end of row is approaching.

To use the above example; the alarm will not sound when the operator has control of the steering. When the operator engages the vehicle, and the vehicle is approaching 50m before the end of the row; a warning will be sounded "End of Row is Near", through the X20 Console's speaker. Then after 8.0 seconds has lapsed the second warning will be sounded. Because the number of alarms is set at '2' there will no more warnings. Until the vehicle is turned around and the auto-steer is re-engaged and the vehicle is within 50m of an end of a row.

## 2.0 OPERATION



Press the bar and the **Latitude/Longitude** appears. This is the geographical location of the DGPS antenna

Touch the bar again, **speed** appears. This is the DGPS speed the vehicle is doing

Touch the screen again, and **Points** will appear. This is the amount of drawn geographical points and the count of how many points are being sensed in operation.

**Area:** Counts area that the guidance swath has covered. On the completion of the first lap of the field, it will show how many Ha/Acres have been covered, how much area there is in the field, and how much area is left to cover.

Touch the screen again and it will scroll to the **Field Number**, selected in "Field Setup", and the **Swath width**, selected in **Swath Selection**

Warnings referring to DGPS signal status are also displayed within the "top display bar".

Touch the flashing icon  
The flashing icon, indicates that there is DGPS present.  
If the logo is not flashing, DGPS is not present, and the guidance will not work.  
Detailed evaluation is continued over the page.



PRO Steer Operation Screen Buttons

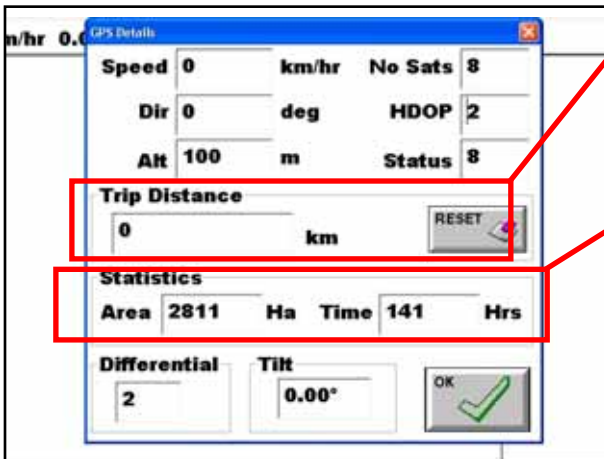


**Speed:**  
The DGPS speed.

**Direction:**  
This is the heading you are traveling, in degrees.

**Altitude:**  
The mean height above sea level.

**TILT:** displays the reading from the 'Tilt' sensor in the ProSteer ECU.



**Trip Distance:**  
Re-settable. using the reset button, enables you to measure distance accurately, using the DGPS.

**Statistics:**  
This is a NON-Re-settable, accumulative count of guidance area and time.



**No Sats:**  
This is the number of satellites that is being used by the DGPS. 4 is the minimum, and you may see as many as 11.

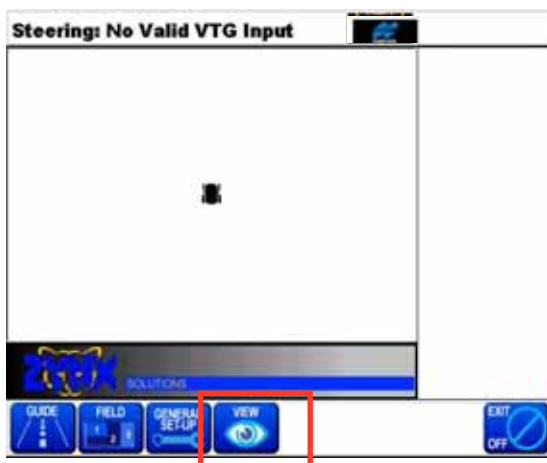
**HDOP:**  
This is a measurement of "signal strength" . The higher the number, the worse it is . This will range from .8 ( good ) up to 2.4 getting unstable. This normally occurs when the satellite numbers are low.

**Status:**  
8 = DGPS  
7, and below = no DGPS

**Differential:**  
Indicates the Differential correction accuracy being relieved.  
2 = Sub Meter DGPS  
5 = 10cm  
4 = 2cm



## PRO Steer Operation Screen Buttons



**View:** Select the view button to select from the below choices



**VIEW IN:** Select to gain a closer view of the application screen. There is only two stages of enlargement.

**VIEW OUT:** Allows the operator to view the whole screen. NOTE: Only in North up mode whilst moving.

**VIEW ALL:** Can only be accessed when the VIEW MODE button is selected. When the VIEW all button is selected the application screen will show the entire worked area, but not the actual running screen.

**LIVE MODE:** Brings the application screen back to the actual run time screen.

**HEADS UP:** The vehicle on the screen is always facing the top of the console, and the map moves around under the vehicle.

**NORTH UP:** The vehicle icon changes and will face the degree direction that the DGPS is reading at that particular time. The map is stationary and the vehicle moves around the map. The top of the console screen is due north.



## PRO Steer Operation Screen Buttons



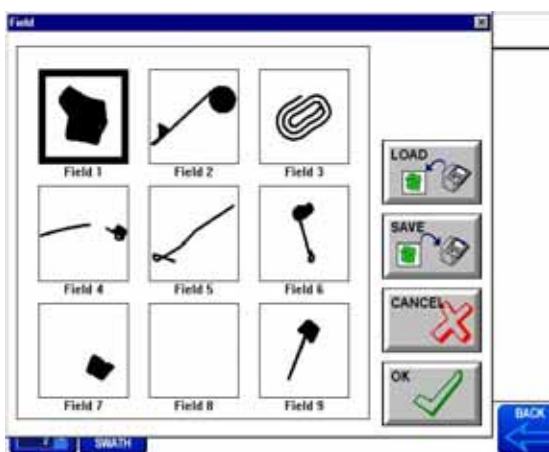
From the VIEW options, press **BACK** and then **FIELD** to view this screen.

Press **RESTART SWATH** to change the swath value of the working implement.



If you have a previous field loaded and you wish to re-use the Parallel lines, leave the "Delete Guideline" box, unselected (no tick).

Note: If using the X20 Console as a sprayer, spreader or planter controller, the swath width is automatically taken from the application software.



Selecting the FIELD button again, allows the saving of the field to either the supplied Thumb Drive or within the X20 Console Flash card itself.

Saved fields are also able to be loaded back onto the screen to either continue work or reload the previous guide lines.

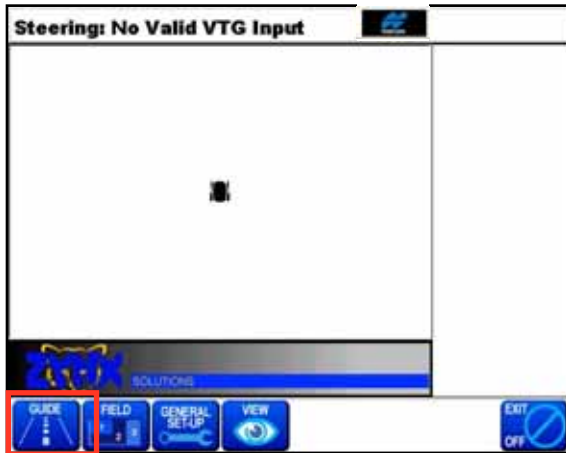
Whilst there is provision for 9 fields to be worked in conjunction, it is strongly recommended that once a field is finished, either save it or delete it. This is due to excess data

**IMPORTANT: ONLY ONE FIELD AREA TO ONE OF THESE FIELDS. ie: DO NOT HAVE MULTIPLE FIELDS MAPPED WITHIN ONE OF THE ABOVE AREAS**

The result of too large a file will slow the console onscreen mapping.



## OPERATION



Select **Guide**



The unit is now ready to start mapping a new Field

This is how the screen will look when you wish to start guidance, as all of the buttons on the Working buttons are what you will need to use when operating the ProSteer.



## Connecting A1901 Cable to ProSteer

### 3.0 CONNECTING A REMOTE MASTER

The (A1901) GPS COMMS CABLE kit is required if remote mapping ON/OFF is required. A third party controller's Master switch can be connected to the X20's 'Remote Mapping Lead' and therefore the coverage map will only map when the controller Master is switched ON. A remote Master Switch can also be used, (this is not supplied in the kit), and 12VDC will have to be supplied to the Master switch.

- 1- Connect the DGPS Comms cable to COM 1 port.
- 2- Connect the A1901 harness, with the plug marked 'GPS, COM 1' (with red wire) into 'COM Port 3' at the back of the X20 console as shown.
- 3- Do not connect the other 2 plugs of the A1901 harness to anything- cable tie them out of the way, as shown below.
- 4- 'COM Port 2' on the back of the X20 console is normally reserved for the ProSteer ECU serial cable.



#### Connecting the (A1901) kit to the DGPS Cable

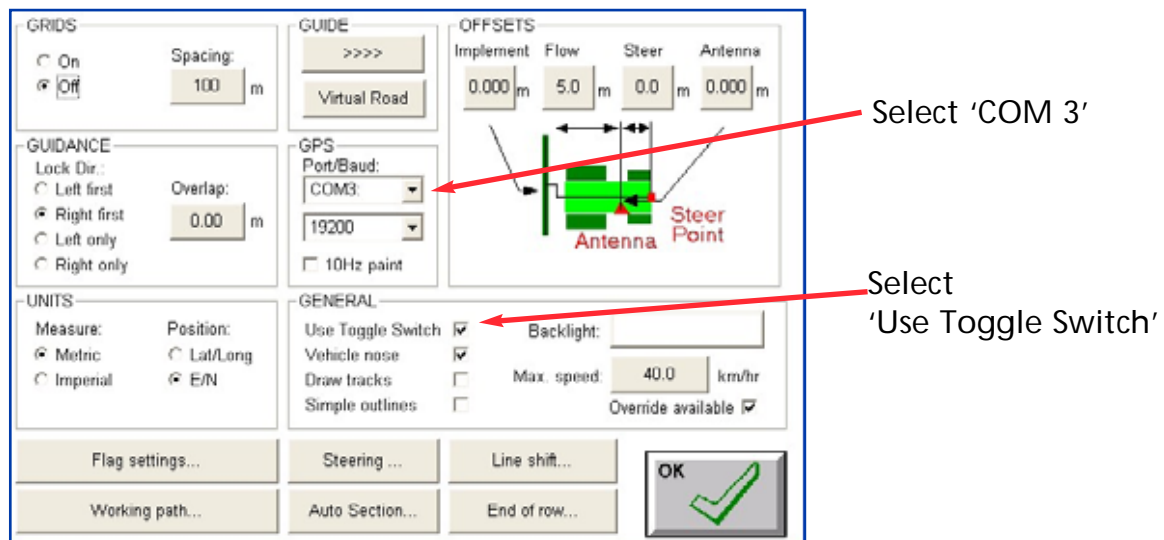
##### Remote Mapping Lead

The 'red wire' that comes from the H1901 cable is able to be connected to a remote ON /OFF switch.

The 'red wire' (Part No. A1100) can be connected to the red wire coming out of the H829 cable to provide an extension to reach the Master switch the lead is being connected to.

When 12 DCV is supplied to the 'red wire' ,the mapping on the guidance screen is activated. Switch the Master OFF (the 'red wire' is 0DCV) and the mapping is stopped.

## Connecting A1901 Cable to ProSteer



- 1- Select the 'General Setup' button from the Guidance Working screen.
- 2- Change the 'Port' to 'COM3'. Otherwise select the 'COM Port' the connector marked 'GPS, COM 1' was connected to the back of the X20 console.
- 3- Select the 'Use Toggle Switch' from the 'GENERAL' window. *Place a 'tick' in the box.*

*Note: This feature (Remote Mapping Lead) is not required when using the Guidance in conjunction with the Seeder, Sprayer, or Spreader Software, being used as the primary controller.*



## WARRANTY

The warranty provided by KEE Technologies Pty Ltd covers faulty manufacture, defective components and installation of components, but not installation to the machine.

For the warranty to be recognised by KEE Technologies Pty Ltd the end user of the equipment must in the first instance of a problem developing, contact the local Dealer from where the unit was purchased.

The Control Unit Micro Processor is covered for 12 months under this warranty.

Accessories such as cables, sensors and hydraulic kits are covered for 1 year under this warranty.

This warranty will become void if any attempt is made to repair or modify the Control Unit Micro Processor.

This warranty will become void for all components if they are misused, accidentally damaged, if any attempt is made to repair or modify them or operate them on other the recommended or specified voltage.

This warranty is in addition to and not in substitution for any warranty or condition implied by the provisions of the Trade Practices Act.

## OPERATION OF WARRANTY

In the event of warranty claim being made KEE Technologies Pty Ltd, will endeavour via its authorised dealer/installer to rectify the problem at the earliest opportunity. KEE Technologies Pty Ltd will arrange for the problem to be fixed and if necessary supply an exchange unit and or components. The method of repair shall be determined by KEE Technologies Pty Ltd at its sole discretion.

Any warranty claim shall at the first instance be reported to KEE Technologies Pty Ltd.

KEE Technologies Pty Ltd shall not in any event be liable for any direct or consequential injury, loss or damage arising out of any matter giving rise to a warranty claim.

Warranty registration must be filled in and Posted to KEE within 7 days of fitment to avoid warranty confusion at a later date if the unit fails during the warranty period.





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