# MATRIX® 430

## USER MANUAL

**Entry level guidance**

**Software version 1.03**

**TeeJet**
TECHNOLOGIES

A Subsidiary of **Spraying Systems Co.®**

## GETTING STARTED

1. Power on the console.

### Setup machine

2. On guidance screen, press NAVIGATION AND GUIDANCE OPTIONS tab 🔙 to display options.
3. Press HOME button 🏠.
4. Press CONSOLE button 🖥.
   - ► LCD Brightness 💡
   - ► Color scheme 🎨
   - ► Units 📏
   - ► GNSS demo mode 🛰
   - ► Screenshot 📷
   - ► Time zone 🌐
   - ► Console information ℹ
5. Press HOME button 🏠.
6. Press CONFIGURATION button ⚙.
   - ► Machine Configuration 🚜
   - ► Lightbar spacing 📊
   - ► GNSS 🛰

### Setup guidance

7. From the Home screen, press GUIDANCE button 👷.
8. On guidance screen, press NAVIGATION AND GUIDANCE OPTIONS tab 🔙 to display options.
   - ► Guidance mode 🔄 – Straight AB guidance, Curved AB guidance, Circle pivot guidance, Last pass guidance or no guidance
   - ► Create AB guideline Ⓐ Ⓑ
   - ► Create boundary 🟩
   - ► Set return point 🚩

### Start mapping

9. Press VEHICLE icon 🔺 in the center of the guidance screen to turn on or off application mapping.

### Guidance screen includes

   - ► Selectable information – Speed 🚜, total applied area 📐, application time 🕐 or swath number 〣 〣
   - ► Lighbar and Navigation Activity – GNSS status, cross track error or current activity
   - ► Status Bar – GNSS 📡, guidance mode ⊖, boundary area Ⓐ and Application mapping status 🔺
   - ► A+ nudge feature Ⓐ⁺
   - ► Transport mode Ⓐ 🚶
   - ► Zoom 🔍

### Start new job

To start a new job, delete old job data.

1. From the Home screen, press DATA button 🗃.
2. Press RECYCLE button ♻.

## MATRIX 430 CONSOLE

Bright touch screen

Power button

USB port
with rubber cover

Standard RAM bracket
(assembly required)

GNSS antenna connection

Power connection

Integrated RAM mount
(assembly required)

## System components

GPS Patch Antenna

RXA-30 Antenna

Console, Matrix 430
CG430-GLO

Kit, RAM Mount
w/ Suction Cup

**Power Cables**

Direct to Battery 45-05775

Lighter Adapter 45-05645

COBO Adapter 45-05867
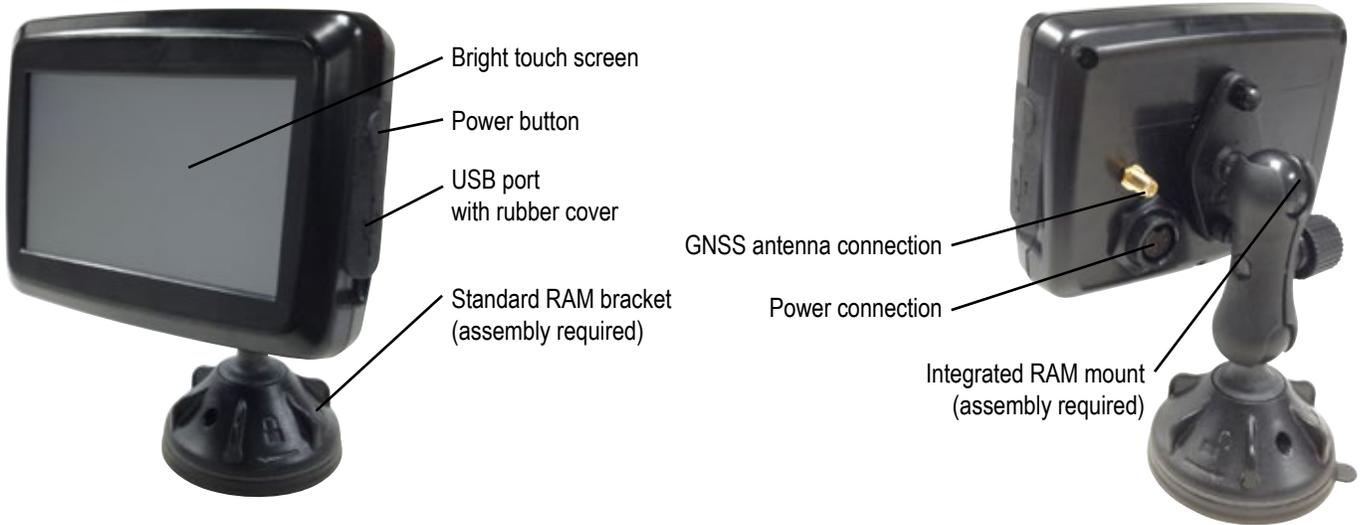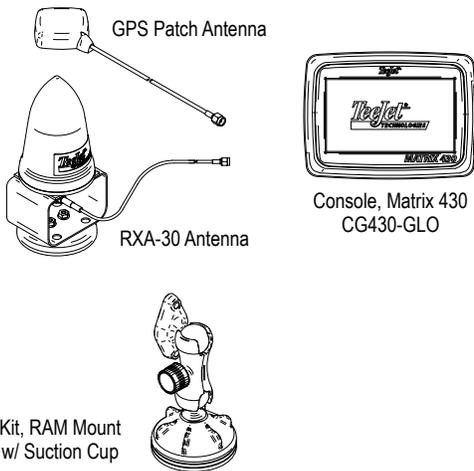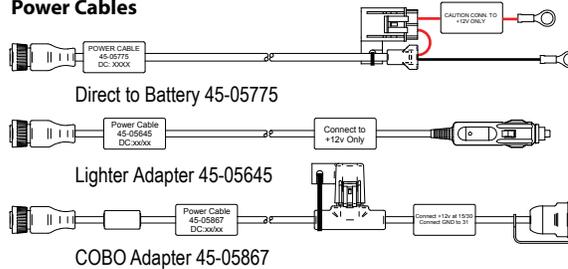
**Power/Sense/Speed Cables**

US 45-05970

EU 45-05969
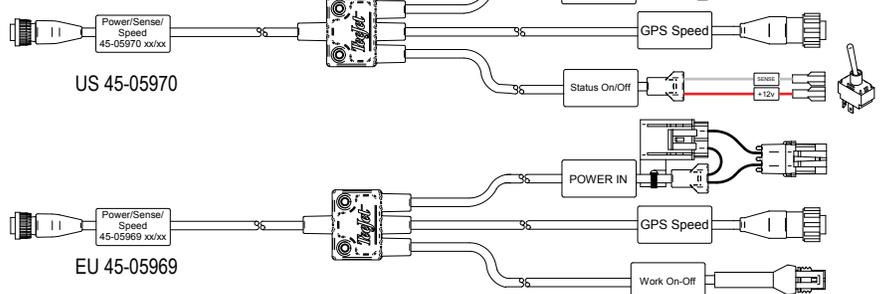
All changes are saved automatically.

The console needs to be cycled off and back on when changing or attaching equipment to the Matrix 430 system.

### Recommended antenna installation

The GNSS antenna should be mounted as far forward as possible on top of the cab on a metal surface of at least 4"/10 cm square.

### Power on

1. Press POWER button ⏻.

### Power off

1. Press POWER button ⏻.
2. Select from:
   ► Accept ✔ – to continue shut down
   ► Cancel ✖ – to keep the console on.

*WARNING! Wait 30 seconds before restarting the console after powering off.*

# Matrix® 430

## ICON REFERENCE

### Guidance
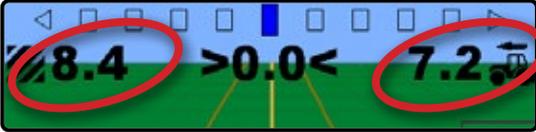
Selectable information

🚜 Speed

▨ Total applied area

⏱ Application time

⊩ ⥻ Swath number

☐ Show nothing

(A) (B)  Mark A , Mark B

(A⁺)  A+ nudge feature

(⚠) (🧑)  Transport Mode

←  Navigation and guidance options tab

   🏠  Home

   Guidance modes

     🚩 ⊝  Straight AB guidance

     🚩 〰  Curved AB guidance

     ◎ ◎  Circle pivot guidance

     ⊠ ⊠  Last pass guidance

     🚫  No guidance

   Application boundary

     🔲  Start

     🏁  Finish

     🔲  Cancel

     🔲  Delete

   Return to point

     🚩  Mark

     🚩  Go to point

     🚩  Cancel

     🚩  Delete

   →  Close options

   🔍  Zoom in/out

### Configuration

🚜  Machine settings

   ❶  Number of implement sections

   ❷  Section widths

   ❸  In-line implement offset distance

   ❹  Lateral implement offset distance
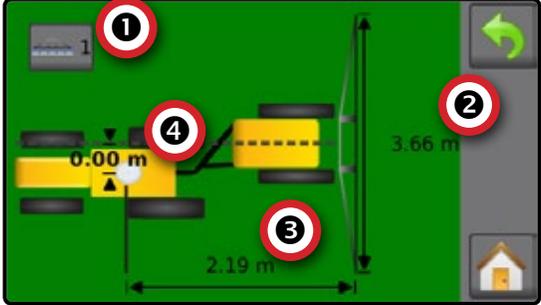
📏  Lightbar spacing

📡  GNSS receiver configuration

### Job Data

▨  Total applied area

▭  Bounded area

⏱  Application time

🗑  Delete

📄 ALL  Reports

### Console

💡  LCD brightness

🎨  User interface colour scheme

📏  Units

   Demonstration GNSS

📡▶  ✗  GNSS

     ▶  Demo

📷  Screenshot

🌐  Time zone

ℹ  About

## KEYBOARD ENTRY SCREENS

To change a value:

1. Press CURRENT VALUE.

2. Use the numeric keypad to enter a new value.

3. Select from:

   ► Accept ✓ – to save the settings

   ► Cancel ✗ – to leave the keypad without saving

*Figure 1: Example of keyboard*
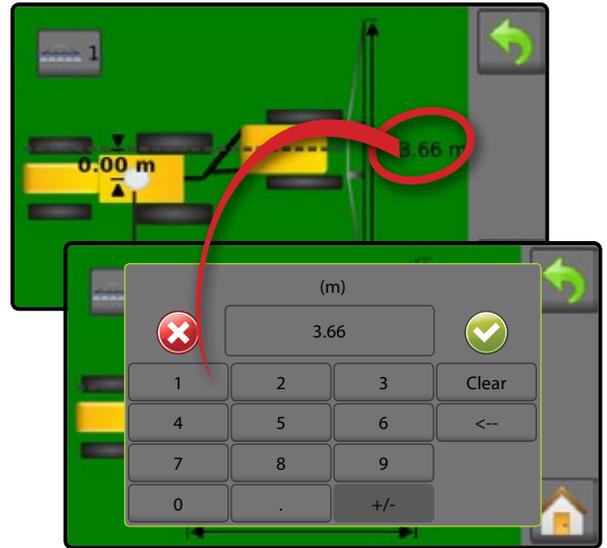


## HOME
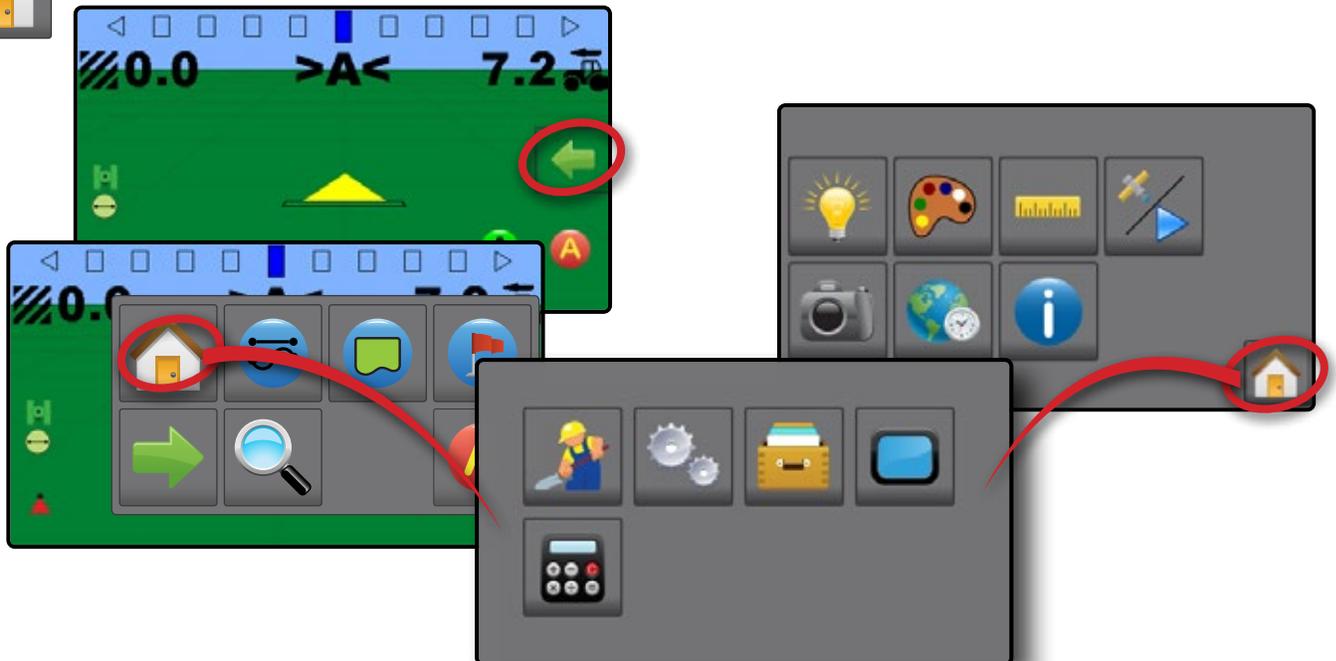


*Guidance*
Used to view a computer-generated image of the vehicle position displayed in the application area. From this screen all setup and navigation options can be accessed via the tab on the right side of the screen.

*Configuration*
Used to setup the machine settings, lightbar and GNSS receiver.

*Job data*
Used to view or delete job data and export reports.

*Console*
Used to setup LCD brightness, colour scheme, units, screenshot and time zone; start demonstration GNSS; and view console information.

*Calculator*

# Matrix® 430

## GUIDANCE

The Guidance Screen creates a computer-generated image of the vehicle position displayed in the application area. From this screen all setup and navigation options can be accessed via the tab on the right side of the screen.



Guidance bar

Vehicle with real-time representation of active boom sections

Navigation and guidance options tab

Overlap coverage area

Status bar

Navigation guidelines

Painted coverage area
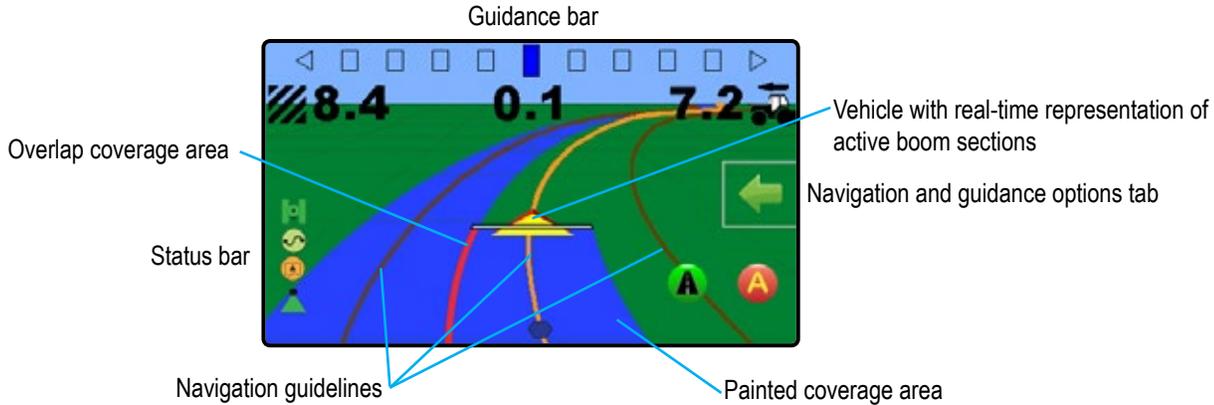
### Navigation and guidance options tab

Home 🏠 – used to access Home screen

Guidance Modes 〰 – select one of five (5) guidance modes: Straight AB guidance ↤, Curved AB guidance 〰, Circle pivot guidance ◎, Last pass guidance ⬚, No guidance ⊘

Application Boundary ▭ – create or delete a boundary

Return to Point 🚩 – create, guide to or delete a point

Close menu ➡ – used to close the Navigation and guidance options menu

Zoom In/Out 🔍 – adjust the vehicle's view or perspective to the horizon from vehicle view to bird's eye view

Guidelines Ⓐ – establish an AB guideline or shift line to the vehicle's current location

Transport mode ⚠ 👷 – when enabled, all operation functions are locked off and cannot be activated.





### On screen guidance

- Guidelines:
  - ◄Orange – active guidance line
  - ◄Brown (multiple) – adjacent guidance lines
  - ◄Black – boundary line
- Points – markers for established points:
  - ◄Red point – Return to point
  - ◄Blue point – Mark A
  - ◄Green point – Mark B
- Coverage area – illustrates applied area and overlap:
  - ◄Blue – one application
  - ◄Red – two or more applications
- Zoom in/out & perspective – adjusts the vehicle's view or perspective to the horizon from vehicle view to bird's eye view.
- Boom Sections:
  - ◄Empty box – inactive boom
  - ◄White box – active boom

## Status bar

The status bar provides information on GNSS status, guidance mode, boundary area, and implement control status.
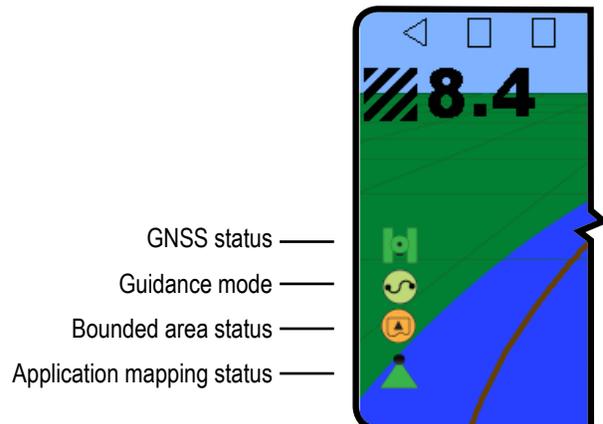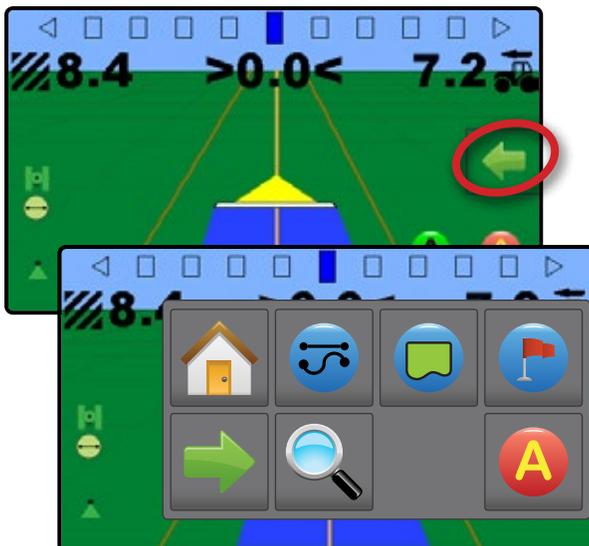


GNSS status

Guidance mode

Bounded area status

Application mapping status

## GNSS status

| | |
|---|---|
| 🔴 | Red = no GNSS |
| 🟡 | GPS only |
| 🟢 | Green = DGPS,WAAS/RTK, GLONASS |

## Guidance mode

| | |
|---|---|
| ⊖ | Straight AB guidance |
| ∿ | Curved AB guidance |
| ◎ | Circle pivot guidance |
| 🔁 | Last pass guidance |
| | No icon = no guidance |

## Bounded area status

| | |
|---|---|
| 🟠 | Outside boundary = currently traveling outside bounded area |
| 🟠 | Inside boundary = currently traveling inside bounded area |
| | No icon = no boundary established |

## Application mapping status

| | |
|---|---|
| 🔺 | Red = off |
| 🔺 | Green = on |

## Status/information screens

To display information:
1. Press status bar icon.
   ► GNSS status 🟢 – displays information regarding number of satellites in view, satellite quality and receiver ID

   

   ► Bounded area status 🟠 – displays information regarding the area in the current boundary
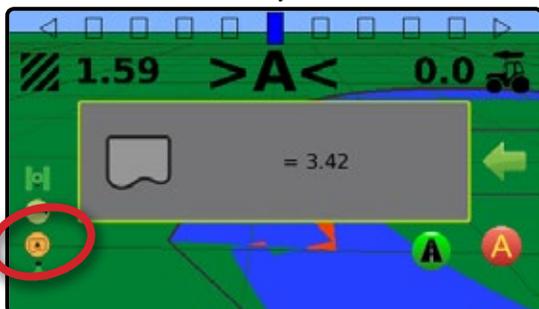
   

To remove the information box, tap the information box.

## Guidance bar

The guidance bar keeps you informed of your choice of selectable information (current speed, total applied area, application time, swath number) and navigation activity (cross track error, current activity and GNSS status).
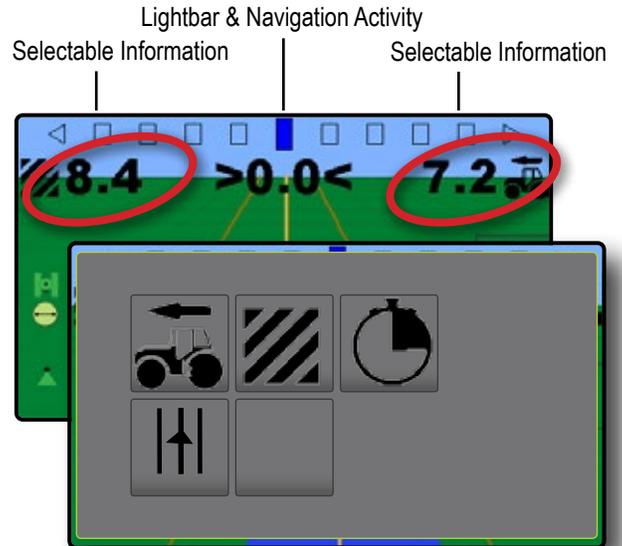


### Lighbar & navigation activity

Lightbar spacing – used to represent the distance away from the guideline or vehicle.

GNSS status – displays flashes "GPS" when GNSS is unavailable

Cross track error – displays the distance from your desired guideline

Current activity – displays activities such as mark an A or B point and distance to return to a marked point

### Selectable information

Speed 🚜 – displays the current speed of travel

Total applied area 🗄 – displays the total accumulated area that has had application applied including double coverage areas

Application time 🕐 – displays the total time application is active during the current job

Swatch number ╟╢ ⸮⸮ – displays the current swath number in reference to the initial guidance line. Number will be shown as a positive number when the vehicle is to the right of the AB baseline or a negative number when the vehicle is to the left of the AB baseline
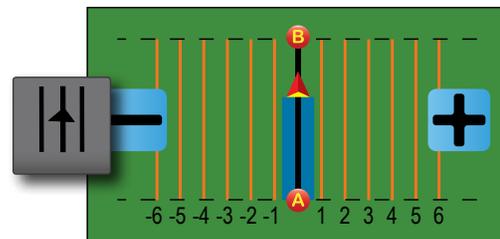


No information ☐ – shows no information in the display area

## Guidance Modes

To choose a Guidance Mode:

1. Press NAVIGATION AND GUIDANCE OPTIONS tab ⬅ to display navigation options.
2. Press GUIDANCE MODE button.
3. Select from:
   ► Straight AB guidance
   ► Curved AB guidance
   ► Circle pivot guidance
   ► Last pass guidance
   ► No guidance

*NOTE: Offset to adjacent guidelines will be calculated using the guidance width, which is encoded in Machine setup in the Configuration options.*
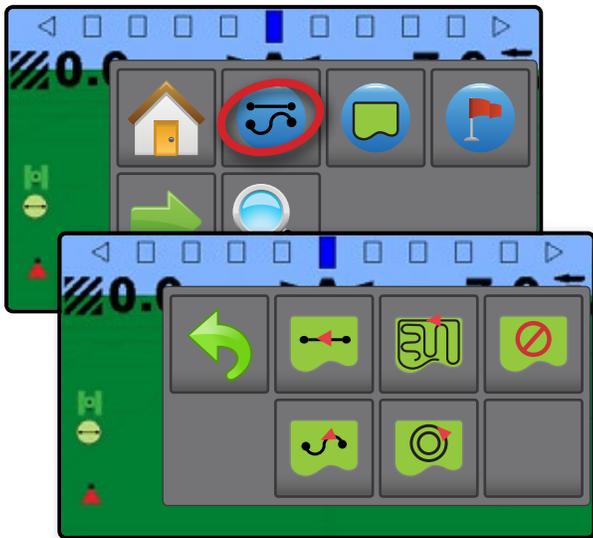


### Straight AB guidance

Straight AB guidance provides straight line guidance based on A and B reference points. The original A and B point are used to calculate all other parallel guidelines.
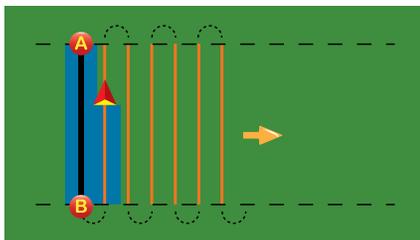


### No guidance

No guidance turns off guidance.

*NOTE: No guidance mode does not delete established guide lines or points from the console. To delete established/saved data from the console, please refer to the Data management section under Unit setup.*

### Last pass guidance

Last pass guidance offers true last pass navigation. The console will automatically detect the nearest applied area and establish parallel guideline based on that area.

*NOTE: If a boundary is established but no application occurred during the boundary process, guidance will not initiate.*
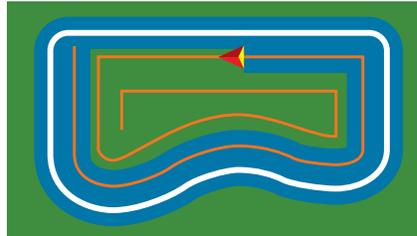


### Curved AB guidance

Curved AB guidance provides guidance along curved lines based on an initial AB reference line. This initial baseline is used to calculate all other guidelines.

*NOTE: Curved guidance is recommended not to exceed 30° within the AB guideline.*

*HINT: While working in a bounded area, the guidance pattern extending beyond the established AB points will be straight line guidance.*
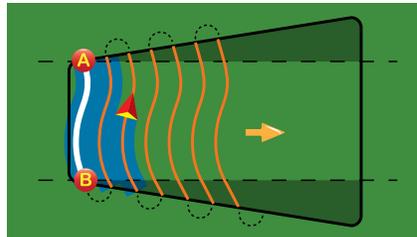


### Circle pivot guidance

Circle pivot guidance provides guidance around a central location that radiates inward or outward based on an initial AB reference line. This initial baseline is used to calculate all other guidelines.

It is used for product application in a centre pivot field while being guided along a circular guideline that matches a centre pivot irrigation system radius.
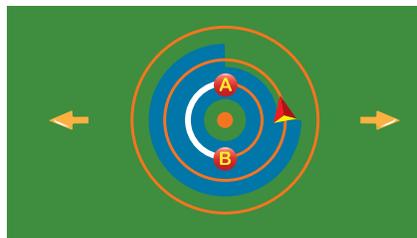
## A  Guidelines

### A  B  Marking A and B points

To establish an AB guideline:
1. Drive to the desired location of Point A 🔵.
2. **While the vehicle is in motion,** press MARK A icon Ⓐ.

    *NOTE: a Mark A button Ⓐ is also available on the Navigation and guidance options ⬅ menu*

3. Drive to the desired location of Point B 🟢.
4. Press MARK B button Ⓑ to establish the AB line.

The console will begin providing navigation information.

*NOTE: The MARK B Icon Ⓑ is not available for selection (greyed out) until the minimum distance is travelled (3.0 metres in Straight or Curved guidance, 50.0 metres in Circle pivot guidance).*

*It is not necessary to drive the entire circumference of the centre pivot in order to initiate Circle pivot guidance.*

Use CANCEL MARK button 🚫 on the Navigation and guidance options ⬅ menu to cancel the Mark A command and revert to the previous guideline (when established).
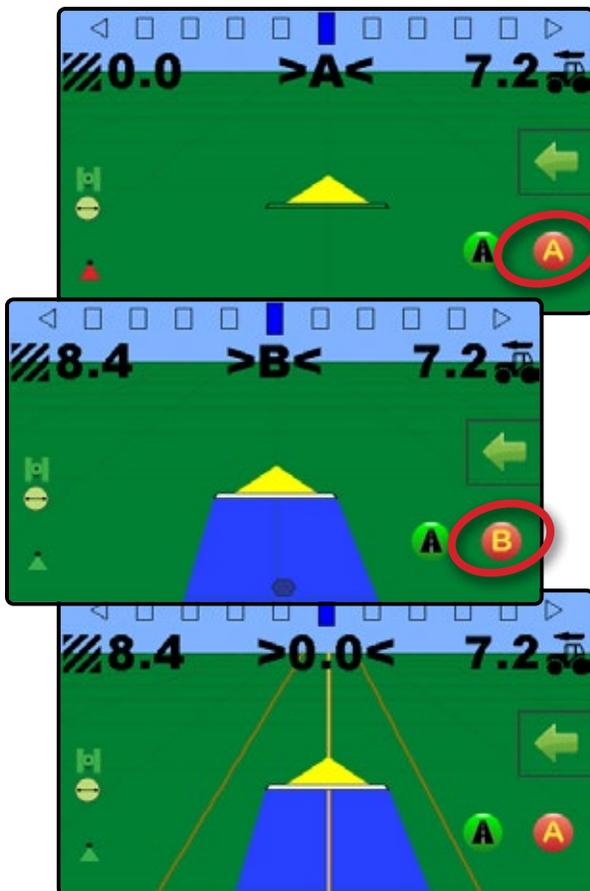
### A⁺  A+ nudge feature

The A+ nudge feature allows the current guideline to be shifted to the vehicle's current location.

To adjust the guideline:
1. Press NAVIGATION AND GUIDANCE OPTIONS tab ⬅ to display navigation options.
2. Press A+ NUDGE button Ⓐ⁺.
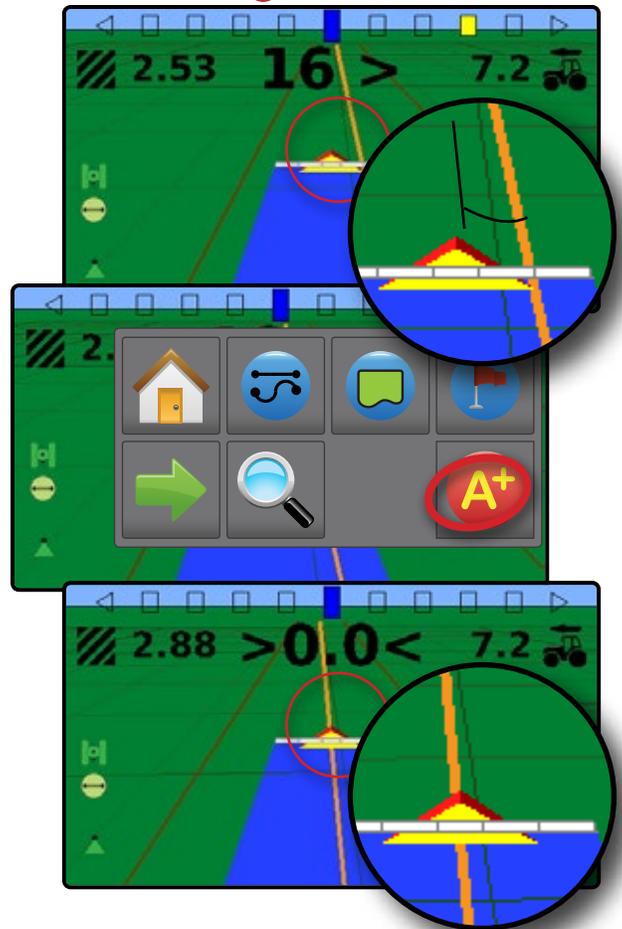
## Application Boundary

Application boundaries establish areas where application is and is not to be applied. Boundaries can be established in all guidance modes. One exterior boundary can be stored at a time.In correspondence to your current location, the IN BOUNDARY icon or OUT BOUNDARY icon is displayed on the status bar once the boundary is established.
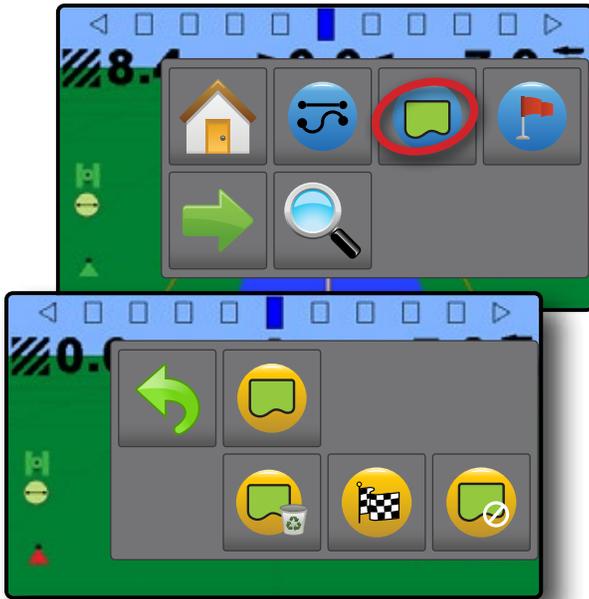
### Creating a boundary

To establish an application boundary:

1. Drive to a desired location at the perimeter of the field/ application area.
2. Press NAVIGATION AND GUIDANCE OPTIONS tab to display navigation options.
3. Press BOUNDARY button .
4. While the vehicle is in motion, press BOUNDARY button .
5. Travel the perimeter of the field/area.
6. Finish boundary:

    ▶ Travel to within one swath width of the starting point. The boundary will close automatically (the white boundary line will turn black)

    ▶ Press BOUNDARY FINISH button . A straight line will complete the boundary between your current location and the starting point

*NOTE: The BOUNDARY FINISH button is not available for selection (greyed out) until the minimum distance is travelled (five-times the swath width).*

Use CANCEL BOUNDARY button under Boundary on the Navigation and guidance options menu to cancel the new field boundary process and revert to the previous boundary (when established).
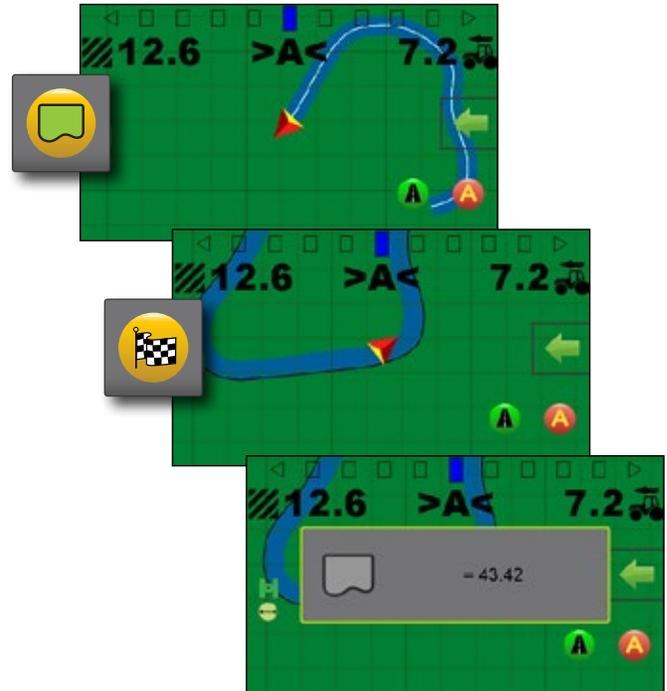
### Delete the boundary

To delete the established boundary:

1. Press NAVIGATION AND GUIDANCE OPTIONS tab to display navigation options.
2. Press BOUNDARY button .
3. Press DELETE BOUNDARY button .
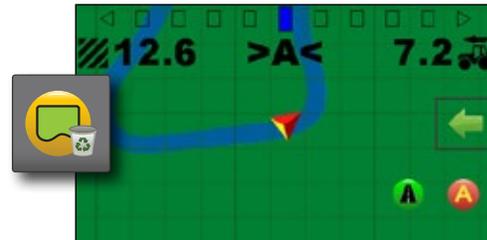
## Return to Point

Return to point provides guidance back to an established point. An arrow directs the vehicle back to the established point.

A return point will remain active until deleted.

### Marking a return point

To mark a return point:
1. Drive to the desired location of return point ⬢.
2. Press NAVIGATION AND GUIDANCE OPTIONS tab ⬅ to display navigation options.
3. Press RETURN TO POINT button 🚩.
4. Press ADD POINT button 🚩.
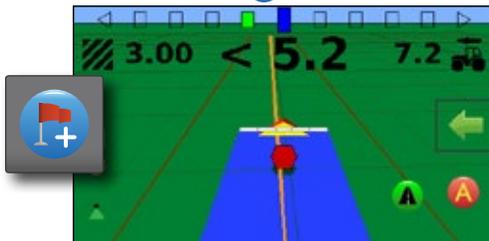
### Delete the return point

To delete the established return point:
1. Press NAVIGATION AND GUIDANCE OPTIONS tab ⬅ to display navigation options.
2. Press RETURN TO POINT button 🚩.
3. Press DELETE POINT button 🚩.

Delete point button is not available while return to point guidance is active.
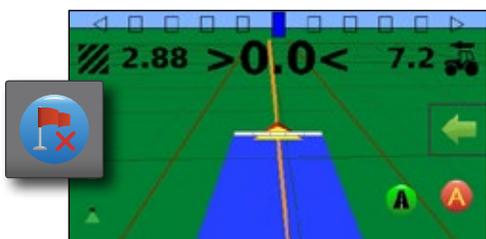
## Guidance to a return point

To show distance and guidance to the established return point:
1. Press NAVIGATION AND GUIDANCE OPTIONS tab ⬅ to display navigation options.
2. Press RETURN TO POINT button 🚩.
3. Press RETURN TO POINT GUIDANCE button 🚩.

The console will begin providing the distance information on the guidance bar from the vehicle to the established point.

Use CANCEL RETURN TO POINT GUIDANCE button 🚩 under Return to point 🚩 on the Navigation and guidance options ⬅ menu to hide distance and guidance to the established point.

Guidance cannot be calculated when "?" appears in the guidance bar.
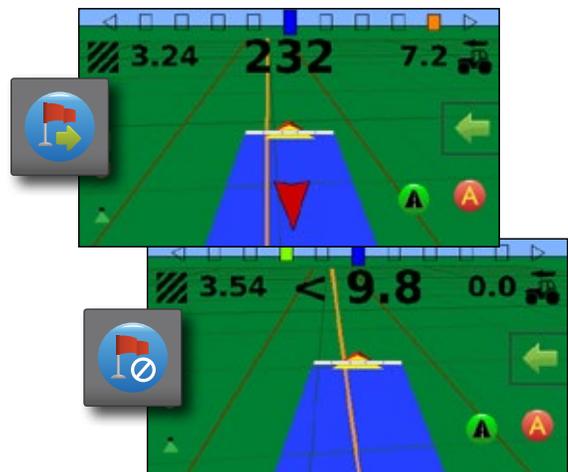
## Zoom In/Out

Zoom in/out & perspective is used to adjust the vehicle's view or perspective to the horizon from vehicle view to bird's eye view.

- Zoom in 🔍 will adjust view to vehicle view displaying a compass on the horizon
- Zoom out 🔍 will adjust view to bird's eye view
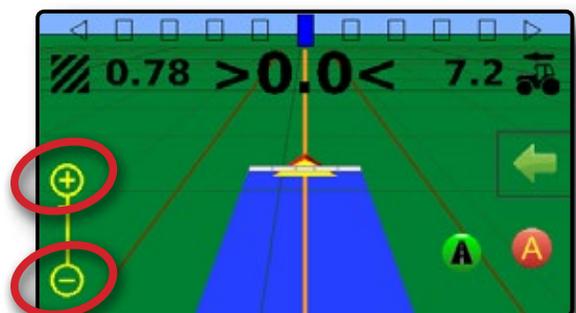
## ▲ Application Mapping & Applied alert

Application mapping is used to map coverage areas and flash and sound alerts when entering and existing previously mapped applied areas to alert the operator to turn on or shut off application.

*NOTE: Application mapping does not control actual application.*

### Mapping with console only

To switch mapping and alerts off or on using the console:
1. Press vehicle ▲ in the center of the screen.

◄ Mapping and alerts on – status bar icon will change to green ▲

◄ Mapping and alerts off – status bar icon will change to red ▲
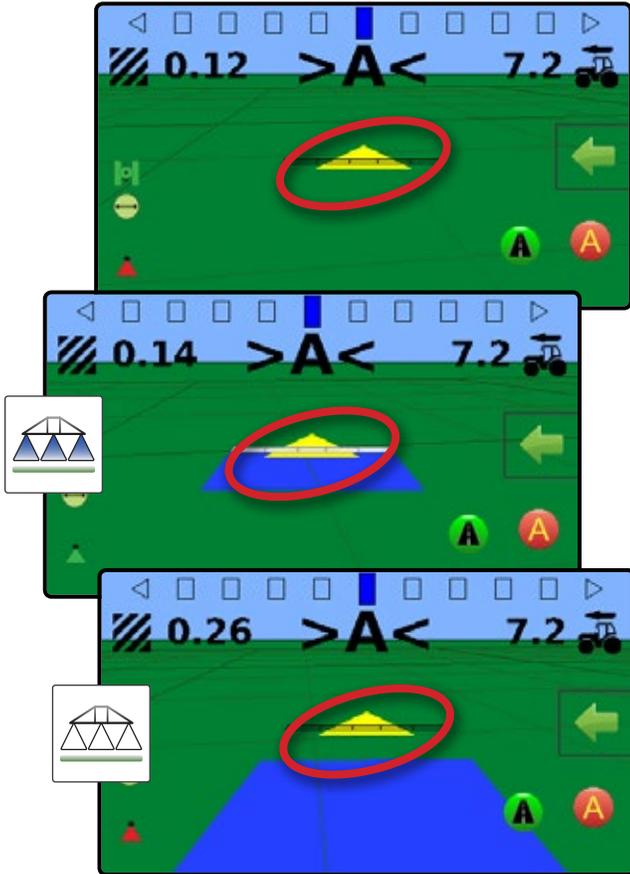






### Mapping with work on/off switch

When installed, the work on/off switch should remain in the "off" position for all setup options.

To switch mapping and alerts off or on using the switch:
1. Turn the switch to the "On" or "Off" position.

◄ Mapping and alerts on – status bar icon will change to green ▲

◄ Mapping and alerts off – status bar icon will change to red ▲

To switch mapping and alerts off or on using the console while a switch is attached:
1. Turn the switch to the "Off" position.
2. Press vehicle ▲ in the center of the screen.

◄ Mapping and alerts on – status bar icon will change to green ▲

◄ Mapping and alerts off – status bar icon will change to red ▲

### Applied alert

When entering or exiting an applied area, an audio alert will sound and section indicators will flash as each section needs to be turned on/off.

◄ Two beeps – entering an applied area; section mapping will turn off

◄ One beep – exiting an applied area; section mapping will turn on
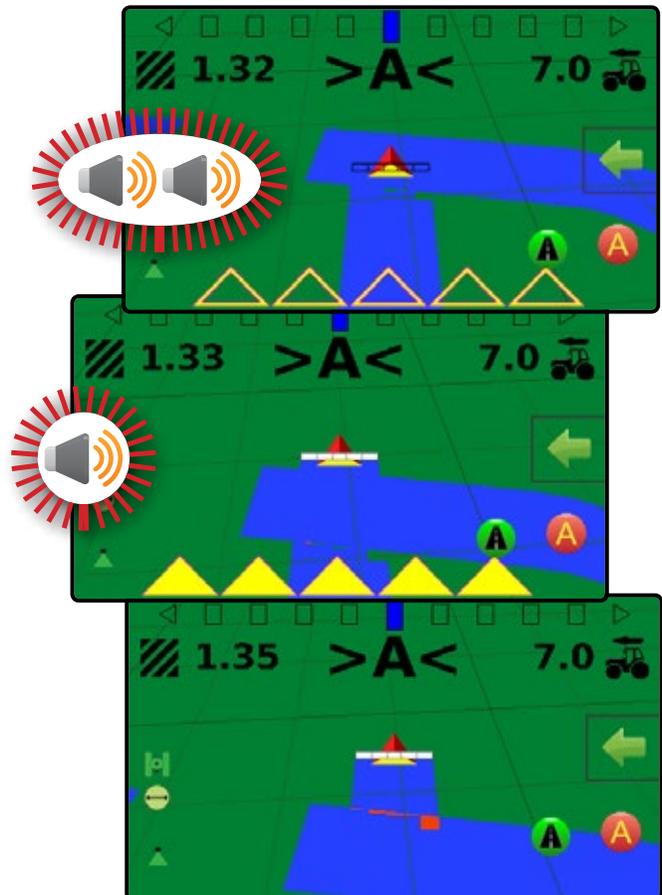
## 🅰 Transport Mode

Transport mode is recommended for use when traveling between fields as this will improve accuracy in guidance functions.

To enable Transport Mode:

1. Press the Transport Mode button 🅰.

   ◄ When enabled, all guidance functions are disabled.
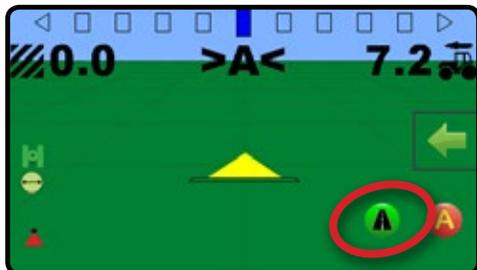
To disableTransport Mode:

1. Press the Guidance button 🏃.

*NOTE: There will be a slight delay while exiting Transport Mode.*
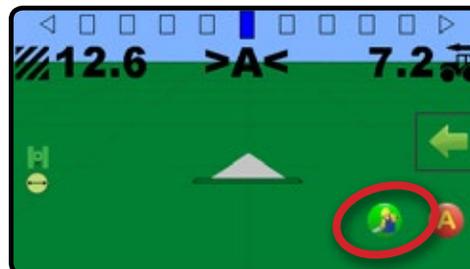
## ⚙ CONFIGURATION

### 🚜 Machine settings

1. From the Home screen, press CONFIGURATION button ⚙.
2. Press MACHINE CONFIGURATION button 🚜.
3. Press current value and use the keyboard to enter a new value.

   ► Number of implement sections ❶ – used to select the number of implement sections. Range is 1 to 7 sections.

   ► Section widths ❷ – used to enter the width of each section. Each section can be a different width. Range for each section is 0.0 to 246.06 feet / 0.0 to 75.0 metres. Total for all sections must be greater than 3.28 feet / 1.0 metre.

   ► In-line implement offset distance ❸ – used to define the in-line distance from the GNSS antenna to the implement. Range is 0.0 to 164.04 feet / 0.0 to 50.0 metres.

   ► Lateral implement offset distance ❹ – used to define the lateral distance from the center line of the machine to the center of the implement.

   While facing in the machine's forward direction:

   ◄ Right of center – use a positive value

   ◄ Left of center – use a negative value

   Range is 0.0 to +/-32.8 feet / 0.0 to +/-10.0 metres.

# Matrix® 430
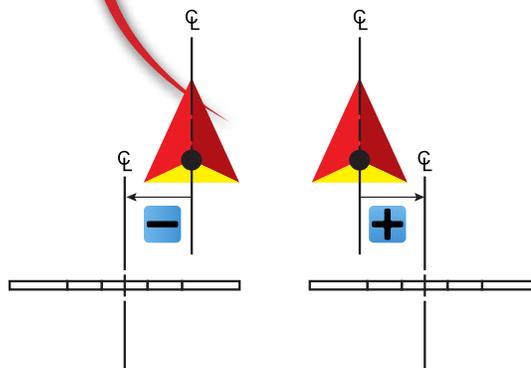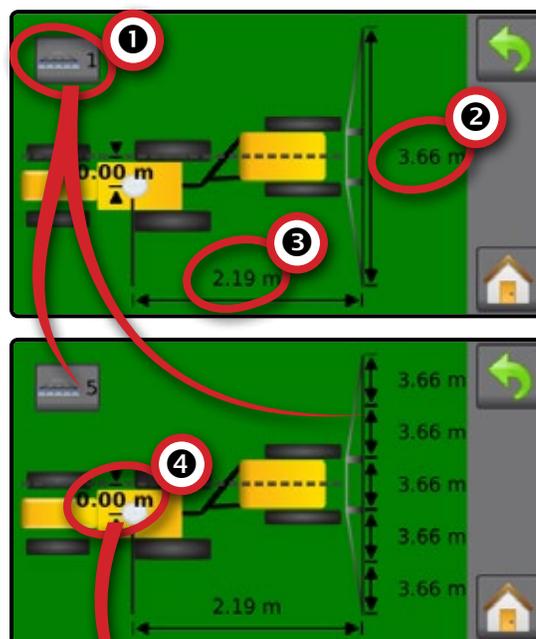
## Lightbar spacing

Lightbar spacing is used to set the distance away from the guideline or vehicle each guidance screen lightbar box represents.

1. From the Home screen, press CONFIGURATION button.
2. Press LIGHTBAR SPACING button.
3. Press current value and use the keyboard to enter a new value.
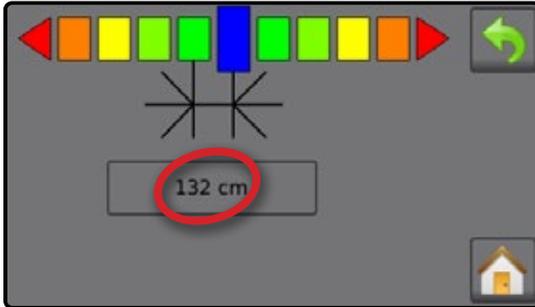
## GNSS receiver configuration

Used to configure GNSS receiver type.

1. From the Home screen, press CONFIGURATION button.
2. Press GNSS button.
3. Select:
   ► GPS – uncorrected signals from the GPS system
   ► SBAS (e.g. EGNOS, GAGAN, MSAS, SDCM, WAAS) – adds differentially corrected signals from the SBAS system
   ► GLONASS – adds uncorrected signals from the GLONASS system

## JOB DATA

Job Information provides an overview of job information including the total applied area, total time traveled and bounded area.

1. From the Home screen, press DATA button.
   ► Total applied area
   ► Bounded area

   *NOTE: bounded area is only shown when a boundary is active.*

   ► Application time

## Delete job data

To start a new job, delete job data from internal storage:

1. Press DATA button.
2. Press RECYCLE button.
3. Select ACCEPT icon or CANCEL icon accordingly.

### ALL Reports

To save reports to a USB drive:

1. Press DATA button 🗄.
2. Insert USB drive.
3. Press SAVE ALL button ALL.

*NOTE: If no data has been collected, the SAVE ALL button will be unavailable (grayed out).*
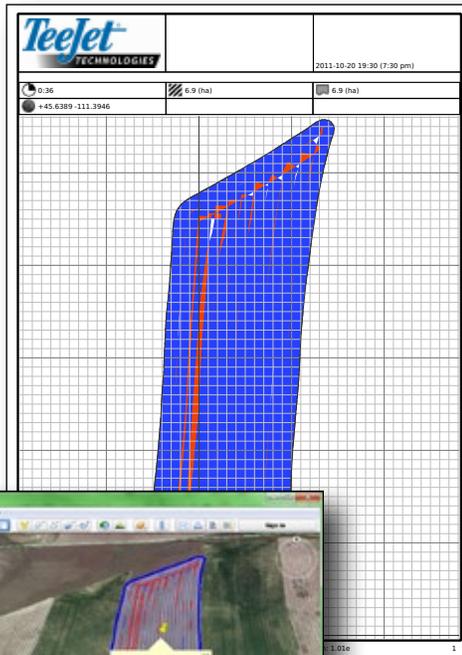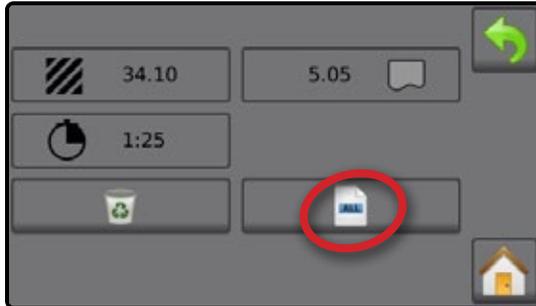
### CONSOLE

The Console setup is used to configure the display and cultural settings.

1. From the Home screen, press CONSOLE button 🔲.
2. Select from:
    ► LCD brightness 💡 – used to adjust the brightness of the console display
    ► Colour scheme 🎨 – used to change the background and text colours on the display
    ► Units 📏 – used to define the system measurements
    ► Demo mode 📡▶ – used to start playback of simulated GNSS data
        ◄GNSS 🛰 – press to use real GNSS signals
        ◄Demo ▶ – press to start demonstration GNSS
    ► Screenshot 📷 – used to allow screen captures to be saved to a USB drive
    ► Time zone 🌍 – used to establish the local time zone
    ► About ℹ – used to display the system software version

# MATRIX® 430
## USER MANUAL

## FIRST START-UP CONSOLE CONFIGURATION

The first time the console is started a sequence of configuration settings will be presented:

### Units

► Select system measurements units

### Machine settings

► Set Number of implement sections ❶
► Set Section widths ❷
► Set In-line implement offset distance ❸
► Set Lateral implement offset distance ❹

### GNSS Receiver Configuration

The GNSS configuration menu allows the user selection of GPS, GLONASS, or SBAS when using the internal receiver. When operating under a supported SBAS system, the receiver will apply SBAS corrections to the 8 strongest GPS observations, and in addition will included up to for GLONASS observations to the solution.

Select from:

◄ GPS – uncorrected signals from the GPS system
◄ SBAS (e.g. EGNOS, GAGAN, MSAS, SDCM, WAAS) – adds differentially corrected signals from the SBAS system
◄ GLONASS – adds uncorrected signals from the GLONASS system