USER GUIDE

CenterLine 2.02

TeeJet®

CenterLine
Software Version 2.02

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CHAPTER 1 - INTRODUCTION

CenterLine is an economical lightbar guidance system that is controlled by a wireless remote. CenterLine provides accurate Straight-Line and Curved Guidance for use in spraying, seeding, and other related jobs at a cost that rivals foam markers. The CenterLine product is equipped with a combination Beacon/WAAS or WAAS only DGPS receiver, providing sub-meter, pass-to-pass positioning accuracy. The wireless remote control is used to configure and operate the system through menus and options displayed on the lightbar.

CenterLine's attractive design combines compact size with fully adjustable, easy to see LEDs. Using dedicated buttons on the wireless remote, the lightbar can be dimmed to efficiently run at night and brightened for viewing in full sunlight.

STRAIGHT OR CURVED GUIDANCE

CenterLine guides along various types of swaths with sub-meter, pass-to-pass accuracy. Select the driving pattern and CenterLine determines the closest swath to follow. There is no need to decide a guidance pattern ahead of time or commit to a pattern for the entire job. CenterLine allows the switching of patterns during operation, determining when a new pattern is being used and keeping the operator informed of the current status.

WIRELESS REMOTE CONTROL UNIT

CenterLine's ergonomic, handheld remote control is easier to use than most television remotes. Seven easy-to-read buttons allow for the scrolling of menus displayed on the lightbar. The remote keypad is backlit for nighttime operation. Three AAA batteries (included) power the unit for an entire season.

The small, powerful remote permits mounting the weather-resistant lightbar outside on the hood or in the cab. When mounted outside, wireless communication permits easy operation while the cab stays clean and sealed from dust and contaminants.

LIGHTBAR DISPLAY

A text display on the lightbar reports a choice of guidance information. It also warns when an area of the field is entered that has already been applied. Guidance text information can be turned off, if preferred. Two of the following guidance messages are available for selection during operation to monitor progress:

- Cross-Track Error
- Current Swath Number
- Vehicle Speed
- Applied Area
- Vehicle Course On Ground (COG)

MENU ITEMS AND PICK LIST TEXT

Throughout this User's Guide, menu item text is displayed between < > characters (i.e., <START>). Buttons on the remote control are denoted in italics (i.e., *Arrow* buttons) and will be displayed in the margin of the User's Guide.

Arrow buttons

Most of the figures in this guide are menu items that are displayed in the text window of the lightbar. This text represents either a menu item, such as <GUIDANCE>, or a list item, such as <METRIC>.

The lightbar text window can display a single line of text up to ten characters in length. Figure 1-1 illustrates an example of a single text line that would be displayed on the lightbar.

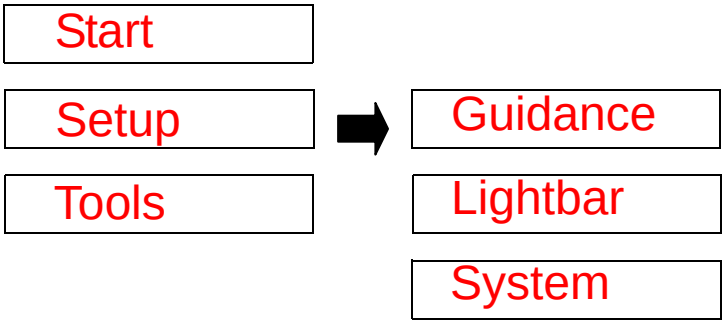
Figure 1-1: Example of Lightbar Text Display

Arrow buttons

Enter button

Figures with multiple menu items are depicted with menu items above and below, and with submenu items located to the right of the text item currently in view. Figure 1-2 represents several menu items. The current menu item in view is <SETUP> and is denoted with a black arrow to the right of the text. The figure shows that the *Arrow* buttons can be used to scroll between <START>, <SETUP>, and <TOOLS>. If the *Enter* button is pressed, the display will progress into <SETUP> and continue with <GUIDANCE> menu options. The *Arrow* buttons would then be able to scroll between <GUIDANCE>, <LIGHTBAR>, <SYSTEM>, etc.

Figure 1-2: Example of Multiple Text Lines

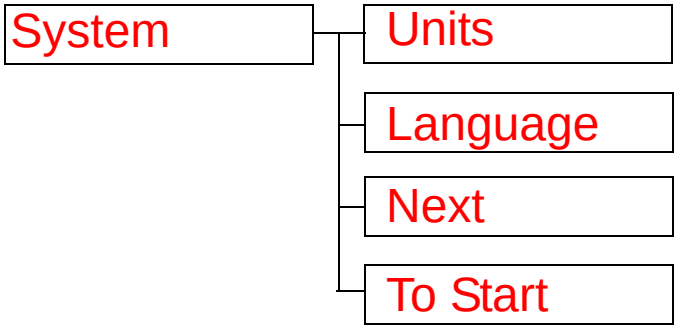


There are two additional menu items that are located in almost every menu:

- <NEXT>
- <TO START>

Figure 1-3 illustrates the <NEXT> and <TO START> menu items in the System Setup menu list. Pressing the *Enter* button when <NEXT> is displayed will launch the next menu heading. For example, during Lightbar Setup, pressing *Enter* at <NEXT> will launch <SYSTEM>. Once in System Setup, pressing the *Escape (ESC)* button at <NEXT> will launch the <LIGHTBAR> menu again. Selecting <TO START> automatically reverts the operator back to the main menu. This is useful when it is necessary to make only minor modifications and quickly resume operation.

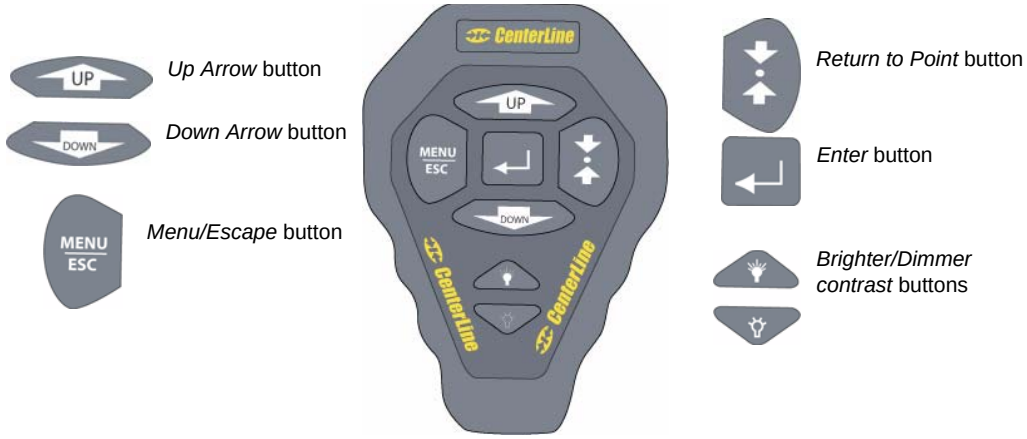
Figure 1-3: <Next> and <To Start> Examples



Wireless Remote Control

Operation of the CenterLine software occurs via remote keypad input and menu items displayed in the text display area. The *Arrow* buttons are used to scroll through menus and sub-menus. The *Enter button* is used to enter menus and sub-menus and accepts the appropriate entry. The *Escape (ESC)* button acts as a cancel button.

Figure 1-4: Wireless Remote Control



LIGHTBAR

Figure 1-5: CenterLine Lightbar

Lightbar Specifications

Housing Material	ABS/Poly carbonate alloy construction.
Dimensions	3.70” H x 9.40” W x 3.80” D / 95mm x 240mm x 100mm
Weight	0.8 lbs / 0.36 kg
Processor	Intel StrongARM
Memory	16 MB Ram, 2 MB Flash
LEDs	High-lumen red, yellow, and green radial light pattern and 10-character LED alphanumeric text display. Full brightness control adjustment using wireless remote.
Operating Voltage	10-14 VDC
Operating Temperature	32^{o} to 160^{o}F / 0^{o} to 70^{o} C
Storage Temperature	-40^{o} to 185^{o} F / -40^{o} to 85^{o} C
I/O to DGPS	1 asynchronous RS232
I/O to Control Unit	Wireless link operating at 433 MHz. FCC Part 15 and Industry Canada RS-210 certified. Other certifications pending.
Mounting	Mounting bracket supplied. Magnetic and suction mounts are optional.

FCC STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference; and (2) this device must accept any interference received, including interference that may cause undesired operation.

QS7CL7850094

QS7CL7850107

TR19JN96.008

Changes or modifications to the product, not expressly approved by TeeJet Technologies, Inc. could void the user’s authority as granted under Part 15 of the FCC Rules to operate the equipment.

CHAPTER 2 - SETUP

It is assumed that the CenterLine system has been properly installed. Refer to the following CenterLine diagrams for system configuration.

QUICK START GUIDE

First Time Start-Up Sequence

1. Turn ON power to CenterLine.
2. The lightbar will perform a start-up sequence.
3. The lightbar will display the current software version.
4. The lightbar will display <START>.
5. Using the *Arrow* buttons, scroll until <SETUP> is displayed on the lightbar. Press the *Enter* button.
6. Configure the CenterLine system by choosing the appropriate settings under <GUIDANCE>, <LIGHTBAR>, and <SYSTEM>. It is important to enter the correct swath width for operation.
7. Use the *Arrow* buttons to locate <TO START>. Press the *Enter* button. The operator will return to the main menu.
8. Once <START> is displayed on the lightbar, press ENTER to begin operation.

Arrow buttons

Enter button

Typical Start-Up Sequence

1. Turn ON power to CenterLine.
2. The lightbar will perform a start-up sequence.
3. The lightbar will display the current software version.
4. The lightbar will display <START>.
5. <START> will remain visible on the lightbar until the *Enter* button is pressed to begin operation or the *Arrow* buttons are pressed to select a menu option.

Figure 2-1: CenterLine Without DGPS Receiver

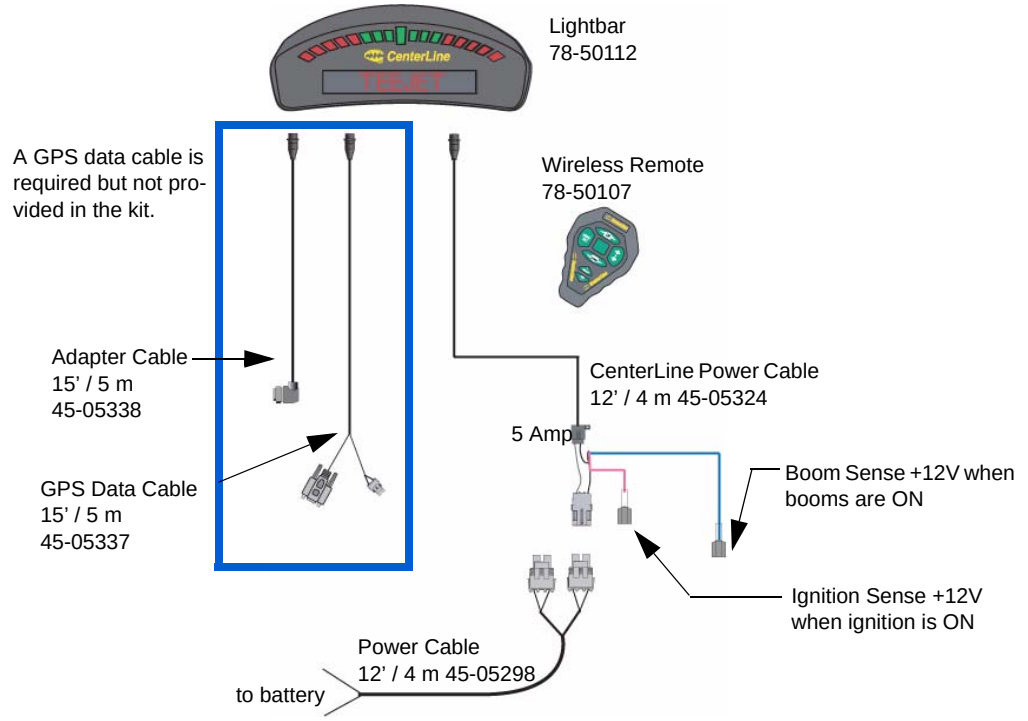
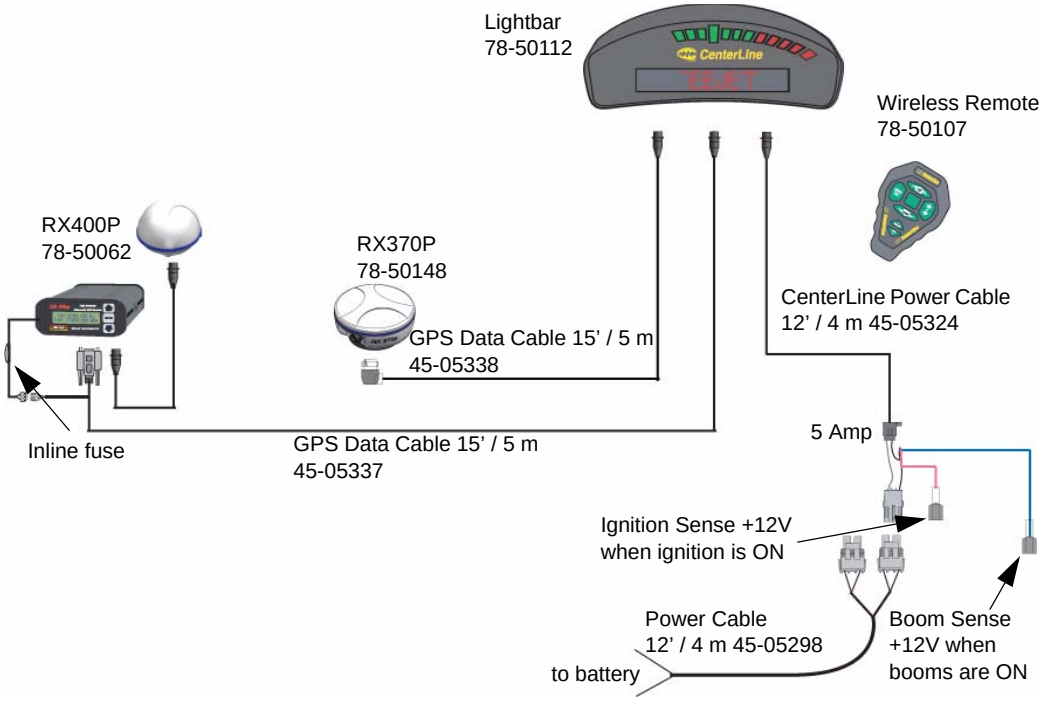


Figure 2-2: CenterLine With DGPS Receiver



CENTERLINE SETUP

CenterLine Setup allows for the configuration of the CenterLine product to best suit current guidance and mapping needs. For a complete overview of the setup process, refer to Figure 2-31 (page 22). CenterLine Setup consists of three sub-menus:

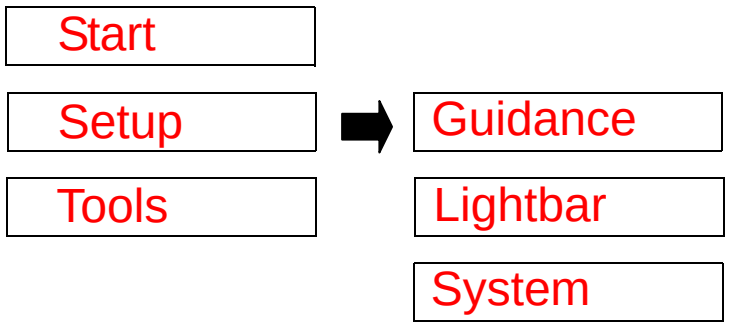
- Guidance
- Lightbar
- System

The top level of CenterLine software contains three menus available for selection: <START>, <SETUP>, and <TOOLS>. To access the setup menus, use the *Arrow* buttons to scroll to <SETUP> and press the *Enter* button. Once in <SETUP> mode, menu options will consist of <GUIDANCE>, <LIGHTBAR>, and <SYSTEM>. Access to setup options is achieved by pressing the *Enter* button.

Arrow buttons

Enter button

Figure 2-3: CenterLine Setup Flow



Guidance Mode

Guidance Mode allows for the establishment of several parameters that pertain to guidance functionality. To access Guidance Mode, use the *Arrow* buttons to scroll through the menu selections until <GUIDANCE> appears on the lightbar. Press the *Enter* button.

If the first menu item displayed is <SWATH MAN>, Swath Manager 5 has been detected on the system and needs to be configured. Refer to CHAPTER 2 - SWATH MANAGER for additional information.

Figure 2-4: Guidance Setup Flow

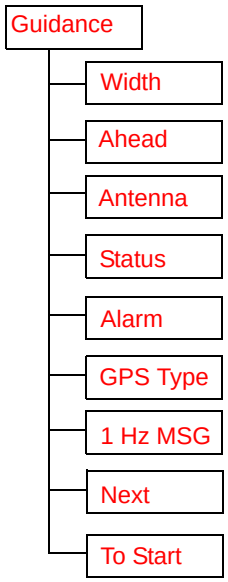


Table 2-1: Guidance Default Settings

Setting	Default Value	Change at Initial Startup
Width	30.0 feet/10 meters	Required
Ahead	1.5 seconds	Optional
Antenna - Direction	None	Recommended
Antenna - Distance	0.0 feet	Recommended
Antenna - Height	9.8 feet / 2.9 meters	Recommended
Status Detect	Off	Optional
Alarm	Off	Recommended
GPS Type	DGPS	Recommended
1 Hz MSG	Yes	Not Recommended

Arrow buttons

Enter button

Swath Manager 5

The Guidance parameter <SWATH MAN> is only displayed when Swath Manager 5 is connected to the system. If Swath Manager 5 is not being used, this section is not required and can be skipped.

To adjust <SWATH MAN> settings in <GUIDANCE> mode, use the *Arrow* keys until <SWATH MAN> is displayed and press the *Enter* button. The Swath Manager menu contains four parameters:

- % overlap
- Sections
- Width 1-5
- Delay

Figure 2-5: Swath Manager 5 Setup

Table 2-2: Swath Manager Settings

Setting	Description
% Overlap	Boom sections are activated and deactivated based on the percentage of boom overlap setting (0%, 50%, and 100%)
Sections	The number of sections (1-5) active on the system.
Width 1-5	The width for each boom 1-5.
Delay	The delay in seconds to turn the booms on and off when entering/exiting applied zones.

Arrow buttons

Enter button

% Overlap

%Overlap determines the amount of overlap allowance to eliminate skips in application. Enter the appropriate pattern by using the *Arrow* buttons to select 0%, 50%, or 100% and press the *Enter* button to accept the setting.

Figure 2-6: % Overlap Settings

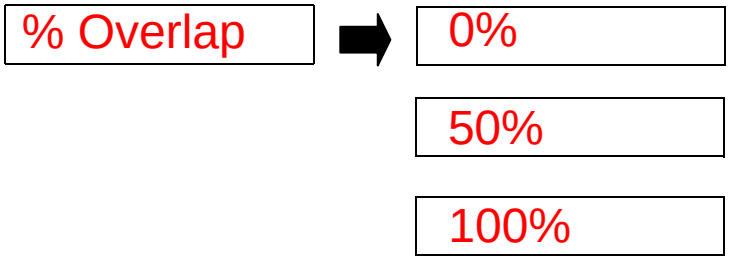
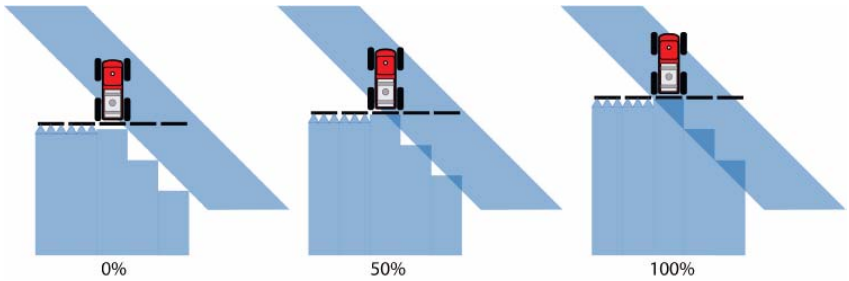


Figure 2-7: % Overlap Illustration



Arrow buttons

Enter button

Sections

Enter the number of sections that are active in the system. Use the *Arrow* buttons to scroll to the appropriate number (1 - 5) and press the *Enter* button to accept the setting.

Figure 2-8: Number of Sections

Width

Enter the width in feet / meters for boom section 1 by using the *Arrow* buttons to scroll through the options, followed by the *Enter* button. Repeat the process for the remaining boom sections. **The total width of all boom sections is NOT the width that will be used for guidance. Refer to CHAPTER 2 - WIDTH for additional information.**

Figure 2-9: Boom Section Width

Delay

Enter the delay in seconds. This acts as the look ahead to turn booms on and off when entering and exiting applied zones.

Entering Applied Zones: When entering an applied zone, the setting acts as a look ahead and turns the booms off prior to entering the zone according to the number of seconds entered in Delay Setup. The setting allows time for the valves to shut off.

Exiting Applied Zones: When exiting an applied zone, the setting acts as a look ahead and turns the booms on prior to exiting the zone according to the number of seconds entered in Delay Setup. The setting allows time for the booms to re-engage before exiting the applied area.

Figure 2-10: Delay

Width

The Guidance parameter Width measures the distance between guidelines. This width is typically the vehicle implement width, otherwise known as spread width. Setting this width slightly smaller than the actual width reduces skips. Setting this width slightly larger than the actual width reduces overlap. To adjust width setting, select <GUIDANCE> followed by the *Enter* button. Use the *Arrow* buttons and select <WIDTH>, followed by the *Enter* button. To increase the width, press the *Up Arrow button*. To decrease the width, press the *Down Arrow* button. Press the *Enter* button once the desired width is established. Width value is established in 0.1 foot increments.

Figure 2-11: Guidance Width

Ahead

Arrow buttons

Enter button

The Look Ahead value, Ahead, is the number of seconds ahead of the vehicle the operator desires the software to calculate the cross track error. Based on the vehicle's speed and trajectory combined with the look ahead value, CenterLine can determine where the vehicle will be with respect to the current guideline. This setting will vary based on the operator's driving ability and preference. This value is only used during Parallel Guidance. It is not used during Headland Guidance or Circle Pivot. A look ahead value that best fits the operator will result in smoother guidance operation. Typically, this value is set to 1.5 or 2.0 seconds. To adjust Ahead settings, select <GUIDANCE> followed by the *Enter* button. Use the *Arrow* buttons until <AHEAD> is displayed in the text window. Press the *Enter* button and use the *Arrow* buttons to adjust the value. Press the *Enter* button to save the settings and return to the Guidance setup menu.

Figure 2-12: Ahead Value

Antenna

The Antenna sub-menu defines the spatial relationship between the GPS antenna and the vehicle implement or delivery point. The GPS antenna should always be mounted along the vehicle's center line (refer to Figure 2-16). The two primary antenna settings are <DIRECTION> and <DISTANCE>.

To enter the Antenna sub-menu, navigate to <GUIDANCE>, use the *Arrow* buttons until <ANTENNA> is displayed, and press the *Enter* button. Several options will be displayed: <DIRECTION>, <TO START>, <NEXT>, <HEIGHT>, and <DISTANCE>. Press the *Enter* button to save the settings and return to the Guidance setup menu.

Figure 2-13: Antenna Sub-Menu

Antenna - Direction

The Direction sub-menu defines the direction from the swath (refer to Figure 2-16). To change the Direction setting, navigate to <GUIDANCE>, use the *Arrow* buttons until <ANTENNA> is displayed, and press the *Enter* button. Use the *Arrow* buttons to select <DIRECTION> and press the *Enter* button. Scroll through the direction list using the *Arrow* buttons until the desired direction is displayed in the text window. Press the *Enter* button to save the setting and return to the Guidance setup menu.

Figure 2-14: Establishing Direction to Swath

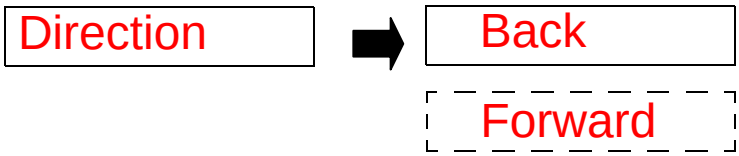


Table 2-3: Swath Settings

Setting	Description
Back	GPS receiver is behind the swath or delivery point on the vehicle along the center line.
Forward	GPS receiver is in front of the swath or delivery point on the vehicle along the center line.

Arrow buttons

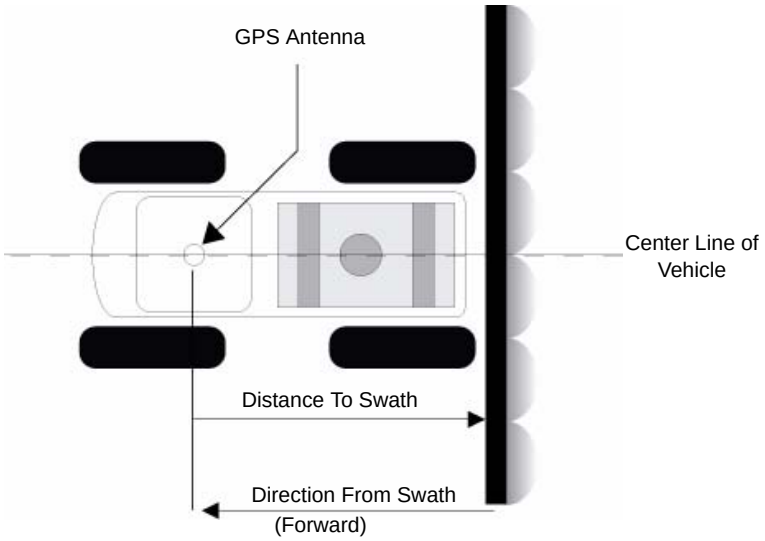
Enter button

Antenna - Distance

The Distance setting defines the distance from the GPS antenna to the swath or delivery location (refer to Figure 2-16). To adjust the Distance setting, navigate to <GUIDANCE>, use the *Arrow* buttons until <ANTENNA> is displayed, and press the *Enter* button. Use the *Arrow* buttons to select <DISTANCE> and press the *Enter* button. Use the *Up Arrow* button to increase distance; use the *Down Arrow* button to decrease distance. Press the *Enter* button once the appropriate distance is displayed to save the settings and return to the Guidance setup menu.

Figure 2-15: Establishing Antenna Distance

Figure 2-16: Direction and Distance to Swath from DGPS Receiver



Antenna - Height

The Height setting defines the height of the GPS antenna to the ground surface. This value is used only when a tilt sensor is connected. To change the height setting, navigate to <GUIDANCE>, use the *Arrow* buttons until <ANTENNA> is displayed, and press the *Enter* button. Use the *Arrow* buttons to select <HEIGHT> and press the *Enter* button. Using the *Arrow* buttons, enter the height value until the desired distance is displayed in the text window. Press the *Enter* button to save the setting and return to the Guidance setup menu.

Arrow buttons

Enter button

Figure 2-17: Establishing Antenna Height

Status

If a Swath Manager 5 is connected to the system, the Status option will be removed from the main setup. Status setup is used to auto detect implement status. When the status detect is properly implemented, CenterLine will detect whether product delivery is ON or OFF based on the vehicle product ON/OFF switch. Refer to Figures 2-1 and 2-2 for the location of status connect (boom sense) wiring.

To adjust Status, navigate to <GUIDANCE>, use the *Arrow* buttons until <STATUS> is displayed and press the *Enter* button. Options are either ON or OFF. Use the *Arrow* buttons to choose the appropriate option and press the *Enter* button to save the settings and return to the Guidance setup menu.

NOTE: When <STATUS> is set to ON, +12V must be supplied to the boom sense wire when booms are ON. If this does not occur, applied area detection will not work. Refer to the CenterLine wiring tips document 98-01095.

Figure 2-18: Status Selection

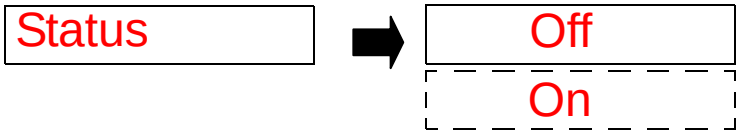


Table 2-4: Status Settings

Setting	Description
Off	No status detect is implemented. This is the default setting.
On	Status detect assumes a single swath centered on the vehicle.

Alarm

The Alarm setting, when enabled, notifies the operator when entering a previously applied area. The text window will display <APPLIED> when the implement swath enters a previously applied area of a field. To adjust the alarm setting, navigate to <GUIDANCE>, use the *Arrow* buttons until <ALARM> is displayed and press the *Enter* button. Options are either ON or OFF. Use the *Arrow* buttons to choose the appropriate option and press the *Enter* button to save the settings and return to the Guidance setup menu.

Figure 2-19: Alarm Selection

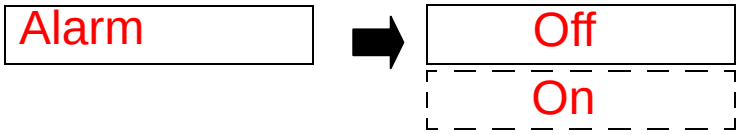


Table 2-5: Alarm Settings

Setting	Description
Off	No applied area detection.
On	Applied area detection. Alarm will sound.

Arrow buttons

Enter button

GPS Type

GPS Type indicates to the CenterLine system if the GPS receiver is differentially corrected. To adjust the GPS Type, navigate to <GUIDANCE>, use the *Arrow* buttons until <GPS TYPE> is displayed and press the *Enter* button. Options include <DGPS> and <GPS>. Select the appropriate option and press the *Enter* button to save the settings and return to the Guidance setup menu.

Figure 2-20: GPS Type Selection

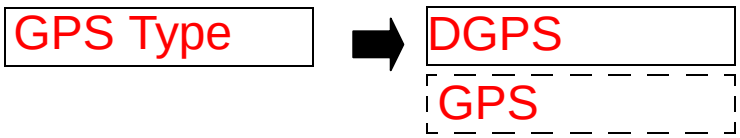


Table 2-6: GPS Type Settings

Setting	Description
GPS	GPS receiver with no differential correction, capable of providing positioning accuracy of approximately 10 meters.
DGPS	GPS receiver with differential correction, capable of providing sub-meter positioning accuracy.

1 Hz MSG

A 1 Hz data rate is not recommended for vehicle guidance, so a “GPS SLOW” message will be displayed on the lightbar to notify the operator if the GPS receiver is set to a 1 Hz data rate. However, there are some areas where the 1 Hz rate is used. For those areas, the ability to disable the “GPS SLOW” message has been established.

To enable or disable the “GPS SLOW” message, navigate to <GUIDANCE>, use the *Arrow* buttons until <1 HZ MSG> is displayed and press the *Enter* button. Options are <YES> and <NO>. Select the appropriate option using the *Arrow* buttons and press the *Enter* button to save the settings and return to the Guidance setup menu.

Figure 2-21: 1 Hz MSG Setting

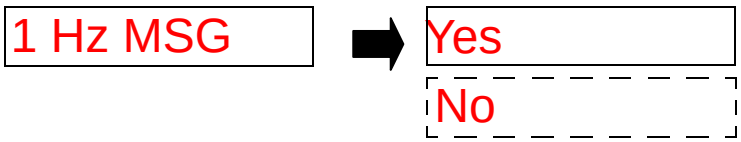


Table 2-7: 1 Hz MSG Settings

Setting	Description
Yes	When the data rate of the GPS receiver is set to 1 Hz, a <GPS SLOW> message is sent to the lightbar and the guidance function is disabled.
No	When the data rate of the GPS receiver is set to 1Hz, a <GPS SLOW> message is sent to the lightbar when the operator first begins operation, but guidance is allowed.

Lightbar

Lightbar setup allows the selection of several parameters related to the lightbar. There are five lightbar settings:

- Drive Sensitivity <SPACING>
- Display Mode <MODE>
- Messages <TEXT 1> and <TEXT 2>
- Steer Bar <STEER BAR>

Figure 2-22: Lightbar Setup Flow

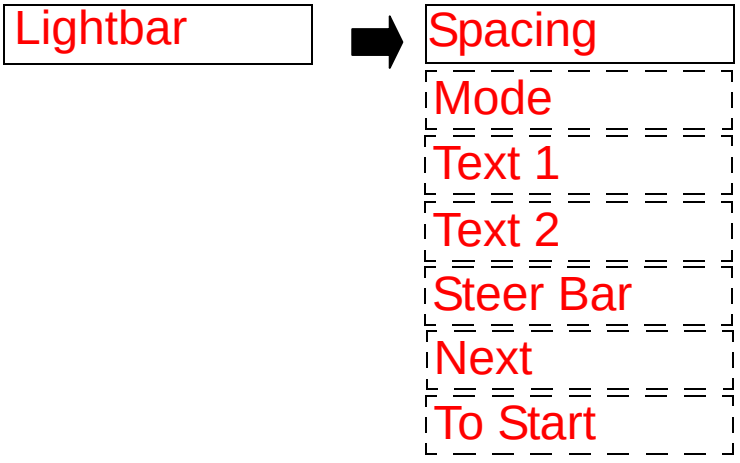


Table 2-8: Lightbar Menu Settings

Setting	Default Value	Change at Startup
Spacing	1.5 feet	Optional
Mode	Swath	Optional
Text 1	X-Track Error	Optional
Text 2	Applied Area	Optional
Steer Bar	No	Optional

Arrow buttons

Enter button

Spacing

The Spacing setting allows the selection of the distance that a single light on the lightbar LED represents. To change the spacing setting, navigate to <LIGHTBAR>, use the *Arrow* buttons until <SPACING> is displayed and press the *Enter* button. Use the *Up Arrow* button to increase distance; use the *Down Arrow* button to decrease distance. Press the *Enter* button once the appropriate distance is displayed to save the settings and return to the Lightbar setup menu. The spacing range is 0.5 feet to 9.5 feet in 0.1 foot increments.

Figure 2-23: Establishing Spacing Distance

Mode

The Mode setting defines how the row of LEDs are interpreted. The center stack of LEDs can represent either the current guideline or the vehicle. To change the Mode setting, navigate to <LIGHTBAR>, use the *Arrow* buttons until <MODE> is displayed and press the *Enter* button. Options include <VEHICLE> and <SWATH>. Use the *Arrow* buttons to select the appropriate option and press the *Enter* button to save the setting and return to the Lightbar setup menu.

Figure 2-24: Establishing Mode

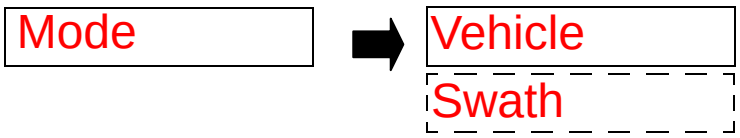


Table 2-9: Mode Settings

Setting	Description
Swath	The center stack of LEDs represent the current guideline. Steer the vehicle to bring the moving LED back to center.
Vehicle	The center stack of LEDs represent the vehicle's position. Steer the vehicle to bring the center lights toward the moving LED.

Text 1 and Text 2

Text 1 and Text 2 settings allow the operator to select text messages from pre-determined guidance information messages. The messages are displayed on the lightbar text window for 15 seconds when first enabled and used during guidance operation. A maximum of two text messages can be displayed.

Arrow buttons

Enter button

Text 1

To select the Text1 setting, navigate to <LIGHTBAR>, use the *Arrow* buttons until <TEXT 1> is displayed and press the *Enter* button. Scroll through the available options using the *Arrow* buttons until the desired message is located. Press the *Enter* button to save the setting and advance to the <TEXT 2> menu item.

Figure 2-25: Selecting Text 1 Message

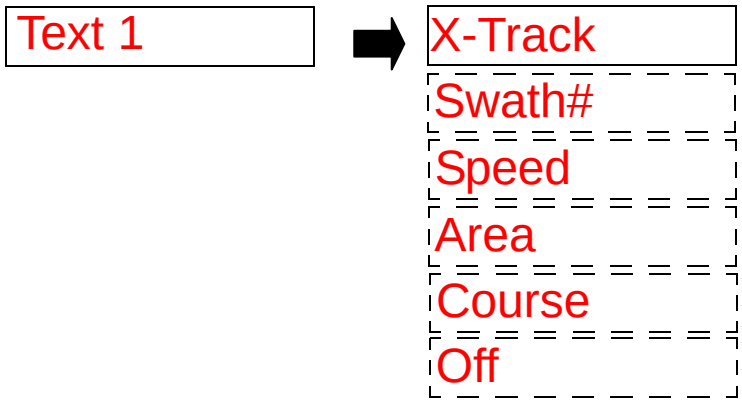


Table 2-10: Text 1 Settings

Message	Description
X-Track	Displays the error (in distance) between the current guideline and the vehicle position.
Swath #	Displays the current guideline number.
Ground Speed	Displays the vehicle ground speed.
Area Applied	Displays the amount of area covered, sprayed, or spread in acres or hectares.
COG	Course on Ground, displays the vehicle heading in degrees.
Off	When OFF is selected, no message is displayed in the message slot.

Arrow buttons

Enter button

Text 2

To select the Text 2 setting, navigate to <LIGHTBAR>, use the *Arrow* buttons until <TEXT 2> is displayed and press the *Enter* button. Scroll through the available options using the *Arrow* buttons until the desired message is located. Press the *Enter* button to save the setting and advance to the <STEER BAR> menu item.

Figure 2-26: Selecting Text 2 Message

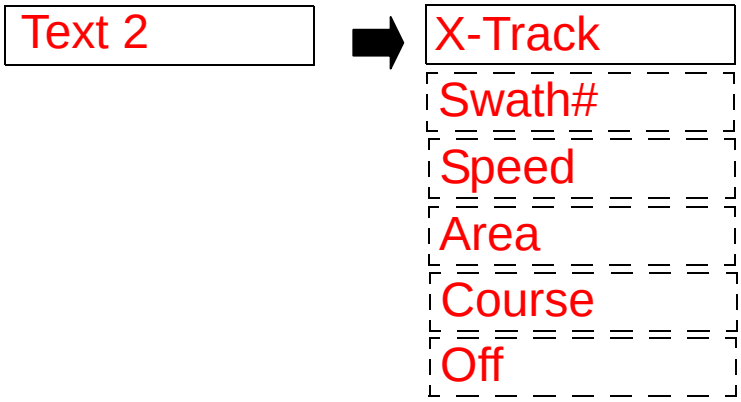


Table 2-11: Text 2 Settings

Message	Description
X-Track	Displays the error (in distance) between the current guideline and the vehicle position.
Swath #	Displays the current guideline number.
Ground Speed	Displays the vehicle ground speed.
Area Applied	Displays the amount of area covered, sprayed, or spread in acres or hectares.
COG	Course on Ground, displays the vehicle heading in degrees.
Off	When OFF is selected, no message is displayed in the message slot.

Steer Bar

The Steer Bar setting determines how the LED steering display will appear. The LEDs represent the vehicle track in relation to the current guideline. They can be displayed as a single LED or as a solid bar. To change the steer bar setting, navigate to <LIGHTBAR>, use the *Arrow* buttons until <STEER BAR> is displayed and press the *Enter* button. Use the *Arrow* buttons to select either YES or NO. Press the *Enter* button to save the setting and return to the <LIGHTBAR> menu.

Arrow buttons

Enter button

Figure 2-27: Selecting Steer Bar Option

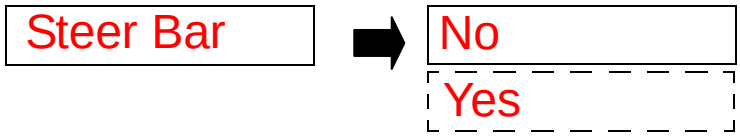


Table 2-12: Steer Bar Settings

Setting	Description
No	The LEDs, representing the vehicle track in relation to the current guideline, are shown as a single LED.
Yes	The LEDs, representing the vehicle track in relation to the current guideline, are shown as a solid bar.

System Setup

System Setup allows for the selection of settings that affect the entire CenterLine product. There are two settings that impact CenterLine:

- Unit
- Language

Figure 2-28: System Setup

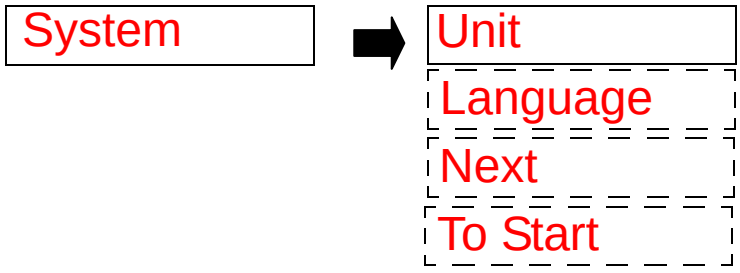


Table 2-13: System Settings

Setting	Default Value	Change Upon Startup
Unit	US	Optional
Language	English	Optional

Unit

Arrow buttons

Enter button

System units allow the selection of either U.S. or Metric units of measurement. To change the system units, navigate to <SYSTEM> and press the *Enter* button. Use the *Arrow* buttons to navigate to <UNIT> and press the *Enter* button. Options are either US or Metric. Select the appropriate option and press the *Enter* button to save the setting and progress to the <LANGUAGE> menu.

Figure 2-29: Unit selection

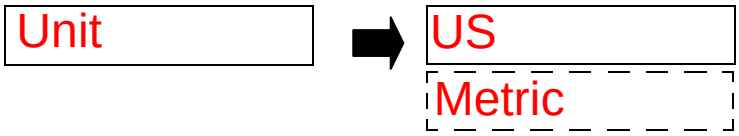


Table 2-14: Unit Setting

Setting	Description
US	All units are entered and displayed in feet, miles, and acres. This is the default setting.
Metric	All units are entered and displayed in meters, kilometers, and hectares.

Language

CenterLine is pre-loaded with several language options. To change the system language, navigate to <SYSTEM> and press the *Enter* button. Use the *Arrow* buttons to navigate to <LANGUAGE> and press the *Enter* button. Toggle through the language options using the *Arrow* buttons and press the *Enter* button to save the setting and return to the <SETUP> menu.

Figure 2-30: Language Options

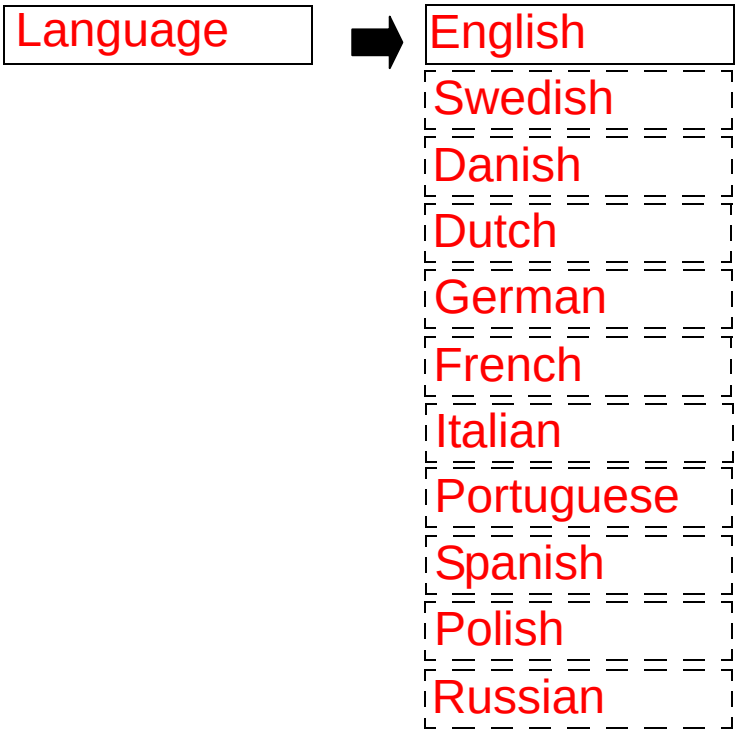
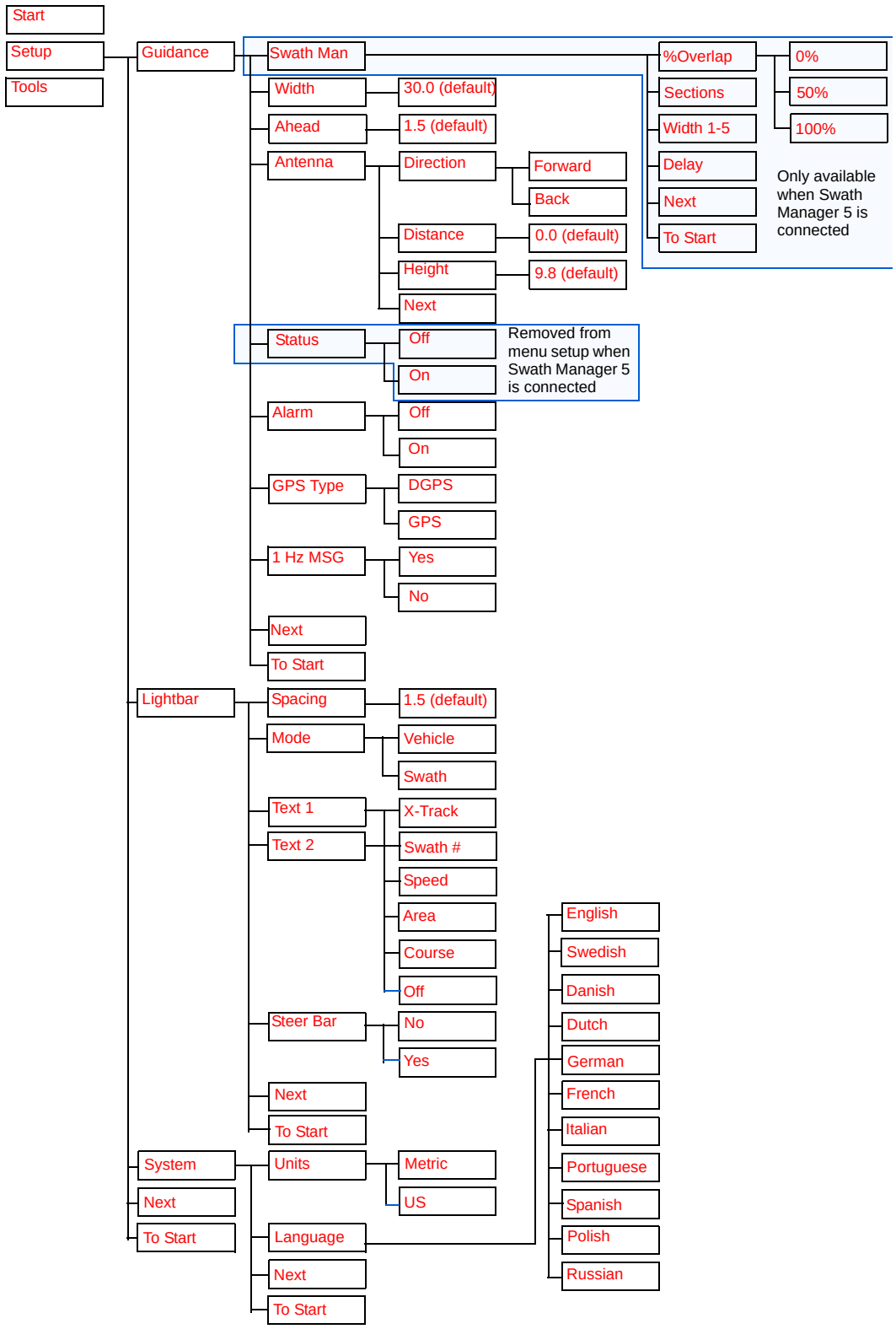


Figure 2-31: CenterLine Setup Flow Diagram



TOOLS

The Tools menu contains several functions that provide basic systems diagnostics. The tools menu is accessed from the main menu. Use the *Arrow* buttons to select <TOOLS> and press the *Enter* button.

Arrow buttons

Enter button

Figure 2-32: Tools Menu Flow

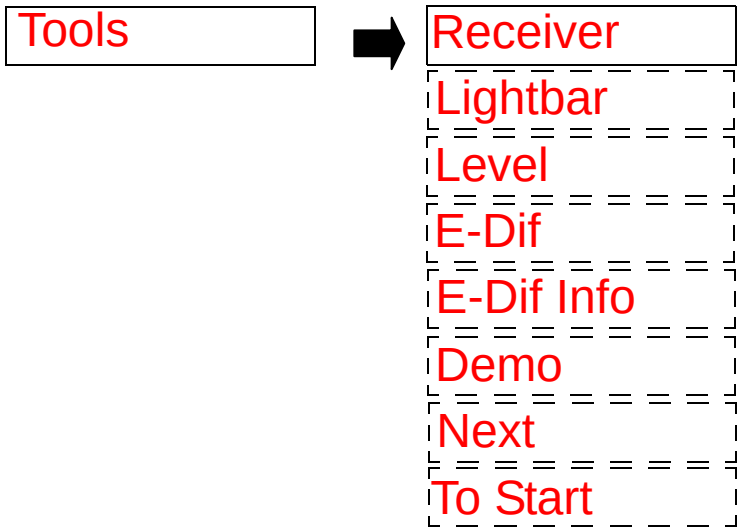


Table 2-15: Tools Menu Items

Menu Item	Description
Receiver	Checks the status of a connected GPS receiver
Lightbar	Tests the functionality of the CenterLine lightbar LEDs and text window.
Level	Only appears if a Tilt Compensation Module is detected. When on a level surface, use the level function to calibrate the Tilt Module.
e-Dif	Only appears if an e-Dif GPS receiver is detected by the CenterLine system. Re-calibrates the e-Dif receiver.
e-Dif Info	Only appears if an e-Dif GPS receiver is detected by the CenterLine system. Displays current position information.
Demo	Activates a simulated CenterLine session.
Next	Advances to the next Setup menu item.
To Start	Returns the operator to the main menu.

Arrow buttons

Enter button

Receiver

The Receiver diagnostic test displays the attached GPS receiver's current configuration and status. The information is displayed in the text window of the lightbar. To begin the receiver check, navigate to <TOOLS> and press the *Enter* button. Use the *Arrow* buttons to select <RECEIVER> and press the *Enter* button. The lightbar will display the diagnostic message.

Table 2-16: Receiver Messages

Message	Description
GPS Status	If the lightbar is not receiving GPS data, the text window message will be displayed as <NO GPS>. If the lightbar is receiving GPS data but the data is not differentially corrected, the text window message will be displayed as <GPS>.
DGPS Status	If the lightbar is receiving GPS data that is differentially corrected, the text window will display the message <DGPS>.
NMEA Strings	Returns the name of each NMEA string currently being received from the receiver. For example, if the NMEA GPGGA string is being received from the receiver, the text window will display <GGA>.
Data Rate	Returns the current receiver data rate. This is typically 5 Hz. The rate is displayed in the text window (e.g., <5 HZ>).

Lightbar

The Lightbar diagnostic test initiates an illumination sequence of all the LEDs in the test window, followed by a brightness control sequence. This will allow the verification that all LEDs on the CenterLine lightbar are working correctly. To begin the lightbar check, navigate to <TOOLS> and press the *Enter* button. Use the *Arrow* buttons to select <LIGHTBAR> and press the *Enter* button. The illumination sequence will begin. Once the test has concluded, the lightbar will display <LIGHTBAR>.

Level

Once the antenna height has been entered (refer to CHAPTER 2 - ANTENNA - HEIGHT) and the vehicle is situated on a level surface, the Tilt Compensation Module should be calibrated (leveled). To access the level feature, navigate to <TOOLS> and press the *Enter* button. Use the *Arrow* buttons to select <LEVEL> and press the *Enter* button. Highlight the Level menu item using the *Arrow* buttons and press the *Enter* button. The lightbar will display <WAIT> during calibration followed by <READY> once the calibration is complete.

e-Dif

The accuracy of the position information provided by the e-Dif GPS receiver slowly deteriorates with time since the last calibration. Due to this factor, it is recommended that the e-Dif receiver be re-calibrated approximately every 1 to 2 hours to maintain accuracy for position information. The e-Dif tool allows the operator to re-calibrate the e-Dif receiver by halting the vehicle and selecting e-Dif in the <TOOLS> menu.

To re-calibrate the e-Dif receiver, navigate to <TOOLS> and press the *Enter* button. Use the *Arrow* keys to select <E-DIF> and press the *Enter* button. The lightbar will display <WAIT> until the receiver is re-calibrated, followed by <READY> once the process is complete.

Arrow buttons

Enter button

e-Dif Info

The e-Dif Info function appears only when the CenterLine system detects that an e-Dif GPS receiver is present and calibrated. This receiver diagnostic test queries that attached e-Dif GPS receiver and displays the generated position information. The information is displayed on the lightbar. To start the e-Dif diagnostic test, navigate to <TOOLS> and press the *Enter* button. Use the *Arrow* buttons to select <E-DIF INFO> and press the *Enter* button. The lightbar will display a diagnostic message as illustrated in Table 2-17.

Table 2-17: e-Dif Diagnostic Messages

Message	Description
Number of Satellites	Displays the number of satellites that are providing a reliable signal to the GPS receiver.
E Correction Age	Displays the time since the last re-calibration.
Current Last Position	Displays the latitude, longitude, and height of the last re-calibration position.

Demo

The Demo mode displays simulated guidance information on the lightbar. This is used primarily by sales personnel to demonstrate the capabilities of the CenterLine system. To access Demo mode, navigate to <TOOLS> and press the *Enter* button. Use the *Arrow* buttons to select <DEMO> and press the *Enter* button.

Next

The Next selection saves the setup information and returns the operator to the starting point on the CenterLine menu.

To Start

The To Start selection saves the setup information and returns the operator to the starting point on the CenterLine menu.

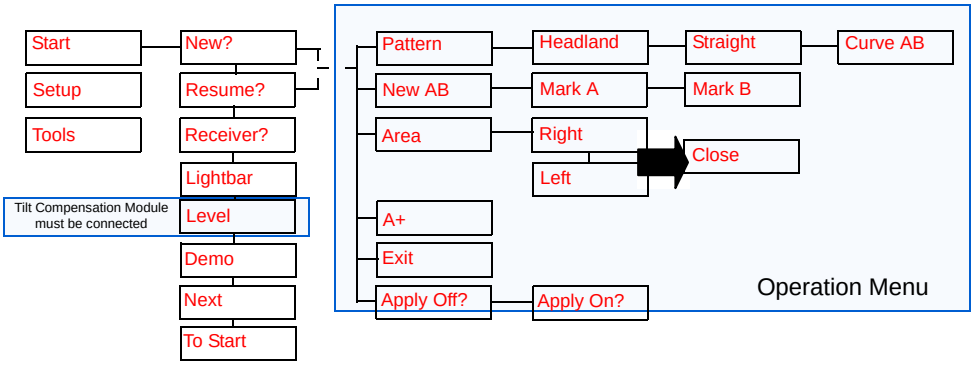
CHAPTER 3 - OPERATION

Arrow buttons

Enter button

Operation is started by pressing the *Enter* button when <START> is displayed on the lightbar. The <START> menu item is at the highest menu level. Start can be easily reached from most menu levels by using the *Arrow* buttons to find <TO START> and pressing the *Enter* button.

Figure 3-1: Operation Flow



OPERATION MENU

During operation, a menu is available that allows the operator to switch between guidance patterns, mark Points A and B for Straight-Line and Curved AB Guidance, start new A-B lines, and exit. The menu is accessed by pressing the *Arrow* buttons during operation. When either *Arrow* button is pressed, the guidance message displayed in the text window on the lightbar is replaced by the operation menu. Use the *Arrow* buttons to scroll through the menu options and press the *Enter* button to select an item. The menu items time out after 5 seconds of inactivity during operation if no selection has been made.

New? Resume?

Once the *Enter* button has been pressed at the <START> menu, a prompt to start a new field or resume working in the current field will be displayed. During operation, CenterLine stores the vehicle's trajectory data. This allows the operator to stop working in the field before the entire job is finished and return to it at a later time, continuing where the process was terminated. Only current field data is stored.

Use the *Arrow* keys to scroll between the <NEW?> and <RESUME?> menu items. Selecting <NEW?> will clear the current field trajectory data and start a new field in memory. Selecting <RESUME?> will retain the current field trajectory data and allow guidance to begin using stored data.

Guidance beings once the <NEW?> or <RESUME?> options are selected. The GPS receiver should already be connected to the CenterLine lightbar and should be operating correctly. The default guidance mode is Straight-Line Guidance. The guidance mode is displayed in reverse video (the lightbar display window is red and the text is black). The current guideline information stored in memory, along with the field's trajectory data is lost when <NEW?> is selected, and retained when <RESUME?> is selected. Only information for a single guideline is stored. While in Headland Guidance, Points A and B can be marked for Straight-Line and Curved AB Guidance.

Note: Apply On/Off does not turn the application on and off. It simply notifies the CenterLine system of the application status. <APPLY ON> and <APPLY OFF> do not appear if <GUIDANCE> <STATUS> is set to ON.

Arrow buttons

Enter button

Apply On/Off

If no SM5 is being used and the <GUIDANCE><STATUS> setting is set to OFF, the Apply On/Off information must be provided to the CenterLine system manually. To toggle the Apply On/Off status, scroll through the menu options using the *Arrow* buttons until <APPLY ON> or <APPLY OFF> are displayed on the lightbar. Press the *Enter* button to change the status of the displayed condition.

Marking Points A and B

Straight-Line and Curved AB Guidance require a reference guideline to navigate the vehicle. Establishing a guideline involves marking two points along a reference guideline. To establish this reference guideline using the operation menu, use the *Arrow* buttons to scroll through the menu until <NEW AB?> is displayed on the lightbar. Press the *Enter* button. The lightbar will display <MARK A>. Mark Point A by pressing the *Enter* button when the desired location has been reached. Once the *Enter* button is pressed, the lightbar will display <MARK B>. To mark Point B, press the *Enter* button once the desired location has been reached. The reference guideline has been established and the lightbar will display guidance information.

Figure 3-2: Mark A, Mark B Sequence

Switching Guidance Modes

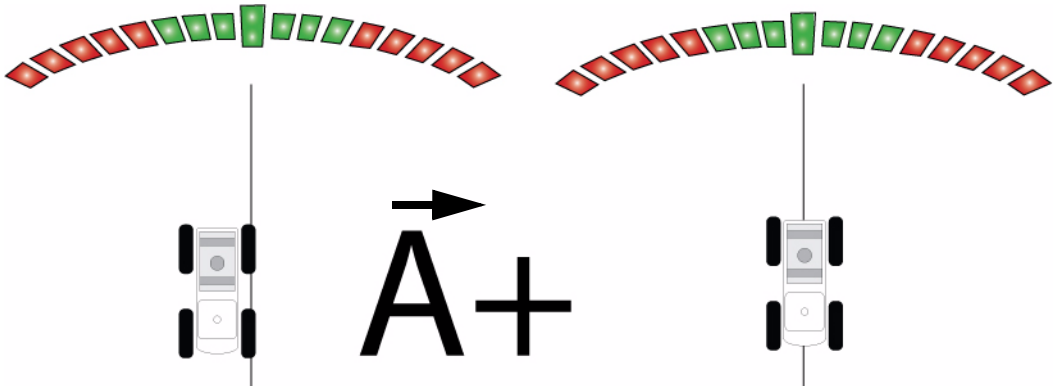
Switching guidance modes may be desirable at some point during operation. Typically an operator makes one or more passes around a field's headland area during Headland Guidance. While driving in Headland Guidance, the operator may mark Points A and B to establish guidelines for switching modes at a later time. Once the headlands are completed, the operator can easily switch to Straight-Line Guidance or Curved AB Guidance and complete the field.

To switch between guidance modes, use the *Arrow* buttons to scroll through the menu until <HEADLAND>, <STRAIGHT>, or <CURVE AB> appears on the lightbar. Select the appropriate guidance mode and press the *Enter* button.

A+ Feature

At any time after a guideline is created, the guidance line can be shifted to the current position by activating the A+ feature. The heading (and shape, if in curved mode) of the original guideline is maintained, but the A-B line is shifted to the vehicle's current location. Scroll through the operation menu using the *Arrow* buttons until <A+> is displayed on the lightbar. Press the *Enter* button to activate the shift.

Figure 3-3: A+ Feature



Area Determination

The area of the current job or field is important. CenterLine allows the determination of the area of a field by driving the perimeter. This can be accomplished while driving the first headland circuit during Headland Guidance.

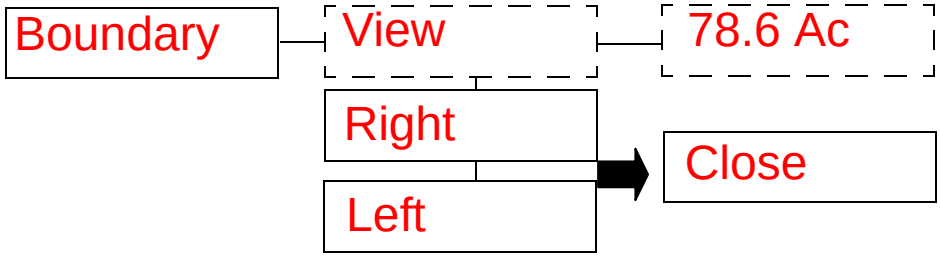
Arrow buttons

To determine the area of the field, use the *Arrow* buttons on the operation menu to locate <AREA>. Press the *Enter* button. The lightbar will display <LEFT> or <RIGHT>. Use the *Arrow* buttons to select the side of the swath or implement that is the closest to the field boundary. Press the *Enter* button to begin area calculation. The lightbar will display <↓MAP BND> or <MAP BND↓>. Once the boundary is ready to be closed, scroll through the operation menu using the *Arrow* button until <CLOSE> is displayed. Press the *Enter* button to close the boundary and determine the area. Pressing *Enter* at <CLOSE> will insert a line between the starting location and the current location and will use the shape to determine the area.

Enter button

The area will automatically be determined when the vehicle drives within 15 feet / 4.5 meters of the starting point. The bounded area is displayed on the lightbar as a part of the guidance message stream for three minutes when stopped in an “applied” area. If a bounded area has already been determined, the <VIEW> menu item will be available. Pressing the *Enter* button at the <VIEW> option will display the current bounded area value.

Figure 3-4: Area Determination Flow



Return To Point

Return to Point button

CenterLine allows the operator to mark a point of reference in the field in which to return at a later time. Typically the Return to Point feature is used to mark a location when stopping guidance and starting in the same location and direction at a later date and time. This Return to Point location is stored in the field's trajectory data and is lost if <NEW?> is select. It is retained if <RESUME?> is selected.

There is a specific *Return to Point* button located on the remote control. The button works in toggle fashion. Pressed once, the lightbar will display <→◆←>. Pressed again, it will navigate back to the point. The navigation process can be stopped by pressing the *Esc* button. Once *Return to Point* is pressed again (a third time), the old location is replaced with the vehicle's current location.

While operating in Return to Point mode, no active text messages are displayed except error messages. If the vehicle enters an area that has already been applied, the display will alternate between the Return to Point distance and <APPLIED>.

HEADLAND GUIDANCE

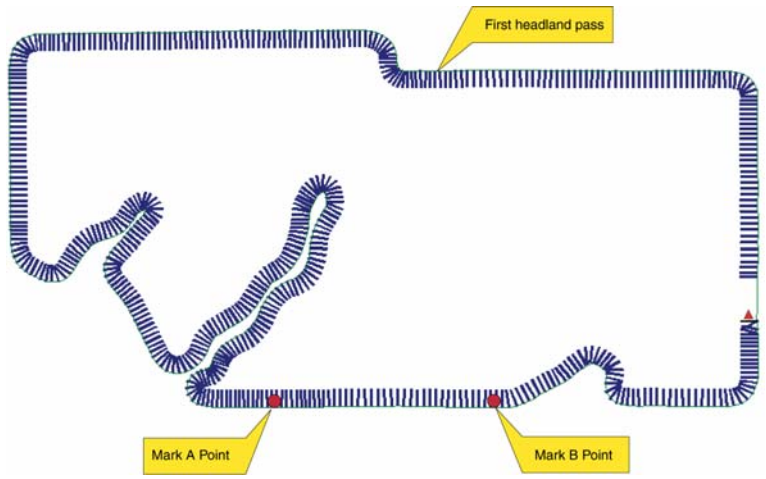
Arrow buttons

Enter button

Headland Guidance is used when the operator wants to drive several circuits around the field boundary and be guided around all circuits that occur after. Headland Guidance is also used when the operator wants to apply product on a terraced field. Once several headland circuits have been completed, the operator has the option of switching to Straight-Line or Curved AB Guidance. In the Headland Curved Guidance pattern, the operator can navigate to any previously applied swath and be guided parallel to the swath by the X-Track guidance display.

To select Headland Guidance, use the *Arrow* buttons on the operation menu to location <HEADLAND>. If <HEADLAND> is not displayed in reverse video (the lightbar is red and "Headland" is black), press the *Enter* button. The guidance pattern will be switched to Headland Guidance. If <HEADLAND> is displayed in reverse video, the system is already in Headland Guidance mode.

Figure 3-5: Example of Headland Guidance



Reference Guideline

While operating in Headland Guidance, the operator has the option to mark Points A and B on the reference guideline used for Straight-Line or Curved AB Guidance modes. It is easier to mark Points A and B for the Straight-Line or Curved AB Guidance modes while driving along a straight edge of a field. Refer to CHAPTER 3 - CURVED AB GUIDANCE for additional information.

The operator will remain in Headland Guidance until the guidance mode is changed using the operation menu (refer to CHAPTER 3 - SWITCHING GUIDANCE MODES for additional information). The reference guideline can then be used for Straight-Line or Curved AB Guidance.

Switching From Headland To Straight-Line Guidance

Once the operator has completed the desired number of headland circuits, the system can be switched to apply the remainder of the field in either Straight-Line or Curved AB Guidance modes. If the operator is being guided along a curved path when the pattern is switched, the lightbar will no longer guide the operator along the curve.

If a reference guideline was established during Headland Guidance, CenterLine will automatically guide the vehicle along the closest parallel line as soon as the operator switches to Straight-Line Guidance. If a reference guideline was not established during Headland Guidance, the operator must mark Points A and B at this time. The light will display <MARK A>, indicating that no reference guideline exists.

Figure 3-6: Example of Headland Guidance Switching to Straight-Line Guidance

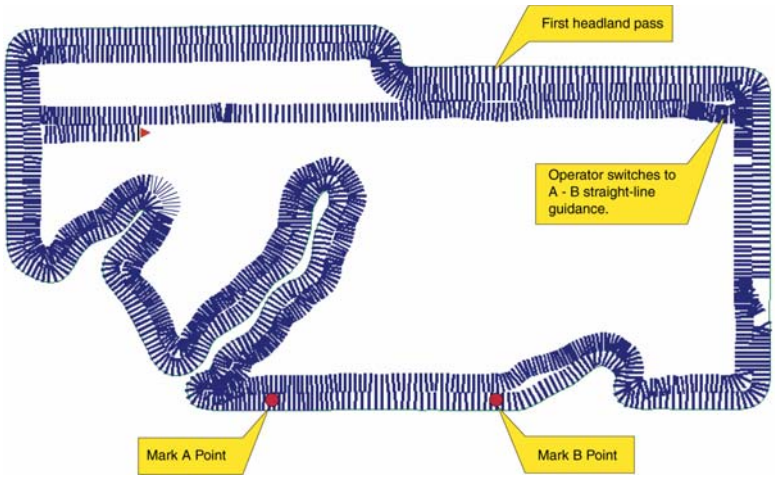
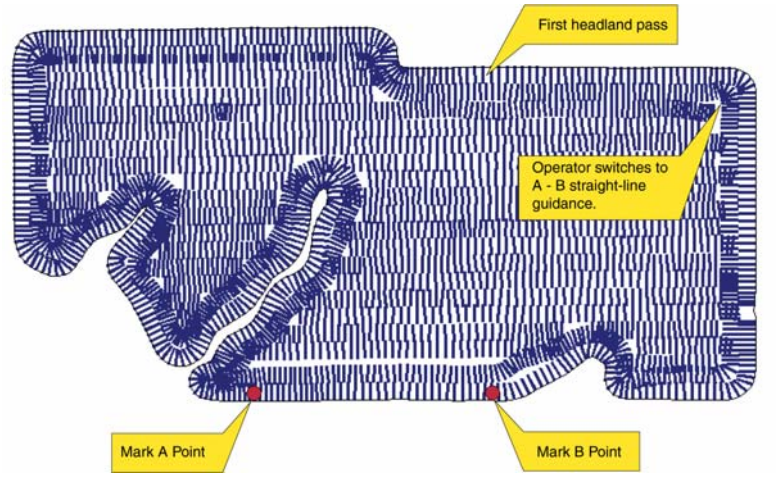


Figure 3-7: Example of Completed Field



Headland Guidance Lightbar Graphics

CenterLine's Headland Guidance uses a lightbar text display graphic that aids the operator when navigating parallel to a curved swath. The X-Track LED functionality that is used during Straight-Line and Curved AB mode is also used during Headland Guidance.

A projected swath path graphic is displayed in the text display area of the lightbar. The projected path is comprised of four horizontal bars. The bottom bar indicates the nearest proximity to the vehicle; the top bar indicates the furthest away. The width of the bars decrease as the distance from the vehicle increases to add perspective to the view. The projected distance of the first bar from the front of the vehicle is based on vehicle speed. A straight lightbar display indicates that there are no turns approaching. A skewed lightbar display indicates that a turn is approaching in the direction the bars are skewed. The X-Track LEDs indicate the vehicle's position in relation to the guideline configured during Swath mode. The X-Track LEDs do not provide information relating to the curved path ahead of the vehicle; they simply indicate the vehicle's location in regard to the established guideline.During the first Headland Guidance pass, the lightbar will display a "hollow" path, meaning that no guidance information is available. The first path must be completed before a parallel path can be established (refer to Figure 3-10).

Figure 3-8: Lightbar - Straight Path Ahead

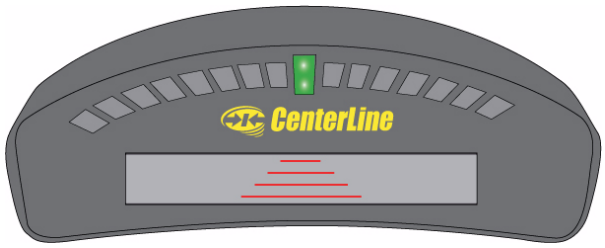


Figure 3-9: Lightbar - Right Turn Approaching

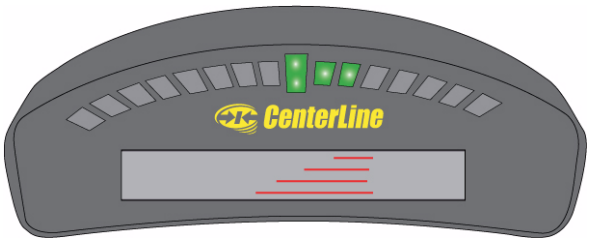
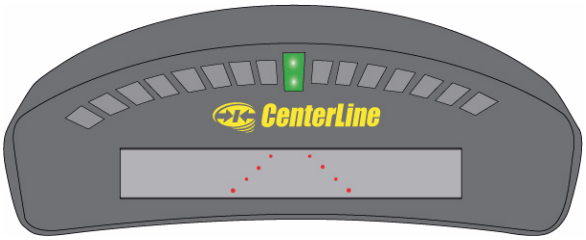


Figure 3-10: Lightbar - Hollow Path During First Headland Pass



STRAIGHT-LINE GUIDANCE

Straight-Line Guidance provides vehicle guidance along straight lines based on a reference guideline. The initial step is to establish the reference guideline. The reference guideline is used to calculate all other parallel guidelines. Refer to CHAPTER 3 - MARKING POINTS A AND B for additional information.

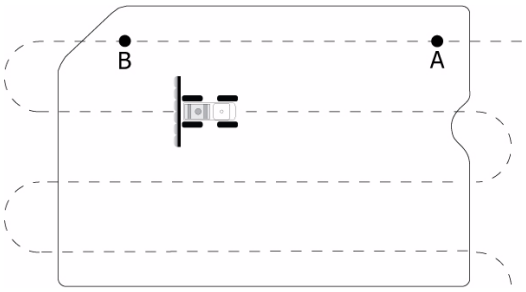
To mark the initial Point A, drive along the first swath path. Typically, the guideline is marked along the longest straight edge of a field boundary. While the vehicle is traveling along the initial swath, the lightbar will display <MARK A>. As the vehicle travels over the desired Point A location, press the *Enter* button to establish Point A.

Enter button

The lightbar will immediate display <MARK B>. To establish Point B, press the *Enter* button once the vehicle travels over the desired Point B location. The reference line is now established. The lightbar will begin displaying X-Track guidance information as well as user-selected messages that were defined during Lightbar Setup (refer to CHAPTER 2 - LIGHTBAR for additional information).

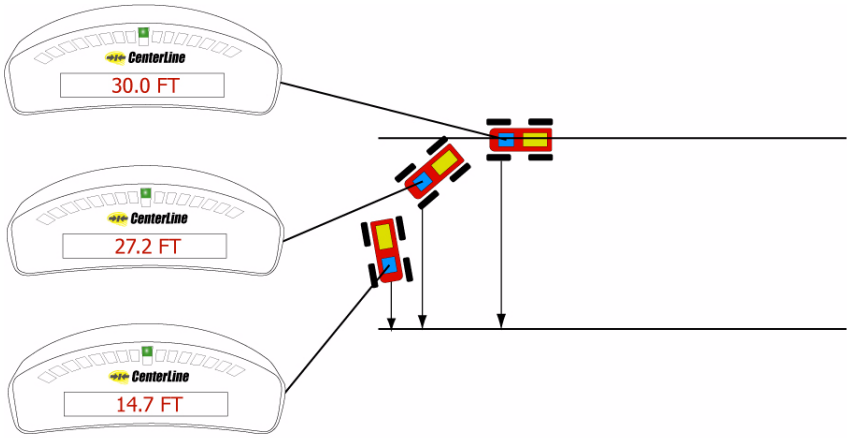
Once the reference guideline has been established, the operator can begin Straight-Line Guidance. The CenterLine software detects which guideline is the closest to the center line of the vehicle and provides guidance information with respect to that line. As the vehicle travels across the field, new guidelines parallel to the reference guideline are established based on the swath width value entered during guidance setup.

Figure 3-11: Example of Straight-Line Guidance



When navigating a turn at the end of the field, the lightbar will display the distance to the next swath.

Figure 3-12: Example of CenterLine Turn



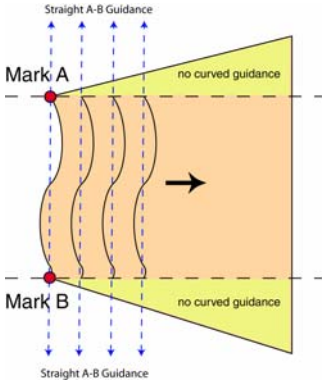
Curved AB Guidance

Curved AB Guidance works similarly to Straight-Line Guidance except it provides vehicle guidance along curved lines based on a curved reference line. The first step is to establish a reference guideline. The reference guideline is used to calculate all other guidelines parallel to the path. Refer to CHAPTER 3 - MARKING POINTS A AND B for additional information.

Enter button

To mark the initial Point A, drive along the first swath path. **It is recommended that the reference guideline be established along the longest side of the field if possible. The curved guidelines do not extend beyond Points A and B. The area beyond Points A and B are controlled by Straight-Line Guidance.** While the vehicle is traveling along the initial swath, the lightbar will display <MARK A>. As the vehicle travels over the desired Point A location, press the *Enter* button to establish Point A.

Figure 3-13: Curved A-B Guidance



The lightbar will immediately display <MARK B>. To establish Point B, press the *Enter* button once the vehicle travels over the desired Point B location. The reference line is now established. The lightbar will begin displaying X-Track guidance information as well as user-selected messages that were defined during Lightbar Setup (refer to CHAPTER 2 - LIGHTBAR for additional information).

Enter button

Once the reference guideline has been established, the operator can begin Curved AB Guidance. The CenterLine software detects which guideline is the closest to the center line of the vehicle and provides guidance information with respect to that line. As the vehicle travels across the field, new guidelines parallel to the reference guideline are established based on the swath width value entered during guidance setup. When navigating a turn at the end of the field, the lightbar will display the distance to the next swath as illustrated in Figure 3-12.

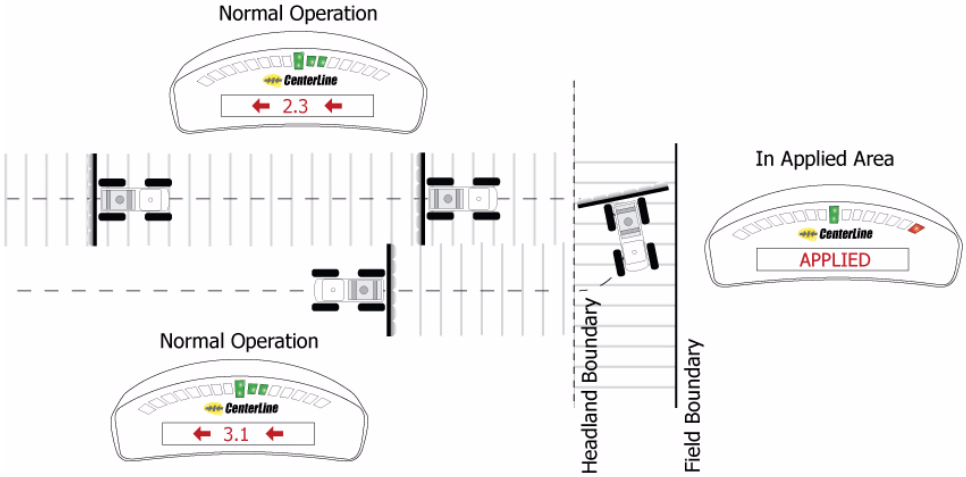
APPLIED AREA DETECTION

CenterLine allows for the detection of a previously applied area. To use applied area detection, the Lightbar Setup - Alarm menu field must be established prior to beginning guidance. Refer to CHAPTER 2 - ALARM for additional information on establishing the settings.

Applied Area Detection

Figure 3-14 illustrates how previously applied area detection is implemented. As the vehicle enters an applied area, the lightbar will display <APPLIED>, even if application is turned off. When the vehicle exits the applied area, <APPLIED> will no longer be displayed on the lightbar.

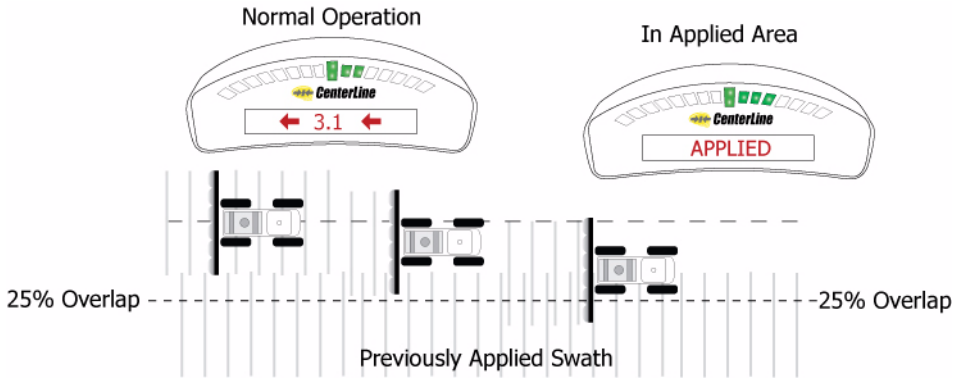
Figure 3-14: Applied Area Detection



Neighboring Swath Detection

Applied area detection also notifies the operator when the vehicle crossed into a previously applied neighboring swath. Figure 3-15 illustrates an example on an applied area overlap. The vehicle can overlap up to 25% of the swath width without notification. Once the edge of the vehicle overlaps the neighboring swath by 25% or more, the lightbar will display <APPLIED>.

Figure 3-15: Neighboring Swath Detection

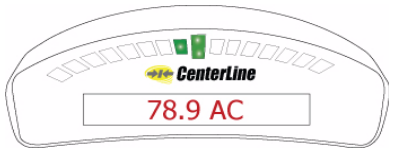


LIGHTBAR INDEX

The CenterLine lightbar is capable of displaying a considerable amount of information to the user. The information can be represented as text on the lightbar, illuminated cross track LEDs, or a combination of text and lights. The information displayed on the lightbar depends on both user-defined settings and system warnings not controlled by the user.

Table 3-1: Lightbar Index

Lightbar	Description
	Mark A. Displayed when establishing Point A of the reference guideline.
	Mark B. Displayed when establishing Point B of the reference guideline.
	Swath #. A user-selected lightbar message. When not on the initial guideline, the first character is either L (left) or R (right) of the initial guideline. The number identifies how many lines left or right of the initial guideline.
	X-Track. A user-defined lightbar message. This cross track message is displayed when the vehicle is on the guideline and there is no error.
	X-Track Error. A user-defined lightbar message. In this example, the operator should steer to the left 2.3 feet (assuming that system units are established in US and the lightbar is set to “Swath Mode”).
	Ground Speed. A user-defined lightbar message indicating the vehicle speed in miles per hour (MPH). The system units are set to US.
	Ground Speed. A user-defined lightbar message indicating the vehicle speed in kilometers per hour (KPH). The system units are set to Metric.
	Course on Ground (COG). A user-defined lightbar message indicating the vehicle’s heading in degrees 0 to 359. The example to the left indicates the vehicle’s course on the ground is due South (180 degrees).

Lightbar	Description
	Area Applied. A user-defined lightbar message indicating the current amount of area applied in acres. The system units are set to US.
	Area Applied. A user-defined lightbar message indicating the current amount of area applied in hectares. The system units are set to Metric.
	Applied Area Detection. This message is displayed when the vehicle is within a previously applied area. The red stoplight (located on the far right) is illuminated.
	Curved guidance information graphics. The four horizontal bars in the text display represent a perspective view of the swath ahead of the vehicle. The bars skew left or right to represent a curved path ahead.
	Curved guidance information graphics. The path in the text display represents a perspective view of the swath ahead of the vehicle. The “hollow path” indicates that the vehicle is completing the first Headland pass and no guidance information currently exists. This is also displayed when in guidance mode but the vehicle is not moving.
	Mapping Boundary. This message is displayed when the user is mapping the field boundary. The arrow symbol indicates the field boundary is on the left side of the vehicle.
	Mapping Boundary. This message is displayed when the user is mapping the field boundary. The arrow symbol indicates the field boundary is on the right side of the vehicle.
	System Warning. This message is displayed when there is a loss of differential GPS correction. Guidance calculations are stopped until differential corrections resume.

Lightbar	Description
	System Warning. This message is displayed when there is a complete loss of GPS signal to the GPS receiver or Smartpad. Guidance calculations are stopped until DGPS signal resumes.
	Lightbar Version Message. This message is displayed when the user starts CenterLine or runs the lightbar test. This number will vary based on the lightbar version and model.

SWATH MANAGER 5

Swath Manager 5 should be configured as illustrated in the following diagrams. Make sure the controller and Swath Manager 5 switches are in the proper locations.

Create a boundary to lock the area of application. If a boundary is created and closed and the Auto Boom switch is set to “engaged”, the system will not apply outside of the boundary. Refer to CHAPTER 3 - AREA DETERMINATION for additional information.

Installation

Cable 45-05462 and 45-05463

Connect between controller and main harnesses

Cable 45-05467

Use T-Taps supplied with harness to tap into the signal wire between the switchbox or existing switches and boom shutoff valves.

Figure 3-16: Installation of Swath Manager 5

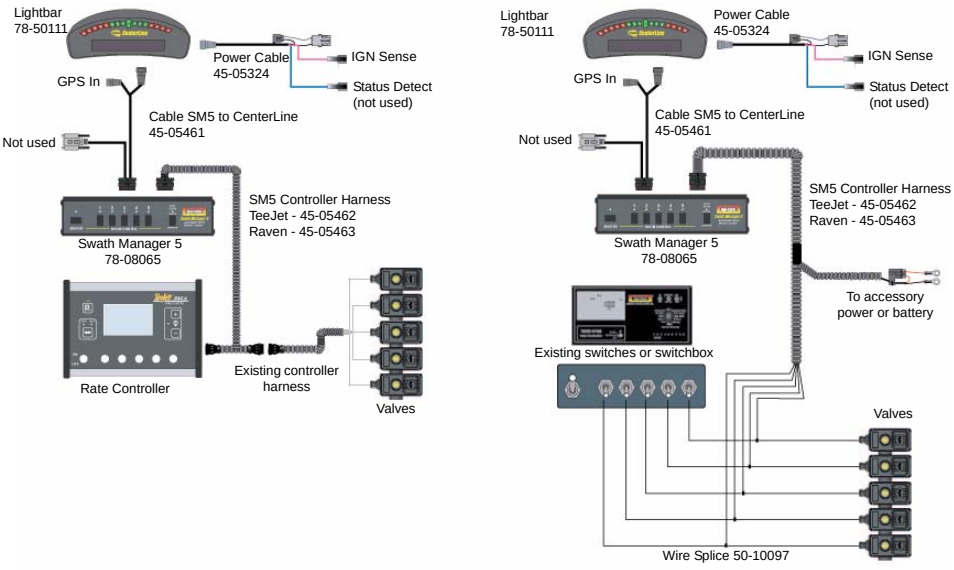


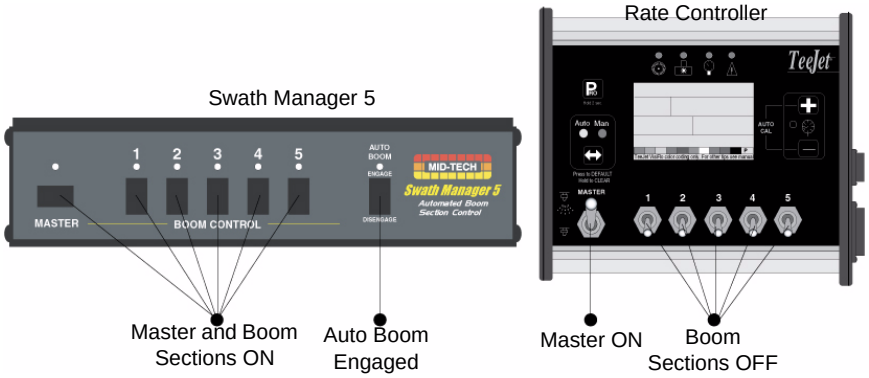
Figure 3-17: Swath Manager 5 Switch Configuration

Swath Manager 5 System	* Controller Master Switch or original Master Switch	** Controller Boom Switches or original Boom Switches	SM5 Master Switch	SM5 Boom Switches	Auto Boom Switch Engage / Disengage	
	SWITCH POSITIONS					
Swath Manager 5 Auto Boom mode	ON	OFF	ON	ON	Engage	
Swath Manager 5 Manual Boom mode	ON	OFF	ON	ON	Disengage	For Individual boom section control use SM5 boom switches

* TeeJet Controller ONLY the controller master switch OFF will force all boom sections OFF.

** Controller boom switches ON will force boom sections ON.

Figure 3-18: Switch Setting Example for Swath Manager 5

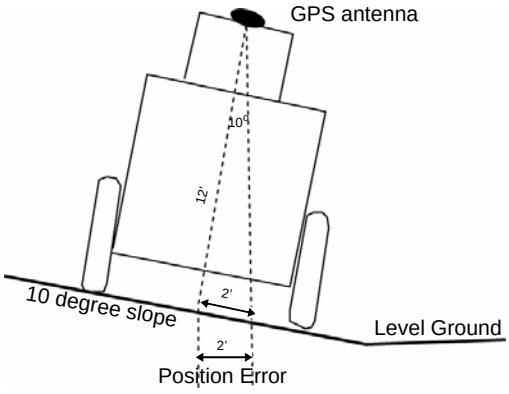


TILT COMPENSATION MODULE

CenterLine must be loaded with Software Version 1.10 or higher to be compatible with the Tilt Compensation Module. The Tilt Module must be leveled (refer to CHAPTER 2 - LEVEL for additional information) and the antenna height must be set (refer to CHAPTER 2 - ANTENNA for additional information). When operating the Tilt Compensation Module, the position data coming from the GPS receiver will be compensated for vehicle tilt errors. Corrected information will be sent to the console.

When the vehicle experiences a sideways tilt, all guidance information is affected. For example, if the GPS sensor is 12 feet / 3.65 meters above the ground, a 10 degree tilt gives a 2 foot / 0.61 meter positioning error.

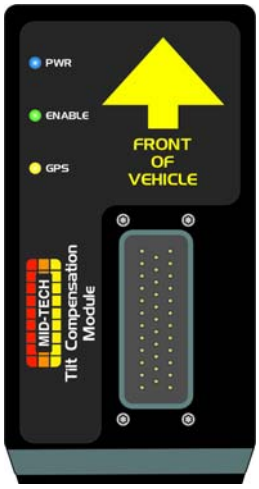
Figure 3-19: Tilt Sensor Example



There are three LEDs visible on the Tilt Sensor that indicate the following:

- Blue - blinks two times per second when the unit is powered and running
- Green - steady ON when tilt correction is enabled; otherwise OFF
- Yellow - Blinks one time per second when valid GPS location data is being received (NMEA-0183 GGA)

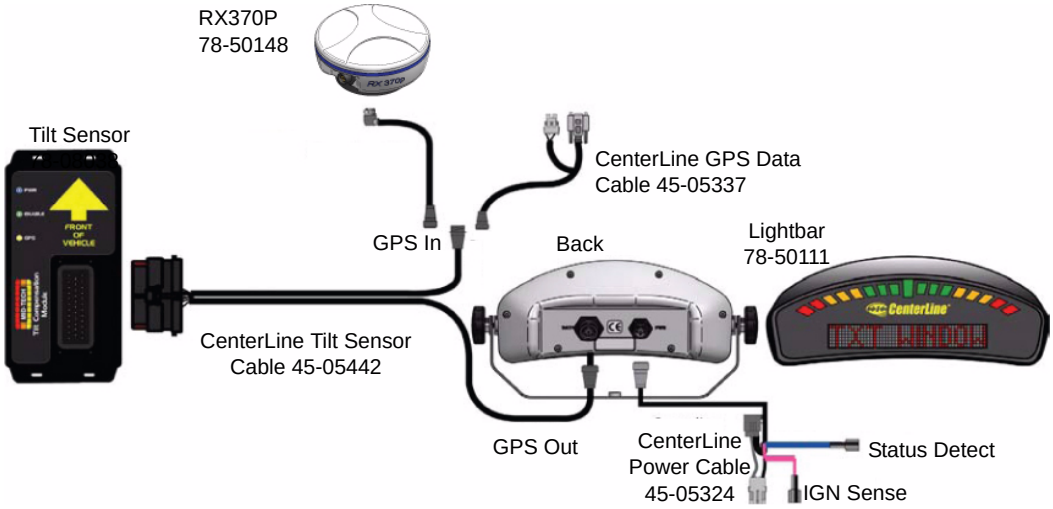
Figure 3-20: Tilt Compensation Module



Tilt Compensation Module Installation

- Mount the Tilt Compensation module as close to the center of the vehicle side as possible.
- Mount the module on a plain parallel to the GPS antenna so that both the antenna and the sensor tilt the same degree.
- Mount the module so the sensor is level and the connector is pointing upward.
- The module should be mounted rigidly to minimize vibration. Vibration will degrade the ability to sense tilt.
- It is recommended that nuts and bolts be used or self-tapping screws be used through the two mounting holes on each end of the module.
- The arrow on the module decal must be pointing toward the front of the vehicle.
- DO NOT mount the module near extreme temperatures, upside down, or on its side.

Figure 3-21: Tilt Compensation Module System



EXITING OPERATION

To exit operation/guidance, press the *Esc* button or use the *Arrow* buttons to scroll through the operation menu until <EXIT?> is displayed on the lightbar and press the *Enter* button. Operation will cease and the display will return to the main menu.

Menu/Esc button

Arrow buttons

Enter button

Figure 3-22: Exit Display