EZ-Steer® System for the EZ-Guide® Plus Lightbar

Reference Guide

REFERENCE GUIDE

EZ-Steer® System for the EZ-Guide® Plus Lightbar

Version 3.00
Revision B
Part Number 61062-80-ENG
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Trimble Navigation Limited
Trimble Agriculture Division
10355 Westmoor Drive
Suite #100
Westminster, CO 80021
USA
+1-913-495-2700 Phone
trimble_support@trimble.com
www.EZ-Steer.com

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This is the December 2006 release (Revision B) of the *EZ-Steer System for the EZ-Guide Plus Lightbar Reference Guide*, part number 61062-80-ENG. It applies to version 4.00 of the EZ-Guide Plus system firmware and version 3.00 of the EZ-Steer system firmware.

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- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

Canada

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3.3 Trimble reserves all rights not expressly granted by this Agreement.

Safety

Always follow the instructions that accompany a Caution. The information it provides is intended to minimize the risk of personal injury and/or damage to property. In particular, observe safety instructions that are presented in the following format:

CAUTION — This alert warns of a hazard or unsafe practice which, if not avoided, can cause injury or damage.

Note — *An absence of specific alerts does not mean that there are no safety risks involved.*

Care of the system

To maximize the life expectancy of the foam drive wheel, as soon as you finish using the system, hinge the electric motor until it locks in the "away" position.

When you are not going to use the EZ-Steer system for a long period of time, remove the EZ-Steer motor from the vehicle and store it in a dry location to prevent damage from condensation and other moisture.

Highway usage

You must remove the motor assembly from the mounting bracket prior to driving the vehicle on a public highway. To remove the motor, undo the two thumb screws.

Cautions

CAUTION — This manual relates to the EZ-Steer system when used with the ***EZ-Guide Plus*** system. It should not be used with the ***EZ-Guide 500*** system. If your EZ-Steer system is connected to an EZ-Guide 500 system, refer to the *EZ-Steer System for the EZ-Guide 500 Lightbar Reference Guide*.

CAUTION — For continued protection against the risk of fire, replace the cigarette lighter fuse only with same type and rating of fuse. Fuse: 8A, 250V, 3AG type.

CAUTION — Always hold the steering wheel while you adjust the column tilt. Otherwise, the weight of the motor may cause the steering wheel to drop suddenly and cause damage to the steering column or dash.

CAUTION — Articulated tractors pivot in the middle. Avoid putting yourself in a position where you could be injured by the pivoting rear section of the vehicle.

CAUTION — Do not attach the controller to a vehicle side wall or window because vibration in these locations can cause the controller to output false terrain compensation readings that could affect performance and cause the vehicle to swerve offline.

CAUTION — Mount the controller as solidly as possible using the supplied mounting plate. If the controller is able to move, or if objects bump it, the controller may make false terrain compensation readings that could affect performance and cause the vehicle to swerve offline.

CAUTION — The EZ-Steer system is not designed to be mounted on machines with an open operator's station (no enclosed operator's cab). Doing so will void the warranty of the EZ-Steer system components.

CAUTION — Ensure that you mount the antenna so that it is level. If the antenna is not level, GPS performance may be reduced.

CAUTION — For optimum performance, ensure that the *Ag*GPS 252 receiver has firmware version 3.0 or later.

CAUTION — Make changes to the system settings in incremental steps. Random changes are likely to result in poor performance.

CAUTION — If you increase the value in the *Diseng. OffIn.* field, the vehicle may overshoot the corners by at least a few feet.

CAUTION — Ensure that the antenna offset measurement is accurate to within 7.6 cm (3 inches). An incorrect offset can cause the vehicle to swerve offline or oscillate back and forward and may cause damage to the vehicle or other property.

CAUTION — Do not supply voltages greater than 16 VDC to the EZ-Steer system, or you risk permanently damaging it.

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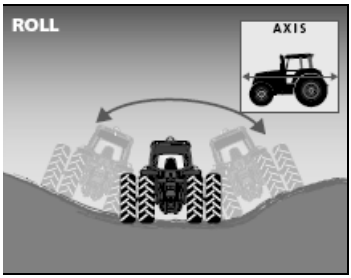
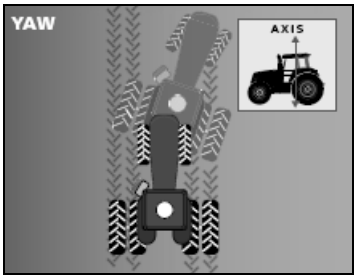
Introduction

The EZ-Steer® assisted steering system steers the vehicle down field passes using GPS guidance from the EZ-Guide® Plus lightbar guidance system, a controller, and a motor mounted to the steering column of the vehicle.

CAUTION — This manual relates to the EZ-Steer system when used with the ***EZ-Guide Plus*** system. It should not be used with the ***EZ-Guide 500*** system. If your EZ-Steer system is connected to an EZ-Guide 500 system, refer to the *EZ-Steer System for the EZ-Guide 500 Lightbar Reference Guide*.

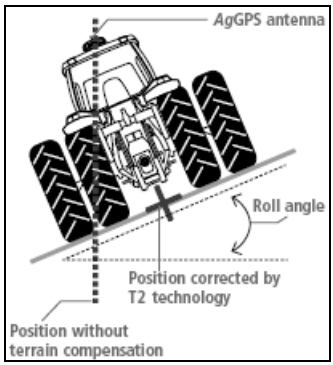
An EZ-Steer controller with T2™ terrain compensation contains sensors that detect the angle and speed of changes to correct the following errors:





Terrain compensation can significantly improve accuracy on slopes, large bumps, and ditches, and can make steering much smoother.

The EZ-Steer system is designed to provide better performance than a human driver. For sub-inch accuracy for spreading, spraying, cultivation, and broadacre planting, use the *Ag*GPS® Autopilot™ automated steering system.

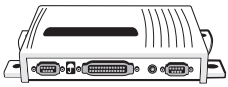
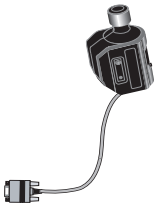


Getting started

Follow the process below to get started with the EZ-Steer system.

1. Perform a pre-installation vehicle inspection — see Chapter 2.
2. Install the system — see Chapter 3.
3. Set up the system — see Chapter 4.
4. Calibrate the system — see Chapter 5.

EZ-Steer kit contents

Controller	Motor	Cabling
		

Note — *If you choose to purchase this kit, a platform kit is also required.*

Optional accessories

In addition to the EZ-Steer system kit and platform kit, you can purchase any of the following optional accessories:

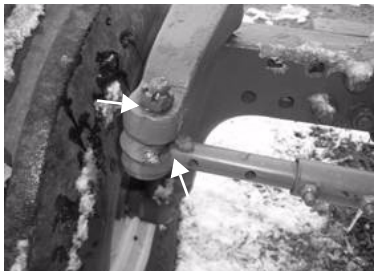
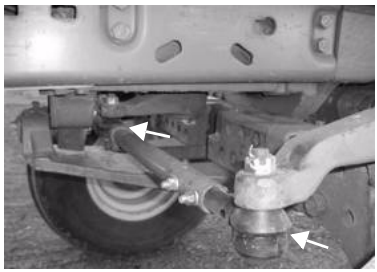
- Seat switch to prevent engaging when the operator is not in the seat
- Remote engage foot pedal

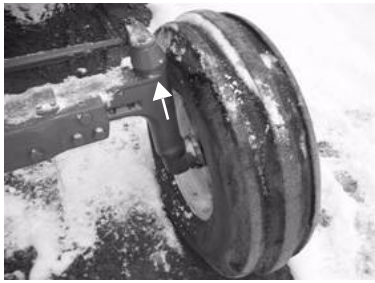
Pre-Installation Vehicle Inspection

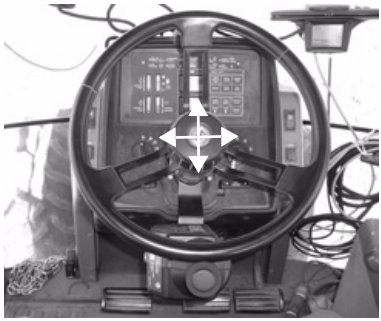
Before you install the EZ-Steer assisted steering system, inspect the vehicle.

Note — *The EZ-Steer system can use AgGPS Freeplay™ technology to compensate for freeplay (also called "slack") in the steering hydraulics and linkages. However, the Freeplay technology cannot counteract mechanical problems or problems caused by the vehicle setup.*

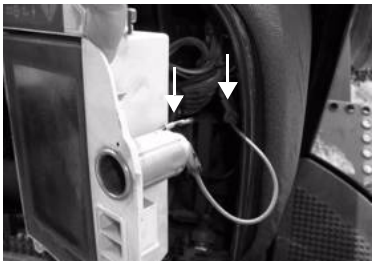
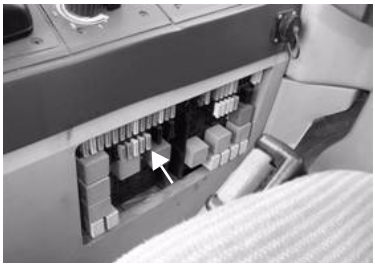
This chapter describes some examples of what to look for before you install the EZ-Steer system on a vehicle.

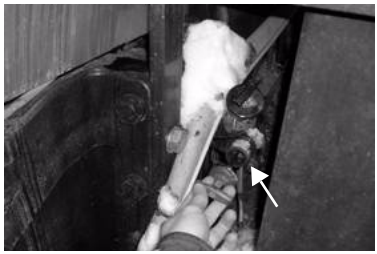
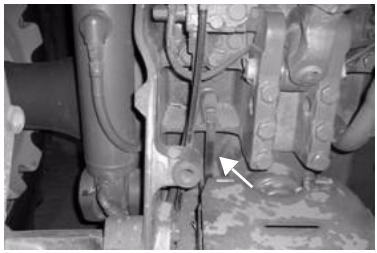
Problem	Cause/solution	Photo
Worn components		
Worn paint around linkage connection points	The bolt has been loose in the connecting arm hole; this indicates a bad ball joint. Replace the ball joint.	
Worn ball joints	The rubber boot seal is missing. Exposure to water and dirt increases the likelihood of a worn ball joint. To check if the ball joint is loose, turn the steering wheel in short, quick motions left and right. ***Note —*** *If your tractor has had a front loader attached, it will almost always have worn ball joints. Replace the ball joints.*	
Torn rubber boot seal around ball joint from poor lubrication	To check if the ball joint is loose, turn the steering wheel in short, quick motions left and right. Check the inner and outer tie rod ball joints for problems. If the ball joint moves a small distance before the connecting arm turns, replace the ball joint.	

Problem	Cause/solution	Photo
Worn splines	In some 2WD tractors, the connecting arm is bolted onto a splined wheel hub shaft. Turn the steering wheel with short, quick motions left and right. The connecting arm should move immediately with the wheel. If you notice a small amount of connecting arm movement before the wheel turns, it is likely that the splines are worn. Replace the front wheel hub shaft.	
Worn front axle pivot pin bushing	On MFWD tractors with a rigid front axle, turn the steering wheel and watch the front wheels turn. If the axle moves forward or backward as you turn the steering wheel (see the white arrows), replace the axle pivot pin bushing.	
Worn steering cylinder pins and bushings	On articulated 4WD tractors, turn the steering wheel and check for play in the steering cylinder pins. If you can see either of the cylinder rods move slightly before the tractor starts to hinge left or right, you must replace the pins and bushings. **CAUTION —** Articulated tractors pivot in the middle. Avoid putting yourself in a position where you could be injured by the pivoting rear section of the vehicle.	

Problem	Cause/solution	Photo
Worn steering shaft causes loose steering wheel	A steering column with play in all directions (see white arrows) can cause the steering shaft to bind against its housing when the pressure of the EZ-Steer motor is applied, making it difficult for the EZ-Steer motor to turn the wheel. Repair or replace the steering shaft.	
Wheel problems		
Uneven tire pressure	Tires mounted on the same axle must be inflated to the same pressure. This improves machine stability by preventing cab roll, and reduces the effort required to turn the front wheels. If the tractor front tires are filled with a fluid such as calcium chloride, slightly increase the Aggressiveness setting in the EZ-Steer system.	
Telescope lock does not hold column in place	For some tractors, you may need to clamp a bracket directly onto a telescoping steering column. Ensure the steering column telescope lock/unlock knob is working correctly. If the steering column cannot be set in a fixed position, the column could telescope freely inward, causing the bracket to strike the instrument panel.	

Problem	Cause/solution	Photo
Steering wheel is loose on steering shaft	A steering wheel with vertical “play” (see white arrow) does not provide good contact with the EZ-Steer system drive wheel. The drive wheel could slip on the steering wheel outer ring, causing a loss in steering accuracy. Tighten the steering wheel.	
Front steering is out of alignment	If one or both of the front wheels are out of alignment, the steering will pull to one side and the machine will constantly steer to the left or right and will have problems following a straight or curved line. Fix the machine's front wheel alignment before installing and calibrating the EZ-Steer system.	
Steering wheel is dirty	Grease, oil, or protectants such as Armor All may cause the foam drive wheel to slip on the steering wheel. Use denatured alcohol to clean the steering wheel.	
Electrical problems		
No power from accessory socket	Plug in the EZ-Steer power cable and flip the switch on the male power adaptor. If the accessory socket has power, the green light on the switch is lit.	

Problem	Cause/solution	Photo
	If the accessory socket does not have power, check: · that the accessory socket is connected · if an in-line fuse has been added and/or if the fuse is blown	
Fuse is too small for power accessory socket	The fuse must be 10 amp or larger. Replace with a larger fuse if necessary.	

Problem	Cause/solution	Photo
Hydraulic fluid		
Low hydraulic fluid level	A low level of hydraulic fluid, or old fluid, can cause the steering wheel to turn the front wheels very erratically, or not at all. Use a dipstick or sight gauge to check the fluid level. Top up or replace the hydraulic fluid as necessary.	 
Cold hydraulic fluid	If the hydraulic oil temperature is lower than 40 °C (100 °F), the machine's steering may be stiff, causing the EZ-Steer system to automatically disengage or respond slowly to steering wheel movements. Before using the system, wait for the hydraulic oil to reach the recommended operating temperature. High clearance sprayers are prone to having slow steering response until the hydraulic fluid temperature is 66 °C – 82 °C (150 °F–180 °F).	

Installation

This chapter provides instructions and tips for installing the EZ-Steer assisted steering system on a vehicle.

Installation process

1. Install the EZ-Steer motor using the platform kit.
2. Install the controller.
3. Check the GPS antenna location.

   Note — *If you are upgrading from the EZ-Guide Plus system, you may need to shift the location of the antenna on the vehicle to ensure best steering performance.*
4. Install optional switches
5. Connect the components together

STEP 1: Installing the motor with the platform kit

To install the EZ-Steer platform kit and motor on the steering column of a vehicle, follow the instructions provided with the platform kit.

Also, check for vehicle-specific installation notes at www.EZ-Steer.com.

CAUTION — Always hold the steering wheel while you adjust the column tilt. Otherwise, the weight of the motor may cause the steering wheel to drop suddenly and cause damage to the steering column or dashboard.

Check that the EZ-Steer system motor is mounted at an appropriate distance from the steering wheel. The foam wheel should be 3.2 cm (1¼ inches) from the steering wheel when the motor is locked away.

Lock the motor drive wheel away from the steering wheel when the system is not in use. This prevents the foam wheel from developing a flat spot.

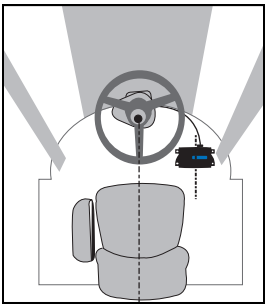
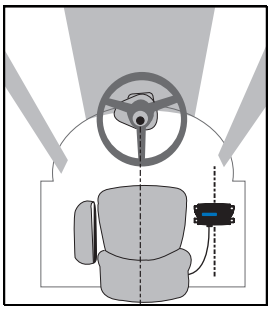
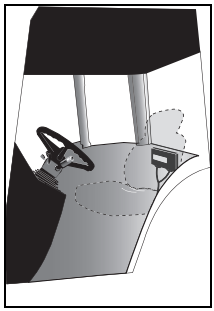
Note — *If the foam wheel develops a flat spot, you can still use the motor drive wheel. The flat spot does not affect the drive wheel, and will eventually disappear.*

STEP 2: Installing the controller

Install the controller in a way that prevents dust and moisture from entering it.

Controller mounting locations

Install the controller in the vehicle cab, parallel to the vehicle's center line and in one of the following locations:

Floor mount		Vertical mount
Parallel to the center line of the vehicle, white sticker facing upwards		Perpendicular to the floor and parallel to the rear axle, with the connectors pointing down toward the floor, white sticker facing towards the front of the vehicle
Connectors facing forward *(preferred for controllers with T2 technology)*	Connectors facing backward	
		
Take extra care not to stand on, kick, or otherwise damage the controller.		

CAUTION — Do not attach the controller to a vehicle side wall or window because vibration in these locations can cause the controller to output false terrain compensation readings that could affect performance and cause the vehicle to swerve offline.

Controller mounting

If you mount the controller on the floor, look for any cab wiring routed under the floormat before screwing the controller into place.

Use screws that are size #12 or #14, and between ½" and 1" long.

CAUTION — Mount the controller as solidly as possible, using the supplied mounting plate. If objects bump the controller, or if the controller vibrates, false terrain compensation readings are created that could affect performance and cause the vehicle to swerve offline.

CAUTION — The EZ-Steer system is not designed to be mounted on machines with an open operator's station (no enclosed operator's cab). Doing so will void the warranty of the EZ-Steer system components.

Note — *If the controller does not have T2 technology (terrain compensation), the controller does not need to be aligned with the center line of the vehicle. However, all other mounting instructions should be followed.*

STEP 3: Checking the antenna location

For optimal performance, mount the antenna as far as possible from the vehicle antenna offset reference point (see page 39) but with a clear view of the sky. The antenna should not be blocked from receiving GPS satellites by, for example, the cab.

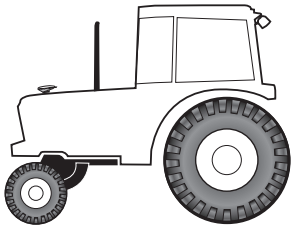
Antenna mounting locations for each vehicle type are shown below.

Note — *Do not mount the antenna on the nose of the vehicle if you are using OmniSTAR HP or XP corrections.*

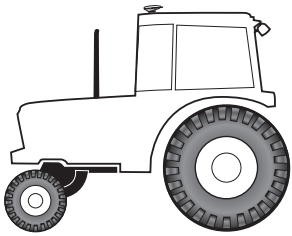
CAUTION — Ensure that you mount the antenna so that it is level. If the antenna is not level, GPS performance may be reduced.

2WD tractor

Nose of vehicle (preferred)



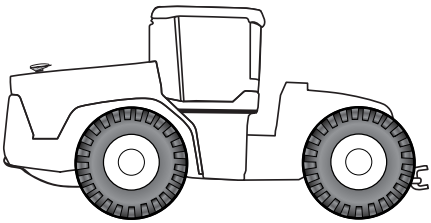
Front of cab



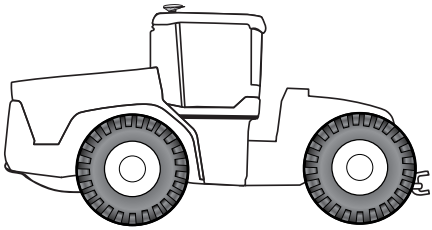
(Only if engine hood shakes, and/or to avoid WAAS signal blockage at higher latitudes)

4WD (articulated) tractor

Nose of vehicle (preferred)



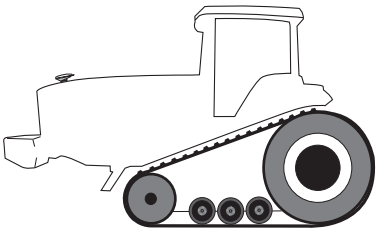
Front of cab



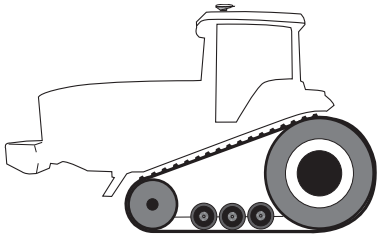
(Only if engine hood shakes, and/or to avoid WAAS signal blockage at higher latitudes)

Tracked tractor

Nose of vehicle (preferred)



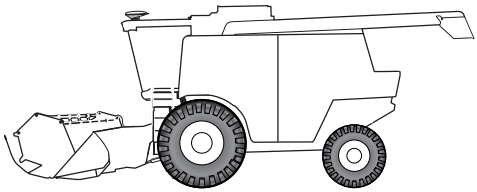
Front of cab



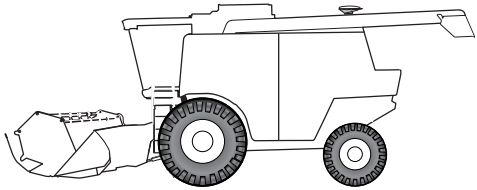
(Only if engine hood shakes, and/or to avoid WAAS signal blockage at higher latitudes)

Combine

Front of cab (preferred)

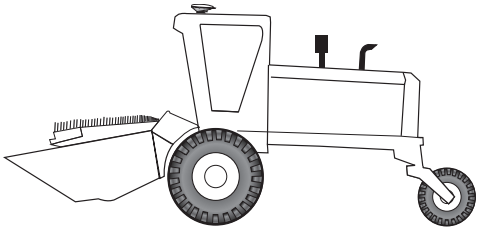


Rear of vehicle

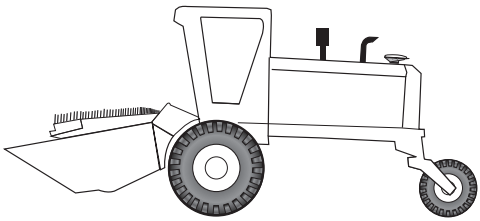


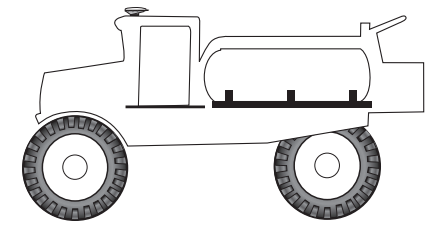
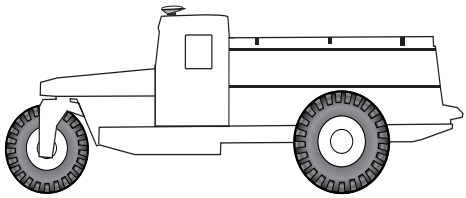
Swather

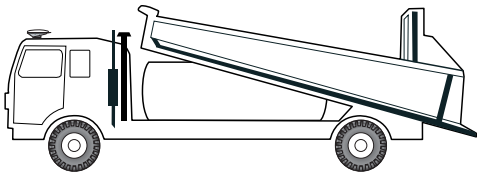
Autopilot antenna mount kit P/N 49307 (preferred)



Rear of vehicle



Sprayer	Floater
Front of cab 	Front of cab 

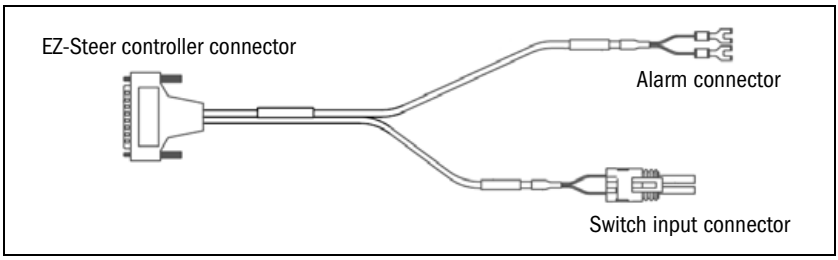
Truck
Front of cab 

STEP 4: Connecting optional switches

You can connect one of the following switches to the EZ-Steer system:

- seat switch to prevent engaging when the operator is not in the seat
- remote-engage foot pedal

The switches connect to the optional accessory cable kit (P/N 53066-00).

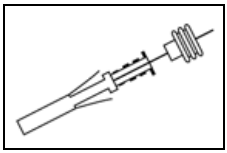


To purchase the optional accessory cable kit, or for more information, contact your local EZ-Steer system reseller.

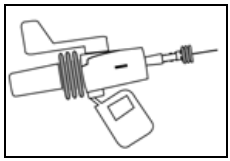
Connecting a seat switch

As an additional safety feature, you can connect a vehicle seat switch to the EZ-Steer accessory cable:

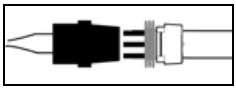
1. Strip about 2.5 cm (1 inch) of insulation off the switch wire.
2. Thread each switch wire through a cable seal.
3. Insert the switch wire and end of the cable seal into the female terminal connector.



4. Crimp the female terminal connector with an appropriately sized crimp tool or pliers, and then solder to ensure a good physical and electrical connection. Do not let excess solder run into other parts of the contact.
5. Insert the two female terminal connectors and the rubber seal into the two holes of the 2-way female connector.

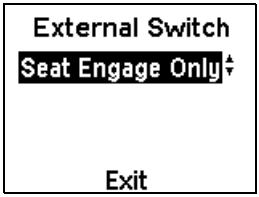


6. Plug the 2-way female connector into the 2-way male connector on the accessory cable.



To enable the seat switch:

1. Select *EZ-Steer / External Switch*.



2. Select one of the following options:

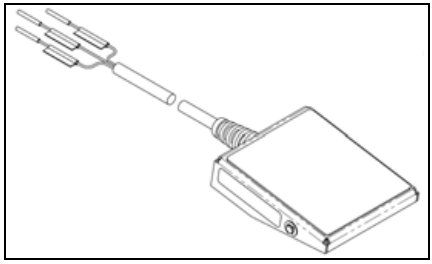
Option	Description
Seat Engage Only	The operator must be sitting on the seat before assisted steering will engage. Assisted steering does ***not*** disengage when the operator leaves the seat.
Seat Disengage	The operator must be sitting on the seat before assisted steering will engage and the system disengages when the operator leaves the seat.

3. Press OK to save the setting.

When the system will not engage because the operator is missing, an “O” (for “operator missing”) appears among the status icons at the bottom of the screen.

Tip — You can disable the seat switch without disconnecting it by selecting the Disable option.

Connecting a remote-engage foot pedal



If you use a foot pedal to engage the EZ-Steer system, the foot pedal must be connected to the optional accessory cable.

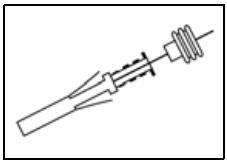
For information on purchasing a foot pedal kit (P/N 60941-00), contact your local EZ-Steer system reseller.

To connect the foot pedal to the accessory cable:

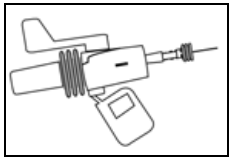
1. Cut the pins off the black and white wires on the foot pedal cable and strip about 2.5 cm (1 inch) of insulation off the switch wires.

   Note — *The green wire is not used and can be cut off if required.*

2. Thread each of the black and white switch wires through a cable seal (supplied with the accessory cable).



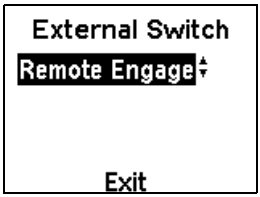
3. Insert each of the switch wires and the end of the cable seal into a female terminal connector.
4. Crimp the female terminal connectors with an appropriately sized crimp tool or pliers, and then solder to ensure a good physical and electrical connection. Do not allow excess solder to run into other parts of the contact.



5. Insert the two female terminal connectors and the rubber seal into the two holes of the 2-way female connector as follows:
   - Black wire into terminal B.
   - White wire into terminal A.

6. Plug the 2-way female connector into the 2-way male connector on the accessory cable.
7. Run the cable to a clear location on the floor board. Use double-sided tape or wide velcro strips to secure the pedal. Route the cable under the floor mat.

To enable the remote engage foot pedal:



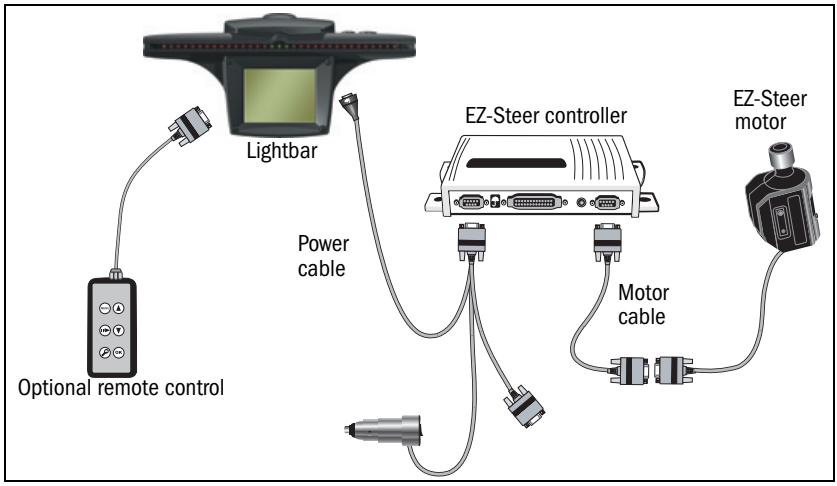
1. Select *EZ-Steer / External Switch.*
2. Press ▼ until *Remote Engage* is displayed.
3. Press OK to save the setting.

Tip — You can disable the remote engage foot pedal without disconnecting by selecting the Disable option.

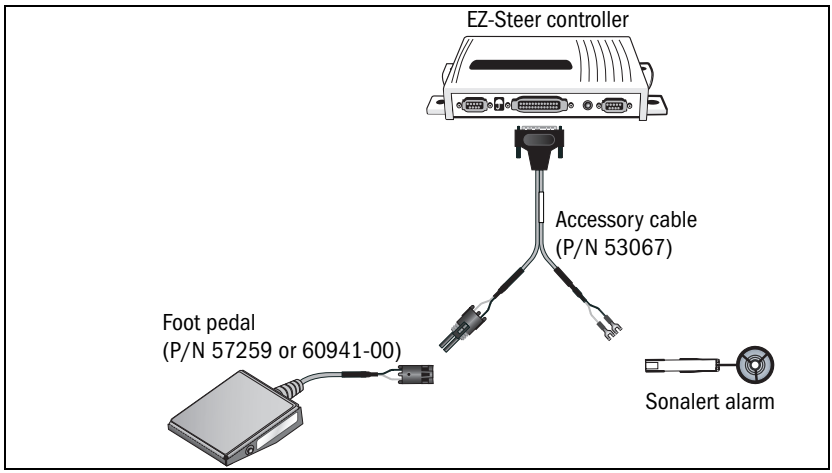
To engage or disengage the EZ-Steer system using the remote engage foot pedal, depress the pedal for 0.5–3 seconds and then release it when you pass the start of the swath. The system engages when the pedal is released. This is done to avoid accidental engaging. To disengage the EZ-Steer system, just turn the steering wheel at the end of the swath, stop, or depress the pedal again.

STEP 5: Connecting the components

Connect the EZ-Guide Plus lightbar and the EZ-Steer system components as shown here.

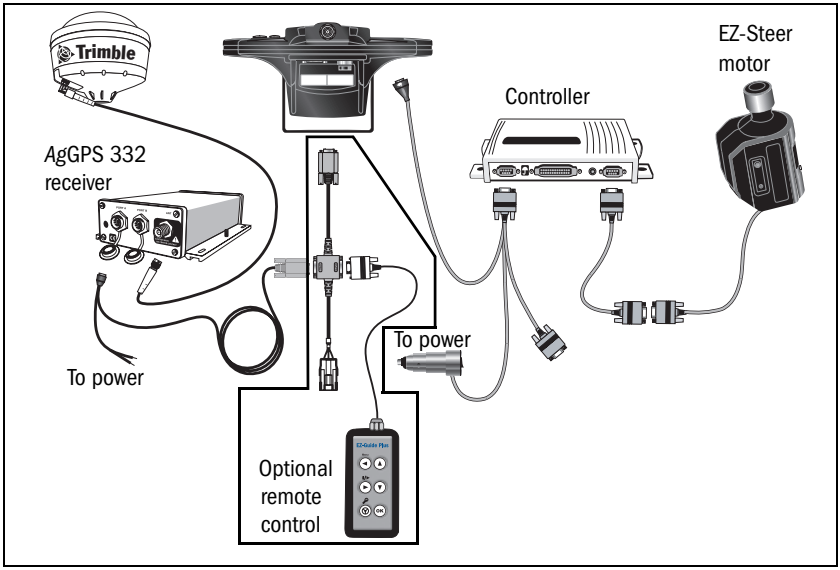


Connect the optional extras as shown here.



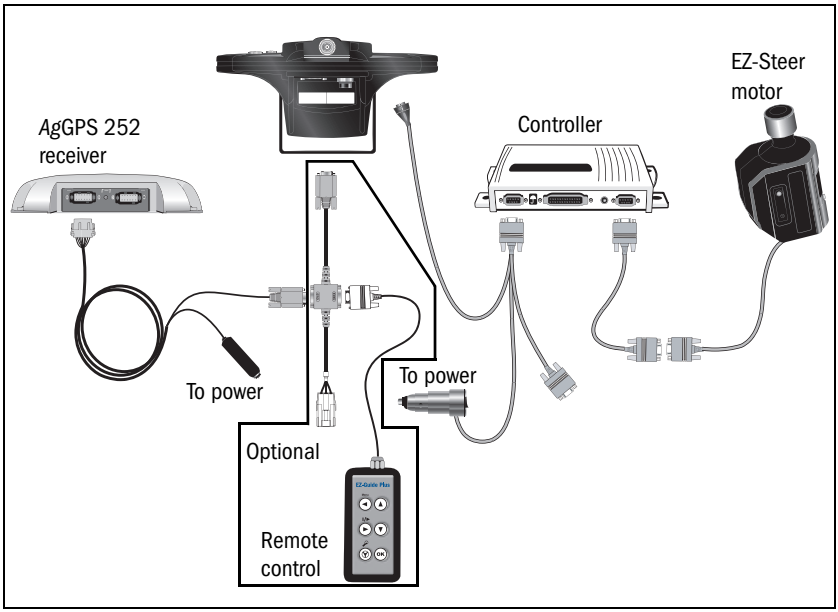
Using the EZ-Steer system with the *Ag*GPS 332 receiver

For greater accuracy, you can use an *Ag*GPS 332 receiver with the EZ-Guide Plus and EZ-Steer systems as shown here. The remote control is optional.



Using the EZ-Steer system with the *Ag*GPS 252 receiver

For greater accuracy, you can use the EZ-Guide 252 system with the EZ-Steer system. The remote control is optional.



CAUTION — For optimum performance, ensure that the *Ag*GPS 252 receiver has firmware version 3.0 or later.

For information on how to configure the lightbar to work with an *Ag*GPS 252 receiver, refer to the *EZ-Guide Plus Lightbar Guidance System Getting Started Guide*.

Note — *If the EZ-Guide Plus lightbar starts to flash a* ***Low Accuracy – Old Corrections*** *warning, monitor the vehicle steering closely. Position jumps may cause the EZ-Steer system to steer the vehicle offline.*

Initial System Setup

This chapter describes how to set up the EZ-Steer system on an approved vehicle.

Note — *Before completing this setup, see:*

- **Pre-Installation Vehicle Inspection, page 15**
- **Installation, page 21**

If you experience performance problems after completing these steps, see **Troubleshooting, page 58**.

CAUTION — Make changes to the system settings in incremental steps. Random changes are likely to result in poor performance.

Setup process

1. Set up T2 technology.
2. Select vehicle type and enter vehicle settings.
3. Set the axle-to-antenna offset.
4. Set up the engage options.
5. Set up the initial Aggressiveness.
6. Get GPS positions.
7. (Optional) Save or load vehicle configurations.

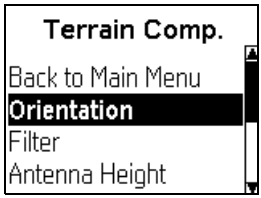
For information on using the EZ-Guide Plus lightbar, including accessing menus and general operation, refer to the *EZ-Guide Plus Lightbar Guidance System Quick Reference Card*.

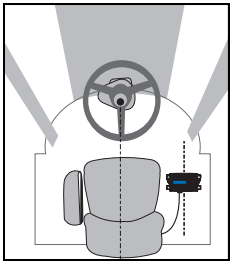
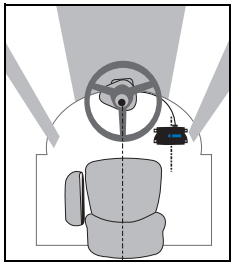
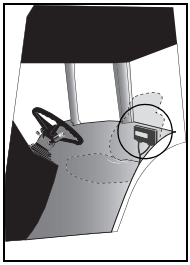
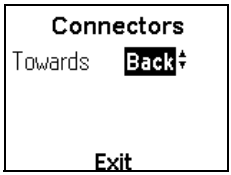
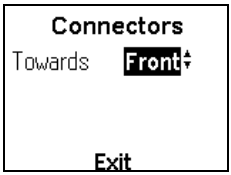
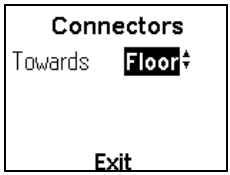
STEP 1: Setting up T2 technology

1. Configure the orientation of the controller.
2. Configure the antenna height.
3. Calibrate the roll compensation.
4. Set the antenna-to-axle offset.

Configure the orientation of the controller

1. Select and press OK to access the configuration menus.
2. Select *Terrain Compensation / Orientation*.
3. In the *Towards* field, select the direction in which the cable connectors point:

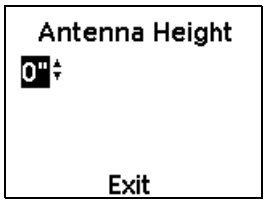


For this mount location			
			
Choose this direction			

4. Select *Exit* and press OK to save the settings.

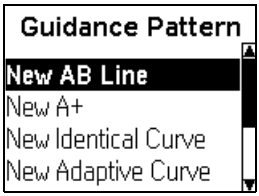
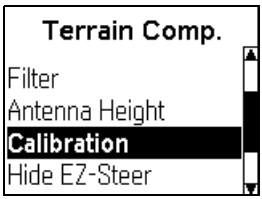
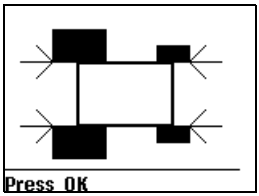
Configure the antenna height

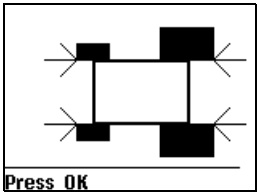
1. Select *Terrain Compensation / Antenna Height*.
2. Press ▲ or ▼ to enter the correct antenna height for your vehicle.
3. Select *Exit* and press OK to save the settings.



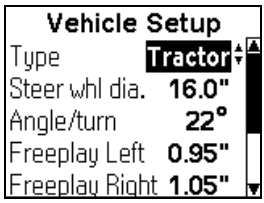
Calibrate the roll compensation

Calibrate the roll compensation using one of the following methods:

Step	Wheel position method	LED method	Example
1		Select ↻ and press OK to reset guidance. Select *New AB Line* and create an AB Line (on level ground or ground with a constant gradient). For more information on setting an AB Line, refer to the *EZ-Guide Plus Quick Reference Card*.	
2	Park the vehicle on level ground, or ground with a constant gradient.	Park the vehicle above the AB Line so the lightbar shows three green LEDs. Stop the vehicle and get out.	
3	Do one of the following: • For a wheeled tractor, mark the position of each wheel. • For a tracked tractor, mark the position of the tracks.	Place a marker on the ground beside the vehicle to mark the point halfway between the front and rear axles.	
4	Select *Terrain Comp. / Calibration*. A warning message appears.		
5	Press OK. The *Calibration* screen appears.		
6	Press OK to record the first roll angle.		

Step	Wheel position method	LED method	Example
7	Turn the vehicle around and park it directly on top of the wheel/track marks.	Turn the vehicle around so it is directly over the AB Line (the lightbar shows three green LEDs). Ensure that the marker on the ground is halfway between the front and rear axles.	
8	Press OK to record the second roll angle.		
	The system automatically calculates the roll calibration. If the roll value is large (>5°), refer to the *AgGPS EZ-Steer Assisted Steering System Troubleshooting Guide* to determine if T2 is working correctly.		

STEP 2: Selecting vehicle type and entering vehicle settings



1. Select *EZ-Steer / Vehicle Setup*.
2. Select the vehicle type.
3. Enter the wheelbase, steering wheel diameter, and angle/turn for your vehicle model.
   - For approved vehicle measurements, see Appendix A: Vehicle Measurement Settings.

     Note — *If the* ***steering wheel diameter*** *value listed for your vehicle model is incorrect, measure and enter the correct diameter. See* Appendix B: Measuring Vehicle Parameters.
   - If the measurements for your approved vehicle are not listed in Appendix A: Vehicle Measurement Settings, check for updates in the *Vehicle Configuration Settings* document on www.EZ-Steer.com.

     Note — *The* ***Freeplay*** *will be set as part of the EZ-Calibration procedure and should not be changed at this stage. Also, do not change the Heading Filter option.*
4. Select *Exit* and press OK to save the settings.

STEP 3: Setting the axle-to-antenna offset

1. Measure the distance from the antenna mounting reference point to where the antenna is mounted. The antenna offset reference points for each vehicle are:

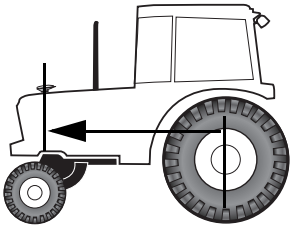
Vehicle type	Antenna offset reference point
2WD tractor	Rear axle
4WD tractor	Front of nose
Tracked tractor	Centre of track
Combine	Front axle

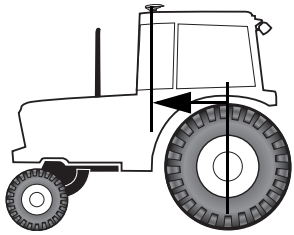
Vehicle type	Antenna offset reference point
Swather	Antenna location
Sprayer	Rear axle
Floater	Rear axle
Truck	Rear axle

The following table shows the measurement of antenna offset for each vehicle type and antenna mounting location.

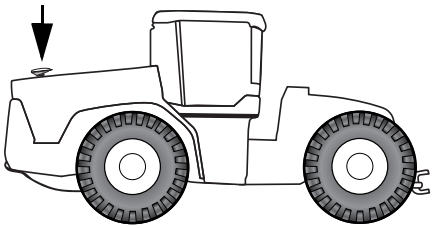
CAUTION — Ensure that the antenna offset measurement is accurate to within 7.6 cm (3 inches). An incorrect offset can cause the vehicle to swerve offline or oscillate back and forward and may cause damage to the vehicle or other property.

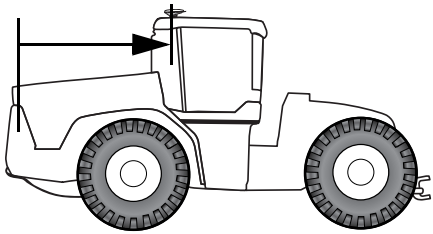
2WD tractor



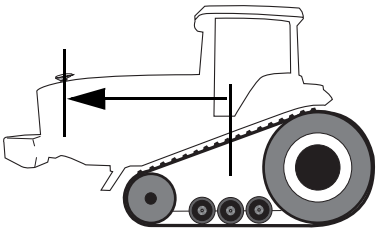


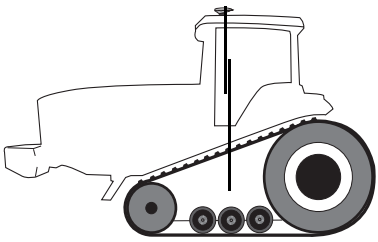
4WD (articulated) tractor



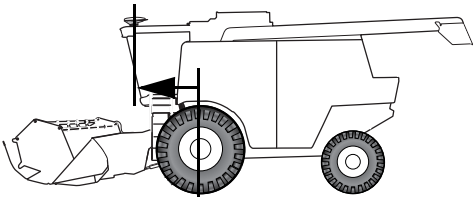


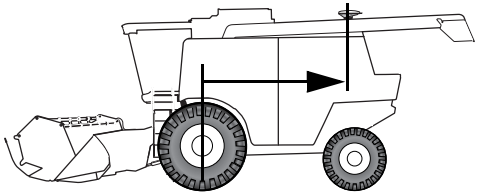
Tracked tractor



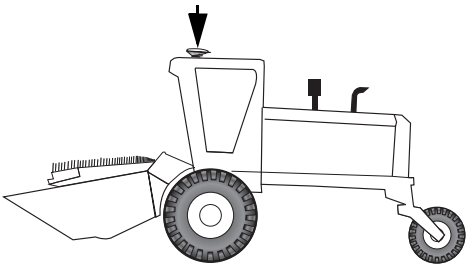


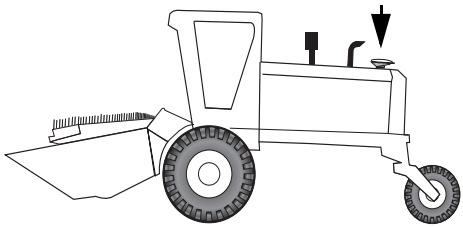
Combine

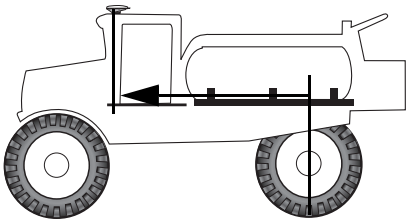
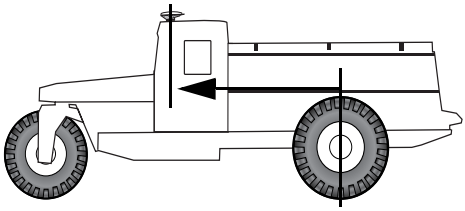


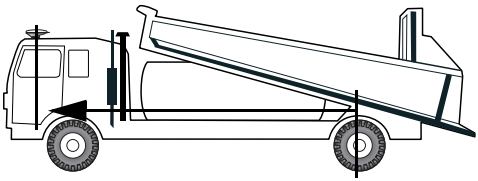


Swather



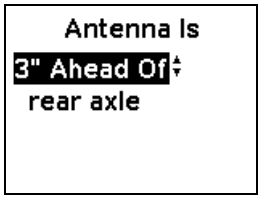


Sprayer	Floater
	

Truck


2. Select *EZ-Steer / Axl/Ant Offset* and enter the measured distance.

   Note — *Take particular care to ensure that the correct direction of offset from the antenna mount reference mount is selected.*



STEP 4: Setting up the engage options

1. Select *EZ-Steer / Engage Options*.
2. Check that the *O'ride Sensitivity* value is set to 20%.
3. Enter the *Motor Spd.* for your vehicle as listed below.

Vehicle	Motor speed	
	With T2	Without T2
2WD tractor	>2000 hours = Man High <2000 hours = Man Max	Under 2000 hrs = Man High Over 2000 hrs = Man Max
4WD tractor	Man High	Man Low
Tracked tractor	Man Low	Auto Low
Combine	Man High	Auto High
Swather	Man Max	Auto High

Vehicle	Motor speed	
	With T2	Without T2
Sprayer	Man Max	Auto High
Floater	Man Max	Auto High
Truck	Man Max	Auto High

Note — *You will calibrate the motor speed during the EZ-Calibration process.*

4. Select *Exit* and press OK to save the settings.

STEP 5: Setting up initial Aggressiveness

Select and then press OK. Configure the initial aggressiveness for your vehicle from the table below.

Vehicle	Aggressiveness
2WD Tractor	130%
4WD Tractor	115%
Tracked Tractor	120%
Combine	120%

Vehicle	Aggressiveness
Swather	120%
Sprayer	130%
Floater	135%
Truck	135%

Note — *Aggressiveness will be calibrated as part of the EZ-Calibration procedure.*

STEP 6: Getting GPS positions

1. Make sure that the GPS antenna has a clear view of the sky, so that it can receive GPS and WAAS/EGNOS signals without interruption. If the antenna is blocked by anything, for example the vehicle cab or loader bucket arms, move the antenna higher on the vehicle or remove the loader.

   Note — *For the best mounting position for the antenna, see* **STEP 3: Checking the antenna location, page 23**.

2. Turn on the GPS receiver and wait until you get your first GPS position.
3. If using WAAS or EGNOS corrections, wait 10 minutes after getting your first GPS position before you set an AB Line or start guidance or steering.

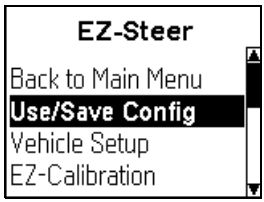
   Note — *If the GPS receiver has been turned off for less than 2 hours, you may not need to wait 10 minutes.*

4. Set an AB Line or start guidance or steering.

STEP 7: Saving and loading vehicle configurations

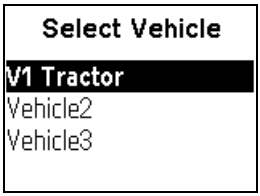
If you move the EZ-Steer system from one vehicle to another, you can save and load vehicle configurations to simplify setup.

1. Select *EZ-Steer / Use/Save Config*.

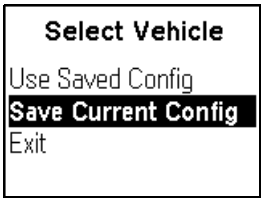


2. Press ▲ or ▼ to select the required option and then press OK.

   Note — *Saved vehicle configurations are named by their location in the menu and then the type of vehicle. For example, if a combine is saved in the third vehicle configuration position, the vehicle configuration is named "V3 Combine".*



3. Do one of the following things:
   - To load the configuration, select *Use Saved Config* and then press OK. A confirmation screen appears.
   - To save your current configuration, select *Save Current Config* and then press OK. A confirmation screen appears.



4. Select *Yes* to continue.

   Note — *Vehicle configurations that were saved using a previous version of the firmware may not be compatible with the current firmware.*

Calibration

The EZ-Steer EZ-Calibration wizard guides you through the calibration process to ensure you get the best performance from your system.

EZ-Calibration process

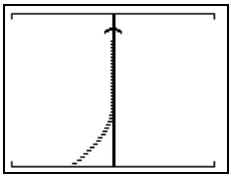
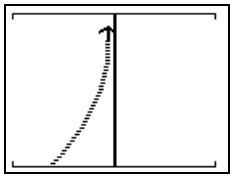
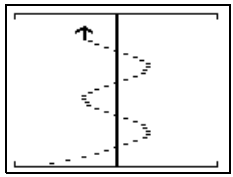
1. Prepare to start the wizard.
2. Start the EZ-Calibration wizard.
3. Confirm the vehicle settings.
4. Calibrate Freeplay.
5. Calibrate Angle/Turn.
6. Calibrate Aggressiveness.
7. Calibrate Freeplay Offset.
8. Calibrate Motor Speed.
9. Confirm calibration parameters.

Note — *It may be necessary to run the EZ-Calibration wizard more than once to achieve optimal results. If you run the wizard again, ensure that you do not reset the Angle/Turn, Freeplay, Aggressiveness, and Motor Speed to the vehicle default.*

Minimizing offline distances

The calibration of all parameters except Freeplay involve engaging the EZ-Steer system on a guidance line, then changing the parameter until you have minimized the offline distances.

Offline examples

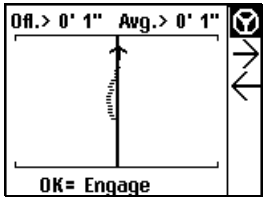
Ideal	Slow to get online	Oscillating about the line
		

Procedure to minimize the offline distance

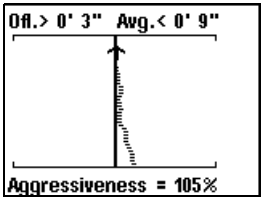
1. Line the vehicle up on any swath except the AB Line.
2. Drive the vehicle at normal operating speed.

3. Select Ⓨ then press Ⓞ to engage the system.

   Note — *If you are too far offline to engage the system, the lightbar displays a "D". Move the vehicle in toward the swath and then engage.*



4. While the system is engaged, press Ⓐ or Ⓥ to adjust the value, until you get the best performance.
5. Press Ⓞ. The system disengages.
6. Select ✣ then press Ⓞ to complete the calibration.



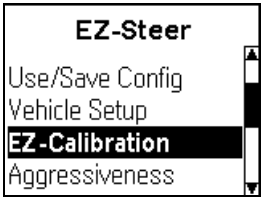
STEP 1: Preparing to start the wizard

Before starting the EZ-Calibration wizard:

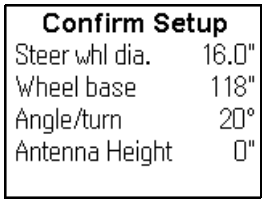
1. Complete the vehicle inspection, installation, and system setup. See **Pre-Installation Vehicle Inspection, page 15**; **Installation, page 21**; and **Initial System Setup, page 35**.
2. Map a straight AB Line and line up on any swath other than the AB Line. For information on mapping an AB Line, refer to the EZ-Guide Plus system documentation.

STEP 2: Starting the EZ-Calibration wizard

- Select *EZ-Steer / EZ-Calibration*.



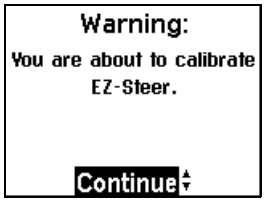
The *Confirm Setup* screen appears.



STEP 3: Confirming the vehicle settings

1. Check the values on the *Confirm Setup* screen and then press OK.

   A warning screen appears.



2. If the vehicle settings were correct, press OK to Continue.

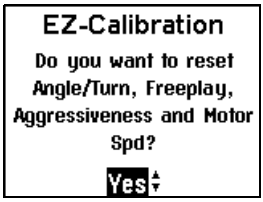
   If any of the vehicle settings were incorrect:

   a. Press ▼ until Exit appears and then press OK.

   b. Select *EZ-Steer / Vehicle Setup* and then enter the correct vehicle settings.

   c. Start the EZ-Calibration wizard again.

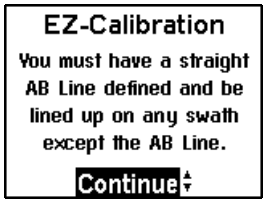
   A screen appears asking if you want to reset vehicle settings.



3. Select one of the following:

   - If you are performing a new calibration, select *Yes* to reset the *Angle/Turn*, *Freeplay*, *Aggressiveness*, and *Motor Speed* values.
   - If you are fine-tuning the calibration settings, select *No* to retain your current settings.

   The AB Line warning screen appears.



4. If you have:

   - created a straight AB Line, select *Continue*. The first *Calibrate Freeplay* screen appears.
   - not created a straight AB Line yet, select Exit.

STEP 4: Calibrating Freeplay

The Freeplay setting compensates for:

- minor wear in vehicle steering
- hydraulic “bleed” (when small or slow steering wheel movements do not translate into changes in vehicle direction)
- slow vehicle operation

Note — *Slow vehicle operation generally requires a higher Freeplay setting, for example, an increase of 2.5 cm–5 cm (1"–2").*

1. Ensure that the vehicle is parked on a gravel road or soft ground. The lower resistance on the wheels will make it easier to tell when they begin to move.
2. Press ▲ until the vehicle wheels are turning.
3. Press ▼ until the vehicle wheels just stop turning.

Note — *For an articulated or tracked tractor, adjust Freeplay until the front of the machine stops rotating from side to side.*

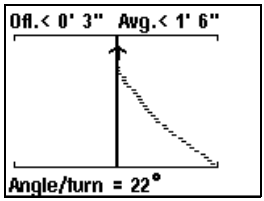
The following table lists recommended Freeplay values.

Vehicle	Freeplay
2WD tractor	New machines = 1.5 cm–7.6 cm (0.6"–3.0") Used machines =7.6 cm–11.4 cm (3.0"–4.5")
4WD tractor	2.5 cm–7.6 cm (1.0"–3.0")
Tracked tractor	1.8 cm–3.8 cm (0.7"–1.5")
Combine	5.1 cm–10.2 cm (2.0"–4.0")

Vehicle	Freeplay
Swather	6.9 cm–10 cm (2.7"–4.0")
Sprayer	7.6 cm–15.2 cm (3.0"–6.0")
Floater	7.6 cm–15.2 cm (3.0"–6.0")
Truck	10.2 cm–16.5 cm (4.0"–6.5")

STEP 5: Calibrating Angle/Turn

The *Angle/Turn* value represents the angle that the wheels will turn through during one full rotation of the steering wheel. This setting smooths steering, stops oscillations and ensures that the vehicle gets online quickly.



Adjust the *Angle/Turn* to minimize the offline distance and adjust for cab roll or tire slip as follows:

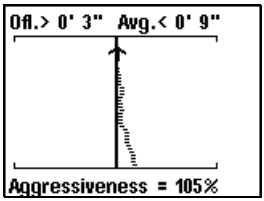
Field condition	Angle/turn adjustment
Smooth	Leave as is or reduce by 1°–5°
Rough	Decrease by 1°–5°
Slippery	Decrease by 1°–5°
Hard	Increase by 1°–5°

Note — *If you are re-calibrating your vehicle for use with T2 terrain compensation, you may need to use an Angle/Turn setting that is slightly lower than the optimal setting without T2 technology.*

STEP 6: Calibrating Aggressiveness

The Aggressiveness setting controls how fast EZ-Steer steers the vehicle onto the current guidance line.

Adjust the Aggressiveness value until line acquisition is fast, but without oscillations.



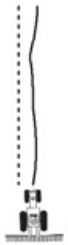
To ...	Do the following ...
Make more aggressive turns to get online quickly	Increase the Aggressiveness value
Make less aggressive turns to avoid oscillations	Decrease the Aggressiveness value

Vehicle	Recommended Aggressiveness settings	
	Without T2	With T2
2WD tractor	Smooth field = 98–105% Rough field = 115–130%	120–135%
4WD tractor	85–95%	110–120%
Tracked tractor	105–120%	110–125%
Combine	65–85%	115–125%
Swather	110–140%	130–140%
Sprayer	110–125%	120–140%
Floater	80–100%	120–140%
Truck	100–115%	125–145%

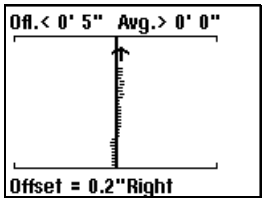
Tip — If the calibrated Aggressiveness value is outside these ranges, there may be a problem with the calibration of one of the other parameters.

STEP 7: Calibrating the Freeplay Offset

The *Freeplay Offset* value compensates for wear on the steering linkages that is greater on one side of the vehicle than it is on the other. This corrects a tendency for the vehicle to drive offline to one side and parallel to the AB line.

Without Freeplay Offset	With Freeplay Offset
	

Adjust the *Freeplay Offset* value to remove steering bias.



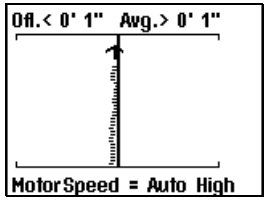
- Press ▲ to increase the offset to the right, or press ▼ to increase the offset to the left.

  When the vehicle is offline:

  - to the right, increase the Freeplay to the left by 0.30 cm (0.1").
  - to the left, increase the Freeplay to the right by 0.30 cm (0.1").

STEP 8: Calibrating Motor Speed

The *Motor Speed* setting helps to increase steering response.



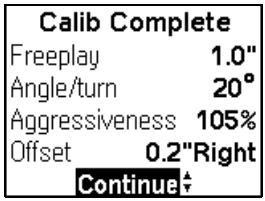
Adjust the motor speed to minimize offline distances.

- Press ▲ or ▼ to cycle through the different settings.

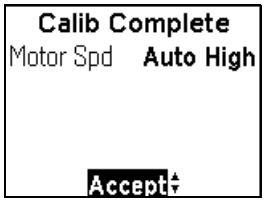
Use the motor speed suggested on page 41.

STEP 9: Confirming the calibration parameters

1. Read through the first *Calib Complete* screen. It shows the new *Freeplay*, *Angle/turn*, *Aggressiveness*, and *Offset* values.
2. Select *Continue*.



The second *Calib Complete* screen appears. It shows the new *Motor Speed* setting.



3. To complete the calibration, press OK.

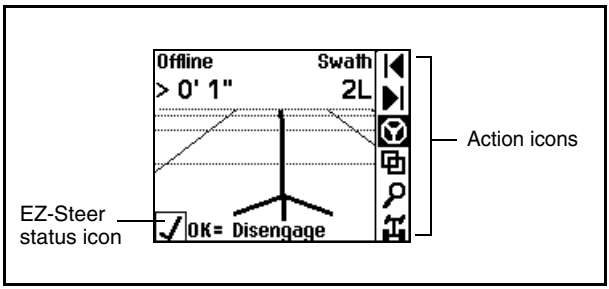
   To fine-tune the settings, press ▼ to display *Refine* and press OK.

Using the EZ-Steer System

For information on using the EZ-Guide Plus lightbar, refer to the *EZ-Guide Plus Lightbar Guidance System Quick Reference Card* or *Getting Started Guide*.

Screen items

The following graphic shows the screen items relating to the EZ-Steer assisted steering system:



Action icons

Icon	Function
⏮	Nudge left
⏭	Nudge right
Ⓨ	Engage / disengage
🚜	Aggressiveness

To select an icon, press ▲ or ▼, and then press OK.

EZ-Steer status icons

Status icon	Description
✕	Cannot engage. See Engage codes, below.
–	Can engage
✓	Currently engaged
!	Fault with EZ-Steer. For more information, select *EZ-Steer / EZ-Steer Faults* on the lightbar.

Engaging

Before you can engage the EZ-Steer system, you must define an AB Line, and drive the vehicle close to the guidance swath. When the system is ready to engage, the — status icon appears and one LED on each end of the lightbar is illuminated.

Note *— See* **Hints for engaging, page 53**.

To manually engage the EZ-Steer system, do one of the following:

- Select Ⓨ on the main map screen and then press ⓄⓀ.
- Press Ⓨ on the optional remote control.
- Depress the optional foot pedal.

While the system is engaged, the ✓ status icon appears and two LEDs on each end of the lightbar are illuminated.

Engage codes

To engage, the vehicle must be within the engage limits configured in the *Engage Options* screen. If the system cannot be engaged, a "Can't engage" message is displayed at the bottom of the screen, with a code.

Engage code	Description
D	Too far offline
B	On outside headland or AB Line
A	Heading error too great
F S	Speed outside allowed range
G	No GPS
O	Operator not present

LED engage states

The outermost lightbar LEDs display the engage status of the EZ-Steer system:

LED state	Engage status
One solid LED at each end	Ready to engage
Two solid LEDs at each end	Currently engaged
Three flashing LEDs at each end (for 10 seconds)	Currently disengaged

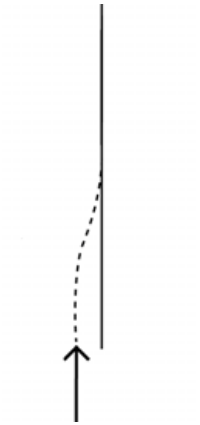
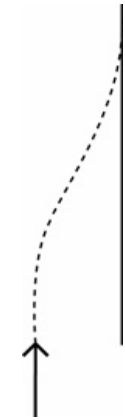
Hints for engaging

The following hints should ensure the best performance of the EZ-Steer system.

Engaging angle and distance

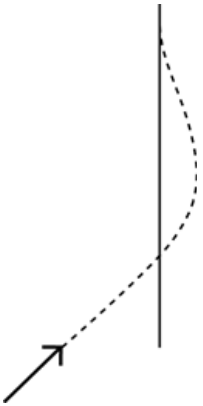
If you are a new user, the best practice is to engage parallel to the line.

1. Use the red/green LEDs to ensure that the vehicle is within 0.6 m (2 feet) of the swath.
2. Use the lightbar graphics display to turn the vehicle parallel to the swath.
3. When you are at the operational speed, engage the EZ-Steer system.

Good	Poor
	
Optimum engage distance	Engage too far from the line – slow to get online

Engaging far from the line

Experienced users can engage over 1.5 m (5 feet) from the swath. Ensure that you approach at a shallow angle to get online quickly without overshooting the swath.

Good	Poor
	
Optimum engage angle	Engage angle too steep – overshoot

Disengaging

The EZ-Steer system automatically disengages when:

- the vehicle is outside the limits configured in the *Engage Options* screen
- paused
- GPS positions are lost

If *Warnings / Low Accuracy Warning* is set to High Accuracy Only, the system disengages if it receives low accuracy positions (for example, no corrections).

To manually disengage the system, do one of the following:

- Select Ⓨ on the main map screen and then press ⓄⓀ.
- Turn the steering wheel to override the electric motor.
- Press Ⓨ on the optional remote control.
- Depress the optional foot pedal.

When the system is disengaged, three LEDs at each end of the lightbar flash and the optional remote control emits an audible warning.

When the system will not be use for an extended period of time, use the motor lock pin to tilt the motor away from the steering wheel.

Audible warning

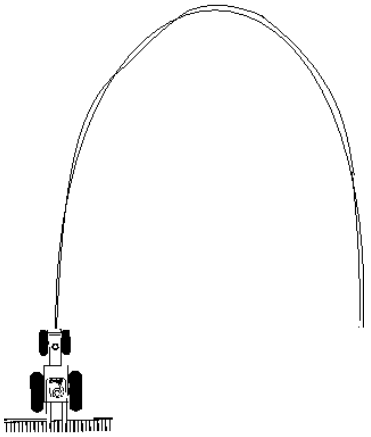
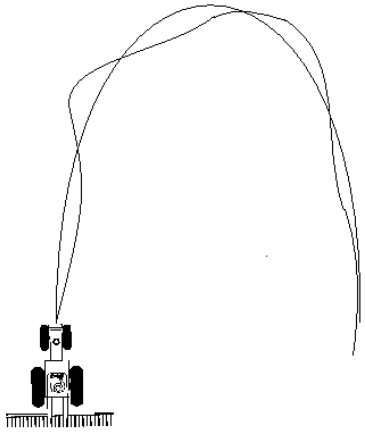
If you have the EZ-Guide Plus system remote control keypad connected to the lightbar, or the Sonalert alarm connected to the EZ-Steer system controller through the optional accessory cable, an audible warning sounds when:

- you disengage the EZ-Steer system
- low accuracy GPS occurs
- a headland or offline warning limit is reached (if this mode is enabled)

Note — *For safety reasons, turning the Audible warning option off does not disable the audible disengage warning.*

Curve autosteering accuracy

To obtain smoother steering when operating on curves, try setting the *Aggressiveness* lower than the optimal *Aggressiveness* setting for straight lines.

Aggressiveness set correctly	**Aggressiveness too high**
	

Headlands

It is possible to engage the EZ-Steer system on headlands which have sharp corners at the edge of the field. However, the EZ-Steer system may be unable to drive around these sharp bends. Use one of the following methods to compensate:

- Manually steer the vehicle around the corner. Once you have rounded the corner, re-engage the EZ-Steer system.
- Select *EZ-Steer / Engage Options* and increase the *Diseng. OffIn.* distance.

CAUTION — If you increase the value in the *Diseng. OffIn.* field, the vehicle may overshoot the corners by at least a few feet.

Vehicle-specific performance hints

2WD tractor

- You can install the EZ-Steer system on tractors that have SuperSteer (for example, New Holland TG). If the tractor has a SuperSteer front axle, for best performance:
  - Use low or medium aggressiveness (100–110%).
  - Line up close to the swath and make certain the front wheels are straight before engaging the EZ-Steer system.
- To get smoother performance when the vehicle is pulling an implement over tilled ground, enable *Diff-Lock*. The setting locks the drive wheels together and causes them to turn at the same rate. This prevents the machine from pulling sharply to the left or right.

  Note — *Turn off Diff-Lock if you are calibrating on a hard surface.*

4WD tractor

- Because the steering on a 4WD articulated tractor is slow, you may need to increase the Freeplay and Aggressiveness settings when traveling at high speeds.
- The EZ-Steer system can be installed on Case IH STX tractors with Accusteer. For optimal performance, disable Accusteer via the switch in the cab if possible.

Tracked tractor

For best performance, use the following settings when configuring the EZ-Steer system for use with a tracked tractor:

- Perform Steps 5–7 of the EZ-Calibration sequence at the speed at which the machine will be most commonly used.
- If you do not have T2 technology, set *Min speed* to a value above 4.8 kph (3 mph). At speeds below 4.8 kph (3 mph), the accuracy of the EZ-Steer system without T2 technology on tracked vehicles drops off quickly.

Sprayer

- It is common for these vehicles to have slow steering. To compensate for this, set the *Motor Speed* to Man Max and use high aggressiveness.
- If the vehicle is slow to get online, or you experience large, slow oscillations, increase the *Aggressiveness* value.
- If you are using the T2 technology option, and traveling faster than 24.1 kph (15 mph) over a rough surface, from *Terrain Comp. / Filter* select the *Roll only* option.

Troubleshooting

The following categories appear in this chapter:

- General
- General GPS
- T2 technology
- System performance
  - Oscillations
  - Offline
  - Other

General

Problem	Possible cause	Solution
The EZ-Steer system is hard to disengage when I manually turn the steering wheel	The *Override Sensitivity* setting is too low.	Select *EZ-Steer / Engage Options* and then increase the *O'ride Sensitivity* setting. Increase the setting in 5% increments. Disengage by turning the steering wheel after each change to test its effect.
The EZ-Steer system disengages on large bumps	The *Override Sensitivity* setting is too high.	Select *EZ-Steer / Engage Options* and then decrease the *O'ride Sensitivity*. Decrease the setting in 5% increments. Disengage after each change to test its effect.
	The offline distance is too small to accommodate disturbances caused by rough field conditions.	Select *EZ-Steer / Engage Options* and then increase the *Diseng. Offln.* setting.
It is difficult to engage the EZ-Steer system	The *Maximum Angle* setting is too narrow, making it difficult to line up the vehicle within the engage angle.	Select *EZ-Steer / Engage Options* and then increase the *Max Angle* setting.
	The *Engage Offln*. limit is too low which means that the vehicle has to be very close to the line before engaging.	Select *EZ-Steer / Engage Options* and then increase the *Engage Offln.* limit.
The remote engage foot pedal does not work	Holding the switch shorter than 0.5 seconds will not engage the system.	Hold the switch down for at least 0.5 seconds. Release the switch between 0.5 and 3.0 seconds. The vehicle will engage when the switch is released.

Problem	Possible cause	Solution
The guidance LEDs jump from side to side and the map is jerky	The *Look Ahead* setting is too high.	Select *Guidance / Look Ahead* and then increase the *Look Ahead* time to 0. This setting does not affect EZ-Steer system performance.
The foam motor drive wheel vibrates	The motor wheel has a flat spot because it was not locked away from the steering wheel when the vehicle was not in use.	When the system is not in use, hinge the EZ-Steer motor until it locks in the "away" position. The flat spot usually disappears after an hour of operation.
The foam wheel slips on the steering wheel	Grease, oil, or protectants such as Armor All may cause the foam drive wheel to slip on the steering wheel.	Clean the steering wheel with denatured alcohol to remove grease, oils, and protectants.
	There is not enough pressure between the drive wheel and the steering wheel.	Loosen the thumb screws and move the motor closer to the steering wheel. This increases the pressure and stops slippage.
The EZ-Steer motor struggles to turn the steering wheel of the vehicle	An excessively worn steering column is binding in its housing inside the steering shaft when the EZ-Steer motor presses against it.	Repair or replace the steering shaft.
The EZ-Steer motor repeatedly disengages immediately after I engage the system	The steering hydraulic temperature is low, and the steering of the vehicle is very stiff and hard to turn.	Decrease the steering override by 5% increments to 20% or less. Engage the EZ-Steer system to see if the problem stops.

General GPS

Problem	Possible cause	Solution
On-the-ground pass to pass errors are greater than 0.3 m (12 inches)	The GPS position is drifting by more than 0.3 m (12 inches) over two passes.	Increase the *Ag*GPS OnPath™ advanced filter technology decay time from *GPS / Filter*. – If there are no trees near your field, select 999 minutes. – If there are trees nearby, select 30 minutes.
	Note — *The receiver specification shows accuracy should be 15 cm–30 cm (6 inches–12 inches) 95% of the time in the American Midwest. If you are not using GPS corrections, the accuracy specification is 15–46 cm (6 inches–18 inches) in open fields with a decay time setting of greater than 30 minutes.*	
	The GPS antenna is on the nose of the vehicle, which is causing GPS signal blockage.	Increase the *Min SNR* setting from *GPS/GPS Limits*. **Tip:** Raise the *Min SNR* value to 42. If this does not fix the issue, set the *Min SNR* value to 45. ***Note —*** *Altering this setting may affect the overall number of satellites you are able to track. If you do not get a GPS position, drop the setting back to its default value of 40.*
		Move the GPS antenna to the top front edge of the vehicle cab, away from other transmitting antennas. Reset the antenna height, axle/antenna offset, angle/turn, and aggressiveness.
	The antenna is not level, which may cause GPS signal errors in some directions.	Ensure that the antenna is mounted within 5 degrees of horizontal.
The GPS position jumps up to several feet soon after startup	For optimal accuracy with WAAS corrections, the WAAS ionosphere model must be downloaded to the receiver, which can take up to 10 minutes. When the download is complete, the GPS position is updated, which can lead to a position jump of up to several feet.	Wait for 10 minutes after getting your first DGPS position before you start to use guidance or autosteering.

Problem	Possible cause	Solution
Intermittent GPS or WAAS signals – the receiver intermittently loses WAAS correction or GPS positions or only ever tracks seven satellites or less	The vehicle cab, exhaust stack, or bucket loader frame arms are blocking part of the view of the sky from the GPS antenna.	Mount the antenna at least 0.9 m (3 feet) away from any obstruction or source of potential interference. Remove any obstacle that may be blocking GPS signals from near the antenna height, axle/antenna offset, angle/turn, and aggressiveness. ***Note –*** *If you move the antenna, recalibrate the EZ-Steer system.*
When I use electrical devices in the cab, the EZ-Guide Plus system loses satellites	Some electrical devices interfere with GPS signals. If a device emits interference, GPS signals may be jammed. Certain types of two-way radio, DVD players, and some transmitting devices can cause this problem.	If you permanently lose all satellites or only ever get zero or one satellites on a regular basis, switch off all electrical devices in the cab one by one until you isolate the device that causes the issue. If this does not work, move the antenna to the nose of the vehicle to avoid interference. ***Note –*** *If you move the antenna, recalibrate the EZ-Steer system.*
The vehicle moves offline when I drive past trees	Trees obstruct GPS signals. If a tree is partially blocking a satellite, the GPS position may shift.	**Autonomous GPS** Increase the *Min SNR* setting (select *GPS / GPS Limits)*. **Tip:** Raise the *Min SNR* value to 42. If this does not fix the issue, set the *Min SNR* value to 45. ***Note –*** *Altering this setting may affect the overall number of satellites you are able to track. If you do not get a GPS position, drop the setting back to its default value of 40.* **OmniSTAR XP/HP** Decrease the *Min SNR* setting (select *GPS / GPS Limits)*. **Tip:** Lower the *Min SNR* value to 38. ***Note –*** *Altering this setting may affect the overall number of satellites you are able to track. If you do not get a GPS position, increase the setting back to its default value of 40.*
***Ag*GPS 252 GPS receiver-specific problems**		
There was a position jump of several meters	The receiver did not receive corrections within 4 minutes and has switched from using DGPS positions to autonomous (uncorrected) positions.	Check your correction source.

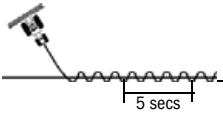
T2 technology

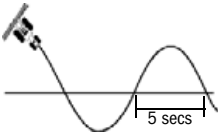
To enable or disable T2 technology:

1. Select the *Terrain Comp.* screen.
2. Select the *T2 Tech On/Off* screen.
3. Select On to enable the T2 technology, or Off to disable it.
   Note — *You can disable T2 technology if you suspect that the T2 gyros are causing a problem.*

EZ-Steer system performance

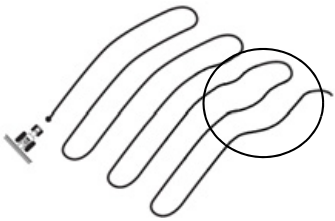
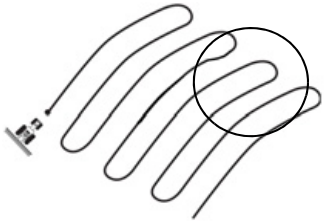
Oscillations

Problem	Possible cause	Solution
The vehicle is oscillating quickly (<5 sec per oscillation) 	The antenna is behind the rear axle.	Place the antenna in front of the rear axle. Check the axle/antenna offset.
	The *Angle/Turn* setting is too low.	1. Reset *Aggressiveness* to 100%: 2. Increase the *Angle/turn* value by 1°–5° from *EZ-Steer / Vehicle Setup*.
	The Aggressiveness setting is too high.	Decrease the *Aggressiveness* setting in increments of 10% to a limit of 80%. ***Note:*** *If you need to go below 80%, this is an indication that there is an incorrect setting somewhere else in the system. Recalibrate the system.*
	The Freeplay™ technology setting is too high.	Recalibrate the *Freeplay* technology setting.

Problem	Possible cause	Solution
The vehicle is oscillating slowly (>5 sec per oscillation) 	The vehicle is oscillating from one side of the line to the other in board sweeps because the *Angle/Turn* setting is too high.	1. Reset *Aggressiveness* to 100%. 2. Decrease the *Angle/turn* value by 1°–5° from *EZ-Steer / Vehicle Setup*. ***Note:*** *Change the setting by only 1° at a time. Test the system before changing this setting further.*
	The *Aggressiveness* setting is too low.	Increase the *Aggressiveness* setting in increments of 10% up to a limit of 140%.
	The *Freeplay* technology setting is too low.	Recalibrate the *Freeplay* technology setting.
	The *Motor Speed* is too low.	Set the Motor Speed. See page 41.
The vehicle is oscillating at high speeds (faster than 16.1 kph (10 mph) on tractors and 24.1 kph (15 mph) on sprayers)	The T2 terrain compensation filter is not optimal.	From *Terrain Comp. / Filter*, select the *Roll Only* option.

Offline

Problem	Possible cause	Solution
The lightbar shows online but when I look at the marks from my last pass, I see gaps	GPS error.	If you are using the EZ-Guide Plus lightbar internal GPS receiver, refer to **General GPS, page 60**.
		If you are using the *Ag*GPS 252 receiver, ensure that the receiver is using firmware version 3.0 or later.
The vehicle is slow to get online	The *Angle/turn* value is too high.	1. Change *Aggressiveness* back to 100%. 2. Decrease the *Angle/turn* value by 1°–5° from *EZ-Steer / Vehicle Setup*.
	The *Aggressiveness* setting is too low.	Increase the *Aggressiveness* setting in increments of 10% up to a limit of 140%.
	The *Motor Speed* is too low.	Set the Motor Speed. See page 41.
	The *Freeplay* technology setting is too low.	Check the *Freeplay* technology setting.
	The system needs to be recalibrated.	Recalibrate the system using the EZ-Calibration wizard.
	The T2 terrain compensation is not calibrated correctly.	Recalibrate the T2 terrain compensation technology.
The EZ-Steer system overshoots the line and disengages	The vehicle is approaching the line at too steep an angle.	Move the vehicle closer to the line with a shallower angle before engaging.
	The engage limits are too narrow to allow the vehicle to maneuver onto the line.	Increase the *Max Angle* and *Diseng. Offln.* settings from *EZ-Steer / Engage Options*.
Bumps in the field cause large offline distances	Bumps in the field are causing the cab to roll. The EZ-Steer system is over-compensating for this motion.	Increase the *Angle/turn* value by 1°–5° from *EZ-Steer / Vehicle Setup*.
		Upgrade to T2 terrain compensation technology and ensure that it is calibrated correctly.
Steering performance on curves is poor	The *Aggressiveness* setting is too high.	Reduce the *Aggressiveness* setting until performance improves.

Problem	Possible cause	Solution
The vehicle runs parallel to the line	The *Aggressiveness* setting is too low.	Increase the *Aggressiveness* in increments of 10% up to a limit of 130%.
	The vehicle has greater Freeplay in one direction than the other.	Configure the Freeplay offset setting: 1. Select *EZ-Steer / Vehicle Setup*. 2. When the vehicle is offline: – to the right, increase the *Freeplay Left* field by 0.30 cm (0.1") and decrease the *Freeplay Right* field by 0.30 cm (0.1"). – to the left, increase the *Freeplay Right* field by 0.30 cm (0.1") and decrease the *Freeplay Left* field by 0.30 cm (0.1"). 3. Test the new setting. Adjust the *Freeplay Left* and *Freeplay Right* values by a further 0.30 cm (0.1") if necessary. Repeat the process until the vehicle makes only small deviations (±5.1 cm–15.2 cm (±2"–6")) either side of the line.
	The system needs recalibrated.	Recalibrate the system using the EZ-Calibration wizard.
When I am using the Adaptive Curve pattern, a minor inaccuracy increases during subsequent swaths	The Adaptive Curve pattern emulates the previous line. 	Use the Identical Curve pattern, which does not emulate the previous line. 

Other

Problem	Possible cause	Solution
The vehicle swerves offline immediately after engaging.	The T2 terrain compensation filter is not optimal.	Drive forward for 4–5 seconds (at any speed) before engaging.
		If the vehicle speed is less than 16 kph (10 mph), from *Terrain Comp. / Filter*, select the *Heavy3* option.
	The controller orientation is incorrect.	Check that the controller is correctly installed and configured. See page 21.
The controller LED is flashing on and off evenly.	This is normal operation.	Do nothing.
The controller LED is flashing with the LED off longer than it is on.	The CAN communication has been lost.	1. Check that the cable connection is secure. 2. Check that the cable is not damaged.
The controller LED is flashing very fast.	There is a controller fault.	Check all equipment and cables for damage. If there is no damage: 1. Download the error log: a. Connect the EZ-Steer system controller to your office computer or laptop. b. Use the EZ-Toolbox™ software to download the error log. For more information, refer to the *EZ-Toolbox Software User Guide*. 2. Send the error log to your local reseller.

Messages and Fault Codes

The following categories appear in this chapter:

- EZ-Steer system disengaged warning messages
- T2 technology system warnings
- EZ-Steer fault codes

EZ-Steer system disengaged warning messages

Message	Explanation
DISENGAGED! Too fast	EZ-Steer system disengaged because the vehicle is traveling above the maximum speed.
DISENGAGED! Too slow	EZ-Steer system disengaged because the vehicle is traveling below the minimum speed.
DISENGAGED! Too far offline	EZ-Steer system disengaged because the vehicle has gone offline beyond the *Diseng. Offln.* value.
DISENGAGED! Manual override	You manually disengaged the EZ-Steer system by turning the steering wheel.
DISENGAGED! Manual disengage	You manually disengaged the EZ-Steer system by pressing the Ⓨ (engage/disengage) button.
DISENGAGED! No GPS	EZ-Steer system disengaged because the GPS positions have been lost.
DISENGAGED! No Corrections	EZ-Steer system disengaged because you have no corrections or old corrections. This occurs only if Low Accuracy Warning is set to High Accuracy Only.
DISENGAGED! High DOP	EZ-Steer system disengaged because you have high DOP. This occurs only if Low Accuracy Warning is set to High Accuracy Only.
DISENGAGED! Unexpected Error	EZ-Steer system disengaged because of an unexpected error in the system.
DISENGAGED! Control fault	EZ-Steer system disengaged because of a control fault.
Controller Comms Lost	There is a poor cable connection or a damaged cable.
EZ-Steer Warning Operator timeout alert	EZ-Steer system has been engaged longer than the operator timeout limit. Press Ⓞ to continue. If you press Ⓞ within 30 seconds of the message appearing, the system does not disengage.

T2 technology system warning messages

Message	Cause	Solution
T2 gyros not found	There is a hardware fault in the steering control module (SCM) or bad power supply.	Turn the EZ-Steer system off and then on again. if the problem persists, see Fault Code 15 in the EZ-Steer system fault codes table below.
EZ-Steer reported T2 fault		
T2 gyros have stopped responding		
T2 bias estimate error		

EZ-Steer system fault codes

Problem	Possible cause	Solution
Fault Code 01: Excessive manual override	There have been a large number of manual overrides on one swath.	Decrease the *O'ride Sensitivity* value from *EZ-Steer / Engage Options*.
Fault Code 02: Hardware fault	There has been a general hardware fault.	Check all equipment and cables for damage.
Fault Code 03: Controller reset	There was a power brownout (a momentary loss of power).	Ensure that no power cables are damaged and check that the connectors are tight.
		Connect the power directly to the battery.
	The EZ-Steer system controller has reset unexpectedly.	1. Download the error log: a. Connect the EZ-Steer system controller to your office computer or laptop. b. Use the EZ-Toolbox software to download the error log. Refer to the *EZ-Toolbox Software User Guide*. 2. Send the error log to your local reseller.
Fault Code 04: Communication error	The EZ-Steer system controller failed to receive CAN messages from the EZ-Guide Plus lightbar.	1. Check that the cable connection is secure. 2. Check that the cable is not damaged.
Fault Code 05: Bridge fault	The manual override sensitivity is too low.	Increase the *O'ride Sensitivity* value from *EZ-Steer / Engage Options*.
	The controller is faulty.	Contact your local EZ-Steer system reseller for a repair or replacement.
Fault Code 07: Broken motor cable	The motor cable is broken.	Contact your local reseller for a replacement motor cable.

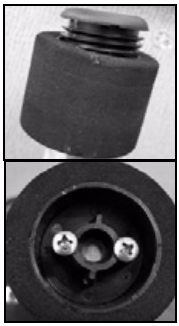
Problem	Possible cause	Solution
Fault Code 08: EEPROM fault	There was a memory error in the EZ-Steer system controller.	1. Download the error log: a. Connect the EZ-Steer system controller to your office computer or laptop. b. Use the EZ-Toolbox software to download the error log. Refer to the *EZ-Toolbox Software User Guide*. 2. Send the error log to your local reseller.
Fault Code 09: No motor connected	The motor, or motor cable, is not connected to the EZ-Steer system controller.	1. Check that the motor cable is connected to the EZ-Steer system motor. 2. Check that the motor cable is connected to the EZ-Steer system controller. 3. Check that all cable connections are secure and that the cables are not damaged.
Fault Code 10: Unknown fault	There was an unknown fault in the EZ-Steer system.	1. Download the error log: a. Connect the EZ-Steer system controller to your office computer or laptop. b. Use the EZ-Toolbox software to download the error log. Refer to the *EZ-Toolbox Software User Guide*. 2. Send the error log to your local reseller.
Fault Code 11: System fault	The lightbar failed to receive messages from the controller.	1. Check that none of the cables are damaged. 2. Check that the connectors are tight. 1. Download the error log: a. Connect the EZ-Steer system controller to your office computer or laptop. b. Use the EZ-Toolbox software to download the error log. Refer to the *EZ-Toolbox Software User Guide*. 2. Send the error log to your reseller.
Fault Code 12: Temperature too high	The controller temperature has exceeded the maximum internal operating temperature of 83 °C (181 °F). ***Note —*** *The internal temperature of the controller may be up to 12 °C (22 °F) warmer than the external temperature.*	1. Move the controller out of direct sunlight. 2. Ensure that the controller is well ventilated. 3. Turn on the air conditioning and direct the cool air to the controller.

Problem	Possible cause	Solution
Fault Code 13: Over voltage	The power supply to the controller exceeded 12.5 V.	Ensure that you only connect the EZ-Steer system to a 12 V power supply. If you jump start a vehicle with a flat battery, unplug the EZ-Steer system power plug first.
Fault Code 15: T2 Fault	The steering control module (SCM) is loaded with an incompatible version of firmware.	Check with your local reseller what the latest version of the firmware is. If you do not have the latest version of the firmware on your controller, update it.
	There are low voltage or intermittent problems with the system's power supply.	1. Check that there are no loose or corroded power connections, especially in the accessory plug area. 2. If necessary, modify the power cable with an in-line fuse and hardware to a reliable power connection. 3. Ensure that the vehicle electrical system is in working order and supplies enough voltage to the system.
	There is a hardware fault in the EZ-Steer controller.	If the above solutions do not work, return the EZ-Steer controller to your local reseller for service.

Maintenance

To ensure that your EZ-Steer system continues to operate correctly, follow this maintenance schedule during your vehicle's regular service or at intervals not exceeding three months:

1. Check that the bolts and nuts that attach the bracket to the steering column are tightened according to the specifications in the steering kit installation instructions.
2. Inspect the vehicle steering column for signs of damage or wear, paying special attention to the areas around the EZ-Steer bracket.
3. Check the position of the EZ-Steer motor relative to the steering wheel and, if necessary, adjust it according to the specifications in the steering kit installation instructions.
4. Check the amount of play in the EZ-Steer motor bearings by gently attempting to move the output shaft from side to side, as well as up and down.
5. Rotate the motor shaft to check there is no noise or resistance in the bearings.
6. Check that the motor mount spring applies sufficient pressure to prevent the foam wheel from slipping on the steering wheel. Replace the spring if necessary.
7. Inspect all cables for damage and replace them if necessary.
8. Check the foam wheel is secure and not excessively worn.
   a. Remove the plastic plug from the end of the foam wheel.



   b. Make sure that the two screws that hold the wheel to the output shaft are tight.
   c. Inspect the foam wheel. If the foam wheel shows signs of excessive wear, flat spots, or deep grooves, replace it.
   d. Reinstall the plastic plug in the end of the foam wheel.
9. Ensure that the:
   - EZ-Steer controller is securely fastened to its mounting point
   - EZ-Steer controller does not show any signs of physical damage
   - EZ-Steer cables are firmly attached

Pivot bearing maintenance

The pivot bearing is lubricated at the factory and should not require maintenance. However, if the steering motor becomes difficult to move from the unlatched to latched position or if there appears to be excessive play in the pivot bearing, follow this procedure to inspect, lubricate, or replace the pivot bearing as necessary:

1. Ensure that the unit is in its unlatched position.
2. Remove the motor mount assembly from the steering column bracket.
3. Remove the shroud:
   a. With a sharp hobby knife or razor blade, slit the "EZ-Steer" label on the front of the motor down the middle where the two shroud halves join.

   b. With a sharp hobby knife or razor blade, slit the part number / serial number label on the angled surface on the rear of the unit.

   Note — *You do not need to cut the orange warning label.*

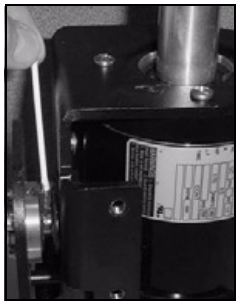
   c. Remove the four screws that hold the shroud to the upper mount.

d. Open the shroud by bending the orange warning label.

e. Remove the shroud.

4. A ¼" screw at the center of the shaft holds the upper mount assembly to the lower mount. Loosen the screw until the screw is almost completely removed.
5. Push the screw head until the shaft and upper mount assembly start to come away from the lower mount. (There will be some resistance due to the spring force.) Push the upper mount assembly away until the screw prevents it coming all the way out. The face of the bearing and some of the shaft will now be visible between the upper and lower mounts.

6. Apply some molybdenum sulphide grease or black grease to the exposed shaft and bearing face.
7. Push the two halves back together and pull them apart again. Do this several times, to spread the grease.
8. Tighten the ¼" screw to 5.6 Nm–6.7 Nm (50 in/lb–60 in/lb).
9. Hinge the motor until it latches a few times to spread the grease around the bearing.



10. Ensure that the two grub screws on the steering motor output shaft are tightened to 2.8 Nm–3.4 Nm (25 in/lb–30 in/lb).

11. Re-attach the shroud:
    a. Ensure that the tongue and groove joint is correctly mated.
    b. Tighten the four shroud screws to 2.6 Nm–3.0 Nm (23 in/lb–27 in/lb).

       Note — *Do not over-tighten the shroud screws or you may damage the plastic shroud.*

12. Re-attach the motor drive unit to the steering column bracket.

If you notice any damage while carrying out the above maintenance, correct the problem before using the EZ-Steer system. If you are unsure whether or not your EZ-Steer system is in safe working order, contact your local EZ-Steer reseller for assistance.

Appendix A: Vehicle Measurement Settings

CAUTION — This manual relates to the EZ-Steer system when used with the ***EZ-Guide Plus*** system. It should not be used with the ***EZ-Guide 500*** system. If your EZ-Steer system is connected to an EZ-Guide 500 system, refer to the *EZ-Steer System for the EZ-Guide 500 Lightbar Reference Guide*.

Make	Series	Model	Steer whl dia.	Angle/Turn	Wheelbase
2WD and MFWD tractors					
AGCO Allis	94x5	9435, 9455	38 cm (15")	21°	300 cm (118")
	96x0	9630, 9650, 9670, 9690	38 cm (15")	21°	300 cm (118")
	96x5	9635, 9655, 9675, 9695	38 cm (15")	21°	300 cm (118")
Buhler		2145, 2160, 2180, 2210	40 cm (15.9")	18–21°	312 cm (123")
Case IH	xx9x	1896, 2094, 2096, 2294, 2394, 2594	40.1 cm (15.8")	23°	264 cm (104")
	MX Maxxum	MX 100, 110, 120, 135	40.5 cm (16")	20°	274 cm (108")
		MX 150, 170	40.5 cm (16")	20°	274 cm (108")
	71x0 Magnum	7110, 7120, 7130, 7140, 7150	40 cm (15.9")	15–25°	300 cm (118")
	72x0 Magnum	7210, 7220, 7230, 7240, 7250			
	89x0 Magnum	8920, 8930, 8940, 8950	40.1 cm (15.8")	20°	305 cm (120")
	MX Magnum Gen 2	MX 210, 230, 255, 285	40.5 cm (16")	18°	305 cm (120")
	MX Magnum Gen 1	MX 180, 200, 220, 240, 270	40.5 cm (16")	18°	300 cm (118")
	MXM	MXM 120, 130, 140, 155	38.9 cm (15.3")	15–20°	264 cm (104")
		MXM 175, 190	39 cm (15.3")	16–20°	282 cm (111")
Fendt	Vario	711, 712, 714, 716, 815, 817, 818, 916, 920, 924, 926, 930	40.5 cm (16")	15–19°	285 cm (112")
	Favorit	711, 712, 714, 716, 816, 818, 822, 824, 916, 920, 924, 926	40.5 cm (16")	15–19°	285 cm (112")
Fiat	G	170, 190, 210, 240	40 cm (15.9")	18–21°	312 cm (123")

Make	Series	Model	Steer whl dia.	Angle/Turn	Wheelbase
John Deere	2x55	2155, 2355, 2555, 2755, 2855N, 2955	40 cm (15.9")	17–23°	229 cm (90")
	4x30	4030, 4230, 4430, 4630	40 cm (15.9")	21–22°	269 cm (106")
	4x40	4040, 4240	40.5 cm (16")	20°	269 cm (106")
		4440, 4640, 4840	40.5 cm (16")	20°	297 cm (117")
	4x50	4050, 4250, 4450, 4650, 4850	40.5 cm (16")	19°	272 cm (107")
	4x55	4055, 4255, 4455, 4555	40.5 cm (16")	18°	272 cm (107")
	4x60	4560, 4760, 4960	40.5 cm (16")	21°	302 cm (119")
	6x10	6110, 6210, 6310, 6410, 6510	40.1 cm (15.8")	18°	260 cm (100")
	6x00	6200, 6300, 6400, 6800	40 cm (15.5")	18°	264 cm (104")
	6x20	6120, 6220, 6320, 6420	40.5 cm (16")	21°	240 cm (95")
	7x00	7200, 7400	40.1 cm (15.8")	24°	262 cm (103")
		7500, 7600, 7700, 7800	40.5 cm (16")	24°	260 cm (102")
	7x10	7210, 7410, 7510, 7610, 7710,7810	40.1 cm (15.8")	25°	279 cm (110")
	7x20	7720, 7820, 7920	40.1 cm (15.8")	18°	287 cm (113")
	8x00	8100, 8200, 8300, 8400	40.1 cm (15.8")	21–24°	295 cm (116")
	8x10	8110, 8210, 8310, 8410	40.1 cm (15.8")	21–24°	295 cm (116")
	8x20	8120, 8220, 8320	40.1 cm (15.8")	21–24°	297 cm (117")
		8420, 8520	40.1 cm (5.8")	21-24°	302 cm (119")
New Holland	8x70 Genesis	8670, 8770, 8870, 8970	40 cm (15.9")	18–21°	312 cm (123")
	8x70A Genesis	8670A, 8770A, 8870A, 8970A	40 cm (15.9")	18–21°	312 cm (123")
	TG	210, 230, 255, 285	40.5 cm (16")	15°	328 cm (129")
	TM	120, 130, 135, 140, 150, 155,165	38.9 cm (15.3")	15–20°	264 cm (104")
		175, 190	39 cm (15.3")	16–20°	282 cm (111")

Make	Series	Model	Steer whl dia.	Angle/Turn	Wheelbase
4WD articulated tractors					
Buhler		2290, 2335, 2360, 2375, 2425	40.5 cm (16")	17°	300 cm (118")
Case IH	STX	275, 325, 440	40.5 cm (16")	28°	391 cm (154")
		375, 425, 450, 500	40.5 cm (16")	25°	391 cm (154")
	STX QuadTrac	375, 425, 450, 500	40.5 cm (16")	25°	254 cm (100")
	92x0 Steiger	9210, 9230, 9240, 9250, 9260, 9270, 9280	38 cm (15")	28°	300 cm (118")
	93x0 Steiger	9310, 9330, 9350, 9370, 9380, 9390	38 cm (15")	20°	300 cm (118")
Ford New Holland Versatile	9xxx	9184, 9280, 9384, 9480, 9482, 9484, 9680, 9682, 9684, 9880, 9882, 9884	40.5 cm (16")	17–25°	300 cm (118")
John Deere	8x30	8430, 8630	40 cm (15.9")	24°	229 cm (90")
	8x40	8440, 8640	40 cm (15.9")	24°	229 cm (90")
	8x50	8450, 8650	40.5 cm (16")	25°	318 cm (125")
		8850	40.5 cm (16")	25°	338 cm (133")
	8x60	8560, 8760, 8960	40 cm (15.9")	22–33°	340 cm (134")
	8x70	8570, 8770, 8870, 8970	40 cm (15.9")	22–33°	340 cm (134")
	9x00	9100, 9200, 9300, 9400	40 cm (15.9")	16°	290 cm (114")
	9x20	9120, 9220, 9320, 9420, 9520, 9620	40.1 cm (15.8")	15°	351 cm (138")
New Holland	TJ	275, 325, 440	40.5 cm (16")	28°	391 cm (154")
		375, 425, 450, 500	40.5 cm (16")	25°	391 cm (154")
Versatile	xx6	846, 936, 946	38 cm (15")	17°	330 cm (130")
	Series 2	835, 855, 875, 895, 935	38 cm (15")	17°	330 cm (130")
Tracked tractors					
CAT		35, 45, 55	38 cm (15")	15°	150 cm (59")
	C, D, E	70C, 85C, 65D, 75D, 85D, 65E, 75E, 85E, 95E	38 cm (15")	15°	150 cm (59")
	MT	835, 845, 855, 865	38 cm (15")	90°	183 cm (72")

Make	Series	Model	Steer whl dia.	Angle/Turn	Wheelbase
John Deere	8xxxT	8100T, 8110T, 8120T, 8200T, 8210T, 8220T, 8300T, 8310T, 8320T, 8400T, 8410T, 8420T	40.1 cm (15.8")	24°	300 cm (118")
	9xxxT	9300T, 9320T, 9400T, 9420T, 9520T, 9620T	40.1 cm (15.8")	24°	300 cm (118")
Combines					
Case	AFX	8010	38 cm (15")	17°	353 cm (139")
	14xx	1400, 1420, 1440, 1460, 1480, 1482	40.6 cm (16")	25°	300 cm (118")
	16xx	1620, 1640, 1660, 1680	40.6 cm (16")	25°	300 cm (118")
		1644, 1666, 1688	35.6 cm (14")	28°	254 cm (100")
	21xx	2144, 2166, 2188	35.6 cm (14")	21–25°	353 cm (139")
	23xx	2344, 2366, 2377, 2388	35.6 cm (14")	21–25°	353 cm (139")
John Deere	9x00	9400, 9500, 9600	34.3 cm (13.5")	13°	351 cm (138")
	9x50	9550, 9650, 9750	34.3 cm (13.5")	24°	254 cm (100")
	9x60	9560, 9660, 9760, 9860	34.3 cm (13.5")	15°	351 cm (138")
	9x50STS	9650STS, 9750STS	34.3 cm (13.5")	24°	254 cm (100")
	9x60STS	9560STS, 9660STS, 9760STS, 9860STS	34.3 cm (13.5")	15°	351 cm (138")
	9x80CTS	9780CTS	34.3 cm (13.5")	15°	351 cm (138")
New Holland	CX	720, 740, 760, 780, 820, 840, 860, 880	39 cm (15.3")	17°	366 cm (144")
	CR	940, 960, 970	39 cm (15.3")	22°	381 cm (150")
Trucks					
International		7300	44.5 cm (17.5")	20–22°	426 cm (168")
	ACCO	1850D	50 cm (19.7")	18°	500 cm (197")
Swathers					
Case	Harvest Pro	8140, 8150, 8152, 8152i	38 cm (15")	137°	300 cm (118")
	1988 – 2004	8820, 8825, 8825HP, 8830, 8840, 8860, 8860HP	38 cm (15")	137°	315 cm (124")
		8870, 8880	38 cm (15")	137°	356 cm (140")
Hesston	1988 - 2004	9230, 9240, 9260, 9280	38 cm (15")	137°	356 cm (140")

Make	Series	Model	Steer whl dia.	Angle/Turn	Wheelbase
John Deere	Premier	2920, 2930, 2940, 2950, 2952, 2952i	15" (38 cm)	137°	300 cm (118")
	4x95	4895, 4995	13.5" (34.3 cm)	130°	444.5 cm (175")
MacDon	MacDon	9200, 9250, 9300, 9350, 9252, 9352i	15" (38 cm)	137°	300 cm (118")
New Holland	Prairie Star	4920, 4930, 4940, 4950, 4952, 4952i	15" (38 cm)	137°	300 cm (118")
Westward Dealers	Westward Pro	9200, 9250, 9300, 9350, 9252, 9352i	15" (38 cm)	137°	300 cm (118")
High clearance sprayers					
Ag Chem	RoGator	854, 1054	34.3 cm (13.5")	15–25°	422 cm (166")
		864, 1064	34.3 cm (13.5")	23–25°	452 cm (178")
Apache		560, 760, 780, 790, 860, 880, 890, 1200, 1280	40.5 cm (16")	18°	264 cm (104")
Case	SPX Patriot	3150, 3185	40.5 cm (16")	18°	305 cm (120")
		3200, 3310	40.5 cm (16")	18°	356 cm (140")
		4260	40.5 cm (16")	23°	380 cm (150")
		4410	40.5 cm (16")	23°	380 cm (150")
Cherokee	SP	560, 575	40.5 cm (16")	22°	305 cm (120")
Hagie	STS (2004 & earlier)	10, 12	38.5 cm (15.2")	19°	353 cm (139")
John Deere	47x0	4700, 4710, 4720	40 cm (15.9")	17°	254 cm (100")
	49x0	4920	40 cm (15.9")	17°	432 cm (170")
	6x00	6500, 6600, 6700	40 cm (15.9")	9°	241 cm (95")
Miller	Nitro N1	2200SS, 2200T, 2200HT, 2275HT	34.3 cm (13.5")	17°	443 cm (174")
	Nitro N2		34.3 cm (13.5")	13°	368 cm (145")
Spra-Coupe		220	38 cm (15")	38°	295 cm (116")
	3xxx	3430, 3440, 3630, 3640	40 cm (15.9")	20°	353 cm (139")
	4xxx	4440, 4450, 4640, 4650	40 cm (15.9")	20°	353 cm (139")

Make	Series	Model	Steer whl dia.	Angle/Turn	Wheelbase
Floaters					
Ag Chem	TerraGator	6103, 8103	38 cm (15")	15°	632 cm (249")
		9103, 9203	38 cm (15")	15°	662 cm (261")
		1664T, 1804	38 cm (15")	15°	434 cm (171")
		1603, 1803, 1903	38 cm (15")	15°	546 cm (215")
Case	FLX	4010, 4510	40 cm (15.9")	14°	460 cm (181")

Appendix B: Measuring Vehicle Parameters

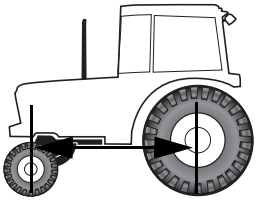
Steering wheel diameter

Measure the steering wheel across the widest part from the outside of the steering wheel.

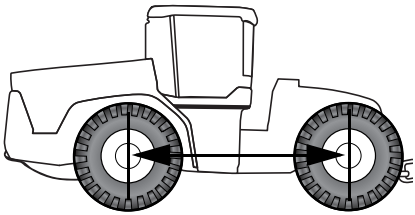
Wheelbase

The wheelbase numbers listed for tracked tractors are shorter than the actual wheelbase. This is required to ensure good performance.

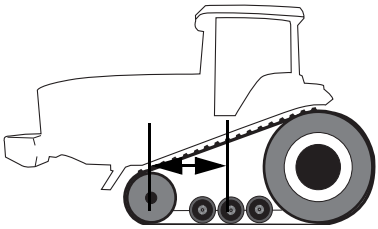
2WD tractor



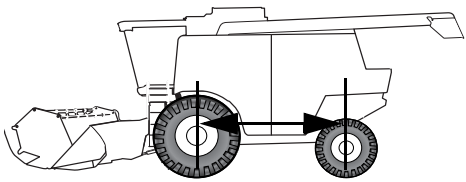
4WD tractor



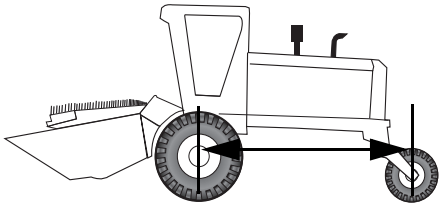
Tracked tractor



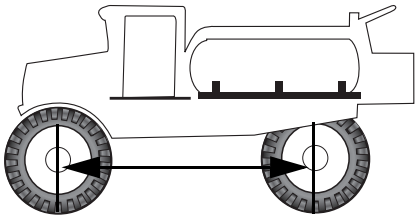
Combine



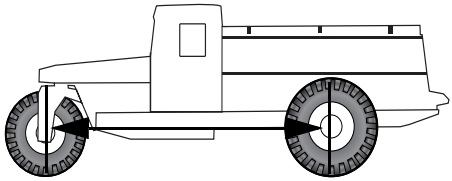
Swather



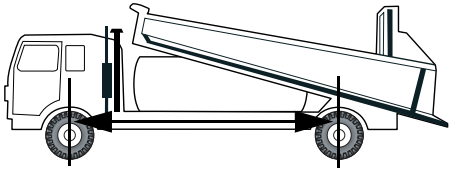
Sprayer



Floater



Truck



Appendix C: Settings and Defaults

Default settings

Vehicle type	Steering wheel diameter	Angle/turn	Freeplay	Wheel base	Aggressiveness	Motor Speed
Tractor	40.6 cm (16.0")	20°	2.5 cm (1.0")	300 cm (118")	115%	Auto High
4WD Tractor	40.6 cm (16.0")	20°	2.5 cm (1.0")	300 cm (118")	115%	Auto High
Tracked Tractor	40.6 cm (16.0")	20°	0.5 cm (0.2")	300 cm (118")	120%	Auto Low
Combine	40.6 cm (16.0")	20°	1.2 cm (0.5")	300 cm (118")	100%	Auto High
Sprayer	40.6 cm (16.0")	20°	3.8 cm (1.5")	300 cm (118")	125%	Auto High
Truck	40.6 cm (16.0")	20°	3.6 cm (1.4")	300 cm (118")	120%	Auto High
Floater	40.6 cm (16.0")	20°	2.5 cm (1.0")	300 cm (118")	120%	Auto High
Swather	38.1 cm (15.0")	137°	10.2 cm (4.0")	300 cm (118")	125%	Auto High
Other	Other vehicle types are not supported.					

Vehicle speed limits

The minimum and maximum allowable speed for assisted steering on straight swaths and pivots, based on the selected vehicle type, is:

Vehicle type	Minimum allowable speed	Maximum allowable speed
Tractor (2WD)	2 kph (1 mph)	24 kph (15 mph)
Tractor (4WD)	2 kph (1 mph)	24 kph (15 mph)
Tracked Tractor	2 kph (1 mph)	24 kph (15 mph)
Combine	2 kph (1 mph)	24 kph (15 mph)
Sprayer	2 kph (1 mph)	32 kph (20 mph)
Truck	2 kph (1 mph)	40 kph (25 mph)

Vehicle type	Minimum allowable speed	Maximum allowable speed
Floater	2 kph (1 mph)	40 kph (25 mph)
Swather	2 kph (1 mph)	24 kph (15 mph)

Note — *The speed limit on curved swaths (including adaptive curves, identical curves, and headlands) is 19.3 kph (12 mph) regardless of vehicle type.*

Operating limits

- The maximum internal operating temperature is 83 ºC (181 ºF).

  If the controller reaches this point, it will automatically shut down to avoid damage. To view the current internal temperature of the controller, select *EZ-Steer Diagnostics*.

  Note — *The internal temperature of the controller may be up to 12 ºC (22 °F) warmer than the external temperature.*

- The maximum operating voltage is 16 VDC. At this point, a warning is displayed and the system is automatically shut down.

CAUTION — Do not supply voltages greater than 16 VDC to the EZ-Steer system, or you risk permanently damaging it.

Vehicle configuration parameters

The following parameters are stored in the vehicle configuration:

EZ-Steer		
Axle/Ant offset	Saved configurations	Vehicle type
Steering wheel diam	Angle/turn	Freeplay left
Freeplay right	Wheel base	Heading Filter
Controller orientation	Antenna height	Roll Angle
Aggressiveness value	Min speed	Max speed
Max angle	Engage offline	Disengage offline
O'ride sensitivity	Motor speed	Engage on AB
Operator Timeout	Ext switch on/off	
EZ-Boom		
Swath width	Boom width	Number of sections
Section # width [10]	Boom switching	Boom control

Lead in	off delay	Rate control
Rate 1	Rate 2	Allowable error
Min flow	Inc/dec step	Control valve type
Frequency	Gain	0 Flow offset
Response 1	Response 2	Threshold
Dead band	Sensor enabled	Set point
Slope	Flow meter cal	Target rate
Speed	Total nozzles	Current flow
Vol/nozzle	Time elapsed	Meas'd flow
Calc'd flow	Diff flow	Tank capacity
Current volume	Low limit	
T2 terrain compensation		
Terrain comp filter	Hide EZ-Steer UI	Ant offset boom
Terrain comp on/off		
Lightbar		
Progress lines	Adjacent swaths	Field boundary
AB Line	View mode	Path Display
Contrast	Backlight on/off	Brightness
LED brightness	Ante/Impl offset distance	lightbar orientation
Status text options	Data port input	Data port stop bits
Data port baud rate	Data port output rate	GGA precision
NMEA out options	Radar rate	Radar angle
Units	Language	
Guidance		
LED Mode	LED Spacing	Look Ahead
Auto-detect Turn	Curve smoothing on/off	Max point of separation
Vertex param	Nudge increment	Swath width
Pattern type		
Warnings		
Headland warning on/off	Headland lead time	Offline warning on/off

Low Acc warning on/off/partial	Audible warning on/off	
GPS		
SV Name	Min Satellites	Max HDOP
Corrections	Correction Limit	Autoseed™ enabled
SBAS setting	VBS Backup	Min elevation
Min SNR	GPS filter options	
About...		
Power saving mode	GPS rate	
Pass code		
Pass Code on/off		

Note — *Vehicle configuration files from EZ-Guide Plus firmware prior to version 4.00 are not compatible with the firmware version 4.00.*

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