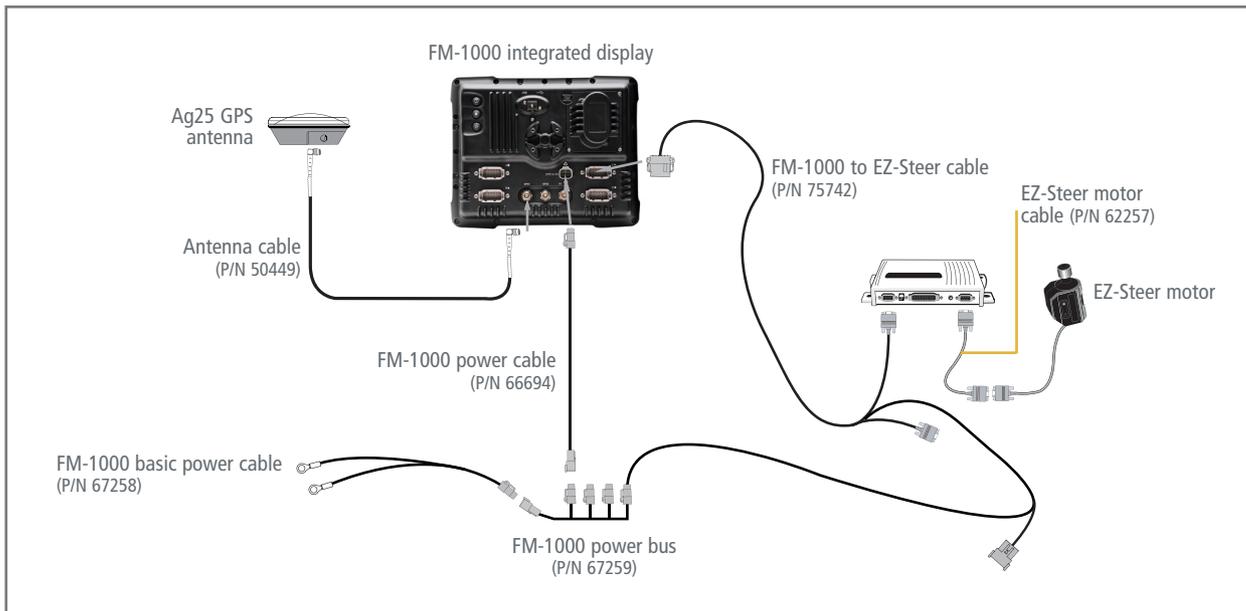


FM-1000™ Integrated Display

with the AgGPS® EZ-Steer® System Quick Reference Card

CONNECTING THE SYSTEM

Once the AgGPS® EZ-Steer® assisted steering system has been professionally installed, add the FM-1000™ integrated display as shown:



RUN SCREEN LAYOUT

Status items tab – Tap a status tab to display text information for the operations connected to the FmX integrated display. Tabs can be set to retract automatically.

Vehicle view – Tap to toggle between overhead and trailing views.

Information dialog – Tap to display a larger amount of permanent text for operations relating to the display while viewing the Run dialog in the upper right-hand corner.

Zoom and Pan – Tap to show zoom and pan function buttons. To zoom in and out, tap the magnifying glass; to pan in any direction, tap the arrow buttons. You can also tap the main map window to adjust the zoom level.

Coverage theme – Displays the coverage and variety tracking settings. Height, coverage/overlap, variety, and GPS quality can be shown.

Status items – These are at the top of the run window and are visible all the time. Tap any text item to toggle to a single status item in a larger font.

Offline guidance display – When the vehicle is online, the center indicators are green. When the vehicle moves offline, the indicators change to red and move to either side, depending on the direction to the line.

Home – Tap to close a field and return to the start window.

Setup and Configuration – Tap to change some setup and display options when the field is open.

Run icon – Tap to take a picture of the current screen.

Active plug-in tabs – Show status and control functions for the applications connected to the FmX integrated display. Tap the Tab icon to change the tab.

Engage panel – Contains the engage controls for plug-ins such as the Autopilot™ automated steering system, TrueTracker™ implement steering, and the FieldLevel II automated levelling system. You can also control for coverage logging.

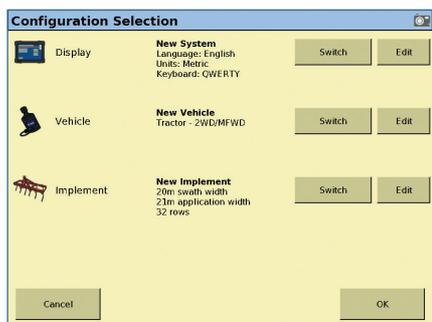
CALIBRATING THE EZ-STEER SYSTEM WITH THE FM-1000 INTEGRATED DISPLAY

Note: For more information on system calibration and settings, see the EZ-Steer documentation.

Calibrating the EZ-Steer system with the FM-1000 integrated display

1. To access the *Configuration Selection* screen, tap **Run** in the Home screen.
2. In the *Configuration Selection* screen, tap the **Edit** button next to *Display*.

Note: EZ-Steer Calibration configures the T2™ roll calibration and the EZ-Steer system Angle per Turn, Aggressiveness, and Freeplay settings:



Before calibrating the vehicle, do the following:

- Ensure that the vehicle's hydraulic oil is up to operating temperature before beginning. See the vehicle documentation.
- Ensure that the tire pressure is correct.
- Perform initial calibration without an implement or with the booms folded in on a high-clearance sprayer. After initial calibration is completed, the settings can be fine-tuned with the implement or booms folded out.
- Choose a field with the smoothest possible surface and perform calibration at the normal operating speed for the vehicle.

EZ-Steer calibration requires a straight A-B line. If you do not create an A-B line before you begin the calibration, the system prompts you to open a field and create one.

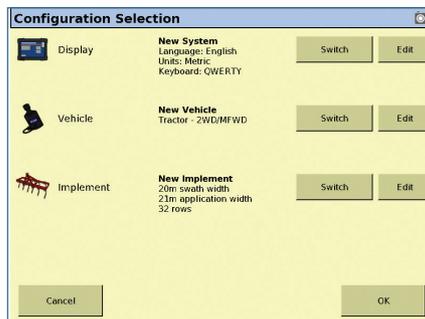
EZ-Steer calibration process

1. Enter the vehicle settings.
2. Perform T2 roll calibration.
3. Calibrate the EZ-Steer system settings:
 - a. Calibrate Angle per Turn.
 - b. Calibrate Aggressiveness.
 - c. Calibrate Freeplay Offset.
4. Confirm the calibration settings.

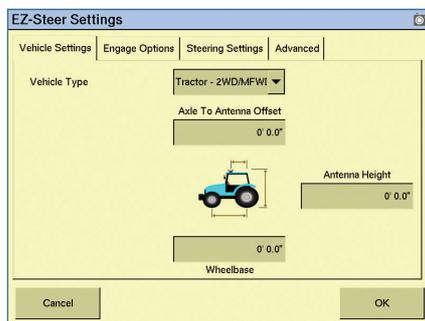
Note: You may need to run the EZ-Steer calibration more than once to achieve optimal results.

Entering the vehicle settings

1. In the *Configuration Selection* screen, select EZ-Steer and then tap **Setup**:



The EZ-Steer Settings screen appears:



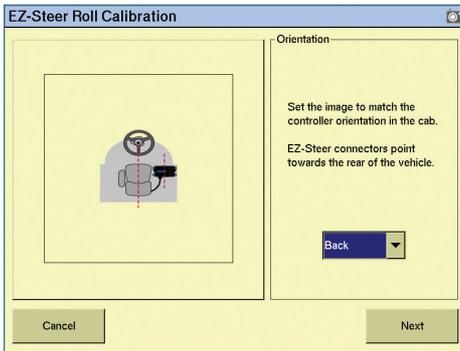
2. Enter the following information in the *Vehicle Settings* tab:
 - a. Select a vehicle type from the drop-down list that closely resembles the machine being calibrated.
 - b. Measure the horizontal distance between the front and rear axles (the "wheelbase") and then enter it.
 - c. Measure the antenna height from the ground and then enter it.
 - d. Measure the horizontal distance from the fixed axle, identified in the image, to the antenna and then enter it.
5. Tap **OK**. The *Configuration* screen appears.

Note: The *Engage Options*, *Steering Settings*, and *Advanced* tabs on this screen are populated automatically with starting values, based on the vehicle type selected.

Performing T2 role calibration

The EZ-Steer system contains sensors that use T2 terrain compensation technology to provide roll compensation when the vehicle is on a slope or drives over a bump. For roll compensation to work correctly, you must calibrate the controller:

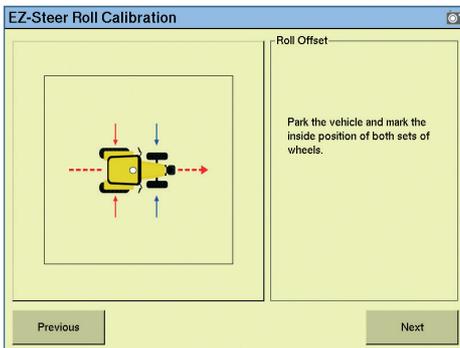
1. Select *Controller Orientation* to calibrate the Steering Control Module (SCM) and perform a Terrain Compensation (T2) calibration.
2. Select the EZ-Steer plugin and then tap **Calibrate**. The *EZ-Steer Steering Calibration* screen appears.
3. Select *Controller Orientation*. The *EZ-Steer Roll Calibration* screen appears:



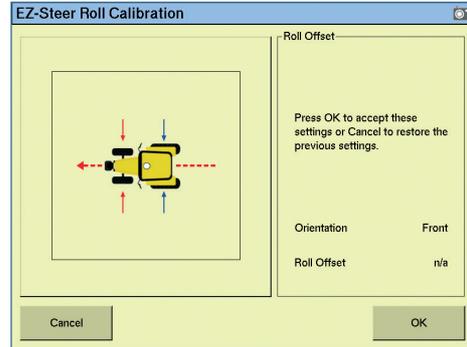
4. Select the direction that the connectors of the EZ-Steer controller face from the drop-down list and then tap **Next**.

Note: For the best accuracy roll compensation, install the EZ-Steer controller on the floor at the front of the cab with the controller parallel to the vehicle center-line. Installing on the back window is not recommended, as vibration may reduce the accuracy of the terrain compensation.

5. Park the vehicle and mark the inside position of both sets of wheels.
6. Tap **Next**. The display records the roll offset in the first direction. This takes approximately 20 seconds. Do not move the vehicle while the offset is being read:



7. Turn the vehicle around and ensure that the wheels are over the positions marked in Step 5.
8. Tap **Next**. The display records the roll offset in the second direction. This takes approximately 20 seconds. Do not move the vehicle while the offset is being read:

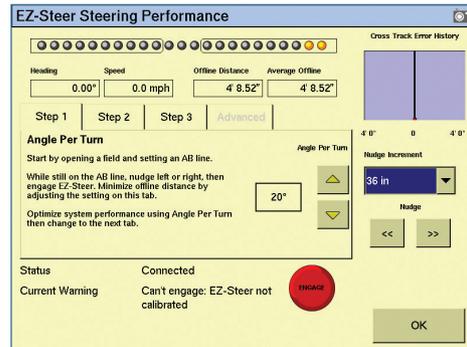


The T2 calibration results appear. The *Roll Offset* value should be between 0° and 4°.

9. Tap **OK** to accept the settings.

Steering Performance calibration

1. Select *Steering Performance*. The *EZ-Steer Steering Performance* screen appears:



2. Complete the *Step* tabs to set the steering parameters.
 - Step 1: Angle Per Turn*. The Angle per Turn value is the angle that the wheels turn through during one full rotation of the steering wheel. This is a course aggressiveness adjustment. If the setting is too low, the system may require several attempts to reach the line.
 - a. Nudge the vehicle left or right, 1 m (3 ft) from the guidance line.
 - b. Engage the EZ-Steer system.

- c. Adjust the Angle per Turn value so that when the system is engaged, the vehicle moves close to the guidance line:

To make ...	Do the following...
More aggressive turns	Decrease the <i>Angle per Turn</i> value.
Less aggressive turns	Increase the <i>Angle per Turn</i> value.

Note: Use the Cross track error history plot on the top right of the page and the Average Offline distance to optimize EZ-Steer performance for each step in the calibration.

Step 2: *Aggressiveness*. The Aggressiveness setting fine-tunes how aggressively the system holds the line:

- If the Aggressiveness setting is too low, the vehicle will not hold the line.
- If the Aggressiveness setting is too high, the vehicle may over-correct and make S-turns.

Adjust the Aggressiveness setting to get the vehicle as close to the line as possible without going into S-turns.

To make ...	Do the following...
More aggressive turns	Increase the <i>Aggressiveness</i> value.
Less aggressive turns	Decrease the <i>Aggressiveness</i> value.

Step 3: *Freeplay offset*. Add a freeplay offset if the steering has greater freeplay in one direction than the other, causing it to drive consistently to one side of the guidance line. Engage the system on the guidance line.

Vehicle is offline ...	Do the following...
To the left	Increase the freeplay offset to the right.
To the right	Increase the freeplay offset to the left.

Note: If you are calibrating a 4WD articulated vehicle, you may need to set the Motor Speed setting to Auto Low.

Note: The Advanced Calibration tab is currently not available. To access these options, select Diagnostics from the main Configuration screen.

- When all the parameters have been entered, tap **OK**. The EZ-Steer Steering Calibration screen re-appears.
- Tap **OK**. The Configuration screen appears.

OPERATING THE EZ-STEER SYSTEM WITH THE FM-1000 INTEGRATED DISPLAY

Engaging the system

To engage the EZ-Steer system, you must have an A-B line defined, and the vehicle must be within the engage limits configured in *EZ-Steer / Engage Options*.

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

- Press the engage button on the main guidance screen or on the optional remote control.
- Press the optional remote engage foot pedal.

Disengaging the system

Turning the steering wheel manually disengages the EZ-Steer system. Trimble recommends that you check this setting before you start using the system in a new installation by engaging on a line and then turning the wheel until EZ-Steer disengages. To adjust the amount of force required to disengage the system, change the Override Sensitivity in the *EZ-Steer Setup* screen. The EZ-Steer system automatically disengages when:

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

- The Minimum Fix Quality setting is set to a high accuracy correction method and the system receives low accuracy positions (for example, no corrections).
- To manually disengage the system, do one of the following:
 - Tap the Engage button on the main guidance screen or on the optional remote control.
 - Turn the steering wheel to override the electric motor.
 - Press the optional remote engage foot pedal.

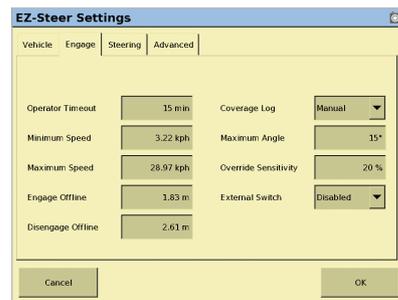
When the system is not in use, hinge the motor away from the steering wheel and secure it with the lock pin.

Engage status indicators

Engage status	Button color	Vehicle icon color
Ready to engage		
Engaged		
Cannot engage		

EZ-STEER SYSTEM ADVANCED SETTINGS FOR FM-1000 INTEGRATED DISPLAY

Option	Description
Minimum Speed	Minimum speed at which the system can engage. If the system is engaged and the speed drops below this limit, the system disengages.
Maximum Speed	Maximum speed at which the system can engage. If the system is engaged and the speed increases above this limit, the system disengages.
Maximum Angle	Maximum angle at which the system can engage. If the vehicle approaches the swath at an angle greater than this limit, it cannot be engaged.
Engage Offline	Maximum distance from the swath at which the system can engage. If the vehicle approaches the swath at a distance greater than this limit, it cannot be engaged.
Disengage Offline	Maximum distance from the swath at which the system can remain engaged. If the vehicle drives offline greater than this limit, the system disengages.
Engage on AB	Configure whether the system can be engaged on the master AB line.
Override Sensitivity	Amount the steering wheel must be turned manually before the system disengages.
EZ-Steer External Switch	Configure the behavior of a seat/foot switch.



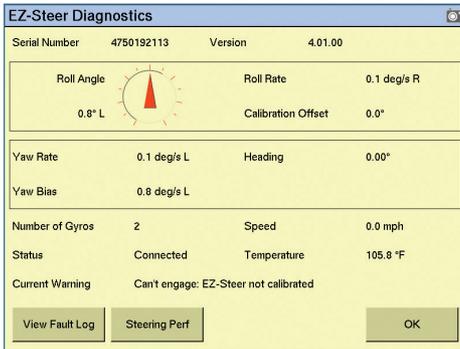
Vehicle-specific performance hints

Vehicle type	Performance hints
2WD tractor	<p>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:</p> <ul style="list-style-type: none"> • Reduce the <i>Online Aggressiveness</i> value. • 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 the <i>Diff-Lock</i>. This prevents the machine from pulling sharply to the left or right. Turn off <i>Diff-Lock</i> if you are calibrating on a hard surface.
4WD tractor	<p>The EZ-Steer system can be installed on Case IH STX tractors with Accusteer. For optimal performance, disable Accusteer using the switch in the cab (if possible).</p>
Sprayer	<ul style="list-style-type: none"> • It is common for these vehicles to have slow steering. To compensate for this, use high aggressiveness. • If you experience large, slow oscillations, increase the aggressiveness. • When you configure the system on a sprayer, the <i>Sprayer steering delay</i> setting is available on the <i>Vehicle Setup</i> screen. Some sprayers have steering that is slow to react after the steering wheel is turned. • The system uses the steering delay setting to compensate for this slowness and ensure that steering corrections occur at the correct point.
Swather	<p>When you configure the system on a swather, the <i>Swather steering delay</i> setting is available on the <i>Vehicle Setup</i> screen. Some swathers have steering that is slow to react after the steering wheel is turned.</p> <p>The system uses the steering delay setting to compensate for this slowness and ensure that steering corrections occur at the correct point.</p> <p>To improve the performance of your swather, only adjust the Swather steering delay setting by a small amount (0.1 seconds) at a time. Test the result between each adjustment.</p>

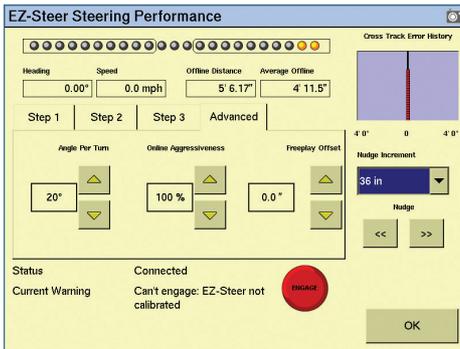
EZ-Steer plugin diagnostics

The *EZ-Steer Diagnostics* displays the SCM statistics and inertial information.

1. In the *Configuration* screen, select the EZ-Steer plugin and then tap **Diagnostics**. The *EZ-Steer Diagnostics* screen appears. This screen displays the roll and heading of the vehicle as well as the temperature of the steering control module:



2. Tap **Steering Perf**. The *EZ-Steer Steering Performance* screen appears. This screen is designed for advanced users that understand how to adjust EZ-Steer performance. If you do not know where to start, Trimble recommends that you adjust the steering parameters in order, stepping through the numbered tabs in sequence.



3. To adjust steering settings, tap the *Advanced calibration* tab and then make the required changes.
4. Tap **OK**.

FAULTS

Fault code	Fault message	Possible cause	Solution
01	Excessive manual overrides	There have been a large number of manual overrides on one swath.	Decrease the <i>Override Sensitivity</i> value in the <i>Engage Options</i> screen.
02	Hardware fault	There has been a general hardware fault.	Check all equipment and cables for damage.
03	Controller reset	There was a power brownout (a momentary loss of power).	Ensure that power cables are not damaged and that all connectors are tight. Connect power directly to the battery.
		The EZ-Steer controller has reset unexpectedly.	Download the error log.
04	Communication error	The EZ-Steer controller failed to receive CAN messages from the EZ-Guide® lightbar.	Check that the cable is not damaged and that connectors are tight.
05	Bridge fault	The manual override sensitivity is too low.	Increase the <i>Override Sensitivity</i> value in the <i>Engage Options</i> screen.
		The controller is faulty.	Contact your local EZ-Steer system reseller for a repair or replacement.
07	Broken motor cable	The motor cable is broken.	Contact your local EZ-Steer system reseller for a repair or replacement.
08	EEPROM fault	There was a memory error in the EZ-Steer system controller.	Contact your local EZ-Steer system reseller for a repair or replacement.
09	No motor connection	The motor or motor cable is not connected to the EZ-Steer system controller.	<ol style="list-style-type: none"> 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.
10	Unknown fault	There was an unknown fault in the EZ-Steer system.	Contact your local EZ-Steer system reseller for a repair or replacement.
11	System fault	The lightbar failed to receive messages from the controller.	<ol style="list-style-type: none"> 1. Check that none of the cables are damaged. 2. Check that the connectors are tight.
12	Temperature too high	The controller temperature has exceeded the maximum internal operating temperature.	<ol style="list-style-type: none"> 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.

*FM-1000*TM Integrated Display

with the AgGPS[®] EZ-Steer[®] System Quick Reference Card

SAFETY INFORMATION

THE EZ-STEER ASSISTED STEERING SYSTEM IS SOLELY INTENDED FOR AGRICULTURAL USE IN AN OPEN FIELD ENVIRONMENT WITH AGRICULTURAL VEHICLES APPROVED BY THE MANUFACTURER FOR USE WITH THE EZ-STEER SYSTEM, AND SHOULD NOT BE USED WITH ANY OTHER TYPE OF VEHICLE OR FOR ANY OTHER PURPOSE.

Before using the system

- Ensure that any EZ-Steer system documentation relates to the system when used **with the FM-1000 integrated display**. The EZ-Steer system works differently with EZ-Guide lightbars, so the documentation is not interchangeable.
- Put the vehicle seat and steering wheel in the normal operating position and check that the EZ-Steer motor does not interfere with any controls, for example, throttle, gears, or wipers.
- If it does interfere with any controls, tilt the steering wheel or orient the motor at a different angle on the steering wheel. For example, shift from the 3 o'clock to the 12 o'clock position to avoid the interference.
- The operator must read and acknowledge safety warnings whenever the system is powered on.

After using the system

- Turn off the EZ-Steer system power switch or remove the power plug before exiting the vehicle.
- If the EZ-Steer system is not being used, pivot the motor away from the steering wheel.



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