

# AMS 2140 Machinery Health™ Analyzer Advanced Laser Alignment Application

## Quick Start Guide



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# Patents

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# 1 Introduction

## 1.1 Basic and Advanced Laser Alignment Application overview

The AMS 2140 Basic and Advanced Laser Alignment Applications enable you to perform horizontal machine alignment. In addition, the Advanced Laser Alignment Application adds advanced options for horizontal alignment along with new applications for vertical machines and straightness measurements. The Basic Laser Alignment Application is similar to the Basic mode available in the Advanced Laser Alignment Application. Alignment is done with the help of the sensALIGN® laser and sensor (Emerson P/N A8240).

The horizontal alignment feature is used to acquire and display alignment data for machines where the machine moves are done at the machine feet.

Horizontal alignment is available in Basic and Advanced mode. In Basic mode, you have access to only a subset of the full functionality of a horizontal alignment job. In Advanced mode, you have access to the full functionality of a horizontal alignment job. The controls for enabling thermal growth input, foot pre-check, review results, live move orientation, live move alerts, setting the alignment method, and changing the placement of the laser and sensor are available only in Advanced mode.

Except for differences in the alignment job parameters you can set under the Laser Align Application ALT screen, the procedure for performing Basic horizontal alignment is identical to Advanced horizontal alignment.

You can create alignment jobs and transfer them to AMS Suite: Machinery Health Manager for storage and analysis.

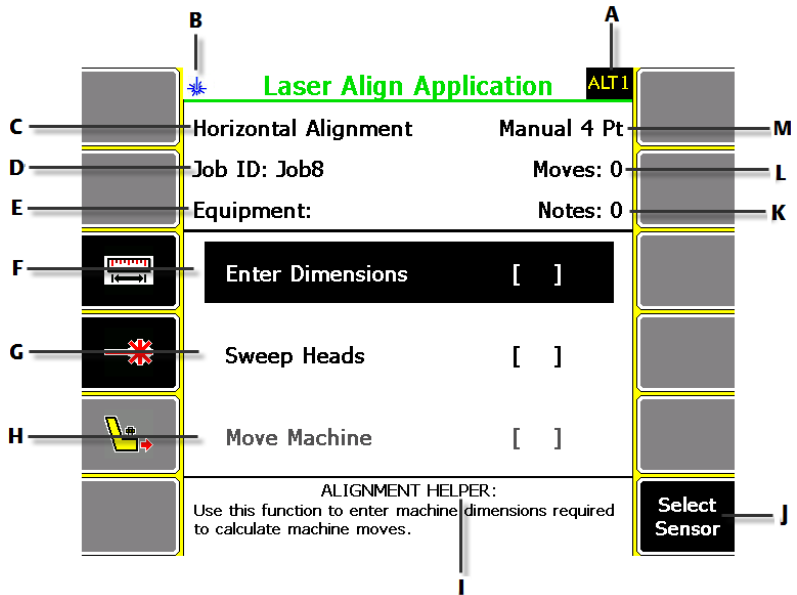
This document only covers horizontal alignment using the Advanced Laser Alignment Application. For a complete list of the Advanced Laser Alignment Application functionality, refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide.

## 1.2 Laser Align Application main menu

From the AMS 2140 Home screen, press F10 Adv. Laser Align to open the Laser Align Application main menu.

Horizontal alignment is a three-step process. The Laser Align Application main menu lets you monitor the progress of an alignment job. An X marks a completed step.

**Figure 1-1: Laser Align Application main menu—Advanced horizontal alignment job**




- A. An alternate (ALT) screen includes additional options.
- B. Icon indicating that this is a Bluetooth-only application.
- C. The alignment mode (horizontal, vertical, or straightness).
- D. The identifier for the job.
- E. The identifier for the equipment.
- F. Enter machine dimensions for the machines being aligned.
- G. Acquire sweep data required to determine the alignment condition of the machines.
- H. View machine moves required to bring the machines into alignment.
- I. View helpful information regarding the highlighted step or the active screen.  
You can also view additional helpful information about the active screen by pressing the Help button twice.
- J. Choose which Bluetooth sensor to communicate with.

- K. The number of notes assigned to the job.*
- L. The number of data acquisitions for the job.*
- M. The alignment method for the job.*

ALT1 keys

Option	Description
F1	Intentionally blank.
F2	Intentionally blank.
F3	Enter machine dimensions for the machines being aligned. See <a href="#">Section 4.1</a> for more information. If thermal growth is enabled, enter thermal growth information. This is available only in Advanced mode.
F4	Acquire alignment data using the alignment method defined for the job. See <a href="#">Section 4.2</a> for more information. If the foot pre-check option is enabled, check for soft foot. This is available only in Advanced mode.
F5	View machine moves required to bring the machines into alignment. If an alignment correction is necessary and requires a live move, do the adjustment from this step. See <a href="#">Section 4.3</a> for more information.
F6	Intentionally blank.
F7	Intentionally blank.
F8	Intentionally blank.
F9	Intentionally blank.
F10	Intentionally blank.
F11	Intentionally blank.
F12 Select Sensor	Choose which Bluetooth sensor to communicate with. The list is populated with Bluetooth devices already paired with the AMS 2140.

**Figure 1-2: ALT 2 keys—Advanced horizontal alignment job**

 <b>Laser Align Application</b> <span style="background-color: black; color: yellow; padding: 2px 5px;">ALT 2</span>	
<b>Notes</b>	
<b>Job Mode</b>	<div>Job Mode: Advanced</div> <div>Left: Laser Right: Sensor</div>
<b>Machine Config</b>	<div>Left: Motor Right: Pump</div>
<b>Laser Align Method</b>	<div>Auto Sweep Mode: Standard</div> <div>Thermal Growth: At Feet Foot Pre-Check: Soft Foot Live Move: Vertical/Horizontal Enable Alert: <input type="radio"/> Review Results: <input checked="" type="radio"/></div>
<b>Tolerance Type</b>	<div>Type: Standard</div>

Exit  
Laser  
Align

Head  
Config

Job  
Manager

Job  
Flow

Print  
Job

Job  
Reset

**ALT 2 keys—horizontal alignment**

Option	Description
F1 Notes	Create, add, or remove notes from an alignment job or the AMS 2140. Notes can be saved with the job to help you remember important information about a machine.
F2 Job Mode	Select Advanced or Basic.
F3 Machine Config	Select the machine components for the alignment job.
F4 Laser Align Method	Select the alignment method. This is intentionally blank when the job mode is set to Basic. Manual 4 Point is the only alignment method available in Basic mode.
F5	Intentionally blank.
F6 Tolerance Type	Select Standard or Jackshaft tolerance.
F7 Exit Laser Align	Exit the Laser Align Application and return to the Home screen.
F8 Head Config	Specify or view the placement of the laser and sensor. This is also where you can check the status of the laser and sensor.
F9 Job Manager	Perform job-related tasks such as creating, activating, copying, or editing a job. This is also where you can select the Connect for Transfer button that enables you to transfer jobs between the AMS 2140 and the PC.

Option	Description
F10 Job Flow	Select optional parameters to include as part of the current alignment job. This is available only in Advanced mode. Parameters include thermal growth, foot pre-check, live move orientation, live move alerts, and an option to review alignment results. Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on thermal growth, foot pre-check, and reviewing of alignment results.
F11 Print Job	Print a summary report of the alignment job to AMS Machinery Manager or to a memory card inserted into the AMS 2140.
F12 Job Reset	Reset the job data by clearing all stored data, loading default values, or by loading default tolerance values.

## 2 Laser and sensor setup

1. Mount the brackets on opposite sides of the coupling.
2. Mount the laser and sensor on the brackets.
3. Adjust the laser beam so that it is correctly centered on the sensor.
4. Enable Bluetooth in the AMS 2140.
5. Pair the sensor.

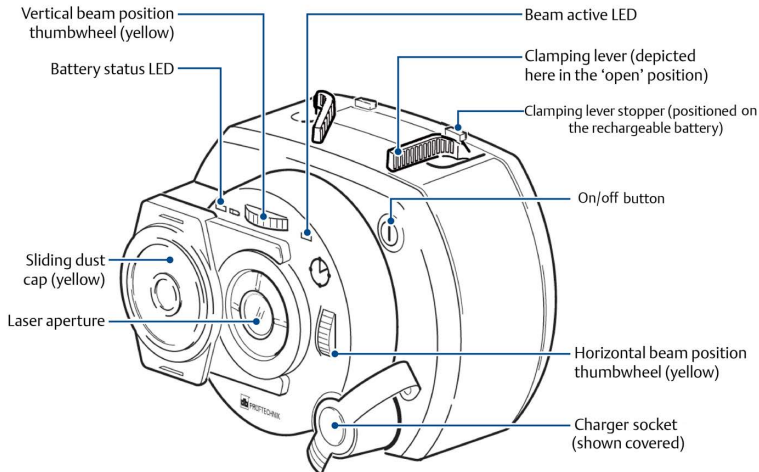
These steps are covered in detail in the topics that follow.

### 2.1 Laser and sensor overview

The laser and sensor communicate via Bluetooth with the AMS 2140.

The laser and sensor have a similar appearance and are differentiated by the color of their sliding dust caps—yellow for the laser and red for the sensor. To power on the laser and sensor, briefly press and hold the on/off button.

#### The laser



The laser beam is adjusted during set-up by changing its vertical and horizontal angles using the position thumbwheels, so that the beam strikes the sensor lens perpendicular to the lens surface.

The laser is water and dust resistant (IP 65). The internal optics and electronics are internally sealed, preventing possible contamination.



Laser safety



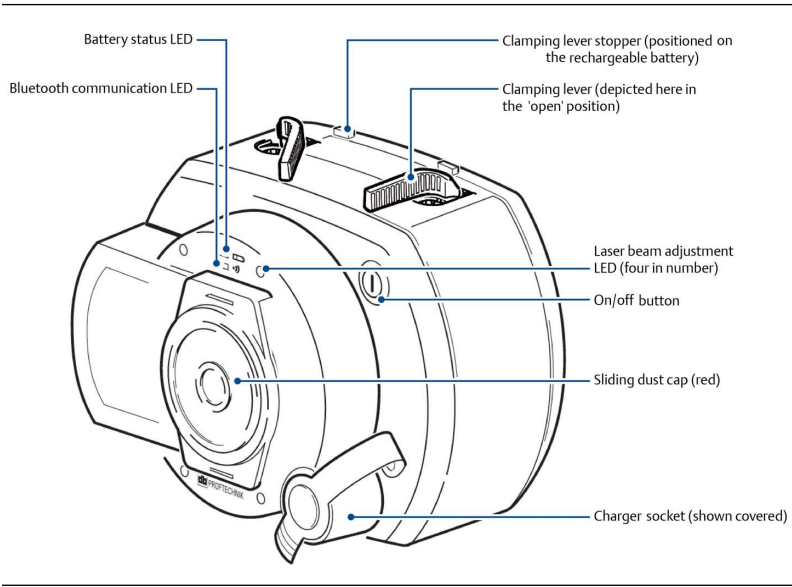
**⚠ WARNING!**

- Do not look directly into the laser beam at any time.
- Do not insert any optical devices into the beam path.

**Note**

The red LED on the front of the laser illuminates whenever the laser beam is emitted.

## The sensor



The sensor contains two position detectors that measure the exact position and inclination of the laser beam as the shafts are rotated.

Bluetooth radio is integrated into the sensor for wireless transmission of measurement data to the AMS 2140.

## Terminology

The following terminologies are used throughout this document.

Term	Meaning
Laser	Refers to the laser head (yellow dust cap)
Sensor	Refers to the sensor head (red dust cap)
Laser fixtures	Refers to both the laser and sensor heads

## 2.2 Mount the brackets

Mount the brackets on opposite sides of the coupling on either the shafts or on the solid coupling hubs, and both at the same rotational position.

### Prerequisites

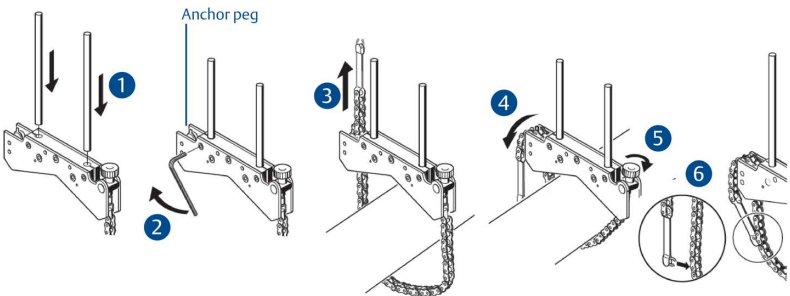
To obtain the highest possible measurement accuracy and to avoid damage to equipment:

- Ensure the brackets fit solidly onto their mounting surfaces.
- Do not use self-constructed mounting brackets, or modify the original bracket configuration. For example, do not use support posts longer than those supplied with the bracket.
- Choose the shortest support posts that will allow the laser beam to pass over or through the coupling.

### Note

Refer to [Figure 2-1](#) for detailed illustrations on how to mount the brackets. The numbers in the figure correspond to the numbers in the following steps.

**Figure 2-1: Mount the brackets**



### Procedure

1. Insert the support posts into the bracket.
2. Fasten the support posts in place by tightening the hex screws on the sides of the bracket frame.
3. Place the bracket on the shaft or coupling, wrap the chain around the shaft and feed it through the other side of the bracket. If the shaft is smaller than the width of the bracket frame, insert the chain from the inside of the bracket. If the shaft is larger than the bracket width, insert the chain into the frame from the outside.
4. Catch the chain loosely on the anchor peg.
5. Turn the bracket thumbscrew clockwise to tighten the assembly onto the shaft.

6. Clip the loose end of the chain back onto itself.

The bracket should now be tight upon the shaft. Do not push or pull on the bracket to check because this could loosen its mounting.

To remove the brackets, turn the thumbscrew counter-clockwise, and then remove the chain from its anchor peg.

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**Note**

The compact chain-type brackets cover most situations, but in cramped or special cases, other types of brackets may be required.

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## 2.3 Mount the laser and sensor

Mount the laser on the support posts of the bracket fixed on the shaft of the left machine (usually the reference machine), and the sensor on the support posts of the bracket fixed on the shaft of the right machine (usually the moveable machine)—as viewed from a normal working position.

**Procedure**

1. Before mounting the laser and sensor, ensure that the yellow clamping levers are in the open position by pointing them to the front of the laser and sensor as shown in [Figure 2-2](#). This enables the laser and sensor to slide onto the support posts.

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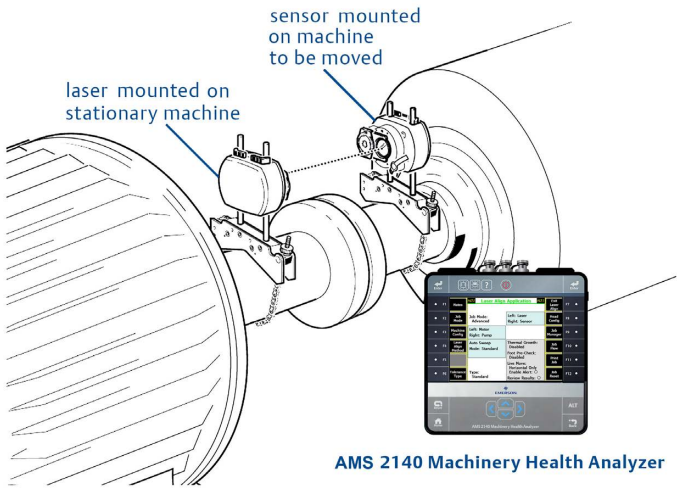
**Figure 2-2: Clamping levers**

2. Fix both the laser and sensor onto the respective support posts by locking the yellow clamping levers. Lock the levers by pushing them backwards until they rest on the stoppers. Ensure the laser beam can pass over or through the coupling and is not blocked.

**Note**

Both the laser and sensor should be at the same height, as low as possible, yet just high enough for the beam to clear the coupling flange. They should also visually appear to be rotationally aligned to each other.

**Figure 2-3: Horizontal alignment**



3. Make final adjustments, loosening the brackets slightly if necessary, then rotating them and re-tightening.

## 2.4 Adjust the laser beam

1. Turn on the laser and sensor.
2. With the sensor lens covered, let the laser beam strike the center of the sensor dust cap.
3. Slide the sensor dust cap to open the lens.
4. Observe the four laser beam adjustment LEDs on the sensor while adjusting the laser beam using the vertical and horizontal beam positioning thumbwheels on the laser.

Use the thumbwheels to adjust the horizontal and vertical laser beam angles.

5. Continue with the adjustment until all four laser beam adjustment LEDs on the sensor are blinking green once every second.

- a. If the laser beam adjustment LEDs on the sensor are blinking green twice every second, the angle at which the laser beam enters the sensor is correct, but an offset is present. Eliminate the offset by sliding back the sensor dust cap to cover the lens, then loosen the chain type bracket supporting sensor, and move the sensor sideways. At the same time, release the sensor clamping levers and move the sensor upwards and downwards until the laser beam is centered on the dust cap.

### CAUTION!

During this adjustment, do not touch the laser.

- b. Slide the sensor dust cap to open the lens and check the blinking of the four laser beam adjustment LEDs. If all four are blinking green once every second, then the laser beam is correctly centered on the sensor.

Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on the laser beam adjustment LED lights and their meanings.

## 2.5 Enable Bluetooth radio in the AMS 2140

1. Press Home > F5 Comm Setup > F7 Bluetooth Setup.
2. Press F2 Bluetooth to enable the Bluetooth radio.

When the radio is enabled, the  icon appears in the upper corner of the screen.

## 2.6 Pair the sensor

For the laser fixtures to communicate with the AMS 2140, you must first pair the sensor. Bluetooth radio is integrated into the sensor.

### Prerequisites

- Ensure the sensor is close to the AMS 2140 (within 30 feet) and is turned on.
- Enable the Bluetooth radio in your AMS 2140.

### Procedure

1. Press Home > F5 Comm Setup > F7 Bluetooth Setup.

2. If more than one device is listed, use the up or down arrow keys to select the sensor.
3. Press F7 Pair to pair the sensor.

## 3 Job setup

You need an alignment job to store alignment data.

1. Create an alignment job.
2. Activate an alignment job.
3. Set the job parameters.

These steps are covered in detail in the topics that follow.

### 3.1 Create an alignment job

1. From the Laser Align Application main menu, press ALT > F9 Job Manager.

The Job Manager screen is displayed.

2. Press F1 Create New Job.

Optionally, you can enter more information about the job.

Option	Description
F2 Edit Job ID	Enter a unique ID to identify the job and press Enter.
F3 Edit Equip ID	Enter the equipment ID to identify the machines being aligned and press Enter.
F4 Edit Equip Desc	Enter an equipment description to add additional information on the machines being aligned and press Enter.
F5 Edit Area	Enter an area description to identify the location of the machines being aligned and press Enter.
F6 Edit Coupling Number	Enter the coupling number and press Enter. This option is useful when there is more than one coupling on the machines being aligned.
F7 Set Mode	Choose Horizontal as the alignment mode and press Enter.
F8 Edit User ID	Enter the initials of the user performing the alignment job and press Enter.

3. Press Enter.

You can save the alignment job for later or activate it to be able to store alignment data.

4. Press F9 Activate Job to activate the job you created.

### 3.2 Activate an alignment job

You need to activate an alignment job to store data to the job.



## Procedure

1. From the Laser Align Application main menu, press ALT > F9 Job Manager.  
The Job Manager screen is displayed.
2. Press F10 or F11 to select the job you want to activate and press F9 Activate Job.  
The Laser Align Application main menu is then displayed. It is where you can begin the three-step alignment process and store data in the active alignment job.

## 3.3 Set the job parameters

This document only covers some of the job parameters you can set up for a horizontal alignment job. Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on the other job parameters you can set.

### 3.3.1 Set the job mode

Horizontal alignment is available in Basic and Advanced mode.

#### Procedure

1. Activate or create a horizontal alignment job.  
For newly created jobs, the job mode is set to Advanced by default.
2. From the Laser Align Application main menu, press ALT > F2 Job Mode.  
Pressing this key toggles between Advanced and Basic modes.
3. Press Yes to proceed with the job mode change.

#### CAUTION!

Changing the job mode clears all data previously acquired for the job.

### 3.3.2 Change the machine configuration

Change the machine configuration on the AMS 2140 to reflect your current machine setup.

#### Procedure

1. Activate a horizontal alignment job.
2. From the Laser Align Application main menu, press ALT > F3 Machine Config.

3. Use the touchscreen or keypad to select an entry from the Machine Type list describing the left machine and press F5 Select Left Machine.
4. Use the touchscreen or keypad to select an entry from the Machine Type list describing the right machine and press F11 Select Right Machine.
5. Optionally, press F8 Change Machine View to change the machine view from 2D to an isometric machine view.
6. Press Enter.

### 3.3.3 Set the alignment method

Selecting an alignment method is available only in Advanced mode. In Basic mode, Manual 4 Point is the only available alignment method.

#### Procedure

1. Activate a horizontal alignment job.
2. From the Laser Align Application main menu, press ALT > F4 Laser Align Method.
3. Select an alignment method.

The Basic Laser Alignment Application defaults to Manual 4 Point. The Advanced Laser Alignment Application lets you select from 5 different methods.

This document only covers Auto Sweep and Manual 4 Point. Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on the other available alignment methods.

- a. For **Auto Sweep**, also select Standard or Averaging as the mode of operation.
- b. For **Manual 4 Point**, also enter a sample rate.

The sample rate sets the number of samples (1 to 25) to be averaged to generate a single reading.

4. Press Enter.

### 3.3.4 Change the laser and sensor placement

Change the laser and sensor placement on the AMS 2140 to reflect your current laser and sensor setup.

Changing the placement of the laser and sensor is available only in Advanced mode.

#### Procedure

1. Activate a horizontal alignment job.
2. From the Laser Align Application main menu, press ALT > F8 Head Config.

3. Press F2 Toggle Head Config to select where to position the laser and sensor (left or right).
4. Press Enter.

### 3.3.5 Set the tolerance type

#### Procedure

1. Activate a horizontal alignment job.
2. From the Laser Align Application main menu, press ALT > F6 Tolerance Type.

The tolerance type changes between Jackshaft and Standard.

Standard tolerance is a combination of offset and angle tolerances. This tolerance type is a direct indication of the alignment condition. Optimum alignment occurs when offset and angular misalignments are zero.

Jackshaft tolerance measures the two angles between the shafts. Optimum alignment occurs when angular misalignment is zero.

Standard tolerance is typically used on short spans where a single coupling is present. Jackshaft tolerance is typically used on longer spans where a jackshaft (or spool-piece) coupling is present.

### 3.3.6 Enable thermal growth option

Enabling the thermal growth option is available only in Advanced mode.

#### Procedure

1. Activate a horizontal alignment job.
2. From the Laser Align Application main menu, press ALT > F10 Job Flow > F8 Thermal Growth.
3. Select a thermal growth conversion option and press Enter.

Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on thermal growth, the available thermal growth conversion options, and on entering thermal growth values.

### 3.3.7 Enable foot pre-check

Checking for soft foot is available only in Advanced mode.

#### Procedure

1. Activate a horizontal alignment job.

2. From the Laser Align Application main menu, press ALT > F10 Job Flow > F9 Foot Pre-Check.
3. Use the up or down arrow keys to select a foot pre-check method to apply to the job and press Enter.

Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on foot pre-check.

### 3.3.8 Select live move orientation

This option enables you to perform a live move in the orientation you selected. By default, live move is enabled in the horizontal direction.

Selecting a live move orientation is available only in Advanced mode.

#### Procedure

1. Activate a horizontal alignment job.
2. From the Laser Align Application main menu, press ALT > F10 Job Flow.
3. Press F10 Live Move to select from Horizontal Only or Vertical and Horizontal.

The selection for Live Move defaults to Horizontal Only, which is recommended for most alignments. For special applications, you can switch to Vertical and Horizontal.

Selecting Horizontal Only displays the movement required to align the machines horizontally.

Selecting Vertical and Horizontal displays the movement required to align the machines in the vertical and horizontal direction.

Only horizontal live moves are covered in this document.

See [Section 4.3.1](#) for more information on performing a live move of the machine.

### 3.3.9 Enable live move alerts

Enabling live move alerts is available only in Advanced mode.

When this option is enabled, the status LED on the AMS 2140 flashes and an audible tone is generated when the machine alignment condition reaches the target tolerance values. Increasing and decreasing flashes indicate when the machine alignment crosses through the acceptable and excellent tolerance condition thresholds. The number of flashes and flash rate are consistent with the audible tone generated when the machine alignment condition reaches the target tolerance values.

## Prerequisites

Enable the Status Beeper option on the General Setup screen to hear the audible alerts. Press Home > ALT > F2 General Setup > F3 Set Status Beeper.

## Procedure

1. Activate a horizontal alignment job.
2. From the Laser Align Application main menu, press ALT > F10 Job Flow.
3. Press F11 Enable Alert to enable live move alerts.

A selected button means the alert is enabled.

## 4 Perform horizontal alignment

Horizontal alignment is a three-step process:

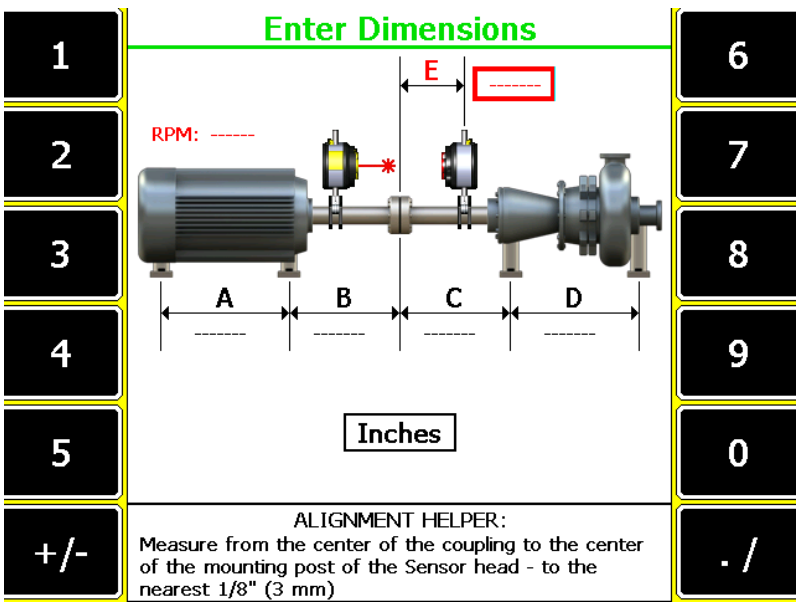
1. Enter machine dimensions (Enter Dimensions).
2. Rotate the laser and sensor to acquire alignment data (Sweep Heads).
3. Review the required vertical and horizontal machine moves and align the machine (Move Machine).

These steps are covered in detail in the topics that follow.

### 4.1 Enter machine dimensions

This is the first step in performing horizontal alignment. After completing this step, the Enter Dimensions function on the Laser Align Application main menu is marked with an X.

**Figure 4-1: Enter dimensions**



#### Prerequisites

1. Ensure the laser and sensor are mounted on the machines.
2. Create and/or activate an alignment job and set up the job parameters. An alignment job is needed to perform alignment.

Procedure

- 1. From the Laser Align Application main menu, press F3 Enter Dimensions.
- 2. Set the machine RPM.

This parameter is used to establish alignment tolerances. If you have a variable speed machine, enter the highest RPM at which the coupling operates.

- 3. Enter machine dimensions and press Enter.

Dimension*	Measurement description
A	Inboard foot to the outboard foot of the machine on the left
B	Inboard foot of the machine on the left to the center of the coupling
C	Center of the coupling to the inboard foot of the machine on the right
D	Inboard foot to the outboard foot of the machine on the right
E	Center of the coupling to the center of the sensor mounting post
F	Center of the coupling to the other center of the coupling
	<div><b>Note</b> The F dimension is only required when the tolerance type is Jackshaft. This dimension is not needed when the tolerance type is Standard.</div>
*Measure to the nearest 1/8 inch (3 mm).	

If the left machine is fixed, then the A and B dimensions are not required and are not displayed.

If the right machine is fixed, then the C and D dimensions are not required and are not displayed.

Note

All machine dimensions must be entered before advancing to the thermal growth screens.

- 4. Enter thermal growth values if thermal growth is enabled and press Enter.

Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on entering thermal growth values.

## 4.2 Acquire alignment data

After you enter machine dimensions, the Laser Align Application automatically advances to the next step, which is to acquire alignment data by sweeping the laser and sensor (Sweep Heads). After completing this step, the Sweep Heads function on the Laser Align Application main menu is marked with an X.

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### Tip

For accuracy and repeatability, do the following when acquiring alignment data:

- Acquire all readings using the same direction of rotation.
  - Rotate the laser fixtures in the same direction as the machines rotate when running.
  - Use a smooth, uniform acceleration and deceleration when rotating the laser fixtures to get accurate, reliable, and repeatable data.
- 

### Prerequisites

Ensure the laser and sensor are mounted on the machines, turned on, and the sensor is paired with the AMS 2140.

### Procedure

1. After entering machine dimensions, press Enter.
2. If you enabled foot pre-check, then the foot pre-check screen launches automatically. Otherwise, press F12 Foot Pre-Check to start checking for soft foot.

Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on entering soft foot information.

3. Acquire alignment data.

For Advanced alignment jobs, the steps vary depending on the alignment method you have previously chosen. For Basic alignment jobs, Manual 4 Point is the only alignment method available.

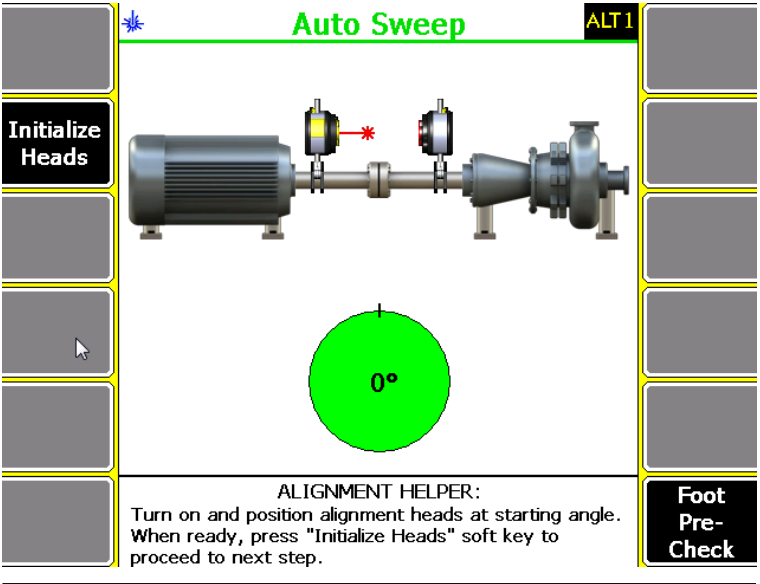
This document only covers Auto Sweep and Manual 4 Point.

Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on acquiring alignment data using the other alignment methods available in Advanced mode.



Auto Sweep

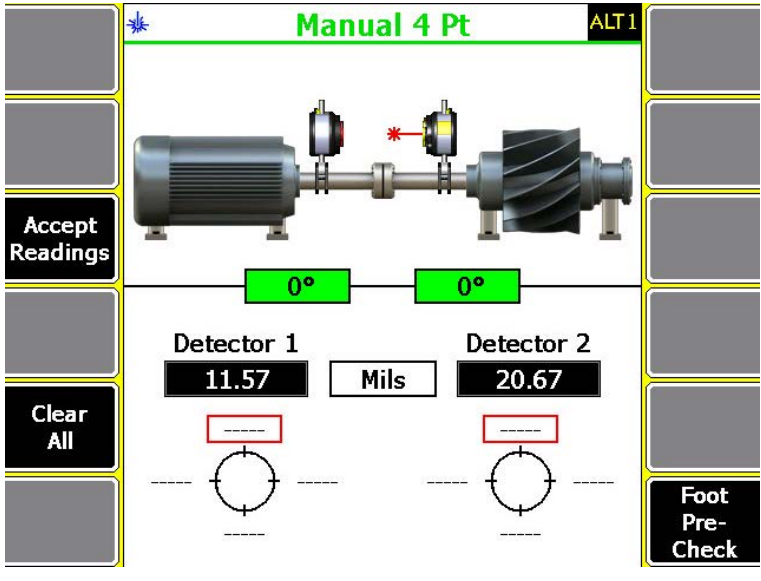
Figure 4-2: Auto Sweep



- a. Position the laser and sensor at a starting angle (any angle). Make sure the laser and sensor are within 2° of each other. The position of the laser fixtures is marked on the screen with a black line on the green circle.
- If the laser and sensor angles are not within 2° of each other, the background of the circle is white. The starting angular position of the laser fixtures is also displayed on the circle.
- b. Press F2 Initialize Heads.
- c. Rotate the laser and sensor. You can rotate the laser fixtures from 45° (minimum) to 360° (maximum). Press F2 Get Sweep Data afterwards to retrieve data from the laser fixtures.

## Manual 4 Point

Figure 4-3: Manual 4 Point



- Position the laser and sensor at a starting angle (ideally at the first cardinal position, 0°).

The laser and sensor angles should be within 2° of each other and within 3° of the active cardinal position (0°, 90°, 180°, and 270°), if possible. When this happens, the background of the box displayed below the machine is green. If the laser and sensor angles are not within 2° of each other and 3° of the active cardinal position, the box background is white.

- Rotate the laser fixtures a full revolution stopping at each cardinal position (0°, 90°, 180°, and 270°). Press F3 Accept Readings after stopping at each point.

### Note

While it is always desirable to measure at all four cardinal positions, it is possible to estimate an alignment solution with only three measurements.

The status LED on the AMS 2140 flashes and an audible tone is produced whenever a reading is taken. The audible tone is only available when the Status Beeper is enabled (Home > ALT > F2 General Setup > F3 Set Status Beeper).

- c. After taking readings for each of the cardinal position, press Enter.
4. If the Review Results option is enabled, review the results, view the tolerance plots, or repeat the reading.

Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on reviewing alignment measurement results.

5. After reviewing results, press Enter to advance to the next step (Move Machine).

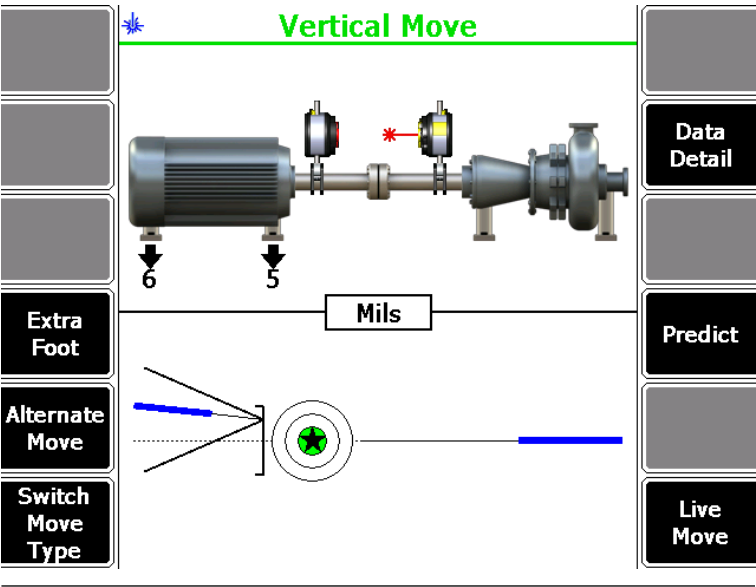
## 4.3 Align the machine

After you acquire alignment data, the Laser Align Application automatically advances to the next step, which is to make adjustments on the machines to align them (Move Machine), if necessary. After completing this step, the Move Machine function on the Laser Align Application main menu is marked with an X.

### Procedure

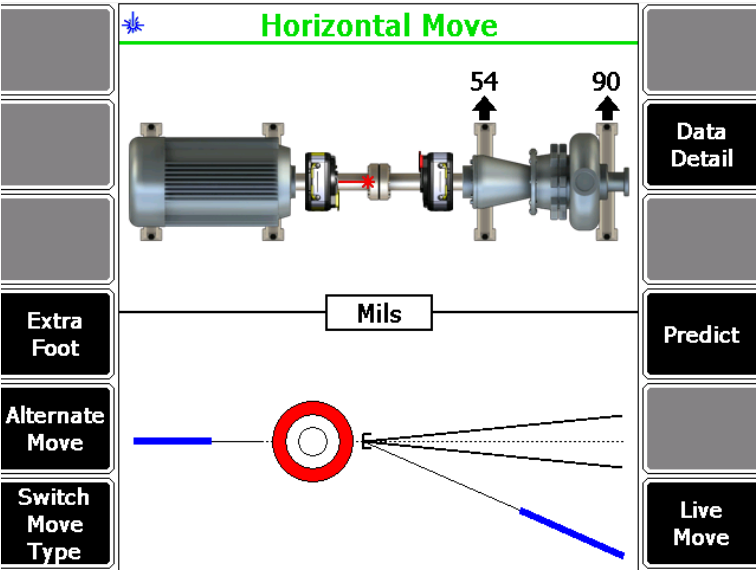
1. After acquiring alignment data, press Enter.
2. Review the amount of required vertical and horizontal machine moves and make the necessary adjustments to the machine.

Figure 4-4: Vertical machine move



For vertical machine moves, if the required movement is positive, the amount of movement is shown above the machine at the appropriate foot with an up arrow. If the required movement is negative, the amount of movement is shown below the machine at the appropriate foot with a down arrow.

**Figure 4-5: Horizontal machine move**



For horizontal machine moves, if the required movement is positive, the amount of movement is shown below the machine at the appropriate foot with a down arrow. If the required movement is negative, the amount of movement is shown above the machine at the appropriate foot with an up arrow.

The bottom half of the AMS 2140 screen shows a bull's-eye target and a shaft centerline plot representing the alignment condition of the machine. The shaft centerline plot includes a "V" shape indicating the acceptable angular tolerance on the machine as well as a bracket at the base of the "V" showing the acceptable offset misalignment at the coupling.

The bull's-eye target compares the total misalignment to the target tolerance. Each circle in the bull's-eye target has a different meaning: red—more than two times the tolerance, yellow—between one and two times the tolerance, green—within acceptable tolerance, green with a star—within excellent tolerance.

Optionally, you can do the following:

- a. Press F4 Extra Foot to calculate the vertical and horizontal machine moves for up to four machine foot locations in addition to those defined for the job.

Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on calculating extra machine feet.

- b. Press F5 Alternate Move to switch between the alternate pairs of feet where the machine moves can be made.

If all dimensions are entered, up to six alternate moves are available.

- c. Press F6 Switch Move Type to select a move type. You can choose vertical, horizontal, or vertical and horizontal.
- d. Press F8 Data Detail to view the tolerance plots.

The tolerance plots are a graphical representation of the alignment condition of the machine. Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on the tolerance plots.

- e. Press F10 Predict to estimate the resulting alignment condition based on a theoretical adjustment prior to actually moving the machine.

This is useful in determining whether appropriate shims are available to correct the misalignment. Refer to the Alignment chapter of the AMS 2140 Machinery Health Analyzer User Guide for more information on the predict mode.

- f. Press F12 Live Move to observe the machine movement in real time from the AMS 2140 while making machine moves.

See [Section 4.3.1](#) for more information on performing live move.

3. If necessary, acquire alignment data again. See [Section 4.2](#).

### 4.3.1 Perform live move

The Live Move option lets you observe the machine movement from the AMS 2140 while you are moving the machine.

Only the horizontal live move is covered in this document.

#### Procedure

1. On the Machine Move screen, press F12 Live Move.

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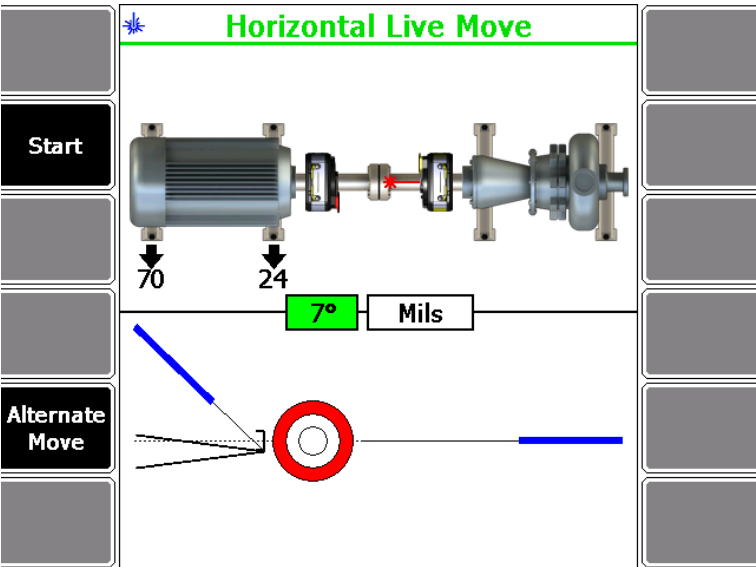
#### Note

This option is present on the Horizontal Move screen by default and is also present depending on the live move orientation you have previously chosen. See [Section 3.3.8](#).

---

The screen then displays the movement required to align the machine horizontally. The bull's-eye target indicates how well the machine is aligned with respect to tolerances.

**Figure 4-6: Horizontal live move**



Perform the live move with the laser fixtures at any rotational position. Before proceeding, make sure that the laser fixtures are located at a position where they can remain stable throughout the alignment process. The average laser and sensor angle position is displayed in the middle of the screen. The background of the box is green when the laser fixtures are within 2° of each other, and is white if the laser fixtures are not within 2° of each other.

For horizontal machine moves, if the required movement is positive, the amount of movement is shown below the machine at the appropriate foot with a down arrow. If the required movement is negative, the amount of movement is shown above the machine at the appropriate foot with an up arrow.

The bottom half of the AMS 2140 screen shows a bull's-eye target and a shaft centerline plot representing the alignment condition of the machine. The shaft centerline plot includes a "V" shape indicating the acceptable angular tolerance on the machine as well as a bracket at the base of the "V" showing the acceptable offset misalignment at the coupling.

The bull's-eye target compares the total misalignment to the target tolerance. Each circle in the bull's-eye target has a different meaning: red—more than two times the tolerance, yellow—between one and two times the tolerance, green—within acceptable tolerance, green with a star—within excellent tolerance.

2. Press F2 Start to start the live move.
  - a. Press F5 Alternate Move to select between the alternate pairs of feet.
3. Loosen the machine feet hold-down bolts, and then move the machine until the target tolerance level is reached.

As the machine is moved, the bottom half of the AMS 2140 screen provides a continuous update of the machine alignment condition.

When the live move alert is enabled, the status LED on the AMS 2140 flashes and an audible alert is heard (only when the Status Beeper is set to on) when the target tolerance value is reached during a live move. See [Section 3.3.9](#) to enable live move alerts.

4. Tighten the machine hold-down bolts when you reach the target alignment condition.
5. Press F2 Stop to stop the live move.
6. Acquire alignment data again to verify the machine alignment condition.

#### CAUTION!

A live machine move is not a reliable indicator of the final alignment condition of a machine. There will be variability in the alignment data due to shaft clearances, bearing faults, base deterioration, etc. Emerson recommends acquiring a new set of alignment data after performing a live move.



## 5 Transfer alignment job data and tolerances

### 5.1 Transfer an alignment job to AMS Machinery Manager

#### Prerequisites

1. Connect the AMS 2140 to a PC with AMS Machinery Manager installed and running.
2. Set the connection type on the AMS 2140.
3. Enable the AMS 2140 in Data Transfer.
4. Set the connection type in Data Transfer. The connection type on the AMS 2140 and on Data Transfer must match.

Refer to the AMS 2140 Machinery Health Analyzer User Guide for more information on setting the connection type on the AMS 2140 and on AMS Machinery Manager Data Transfer.

#### Procedure

1. From the Laser Align Application main menu, press ALT > F9 Job Manager > F7 Connect for Transfer.
2. Optionally, press F1 Set Storage Location to select the internal memory or an SD memory card.

This option is available only if a memory card is inserted into the AMS 2140.

3. Press F8 Dump Data.
4. Press F8 or F9 to select the job you want to transfer and press F1 Select.
5. Press F7 Begin Data Dump.
6. Press F8 or F9 to select a database.
7. Press F10 or F11 to select an area within the database and press F4 Select Area.
8. Press F8 or F9 to select an equipment within the area and press F7 Select.

This transfers the alignment job to the selected equipment within the database. The status of the data transfer is then displayed on the AMS 2140.

### 5.2 Load an alignment job from AMS Machinery Manager

#### Prerequisites

1. Connect the AMS 2140 to a PC with AMS Machinery Manager installed and running.

2. Set the connection type on the AMS 2140.
3. Enable the AMS 2140 in Data Transfer.
4. Set the connection type in Data Transfer. The connection type on the AMS 2140 and on Data Transfer must match.

Refer to the AMS 2140 Machinery Health Analyzer User Guide for more information on setting the connection type on the AMS 2140 and on AMS Machinery Manager Data Transfer.

### Procedure

1. From the Laser Align Application main menu, press ALT > F9 Job Manager > F7 Connect for Transfer.
2. Optionally, press F1 Set Storage Location to select the internal memory or an SD memory card.

This option is available only if a memory card is inserted into the AMS 2140.

3. Press F7 Load Jobs.
4. Press F8 or F9 to select a database.
5. Press F10 or F11 to select an area within the database and press F4 Select Area.
6. Press F8 or F9 to select an equipment within the area and press F7 Select.
7. Press F8 or F9 to select a job and press F1 Select.
8. Press F7 Load Jobs.

## 5.3 Load tolerance table from AMS Machinery Manager

Alignment tolerance tables can only be transferred from the PC to the AMS 2140.

The alignment tolerance table contains the tolerance values for standard and jackshaft tolerances as well as soft foot and frame distortion index (FDI) tolerance values for horizontal alignment jobs.

### Prerequisites

1. Connect the AMS 2140 to a PC with AMS Machinery Manager installed and running.
2. Set the connection type on the AMS 2140.
3. Enable the AMS 2140 in Data Transfer.
4. Set the connection type in Data Transfer. The connection type on the AMS 2140 and on Data Transfer must match.

Refer to the AMS 2140 Machinery Health Analyzer User Guide for more information on setting the connection type on the AMS 2140 and on AMS Machinery Manager Data Transfer.

### Procedure

1. From the Laser Align Application main menu, press ALT > F9 Job Manager > F7 Connect for Transfer.
2. Optionally, press F1 Set Storage Location to select the internal memory or an SD memory card.

This option is available only if a memory card is inserted into the AMS 2140.

3. Press F9 Load Tolerance Table.
4. Press F8 or F9 to select a database containing the tolerance table.
5. Press F7 Load Tolerance Table.
6. Select YES to load the tolerance table and overwrite the existing tolerance table in the AMS 2140.

## 6 Print alignment summary reports

### 6.1 Print an alignment summary report to AMS Machinery Manager

#### Prerequisites

- On the AMS 2140, press Home > ALT > F2 General Setup > F6 Set Print Mode and ensure the default print mode is set to Send to PC.
- Ensure the same connection type is set on the AMS 2140 and in Data Transfer. The Ethernet and Wireless options may require additional setup to connect to the desired computer. Refer to the AMS 2140 Machinery Health Analyzer User Guide for more information.

#### Procedure

1. Activate an alignment job.
2. Use the appropriate cable to connect your AMS 2140 to a computer where AMS Machinery Manager is installed, if you are using a wired connection.
3. On the computer, open Data Transfer.
4. From the Laser Align Application main menu, press ALT > F11 Print Job.

The AMS 2140 connects to Data Transfer and displays the summary report. From the navigation bar in Data Transfer, you can preview the job, save it as an image file, or add a cover sheet. See the AMS Machinery Manager Help for more information.

5. From AMS Machinery Manager, click the print icon to send the report to a printer.
6. To disconnect, click Disconnect on the Data Transfer tab.

### 6.2 Print an alignment summary report to a memory card

You can save a report to a memory card if you inserted a card into the AMS 2140.

#### Prerequisites

On the AMS 2140, press Home > ALT > F2 General Setup > F6 Set Print Mode and ensure the default print mode is set to Store as BMP on CARD or Store as JPG on CARD.

#### Procedure

1. From the Laser Align Application main menu, press ALT > F11 Print Job.

2. Enter up to 8 characters for a file name and press Enter.

The AMS 2140 creates and saves the file to the memory card. The progress is displayed on the screen.

## 7 Verify the AMS Machinery Manager version

The AMS 2140 Laser Align Application is compatible with AMS Machinery Manager v5.61 or later.

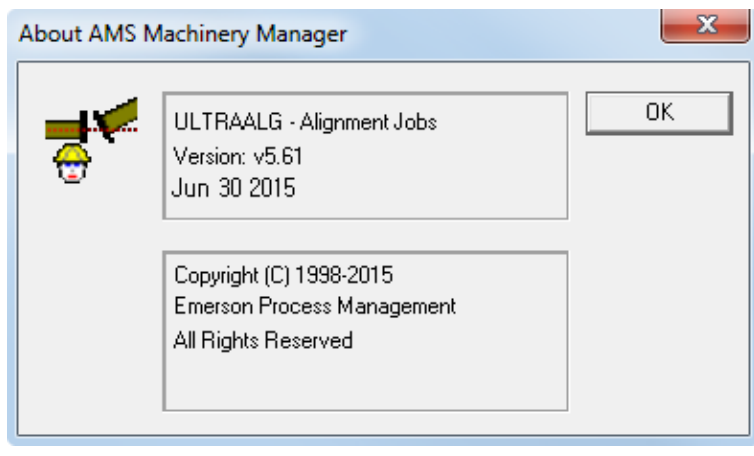
AMS Machinery Manager 5.61 may require a patch to enable full functionality. If you are using AMS Machinery Manager v5.61, perform the following steps to verify that the patch is installed on your PC.

### Procedure

1. From AMS Machinery Manager, click Help > About AMS Suite: Machinery Health Manager and verify the version you are using is v5.61.
2. Select the Tools tab.
3. From the Filters pane, select Document/Reporting.
4. Double-click Alignment Jobs to launch the UltraAlg application.
5. From the UltraAlg application, click Help > About.

Verify the release date of the UltraAlg application. It should be June 30, 2015 or later.

**Figure 7-1: About AMS Machinery Manager**



# Appendix A

## sensALIGN approvals

The sensALIGN sensor complies with the following approvals:

Australia	
Brazil	ANATEL: 1812-15-4219 Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não causar interferência a sistema operando em caráter primário.
Canada	IC: 5123A-BGTWT41
China	CMIIT ID: 2015DJ1567
Europe	
Japan	 209-J00047 当該機器には電波法に基づく、技術基準適合証明等を受けた特定無線設備を装着している
Mexico	IFETEL: RCPPRAL15-0647 La operación de este equipo está sujeta a las siguientes dos condiciones: (1) es posible que este equipo o dispositivo no cause interferencia perjudicial y (2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.
Nigeria	Connection and use of this communications equipment is permitted by the Nigerian Communications Commission
Pakistan	Approved by PTA, 2015
Singapore	Complies with IDA Standards N0817-15
South Africa	 TA 2015-559 APPROVED
South Korea	 MSIP-CRM-PRc-sensALIGNsens
UAE	TRA REGISTERED No: ER39483/15, DEALER No: DA43636/15
USA	FCC: QOQWT41

### Note

The table above does not include all countries for which certificates have been issued. For a complete list, please contact your local Emerson Sales Representative.

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