eqss™ Gen-3 LMS
Telehandler Load Management System

Installation Manual for MLT1040
Manual Tool Recognition

Failure To Follow Installation Manual Will Void Warranty

Documentation Conventions

The list below highlights important documentation conventions.

Text presented in this manner is intended to provide the user with some general information. The user should ensure information presented in this manner is clearly understood.

Text presented in this manner provides the user with information to assist in completion of the current procedure being explained.

Text presented in this manner indicates that a failure to follow directions could result in damage to equipment, loss of information, bodily harm, or loss of life.

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Table of Contents

Tools Required for Installation

The tools required to perform the installation of the TSS are listed below

- Pencil or Texta
- Drill
- Drill bits
  - 3.3 mm
  - 4.5 mm
  - 5 mm
  - 6.25 mm
  - 6.8 mm
  - 8.5 mm
- Centre punch
- Tap T-Handle
- Taps
  - M6
  - M7 x 0.75
  - M8
- Drill and tap oil
- Metric Allen keys
- Phillips Head screw driver
- Spanners and sockets
  - 7 mm
  - 10 mm
  - 13 mm
- Locktite thread locker
- Side cutters
- Stanely knife
- Crimpers
- Wire strippers

Installation Index

The components and cables of the Gen-3 Telehandler Load Management System are outline in the tables below. The following pages show where the components are installed and the cable routing.

See the appropriate manual section for a detailed installation description for each component.

Refer to this section for any component placement or cable routing issues

Item	*Component Description*
1	Cable Reeler
2	Main Lift Cylinder Pressure Sensors
3	Compensation Cylinder Pressure Sensors
4	Can Pressure Input Module (CPIM)
5	Forward Camera
6	Signal Light
7	Rear Camera
8	Can Cabin Interface Module (CCIM)
9	Display Module
10	SPU Module
11	User Control Dial
12	Joystick Connection X67

Table 1: Component Installation Index

Colour	*Cable Description*
Yellow	Boom Cable
Dark Green	Main Cylinder Pressure Sensor Cables
Dark Blue	Compensation Cylinder Pressure Sensors Cables
Light Blue	Forward Camera Cable
Violet	Signal Light Cable
Aqua	Rear Camera Cable
Dark Yellow	CCIM Cable
Light Green	Cutout Harness
Red	Display Cable
Orange	User Input Control Cable
Brown	Machine Input Harness

Table 2: Cable Installation Index

Illustration 1: Machine Boom

Note: The old light tower is shown

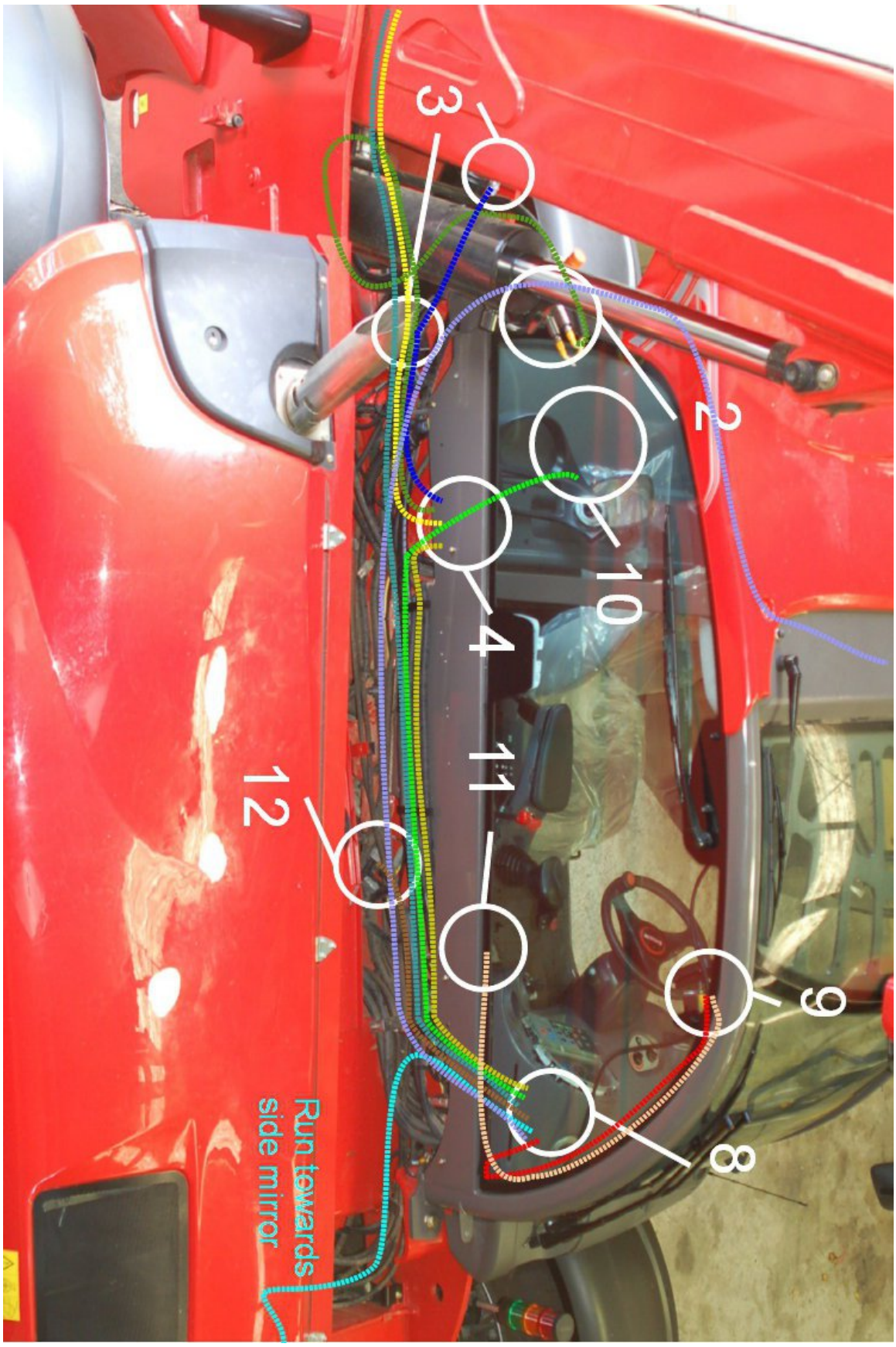


Illustration 2: Machine Chassis

Note: The old light tower is shown

Covers

Remove the following covers before starting the installation

Step	*Description*	*Diagram*
1.	Remove the rear cover behind the boom.	
1.	Remove the side panel next to the cabin under the boom.	
2.	Remove the cover behind the cabin	

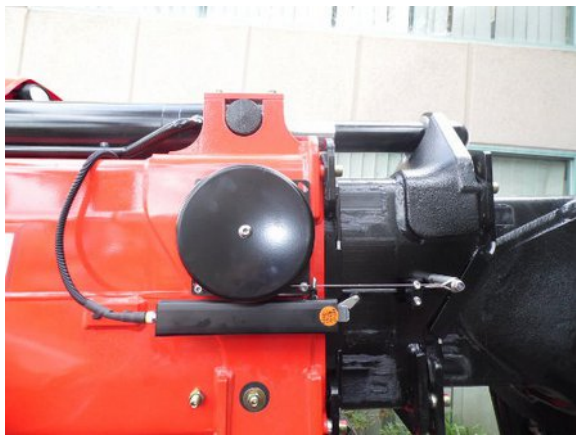
Step	*Description*	*Diagram*
3.	Inside the cabin remove the dashboard display.	

Table 3: Cover removal

Cable Reeler Installation

The cable reeler is used to measure the boom extension to determine the maximum lifting capacity.

A false N07 fault can occur if the boom jumps off the stow switch due to pressurising the hydraulic system and without operating the boom extension control. Ensure the stow switch arm is correctly adjusted to prevent this error.

Step	*Description*	*Diagram*
1.	Drill and tap the holes for the cable reeler according to the mounting diagram on page 15. Mount using the supplied standoffs, bolts and washers.	
2.	Drill and tap an M8 hole for the cable anchor. Ensure the cable anchor is positioned so the cable runs in line with the boom. Mount the cable anchor and attach the cable.	
3.	Drill and tap the M6 holes for the stow switch trigger bracket. Mount the stow switch trigger bracket using the supplied standoffs, bolts and washers.	

Step	Description	Diagram
4.	Connect the supplied M12 10 metre cable (CB001027) into the cable reeler connection.	
5.	Run the cable to the other side of the boom and down through the cable tray to the bottom of the boom. Cable tie to the flexible hydraulic hoses down to the chassis. Make sure the cable isn't pinched or stretched when the boom is raised or lowered. Run the remainder of the cable towards the rear of the cabin and cable tie with the other cables during External Cable Completion on page 33.	 

Table 4: Cable Reeler Installation

For further details on running the boom cable refer to the Installation Index on page 7

Cable Reeler Mounting Position

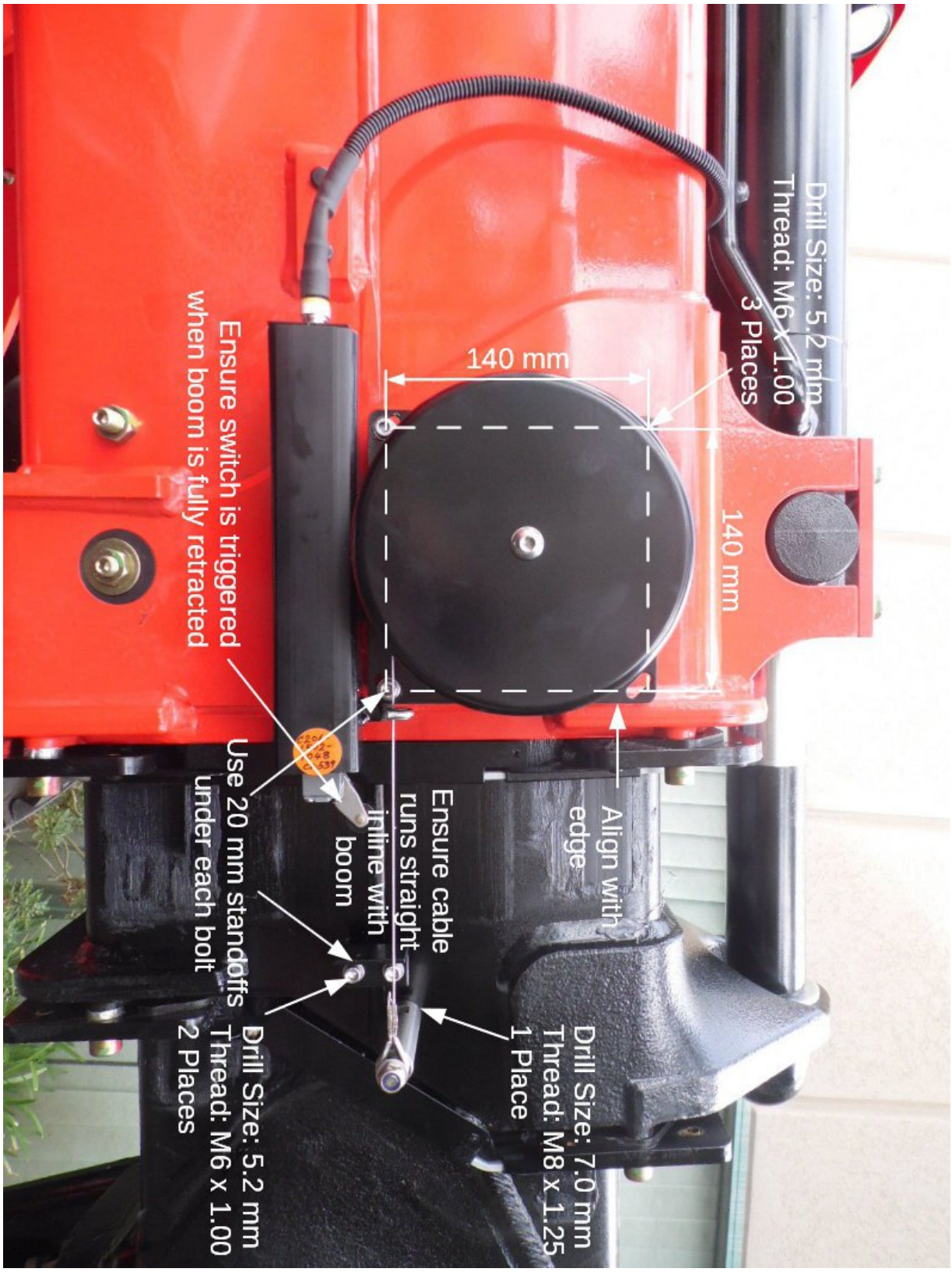


Illustration 3: Cable Reeler Mounting Position

Pressure Sensor Installation

The hydraulic pressure sensors are used to measure the lifting load of the telehandler.

Failure to tighten the bolts to the correct torque on the pressure manifold may result in a pressure failure on the counterbalance valve causing an uncontrolled fall of the boom.

The main lift cylinder pressure sensor installation will differ if configured with the Boom Suspension option. Check the pictures of the counterbalance valve under each section to determine the configuration.

Main Lift Cylinder – Standard Configuration

Step	*Description*	*Diagram*
1.	Raise the boom to approximately 65 degrees, to access the bolts on the counterbalance valve. Support and secure the boom using an A Frame or similar apparatus. **It must support at least 2 tons.** Apply the handbrake and insert chock under wheels. Remove the counterbalance valve on the side of the hydraulic lifting ram. **Removing the counterbalance valve will release the hydraulic pressure which may result in a spray of oil.** Secure the pressure manifold using the supplied 70 mm bolts and seals. Tighten the bolts for the manifold to **25 NM** using a torque wrench. **Start the machine, pressurise the boom and check for leaks.**	

Step	*Description*	*Diagram*
2.	Connect the supplied M12 4 metre cables (CB001026) into each of the pressure sensors. Cable tie to the flexible hydraulic hoses connected to the main lift cylinder. Make sure the cable isn't pinched or stretched when the boom is raised or lowered. Run the remainder of the cable out the hole above the rear axle under the lift cylinder towards the rear of the machine and cable tie with the other cables during External Cable Completion on page 33.	

Table 5: Main Lift Cylinder – Standard Configuration

For further details on running the pressure sensor cables refer to the Installation Index on page 7

Main Lift Cylinder – Boom Suspension Option

Step	*Description*	*Diagram*
1.	Raise the boom and support and secure the boom using an A Frame or similar apparatus. **It must support at least 2 tons.** Apply the handbrake and insert chock under wheels. Remove the pressure sensor connected to the PX port of the main head pressure line on the counterbalance manifold. **Removing the pressure sensor from the counterbalance manifold will release the hydraulic pressure which may result in a spray of oil.** Connect the supplied hydraulic connections and pressure sensor into the PX port of the counterbalance manifold and connect the existing pressure sensor into the available port on the supplied hydraulic connections, as shown in the picture. Ensure the hydraulic connections are orientated as shown in the picture, so the hydraulic connections are not damaged when the boom is lowered.	 View from under the boom towards the main lift cylinder

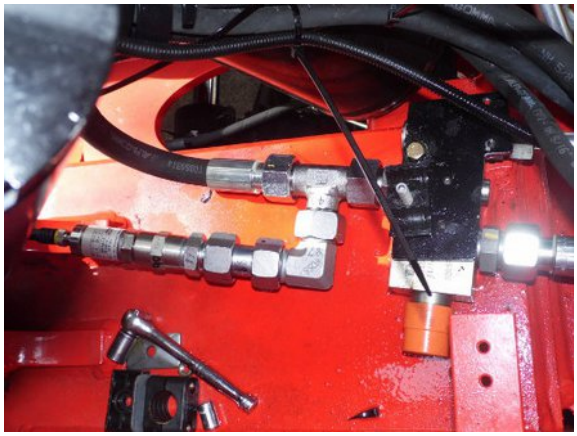
Step	Description	Diagram
2.	Disconnect the hose coming from the main rod pressure line into the left side of the counterbalance manifold mounted on the chassis. Connect the supplied hydraulic tee connection and pressure sensor into the main rod pressure line. Ensure the pressure sensor is aligned as shown in the picture, so the pressure sensor is not crushed when the compensation cylinder is moved. **Start the machine, pressurise the boom and check for leaks.**	 View from under the compensation cylinder
3.	Connect the supplied M12 4 metre cables (CB001026) into each of the pressure sensors. Cable tie the main head pressure sensor cable to the flexible hydraulic hoses connected to the main lift cylinder. Make sure the cable isn't pinched or stretched when the boom is raised or lowered. Run the remainder of the cable towards the rear of the cabin and cable tie with the other cables during External Cable Completion on page 33.	

Table 6: Main Lift Cylinder – Boom Suspension Option

For further details on running the pressure sensor cables refer to the Installation Index on page 7

Compensation Pressure Sensors

Step	*Description*	*Diagram*
1.	Install the pressure sensor with the U shaped hydraulic connection into the rod of the compensation cylinder	 View from behind the cabin towards the center of the machine
2.	Install the head compensation pressure sensor into the compensation cylinder **Start the machine, pressurise the boom and check for leaks.** Connect the supplied M12 4 metre cables (CB001026) into each of the pressure sensors. Run the snake tube and cables towards the cabin and cable tie with the other cables during External Cable Completion on page 33.	 View from under the boom towards the rear of the machine

Table 7: Compensation Pressure Sensor Installation

For further details on running the pressure sensor cables refer to the Installation Index on page 7

Reverse Camera

The rear camera video is displayed on the screen when the machine is in reverse gear to allow the operator to see behind the telehandler while reversing.

> Do not disconnect the camera power connection while the system is operating as this can damage the fuse.

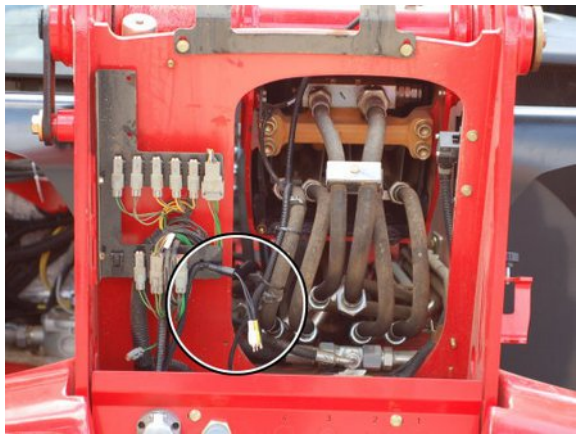
Step	*Description*	*Diagram*
1.	Remove the cover at the rear of the machine. Drill a 31mm hole in the location shown. Making sure to leave enough room for a license plate Insert the camera through the hole and adjust the angle using the alignment washers.	
2.	Connect the camera power and signal connectors to the supplied 5m camera cable (CB001032). Note; The white connector is not used. Secure the camera cable using a single cable tie to maintain the connector location. Run the remainder of the cable towards the cabin and insert into snake tube with the boom cable during External Cable Completion on page 33.	

Table 8: Reverse Camera Installation

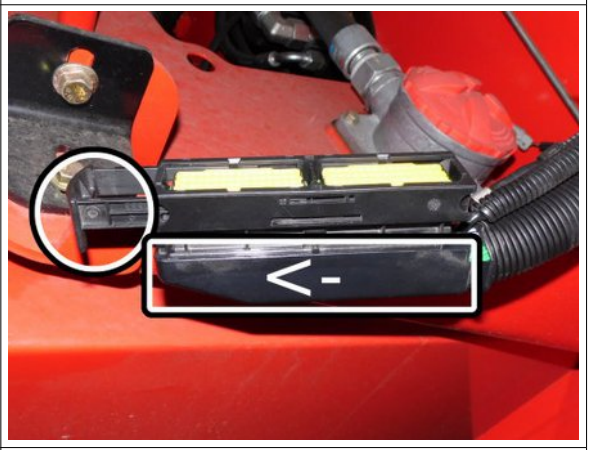
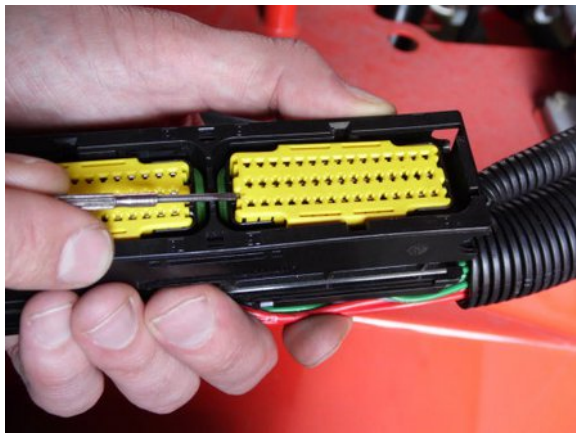
The camera's viewing angle may need to be adjusted once the system is installed and the display is operational.

Once the cable has been secured with a cable tie disconnect the cable to remove the rear cover until the installation is finalised

For further details on running the camera cable refer to the Installation Index on page 7

Cutout Cable Harness

Isolate the main battery before connecting into the machine wiring

Step	*Description*	*Diagram*
1.	Remove connector X148 from the ECU MP1.	
2.	Pull the connector on the left of the connector to disconnect from the ECU. Slide the protective cover off the end of the connector to access the wires.	
3.	Remove the pin support bracket from the left connector, by levering the corners with a small screwdriver.	

Step	*Description*	*Diagram*
4.	Remove the blanking pin from the connector in slot 4 and insert the blue wire from the cutout harness. Note: The pin numbers are written on the front of the connector	
5.	Replace the pin support bracket and the protective cover. Replace any tape that was removed to secure the snake tube of the protective cover. Reattach the connector to the ECU module.	
6.	Run the cable from behind the cabin to the side of the chassis following the existing snake tube.	

Step	Description	Diagram
7.	Run the snake tube and cables towards the cabin and cable tie with the other cables during External Cable Completion on page 33.	

Table 9: Cutout Cable Harness Installation

For further details on running the cutout cable harness refer to the Installation Index on page 7

The green wire on the wire harness is not needed to complete the installation for this machine configuration.

Forward Camera

The forward camera video is displayed on the screen when the machine is in forward gear to allow the operator to see past the boom to obstructions that would damage the right front tyre.

> Do not disconnect the camera power connection while the system is operating as this can damage the fuse.

Step	*Description*	*Diagram*
1.	Mount the camera to the side mirror using the p-clips as shown. Secure using two M6 nuts.	
2.	Connect the camera power and signal connectors to the supplied 5m camera cable (CB001032). Note; The white connector is not used. Run the cable along the mirror post, cable tie every 100 mm down the chassis. Run the cable along the same path as the headlight cable under the chassis to the side of the cabin. Cable tie to the headlight cable every 150 mm to 200 mm. Complete the cable installation during External Cable Completion on page 33.	

Table 10: Forward Camera Installation

The camera's viewing angle may need to be adjusted once the system is installed and the display is operational.

For further details on running the camera cable refer to the Installation Index on page 7

Signal Light Installation

The signal light warns other workers when the telehandler is lifting loads close to it's maximum capacity.

Ensure the power supply voltage is greater than 13.5V otherwise the signal light may not illuminate correctly.

Step	*Description*	*Diagram*
1.	Mount the signal light on the top of the roof past the roof window towards the cabin door.	
2.	Run the cable towards the boom side of the roof and push through the hole near the window wiper. Note: It might be necessary to cut a hole in the plastic roof cover to fit the cable. Run the cable under the cover towards the rear corner.	

Step	*Description*	*Diagram*
3.	Run the cable along the pipes under the cover towards the chassis. Cable tie with the other cables during External Cable Completion on page 33.	

Table 11: Signal Light Installation

Machine Input Harness

Isolate the main battery before connecting into the machine wiring

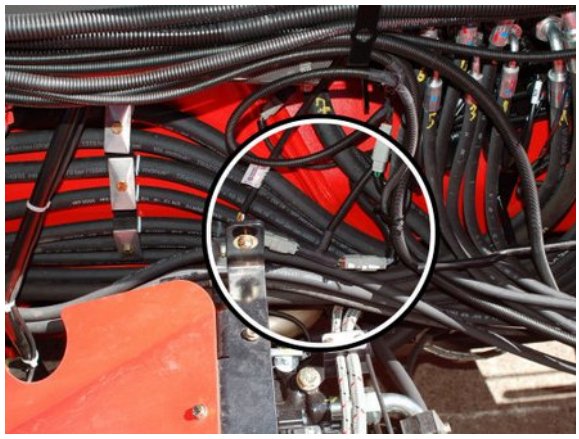
Step	*Description*	*Diagram*
1.	Locate the 12 pin connector under the boom next to the cabin, that connect into the joystick. Connect the 12 pin tee connector into X67. Run the other end of the cable with the 4 pin connector towards the cabin and cable tie with the other cables during External Cable Completion on page 33.	

Table 12: Joystick Cable Harness Installation

For further details on running the machine input harness refer to the Installation Index on page 7

Can Pressure Input Module (CPIM)

The CPIM is responsible for processing the information sent from the pressure sensors.

Accidentally swapping the pressure sensor connections will not damage system and can be determined if the display is showing a negative load.

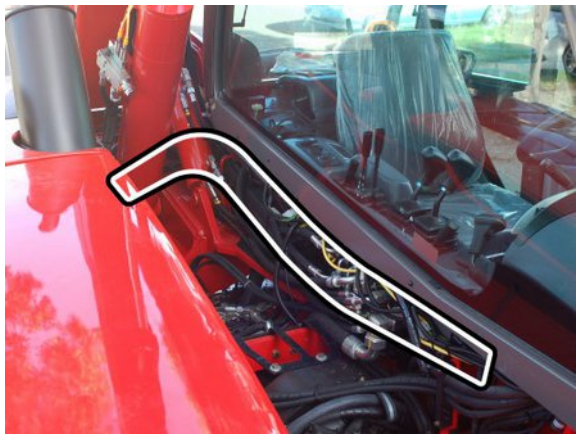
Do not plug the pressure sensor cable into the far right side boom cable. This will damage the system.

Step	*Description*	*Diagram*
1.	Drill and tap two M8 holes for the CPIM bracket in the side of the chassis. Ensure that cover can be installed once the CPIM is mounted Mount using the supplied M8 x 12mm bolts and washers.	
2.	Connect the cables for the pressure sensors and boom cable to the CPIM as described on the label. Note: The CCIM cable will be installed during External Cable Completion on page 33.	

Table 13: Can Pressure Input Module (CPIM) Installation

External Cable Completion

All external cabling is completed in this step.

Step	*Description*	*Diagram*
1.	Coil up and cable tie the additional cabling for the boom and pressure sensor cables and store underneath the CPIM.	
2.	Connect the supplied M12 4 metre cable (CB001026) into the free connection out of the right side of the CPIM for the CCIM cable. Run the cable out the hole under the lift cylinder.	
3.	Cable tie the CCIM, signal light, rear camera, cutout and machine input harnesses together along the side to the front of the cabin.	

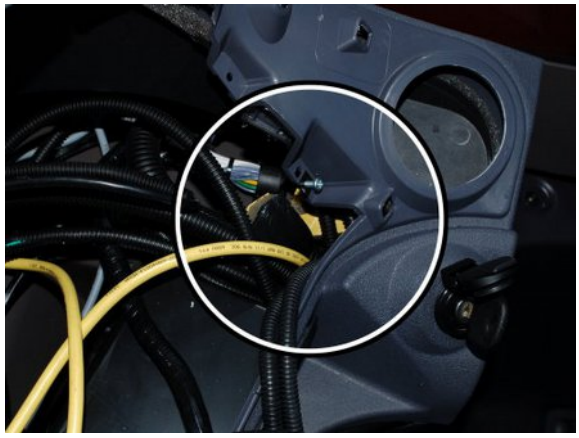
Step	*Description*	*Diagram*
4.	Run the CCIM, signal light, cutout harness, machine input harness and camera cables up through the hole into the cabin under the dashboard. Note: Pull the entire length of cable through into the cabin, excess cable will be stored under the dashboard cover in the cabin.	

Table 14: External Cable Completion

For further details on running the cables refer to the Installation Index on page 7

Display Installation

The display shows the current safety status of the telehandler.

Step	*Description*	*Diagram*
1.	Attach the display bracket to the level indicator in the top right corner using the supplied M6 x 35 mm bolts and nuts. Attach the display to the bracket and tighten the grub screw	

Table 15: Display Installation

Adjust the display bracket for optimal viewing angle once the display is powered

User Input Control

The user input control consists of a 5 button switch mounted in the dashboard.

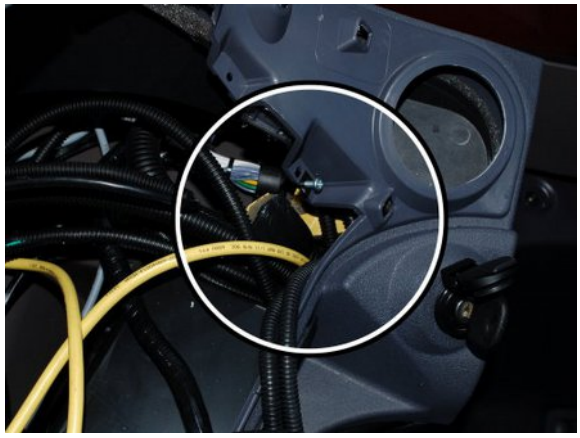
Step	*Description*	*Diagram*
1.	Drill a 34 mm hole into the cover in front of the joystick and install the user control dial. Note: Be careful while drilling not to damage the hydraulic controls positioned under the cover.	
2.	Run the cable through under the dashboard with the other cables.	

Table 16: User Input Control Installation

Can Cabin Interface Module (CCIM)

The CCIM connects the system into the machine electronics.

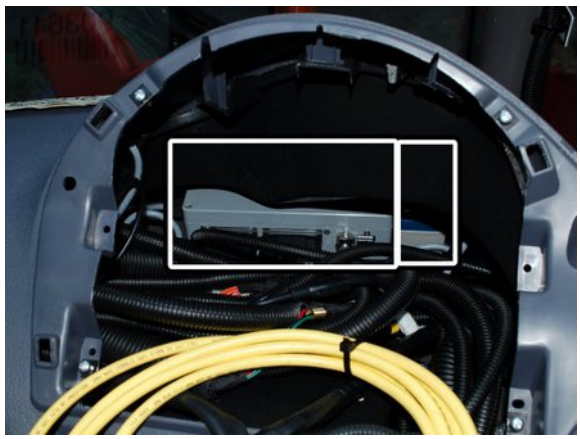
Step	*Description*	*Diagram*
1.	Position the backup battery (to the right of the CCIM) underneath the dashboard using double sided velcro tape. Position the CCIM to the left of the backup battery using double sided velcro tape. Remove the battery and CCIM from the velcro to allow the connections to be completed. Reattach to the velcro in the section Finalisation on page 42.	

Table 17: CCIM Installation

Override Wiring

The following connections are located behind the dashboard display in the cabin.

> Isolate the main battery before connecting into the machine wiring

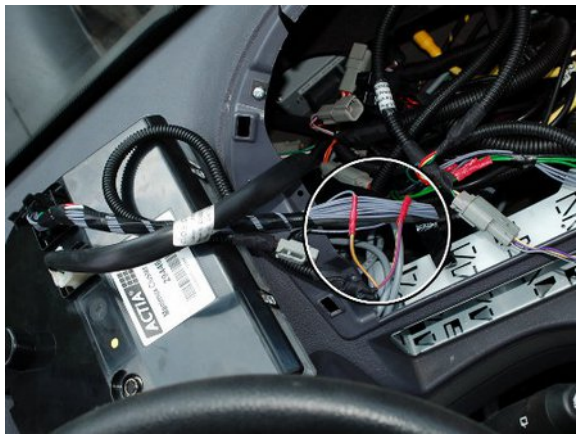
Step	*Description*	*Diagram*
1.	Locate the dashboard display connector (X13). Cut wire 124 into the connector. Join the yellow wire from the machine input harness to the side of wire 124 leading towards the connector. Join the violet wire from the machine input harness to the other side of wire 124 leading towards the cabin.	

Table 18: Override Wiring Installation

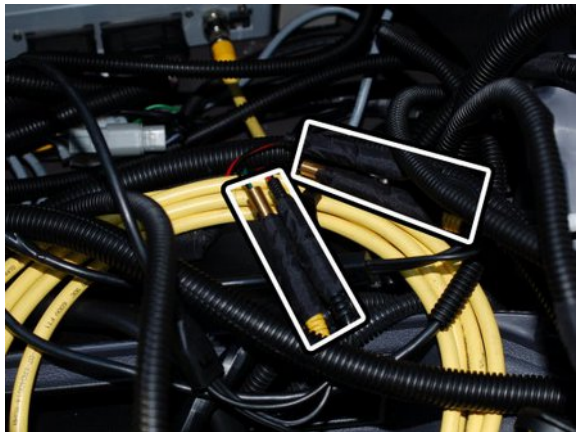
Cabin Loom

The cabin loom connects the CCIM to the machine connections and the other modules of the system.

Do not disconnect the camera power connection while the system is operating as this can damage the fuse.

Isolate the main battery before connecting into the machine wiring

Step	*Description*	*Diagram*
1.	Connect the CCIM and signal light cables to the M12 connectors on the CCIM. Note: It doesn't matter which of the M12 connectors the CCIM and signal light cables are plugged into.	
2.	Connect the cabin loom to the CCIM bulk head connectors	

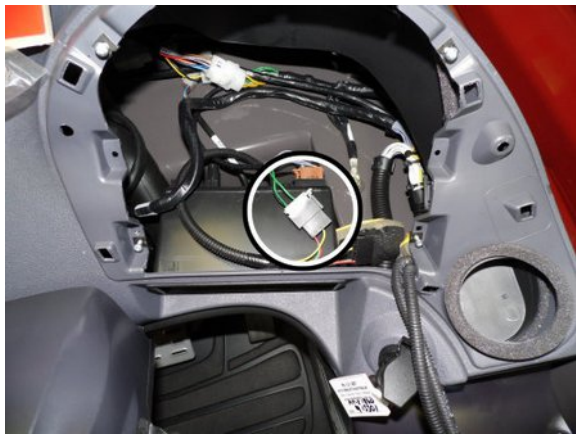
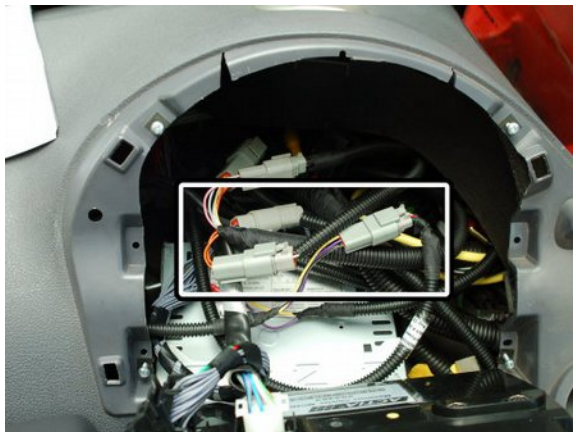
Step	*Description*	*Diagram*
3.	Connect the camera power and signal cables to the cabin loom. Note: The white connector is not used.	
4.	Attach the ring lug from the cutout cable to the ground lug inside the dashboard.	
5.	Run the 8 pin cable from the CCIM and the 5 pin cable from the user control through the gap between the window and the dashboard. Connect into the 8 and 5 pin connectors into the display	

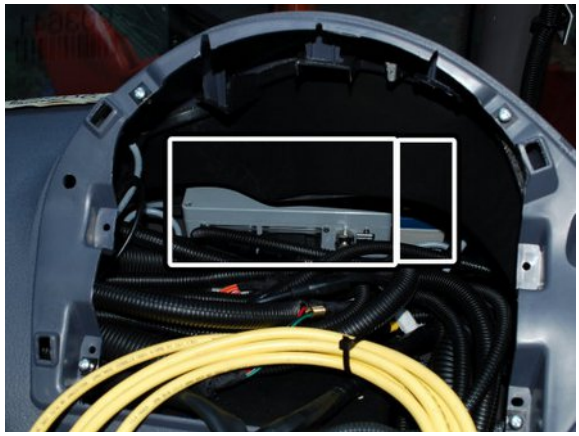
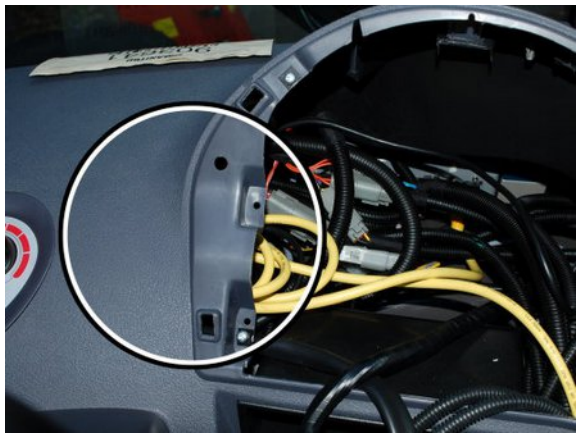
Step	*Description*	*Diagram*
6.	Run the cable through snake tube. Place cable tie points on the side of the window. Cable tie the snake tube to the cable tie points.	

Table 19: Cabin Loom Installation

Finalisation

This section will complete the final power connections to power the system and finish any additional items.

Step	*Description*	*Diagram*
1.	Connect the radio power harness into the radio power connector. Ensure there is a 2A fuse installed in F10 and a 7.5A fuse installed in F26 for radio power.	
2.	Connect the 4 pin female connector from the machine input harness, the 6 pin male connector from the cutout harness and the 3 pin connector from the power harness to the cabin loom connectors. Note: The 2 pin and 12 pin connectors are not used.	
3.	Connect the spade lug on the black wire to the negative (black) battery terminal. Connect the spade lug on the blue wire to the positive (red) battery terminal.	

Step	*Description*	*Diagram*
4.	Attach the backup battery and CCIM to the velcro strips installed earlier.	
5.	Coil up the extra cables and store underneath the dashboard cover.	
6.	Reconnect the main battery from the isolation switch. Turn the machine onto first stage /accessories and ensure the system is activated.	

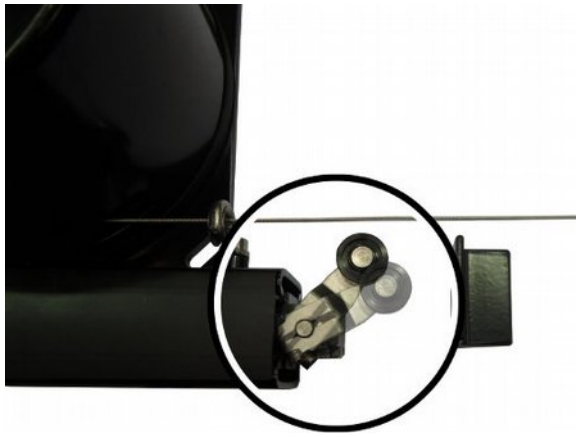
Step	*Description*	*Diagram*
7.	Adjust the display bracket for optimal viewing Set the machine into forward gear to activate the forward camera. Adjust the forward camera so the front right wheel is visible. Set the machine into reverse gear to activate the reverse camera. Adjust the reverse camera so the video is level.	
8.	Operate the boom movement controls to test if a false N07 fault occurs. If a N07 fault does occur, adjust the arm on the stow switch forwards towards the stow switch trigger. Note: The actual switch arm orientation may differ from the picture.	
9.	Perform a final check on all the cabling and sensors. Replace all the covers	

Table 20: Finalisation

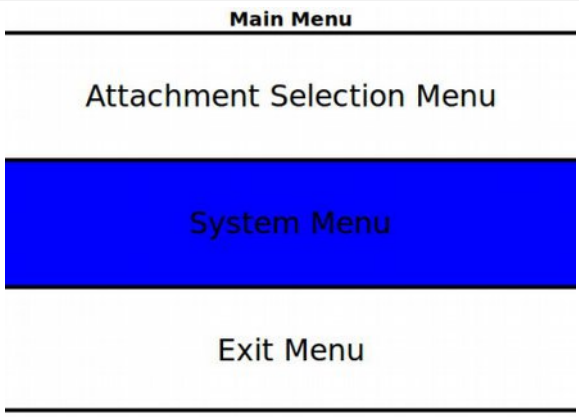
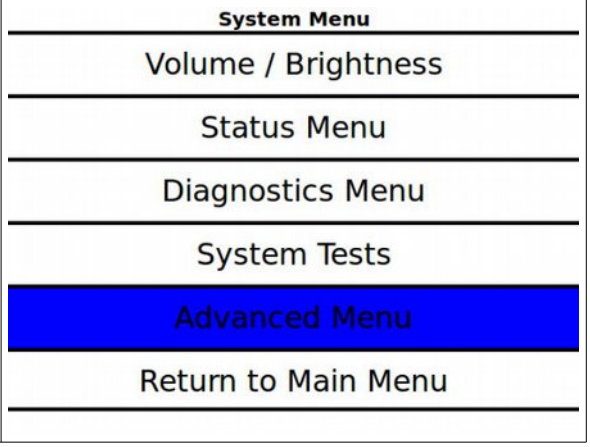
Make sure to update the machine ECU software for Australian configuration using the Manitou pad.

Complete the system checklist once installation has been completed.

Sensor Calibration

Once the installation is complete, the sensors will require calibration.

A sensor calibration must be performed once the cable reeler and CPIM have been mounted. If the cable reeler or CPIM have been moved/repositioned a recalibration must be performed

Step	*Description*	*Diagram*
1.	Press Enter on the user control dial to enter the menu system. Press the arrow buttons to select System Menu. Press Enter to select the menu.	
2.	Select Advanced Menu	

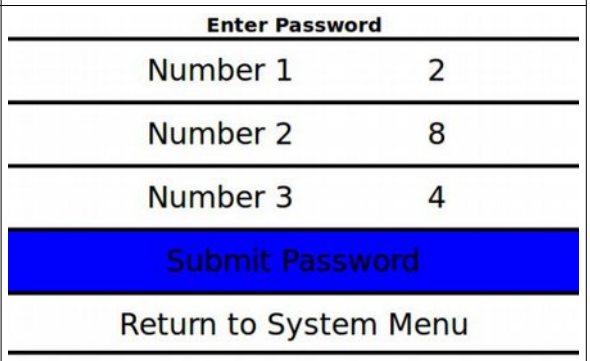
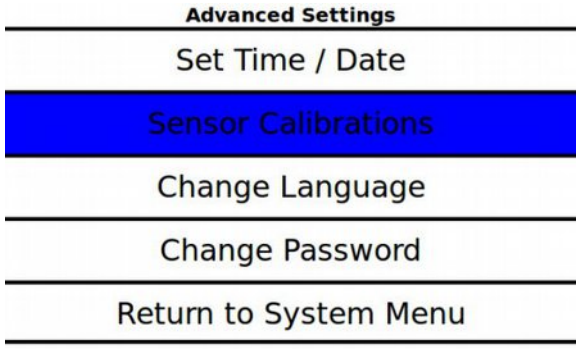
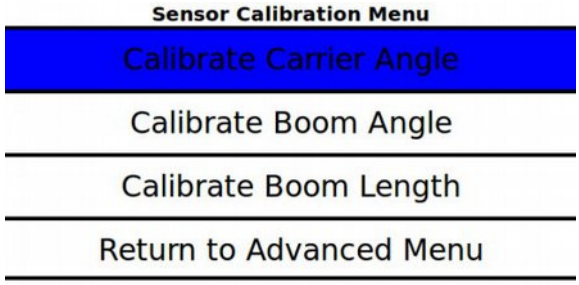
Step	*Description*	*Diagram*
3.	Enter the password (Default Password: 2-8-4)	
4.	Select Sensor Calibrations	
5.	Select Calibrate Carrier Angle and then follow the instructions on the screen to complete the calibration. Repeat for Calibrate Boom Angle and Calibrate Boom Length.	

Table 21: Sensor Calibration

Indexes and Tables

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