eqss™ Gen-3 LMS
Telehandler Load Management System

Installation Manual for JCB 525-60

PLEASE NOTE:

*****Do Not Swap Components between Gen3-LMS kits*****

When installing multiple Gen3-LMS kits, make sure the serial number on the sticker matches the serial number on the machine.

*****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.

Important Information

Information contained in this publication regarding this device's applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that the application or our equipment meets with your specifications.

EQUIPMENT SAFETY SYSTEMS MAKE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO, IT'S CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE.

Equipment Safety Systems disclaims all liability arising from this information and its use. Use of Equipment Safety Systems' products as critical components in life support systems is not authorised except with express written approval by Equipment Safety Systems. No licenses are conveyed, implicitly or otherwise, under any Equipment Safety Systems intellectual property rights.

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
- Hole saw
  - 31 mm
  - 34 mm

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 Head Pressure Sensor
3	Compensation Pressure Sensors
4	Can Pressure Input Module (CPIM)
5	Forward Camera
6	Reverse Camera
7	Light Tower
8	Can Cabin Interface Module (CCIM)
9	Display Module
10	User Control

Table 1: Component Installation Index

Colour	*Cable Description*
Red	Boom Cable
Dark Green	Main Cylinder Head Pressure Sensor Cable
Dark Blue	Compensation Cylinder Pressure Sensors Cables
Light Blue	Forward Camera Cable
Violet	Light Tower Cable
Aqua	Rear Camera Cable
Dark Purple	CCIM Cable
Light Green	Cutout Harness
Orange	User Control Cable

Table 2: Cable Installation Index

Illustration 1: Machine Boom

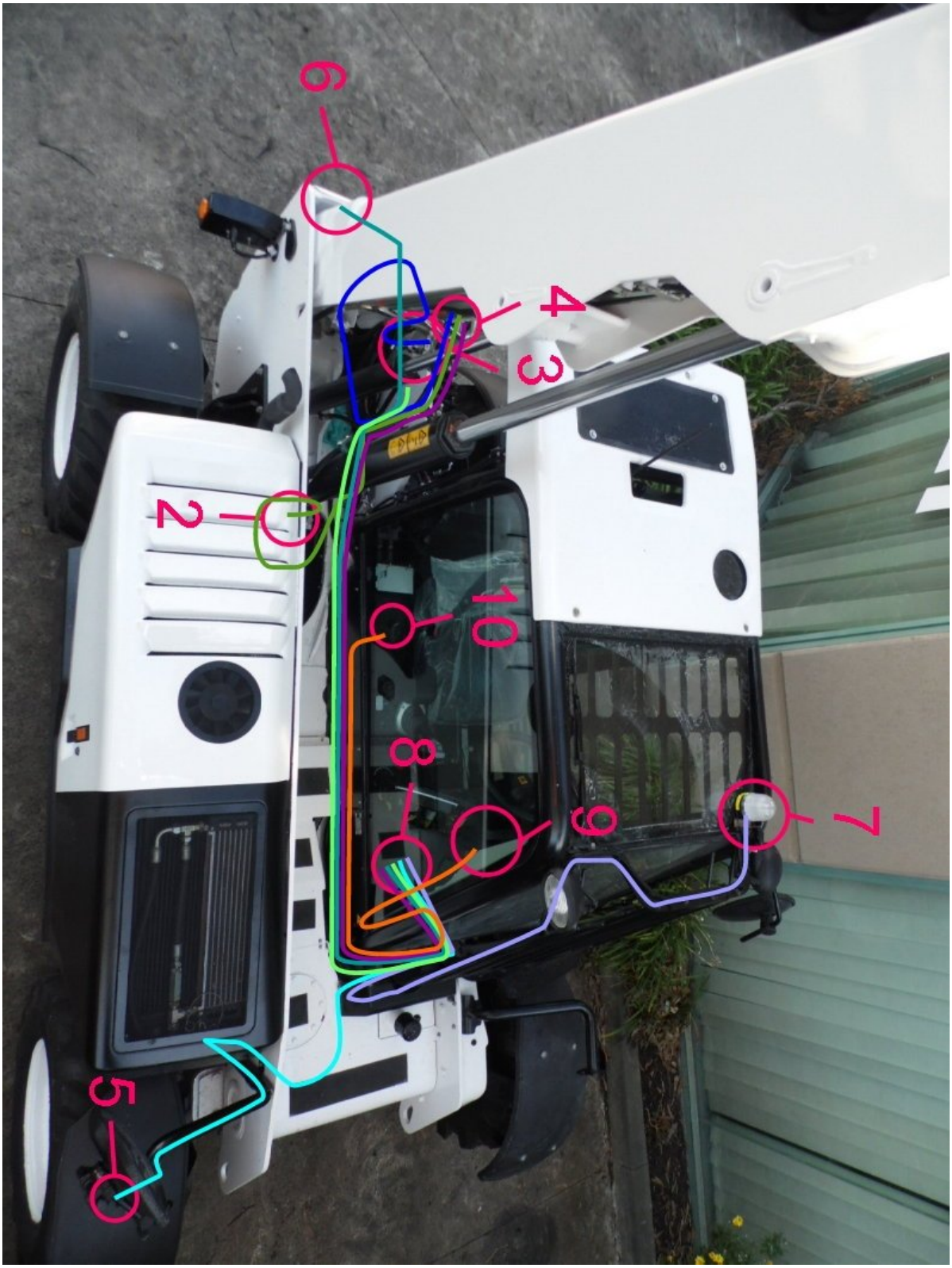


Illustration 2: Machine Chassis

Covers

Remove the following covers before starting the installation

Step	*Description*	*Diagram*
1.	Release the dashboard display bolts Remove the indicator display behind the steering wheel	
2.	Remove the top section of the dashboard	
3.	Remove the cover located between the front of the cabin and the front left wheel	

Step	Description	Diagram
4.	Remove the cover beside the cabin under the boom	
5.	Remove the cover on top of the chassis at the front of the machine	
6.	Remove the top and side covers for the hydraulics behind the cabin.	

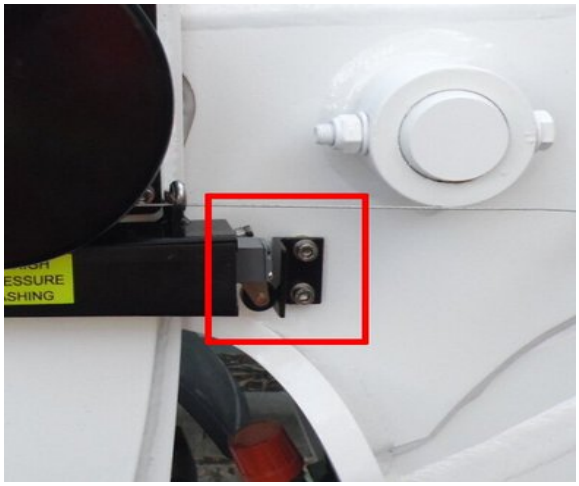
Table 3: Cover removal

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 M6 x 12 mm 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 secure the cable to the anchor.	

Step	*Description*	*Diagram*
3.	Drill and tap the M6 holes for the stow switch trigger. Ensure the stow switch is pressed when the boom is retracted. Mount the stow switch trigger using the supplied M6 x 16 mm bolts and standoffs.	
4.	Connect the supplied M12 10 metre cable (CB001027) into the cable reeler connection.	

Step	Description	Diagram
5.	Run the cable along the hydraulic pipes running down the boom, secure using cable ties every 150 mm to 200 mm. 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 cable towards the cabin and cable tie with the other cables during External Cable Completion on page 29.	

Table 4: Cable Reeler Installation

Cable Reeler Mounting Position

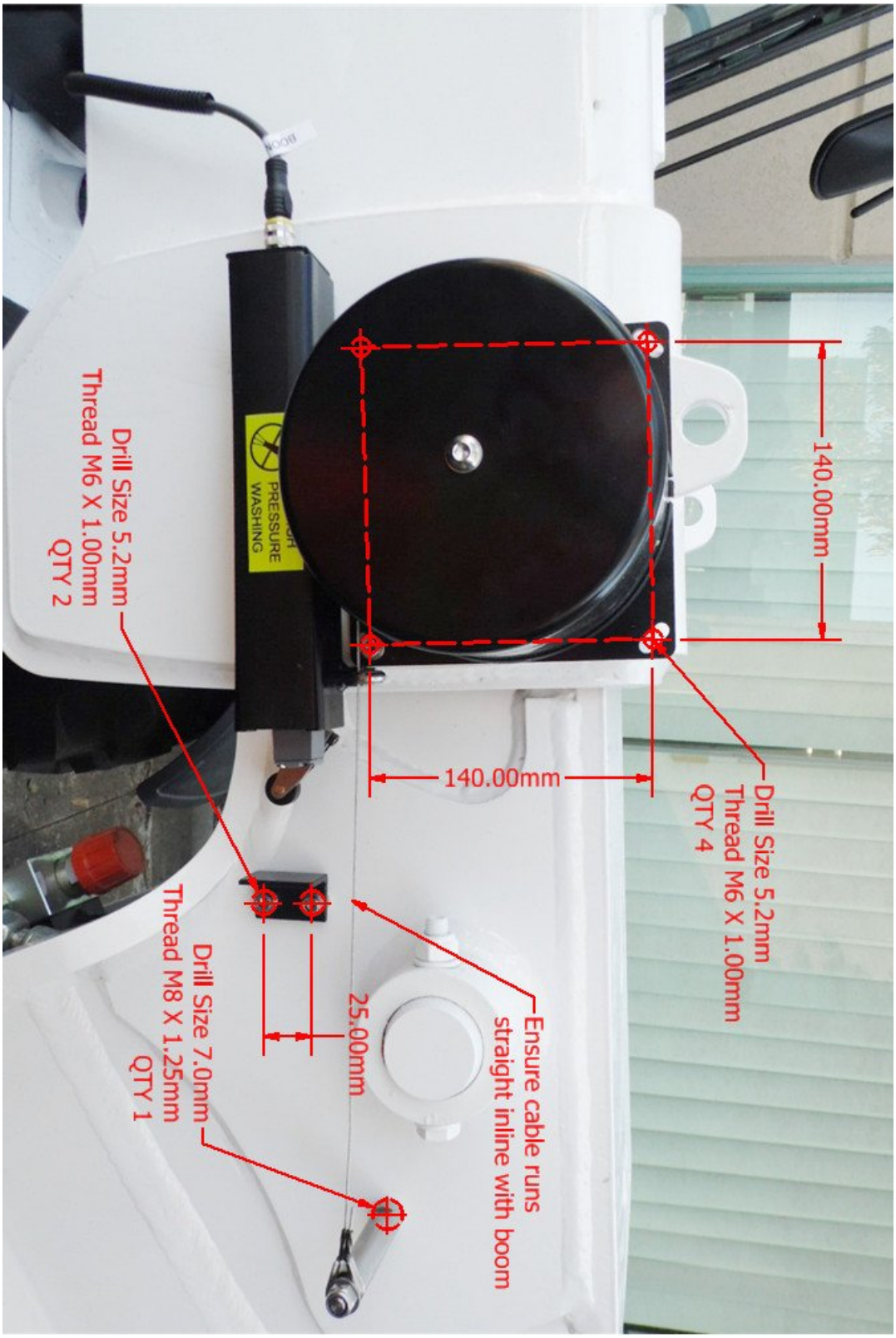


Illustration 3: Cable Reeler Mounting Position

Pressure Sensor Installation

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

Pressure Manifold

Step	*Description*	*Diagram*
1.	Raise the boom to approximately 40 degrees. 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 90 mm bolts and seals. Tighten the **12.9 grade** bolts for the manifold to **41 NM** using a torque wrench. **Start the machine, pressurise the boom and check for leaks.**	

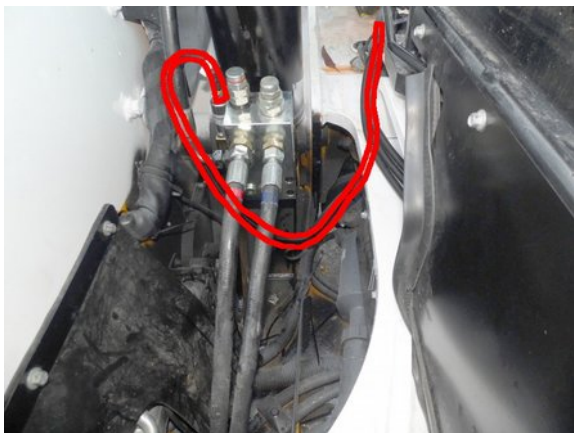
Step	Description	Diagram
2.	Connect the supplied M12 4 metre cables (CB001026) into the pressure sensor. Cable tie the head pressure sensor cable to the flexible hydraulic hoses connected to the main lift cylinder. Make sure the cable isn't pinched or stretched when the boom is raised or lowered. Run the cable towards the rear of the machine and cable tie with the other cables during External Cable Completion on page 29.	

Table 5: Pressure Manifold Installation

Main Rod Pressure Sensor

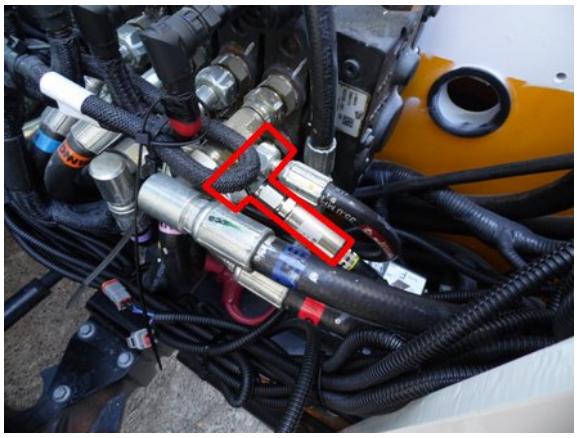
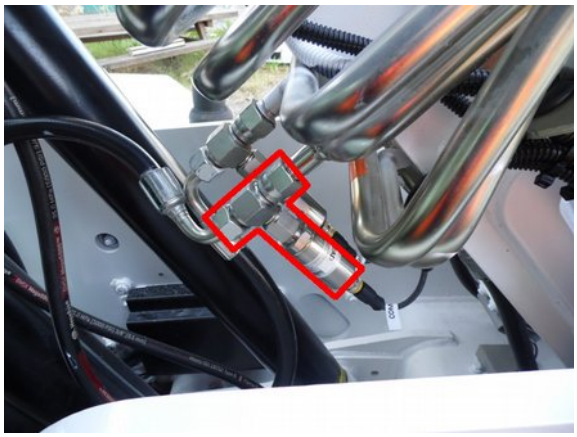
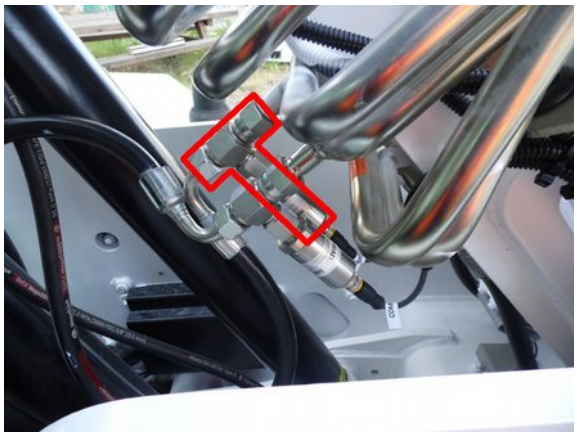
Step	*Description*	*Diagram*
1.	Remove the main rod hydraulic hose connection (red label) into the hydraulic spool assembly behind the cabin. Install the main rod pressure sensor tee connection in between the hydraulic spool assembly and the main rod hydraulic hose. **Start the machine, pressurise the boom and check for leaks.** Connect the supplied M12 4 metre cables (CB001026) into the pressure sensor. Cable tie with the other cables during External Cable Completion on page 29.	 View from behind the cabin towards the rear of the machine

Table 6: Main Rod Pressure Sensor Installation

Compensation Pressure Sensors

Step	*Description*	*Diagram*
1.	Undo the hydraulic connection for the head compensation where the flexible hydraulic line from the compensation cylinder is connected into the fixed hydraulic pipes under the boom behind the cabin. Install the supplied tee piece so the pressure sensor points towards the rear of the machine.	 View from behind the cabin towards the boom
2.	Undo the hydraulic connection for the rod compensation where the flexible hydraulic line from the compensation cylinder is connected into the fixed hydraulic pipes under the boom behind the cabin. Install the supplied tee piece so the pressure sensor points towards the rear of the machine. **Start the machine, pressurise the boom and check for leaks.**	 View from behind the cabin towards the boom

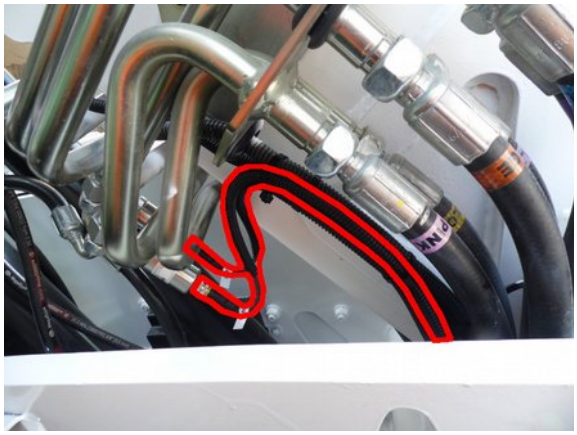
Step	*Description*	*Diagram*
3.	Connect the supplied M12 4 metre cables (CB001026) into each of the pressure sensors. Run the cables along the fixed and flexible hydraulic hoses on the boom down to the chassis. Run the cable towards the rear of the machine and cable tie with the other cables during External Cable Completion on page 29. **Ensure the pressure sensors and cables do not collide with the boom and chassis structures and the cables do not stretch or pinch when the boom is raised and lowered.**	

Table 7: Compensation Pressure Sensor Installation

Angle the tee connections to ensure the hydraulic connections and pressure sensor do not hit the boom when the boom is lowered

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.

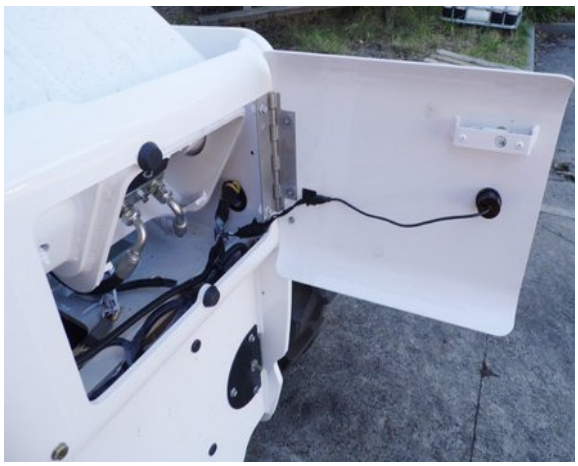
Step	*Description*	*Diagram*
1.	Drill a 31mm hole in the location shown. Making sure to leave enough room for a license plate. Insert the camera through the hole and adjust the angle using the alignment washers.	
2.	Connect the camera power and signal connectors to the supplied 5m camera cable (CB001032). Note; The white connector is not used. Place the supplied cable tie point in the location shown to secure the cable to the chassis. Secure the camera cable to the cables running behind the boom. Ensure there is enough slack in the cable to allow the rear door to be opened. Run the remainder of the cable towards the cabin and cable tie with the other cables during External Cable Completion on page 29.	

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.

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 same path as the headlight cable, run it through the headlight post, then under the chassis to the side of the cabin. Cable tie during External Cable Completion on page 29.	

Table 9: Forward Camera Installation

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

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 in the top left corner on top of the roof. Used the supplied bolt, nut and washers to secure the light tower.	 View from on top of the cabin
2.	Run the cable along the top then down the side of the windshield guard and cable tie down towards the chassis. Cable tie during External Cable Completion on page 29.	

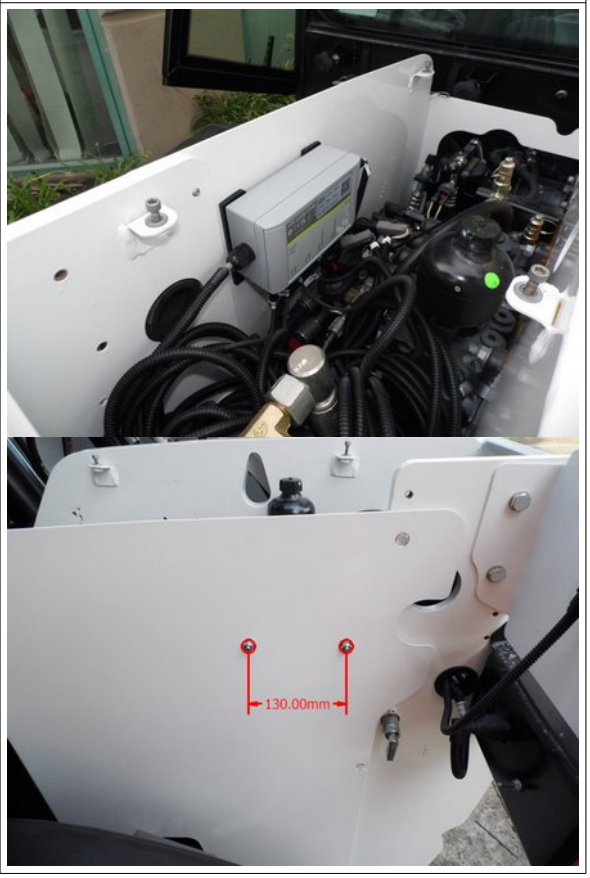
Table 10: Signal Light Installation

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 cover protecting the boom hydraulic block behind the cabin. Mount using the supplied M8 x 20mm bolts and washers. Ensure the side cover can be reinstalled without hitting the CPIM or cable connectors.	

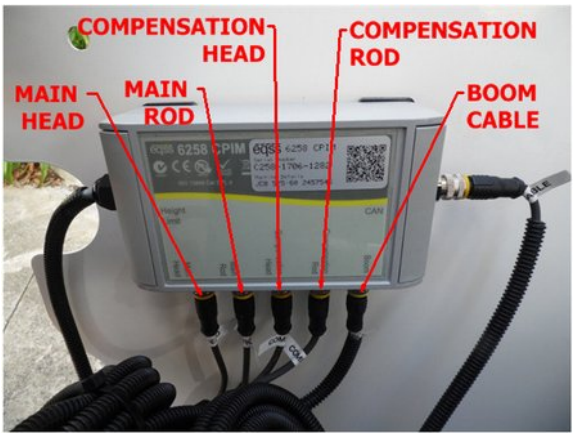
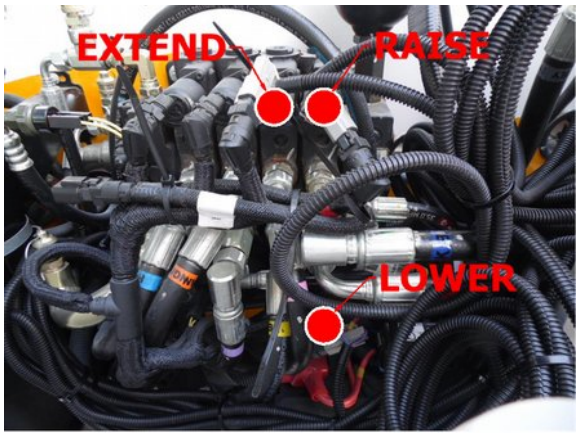
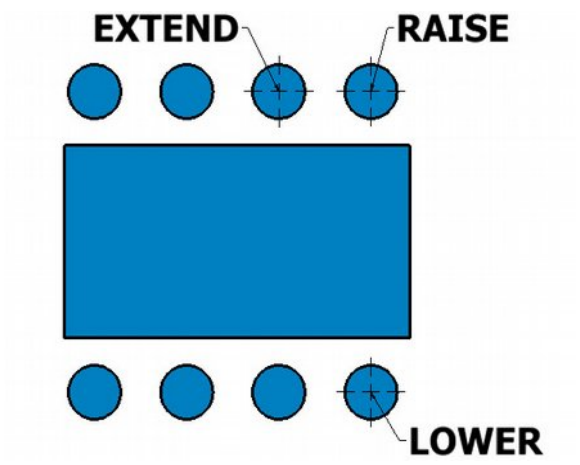
Step	Description	Diagram
2.	Rest the side cover on the rear axle between the rear left wheel and chassis. Connect the cables for the pressure sensors and boom cable to the CPIM according to the picture shown. Connect the supplied M12 4 metre cable (CB001026) into the connection out of the right side of the CPIM for the CCIM cable. Run the CCIM cable towards the cabin.	
3.	Run the height limiter cable from out the left side of the CPIM to the hydraulic block behind the cabin. Connect the tee connector labelled “Raise” from the height limiter cable to the boom raise (top right) connector on the hydraulic block and the tee connector labelled “Extend” from the height limiter cable to the boom extend (top second from right) connector on the hydraulic block. Place a single cable tie to hold each cable position then disconnect the tee's from the raise and extend connectors, otherwise the boom will not move. Complete the cable installation during External Cable Completion on page 29.	 

Table 11: Can Pressure Input Module (CPIM) Installation

Cutout Cable Harness

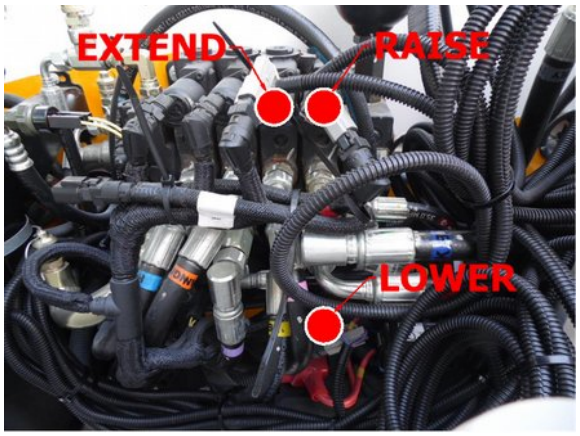
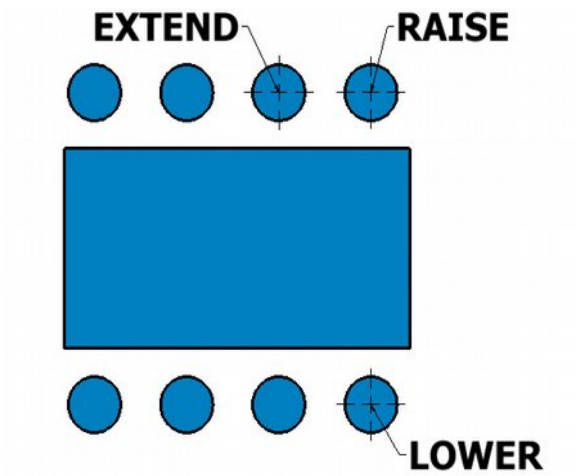
Step	*Description*	*Diagram*
1.	Connect the tee connector labelled from the machine cutout harness to the boom lower (bottom right) connector on the hydraulic block. Place a single cable tie to hold each cable position then disconnect the tee from the boom lower connectors, otherwise the boom will not move. Complete the cable installation during External Cable Completion on page 29.	 

Table 12: Cutout Cable Harness Installation

For further details on running the cutout cable harness refer to the Installation Index on page 6

User Input Control

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

Step	*Description*	*Diagram*
1.	Drill a 34 mm hole into the plate below the joystick next to the seat in the cabin. Install the user input control dial in the dashboard, aligned so the Enter cap is facing up. Complete the cable installation during External Cable Completion on page 29.	

Table 13: User Input Control Installation

External Cable Completion

All external cabling is completed in this step.

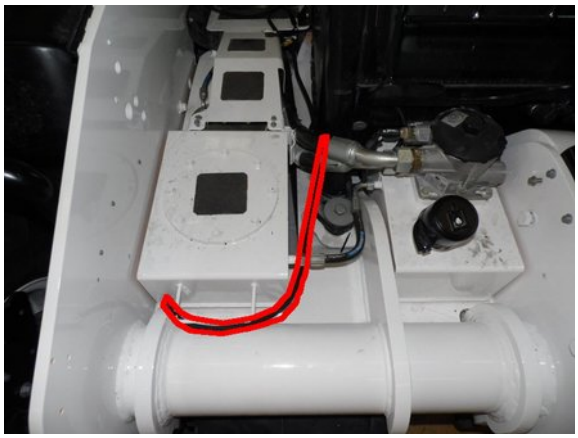
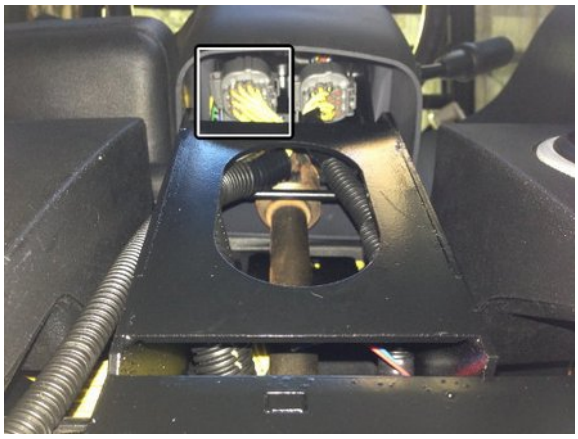
Step	*Description*	*Diagram*
1.	Locate the reverse camera, cutout, user control and CCIM cables at the rear of the machine and cable tie to the existing snake tube and hydraulic lines running towards the front of the cabin. Coil up any additional cable and store beside the hydraulic block at the rear of the machine.	 View from under the boom towards the rear of the machine
2.	At the front of the machine cable tie the front camera cable from out of the bottom of the headlight post through the hole on top of the chassis and run towards the front of the cabin.	
3.	Run the CCIM, signal light, cutout, user control and camera cables through the hole into the cabin following the existing wire harnesses.	

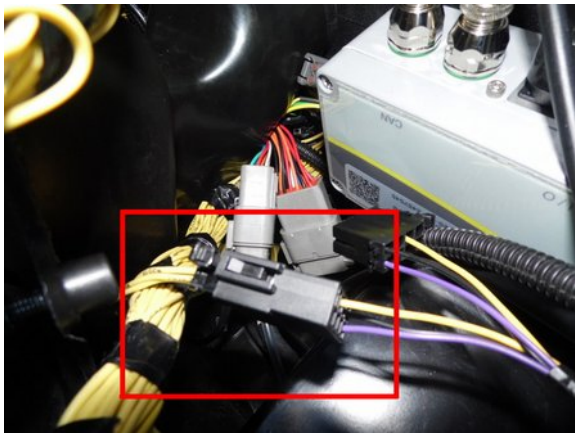
Table 14: External Cable Completion

Machine Connections

The following procedures connect the safety systems to the existing electronics in the machine.

Isolate the main battery before starting the machine connections

Step	*Description*	*Diagram*
1.	Splice the following wire colours from the machine input harness with the 4 pin connector into the connector for the left steering column switch. Note: Remove the steering wheel height adjustment lever, to move the steering wheel higher, to get better access to the switch connector Wire Colour — Wire Number Orange — 416F Red — 416R	
2.	Run the 12 pin tee connector out the hole in the cabin to the chassis. Note: The red and white terminals in the 12 pin tee connectors will need to be removed to fit the cable through the cabin hole. Reconnect the red terminals back into pin 2 and the white terminals back into pin 3 of the tee connector. Connect the 12 pin tee connector to the joystick connection.	

Step	Description	Diagram
3.	Attach the radio power harness to the radio connector. Note: If the radio connector is not installed in the machine. Cut off the tee connectors from the radio power harness and splice into the 4 pin radio power connector located under the dashboard according to the table below. Wire Colour — Wire Number Black — 601AG Red — 181 Yellow — 301F	 
4.	Reinstall the top section of the dashboard	

Step	*Description*	*Diagram*
5.	Remove a blanking switch plate from the dashboard and install the override switch. Connect the spade terminals on the green and yellow wires from the machine input harness with the 4 and 12 pin connectors into the override switch mounted in the dashboard.	

Table 15: Machine Connections

Can Cabin Interface Module (CCIM)

The CCIM connects the system into the machine electronics.

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 Power/Camera and IO Harnesses to the bulkhead connectors on the CCIM. Position the CCIM underneath the dashboard using double sided velcro tape. Note: Make sure to leave enough room for the connectors and ensure that the dashboard displays can be reinstalled and a radio fitted.	
3.	Install the backup battery behind the indicator display using double sided velcro tape.	

Table 16: CCIM Installation

Display Installation

The display shows the current safety status of the telehandler.

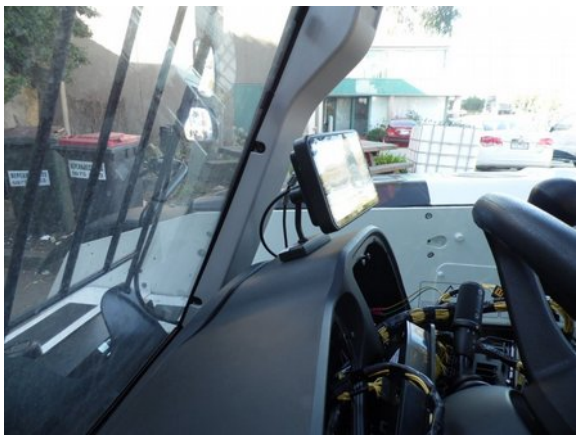
Step	*Description*	*Diagram*
1.	Position the display bracket in the top right of the dashboard in the approximate location shown. Drill two 7 mm holes to attach the bracket to the dashboard. Secure the bracket to the dashboard using the supplied large washers and nuts Attach the display to the bracket and tighten the grub screw	

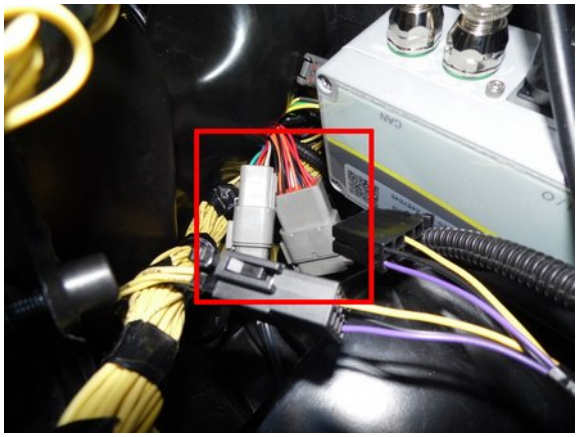
Table 17: Display Installation

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

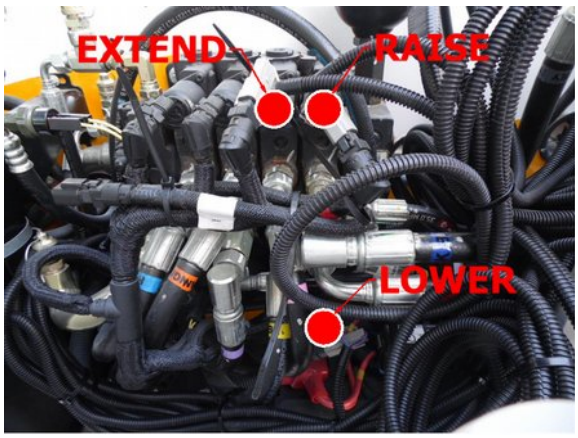
Finalisation

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

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

Step	*Description*	*Diagram*
1.	Connect the 4, 6 and 12 pin connectors from the machine input and cutout harnesses into the I/O harness.	
2.	Connect the camera power and signal cables from the front and rear cameras to the power/camera harness connectors. Note: The white connector is not used.	

Step	*Description*	*Diagram*
3.	Connect the 3 pin connector from the radio power harness into the power/camera harness.	
4.	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.	
5.	Coil up the extra cables and store underneath the dashboard cover.	

Step	*Description*	*Diagram*
6.	Reconnect the tee connectors back into the hydraulic block.	
7.	Reconnect the main battery from the isolation switch. Turn the machine onto first stage /accessories and ensure the system is activated.	
8.	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.	

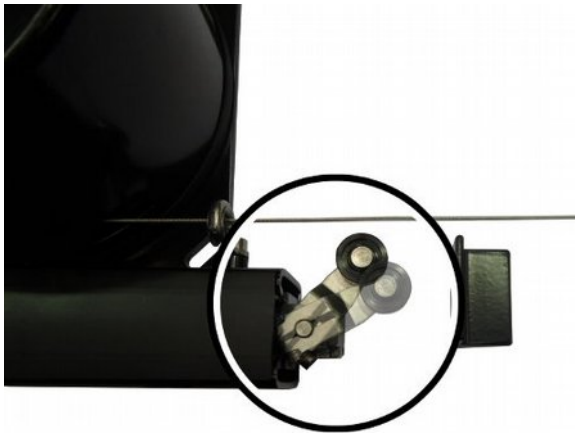
Step	Description	Diagram
9.	Operate the boom movement controls to test if a false N07 fault occurs. If a N07 fault does occur, adjust the arm on the stow switch forwards towards the stow switch trigger. Note: The actual switch arm orientation may differ from the picture.	
10.	Perform a final check on all the cabling and sensors. Replace all the covers	

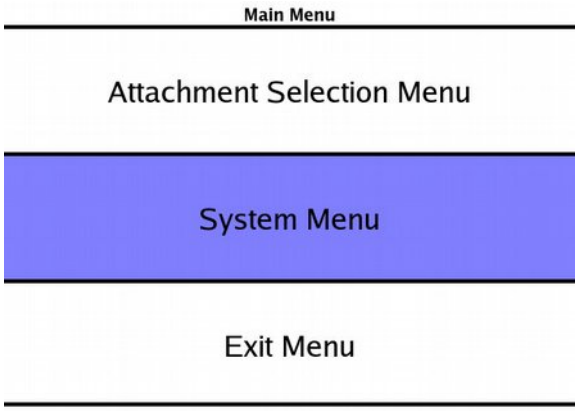
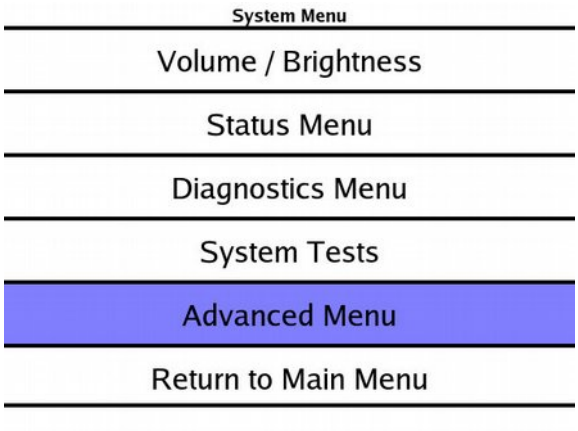
Table 18: Finalisation

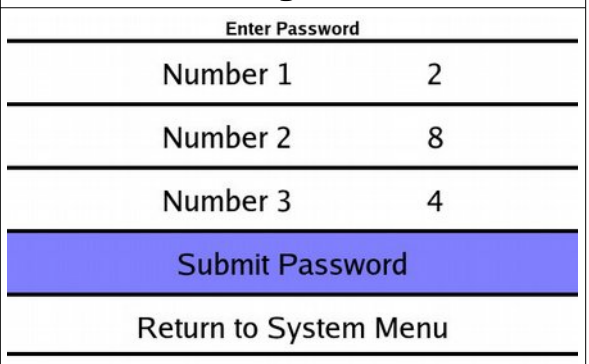
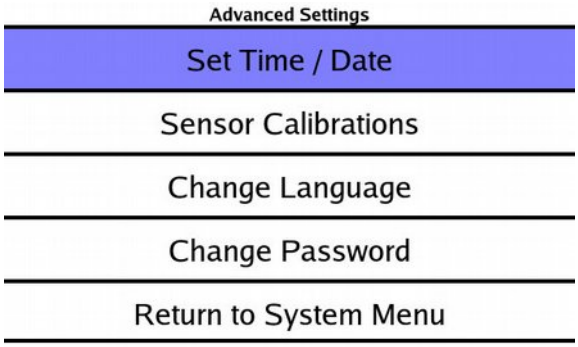
Complete the system checklist once installation has been completed.

Set Time & Sensor Calibration

Once the installation is complete, the time will need to be set and 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 Set Time / Date	
5.	Enter the correct time and date for your area. Press the arrow keys to select a time/date parameter Press Enter and the parameter will change to red, press the arrow keys to change the value and then press the Enter key to store the value. Note: The hour parameter is in 24 hour clock Repeat for the rest of the time values	

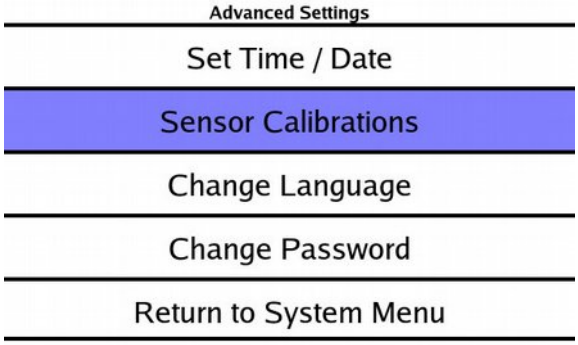
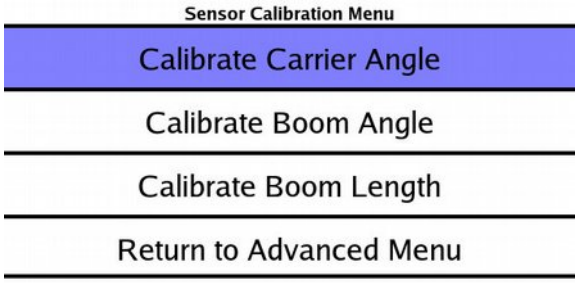
Step	Description	Diagram
6.	Scroll to the next page and select Save to store the new time/date and return to the Advanced Menu.	
7.	Select Sensor Calibrations	
8.	Select Calibrate Carrier Angle and then follow the instructions on the screen to complete the calibration. Repeat for Calibrate Boom Angle and Calibrate Boom Length.	

Table 19: Sensor Calibration

Appendix A: Attaching Display Connectors

The procedure below describes the correct method of attaching the cables to the screw lock connectors on the display.

> If the M12 screw lock connectors on the display are over tightened, it will twist the connector pins attaching the connector to the PCB.

Step	*Description*	*Diagram*
1.	Connect the cable from the user control to the top 5 pin connector on the display. Connect the cable from the CCIM to the bottom 8 pin connector on the display.	
2.	Line up the alignment hole on the cable connector with the alignment notch on the display connector.	

Step	*Description*	*Diagram*
3.	Push the female connector from the cable into the male connector on the display.	
4.	Rotate the nut on the female connector by hand in a clockwise direction, until the tension on the nut starts to increase.	
5.	Push the cable in again and repeat steps 3 and 4 until the connector is secure.	

Table 20: Install Display Connector Procedure

The method to correctly secure the cable is to push-twist-push-twist until the connector is fully inserted and secure. This will minimise the twisting force applied to the connector.

Below is a picture of a damaged connector on the PCB inside the display. This damaged occurred because the connector was over tightened.

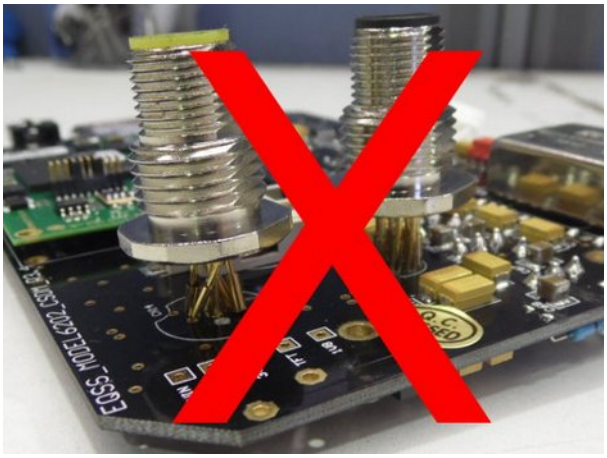


Illustration 4: Damaged Display Connector

Do not use any tools to tighten the connector.

Illustration 5: Do Not Use Tools To Tighten Connector

Do not over-tighten the nuts on the back of the display connectors. These nuts should only be hand tightened. If the nuts are overtightened it will damage the PCB inside the display.

Illustration 6: Do Not Over Tighten Nuts

Damage to the display connectors is not covered under warranty.

Appendix B: Reattach Ferrites

If the clip-on ferrites on the displays are removed during installation, they will need to be reattached as shown in the procedure below.

> If the ferrites are not reinstalled or attached in the specified location the Gen3-LMS kit will not meet the AS/NZS CISPR 22:2006 certification.

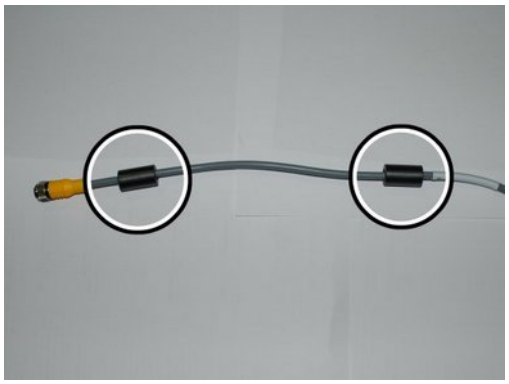
Step	*Description*	*Diagram*
1.	Attach the two clip-on ferrites at a location of 60 mm and 260 mm from the start of the connector to the start of the ferrite. Do this for both the CCIM and user control cables that plug into the display.	

Table 21: Reattach Ferrites Procedure

Indexes and Tables

Illustration Index

Index of Tables

Equipment Safety Systems Pty. Ltd. ABN: 31 061 789 151
27 Cumberland Drive, Seaford 3198, Victoria, Australia

Tel: +61 3 8770 6555
Fax: +61 3 8770 6590
Web: www.eqss.com.au