eqss™ Gen-3 LMS
Telehandler Load Management System

Installation Manual for TL35.70

WARNING!
DO NOT HIGH PRESSURE WASH ANY OF THE GEN3 COMPONENTS. FAILURE TO FOLLOW THIS WARNING WILL VOID WARRANTY

*****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in this publication regarding this device's applications and the like is provided only for your convenience and may be superseded by updates.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.

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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
  - 6.8 mm
  - 8.5 mm
- Centre punch
- Tap T-Handle
- Taps
  - M6
  - 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
- Torque Wrench

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	Cutout Connections
6	Lock Pin Release Connection
7	Forward Camera
8	Signal Light
9	Rear Camera

Table 1: Component Installation Index

Colour	*Cable Description*
Light Purple	Boom Cable
Dark Green	Main Cylinder Pressure Sensor Cables
Dark Blue	Compensation Cylinder Pressure Sensors Cables
Red	Cutout Harness
Orange	Lock Pin Release Harness
Light Green	Forward Camera Cable
Brown	Signal Light Cable
Light Blue	Rear Camera Cable
Dark Purple	CCIM 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.	Remove the rear covers and disconnect the license plate light.	
2.	Remove the side panel next to the cabin under the boom.	
3.	Remove the cover under the steering wheel.	

Step	*Description*	*Diagram*
4.	Undo the bolts attaching the dashboard.	

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 the holes for the cable reeler mounting plate according to the mounting diagram on page 13. Mount using the supplied M8 x 30 mm bolts, nuts 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 M6 x 12 mm bolts and washers. Adjust the length of the trigger plate to ensure the stow switch is pressed when the boom is retracted.	

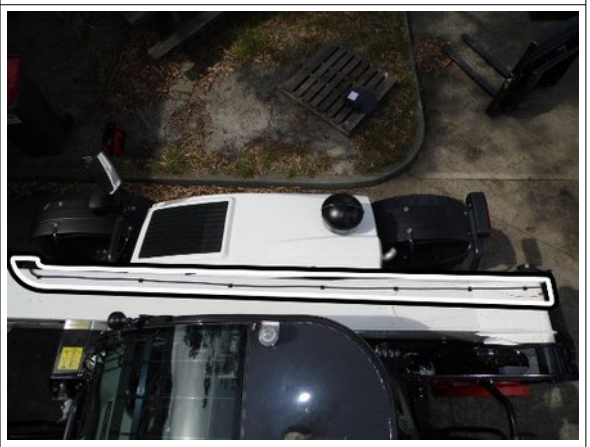
Step	Description	Diagram
4.	Connect the supplied M12 10 metre cable (CB001027) into the cable reeler connection.	
5.	Run the cable down the top of the boom, place cable tie points every 500 mm down the boom and secure the cable to the cable tie points. Cable tie to the flexible hydraulic hoses down to the chassis. Make sure the cable isn't pinched or stretched when the boom is raised or lowered. Cable tie with the other cables during External Cable Completion on page 26.	 

Table 4: Cable Reeler Installation

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

Cable Reeler Mounting Position

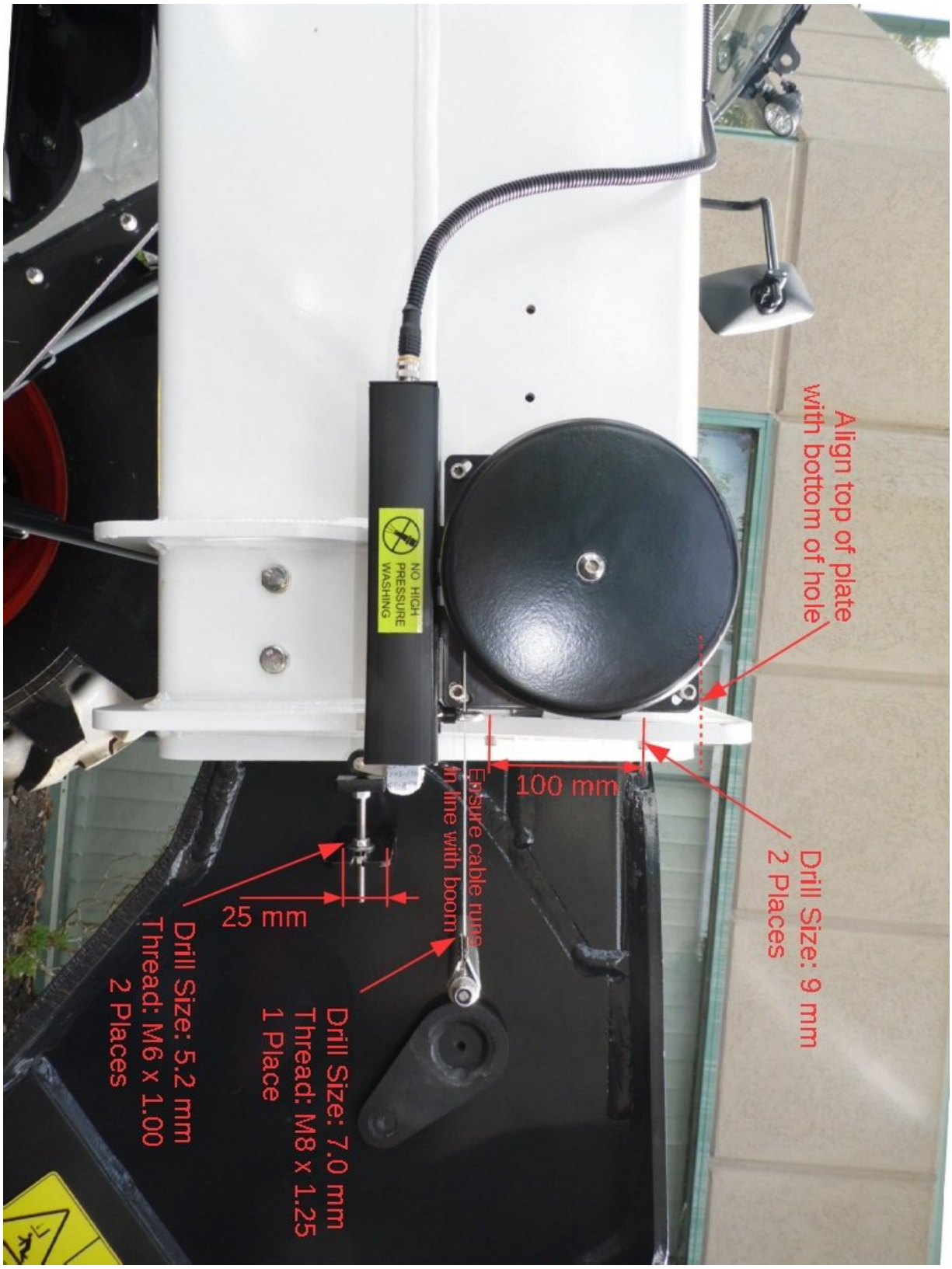


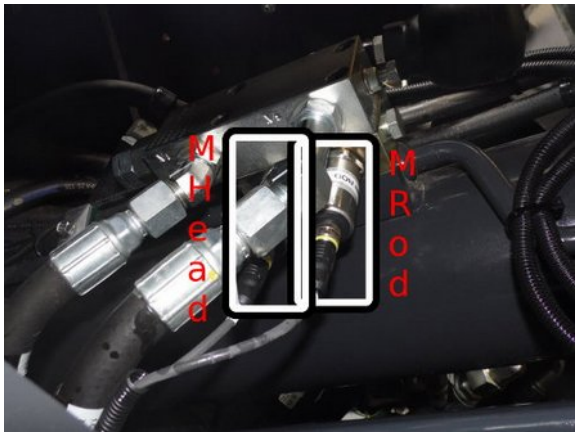
Illustration 3: Cable Reeler Mounting Position

Pressure Sensor Installation

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

Pressure Manifold

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.

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 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.**	   Use lube on seals to hold in place during mounting

Step	Description	Diagram
2.	Connect the supplied M12 4 metre cables (CB001026) into each of the pressure sensors. Cable tie the 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 cables towards the rear of the machine and cable tie with the other cables during External Cable Completion on page 26. **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 5: Pressure Manifold Installation

For further details on running the pressure sensor cables refer to the Installation Index on page 6

Compensation Pressure Sensors

Step	*Description*	*Diagram*
1.	Undo the flexible hydraulic hose connection into the top port on the compensation manifold block. Install the supplied head pressure sensor and tee connections and reconnect the flexible hydraulic hose. Ensure the pressure sensor and the hydraulic hose connections are against the side of the chassis, to ensure they don't hit the boom when at lower boom angles.	 View from under the boom behind the rear left wheel. Note: Boom suspension counterbalance manifold block shown
2.	Undo the flexible hydraulic hose connection into the rod the compensation cylinder. Install the supplied rod pressure sensor and tee connections and reconnect the flexible hydraulic hose. Adjust the angle of the hydraulic elbow into the rod of the compensation cylinder to take up the slack on the hydraulic hose to ensure it doesn't hit the hydraulic connections into the spool assembly mounted on the chassis. Ensure the pressure sensor is angled to rest against the top of the cylinders, to ensure it doesn't hit the bottom of the boom at minimum boom angle. **Start the machine, pressurise the boom and check for leaks and check for clearance.**	

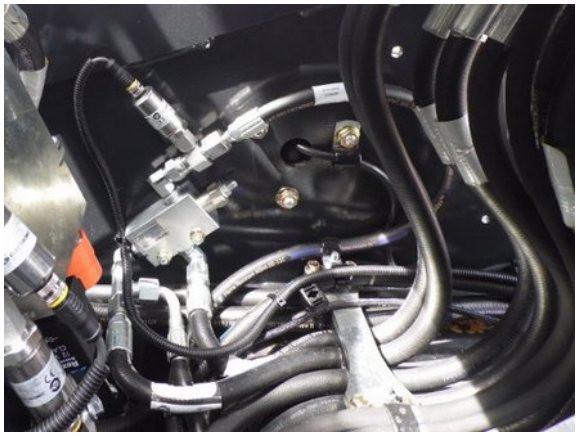
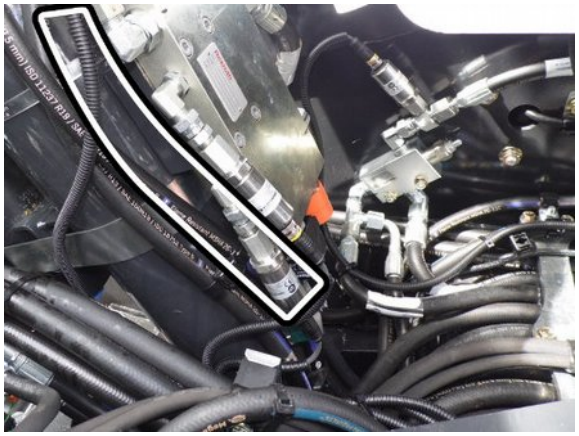
Step	Description	Diagram
3.	Connect the supplied M12 4 metre cables (CB001026) into each of the pressure sensors. Cable tie the rod pressure sensor cable to the flexible hydraulic hoses connected to the main lift cylinder along with the main pressure sensor cables. Make sure the cable isn't pinched or stretched when the boom is raised or lowered. Run the cables towards the rear of the machine and cable tie with the other cables during External Cable Completion on page 26.	 View from under the boom behind the rear left wheel.  View from under the boom behind the rear left wheel. Note: Boom suspension counterbalance manifold block shown

Table 6: Compensation Pressure Sensor Installation

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 in the rear cover. 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.	Place the supplied high pressure warning decal next to the reverse camera.	
3.	Connect the camera power and signal connectors to the supplied 5m camera cable (CB001032). Note; The white connector is not used. Run the remainder of the cable towards the cabin and insert into cabin during External Cable Completion on page 26.	

Table 7: Reverse 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 6

Can Pressure Input Module (CPIM)

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

Accidentally swapping the pressure sensor connections will not damage the system.

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

Step	*Description*	*Diagram*
1.	Drill two M8 holes for the CPIM bracket in the side of the chassis. Mount using the supplied M8 x 30mm bolts, nuts and washers.	
2.	Connect the cables for the pressure sensors and boom cable to the CPIM according to the picture shown. Note: The CCIM cable will be installed during External Cable Completion on page 26.	

Table 8: Can Pressure Input Module (CPIM) Installation

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 to the top of the cabin using the magnetic anchor.	 View from on top of the cabin
2.	Run the cable down between the edge of the windshield and cabin frame to the base of the windshield.	

Step	*Description*	*Diagram*
3.	Drill and tap a M6 hole to mount a p-clip to secure the cable in place between the edge of the windshield and cabin frame. Run the remaining cable through the gap between the front of the cabin to the side of the chassis.	 View from on top of the cabin  View from the front of the machine towards the cabin

Table 9: Signal Light Installation

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.

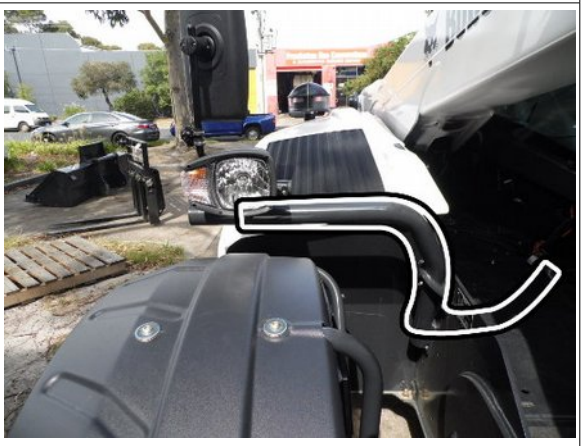
Step	*Description*	*Diagram*
1.	Mount the camera to the side mirror post using the p-clips as shown. Secure using two M6 nuts.	
2.	Connect the camera power and signal connectors to the supplied 5m camera cable (CB001032). Note; The white connector is not used. Run the cable along the same path as the headlight cable through the headlight post. Run the remainder of the cable towards the cabin following the headlight cable and insert into cabin during External Cable Completion on page 26.	

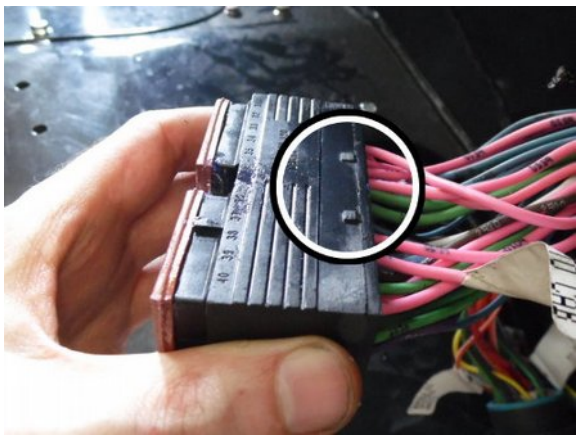
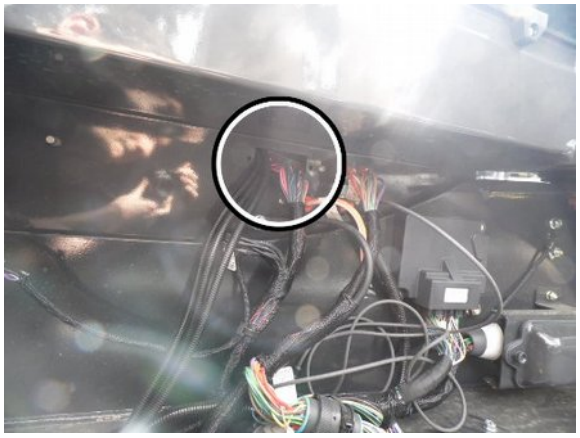
Table 10: Forward Camera Installation

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

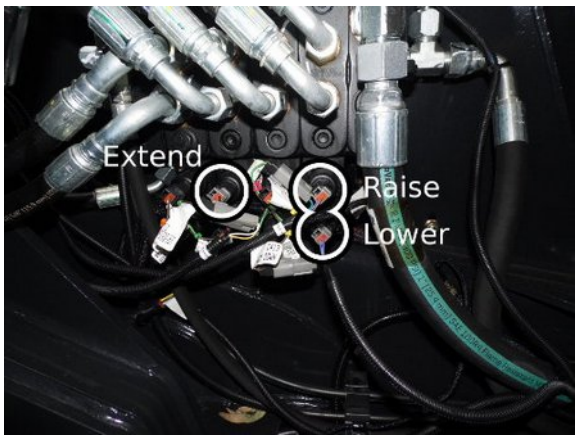
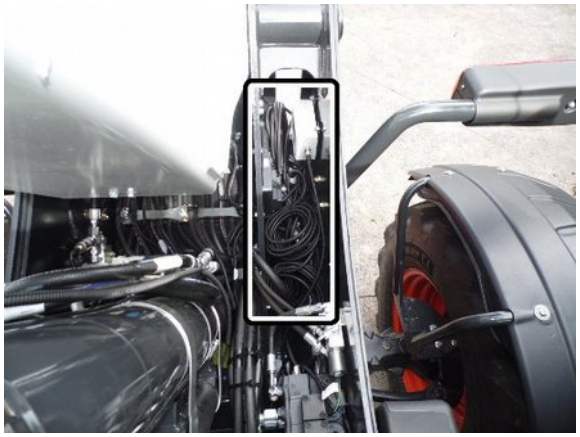
For further details on running the camera cable refer to the Installation Index on page 6

External Cable Completion

All external cabling is completed in this step.

Step	*Description*	*Diagram*
1.	Disconnect the large bulkhead connector into the cabin. File off the six notches on the side of the female connector.	
2.	Remove the mounting bolts attaching the male connector to the chassis. Reconnect the female and male connectors.	
3.	Run the two pin connector pairs from the cutout and lock pin release harnesses through the connector hole from inside the cabin to the outside of the chassis.	

Step	Description	Diagram
4.	Connect the supplied M12 4 metre cable (CB001026) into the right side of the CPIM for the CCIM cable.	
5.	Run the cutout and lock pin release harnesses along the same path under the chassis covers as the existing electrical harnesses towards the spool assembly at the rear of the machine. Run the CCIM and rear camera cables along the same path as the existing electrical harnesses towards and through the hole into the cabin.	
6.	Run the two pin connectors on the lock pin release harness up to the lock pin release solenoid valve and secure in place using cable ties. This will be connected into the solenoid valve during Finalisation on page 38.	
7.	Run the pair of two pin connectors on the height limit cable from out the side of the CPIM module and the two pin connectors from the cutout harness to the spool assembly.	

Step	*Description*	*Diagram*
8.	Connect into the spool assembly as shown and secure in place using cable ties. Once secure remove the connections so that the boom will function. These will be reconnected into the solenoid valves during Finalisation on page 38.	
9.	Coil up the additional cabling for the pressure sensor, CCIM and boom cables and store underneath the CPIM.	 View from behind the cabin
10.	At the front of the machine cable tie the signal light and forward camera together and run towards the cabin.	

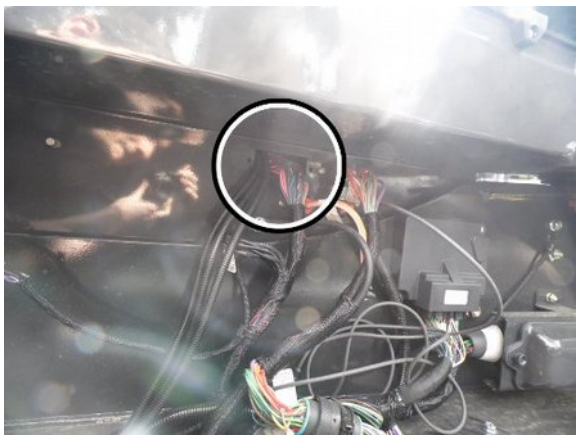
Step	*Description*	*Diagram*
11.	Run the CCIM, signal light and camera cables up through the hole into the cabin. Note: Pull a short length of cable through into the cabin. Store excess cable under the cover on the side of the chassis.	

Table 11: External Cable Completion

Display Installation

The display shows the current safety status of the telehandler.

Step	*Description*	*Diagram*
1.	Remove the rear mirror from the right colomn. Using the supplied M3 screws and bolts, mount the Display Bracket to the same mounting location of the removed rear-view mirror.	
2.	Mount the display to the installed display-bracket and connect the 2 X M12 screw-lock connectors to the back of the display.	

Table 12: Display Installation

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

If the M12 screw lock connectors on the display are over tightened it will twist the connector pins attaching the connector to the PCB. See Appendix A: Attaching Display Connectors on page 48 for the correct method of attaching to the display connectors.

User Control

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

Step	*Description*	*Diagram*
1.	Drill a 39 mm hole into the left switch panel. Install the user control dial in the dashboard, aligned so the Enter cap is facing up.	
2.	If the above location is used for a keypad. Install the user control below the override switch as shown.	

Table 13: User Control Installation

If the M12 screw lock connectors on the display are over tightened it will twist the connector pins attaching the connector to the PCB. See Appendix A: Attaching Display Connectors on page 48 for the correct method of attaching to the display connectors.

Can Cabin Interface Module (CCIM)

The CCIM connects the system into the machine electronics.

Step	*Description*	*Diagram*
1.	Position the backup battery on top of the CCIM using double sided velcro tape. Position the CCIM on the plate above the steering column 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 38.	 View from the from the floor of the cabin towards the steering column

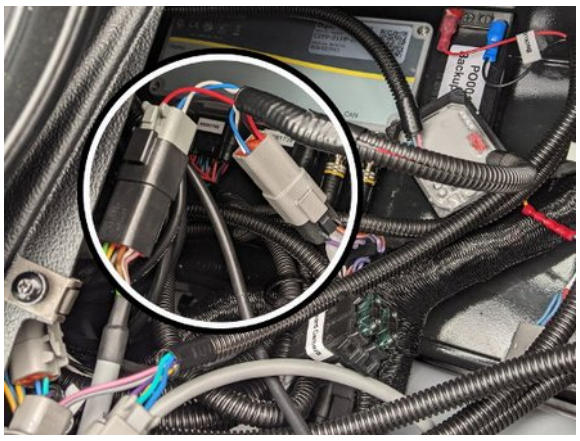
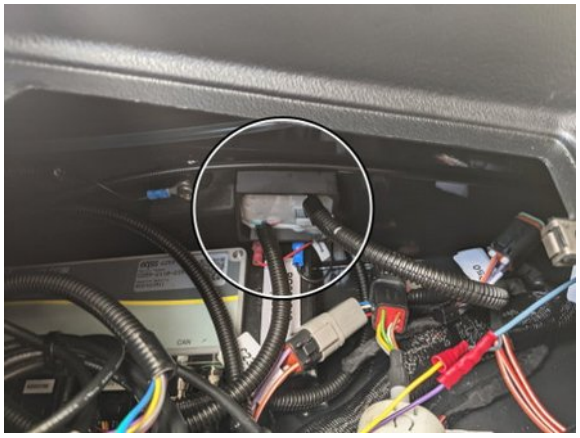
Table 14: CCIM Installation

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

After completing the machine connections the boom can not be moved until the installation is complete

Step	*Description*	*Diagram*
1.	Connect the 6 pin tee connectors from the CAN I/O module harness into the LLMI connector C237.	
2.	Secure the CAN I/O module to the side of the cabin chassis using velcro tape.	

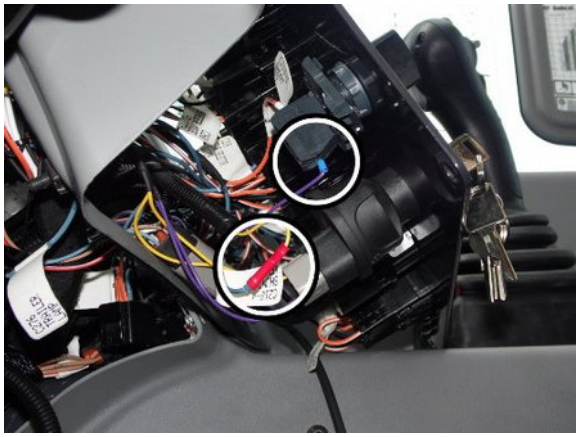
Step	*Description*	*Diagram*
3.	Locate the override switch terminal C218 in the removable dashboard panel. Remove the fork terminal connected to blue wire #3310 from the override switch terminal and replace with the violet wire from the CAN I/O module harness. Cut off the fork terminal on the blue wire #3310 and join to the yellow wire from the CAN I/O module harness.	 View behind the dashboard
4.	Locate the ignition key switch terminal C210 in the removable dashboard panel. Connect the 6 pin tee connection on the power harness into the C210 connector.	 View behind the dashboard
5.	Locate the ground lug near the bulkhead connectors attached to the side of the chassis. Attach the ring lug from the power harness to the ground lug.	 View from the from the floor of the cabin towards the middle of the machine

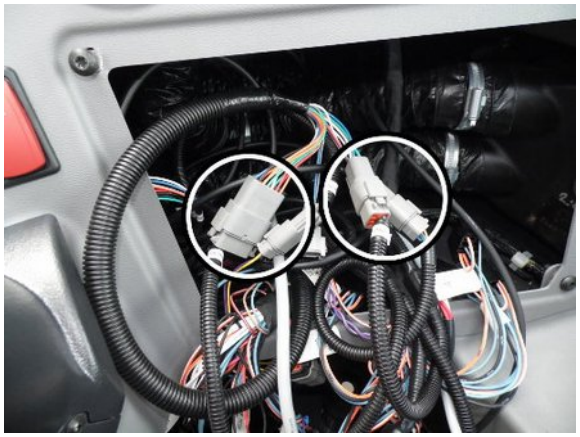
Table 15: Machine Connections

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.

Step	*Description*	*Diagram*
1.	Connect the CCIM and signal light cables to the M12 connectors on the CCIM. Note: It doesn't which of the M12 connectors the CCIM and signal light cables are plugged into.	
2.	Connect the power/camera and IO harnesses to the CCIM bulk head connectors	
3.	Connect the forward and reverse cables to the power/camera harness. Note; The white connector is not used.	

Step	*Description*	*Diagram*
4.	Connect the 4 pin connector from the machine input harness into the IO harness. Connect the 6 pin connector from the machine cutout harness to the IO harness. Connect the 12 pin connector from the lock pin release harness to the IO harness. Note: The 2 pin connection on the IO harness is not used.	
5.	Run the 8 pin CCIM cable and the 5 pin user control cable through the gap between the window and the dashboard. Note: The clip-on ferrites will need to be removed to run the cables through the gap between the window and the dashboard. Reattach the ferrites according to Appendix A: Attaching Display Connectors on page 48.	
6.	Run the cables through snake tube. Place cable tie points on the side of the window. Cable tie the snake tube to the cable tie points. Connect into the 8 pin and 5 pin connectors into the display	

Step	Description	Diagram
7.	Connect the spade lug on the black wire to the negative (black) battery terminal on the backup battery. Connect the spade lug on the blue wire to the positive (red) battery terminal on the backup battery.	

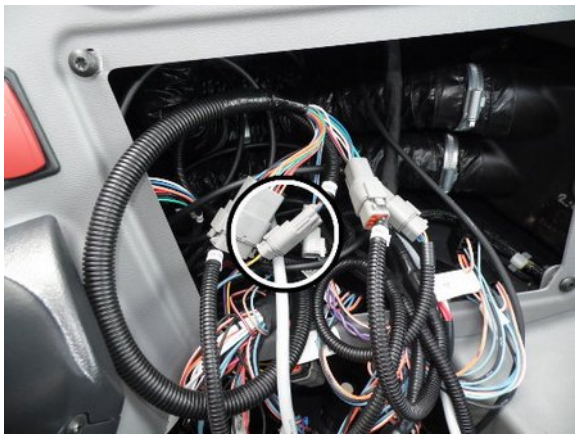
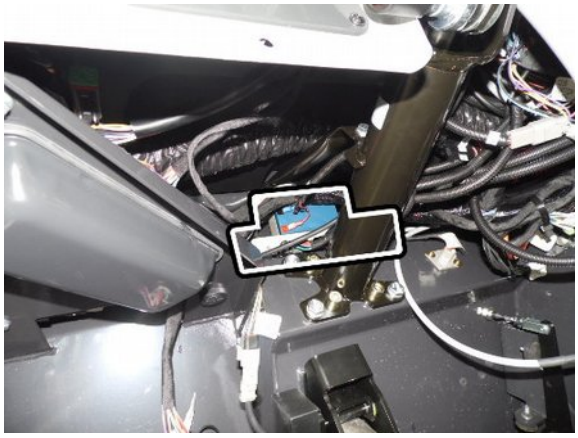
Table 16: Cabin Loom Installation

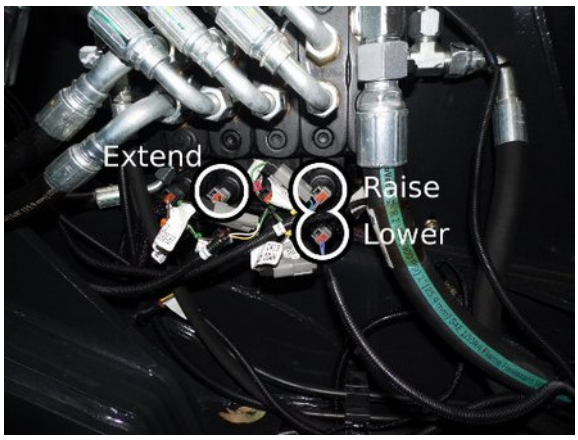
If the M12 screw lock connectors on the display are over tightened it will twist the connector pins attaching the connector to the PCB. See Appendix A: Attaching Display Connectors on page 48 for the correct method of attaching to the display connectors.

If the clip-on ferrites were removed from the CCIM and user control cables. See Appendix B: Reattach Ferrites and page 52 for the correct reattachment position.

Finalisation

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

Step	*Description*	*Diagram*
1.	Connect the 3 pin connector from the radio power harness into the power/camera harness. Coil up and store the wire harnesses under the dashboard.	
2.	Attach the backup battery to the velcro on the CCIM and attach the CCIM to the velcro installed earlier to the cabin chassis	 View from the from the floor of the cabin towards the steering column

Step	*Description*	*Diagram*
3.	Reconnect the tee connectors back into the spool assembly and the lock pin release solenoids.	 View from under the cylinder towards the solenoid connections 
4.	Turn the machine onto first stage /accessories and ensure the system is activated. Adjust the display bracket for optimal viewing Press the top of the Camera switch to active the forward camera. Adjust the forward camera so the front right wheel is visible. Press the bottom of the Camera switch to active the reverse camera. Adjust the reverse camera so the video is level.	

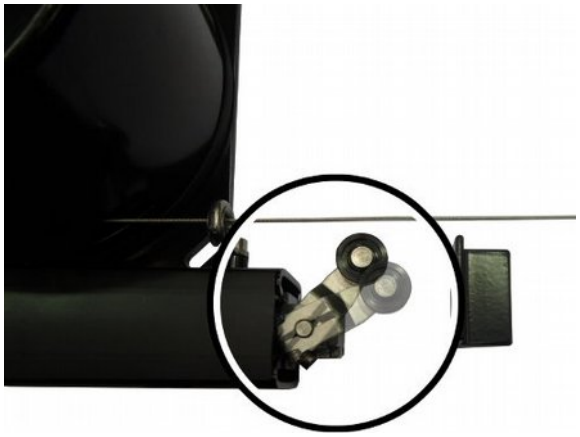
Step	*Description*	*Diagram*
5.	Operate the boom movement controls to test if a false N07 fault occurs. If a N07 fault does occur, adjust the arm on the stow switch forwards towards the stow switch trigger. Note: The actual switch arm orientation may differ from the picture.	
6.	Perform a final check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

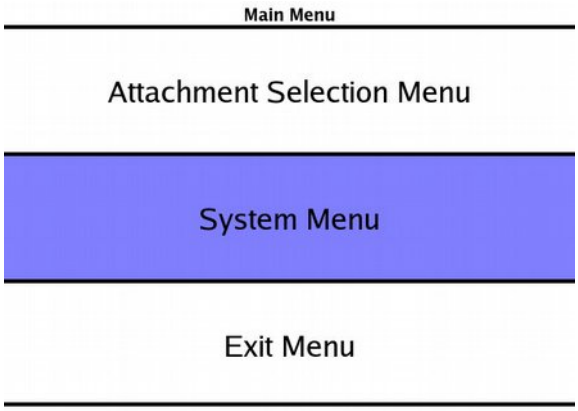
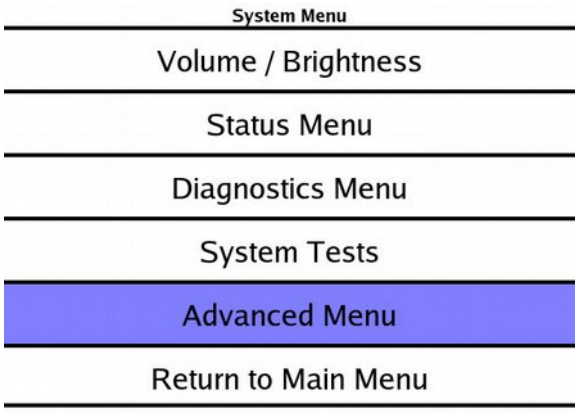
Table 17: Finalisation

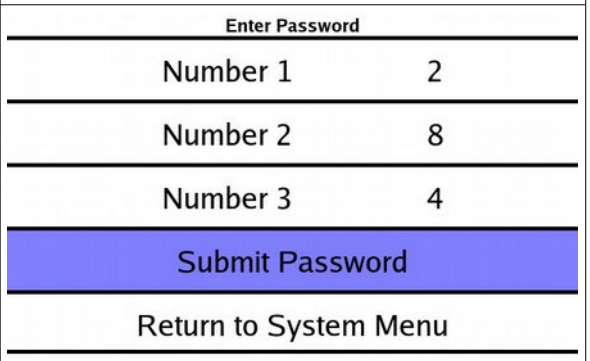
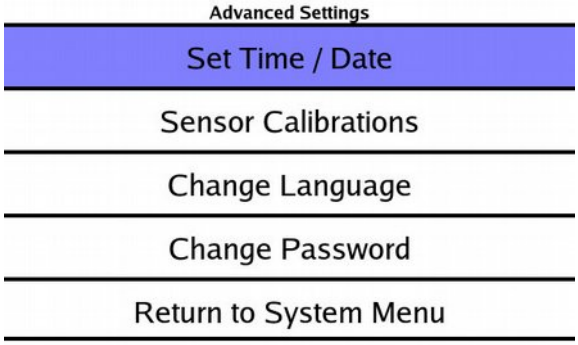
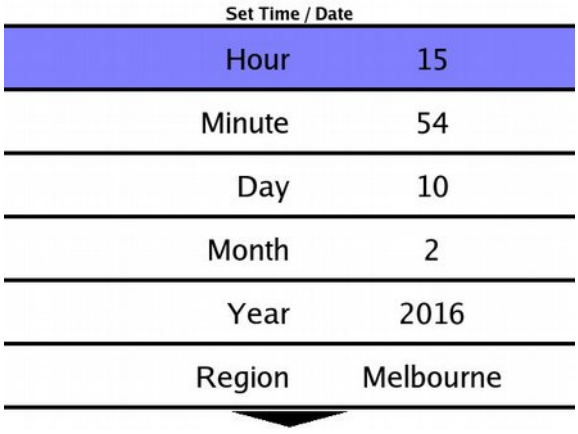
Complete the system checklist once installation has been completed.

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	

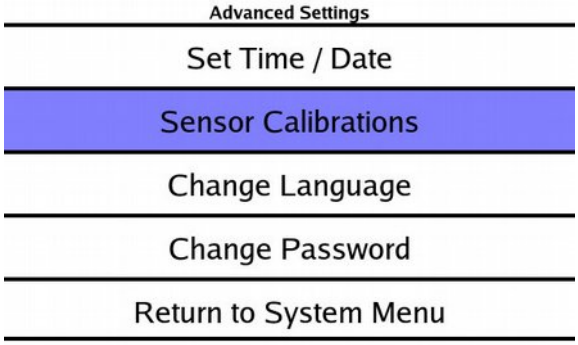
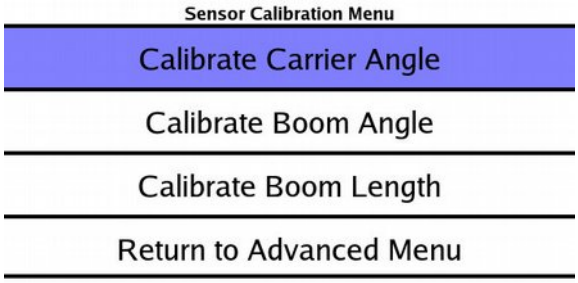
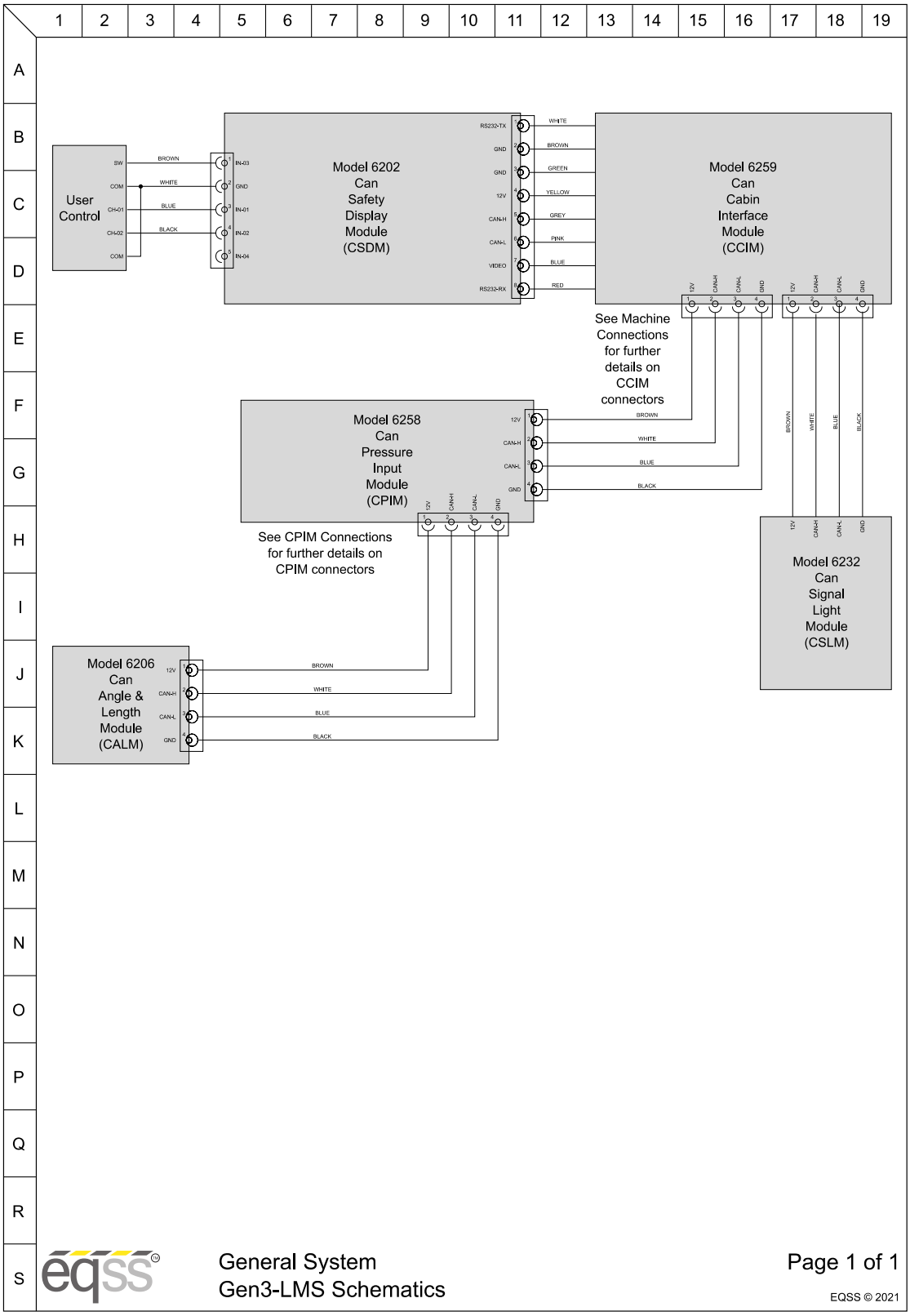
Step	Description	Diagram
6.	Scroll to the next page and select Save to store the new time/date and return to the Advanced Menu.	
7.	Select Sensor Calibrations	
8.	Select Calibrate Carrier Angle and then follow the instructions on the screen to complete the calibration. Repeat for Calibrate Boom Angle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

Table 18: Sensor Calibration

Schematics


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
A B C D E F G H I J K L M N O P Q R S
User Control
SW
COM
CH-01
CH-02
COM
BROWN
WHITE
BLUE
BLACK
IN-03
GND
IN-01
IN-02
IN-04
Model 6202 Can Safety Display Module (CSDM)
RS232-TX
GND
GND
12V
CAN-H
CAN-L
VIDEO
RS232-RX
WHITE
BROWN
GREEN
YELLOW
GREY
PINK
BLUE
RED
Model 6259 Can Cabin Interface Module (CCIM)
12V
CAN-H
CAN-L
GND
See Machine Connections for further details on CCIM connectors
Model 6258 Can Pressure Input Module (CPIM)
See CPIM Connections for further details on CPIM connectors
Model 6232 Can Signal Light Module (CSLM)
Model 6206 Can Angle & Length Module (CALM)
BROWN
WHITE
BLUE
BLACK
eqss
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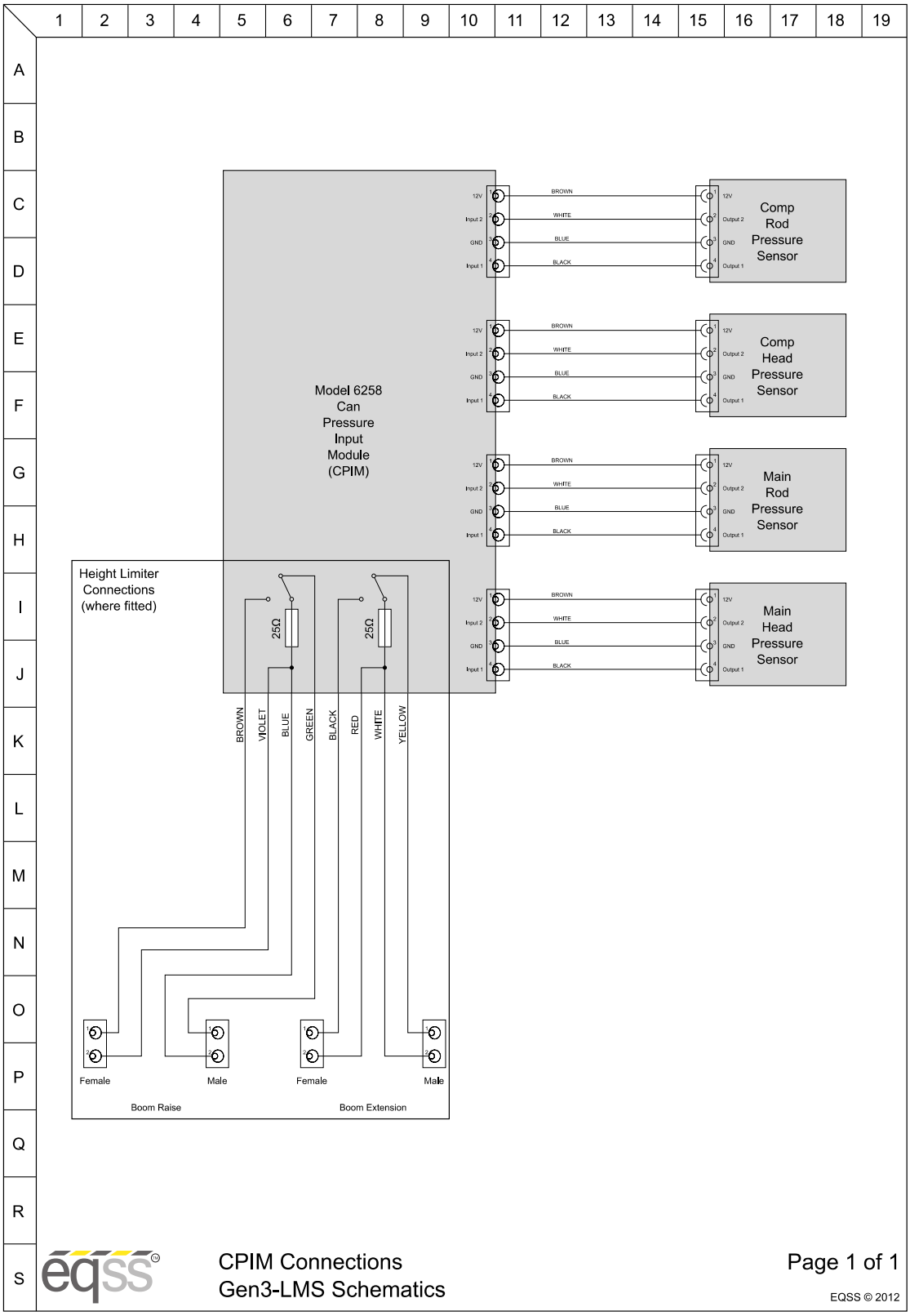
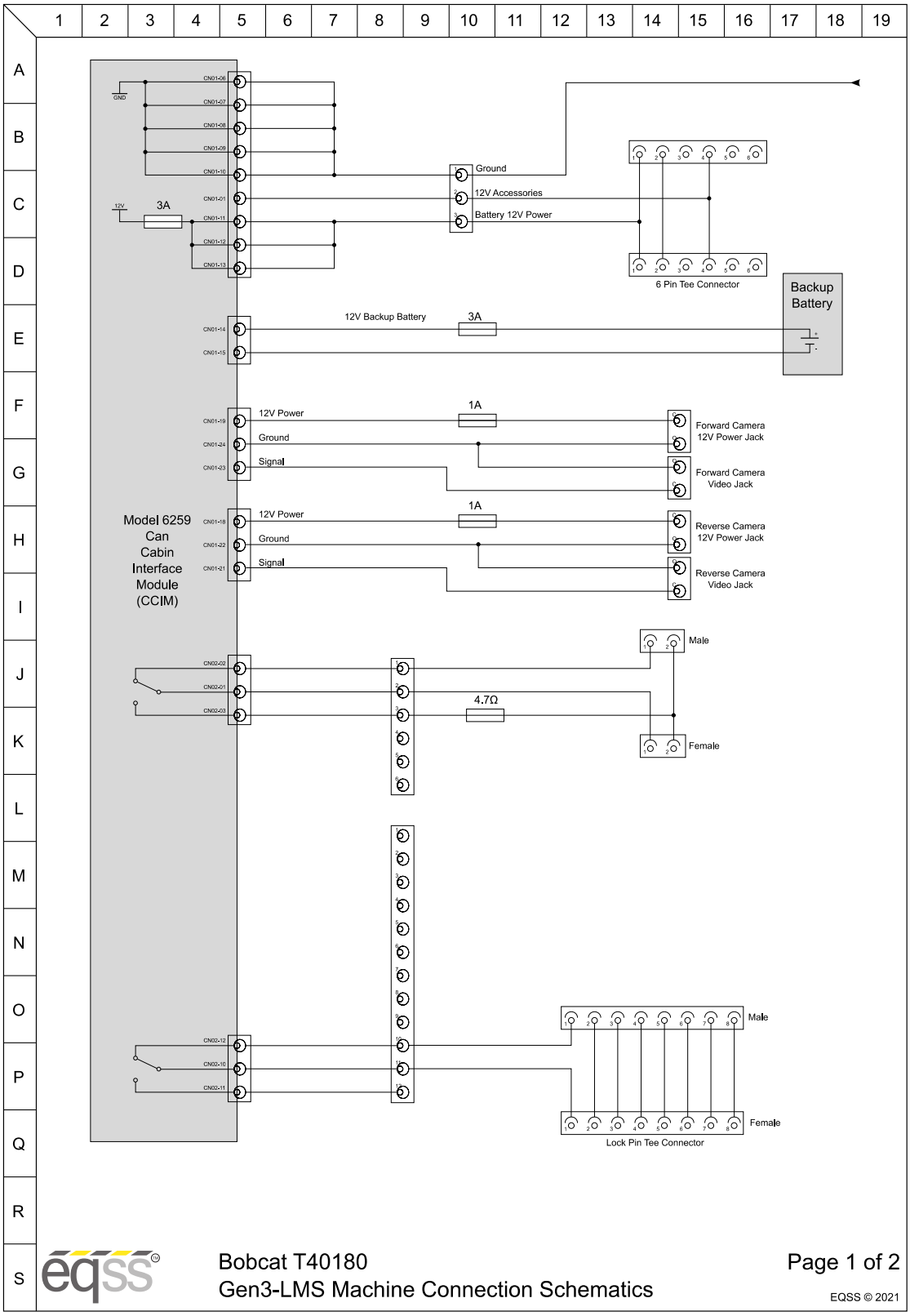

Model 6258
Can
Pressure
Input
Module
(CPIM)
Comp
Rod
Pressure
Sensor
Comp
Head
Pressure
Sensor
Main
Rod
Pressure
Sensor
Main
Head
Pressure
Sensor
BROWN
WHITE
BLUE
BLACK
12V
Input 2
GND
Input 1
Output 2
Output 1
Height Limiter
Connections
(where fitted)
25Ω
25Ω
BROWN
VIOLET
BLUE
GREEN
BLACK
RED
WHITE
YELLOW
Female
Male
Female
Male
Boom Raise
Boom Extension
CPIM Connections
Gen3-LMS Schematics
Page 1 of 1
EQSS © 2012



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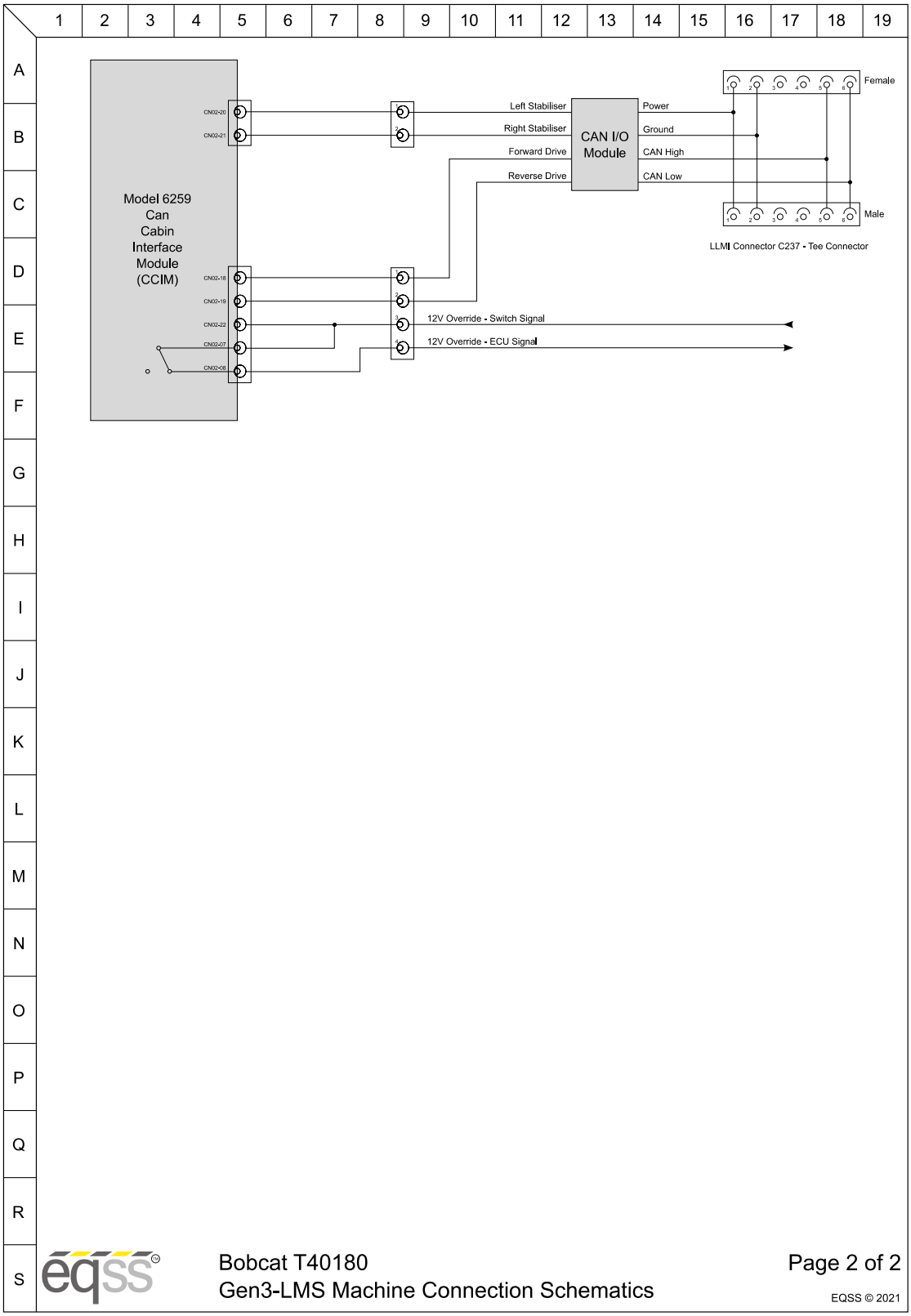


Bobcat T40180
Gen3-LMS Machine Connection Schematics

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 19: 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.

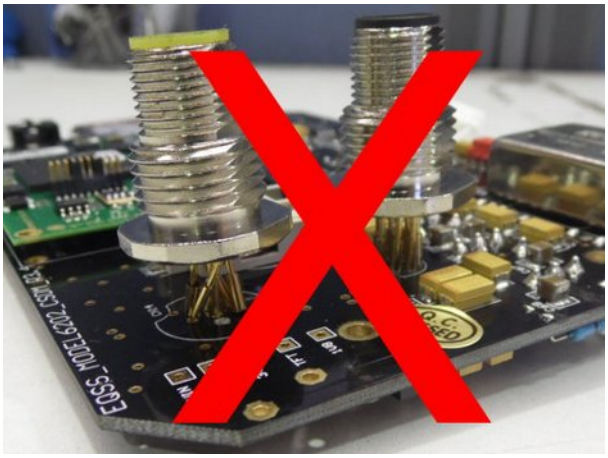


Illustration 4: Damaged Display Connector

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.

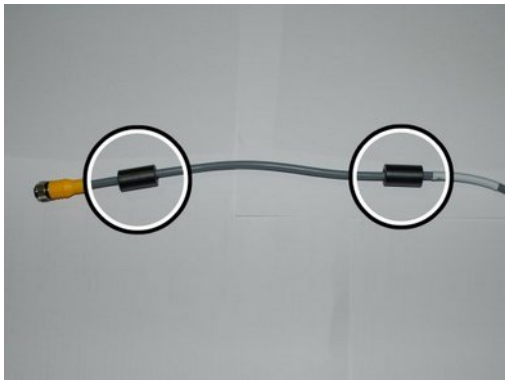
Step	*Description*	*Diagram*
1.	Attach the two clip-on ferrites at a location of 60 mm and 260 mm from the start of the connector to the start of the ferrite. Do this for both the CCIM and user control cables that plug into the display.	

Table 20: Reattach Ferrites Procedure

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