USER MANUAL

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Introduction

1 Introduction

	Introduction

Electric Drive

Scissor

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Machine Details

2 Machine Details

	**Machine Details**

.

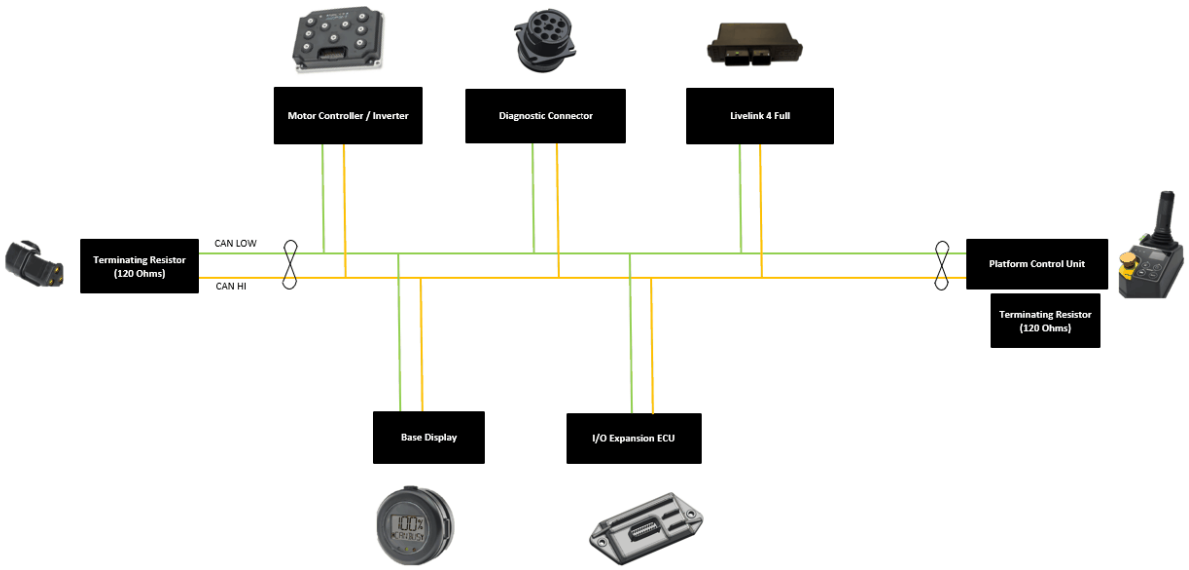
Machine Details

2.1 Can Layout

	Can Layout

Machine 10 Details > **Can Layout**

Can Layout

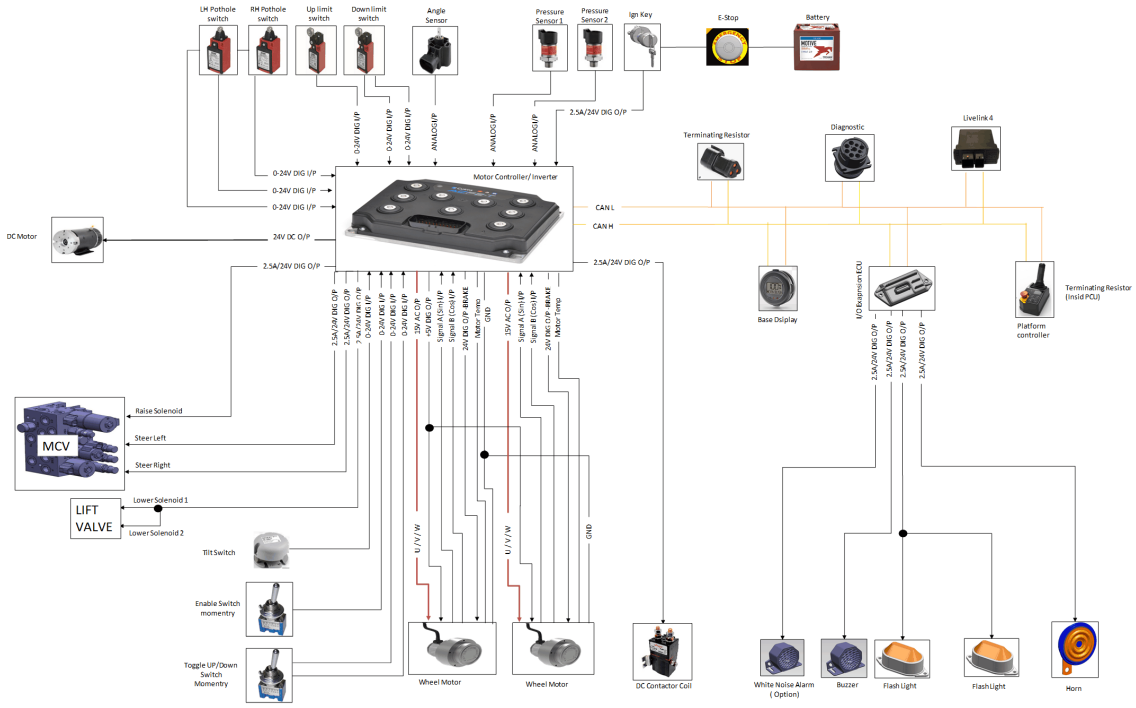


2.2 System Block Diagram

System Block Diagram

Machine 10 Details > **System Block Diagram**

System Block Diagram

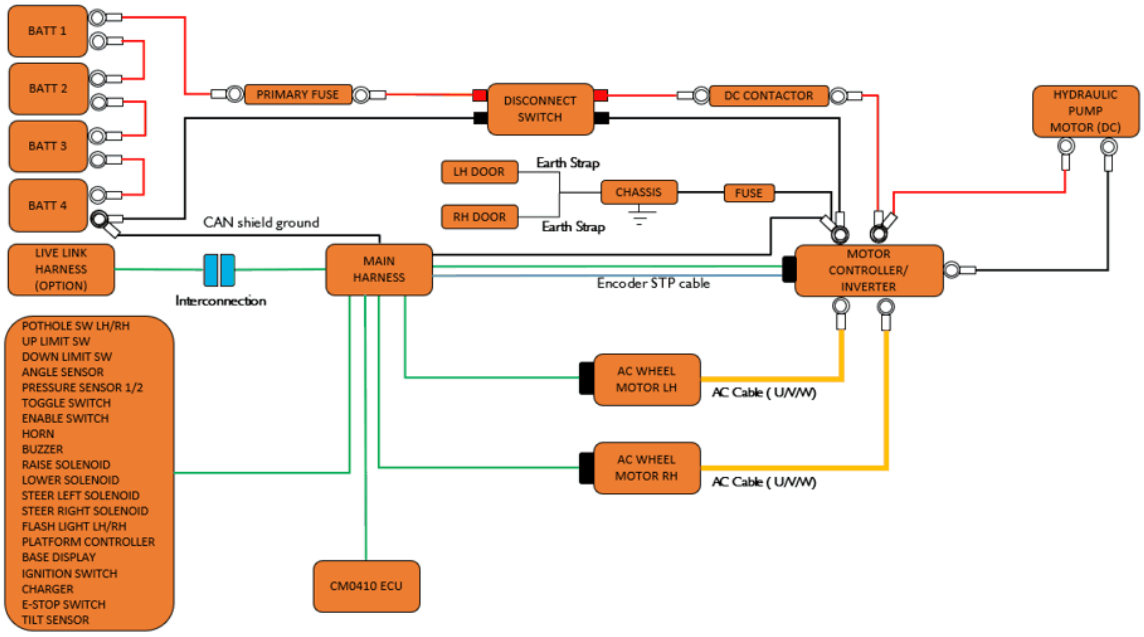


2.3 Wiring & Battery Lead Layout

	Wiring & Battery Lead Layout

Machine 10 Details > **Wiring & Battery Lead Layout**

Wiring & Battery Lead Layout



System Level Function

3 System Level Function

	System Level Function

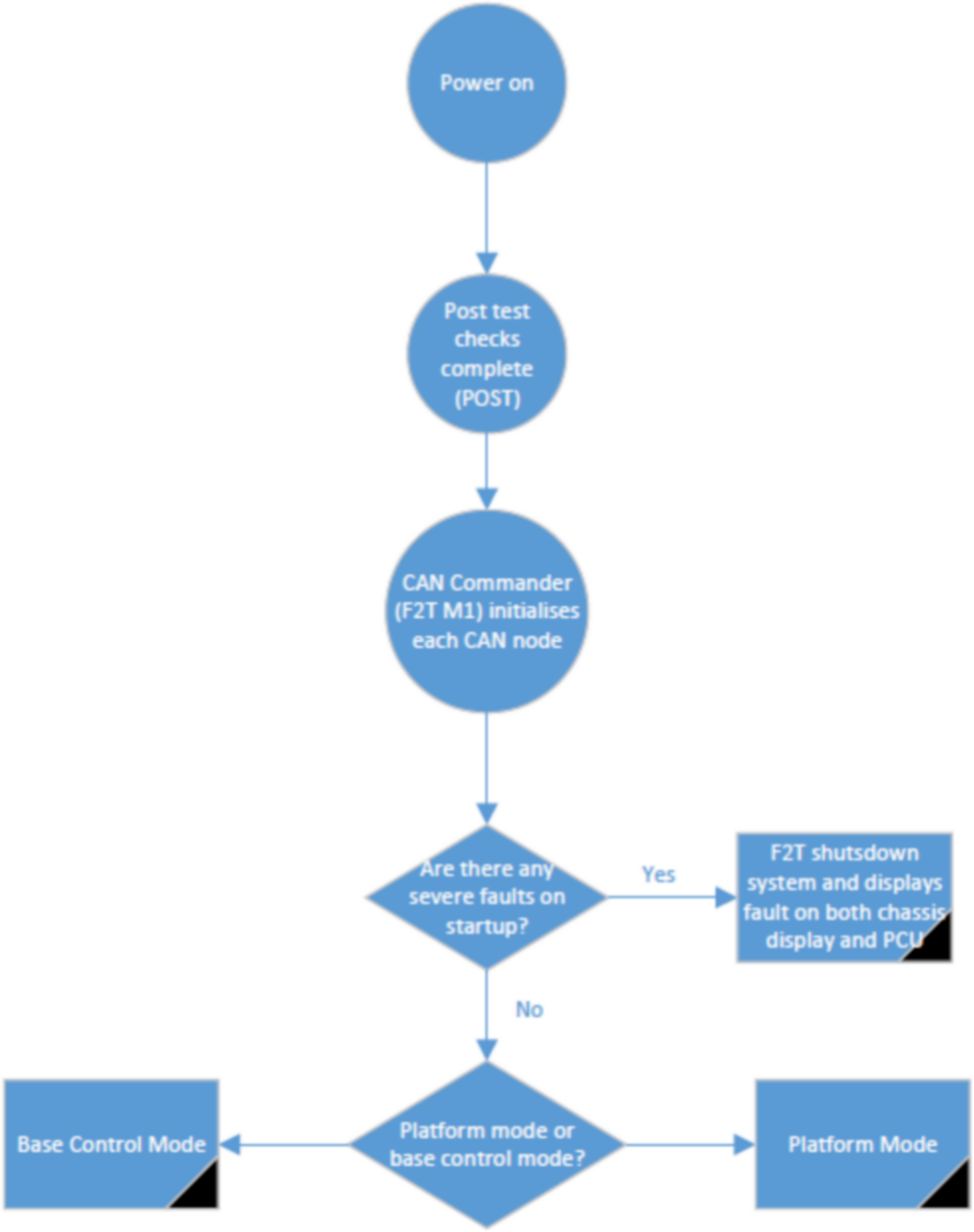
System Level Function

3.1 System Startup Diagram

	System Start up Diagram

System Level Function > System Start up Diagram

System Start up Diagram

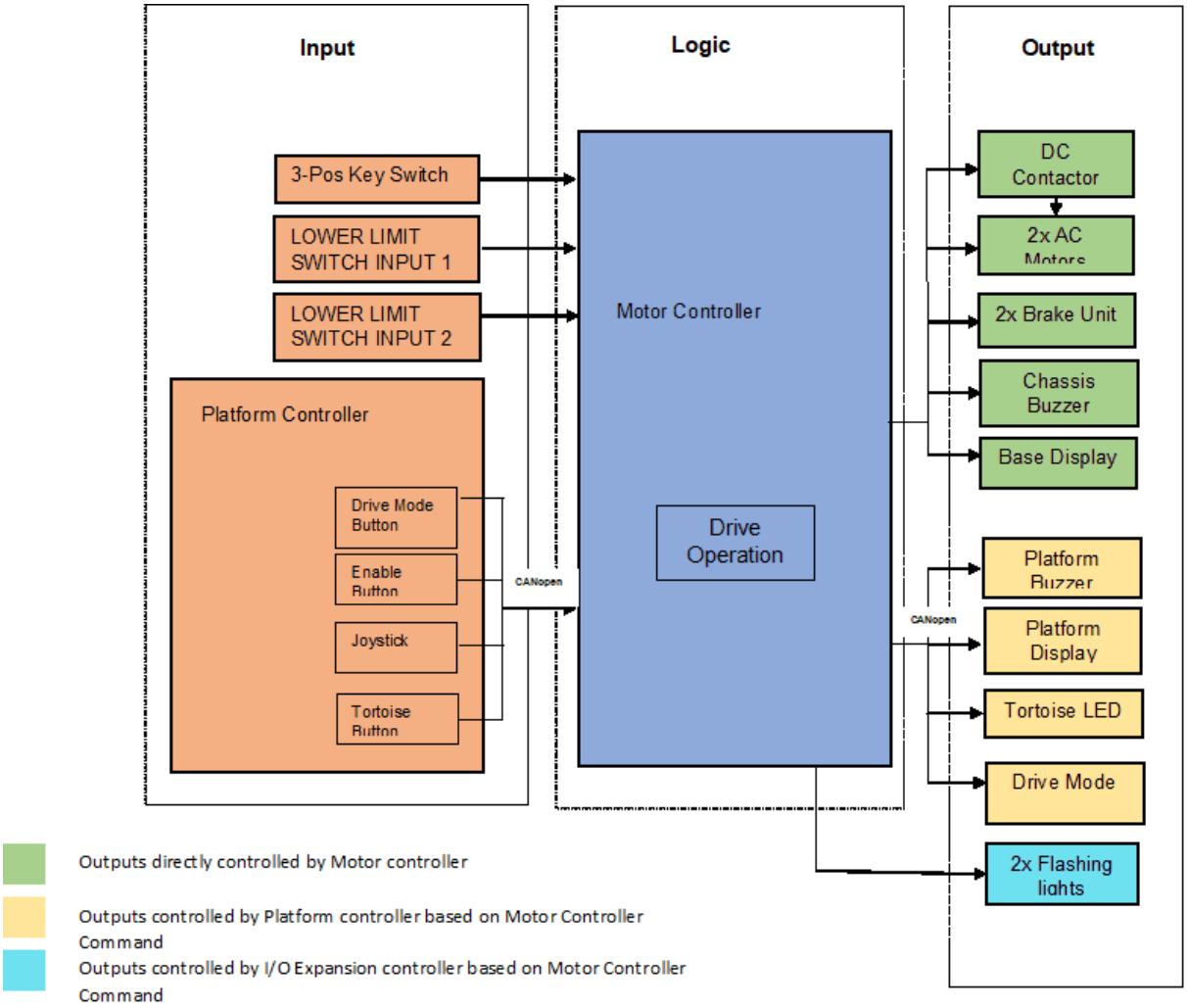


3.2 Drive

	Drive

Drive

The drive functionality enable the operator to drive the machine in Forward or Reverse direction

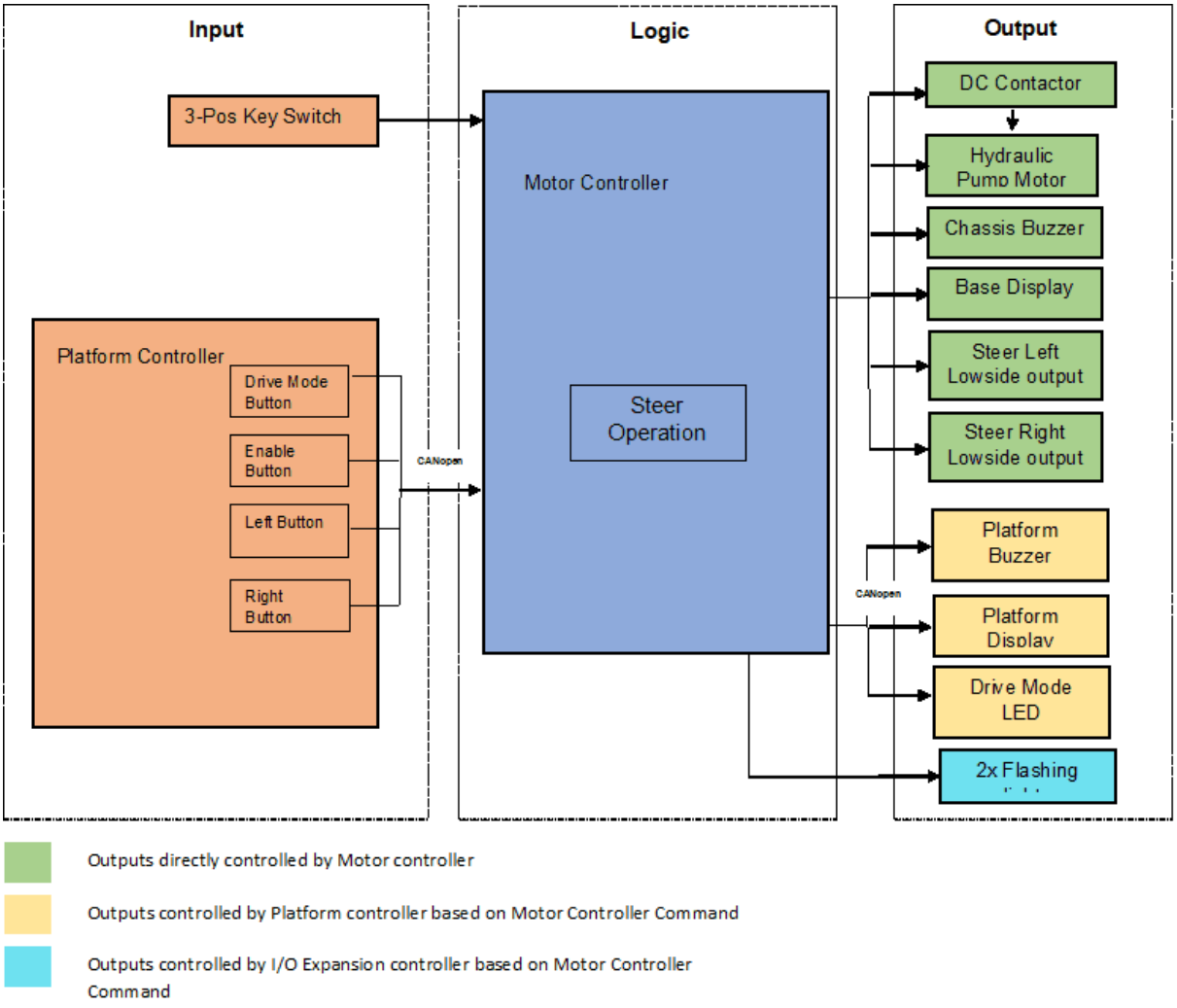


3.3 Steering

Steering

Steering

Steer operation allows the machine to turn left or right. The steering is controlled by the hydraulic system



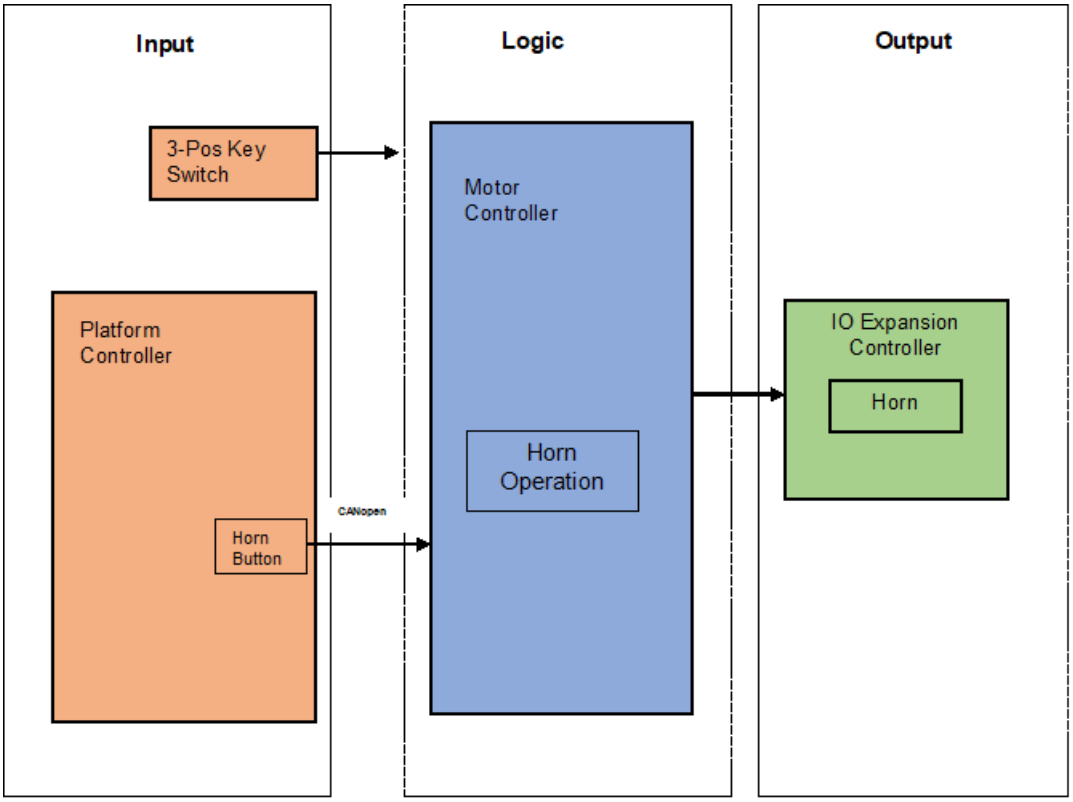
3.4 Horn

	Horn

System Level Function > Horn

Horn

Horn shall get activated at Platform Control Panel and sounds at the ground as a warning to ground personnel. The Horn output is driven by an IO expansion module based on commands from Motor Controller



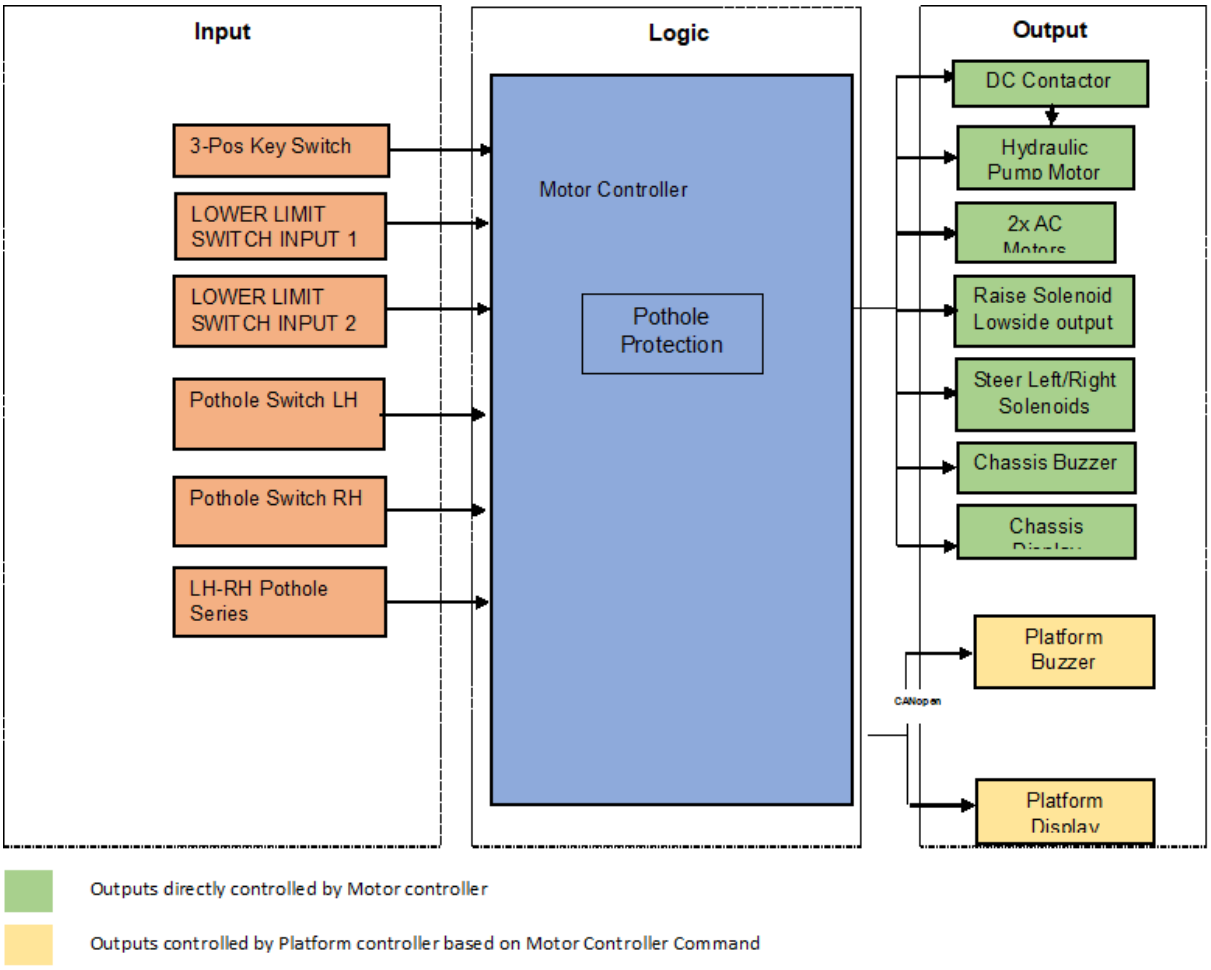
3.5 Pothole Protection

Pothole Protection

System Level Function > **Pothole Protection**

Pothole Protection

The pothole protection system helps to prevent the machine from tipping over when one wheel drives off a depression, such as a pothole. A typical pothole protection system consists of a protection plate, actuator and supporting linkages. The protection plates are spread (extended) when the platform is raised and the protection plates are stowed (retracted) when the platform is lowered to allow the machine to drive over ramps or obstacles.



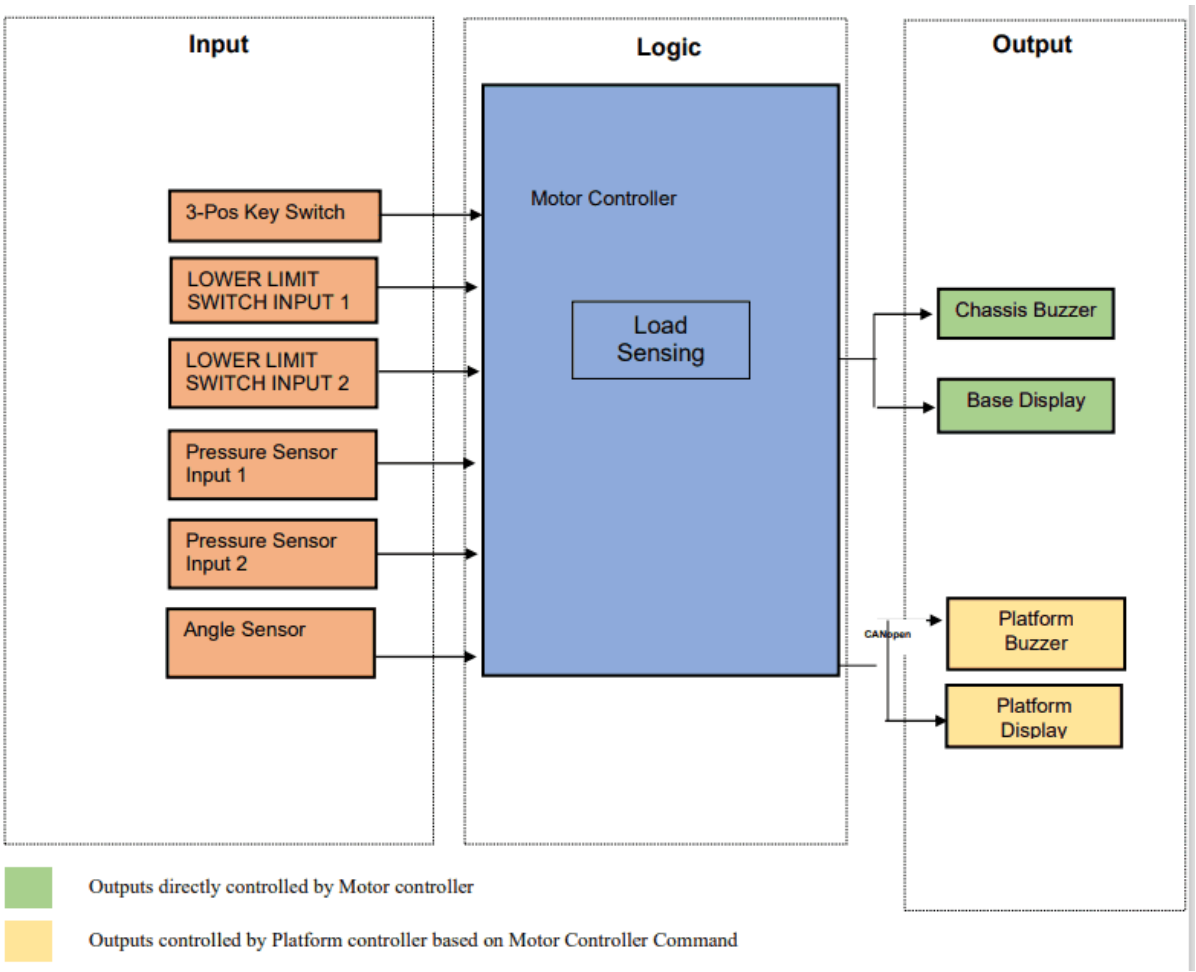
3.6 Load Sensing

Load Sensing

System Level Function > Load Sensing

Load Sensing

This section describes requirements of the Load Sensing system of the machine. The load sensing system comprises of the x2 pressure sensors mounted to hydraulic lift cylinder and an analogue rotary encoder mounted to scissor pack boss used to determine scissor pack position. Pressure in cylinder is proportion to load in platform and scissor pack position.



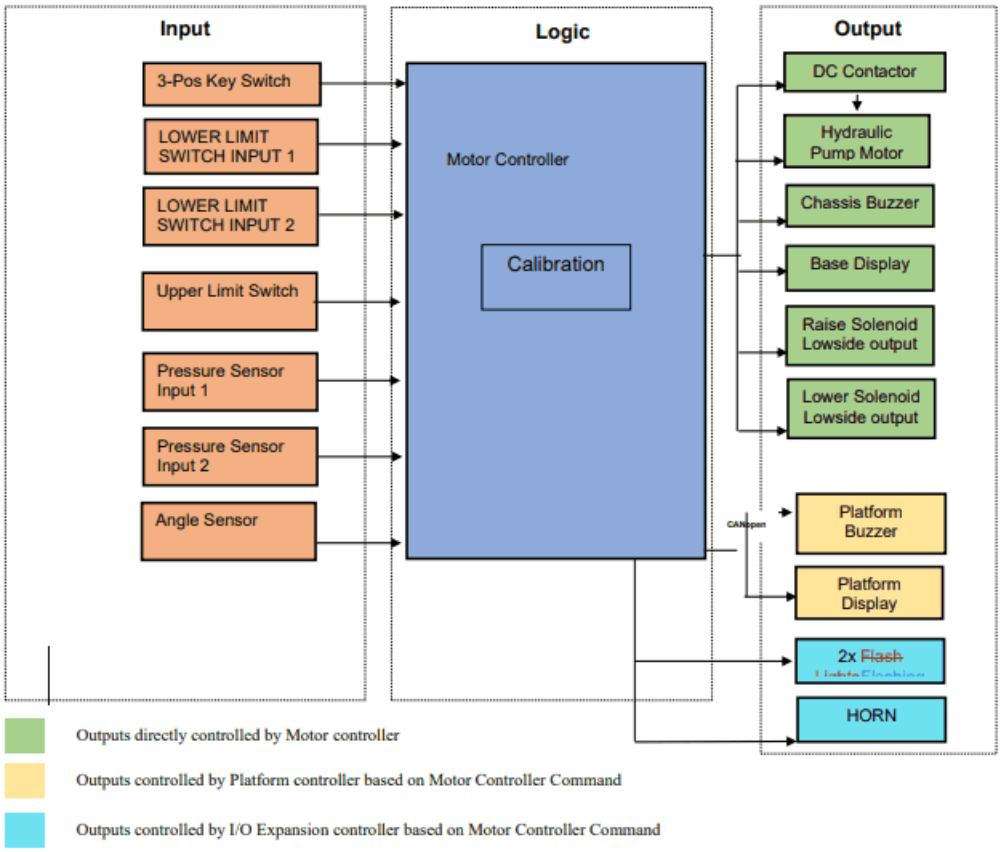
3.7 Load Calibration

	Load Calibration

System Level Function > **Load Calibration**

Load Calibration

This section describes requirements for the machine load calibration. The calibration is necessary to calibrate the machine using angle and pressure values for load percentage calculation. Two kinds of angle vs. pressure curves shall be generated by calibration no load curve and full load curve.

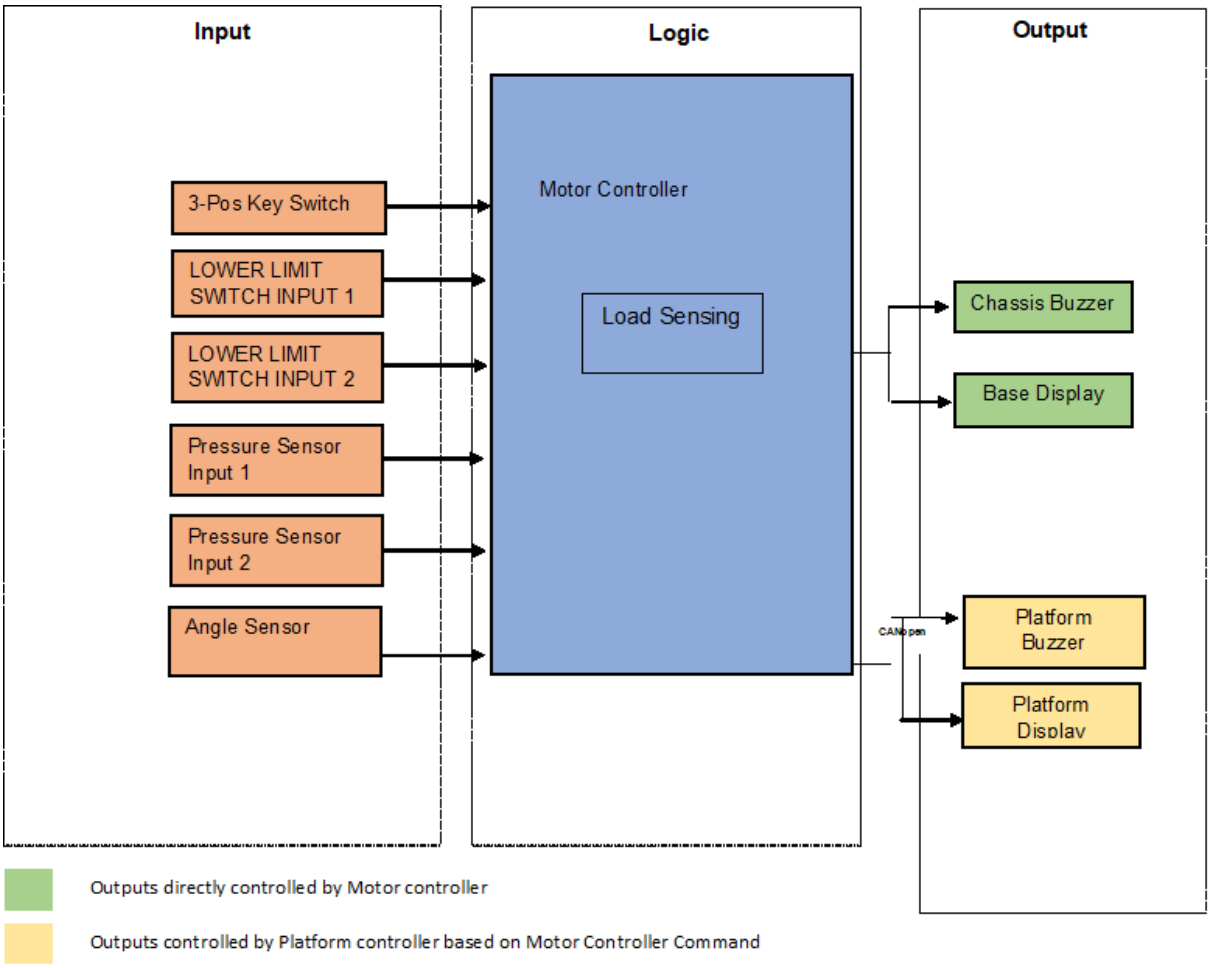


3.8 Pressure Sensor

	Pressure Sensor

System Level Function > **Pressure Sensor**

Pressure Sensor



3.9 Platform Controller

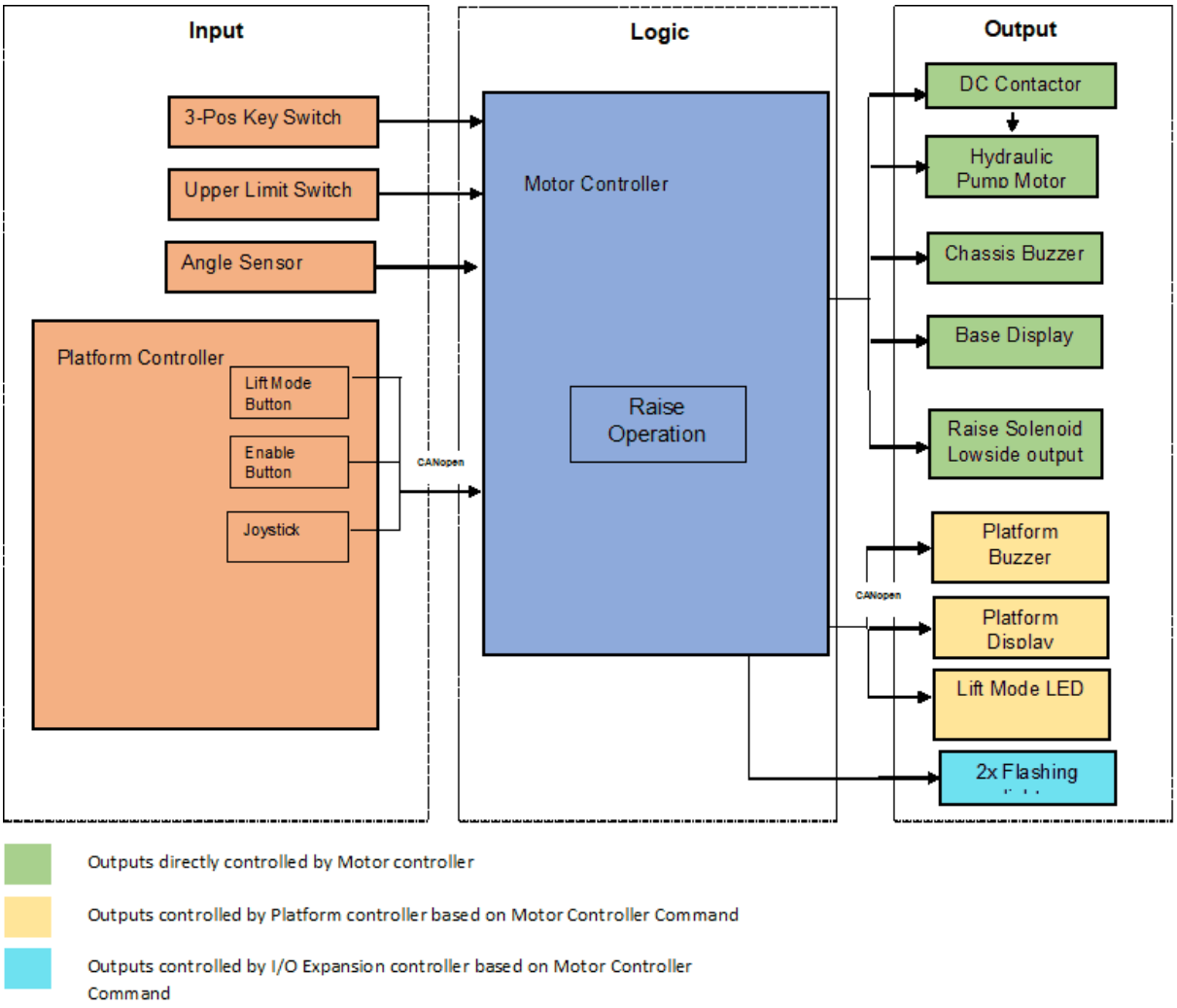
Platform Controller

System Level Function > **Platform Controller**

Platform Controller

Machine operation allows the platform to be raised when commanded either from platform or chassis control panel

This section describes requirements for platform raise operations executed from platform control panel



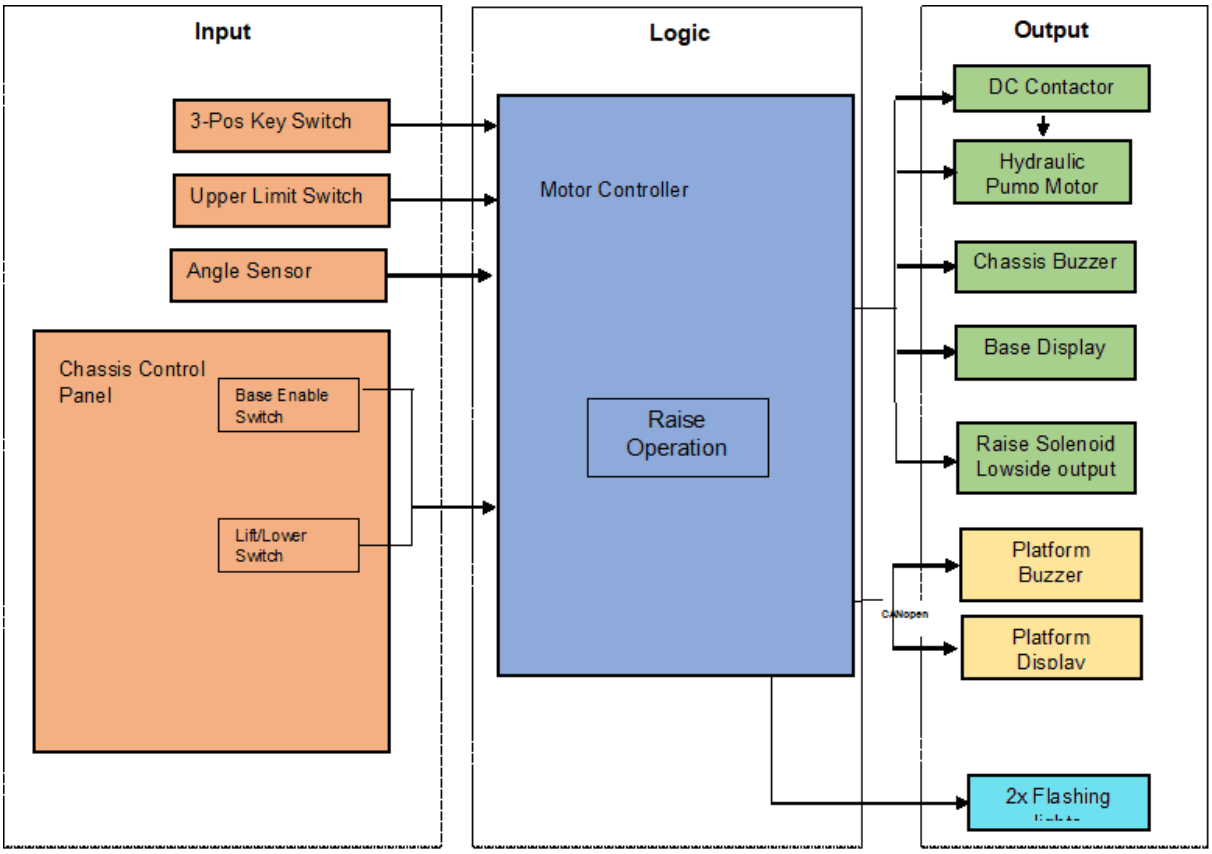
3.10 Base Controller

	Base Controller

System Level Function > **Base Controller**

Base Controller

This section describes requirements for platform raise operations executed from chassis control panel

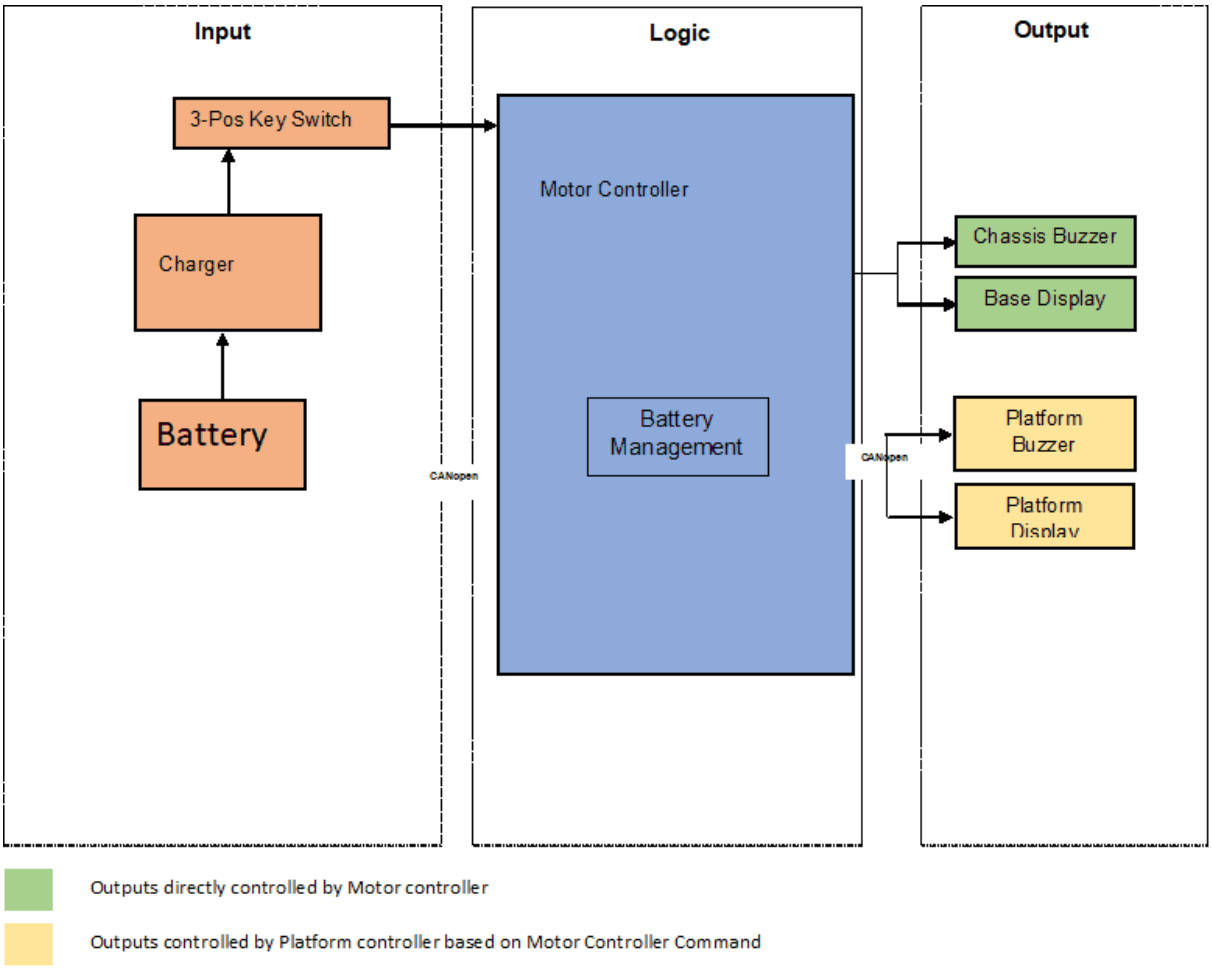


3.11 Battery System

	Battery System

System Level Function > Battery System

Battery System



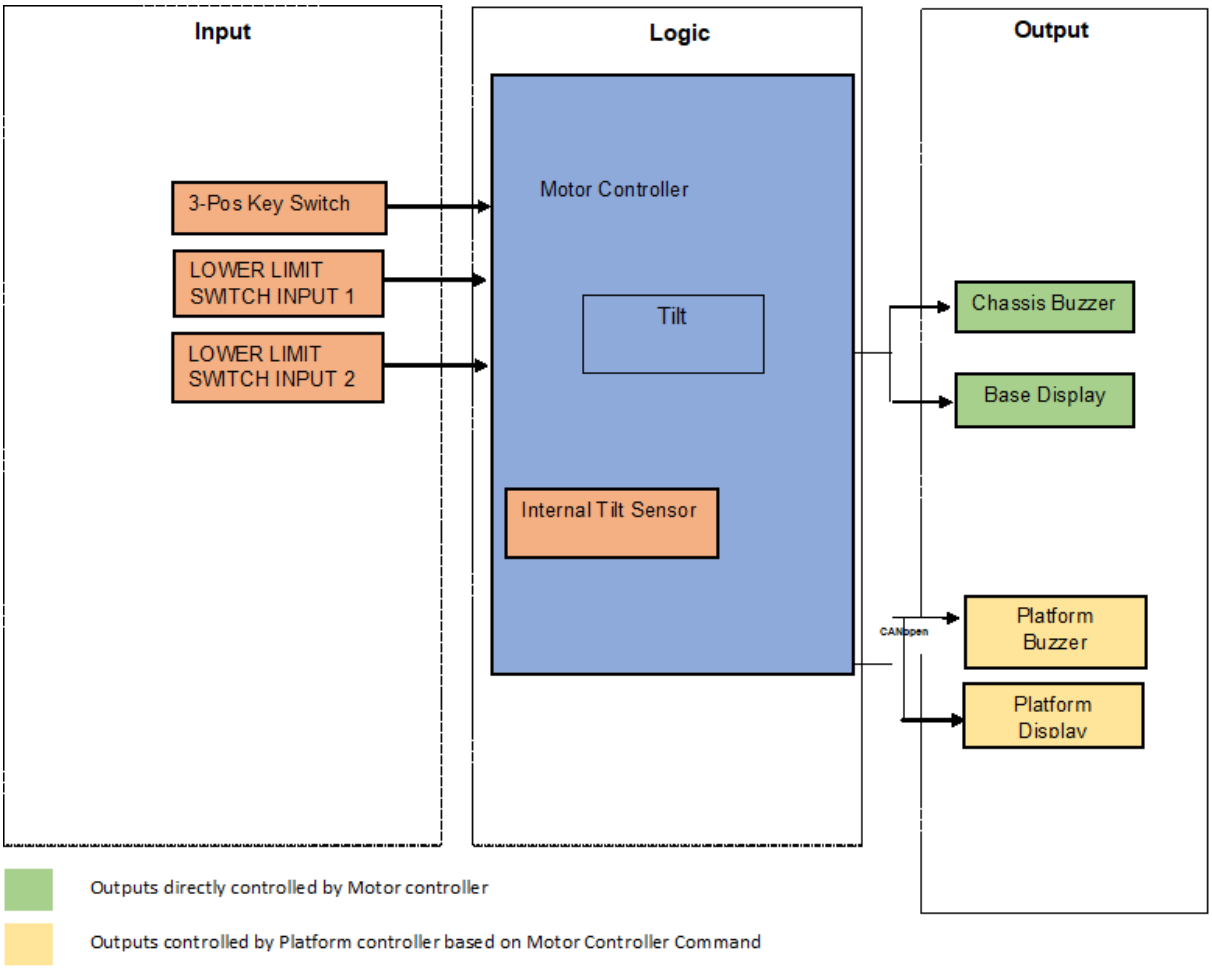
3.12 Tilt Alarm

	Tilt Alarm

System Level Function > **Tilt Alarm**

Tilt Alarm

The Tilt sensor is internal to motor controller/ECU. This is used to maintain the stability of the machine by determining inclination of chassis when platform is elevated

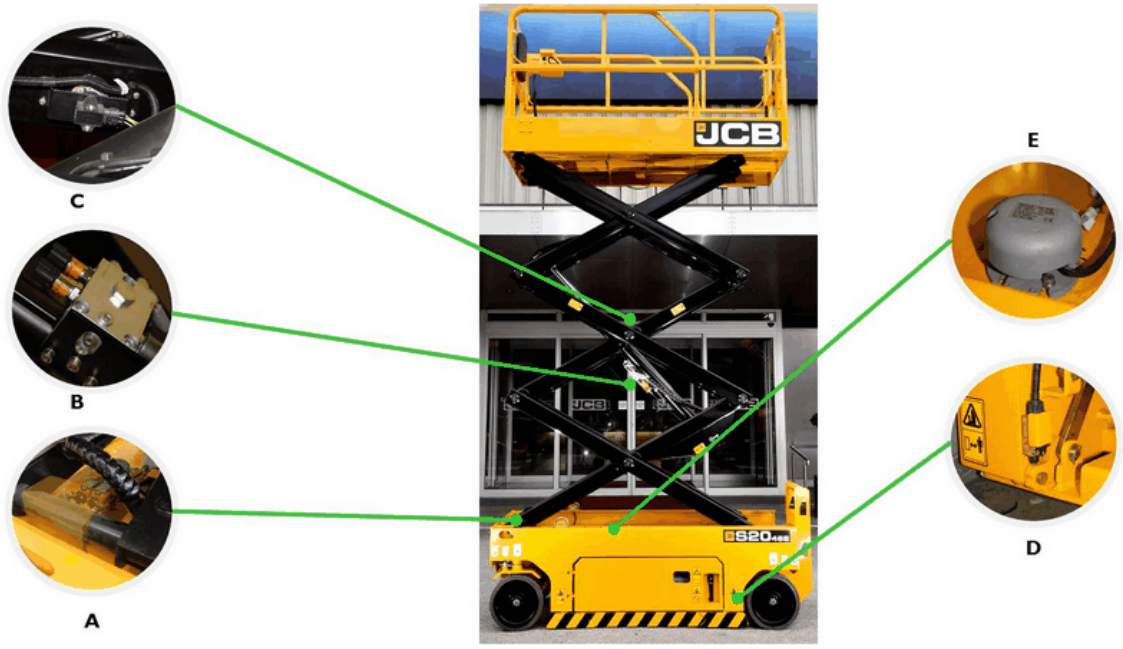


3.13 Sensor & Switches

	Sensor & Switches

System Level Function > Sensor & Switches

Sensor & Switches



3.14 Battery Management System

	Battery Management System

System Level Function > Battery Management System

Battery Management System

This section describes requirements for the battery management of the machine. The Machine is fitted with four Trojan T105 batteries providing 225AH at 6V or 225AH at 24V when connected in series.

The lead-acid battery discharge indicator (BDI) algorithm of Motor Controller continuously calculates the battery state of charge (SOC) from the key switch voltage (KSI, pin 1) whenever the main contactor is closed.

State of Charge (SOC)-

1.Battery state of charge shall be calculated based on battery voltage and SOC characteristic curves

2.These SOC characteristic curves shall be configurable in controller through internal parameters

3.The SOC shall be displayed in *bars and %

Battery Drain-

1. Battery drain alarm is enabled and there is machine activity for the ‘Battery Drain alarm delay’.There shall be an audible warning at the Chassis Buzzer at rate specified in buzzer section

2. Pressing ‘Drive’ or ‘Lift’ button on platform shall stop this warning

Limp Mode-

1.If state of charge is below Limp mode level for 120s machine shall enter limp mode.

2.When SOC falls below Limp mode level (10%), visual flashing indicator shall be triggered in the platform to warn operator that they are approaching low SOC.

3.When batteries fall below Limp mode level, all machine functions shall be reduced in speed to 50% this also known as Limp Mode.

Battery Low Voltage fault-

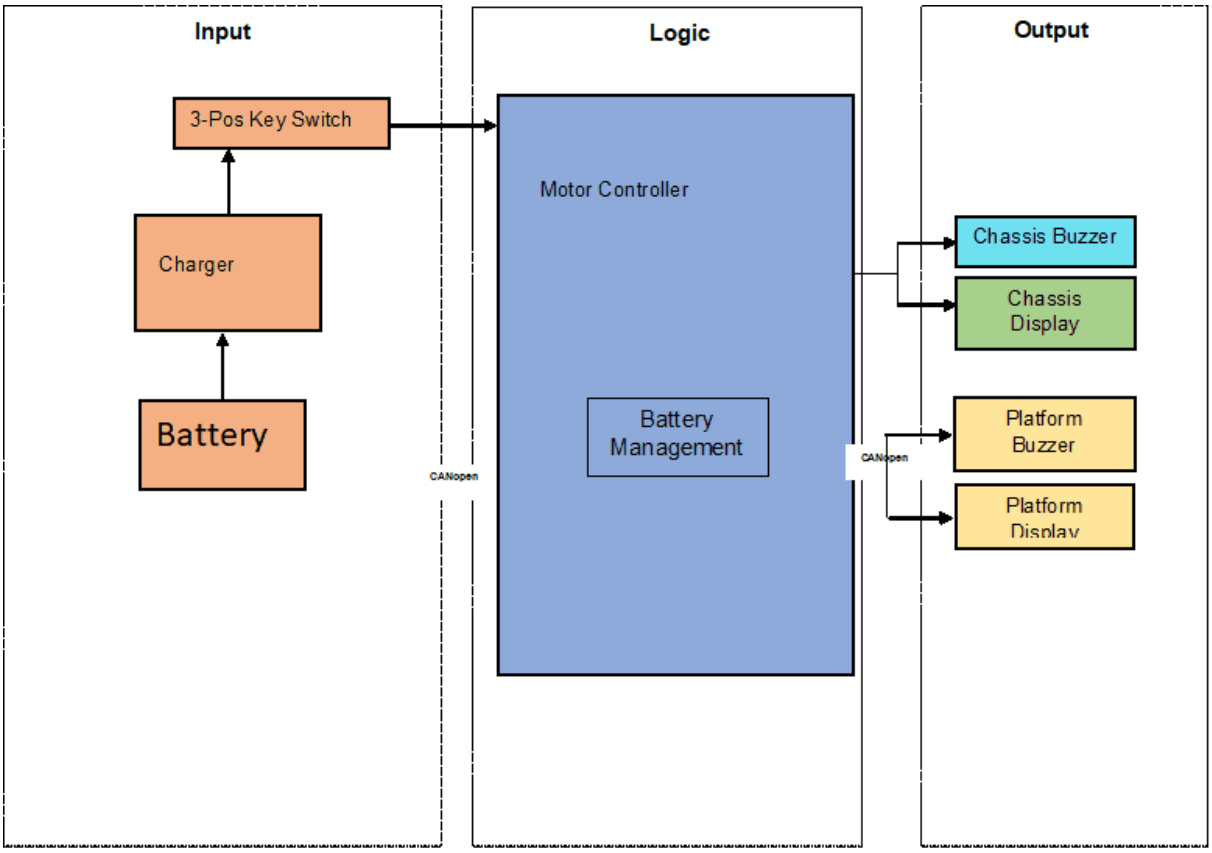
1. If battery voltage is less than threshold (5%) for Battery low voltage fault delay. ECU shall set battery low voltage fault.

2. ECU shall disable all the motion after detection of this fault

3.Fault code “6E” shall be displayed on the platform display and the chassis display shall show fault code and me

4.There shall be an audible warning at Chassis Buzzer

5. Code 6E shall be cleared when the battery level reaches ‘Battery low voltage fault reset.



Scissor Trouble shooting Guide

4 Scissor Trouble shooting Guide

	Scissor Trouble Shooting Guide

Scissor Trouble Shooting Guide

4.1 Index

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Sr No.	Fault Code	Description
1	DTC 74-75	Fault on other traction Controller / Dual Severe
2	B9	Pressure Sensor 1 Fault
3	54	Pressure Sensors Correlation Fault (Elevate)
4	58	Pressure sensor 1 fault
5	63	Pressure sensor 1 warning (stowed)
6	66	Pressure Sensor 1 Warning (Elevated)
7	6C	Pressure Sensor Correlation Elevated Fault
8	BB	Pressure Sensor 2 Fault
9	B8	Angle Sensor Fault
10	53	Angle Sensor Fault
11	65	Angle Sensor Calibration Fault
12	A1	Steer right Fault
13	A6	Steer Left Coil Fault
14	A4	Lift Up solenoid
15	A7	Lift Down Coil Fault
16	51	Wika PCU Throttle Fault
17	5F	PCU HW Fault
18	52	Wika PCU PDO Timeout Fault

19	5E	PCU Data Freeze Fault
20	59	F2T M2 PDO Timeout Fault
21	LL	Inclination Fault
22	56	Pothole Switch Fault
23	57	F2T M2 Not Operational Fault
24	61	Hydraulic SRO Fault
25	47	HPD Sequencing
26	67	Hydraulic HPD Fault
27	OL	Platform Overload Above Set point
28	64	Platform Overload Below Set point
29	5A	Down limit Switch Fault
30	6D	Lift Motion Fault
31	5B	PCU Steer Left Sequence Fault
32	5C	PCU Enable Trigger Sequence Fault
33	5D	PCU Pass code Fault
34	6A	PCU Steer Right Sequence Fault
35	7B	Limp Mode Fault
36	6E	Battery Low Voltage Fault

4.2 Annexure - A

Annexure - A

Scissor Trouble shooting Guide > **Annexure - A**

Note :

> Curtis Motor controller has two internal Drivers - M1 & M2 with M1 being master or primary driver.
> Some faults are linked to M1 and some to M2 driver.
> M2 driver related primary faults do not appear on Base Display or Joystick display. These can be checked thru Service Master (refer Annexure-B for details)
> Below table shows functions linked to M1 & M2 drivers with their primary faults.
> For any fault on machine first Key Cycle the machine to ensure that fault is really present.
> Use details provided in Annexure-C to ensure that all the machine switches and sensors are behaving as per design.

Sr No.	Symbol	Function / Description	Pin Number (Curtis 35 Pin Connector)	Controller Driver	Linked Primary Fault
1	Driver 1	Steer Right Solenoid	2	M1	A1
2	Driver 2	EM Brake RH	5	M2	A2
3	Driver 3	EM Brake LH	4	M1	A3
4	Driver 4	Raise Solenoid	3	M2	A4
5	Driver 5	DC Contactor Coil	6	M1	**31**, 38, 39

6	Driver 6	Steer Left Solenoid	19	M1	A6
7	Driver 7	Lower Solenoid	20	M2	A7
8	Analog 8	Angle Sensor	28	M1	**B8**, 53, 65, 6D, 5A
9	Analog 9	Pressure Sensor 1	24	M1	**B9**, 54, 58, 63, 66, 6C
10	Analog 14	Pressure sensor 2	25	M2	BB
11	Motor Feedback (Sin/Cos)	Wheel motor LH Speed/Position Sensor	10-11	M2	36
12	Motor Temp	Wheel Motor RH Temp Sensor	21	M2	29

1	CAN1H	CAN High	23
2	CAN1L	CAN Low	35

4.3 Annexure - B

Annexure - B

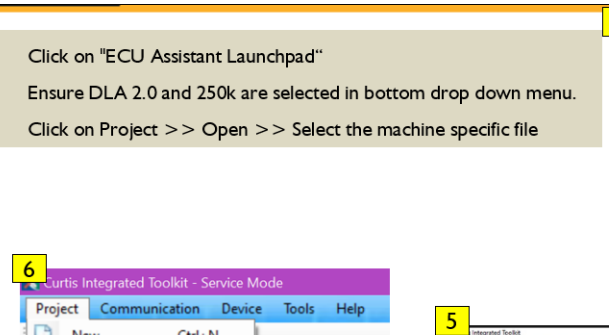
Scissor Trouble shooting Guide > **Annexure - B**

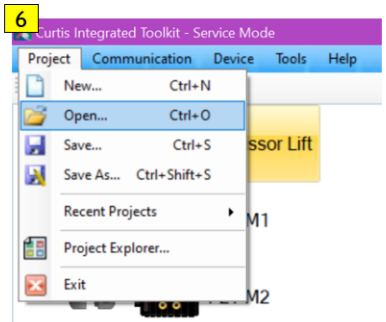
Sheet Content :

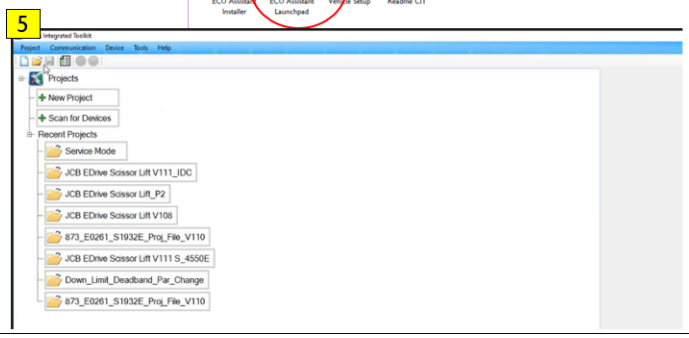
A) Steps to connect the Service Master to Machine and see Faults on M1 & M2
B) Steps to check analog sensor values

A) Steps to connect the Service Master to Machine and see Faults on M1 & M2

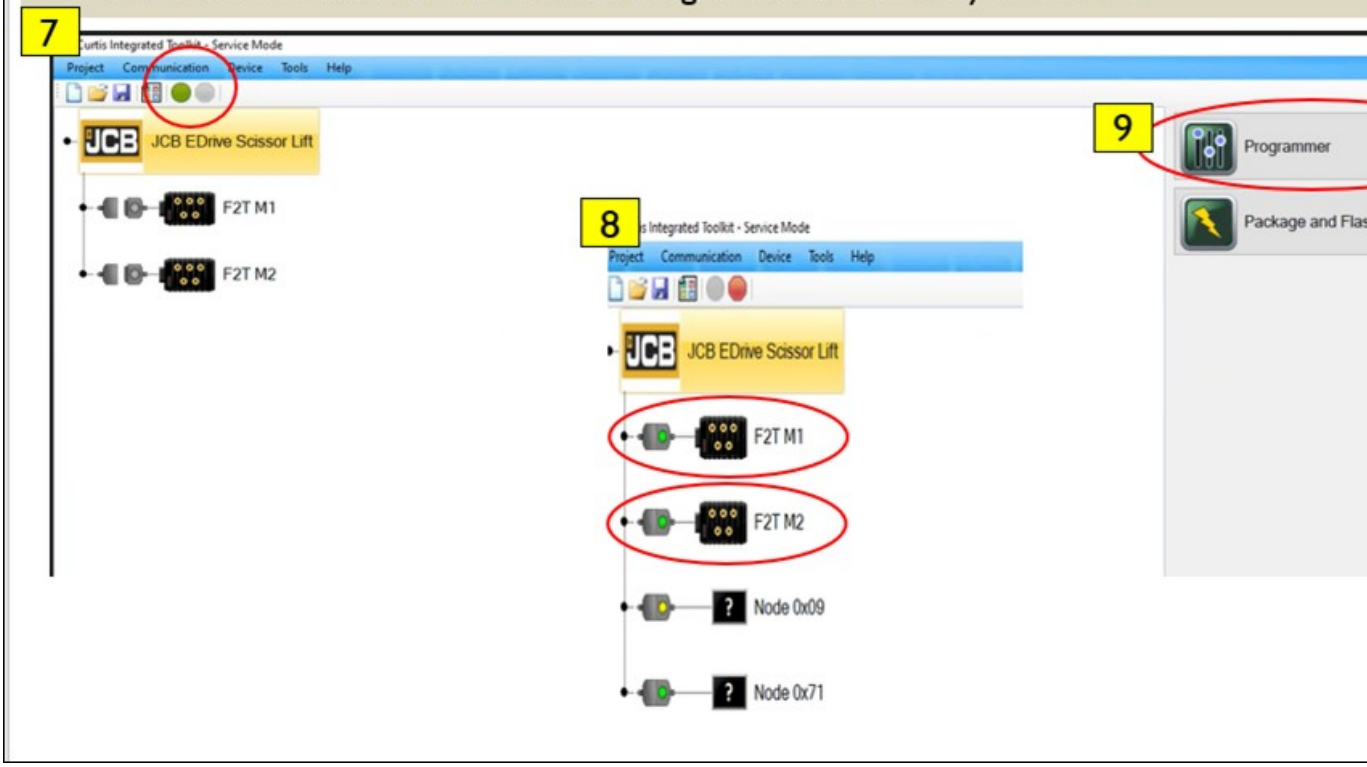
- Click on "ECU Assistant Launchpad"
- Ensure DLA 2.0 and 250k are selected in bottom drop down menu.
- Click on Project >> Open >> Select the machine specific file

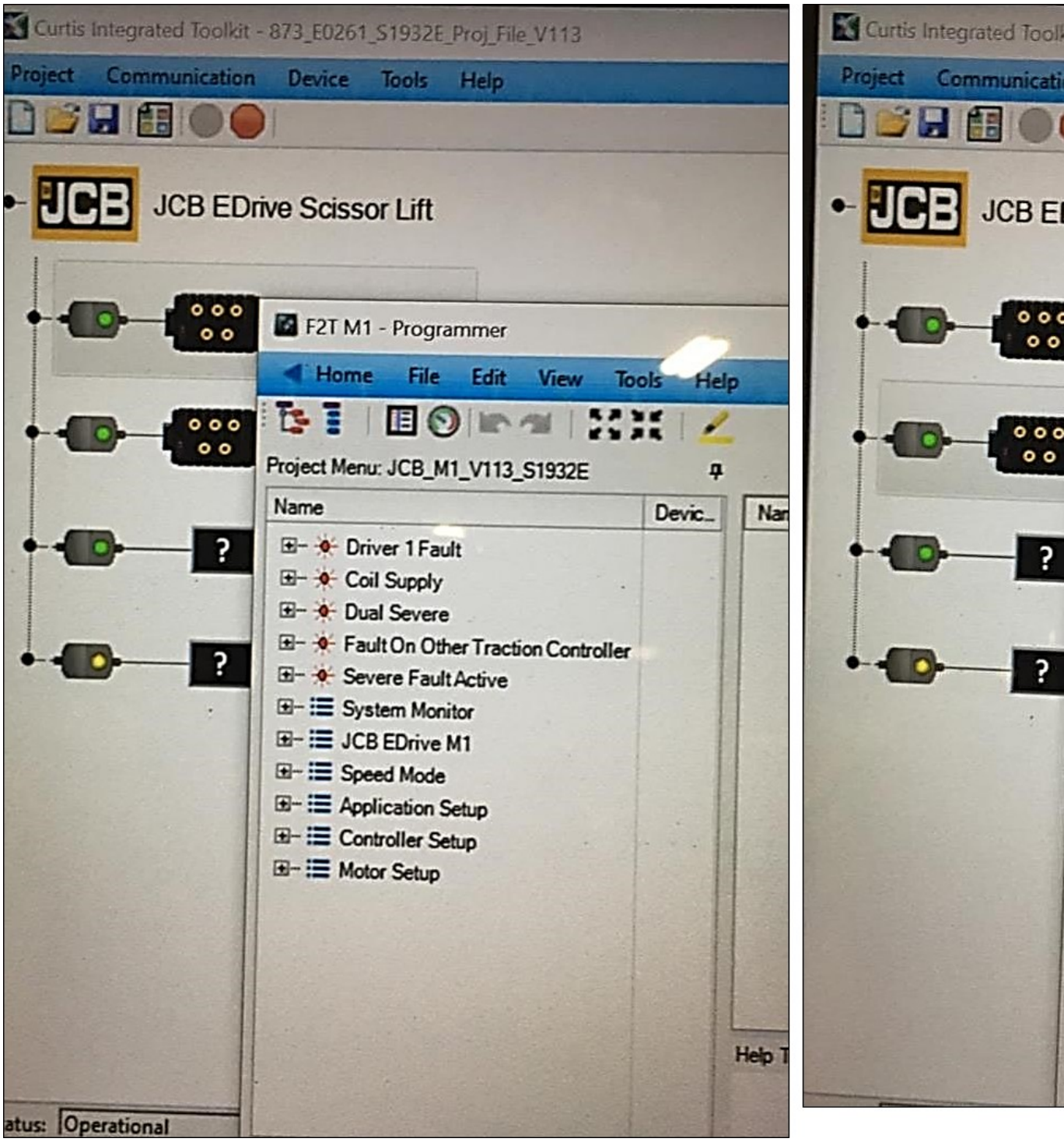






- Select JCB Edrive Scissor Lift and click on green button
- Controller will connect and become online
- F2T M1 and F2T M2 icons will become green.
- Once online click on F2T M1 and then Programmer and similarly for F2T M2

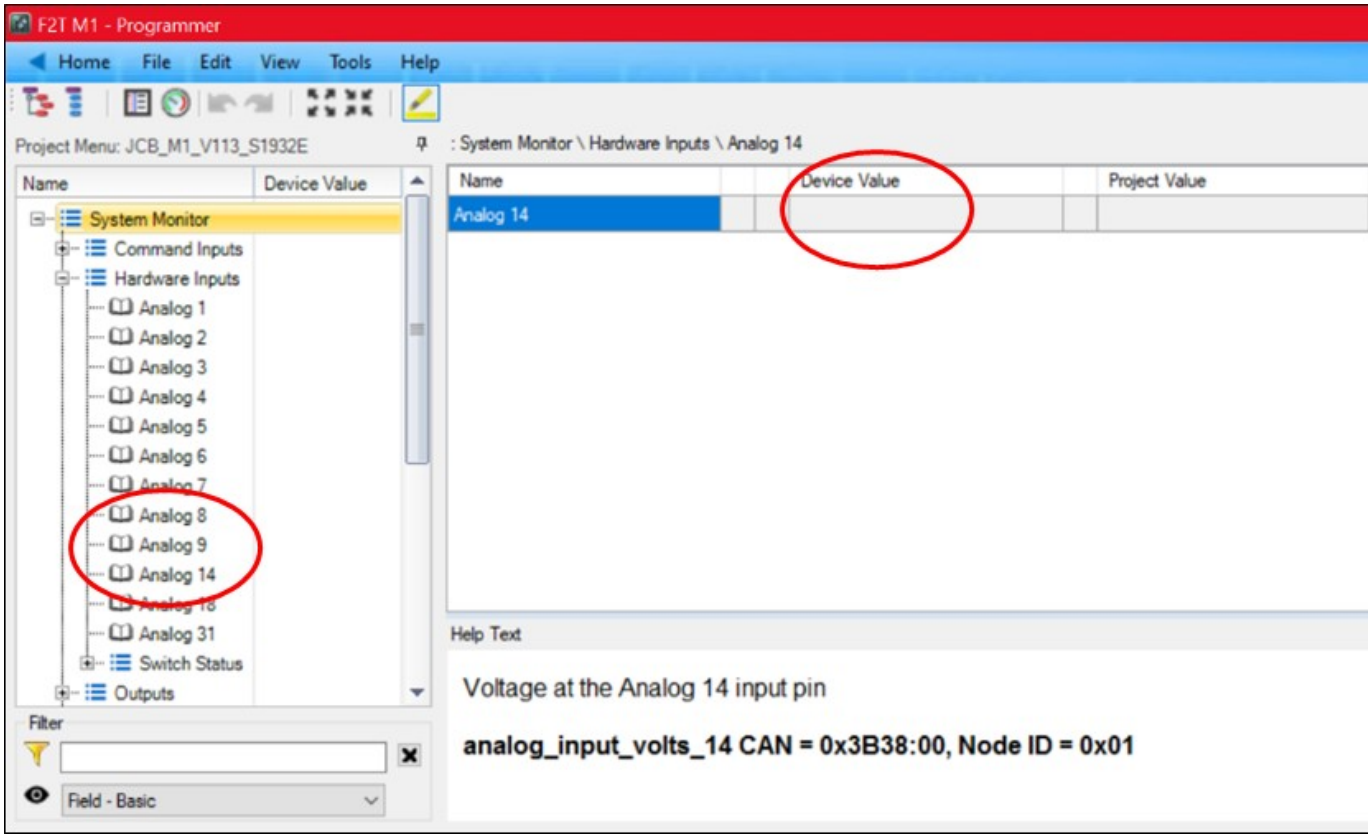




B) Steps to check analog sensor values :

- Inside F2T M1 Programmer click on System Monitor -> hardware Inputs ->

- Click on Analog 8 or 9 or 14 to check the device values.
- Valid Range for these sensors is 0.5 to 4.5 V



4.4 Annexure - C

	Annexure-C

Scissor Trouble shooting Guide > **Annexure-C**

Steps to check correct Sensor and Switch position in Machine -

Switch & Sensor Logic :

Component	Software ID	Description	Full
Lower Limit Switch	Switch 13	Lower_Limit_Switch_2	
	Switch 7	Lower_Limit_Switch_1	
Upper Limit Switch	Switch 10	Upper_Limit_Switch	
Pothole Switch	Switch 18	LH_Pothole_Input	
	Switch 11	RH_Pothole_Input	
	Switch 11 - M2	LH_RH_Pothole_Series	
Pressure Sensor	Analog 9	Pressure_Sensor_Input_1	
	Analog 14	Pressure_Sensor_Input_2	
Angle Sensor	Analog 8	Angle_Sensor_Input	

Height State Logic :

Height State	Platform Physical Condition
1	Fully Stowed
2	Below Descent Delay Height
3	Descent Delay Height + Tolerance
4	Above Descent Delay Height
5	Fully Raised

4.5 CAN Test

CAN Test

Scissor Trouble shooting Guide > **CAN Test**

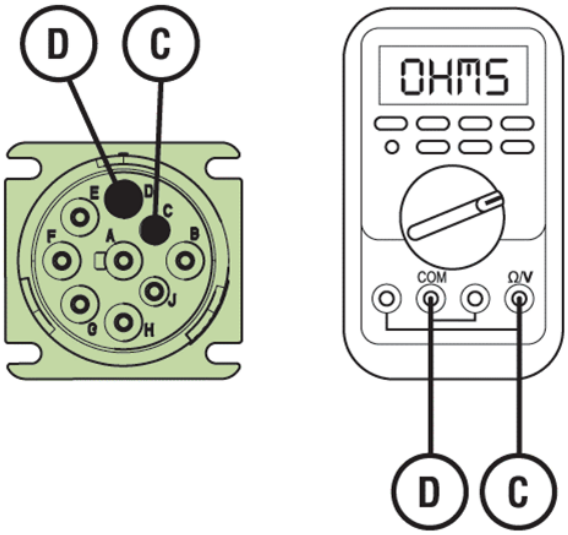
Steps to Check CAN Network -

1. key Off the machine.
2. Locate the 9 pin diagnostic connector in the RH door above the DC motor.
3. Connect Digital Multimeter between Pin C & D and record resistance.
4. If the resistance value is ~60 Ohms, CAN network is working fine.
5. If value is more than 60 Ohms check the terminating resistor if it is connected properly.

5.1 Terminating resistor can be located in Main Harness near Ignition Switch Branch. It is a 3 pole connector tapped to main Branch.

5.2 Second terminating resistor is inside WIKA PCU. Try replacing that with a new one.

6. If resistance is very less CAN wires might be shorted. Check for any damage on Harness or else replace the Harness.



4.6 DTC- 74-75

DTC- 74-75

Scissor Trouble shooting Guide > **DTC- 74-75**

Fault Code	Fault Detail	Description	Fault Action
DTC 74	Fault on other traction Controller	A fault is active on the other traction controller (M1 or M2) . Any fault on other traction controller will cause this fault to set.	No Action

		For information on this fault, connect the service master and check programmer.	
DTC 75	Dual Severe	Both traction controllers (M1 & M2) have active severe faults and therefore both will be disabled.	Shut Down Vehicle

DTC 74 and DTC 75 are generic faults indicating that either M1 or M2 or both drivers have faults.

Scenario 1 :

If DTC 74/75 is coming along with other faults

- In this case DTC74/75 are secondary faults indicating some fault in M1 controller.
- Check base or Joystick display for any other primary fault active on controller
- In case its not clear, connect DLA tool and check individual faults on M1 & M2 controllers to further diagnose. (refer Annexure-B for connection steps)

Example -

A typical pressure sensor 1 fault (Analog 9 out of range) shows below fault codes on display :

DTC Codes : B9...7C...63...75...74...A1...32...31...A6...A9

- In this case, DTC74/75 are coming along with other faults so it can be ignored as secondary fault.
- Start with first fault code in sequence on key cycle. The very first fault code here is B9 which is a primary fault code for Pressure Sensor 1 Failure as shown in Annexure-A.
- Check Analog 9 value in F2T M1 programmer as explained in Annexure-B.
- If value is out of range - Refer troubleshooting procedure mentioned in B9 tab.
- If everything looks OK move to next primary fault in sequence and check the troubleshooting steps for that.

Scenario 2 :

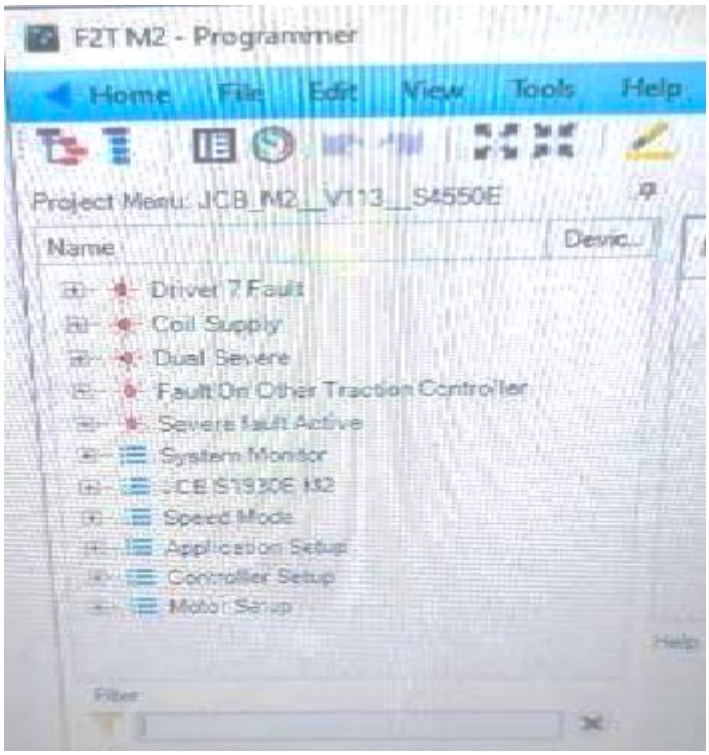
If only DTC 74/75 is coming

- In this case DTC74/75 are indicating a primary fault in M2 driver.
- Connect DLA tool and check individual faults on F2T M2 programmer to further diagnose. (refer Annexure-B for connection steps).

Example -

DTC Codes : 74...75

- Connect DLA tool and check individual faults on F2T M2 programmer.
- Specific fault would be displayed on top in red color as shown here.
- Here it shows Driver 7 Fault which is Lower Solenoid Fault - check the troubleshooting steps.



Related / Similar Faults :

Fault Code	Fault Detail	Description	Fault Action
7C	Severe Fault Active User_31_Fault	If any of the below OS faults are active: Driver_1_Fault EM_Brake_Driver Driver_3_Fault Driver_6_Fault	Shutdown Vehicle Shutdown Coil Supply

4.7 DTC - B9

	DTC - B9

Fault Code	Fault Detail	Description	Fault Action
B9	Pressure Sensor 1 Fault	If filtered pressure value is less than 0.15V for 50ms OR If filtered pressure value is greater than 4.6V for 1500ms	When platform is above down limit switch, disable all motions. When platform is below down limit switch, disable all motions except lowering.

Possible Causes :

1. Faulty Pressure Sensor

2. Faulty Wiring Harness

   2.1 Fuse Blown

   2.2 Wire Short Circuit

   2.3 Wire Open Circuit

   2.4 Connector Damage/Loose

   2.5 Terminal Back out

Troubleshooting Steps :

1. Connect DLA tool and open M1 programmer & check if analog 9 output voltage (Refer Annexe-B for steps).

//Sensor Valid Output Range : 0.5-4.5 Volts//

2. If sensor output is out of range (i.e. less than 0.5V or greater than 4.5V) check below

2.1 Check if connector C18_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step

2.2 Check Fuse FU5_MH (5A), Replace if blown otherwise continue to next step.

2.3 Check continuity between Wire 4200G (Pin 4) of Pressure sensor connector C18_MH and Pin 24 of Controller 35 Pin connector CN1_MH.

2.4 If no continuity, check the mating connectors, chassis interconnections for any loose or damaged connection. otherwise continue to next step.

2.5 Check voltage between Pin 1 & Pin 2 of Pressure Sensor 1, If it is not ~24V check wiring for loose connection or damage. Otherwise continue to next step.

3. If all above steps are negative, try replacing the pressure sensor.

4. Re-calibrate the machine after replacement. (No Load and Full Load Calibration)

Related / Similar Faults :

Fault Code	Fault Detail	Description	Fault Action
54	Pressure Sensors Corelation Fault (Elevate) User_4_Fault	If the difference between filtered pressure value 1 and filtered pressure 2 value is greater than 0.25V for 1500ms when the platform is elevated, then this fault is set. The potential cause could be: Faulty pressure sensor Pressure sensor(s) wiring issue	When platform is above down limit switch, disable all motions. When platform is below down limit switch, disable all motions except lowering
58	Pressure sensor 1 fault User_8_Fault	If pressure sensor 1 is out of range & the platform is below 50% height of the machine, the fault will be set. Possible causes for this fault include: Pressure sensor wiring issue Pressure sensor hardware failure	Shutdown Vehicle
63	Pressure sensor 1 warning (stowed) User_12_Fault	If the platform is fully lowered and analog 9 out of range fault is active. The following are possible causes: Pressure sensor wiring issue Pressure sensor hardware failure	NA
66	Pressure Sensor 1 Warning (Elevated) User_15_Fault	If the platform is above fully lowered but below 50% height and analog 9 out of range fault is active. The following are possible causes: Pressure sensor wiring issue Pressure sensor hardware failure	Shut down Throttle Shutdown Pump
6C	Pressure Sensor Correlation Elevated Fault User_25_Fault	If the difference between both pressure sensors is greater than the tolerance when the platform is stowed, then this fault is set. The potential cause could be: Pressure sensor wiring issue Pressure sensor hardware failure	Shutdown Vehicle Shutdown Coil Supply

7A	Percentage To Max Load Difference Fault User_25_Fault	If the percentage to max load that is calculated by M1 and M2 individually is different by more than the max percentage difference parameter for more than 2500ms. Possible causes for this fault includes: Calibration failure Pressure sensor failure Electrical noise issue on one of the pressure sensors	Shutdown Vehicle Shutdown Coil Supply

4.8 DTC- BB

DTC- BB

Scissor Trouble shooting Guide > **DTC- BB**

Fault Code	Fault Detail	Description	Fault Action
BB	Pressure Sensor 2 Fault	If filtered pressure value is less than 0.15V for 50ms OR If filtered pressure value is greater than 4.6V for 1500ms	When platform is above down limit switch, disable all motions. When platform is below down limit switch, disable all motions except lowering.

Possible Causes :

1. Faulty Pressure Sensor

2. Faulty Wiring Harness

    2.1 Fuse Blown

    2.2 Wire Short Circuit

    2.3 Wire Open Circuit

    2.4 Connector Damage/Loose

    2.5 Terminal Back out

Troubleshooting Steps :

1. Connect DLA tool and open M1 programmer & check if analog 14 output voltage (Refer Annexure-B for steps).

//Sensor Valid Output Range : 0.5-4.5 Volts//

2. If sensor output is out of range (i.e. less than 0.5V or greater than 4.5V) check below

2.1 Check if connector C34_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step

2.2 Check Fuse FU8_MH (5A), Replace if blown otherwise continue to next step.

2.3 Check continuity between Wire 4300C (Pin 4) of Pressure sensor connector C34_MH and Pin 25 of Controller 35 Pin connector CN1_MH.

2.4 If no continuity, check the mating connectors, chassis interconnections for any loose or damaged connection. otherwise continue to next step.

2.5 Check voltage between Pin 1 & Pin 2 of Pressure Sensor 1, If it is not ~24V check wiring for loose connection or damage. Otherwise continue to next step.

3. If all above steps are negative, try replacing the pressure sensor.

4. Re-calibrate the machine after replacement. (No Load and Full Load Calibration)

Related / Similar Faults :

Fault Code	Fault Detail	Description	Fault Action
54	Pressure Sensors Correlation Fault (Elevate) User_4_Fault	If the difference between filtered pressure value 1 and filtered pressure 2 value is greater than 0.25V for 1500ms when the platform is elevated, then this fault is set. The potential cause could be: Faulty pressure sensor Pressure sensor(s) wiring issue	When platform is above down limit switch, disable all motions. When platform is below down limit switch, disable all motions except lowering
6C	Pressure Sensor Correlation Elevated Fault User_25_Fault	If the difference between both pressure sensors is greater than the tolerance when the platform is stowed, then this fault is set. The potential cause could be: Pressure sensor wiring issue Pressure sensor hardware failure	Shutdown Vehicle Shutdown Coil Supply

6C	Pressure Sensor Correlation Elevated Fault User_25_Fault	If the difference between both pressure sensors is greater than the tolerance when the platform is stowed, then this fault is set. The potential cause could be: Pressure sensor wiring issue Pressure sensor hardware failure	Shutdown Vehicle Shutdown Coil Supply

4.9 DTC- B8

DTC- B8

Scissor Trouble shooting Guide > **DTC- B8**

Fault Code	Fault Detail	Description	Fault Action
B8	Angle Sensor Fault	If filtered angle value is less than 0.15V for 50 ms OR If filtered angle value is greater than 4.6V for 50 ms	When platform is above down limit switch, disable all motions. When platform is below down limit switch, disable all motions except lowering

Possible Causes :

1. Faulty Angle Sensor

2. Mounting Issue

3. Faulty Wiring Harness

    3.1 Fuse Blown

3.2 Wire Short Circuit

3.3 Wire Open Circuit

3.4 Connector Damage/Loose

3.5 Terminal Back out

Troubleshooting Steps :

1. Connect DLA tool and open M1 programmer & check if analog 8 output voltage (Refer Annexure-B for steps).

//Sensor Valid Output Range : 0.4-4.5 Volts//

2. If sensor output is out of range (i.e. less than 0.4V or greater than 4.5V) check below

2.1 Check if connector C33_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step

2.2 Check Fuse FU5_MH (5A), Replace if blown otherwise continue to next step.

2.3 Check continuity between Wire 4200C (Pin 3) of Angle sensor connector C33_MH and Pin 28 of Controller 35 Pin connector CN1_MH.

2.4 If no continuity, check the mating connectors, chassis interconnections for any loose or damaged connection. otherwise continue to next step.

2.5 Check voltage between Pin 1 & Pin 2 of Angle Sensor 1, If it is not ~24V check wiring for loose connection or damage. Otherwise continue to next step.

3. Using the Service Mode menu of Joystick controller, raise the machine and apply safety structure.

3.1 Raise and lower the machine to check if the angle sensor voltage is changing or not.

3.2 If not, open the angle sensor mounting and check the D-bit for any damage.

3.3 Check the angle sensor shaft for any damage. Try rotating it with hand and check if the voltage value is changing or not.

4. If all above steps are negative, try replacing the sensor.

5. Re-calibrate the machine after replacement. (Full Calibration starting with Angle Sensor CAL)

6. Check the Height State and Switch position as per Annexure-C to ensure correct machine operation.

Related / Similar Faults :

Fault Code	Fault Detail	Description	Fault Action
53	Angle Sensor Fault User_3_Fault	If the angle sensor voltage input is out of range (i.e. if the analog 8 out of range fault is active). Potential cause for this fault are: Wiring issue Angle sensor hardware fault	Shutdown Vehicle
65	Angle Sensor Calibration Fault User_14_Fault	If the lower limit switch (NC contact) is open circuit and the angle sensor voltage is below 0.5V when lifting. Potential cause for this fault are: Wiring issue Angle sensor hardware fault	Shutdown Vehicle
6D	Lift Motion Fault User_26_Fault	Type 0: If the pump PWM > 30%, raise solenoid driver PWM is applied and the angle sensor percent hasn't increased by 5% within 10 seconds. Type 1: If the pump PWM is 0%, lower solenoid driver PWM is applied and the angle sensor percent hasn't decreased by 5% within 10 seconds. Type 2: If the platform is stationary (no lift or lower requested) and the angle sensor percent has changed by more than 5% for 6 seconds. Possible causes for these faults include: Faulty angle sensor Electrical noise on angle sensor input Hydraulic issue Lift or lower solenoid mechanical failure	Shutdown Vehicle Shutdown Coil Supply
5A	Down limit Switch Fault User_17_Fault	Down limit switch faults for 500ms OR If the N/C contact of up limit switch is open (above up limit) and measured angle is less	Shutdown Vehicle Shutdown Coil Supply

		than 90% of max angle of calibration for 500ms	

4.10 DTC- A1

DTC- A1

Scissor Trouble shooting Guide > **DTC- A1**

Fault Code	Fault Detail	Description	Fault Action
A1	Steer right Fault	If measured solenoid drive current is greater than short current (900, about 8A) for a configurable delay time (default is 0.7s) OR If measured solenoid drive If measured solenoid drive current is less than open current) for a configurable delay time (default is 0.7s)	Disable all motions except lowering

Possible Causes :

1. Faulty Solenoid

2. Faulty Wiring Harness

   2.1 Wire Short Circuit

   2.2 Wire Open Circuit

   2.3 Connector Damage/Loose

   2.4 Terminal Back out

Troubleshooting Steps :

1. Check if connector C11_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step

2.Check continuity between Wire 6000L (Pin 2) of Steer right solenoid C11_MH and Pin 2 of Controller 35 Pin connector CN1_MH.

3. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.

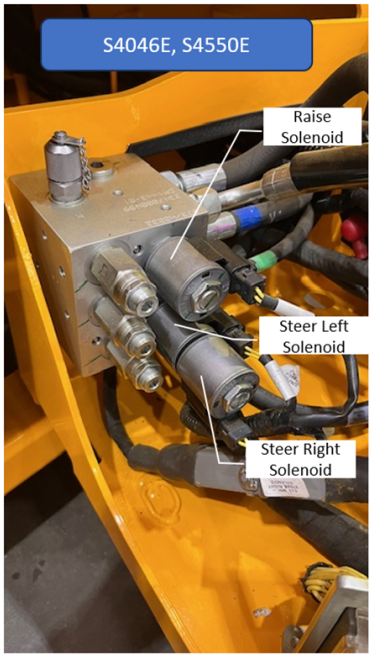
4. Check continuity between Wire 8401 (Pin 1) of Steer right solenoid C11_MH and Wire 8402 (Pin 13) of Controller 35 Pin connector CN1_MH.

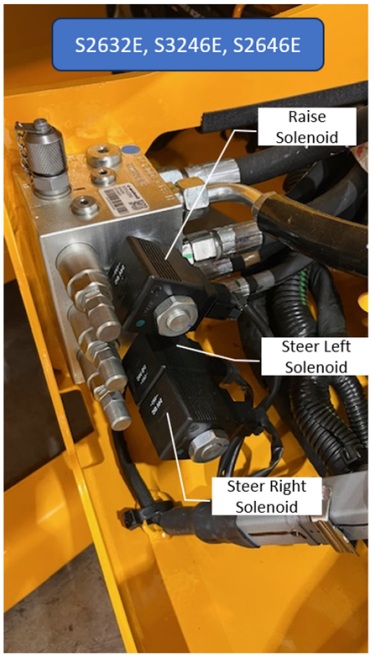
5. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.

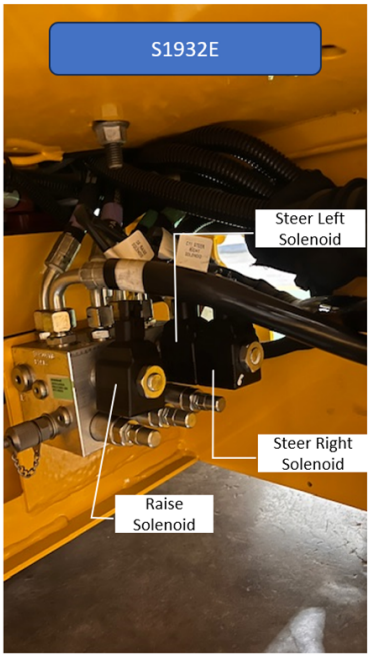
6. If all above steps are negative, try replacing the Main control Valve.

Related / Similar Faults : **N/A**

Location :







Additonal Info :

- This fault could also come as part secondary fault set along with any primary fault.
- Try to identify primary fault in M1 & M2 first.
- If this fault Is coming as first fault on display after key cycle and no other fault seem primary - continue to explore the troubleshooting steps.

4.11 DTC- A6

DTC- A6

Scissor Trouble shooting Guide > **DTC- A6**

Fault Code	Fault Detail	Description	Fault Action
A6	Steer Left Coil Fault	Short circuit OR Open circuit	Disable all motions except lowering

Possible Causes :

1. Faulty Solenoid

2. Faulty Wiring Harness

   2.1 Wire Short Circuit

   2.2 Wire Open Circuit

   2.3 Connector Damage/Loose

   2.4 Terminal Back out

Troubleshooting Steps :

1. Check if connector C10_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step

2.Check continuity between Wire 6000M (Pin 2) of Steer Left solenoid C10_MH and Pin 19 of Controller 35 Pin connector CN1_MH.

3. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.

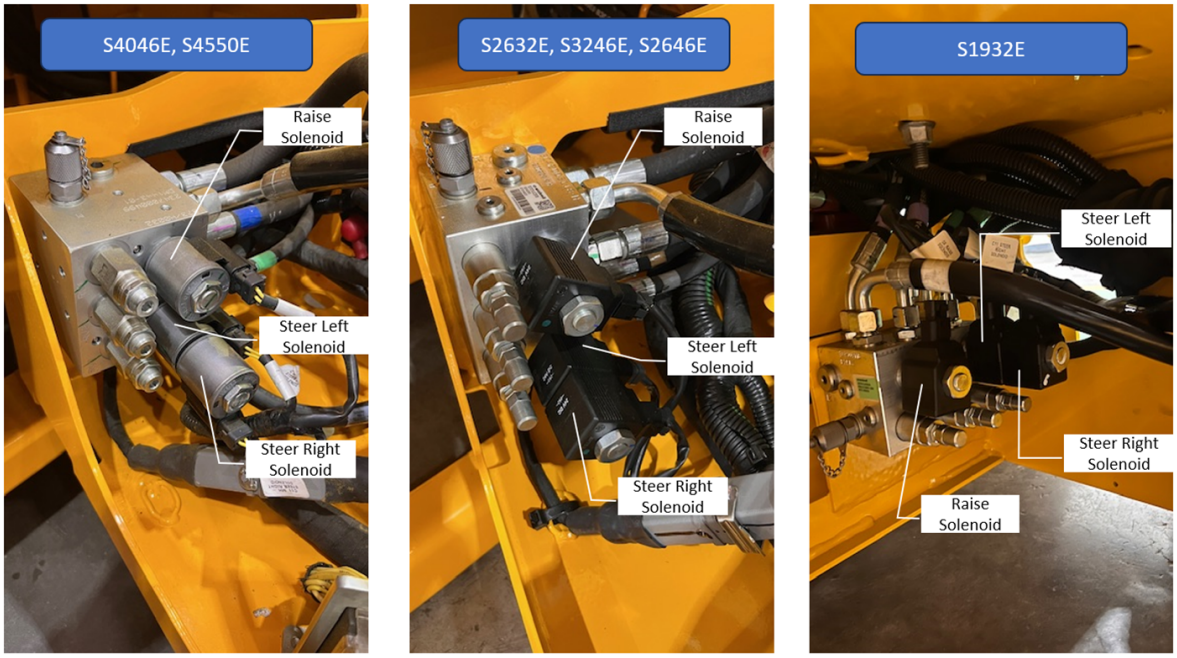
4. Check continuity between Wire 8400 (Pin 1) of Steer Left solenoid C10_MH and Wire 8402 (Pin 13) of Controller 35 Pin connector CN1_MH.

5. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.

6. If all above steps are negative, try replacing the Main control Valve.

Related / Similar Faults : **NA**

Location :



Additonal Info :

- This fault could also come as part secondary fault set along with any primary fault.
- Try to identify primary fault in M1 & M2 first.
- If this fault Is coming as first fault on display after key cycle and no other fault seem primary - continue to explore the troubleshooting steps.

4.12 DTC- A4

DTC- A4

Scissor Trouble shooting Guide > **DTC- A4**

Fault Code	Fault Detail	Description	Fault Action
A4	Lift Up solenoid	Short circuit OR Open circuit	Disable all motions except lowering

Possible Causes :

1. Faulty Solenoid

2. Faulty Wiring Harness

    2.1 Wire Short Circuit

    2.2 Wire Open Circuit

    2.3 Connector Damage/Loose

    2.4 Terminal Back out

Troubleshooting Steps :

1. Check if connector C6_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step

2.Check continuity between Wire 6000U (Pin 2) of Lift Up solenoid C6_MH and Pin 3 of Controller 35 Pin connector CN1_MH.

3. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.

4. Check continuity between Wire 8100 (Pin 1) of Lift Up solenoid C6_MH and Wire 8402 (Pin 13) of Controller 35 Pin connector CN1_MH.

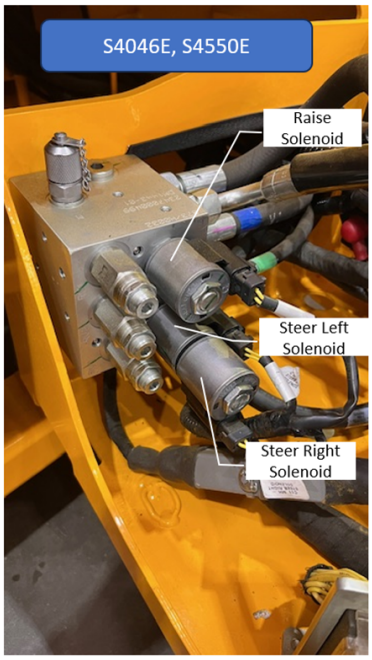
5. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.

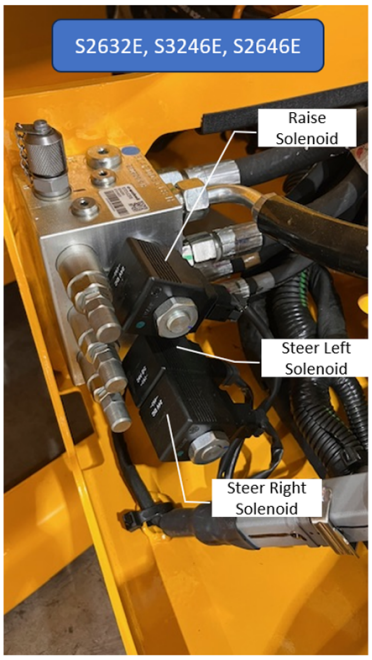
6. If all above steps are negative, try replacing the Main control Valve.

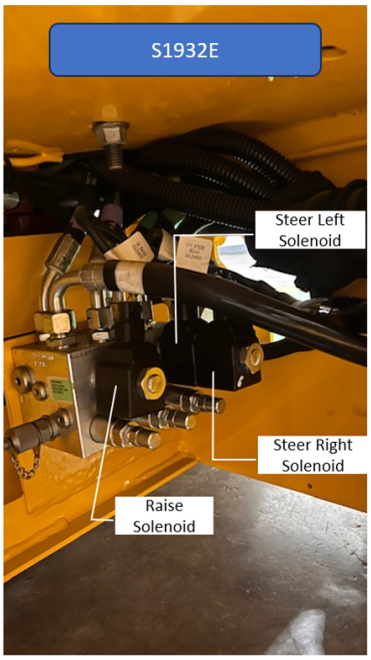
Related / Similar Faults :

NA

Location :







Additonal Info :

- This fault could also come as part secondary fault set along with any primary fault.
- Try to identify primary fault in M1 & M2 first.
- If display is only showing DTC74/75 and on M2 programmer this is coming and no other fault seem primary - continue to explore the troubleshooting steps.

4.13 DTC- A7

DTC- A7

Scissor Trouble shooting Guide > **DTC- A7**

Fault Code	Fault Detail	Description	Fault Action
A7	Lift Down Coil Fault	If measured solenoid drive current is greater than short current (900, about 8A) for a configurable delay time (default is 0.7s) OR If measured solenoid drive If measured solenoid drive current is less than open current) for a	Disable drive F/R

		configurable delay time (default is 0.7s)	

Possible Causes :

1. Faulty Solenoid

2. Faulty Wiring Harness

   2.1 Wire Short Circuit

   2.2 Wire Open Circuit

   2.3 Connector Damage/Loose

   2.4 Terminal Back out

Troubleshooting Steps :

1. Check if connector C8_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step

2.Check continuity between Wire 6000P (Pin 2) of Lift Down Solenoid C8_MH and Pin 20 of Controller 35 Pin connector CN1_MH - (For Single cylinder machine)

2. Check continuity between Wire 6000S (Pin 2) of Lift Down Solenoid C8_MH and 6000R (Pin2) of Lift Down Solenoid 2 C74_MH with Pin 20 of Controller 35 Pin connector CN1_MH - (For Double cylinder machine)

3. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.

4. Check continuity between Wire 8201 (Pin 1) of Lift Down Solenoid C8_MH and Wire 8402 (Pin 13) of Controller 35 Pin connector CN1_MH - (For Single cylinder machine)

4. Check continuity between Wire 8201A (Pin 1) of Lift Down Solenoid C8_MH and Wire 8201B (Pin1) of Lift Down Solenoid 2 C74_MH with wire 8402 (Pin 13) of Controller 35 Pin connector CN1_MH - (For Double cylinder machine)

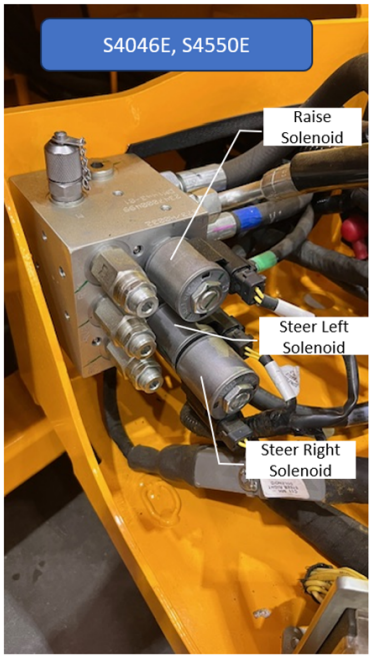
5. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.

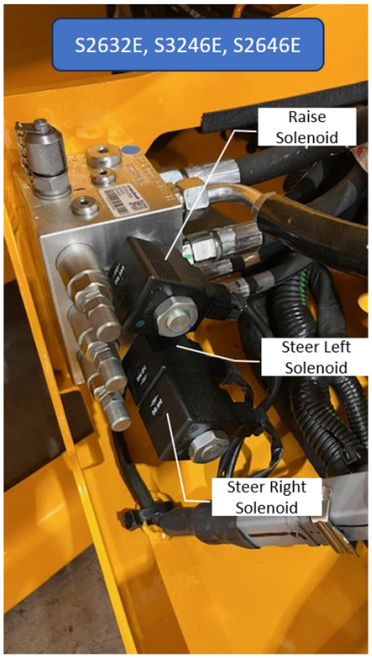
6. If all above steps are negative, try replacing the Main control Valve.

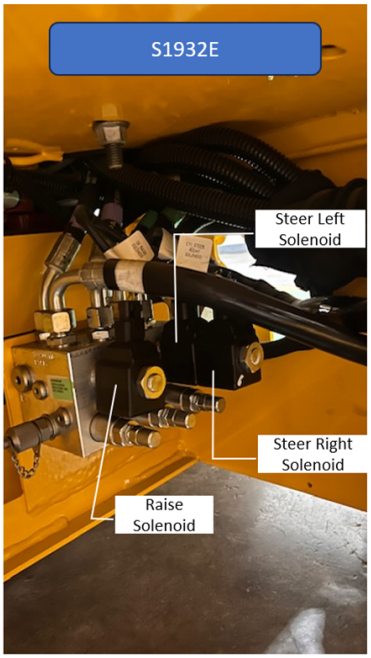
Related / Similar Faults :

NA

Location :







Additional Info :

- This fault could also come as part secondary fault set along with any primary fault.
- Try to identify primary fault in M1 & M2 first.
- If display is only showing DTC74/75 and on M2 programmer this is coming and no other fault seem primary - continue to explore the troubleshooting steps.

4.14 DTC- 51

DTC- 51

Scissor Trouble shooting Guide > **DTC- 51**

Fault Code	Fault Detail	Description	Fault Action
51	Wika PCU Throttle Fault	If difference between the throttle channels from the PCU is greater than 3x then this fault is set.	Shutdown Vehicle Shutdown Coil Supply

Possible Causes :

1. Faulty Hardware

2. Faulty CAN Wiring

Troubleshooting Steps :

1. Check the CAN resistance as explained in CAN Test Tab. If resistance is as per specification continue to next step.

2.Try replacing the Joystick with a new one.

3. If problem still persists, try wiggling the wire bunch near door hinge area and check for any possible loose connection or damage to Harness.

4. If problem still persists, replace Main Harness.

Related / Similar Faults :

Fault Code	Fault Detail	Description	Fault Action
5F	PCU HW Fault User_22_Fault	Type 0: PCU button 1 HW fault (Lift/Lower mode) Type 1: PCU button 2 HW fault (Traction mode) Type 2: PCU button 3 HW fault (Horn) Type 3: PCU button 4 HW fault (Speed mode) Type 4: PCU steer left or right button HW fault Type 5: PCU enable trigger button HW fault All of these are reported by the PCU and HW faults.	Shutdown Vehicle Shutdown Coil Supply
52	Wika PCU PDO Timeout Fault User_2_Fault	If the cyclic PDO isn't received within 100ms. The potential cause could be: CAN wiring issue Incorrect baud rate or node ID set in the PCU CAN hardware issue on node CAN node not in CAN NMT operational state	Shutdown Vehicle Shutdown Coil Supply

5E	PCU Data Freeze Fault User_21_Fault	Type 1: PDO1 from PCU (0x189) data freezes Type 2: PDO2 from PCU (0x289) data freezes Type 3: PDO1 from PCU (0x189) & PDO2 from PCU (0x289) data freezes Possible causes could be: PCU HW issue	Shutdown Vehicle
59	F2T M2 PDO Timeout Fault User_9_Fault	If the cyclic PDO isn't received within 100ms. The potential cause could be: CAN wiring issue Incorrect baud rate or node ID set in the F2T M1 CAN hardware issue on node CAN node not in CAN NMT operational state	Shutdown Vehicle
57	F2T M2 Not Operational Fault User_7_Fault	If the F2T M1 sees the CAN NMT state is not operational after initialization then this fault is set. The potential cause could be as follows: CAN wiring issue	Shutdown Vehicle

Location :

NA

Additional Info :

- This fault could also come as part secondary fault set along with any primary fault.
- Try to identify primary fault in M1 & M2 first.
- If only this fault Is coming as first fault after key cycle and no other fault seem primary - continue to explore the troubleshooting steps.

4.15 DTC- LL

DTC- LL

Scissor Trouble shooting Guide > **DTC- LL**

Fault Code	Fault Detail	Description	Fault Action
LL	Inclination Fault	If the inclination switched input is open circuit (0V) and the platform is elevated (both lower limit switches in the elevated state).	Shutdown Throttle Shutdown Interlock Shut down Pump

Possible Causes :

1. Machine Tilted outside limit

2. Faulty Tilt Sensor

3. Tilt Sensor calibration out

4. Faulty Wiring Harness

   4.1 Wire Short Circuit

   4.2 Wire Open Circuit

   4.3 Connector Damage/Loose

   4.4 Terminal Back out

Troubleshooting Steps :

1. If the machine is at or above down limit - Check if machine Pitch angle (Along the length of machine) is not exceeding 3.0 Degrees and Roll angle (Along the width of machine) is not exceeding 1.5 degrees. If yes, place the machine on flat ground within this spec.

2. If ground angle is within specification or machine is below down limit and fault is appearing - try re-calibrating the Tilt sensor. (refer procedure below). If problem persists, contine to next step.

3. Check if connector C26_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step

4. Check continuity between Wire 4200B (Pin B) of Tilt Sensor C26_MH and Pin 34 of Controller 35 Pin connector CN1_MH.

5. Check voltage between Pin A of tilt sensor C26_MH and Battery GND. It should show ~24V. if not check the wiring for any damage.

6. Check voltage between Pin C of tilt sensor C26_MH and Battery POS. It should show ~24V. if not check the wiring and grounding for any damage.

7. Check Fuse FU5_MH (5A), Replace if blown otherwise continue to next step.

8. If all above steps are negative, try replacing the Tilt Sensor.

9. Re calibrate the sensor after replacement.

Related / Similar Faults :

Fault Code	Fault Detail	Description	Fault Action
55	Machine Tilted Beyond Safe Limits Fault	If platform is above down limit and tilt inclinometer is above maximum rated angle for 1.5 ° /3 °	Shutdown Vehicle Shutdown Coil Supply

Location :

NA

Additonal Info :

A) Zero Calibration Method:

1. Ensure that machine is on X = 0 Deg and Y= 0 Deg surface. (Wrong calibration may result in unsafe operation, even machine topple)

2. Power on the machine

3. Locate the zero setting red cable coming out from tilt sensor.

4. Provide 24V power supply from battery to this cable for 7 seconds.

5. The green LED will start to blink faster for a while to show correct zero calibration.

B) LED Visualization :

Green LED	Meaning
Solid ON	Device powered on and currently supplied
OFF	Tilt outside range
Blink (1-7)	Internal fault

4.16 DTC- 56

DTC- 56

Scissor Trouble shooting Guide > DTC- 56

Fault Code	Fault Detail	Description	Fault Action
56	Pothole Switch Fault	Type 0: If the pothole series switch state is on & LH pothole switch is off & RH pothole input switch is on & platform is elevated above the lower limit switches. Type 1: If the pothole series switch state is on & LH pothole switch is on & RH pothole input switch is off & platform is elevated above the lower limit switches. Type 2: If the pothole series switch state is off & LH pothole switch is off & RH pothole input switch is on & platform is elevated above the lower limit switches. Type 3: If the pothole series switch state is off & LH pothole switch is on & RH pothole input switch is off & platform is elevated above the lower limit switches. Type 4: If the pothole series switch state is off & LH pothole switch is on & RH pothole input switch is on & platform is elevated above the lower limit switches.	Shutdown Throttle Shutdown Pump

Possible Causes :

1. Pothole Plate blocked
2. Pothole Switch setting problem
3. Pothole Switch faulty
4. Pothole switch wiring wrong

5. Faulty Wiring Harness

5.1 Wire Short Circuit

5.2 Wire Open Circuit

5.3 Connector Damage/Loose

5.4 Terminal Back out

Troubleshooting Steps :

1. Check if pothole LH or RH plates are blocked by any obstacle. If yes clear them after lowering the machine. If not continue to next step.

2. Using service master dashboard, check if switch conditions (LH, RH, LH-RH Series) are as per table mentioned in Annexure-C.

3. If switch outputs do not match the table, check if LH and RH switches are properly mounted and during fully stowed condition they are fully pressed and while pothole opening they get fully depressed.

4. Switch can be adjusted in the mounting slot to get the right position.

5. If switch pressing is correct, yet switch output is not correct check switch connections (13, 14, 21, 22) as per schematic. Snap shown below.

6. Check continuity between Wire 4200F (Pin 14) of Pothole Switch RH and Pin33 of Controller 35 Pin connector CN1_MH, if no continuity check wiring harness for any damage.

7. Check continuity between Wire 4300F (Pin 22) of Pothole Switch RH and Pin12 of Controller 35 Pin connector CN1_MH, if no continuity check wiring harness for any damage.

8. If no issue in wiring check switch continuity. When switch is pressed Pin 13-14 will show continuity and Pin 21-22 will show open circuit. Opposite when switch is depressed.

9. Replace the switch if it doesn't work correctly.

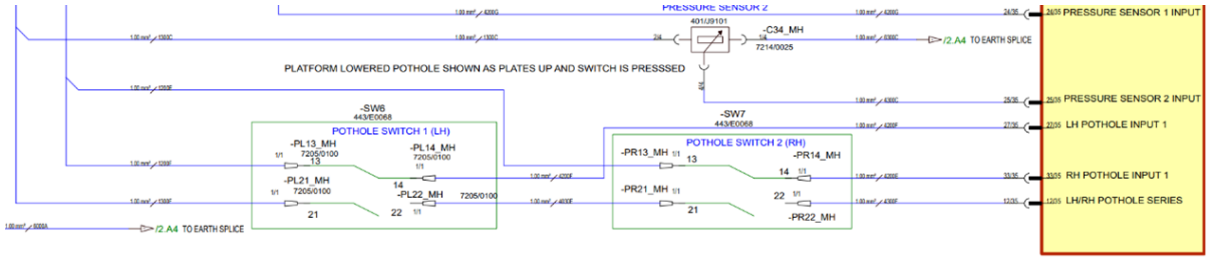
Related / Similar Faults :

NA

Location :

NA

Additional Info :



4.17 DTC- 61

DTC- 61

Scissor Trouble shooting Guide > **DTC- 61**

Fault Code	Fault Detail	Description	Fault Action
61	Hydraulic SRO Fault	Type 1: If the PCU joystick is in the lower position OR the base lower switch is ON at start up. Type 2: If the PCU joystick is in the lift position OR the base upper switch is ON at start up.	Shutdown Throttle Shutdown Pump

Possible Causes :

1. Faulty Joystick
2. Faulty Toggle Switches
3. Faulty Wiring Harness

3.1 Wire Short Circuit

3.2 Wire Open Circuit

3.3 Connector Damage/Loose

3.4 Terminal Back out

Troubleshooting Steps :

1. Ensure that Joystick or base toggle switches are not pressed at start up. Key cycle the machine to verify. If fault is present continue to next step.

2. Check the base enable and up down toggle switches for any damage or switch stuck or freely rotating. If found damaged, replace the switch or else continue.

3. Check the harness connection on both switches for any loose connection or disconnection.

4. Check harness connected in correct pin numbers. See below image for correct sequence of connection. if sequence is correct continue to next step.

5. Check voltage between Pin 16 of 35 Pin ECU connector CN1_MH with Batt GND (Without pressing the switch) nd if found 24V that means wire is short to BATT +. Check wiring for damage or replace.

6. Check voltage between Pin 9 of 35 Pin ECU connector CN1_MH with Batt GND (Without pressing the switch) nd if found 24V that means wire is short to BATT +. Check wiring for damage or replace.

7. If all above points are OK, try replacing the Joystick.

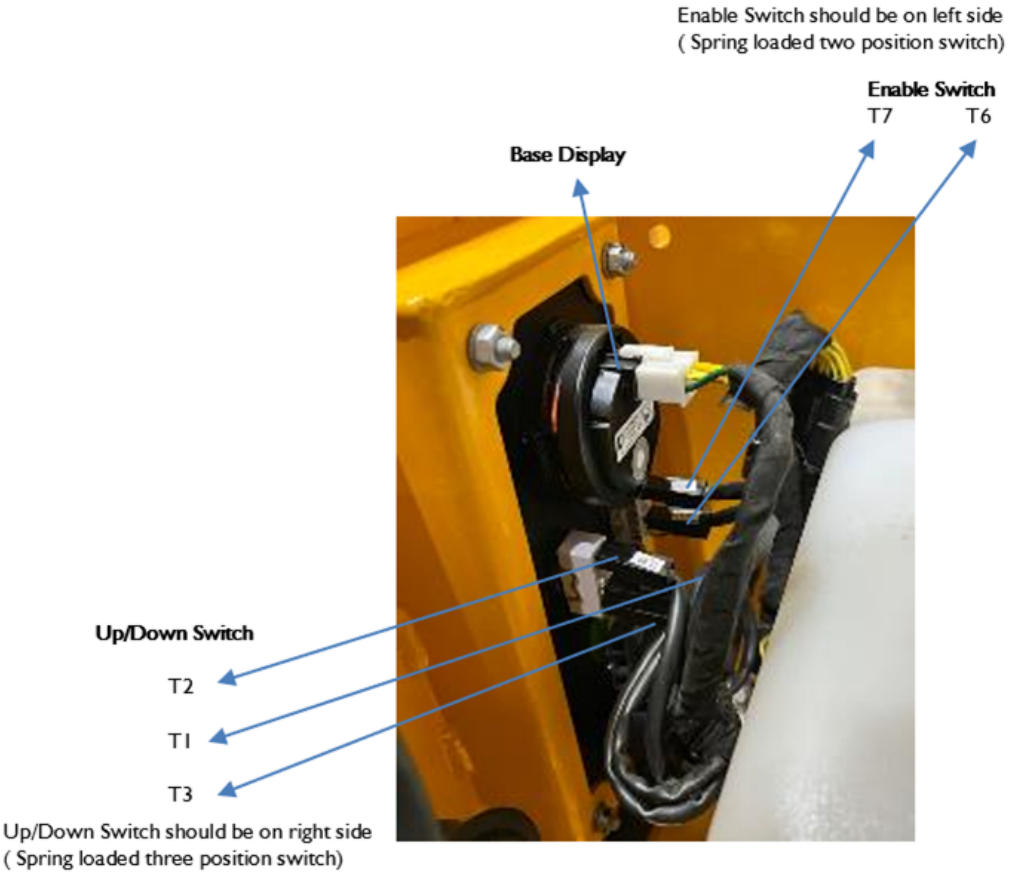
Related / Similar Faults :

Fault Code	Fault Detail	Description	Fault Action
47	HPD Sequencing	If enable button is pressed after joystick lever is pushed forward or reverse OR If base enable button is pressed after pushing Platform lift/lower button	Disable drive F/R
67	Hydraulic HPD Fault User_16_Fault	If Pump HPD fault is active OR lift/lower request is present on start up.	Shutdown Throttle Shutdown Pump

Location :

NA

Additional Info :



4.18 DTC- OL

	DTC- OL

Scissor Trouble shooting Guide > **DTC- OL**

Fault Code	Fault Detail	Description	Fault Action
OL	Platform Overload Above Set point	If the averaged percentage to max load is >99% and the platform is above 50% height, this fault will be set. Below are the fault types: Type 0: Static overload checks Type 1: Dynamic lift overload checks Type 2: Dynamic lower overload checks	Shutdown Vehicle Shutdown Coil Supply

Possible Causes :

1. Load on Platform beyond specification

2. Machine Calibration out

Troubleshooting Steps :

1. Ensure that load on platform is not more than 95% of rated load for that machine. Rated load is mentioned on the platform decal.

2. Remove the load and key cycle the machine to remove error.

3. If machine is giving false overload i.e. platform is not over loaded and yet OL fault is coming; this could be because of calibration out. Re-run the full machine calibration and check again.

Related / Similar Faults :

Fault Code	Fault Detail	Description	Fault Action
64	Platform Overload Below Set point User_13_Fault	If the averaged percentage to max load is >99% and the platform is below 50% height, this fault will be set. Below are the fault types: Type 0: Static overload checks Type 1: Dynamic lift overload checks Type 2: Dynamic lower overload checks	Shutdown Throttle Shutdown Pump

Location :

NA

Additional Info :

- During OL fault condition, if machine above the 50% of machine height, platform will not lower from joystick or base command. Use Manual descent lever to lower the machine.
- In case of OL fault below 50% of machine height, platform can be lowered using joystick or base command.
- The machine measures the hydraulic pressure to do load calculation and same is affected with temperature variation. Lower temperature would mean reduced lifting capacity as OL faults will trigger at lesser weight. This is a known behavior of machine.

4.19 DTC- 5A

DTC- 5A

Scissor Trouble shooting Guide > **DTC- 5A**

Fault Code	Fault Detail	Description	Fault Action
5A	Down limit Switch Fault	Both NO and NC switched inputs of Lower Limit Switch are in the same state outside of the mechanical dead zone in the switch itself for more than 500ms. OR The NC switched input of Lower Limit Switch is OFF below the down limit height for more than 500ms. OR The NC switched input of Lower Limit Switch is ON above the down limit height for more than 500ms. OR The N/C contact of up limit switch is open (above up limit) and measured angle is less than 90% of max angle of calibration for 500ms OR If Pothole is open (Pothole switch 18 & 11 = OFF) and Down Limit Switch state is below Down limit height (Switch 13 = OFF & Switch 7 = ON)	Shutdown Vehicle Shutdown Coil Supply

Possible Causes :

1. Lower Limit Switch Wiring Open or Short

2. Lower Limit Switch Height Setting Wrong

3. Upper Limit Switch not set

4. Angle Sensor not moving

5. Pothole switch setting wrong

Troubleshooting Steps :

1. Connect the service master and open dashboard to check the Lower Limit Switch, Upper Limit switch positions from stowed.

2. If Lower Limit Switch 13 & 7 are not in correct state, raise the machine in service mode (refer Annexure-C) and open switch cover to check for any loose connection or wire shorting.

2.1. Check continuity between wire 4200A (Pin 23) of lower limit switch to Pin 22 of 35 Pin Motor controller connector CN1_MH. If found OK, continue to next step.

2.2. Check continuity between wire 4300A (Pin 15) of lower limit switch to Pin 14 of 35 Pin Motor controller connector CN1_MH. If found OK, continue to next step.

2.3. Check continuity between wire 4200A (Pin 23) and 4300A (Pin 15) of Lower Limit Switch. There should be no continuity when fully stowed.

3. If switch status is correct Check the down limit height of the machine and try setting this close to upper band of Down limit height limit. Check the pothole switch status changeover point using SM dashboard and adjust the down limit near that.

4. Try changing the Lower Limit Switch if all above points are OK. If Lower Limit Switch output is as per Annexure-C move to next step.

5. Check Pothole switch status in dashboard as per Annexure-C if not correct refer tab "56" for troubleshooting.

6. If problem is coming near full height check upper limit switch status in dashboard along with angle sensor percentage.

7. If angle sensor has not yet reached 90% and upper limit switch is ON, adjust the upper limit switch to correct height.

8. if set to correct height and still fault is coming this could be because of angel sensor calibration wrong. try re-calibrating the machine.

4.20 DTC- 6D

DTC- 6D

Scissor Trouble shooting Guide > DTC- 6D

Fault Code	Fault Detail	Description	Fault Action
6D	Lift Motion Fault	Type 0: If the pump PWM > 30%, raise solenoid driver PWM is applied and the angle sensor percent hasn't increased by 5% within 10 seconds. Type 1: If the pump PWM is 0%, lower solenoid driver PWM is applied and the angle sensor percent hasn't decreased by 5% within 10 seconds. Type 2: If the platform is stationary (no lift or lower requested) and the angle sensor percent has changed by more than 5% for 6 seconds.	Shutdown Vehicle Shutdown Coil Supply

Possible Causes :

1. Faulty Angle Sensor
2. Mounting Issue
3. Pothole Switch faulty
4. Faulty Wiring Harness
   - 4.1 Wire Short Circuit
   - 4.2 Wire Open Circuit
   - 4.3 Connector Damage/Loose
   - 4.4 Terminal Back out

Troubleshooting Steps :

1. Refer to tab "B8" to resolve angle sensor related issue.

Related / Similar Faults :

NA

Location :

NA

Additional Info :

NA

4.21 DTC- 5B

DTC- 5B

Scissor Trouble shooting Guide > **DTC- 5B**

Fault Code	Fault Detail	Description	Fault Action
5B	PCU Steer Left Sequence Fault	If the PCU steer left button is ON at start up.	NA

Possible Causes :

1. Faulty PCU

2. Button Stuck

Troubleshooting Steps :

1. Check the PCU steer buttons for any mechanical object stuck. Clear the object and key cycle the machine.

2. Otherwise, try changing the PCU .

Related / Similar Faults :

NA

Fault Code	Fault Detail	Description	Fault Action

6A	PCU Steer Right Sequence Fault User_23_Fault	If the PCU steer right button is ON at start up.	NA
5C	PCU Enable Trigger Sequence Fault User_19_Fault	If the PCU enable trigger is ON at start up.	NA
5D	PCU Passcode Fault User_20_Fault	Type 0: SDO write failure when requesting to change PCU passcode. Type 1: SDO response failure when requesting to change PCU passcode.	NA

4.22 DTC- 7B

DTC- 7B

Scissor Trouble shooting Guide > **DTC- 7B**

Fault Code	Fault Detail	Description	Fault Action
7B	Limp Mode Fault	If BDI percentage is below or equal to the limp mode level parameter i.e. 10%	Reduce the operation performance to 50%

Possible Causes :

1. BDI Percentage low

2. Battery Not charged or faulty.

Troubleshooting Steps :

1. Check the BDI percentage on the Base display or Platform Control Unit and if its 10% or below put the machine on charge.

2. Check if any battery is faulty causing low BDI percentage. Check individual battery voltage, water level to confirm.

Related / Similar Faults :

Fault Code	Fault Detail	Description	Fault Action
6E	Battery Low Voltage Fault User 27 Fault	If the BDI percentage lower than the low BDI percentage parameter i.e. 5% for more than 3600ms.	Shutdown Vehicle Shutdown Coil Supply

Location :

NA

Additional Info :

1. Machine will come out of limp mode when BDI % is above 15 %.

2. Below or at 5% of BDI all machine operations stop to protect batteries. Use manual break disengagement to move the machine.

3. It is highly recommended to full charge the machine (Charger display showing 100%). Partial charging may damage the batteries and impact battery performance.

Machine Fault Codes

5 Machine Fault Codes

	Machine Fault Codes

Machine Fault Codes

5.1 Machine Must Be Fully Charge

Machine Fault Codes 80 >

- **Before Troubleshooting Please ensure Machine should be fully Charged.**
- **The Machine Charge less than 30 % can exhibit behave where enormous error code in display ex- 5E, 52, 67, 74, 75.**

5.2 DTC - B9,A1,A6,A9,63,74,75

	DTC - B9,A1,A6,A9,63,74,75

Machine Fault Codes 80 > **DTC - B9,A1,A6,A9,74,75**

Error code:	**B9,A1,A6,A9,74,75**
ECU	PECU
Description:	Error showing in platform Control Display and all function disable
Component :	Pressure Sensor 1

Vehicle reaction:	Disable all function
Possible Cause:	Pressure Sensor 1 failure or harness issue
Service Action:	1. Check the voltage of analog 9 in the service master (F2M1> hardware I/P > Analog 9). If the voltage is 0.0 , more than 4.5 and voltage with fluctuation of more than 0.05 volt, then pressure sensor is faulty. After checking this, follow the below mentioned fixes. 2. Check Fuse 5 as for blow and for loose connection 3. Check earth resistance from the ram lowering valve to the chassis earth point, should be below 0.3 ohms. 4. Check all 3 wires coming from main harness to pressure sensor connector are not pinched/cut from anywhere. 5. Check the continuity from the Main controller pin 24 to pin 4 of pressure sensor connector(C18) as these 3 wires are linked to this. 6. Check the status of voltage coming between Pressure Sensor's pin 1 and 2 . It should be approx 24 volt 7. Correct if found anything as per above mentioned fixes or replace the sensor if required.  **Note - In case DTC - 31,32,74,75,A1,A6,A9,7C if appear along with this main DTC then ignore all these error and follow the above instruction.**

5.3 DTC - 74,75,31,32,A6,A7,7C

	DTC - 74,75,31,32,7C,A6,

Machine Fault Codes > DTC - 74,75,31,32,7C,A6,A9

Error code:	**DTC - 74,75,31,32,7C,A6,**
ECU	PECU

Description:	Error on Display & Lifting and Drive function inoperative
Component :	Pressure Sensor M2
Vehicle reaction:	Lifting and Drive function disable
Possible Cause:	Pressure Sensor M2 failure
Service Action:	1. Check the voltage of analog 14 in the service master (F2M1> hardware I/P > Analog 9). If the voltage is 0.0 , more than 4.5 and voltage with fluctuation of more than 0.05 volt, then pressure sensor is faulty. After checking this, follow the below mentioned fixes. 2. Check Fuse 8 as for blow and for loose connection 3. Check earth resistance from the ram lowering valve to the chassis earth point, should be below 0.3 ohms. 4. Check all 3 wires coming from main harness to pressure sensor connector are not pinched/cut from anywhere. 5. Check the continuity from the Main controller pin 25 to pin 4 of pressure sensor connector(C34) as these 3 wires are linked to this. 6. Check the status of voltage coming between Pressure Sensor's pin 1 and 2 . It should be approx 24 volt 7. Correct if found anything as per above mentioned fixes or replace the sensor if required.  **Note - In case DTC - 31,32,74,75,A1,A6,A9,7C if appear along with this main DTC then ignore all these error and follow the above instruction.**

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5.4 DTC - 5A

	DTC - 5A

Machine Fault Codes 80 > **DTC - 5A**

<table>
<tr><td>Error code:</td><td>DTC - 5A - Error During Raising and Lowering or at the time of Machine Turning ON.</td></tr>
<tr><td>ECU</td><td>PECU/Base</td></tr>
<tr><td>Description:</td><td>If any of the Equipment from Both Limit Switch, Pothole Sensors, Angle Sensor (Value) is inoperative or not synchronized with machine operating state, this error will appear.</td></tr>
<tr><td>Component :</td><td>Down Limit SW (If Error During Raising), Upper Limit SW (If Error During lowering/ above Down Limit height), Angle Sensor.</td></tr>
<tr><td>Vehicle reaction:</td><td>Disable all motions</td></tr>
<tr><td>Possible Cause:</td><td>1. Check the machine condition based on below matrix. If anything is wrong as per this, Please correct.
<table>
<tr><td rowspan="2">Machine Height</td><td colspan="7">Equipment</td></tr>
<tr><td>Lower Limit SW 2</td><td>Lower Limit SW 1</td><td>Upper Limit SW 1</td><td>Pothole RH</td><td>Pothole LH</td><td>Pothole Series</td><td>Angle Sensor Voltage</td></tr>
<tr><td>Stowed</td><td>OFF</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>OFF</td><td>0.70 ~ 0.85</td></tr>
<tr><td>Above Down Limit</td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>Very Machine to Machine</td></tr>
<tr><td>Full Height</td><td>ON</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>For 1932 (1.7~2.0)
For All Others (3.4~3.7)</td></tr>
</table></td></tr>
<tr><td>Service Action:</td><td>1. Connect the Servicemaster and open dashboard to check the Lower Limit Switch & Upper Limit switch positions from stowed and match with table in Annexure-C.

2. If Lower Limit Switch 13 & 7 are not in correct state, raise the machine in service mode and open switch cover to check for any loose connection or wire shorting.

2.1. Check continuity between wire 4200A (Pin 23) of lower limit switch to Pin 22 of 35 Pin Motor controller connector CN1_MH. If found Ok, continue to next step.

2.2. Check continuity between wire 4300A (Pin 15) of lower limit switch to Pin 14 of 35 Pin Motor controller connector CN1_MH. If found Ok, continue to next step.

2.3. Check continuity between wire 4200A (Pin 23) and 4300A (Pin 15) of Lower Limit Switch. There should be no continuity when fully stowed.

3. If switch status is correct at stowed, Check the down limit height of the machine and try setting this close to upper band of Down limit height limit. Check the pothole switch status changeover point using SM dashboard and adjust the down limit near that.

4. If not able to adjust down limit height and constantly getting 5A, Try adjusting the limit switch bracket to improve plunger and roller engagement so that switch status changes (ON-ON to ON-OFF) within time. If still 5A is coming check next step.

5. Check Pothole switch status at fault height in dashboard as per Annexure-C if not correct refer tab "56" for troubleshooting.</td></tr>
</table>

	6. If problem is coming near full height check upper limit switch status in dashboard along with angle sensor percentage. 7. If angle sensor has not yet reached 90% and upper limit switch is ON, adjust the upper limit switch to correct height. 8. if set to correct height and still fault is coming this could be because of angel sensor calibration wrong. try re-calibrating the machine.  

5.5 DTC - 5B

	DTC - 5B

Machine Fault Codes 80 > **DTC - 5B**

Error code:	**DTC - 5B**
ECU	PECU
Description:	User start-up fault. Platform Joystick Enable Switch ON at power-up
Component:	Platform Controller
Vehicle reaction:	Disable all motions
Possible Cause:	1. Faulty PCU 2. Button Stuck
Service Action:	1. Restart the machine and Operate the function in sequence.(E-stop ON, wait for system reboot then First press the enable switch and then press function switch)

	 2. Check platform control cable should be connected properly. 3. Check Platform control Joystick and steer button for stuck or damage, if found Repair/Replace failure part.

5.6 DTC - 5C

	DTC - 5C

Machine Fault Codes 80 > **DTC - 5C**

Error code:	**DTC - 5C**
ECU	PECU
Description:	User start-up fault. Left button on joystick is active when system boot-up.
Component:	Joystick
Vehicle reaction:	All Function Disable
Possible Cause:	Platform control Enable switch ON at start up
Service Action:	1.Restart the machine and Operate the function in sequence.(E-stop ON, wait for system reboot then First press the enable switch and then press function switch)

	 2.Check platform control cable should be connected properly. 3.Check Platform control Joystick and mode button for stuck or damage, if found Repair/Replace failure part.

5.7 DTC - 5D

	DTC - 5D

Machine Fault Codes 80 > **DTC - 5D**

Error code:	**DTC - 5D**
ECU	PECU
Description:	User start-up fault. Platform Joystick Enable Switch ON at power-up Fault
Component:	Platform Control Joystick
Vehicle reaction:	All Function Disable
Possible Cause:	1.Platform Joystick Enable Switch ON during machine power ON 2.Platform controller switch stuck or inoperative
Service Action:	1.Restart the machine and Operate the function in sequence.(E-stop ON, wait for system reboot then First press the enable switch and then press function switch)

	 2.Check platform control cable should be connected properly. 3.Check Platform control Joystick and mode button for stuck or damage, if found Repair/Replace failure part.

5.8 DTC - 5E

	DTC - 5E

Machine Fault Codes 80 > **DTC - 5E**

Error code:	**DTC - 5E**
ECU	PECU
Description:	User start-up fault. Left button on joystick is active when system boot-up
Component:	Joystick
Vehicle reaction:	All Function Disable
Possible Cause:	Plat form Joystick and PCU hardware issue
Service Action:	1.Restart the machine and Operate the function in sequence.(E-stop ON, wait for system reboot then First press the enable switch and then press function switch)

	 2.Check platform control cable should be connected properly. 3.Check Platform control Joystick and mode button for stuck or damage, if found Repair/Replace failure part. **Note - In case DTC - 31,32,74,75,A1,A6,A9,7C if appear along with this main DTC then ignore all these error and follow the above instruction.**

5.9 DTC - 5F

	DTC - 5F

Machine Fault Codes > DTC - 5F

Error code:	**DTC - 5F**
ECU	PECU
Description:	User start-up fault. Left button on joystick is active when system boot-up
Component:	Joystick
Vehicle reaction:	Shutdown Vehicle + Shutdown Coil Supply
Possible Cause:	Platform Joystick and PCU hardware issue
Service Action:	1. Shut Off the machine, Wait for 2 Minutes and Restart the machine and Operate the function in sequence.(E-stop ON, wait for system reboot then First press the enable switch and then press function switch)

	 2. Check platform control cable should be connected properly. 3. Check Platform control Joystick and mode button for stuck or damage, if found Repair/Replace failure part. 4. If Error Still persist, Please do software update and Vehicle Identification again. For **Vehicle Identification, Take the machine to Service center or arrange the service engineer with VIN Setup Access.** 5. If software is flashed recently, JCB recommends to do Vehicle Setup again.

5.10 DTC - 6A

	DTC - 6A

Machine Fault Codes > **DTC - 6A**

Error code:	**DTC - 6A -** PCU Steer Right Sequence
ECU	PECU
Description:	User start-up fault. Right button on joystick is active when system boot-up
Component:	Joystick
Vehicle reaction:	Diagnostic Message Only
Possible Cause:	1. Faulty PCU 2. Button Stuck
Service Action:	1.Restart the machine and Operate the function in sequence.(E-stop ON, wait for system reboot then First press the enable switch and then press function switch) 2.Check the PCU steer buttons for any mechanical object stuck. Clear the object and key cycle the machine.

	3.Otherwise, try changing the PCU . 

5.11 DTC - 6B

	DTC - 6B

Machine Fault Codes 80 > **DTC - 6B**

Error code:	**DTC - 6B -** PCU Steer Right Sequence
ECU	PECU
Description:	User start-up fault. Right button on joystick is active when system boot-up
Component :	Joystick
Vehicle reaction:	Diagnostic Message Only
Possible Cause:	If the Joystick steer right button is ON at start up
Service Action:	1.Restart the machine and Operate the function in sequence.(E-stop ON, wait for system reboot then First press the enable switch and then press function switch)

5.12 DTC - 6C

DTC - 6C

Machine Fault Codes > DTC - 6C

Error code:	DTC - 6C - Pressure Sensor Fault
ECU	PECU
Description:	Pressure Sensor fault
Component:	Pressure Sensor
Vehicle reaction:	Shutdown Vehicle + Shutdown Coil Supply
Possible Cause:	1.Faulty pressure sensor 2.Pressure sensor(s) wiring issue
Service Action:	1. Check earth resistance from the ram lowering valve to the chassis earth point, should be below 0.3 ohms. 2. Check Harness cable and connector for any cut damage or loose connection 3. Check Pressure Sensor voltage on both side, replace if faulty.

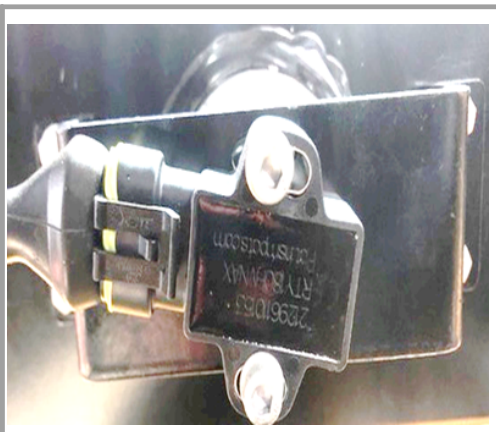
5.13 DTC - 6D

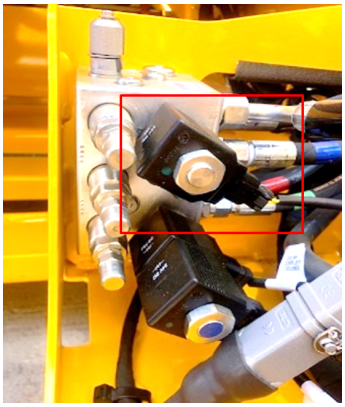
	DTC - 6D

Machine Fault Codes > **DTC - 6D**

Error code:	**DTC - 6D** - Lift Motion Fault
ECU	PECU
Description:	Lift Motion Fault
Component:	Angle Sensor, Lift/Lower Solenoid
Vehicle reaction:	Shutdown Vehicle +Shutdown Coil Supply
Possible Cause:	1.Faulty angle sensor 2.Mounting Issue 3.Pothole Switch faulty 4.Faulty Wiring Harness - Wire Short Circuit, Wire Open Circuit, Connector Damage/Loose, Terminal Back out 5.Electrical noise on angle sensor input 6.Hydraulic issue 7.Lift or lower solenoid mechanical failure

Service Action:	1. Connect DLA tool and open M1 programmer & check if analog 8 output voltage (Sensor Valid Output Range : 0.4-4.5 Volts) 2. If sensor output is out of range (i.e. less than 0.4V or greater than 4.5V) check below 2.1 Check if connector C33_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step 2.2 Check Fuse FU5_MH (5A), Replace if blown otherwise continue to next step. 2.3 Check voltage between Pin 1 & Pin 2 of Angle Sensor 1, If it is not ~24V check wiring for loose connection or damage. Otherwise continue to next step. 2.4 Check voltage between Pin 1 & Batt GND, if not 24V, check wiring between Pin 1 & Fuse or else continue to next step. 2.5 Check Voltage between Pin 2 and Batt Positive, if not check grounding or else continue to next step. 2.6 Check continuity between Wire 4200C (Pin 3) of Angle sensor connector C33_MH and Pin 28 of Controller 35 Pin connector CN1_MH. 2.7 If no continuity, check the mating connectors, chassis interconnections for any loose or damaged connection. otherwise continue to next step. 3. Using the Service Mode menu of Joystick controller, raise the machine and apply safety structure. 3.1 Raise and lower the machine to check if the angle sensor voltage is changing or not. 3.2 If not, open the angle sensor mounting and check the D-bit for any damage. 3.3 Check the angle sensor shaft for any damage. Try rotating it with hand and check if the voltage value is changing or not. 4. If all above steps are negative, try replacing the sensor. 5. Re-calibrate the machine after replacement. (Full Calibration starting with Angle Sensor CAL) 6. Check the Height State and Switch position





Platform Stationary	During Platform Lift		
Type 1	**Type 2**	**Type 3**	**Type 5**
Fault Condition : If Platform is stationary & Angle Sensor value changes more than defined Parameter for Minimum angle change in Software	**Fault Condition :** If Platform is raising & limit switch change over is completed (Off-On to On-Off) but the angle sensor value is still around fully lowered voltage	**Fault Condition :** If Platform is raising & angle sensor value is at or above descent height but the limit switch change over is not completed (Off-On to On-Off)	**Fault Condition :** If Platform is raising & angle sensor value has not changed by a defined percentage (S/w Parameter) in a defined time (S/w parameter)
Root Cause : Angle sensor value is fluctuating more than defined parameter at stationary condition	**Root Cause :** Angle sensor not moving while platform is raising	**Root Cause :** Down Limit height is above the specified range Down Limit Height is above descent height (* edge case Refer slide 3)	**Root Cause :** Angle sensor not moving or moving very slowly while platform is raising
Corrective Action : Adjust the angle sensor mounting	**Corrective Action :** • Check the angle sensor output voltage & wiring connection • Adjust the angle sensor mounting (bracket / D-bit/ Spacer)	**Corrective Action :** • Set the down limit height within the range • Adjust the descent height as specified in slide 3	**Corrective Action :** • Adjust the angle sensor mounting (bracket / D-bit/ Spacer) • Match the fully lowered actual voltage with saved value in controller.

JCB Lift Motion Fault (6D) – Fault Types 1

During Platform Lowering			After Key Cycle
Type 6	**Type 7**	**Type 8**	**Type 0**
Fault Condition : If Platform is lowering & limit switch change over is not completed (On-Off to Off-On) but the angle sensor value has reached around fully lowered voltage	**Fault Condition :** If Platform is lowering & angle sensor value is at or above descent height but the limit switch change over is completed (On-Off to On/On or Off-On)	**Fault Condition :** If Platform is lowering & angle sensor value has not changed by a defined percentage (S/w Parameter) in a defined time (S/w parameter)	**Fault Condition :** If 6D fault was active and key cycle was done without clearing the fault
Root Cause : Angle sensor not moving while platform is lowering	**Root Cause :** Down Limit height is above the specified range Down Limit Height is above descent height (* edge case Refer slide 3)	**Root Cause :** Angle sensor not moving or moving very slowly while platform is lowering	**Root Cause :** NA
Corrective Action : • Check the angle sensor output voltage & wiring connection • Adjust the angle sensor mounting (bracket / D-bit/ Spacer)	**Corrective Action :** • Set the down limit height within the range • Adjust the descent height as specified in slide 3	**Corrective Action :** • Adjust the angle sensor mounting (bracket / D-bit/ Spacer) • Match the fully lowered actual voltage with saved value in controller.	**Corrective Action :** Fully lower the machine and key cycle to clear the fault. Re-create the condition and check the fault type

JCB Lift Motion Fault (6D) – Fault Types 2

Edge Case :

- US machines do not require descent delay stop and hence descent height was not set on those machines.
- Software files have a default value of descent height as angle sensor percentage.
- As per 6D criteria 1&2 (given below) , the edge case may occur if angle sensor value at down limit height overlaps with Descent delay default parameter

Lift motion fault shall be raised during Lift operation if any of the following condition is satisfied_
IF
Lift Command = ON AND Height State = 1 AND Platform State = 1
OR
Lift Command = ON AND Height State > =3 AND Platform State = 2

Field Fix :

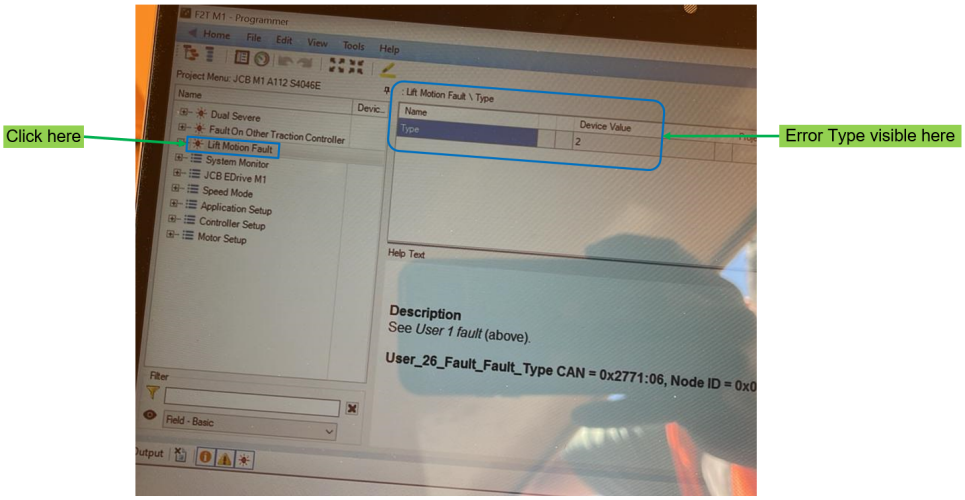
- Increase the descent delay default parameter by 3% from Joystick menu

JCB Lift Motion Fault (6D) – Type 3/7 Edge Case 3

Sequence of checking

		All Models						S1932E Only		
Lift Motion Fault - 6D	Fault Type	Check Angle Sensor live value matches with Fully Lowered volts	Check Angle Sensor live value matches with Fully elevated volts	Descent Height Increase by 3%	D-Bit mounting surface finish	Angle Sensor D-Bit surface finish	Angle Sensor shaft & D-Bit Play	Angle Sensor Bracket (Flatness)	Angle Sensor Mounting Pin cross bolt torque (47Nm)	Check for welding splatters on circular flange
	Type 2	✓	✓		✓	✓	✓		✓	✓
	Type 3	✓	✓	✓						
	Type 5	✓	✓		✓	✓	✓	✓	✓	✓
	Type 6	✓	✓	✓						
	Type 7	✓	✓	✓						
	Type 8	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Type 1	✓	✓							
	Type 0	Manually lower the machine -> Key Cycle -> Re-create the fault -> Check fault type								

JCB 6D Error verification Table 4



JCB Error Identification Method 5

5.14 DTC - 6E

	DTC - 6E

Machine Fault Codes > **DTC - 6E**

Error code:	**DTC - 6E -** Battery Low Voltage Fault
ECU	PECU
Description:	Battery voltage is less than threshold for Battery low voltage fault delay
Component :	Battery and Charger
Vehicle reaction:	All function Disable
Possible Cause:	Battery faulty or Charger inoperative
Service Action:	1. Check the electrolyte level. 2. Check all battery cable connection loose or not, if loose re-tighten. 3. Check battery condition and voltage if faulty replace. 4. Check the charger output, if faulty replace charger. 5. Check charger AC input cable connected properly. 6. Check the battery charging socket condition if damage replace.

A USB (Universal Serial Bus) port
B LED (Light Emitting Diode) display
C AC (Alternating Current) input

Additional Info :

1. Machine will come out of limp mode when BDI % is above 15 %.

2. Below or at 5% of BDI all machine operations stop to protect batteries. Use manual break disengagement to move the machine.

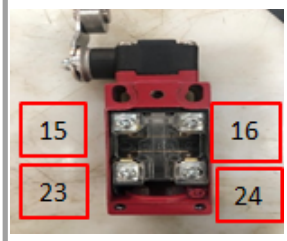
3. It is highly recommended to full charge the machine (Charger display showing 100%). Partial charging may damage the batteries and impact battery performance.

5.15 DTC - 6F

	DTC - 6F

Machine Fault Codes 80 > **DTC - 6F**

Error code:	DTC - 6F - Up Limit Switch Fault
ECU	PECU
Description:	Up Limit Switch Fault
Component :	Up Limit Switch

Vehicle reaction:	All Function Disable
Possible Cause:	Up Limit switch failure
Service Action:	Check Wire installation and Contact Block – 1. Check down limit switch wire fitted on contact block as per tag on wire. 2. Check contact block by checking continuity on terminal of contact block 15 & 16 and 23 & 24. Note – For above check only remove cover. Do not remove full limit switch. Check Roller and Arm – 1. Check Roller and arm if stuck or damage. 2. If stuck, clean and lubricate. 3. If damage change down limit switch. Adjustment of Plunger – 1. After done above check if wire connection and Roller & Arm is Ok, then adjust the Plunger. 2. Loosen the Plunger nut and rotate the plunger anticlockwise Direction (Downward direction) and check Error 18 should be disappeared. 3. If not, please repeat the process. 4. Recalibrate the machine on No load and full load.  

5.16 DTC - 7A

	DTC - 7A

Machine Fault Codes 80 > **DTC - 7A**

Error code:	**DTC - 7A - Pressure Sensor Failure**
ECU	PECU
Description:	Calibration Related Fault / Pressure Sensor voltage mismatch for 1500ms
Component:	Pressure Sensor / Calibration
Vehicle reaction:	All Function Disable

Possible Cause:	1.Calibration failure 2.Pressure sensor failure 3.Electrical noise issue on one of the pressure sensors
Service Action:	1. Swap the M1 and M2 Pressure Sensors (Within Machine) 2. Calibrate the machine with Load and No Load if calibration failure.  

5.17 DTC - 7B

	DTC - 7B

Machine Fault Codes 80 > **DTC - 7B**

Error code:	**DTC - 7B**
ECU	PECU
Description:	Battery and Charging Issue
Component:	Battery and Charger
Vehicle reaction:	All Function Disable
Possible Cause:	Battery or Charger failure
Service Action:	1. Check the electrolyte level. 2. Check all battery cable connection loose or not, if loose re-tighten. 3. Check battery condition and voltage if faulty replace. 4. Check the charger output, if faulty replace charger.

	5. Check charger AC input cable connected properly. 6. Check the battery charging socket condition if damage replace.  A USB (Universal Serial Bus) port B LED (Light Emitting Diode) display C AC (Alternating Current) input  **Additional Info :** 1. Machine will come out of limp mode when BDI % is above 15 %. 2. Below or at 5% of BDI all machine operations stop to protect batteries. Use manual break disengagement to move the machine. 3. It is highly recommended to full charge the machine (Charger display showing 100%). Partial charging may damage the batteries and impact battery performance.

5.18 DTC - 7C

	DTC - 7C

Machine Fault Codes 80 > **DTC - 7C**

Error code:	**DTC - 7C - Pressure Sensor issue**
ECU	PECU

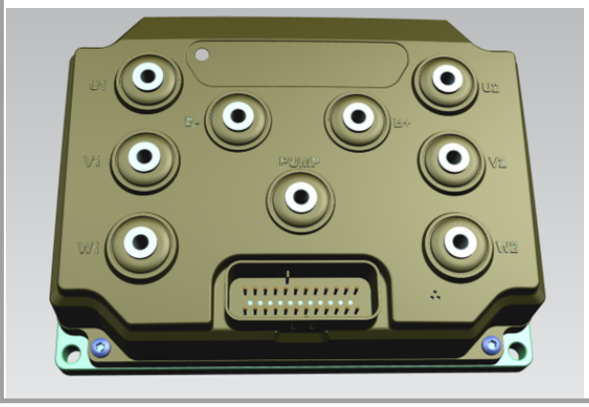
Description:	Difference between Pressure sensor M1 and M2 voltage
Component :	Pressure Sensor
Vehicle reaction:	All function Disable
Possible Cause:	Pressure sensor M1 and M2 voltage
Service Action:	1. Check earth resistance from the ram lowering valve to the chassis earth point, should be below 0.3 ohms. 2. Check Harness cable and connector for any cut damage or loose connection 3. Check Pressure Sensor voltage on both side, replace if faulty.   **Note - In case DTC - 31,32,74,75,A1,A6,A9,7C if appear along with this main DTC then ignore all these error and follow the above instruction.**

5.19 DTC - 7D

	DTC - 7D

Machine Fault Codes 80 > **DTC - 7D**

Error code:	**DTC - 7D**
ECU	PECU

Description:	Address Claim Fault
Component :	Motor Controller
Vehicle reaction:	M/c Function Disable
Possible Cause:	Harness Connection issue
Service Action:	1. Check Harness cable and connector for any cut damage or loose connection. 2. If OK, ON/OFF the key switch. 3. If the fault still persists, Reflash the software 

5.20 DTC - 12

	DTC - 12

Machine Fault Codes 80 > **DTC - 12**

Error code:	**DTC - 12**
ECU	PECU
Description:	Motor controller/ Drive Motor issue
Component :	Motor Controller / Drive Motor
Vehicle reaction:	All function Disable
Possible Cause:	1. External short of phase U, V or W motor connections. 2. Speed encoder noise problems. 3. Motor parameters are mistuned.

	4. Controller defective. 5. Drive Motor cable Pinched/ Damaged
Service Action:	1. Check Motor controller harness and connector for any cut, damage and loose connection 2. Check Drive Motor cable and Motor Controller connection U, V and W harness, Repair/Replace if faulty. 3. Check Drive motor condition, if faulty Repair/Replace. 4. Check Motor Controller Condition, Reset/ Replace if faulty. 5. Try re flashing the software.  

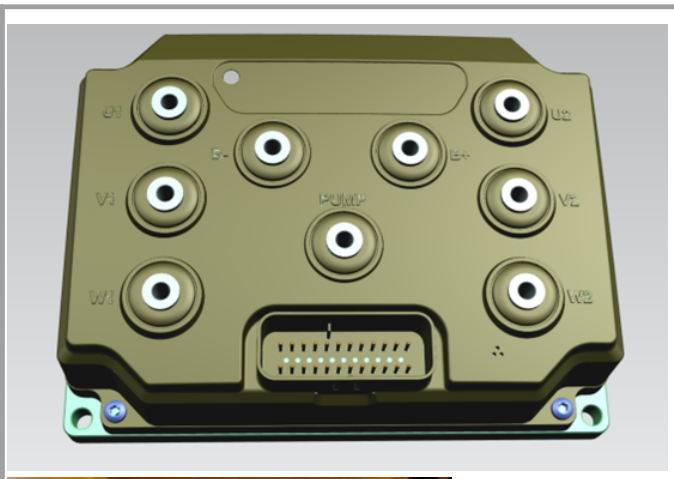
5.21 DTC- 13

	DTC- 13

Machine Fault Codes 80 > **DTC- 13**

Error code:	DTC- 13

ECU	PECU
Description:	Motor controller issue
Component:	Motor Controller
Vehicle reaction:	All function Disable
Possible Cause:	1. External short of phase U, V or W motor connections. 2. Speed encoder noise problems. 3. Motor parameters are mistuned. 4. Controller defective. 5. Drive Motor cable Pinched/ Damaged
Service Action:	1. Check Motor controller harness and connector for any cut, damage and loose connection 2. Check Drive Motor cable and Motor Controller connection U, V and W harness, Repair/Replace if faulty. 3. Check Drive motor condition, if faulty Repair/Replace. 4. Check Motor Controller Condition, Reset/ Replace if faulty. 5. Try re flashing the software.



5.22 DTC- 14

	DTC- 14

Machine Fault Codes > DTC- 14

Error code:	DTC- 14
ECU	PECU
Description:	Controller Internal Fault
Component:	Motor Controller
Vehicle reaction:	Disable all motion
Possible Cause:	An external load on the capacitor bank (B+ connection terminal) that prevents the capacitor bank from charging.

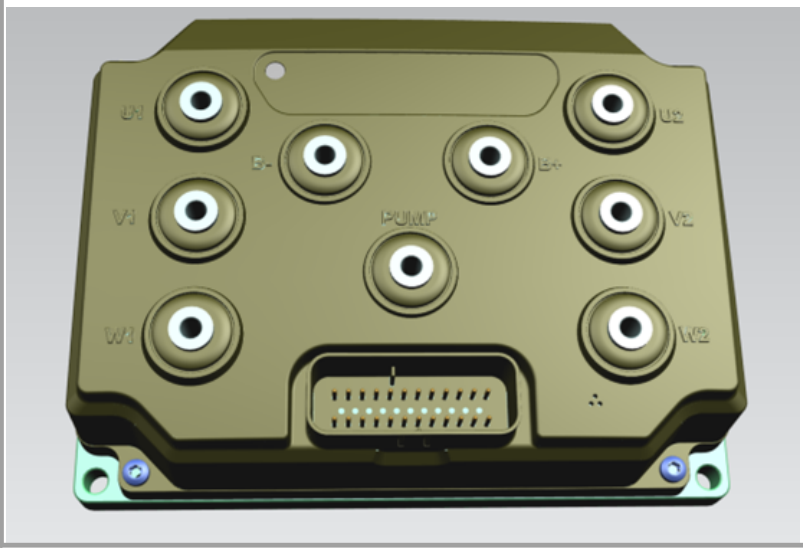
Service Action:	1. Check B+ cable connections from battery to Motor Controller. 2. Check the electrolyte level in Batteries. 3. Check Motor controller harness and connector for any cut, damage and loose connection 4. Check Fuse 5amp installed in T15 harness near RH side door chassis corner and resistance between these 2. 5. Check Motor Controller Condition, Reset/ Replace if faulty. 

5.23 DTC- 15

DTC- 15

Machine Fault Codes > DTC- 15

Error code:	**DTC- 15**
ECU	PECU
Description:	Controller Severe Under temperature
Component :	Motor Controller
Vehicle reaction:	All Function Disable
Possible Cause:	Machine is working in an Extreme Condition
Service Action:	1. Please check Motor controller temperature, if the controller Temp below -40 degree C, Bring motor controller temperature above –40°C, and then Reset Controller.. 2. Check motor controller if faulty, Replace. 3. Check all motor controller cable, harness and connector for any damage or loose connection.

	4. If still issue persists, try changing the controller 

5.24 DTC- 16

	DTC- 16

Machine Fault Codes > **DTC- 16**

Error code:	**DTC- 16**
ECU	PECU
Description:	Controller Severe Over temperature
Component :	Motor Controller
Vehicle reaction:	All Function Disable
Possible Cause:	1. Controller is operating in an extreme environment. 2. Excessive load on vehicle. 3. Improper mounting of controller.
Service Action:	1. Check if the vehicle running in very harsh operation. Try stopping the vehicle to let the controller cool down. 2. Please check Motor controller temperature, if Controller Temp above 95 degree C, Bring motor controller temperature in operating range of <50C. 3. Check the mounting of Motor Controller, Repair if improper. 4. Check for any improper gap between controller body and door surface. 5. Check motor controller if faulty, Replace.

	6. Check all motor controller cable, harness and connector for any damage or loose connection. Replace/Repair if faulty. 

5.25 DTC- 17

	DTC- 17

Machine Fault Codes 80 > **DTC- 17**

Error code:	**DTC- 17-**
ECU	PECU
Description:	Severe B+ Under voltage & Severe KSI Over voltage
Component :	Battery, Motor Controller & Key Switch
Vehicle reaction:	All Function Disable
Possible Cause:	1. Non-controller system drain on battery/Key Switch circuit. 2. Key switch Circuit high Resistance 2. Battery resistance too high. 3. Battery or Key switch disconnected while driving. 4. Blown B+ fuse or main Contactor did not close. 5. Battery parameters are unadjusted. 6. Check battery Voltage

Service Action:	1. Check all battery and motor controller cable and harness for any cut or damage, Repair/Replace if faulty. 2. Check battery Voltage, Replace if faulty. 3. Check Key switch condition and wire harness, Repair/Replace if faulty 4. Check Fuses, Replace if faulty. 5.Check battery charging system, Repair/ Replace if faulty.  

5.26 DTC- 18

	DTC- 18

Machine Fault Codes 80 > **DTC- 18**

Error code:	**DTC- 18**
ECU	PECU
Description:	Severe B+ Under voltage & Severe Key Switch Ignition Over voltage
Component :	Battery and cable
Vehicle reaction:	All Function Disable

Possible Cause:	1.Battery failure 2.Motor Controller failure 3.Harness or cable failure
Service Action:	1. Check if battery health is OK and has sufficient charge. 2.Check B+ & B- cable connections from battery to Motor Controller. 3. Check for any cable damage or short. 4. Check for wrong connection or improper connection. 5. If all above OK try replacing the cables.  

5.27 DTC- 19

	DTC - 19

Machine Fault Codes 80 > **DTC - 19**

Error code:	**DTC - 19**
ECU	PECU
Description:	Error showing in platform Control Display and Drive function disable
Component:	Cable Drive Motor

Vehicle reaction:	Disable Drive function
Possible Cause:	Drive motor cable damage or loose connection
Service Action:	1. Check scissor harness from any cut or damage. 2. Check continuity in harness connector and check any loose connection. 

5.28 DTC- 22

DTC- 22

Machine Fault Codes > **DTC- 22**

Error code:	**DTC- 22**
ECU	PECU
Description:	Controller Over Temperature Cutback
Component :	Motor Controller
Vehicle reaction:	Warning only
Possible Cause:	1. Controller is operating in an extreme environment. 2. Excessive load on vehicle. 3. Improper mounting of controller which is preventing controller cooling 4. Controller is performance-limited at this temperature.
Service Action:	1. Controller's temperature exceeded temperature cutback threshold.: Bring motor controller temperature in operating range of <50C.. 2. Check if there is Excessive load on Motor Controller by harsh Operating. 3. Check Battery connections if any wire is not connected properly. 4. If all above OK, try replacing the controller.

5.29 DTC- 23

	DTC- 23

Machine Fault Codes 80 > DTC- 23

Error code:	DTC- 23
ECU	PECU
Description:	Battery Voltage issue
Component:	Battery and Charger
Vehicle reaction:	Warning only
Possible Cause:	1. Batteries need recharging. Controller is performance limited at this voltage. 2. Battery parameters are miss adjusted. 3 .Non-controller system-drain on battery. 4 Battery resistance too high 5. Battery disconnected while driving. 6. Blown B+ fuse or main contractor did not close.
Service Action:	1. Check battery condition and Voltage. Recharge/Replace if faulty. 2. Check Battery charger condition. Replace if faulty. 3. Check all battery and charger cable for and cut, damage or any loose connection 4. Check battery voltage if discharge, Recharge the battery and flashed new software in ECU.

5.30 DTC- 24

	DTC- 24

Machine Fault Codes 80 > DTC- 24

Error code:	DTC- 24
ECU	PECU
Description:	Over Voltage Cutback
Component:	Motor Controller
Vehicle reaction:	Warning Only
Possible Cause:	1. Normal operation. Fault shows that regen braking currents elevated the battery voltage during regen braking. Controller is performance limited at this voltage. 2. Battery parameters are misadjusted.

	3.Battery resistance too high for given regen current. 4. Battery disconnected while regen braking.
Service Action:	1. Check if battery health is OK and has sufficient charge. 2.Check Battery connections if any wire is not connected properly. 3. Check for any cable damage or short. 4. Check for wrong connection or improper connection. 5. If all above OK try replacing the batteries.  

5.31 DTC- 25

	DTC- 25

Machine Fault Codes > **DTC- 25**

Error code:	**DTC- 25**
ECU	PECU
Description:	Ext 5V Supply Failure
Component:	Motor Controller

Vehicle reaction:	All Function Disable
Possible Cause:	1. External load impedance on the +5V supply (pin 16) is too low (i.e., a short circuit).
Service Action:	1.This is not a primary fault, it will be triggered with some supply related primary fault. 2.Reflash the latest software. 3.If the fault persists, change the controller. 

5.32 DTC- 26

	DTC- 26

Machine Fault Codes > **DTC- 26**

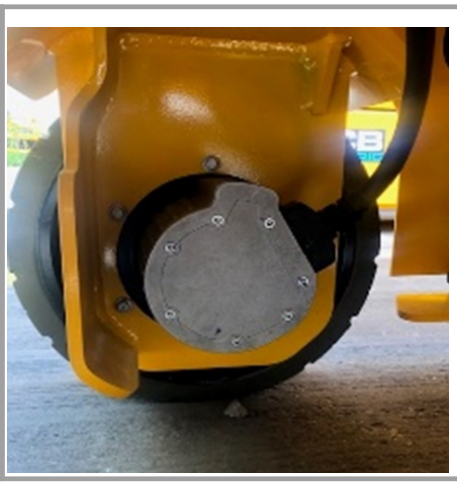
Error code:	**DTC- 26**
ECU	PECU
Description:	Ext 12 V Supply Failure
Component:	Motor Controller
Vehicle reaction:	All Function Disable
Possible Cause:	1. External load impedance on the +12V supply (pin 23) is too low (i.e., a short circuit).
Service Action:	1.This is not a primary fault, it will be triggered with some supply related primary fault. 2.Reflash the latest software. 3.If the fault persists, change the controller.

5.33 DTC- 28

DTC- 28

Machine Fault Codes 80 > DTC- 28

Error code:	DTC- 28
ECU	PECU
Description:	Motor Temp Hot Cutback
Component :	Drive Motor
Vehicle reaction:	Drive Function Issue
Possible Cause:	1.Motor temperature is at or above the programmed Temperature Hot setting resulting in a reduction of controller drive current. 2.The motor temperature and sensor control parameters are miss adjusted.
Service Action:	1. Stop the machine for at least 30 min for the motor windings to cool down. 2. If even after cooling error doesn't go check the Motor 8 pole connector for any miss wiring or terminal back out. 3. if all Ok, replace motor.

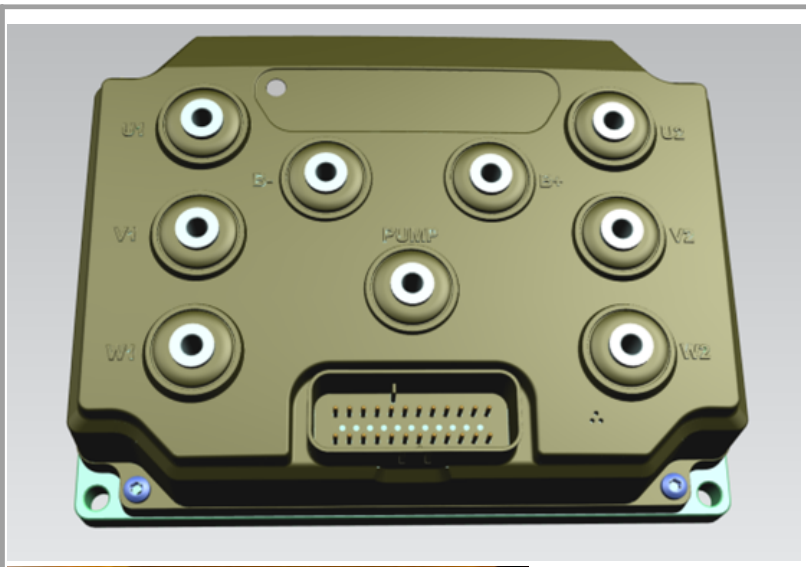


5.34 DTC- 29

DTC- 29

Machine Fault Codes > DTC- 29

Error code:	DTC- 29
ECU	PECU
Description:	Drive Motor Temperature Sensor issue
Component:	Drive Motor Motor, Motor Controller, Harness
Vehicle reaction:	All Function Disable
Possible Cause:	1. Motor thermistor is not connected properly. 2. Sensor polarity (between Pin 9 and Pin 12) is incorrect. 3. The motor temperature and sensor parameters are unadjusted.
Service Action:	1. Check Drive Motor cable and Motor Controller connection U, V and W harness, Repair/Replace if faulty. 2. Check Motor thermistor input (pin 9) is at the voltage rail if not set the motor thermistor input voltage. 3. Check Motor Controller Condition, Reset/ Replace if faulty. 4. Check the harness and drive motor cable pinching/damaging. 5. If all above OK try replacing the Drive Motor LH Side (If Error Showing in F2M1 Tab of Service Master) & Drive Motor RH Side (If Error Showing in F2M2 Tab of Service Master).



5.35 DTC- 31

	DTC- 31

Machine Fault Codes 80 > DTC- 31

Error code:	DTC- 31
ECU	PECU
Description:	Main Contactor, Motor Controller and Drive Motor
Component:	Main Contactor, Motor Controller and Drive Motor

Vehicle reaction:	All Function Disable
Possible Cause:	1. Open or short on Main Contactor, Motor Controller and Drive Motor 2. Dirty connector pins at Main Contactor, Motor Controller and Drive Motor 3. Bad connector crimps or faulty wiring at Main Contactor, Motor Controller and Drive Motor 4. Driver over current, as set by the Driver x Over current parameter.
Service Action:	1. Check Main Contactor, Motor Controller and Drive Motor is either open or shorted. 2. Check for any cable damage or short Main Contactor, Motor Controller and Drive Motor 3. Check for wrong connection or loose connection. 4. If all above OK try replacing the Drive Motor LH Side (If Error Showing in F2M1 Tab of Service Master) & Drive Motor RH Side (If Error Showing in F2M2 Tab of Service Master).  

5.36 DTC- 32

	DTC- 32

Machine Fault Codes > DTC- 32

Error code:	**DTC- 32**
ECU	PECU
Description:	Electromagnetic Brake Failure
Component :	Drive Motor

Vehicle reaction:	All Function Disable
Possible Cause:	1. Open or short on Main Contactor, Motor Controller and Drive Motor 2. Dirty connector pins at Main Contactor, Motor Controller and Drive Motor 3. Bad connector crimps or faulty wiring at Main Contactor, Motor Controller and Drive Motor 4. Driver over current, as set by the Driver x Over current parameter.
Service Action:	1. Check Main Contactor, Motor Controller and Drive Motor is either open or shorted. 2. Check for any cable damage or short Main Contactor, Motor Controller and Drive Motor 3. Check for wrong connection or loose connection. 4. If all above OK try replacing the Drive Motor LH Side (If Error Showing in F2M1 Tab of Service Master) & Drive Motor RH Side (If Error Showing in F2M2 Tab of Service Master). 

5.37 DTC- 33

DTC- 33

Machine Fault Codes > **DTC- 33**

Error code:	**DTC- 33**
ECU	PECU
Description:	Pump Contactor Fault

Component :	Main Contactor and Motor Controller
Vehicle reaction:	all function Disable
Possible Cause:	1. Open or short on Main Contactor. 2. Dirty connector pins at controller or Contactor coil. 3. Bad connector crimps or faulty wiring.
Service Action:	1. Main Contactor is either open or shorted. 2. Check for any cable damage or short near Contactor or controller. 3. Check for wrong connection or improper connection. 4. If all above OK try replacing the controller.  

5.38 DTC- 34

	DTC- 34

Machine Fault Codes 80 > **DTC- 34**

Error code:	**DTC- 34**
ECU	PECU
Description:	Controller Internal Fault
Component :	Motor Controller and DC Contactor
Vehicle reaction:	Warning Only

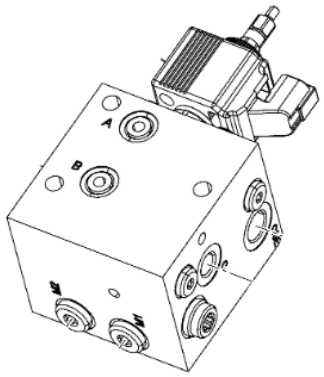
Possible Cause:	1. Open or short on driver load. 2. Dirty connector pins at controller or Contactor coil. 3. Bad connector crimps or faulty wiring
Service Action:	This is not a primary fault, it will be triggered with some Solenoid or DC Contactor related primary fault, Which indicates that there is any of the coil circuits any solenoid or DC Contactor or EM brakes are faulty. Check for Other active faults in the machine to identify faulty solenoid or DC Contactor or EM brakes. 1. Main Contactor is either open or shorted. 2. Check for any cable damage or short near Contactor or controller. 3. Check for wrong connection or improper connection. 4. If all above OK try replacing the controller.  

5.39 DTC- 35

DTC- 35

Machine Fault Codes 80 > **DTC- 35**

Error code:	**DTC- 35**
ECU	PECU
Description:	Lift Valve Solenoid Fault
Component:	Lift Valve Solenoid
Vehicle reaction:	Lift Function Disable

Possible Cause:	1. Open or short on lift valve solenoid. 2. Dirty connector pins at controller or Contactor coil. 3. Bad connector crimps or faulty wiring.
Service Action:	1. Check if lift valve solenoid load is open or shorted. 2. Check for any cable damage 3. Check for wrong connection or improper connection. 4. If all above OK try replacing the Lift control valve install on lift ram. 

5.40 DTC- 36

	DTC- 36

Machine Fault Codes > **DTC- 36**

Error code:	**DTC- 36**
ECU	PECU
Description:	Drive Motor Issue
Component :	Drive Motor
Vehicle reaction:	Drive Function Disable
Possible Cause:	1. Motor encoder failure. 2. Bad crimps or faulty wiring.
Service Action:	1. Check Motor Controller Drive Motor is either open or shorted. 2. Check for any cable damage or short Motor Controller and Drive Motor

	3. Check for wrong connection or loose connection. 4. If all above OK try replacing the Drive Motor LH Side (If Error Showing in F2M1 Tab of Service Master) & Drive Motor RH Side (If Error Showing in F2M2 Tab of Service Master).  

5.41 DTC- 37

	DTC- 37

Machine Fault Codes 80 > **DTC- 37**

Error code:	**DTC- 37**
ECU	PECU

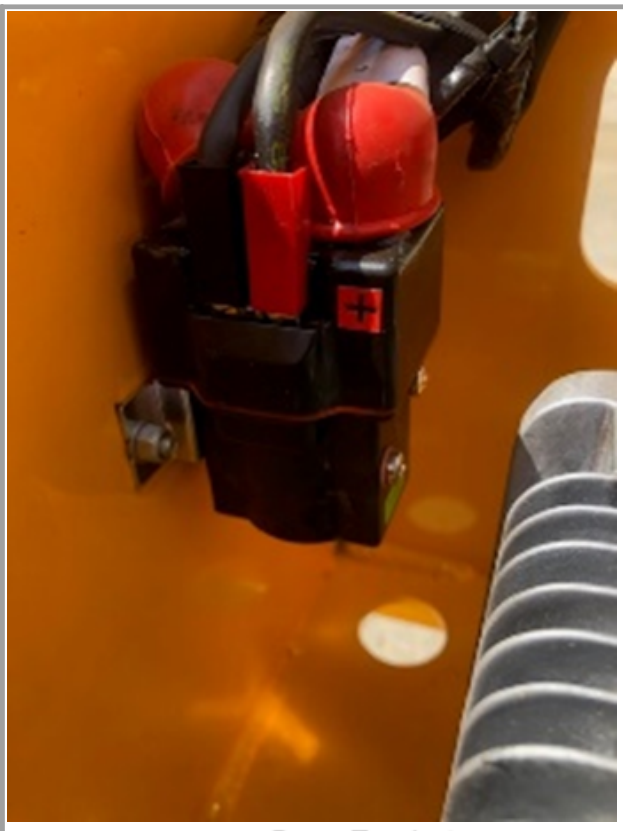
Description:	Drive Motor Open
Component:	Drive Motor Motor, Motor Controller, Harness
Vehicle reaction:	All Function Disable
Possible Cause:	1. Motor phase is open. 2. Bad crimps or faulty wiring.
Service Action:	1.Check Drive Motor cable and Motor Controller connection U, V and W harness, Repair/Replace if faulty. 2.Check Drive motor condition, if faulty Repair/Replace. 3.Check Motor Controller Condition, Reset/ Replace if faulty.  

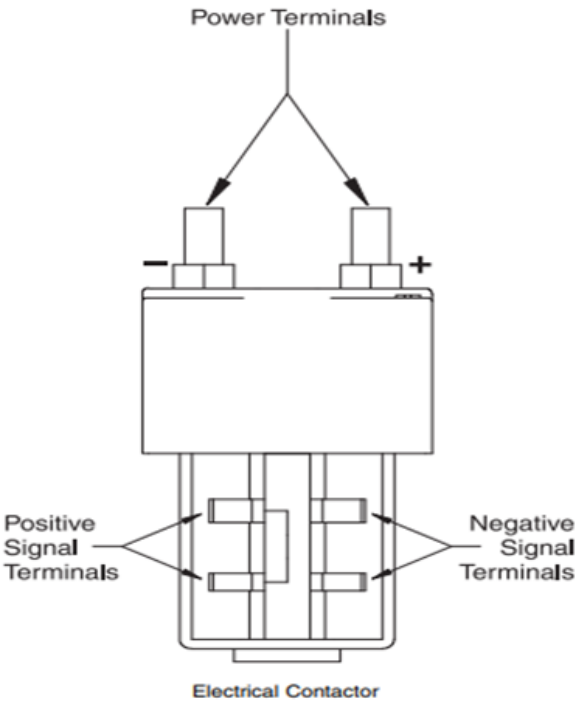
5.42 DTC- 38

	DTC- 38

Machine Fault Codes > DTC- 38

Error code:	DTC- 38
ECU	PECU
Description:	Main Contactor Fault
Component:	DC Contactor
Vehicle reaction:	Disable All Function
Possible Cause:	1. Main Contactor did not close. 2. Main Contactor tips are oxidized, burned or not making good contact. 3. An external load on the capacitor bank (B+ connection terminal) is preventing the capacitor bank from charging. 5. Main Contactor opened during operation (while commanded closed). 6. Driver wiring to Contactor coil (e.g., pin wiring) removed during operation. 7. Contactor/coil defective.
Service Action:	1. Check all cable connection loose or not, if loose re-tighten. 2. Check DC Contactor condition and voltage if faulty replace.



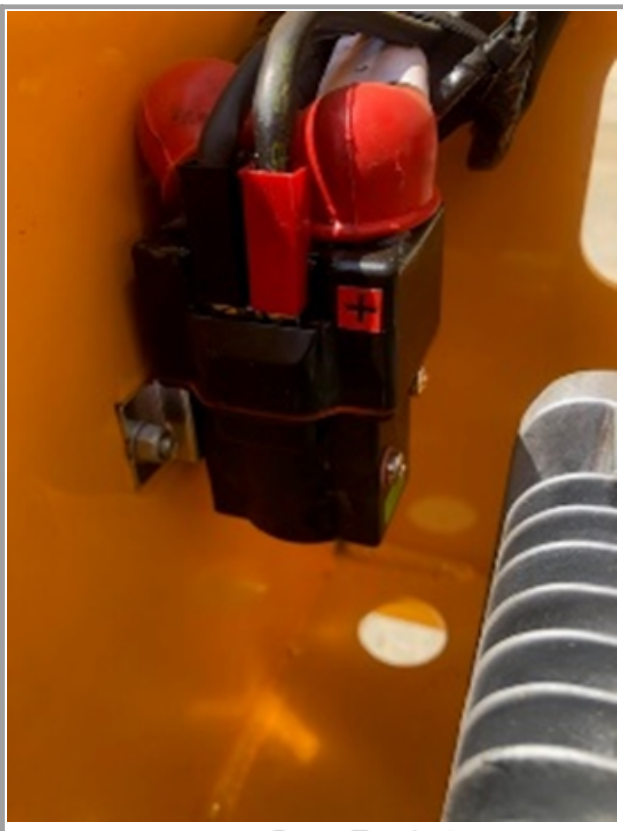


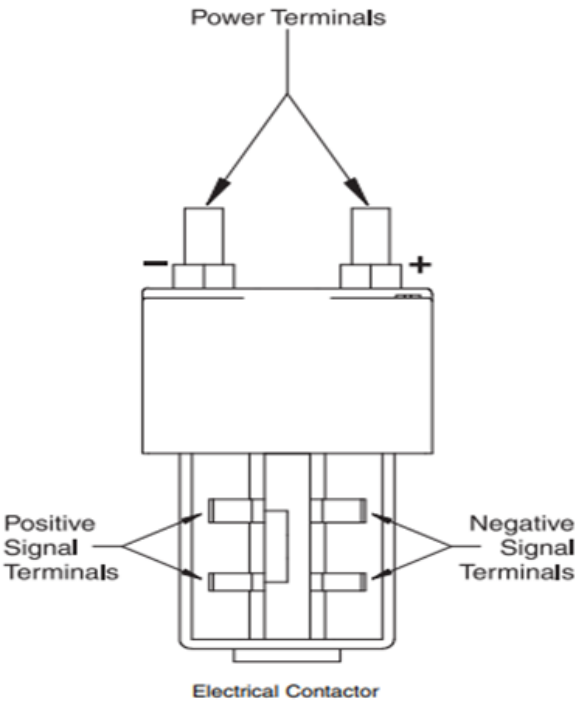
5.43 DTC- 39

	DTC- 39

Machine Fault Codes > DTC- 39

Error code:	DTC- 39
ECU	PECU
Description:	Main Contactor Fault
Component:	DC Contactor
Vehicle reaction:	Disable All Function
Possible Cause:	1. Main Contactor did not close. 2. Main Contactor tips are oxidized, burned or not making good contact. 3. An external load on the capacitor bank (B+ connection terminal) is preventing the capacitor bank from charging. 4. Blown B+ fuse. 5. Main Contactor parameters mistuned; Main Pull-in Voltage Main Holding Voltage. 5. Main Contactor opened during operation (while commanded closed). 6. Driver wiring to Contactor coil (e.g., pin wiring) removed during operation. 7. Contactor/coil defective. 8 Battery not connected to B+ when main enable is off and interlock applied
Service Action:	1. Check all battery cable connection loose or not, if loose re-tighten. 2. Check DC Contactor condition and voltage if faulty replace.



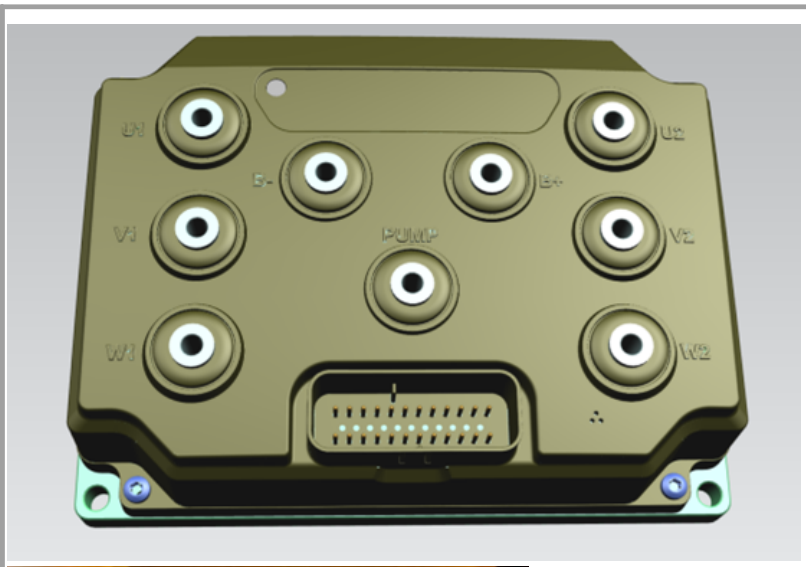


5.44 DTC- 3A

	DTC- 3A

Machine Fault Codes 80 > DTC- 3A

Error code:	DTC- 3A
ECU	PECU
Description:	Motor Setup Needed
Component:	Motor Controller and Drive Motor
Vehicle reaction:	Drive Function Disable
Possible Cause:	Motor setup is required. Please refer to fault type. Bit1: The current regulator needs to be configured. Bit2: The slip gain test needs to be run. Bit3: The base speed test needs to be run. Bit4: The automated test needs to be run (full motor commissioning).
Service Action:	1. This fault comes if the drive motor setup parameters are not correct. 2. Re-flash the software to latest version available. 3. Try changing the controller if problem persists.



5.45 DTC- 42

	DTC- 42

Machine Fault Codes 80 > DTC- 42

Error code:	DTC- 42
ECU	PECU
Description:	Throttle Input Issue
Component:	Platform Controller

Vehicle reaction:	Drive Function Disable
Possible Cause:	1.Throttle voltage exceeded the Alog Low or Alog High parameters for the a log input defined for the throttle input.
Service Action:	1. This fault may come if Throttle voltage input from joystick is not correct, i.e. out of range. 2. Try replacing the joystick. 

5.46 DTC- 44

	DTC- 44

Machine Fault Codes 80 > **DTC- 44**

Error code:	**DTC- 44**
ECU	PECU
Description:	Brake Input Fault
Component:	Drive Motor Brake and Motor Controller
Vehicle reaction:	Disable drive F/R-Full Brake
Possible Cause:	Triggered by the respective fault diagnostic associated with the brake input source

Service Action:	1. Reflash the latest software. 2. This is not a primary fault, it will be triggered with some brake related primary fault. 3. If the fault persists, change the controller

5.47 DTC- 46

	DTC- 46

Machine Fault Codes > **DTC- 46**

Error code:	**DTC- 46**
ECU	PECU
Description:	Non volatile Memory Failure
Component:	Motor Controller
Vehicle reaction:	All Function Disable
Possible Cause:	1. Failure to read or write to nonvolatile (NV) memory. 2. Motor controller Internal fault.
Service Action:	2. Reflash the latest software. 3. If the fault persists, change the controller.

5.48 DTC- 47

	DTC- 47

Machine Fault Codes > **DTC- 47**

Error code:	**DTC- 47**
ECU	PECU
Description:	If enable button is pressed after joystick lever is pushed forward or reverse OR If base enable button is pressed after pushing Platform lift/lower button
Component:	Platform Control
Vehicle reaction:	Disable drive F/R

Possible Cause:	1. Faulty Joystick 2. Faulty Toggle Switches 3. Faulty Wiring Harness 3.1 Wire Short Circuit 3.2 Wire Open Circuit 3.3 Connector Damage/Loose 3.4 Terminal Back out
Service Action:	1. Ensure that Joystick or base toggle switches are not pressed at start up. Key cycle the machine to verify. If fault is present continue to next step. 2. Check the base enable and up down toggle switches for any damage or switch stuck or freely rotating. If found damaged, replace the switch or else continue. 3. Check the harness connection on both switches for any loose connection or disconnection. 4. Check harness connected in correct pin numbers. See below image for correct sequence of connection. if sequence is correct continue to next step. 5. Check voltage between Pin 16 of 35 Pin ECU connector CN1_MH with Batt GND (Without pressing the switch) nd if found 24V that means wire is short to BATT +. Check wiring for damage or replace. 6. Check voltage between Pin 9 of 35 Pin ECU connector CN1_MH with Batt GND (Without pressing the switch) nd if found 24V that means wire is short to BATT +. Check wiring for damage or replace. 7. If all above points are OK, try replacing the Joystick. 

5.49 DTC- 49

	DTC- 49

Machine Fault Codes > **DTC- 49**

Error code:	**DTC- 49**
ECU	PECU
Description:	Parameter Change
Component:	Motor controller
Vehicle reaction:	All Function Disable
Possible Cause:	When Interlock is On, and a safety?based parameter is changed. Parameters with this property are marked with a [PCF] (Parameter Change fault) in the Parameter menu listings.
Service Action:	Check Harness cable and connector for any cut damage or loose connection. If OK, ON/OFF the key switch. If the fault still persists, Reflash the software

5.50 DTC- 51

	DTC- 51

Machine Fault Codes > **DTC- 51**

Error code:	**DTC- 51**
ECU	PECU
Description:	Wika PCU Throttle Fault
Component:	Platform Control
Vehicle reaction:	Shutdown Vehicle & Shutdown Coil Supply
Possible Cause:	1. Faulty Hardware 2. Faulty CAN Wiring

Service Action:	1. Check the CAN resistance as explained in CAN Test Tab. If resistance is as per specification continue to next step. 2. Try replacing the Joystick with a new one. 3. If problem still persists, try wiggling the wire bunch near door hinge area and check for any possible loose connection or damage to Harness. 4. If problem still persists, replace Main Harness.  **Additional Info :** • This fault could also come as part secondary fault set along with any primary fault. • Try to identify primary fault in M1 & M2 first. • If only this fault Is coming as first fault after key cycle and no other fault seem primary - continue to explore the troubleshooting steps.

5.51 DTC- 52

DTC- 52

Machine Fault Codes 80 > DTC- 52

Error code:	**DTC- 52**
ECU	PECU
Description:	Wika PCU PDO Timeout Fault

Component :	Platform Control
Vehicle reaction:	Shutdown Vehicle & Shutdown Coil Supply
Possible Cause:	1. Faulty Hardware 2. Faulty CAN Wiring
Service Action:	1. Check the CAN resistance as explained in CAN Test Tab. If resistance is as per specification continue to next step. 2.Try replacing the Joystick with a new one. 3. If problem still persists, try wiggling the wire bunch near door hinge area and check for any possible loose connection or damage to Harness. 4. If problem still persists, replace Main Harness.  **Additional Info :** • This fault could also come as part secondary fault set along with any primary fault. • Try to identify primary fault in M1 & M2 first. • If only this fault Is coming as first fault after key cycle and no other fault seem primary - continue to explore the troubleshooting steps.

5.52 DTC- 53

	DTC- 53

Machine Fault Codes > DTC- 53

Error code:	DTC- 53
ECU	PECU
Description:	Angle Sensor Fault
Component:	Angle Sensor
Vehicle reaction:	All function Disable
Possible Cause:	If the angle sensor voltage input is out of range. 1. Check the Wiring of Angle Sensor Connector, Should be as per schematic. **Pin No 1 (1200C), Pin No 2 (6000C) and Pin No 3 (4200G)** 2. Angle sensor hardware fault
Service Action:	1. Check Harness and connector for any cut, damage or loose connection and wrong connections as per schematic. 2. Check Angle Sensor, replace if faulty. 

5.53 DTC- 54

	DTC- 54

Machine Fault Codes > DTC- 54

Error code:	DTC- 54
ECU	PECU
Description:	Pressure Sensor M1 and M2 issue

Component :	Pressure Sensor M1 and M2
Vehicle reaction:	When platform is above down limit switch, disable all motions when platform is below down limit switch, disable all motions except lowering Shut down Vehicle+ Shutdown Coil Supply
Possible Cause:	1. Harness issue 2. Pressure Sensor M1 faulty
Service Action:	1. Check earth resistance from the ram lowering valve to the chassis earth point, should be below 0.3 ohms. 2. Check Harness and connector for any cut, damage or loose connection 3. Check Pressure Sensor M1 & M2, replace if faulty. 

5.54 DTC- 55

	DTC- 55

Machine Fault Codes > **DTC- 55**

Error code:	**DTC- 55**
ECU	PECU
Description:	Machine Tilted Beyond Safe Limits Fault (Inclination)
Component :	Tilt Sensor
Vehicle reaction:	All Function Disable

Possible Cause:	1. Machine is in Inclined surface more than Permissible angle 2. Tilt switch wiring issue 3. Tilt switch hardware issue
Service Action:	1. Check machine position and bring it on surface level if inclination is more than permissible angle. 2. Check tilt sensor cable and connector for any cut, damage or loose connection. 3. Check Tilt sensor, Replace if faulty.  **Additional Info :** A) Zero Calibration Method: 1. Ensure that machine is on X = 0 Deg and Y= 0 Deg surface. (Wrong calibration may result in unsafe operation, even machine topple) 2. Power on the machine 3. Locate the zero setting red cable coming out from tilt sensor. 4. Provide 24V power supply from battery to this cable for 7 seconds. 5. The green LED will start to blink faster for a while to show correct zero calibration.

B) LED Visualization :

Green LED	Meaning
Solid ON	Device powered on and currently supplied
OFF	Tilt outside range
Blink (1-7)	Internal fault

5.55 DTC- 56

DTC- 56

Machine Fault Codes > **DTC - 56**

Error code:	**DTC- 56**
ECU	PECU
Description:	Pothole Guard Fault
Component :	Pothole Guard/ Pothole switch
Vehicle reaction:	All Function Disable
Possible Cause:	Pot hole guard stuck or damage/ Pot hole switch failure
Service Action:	1. Check Pothole plate condition for any bend or damage. 2. Check Pothole plate if stuck. 3. Check all pothole mechanical linkage for damage or stuck 4. Check Pothole switch and harness for any cut or damage. Repair/Replace if faulty. 5. Ensure, Pothole Sensor should be tightened at fully downward position.

5.56 DTC- 57

	DTC- 57

Machine Fault Codes > DTC- 57

Error code:	DTC- 57
ECU	PECU
Description:	F2T M2 Not Operational Fault
Component:	Platform Control
Vehicle reaction:	Shutdown Vehicle
Possible Cause:	1. Faulty Hardware 2. Faulty CAN Wiring
Service Action:	1. Check the CAN resistance as explained in CAN Test Tab. If resistance is as per specification continue to next step. 2.Try replacing the Joystick with a new one. 3. If problem still persists, try wiggling the wire bunch near door hinge area and check for any possible loose connection or damage to Harness. 4. If problem still persists, replace Main Harness.

Additional Info :

- This fault could also come as part secondary fault set along with any primary fault.
- Try to identify primary fault in M1 & M2 first.
- If only this fault Is coming as first fault after key cycle and no other fault seem primary - continue to explore the troubleshooting steps.

5.57 DTC- 58

DTC- 58

Machine Fault Codes 80 > DTC- 58

Error code:	DTC- 58
ECU	PECU
Description:	Pressure Sensor Fault
Component :	Pressure Sensor
Vehicle reaction:	All Function Disable
Possible Cause:	1. Faulty Pressure Sensor 2. Faulty Wiring Harness

	2.1 Fuse Blown 2.2 Wire Short Circuit 2.3 Wire Open Circuit 2.4 Connector Damage/Loose 2.5 Terminal Back out
Service Action:	1. Connect DLA tool and open M1 programmer & check if analog 9 output voltage (Refer Annexure-B for steps). //Sensor Valid Output Range : 0.5-4.5 Volts// 2. If sensor output is out of range (i.e. less than 0.5V or greater than 4.5V) check below 2.1 Check if connector C18_MH is properly connected and is not damaged or terminal back out issue is not there. If everything Ok continue to next step 2.2 Check Fuse FU5_MH (5A), Replace if blown otherwise continue to next step. 2.3 Check voltage between Pin 1 & Pin 2 of Pressure Sensor 1, If it is not ~24V check wiring for loose connection or damage. Otherwise continue to next step. 2.4 Check voltage between Pin 2 & Batt GND, if not 24V, check wiring between Pin 2 & Fuse or else continue to next step. 2.5 Check Voltage between Pin 1 and Batt Positive, if not check grounding or else continue to next step. 2.6 Check continuity between Wire 4200G (Pin 4) of Pressure sensor connector C18_MH and Pin 24 of Controller 35 Pin connector CN1_MH. 2.7 If no continuity, check the mating connectors, chassis interconnections for any loose or damaged connection. otherwise continue to next step. 2.8 If all above steps are negative, try replacing the pressure sensor.  3. Re-calibrate the machine after replacement. (No Load and Full Load Calibration)

5.58 DTC- 59

	DTC- 59

Machine Fault Codes > DTC- 59

Error code:	**DTC- 59**
ECU	PECU
Description:	F2T M2 PDO Timeout Fault
Component :	Platform Control
Vehicle reaction:	Shutdown Vehicle
Possible Cause:	1. Faulty Hardware 2. Faulty CAN Wiring
Service Action:	1. Check the CAN resistance as explained in CAN Test Tab. If resistance is as per specification continue to next step. 2.Try replacing the Joystick with a new one. 3. If problem still persists, try wiggling the wire bunch near door hinge area and check for any possible loose connection or damage to Harness. 4. If problem still persists, replace Main Harness. 

	Additional Info : • This fault could also come as part secondary fault set along with any primary fault. • Try to identify primary fault in M1 & M2 first. • If only this fault Is coming as first fault after key cycle and no other fault seem primary - continue to explore the troubleshooting steps.

5.59 DTC - 61

	DTC - 61

Machine Fault Codes > DTC - 61

Error code:	**DTC - 61**
ECU	PECU
Description:	Error showing in platform Control Display and all function disable
Component :	Function Switch (Ground control/Platform Control)
Vehicle reaction:	All function disable
Possible Cause:	Push and hold the function switch before/without use of enable switch after E-stop ON.
Service Action:	1. Restart the machine and operate the function by using switches in Sequence (First press the enable switch and then press function switch)

	 2. Check Function switch for stuck or any damage, if defective replace. 3. Check harness for any cut or damage or short.

5.60 DTC- 62

	DTC- 62

Machine Fault Codes > DTC- 62

Error code:	**DTC- 62**
ECU	**PECU**
Description:	Platform Overload Above Set point
Component :	Pressure Sensor
Vehicle reaction:	Shutdown Vehicle, Shutdown Coil Supply
Possible Cause:	1. Load on Platform beyond specification 2. Machine Calibration out
Service Action:	1. Ensure that load on platform is not more than 95% of rated load for that machine. Rated load is mentioned on the platform decal. 2. Remove the load and key cycle the machine to remove error. 3. If machine is giving false overload i.e. platform is not over loaded and yet OL fault is coming; this could be because of calibration out. Re-run the full machine calibration and check again.

Additional Info :

- During OL fault condition, if machine above the 50% of machine height, platform will not lower from joystick or base command. Use Manual descent lever to lower the machine.
- In case of OL fault below 50% of machine height, platform can be lowered using joystick or base command.
- The machine measures the hydraulic pressure to do load calculation and same is affected with temperature variation. Lower temperature would mean reduced lifting capacity as OL faults will trigger at lesser weight. This is a known behaviour of machine

5.61 DTC- 63

DTC- 63

Machine Fault Codes > DTC- 63

Error code:	DTC- 63
ECU	PECU
Description:	Pressure Sensor Fault
Component :	Pressure Sensor
Vehicle reaction:	All Function Disable
Possible Cause:	1. Faulty Pressure Sensor 2. Faulty Wiring Harness 2.1 Fuse Blown 2.2 Wire Short Circuit

	2.3 Wire Open Circuit 2.4 Connector Damage/Loose 2.5 Terminal Back out
Service Action:	1. Connect DLA tool and open M1 programmer & check if analog 9 output voltage (Refer Annexure-B for steps). //Sensor Valid Output Range : 0.5-4.5 Volts// 2. If sensor output is out of range (i.e. less than 0.5V or greater than 4.5V) check below 2.1 Check if connector C18_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step 2.2 Check Fuse FU5_MH (5A), Replace if blown otherwise continue to next step. 2.3 Check voltage between Pin 1 & Pin 2 of Pressure Sensor 1, If it is not ~24V check wiring for loose connection or damage. Otherwise continue to next step. 2.4 Check voltage between Pin 2 & Batt GND, if not 24V, check wiring between Pin 2 & Fuse or else continue to next step. 2.5 Check Voltage between Pin 1 and Batt Positive, if not check grounding or else continue to next step. 2.6 Check continuity between Wire 4200G (Pin 4) of Pressure sensor connector C18_MH and Pin 24 of Controller 35 Pin connector CN1_MH. 2.7 If no continuity, check the mating connectors, chassis interconnections for any loose or damaged connection. otherwise continue to next step. 2.8 If all above steps are negative, try replacing the pressure sensor. 3. Re-calibrate the machine after replacement. (No Load and Full Load Calibration) 

5.62 DTC- 64

	DTC- 64

Machine Fault Codes > DTC- 64

Error code:	DTC- 64
ECU	PECU
Description:	Platform Overload Above Set point
Component :	Pressure Sensor
Vehicle reaction:	Shutdown Vehicle, Shutdown Coil Supply
Possible Cause:	1. Load on Platform beyond specification 2. Machine Calibration out
Service Action:	1. Ensure that load on platform is not more than 95% of rated load for that machine. Rated load is mentioned on the platform decal. 2. Remove the load and key cycle the machine to remove error. 3. If machine is giving false overload i.e. platform is not over loaded and yet OL fault is coming; this could be because of calibration out. Re-run the full machine calibration and check again.  **Additional Info :** • During OL fault condition, if machine above the 50% of machine height, platform will not lower from joystick or base command. Use Manual descent lever to lower the machine.

	• In case of OL fault below 50% of machine height, platform can be lowered using joystick or base command. • The machine measures the hydraulic pressure to do load calculation and same is affected with temperature variation. Lower temperature would mean reduced lifting capacity as OL faults will trigger at lesser weight. This is a known behaviour of machine

5.63 DTC- 65

DTC- 65

Machine Fault Codes > DTC- 65

Error code:	DTC- 65
ECU	PECU
Description:	Angle Sensor Calibration Fault
Component :	Angle Sensor
Vehicle reaction:	Shutdown Vehicle
Possible Cause:	1. Faulty Angle Sensor 2. Mounting Issue 3. Faulty Wiring Harness 3.1 Fuse Blown 3.2 Wire Short Circuit 3.3 Wire Open Circuit 3.4 Connector Damage/Loose 3.5 Terminal Back out
Service Action:	1. Connect DLA tool and open M1 programmer & check if analog 8 output voltage (Refer Annexure-B for steps). //Sensor Valid Output Range : 0.4-4.5 Volts// 2. If sensor output is out of range (i.e. less than 0.4V or greater than 4.5V) check below 2.1 Check if connector C33_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step 2.2 Check Fuse FU5_MH (5A), Replace if blown otherwise continue to next step.

	2.3 Check voltage between Pin 1 & Pin 2 of Angle Sensor 1, If it is not ~24V check wiring for loose connection or damage. Otherwise continue to next step. 2.4 Check voltage between Pin 1 & Batt GND, if not 24V, check wiring between Pin 1 & Fuse or else continue to next step. 2.5 Check Voltage between Pin 2 and Batt Positive, if not check grounding or else continue to next step. 2.6 Check continuity between Wire 4200C (Pin 3) of Angle sensor connector C33_MH and Pin 28 of Controller 35 Pin connector CN1_MH. 2.7 If no continuity, check the mating connectors, chassis interconnections for any loose or damaged connection. otherwise continue to next step.  3. Using the Service Mode menu of Joystick controller, raise the machine and apply safety structure. 3.1 Raise and lower the machine to check if the angle sensor voltage is changing or not. 3.2 If not, open the angle sensor mounting and check the D-bit for any damage. 3.3 Check the angle sensor shaft for any damage. Try rotating it with hand and check if the voltage value is changing or not. 4. If all above steps are negative, try replacing the sensor. 5. Re-calibrate the machine after replacement. (Full Calibration starting with Angle Sensor CAL) 6. Check the Height State and Switch position as per Annexure-C to ensure correct machine operation.

5.64 DTC- 66

	DTC- 66

Error code:	DTC- 66
ECU	PECU
Description:	Pressure Sensor Fault
Component:	Pressure Sensor
Vehicle reaction:	All Function Disable
Possible Cause:	1. Faulty Pressure Sensor 2. Faulty Wiring Harness 2.1 Fuse Blown 2.2 Wire Short Circuit 2.3 Wire Open Circuit 2.4 Connector Damage/Loose 2.5 Terminal Back out
Service Action:	1. Connect DLA tool and open M1 programmer & check if analog 9 output voltage (Refer Annexure-B for steps). //Sensor Valid Output Range : 0.5-4.5 Volts//  2. If sensor output is out of range (i.e. less than 0.5V or greater than 4.5V) check below 2.1 Check if connector C18_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step 2.2 Check Fuse FU5_MH (5A), Replace if blown otherwise continue to next step.

	2.3 Check voltage between Pin 1 & Pin 2 of Pressure Sensor 1, If it is not ~24V check wiring for loose connection or damage. Otherwise continue to next step. 2.4 Check voltage between Pin 2 & Batt GND, if not 24V, check wiring between Pin 2 & Fuse or else continue to next step. 2.5 Check Voltage between Pin 1 and Batt Positive, if not check grounding or else continue to next step. 2.6 Check continuity between Wire 4200G (Pin 4) of Pressure sensor connector C18_MH and Pin 24 of Controller 35 Pin connector CN1_MH. 2.7 If no continuity, check the mating connectors, chassis interconnections for any loose or damaged connection. otherwise continue to next step. 2.8 If all above steps are negative, try replacing the pressure sensor. 3. Re-calibrate the machine after replacement. (No Load and Full Load Calibration)

5.65 DTC - 67

	DTC - 67

Machine Fault Codes 80 > **DTC - 67**

Error code:	**DTC - 67**
ECU	PECU
Description:	Error showing in platform Control Display and all function disable
Component :	Function switch and Enable switch (Ground control/Platform control)
Vehicle reaction:	All function disable
Possible Cause:	Push and hold the function/Enable switch before E-stop ON.
Service Action:	1. Restart the machine and operate the function in by using switches in Sequence (Press the enable switch and then press function switch after E-top ON) 2. Check Function/Enable switch for stuck or any damage, if defective replace. 3. Check harness for any cut or damage or short.

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5.66 DTC- 4A

DTC- 4A

Machine Fault Codes > DTC- 4A

Error code:	DTC- 4A
ECU	PECU
Description:	EMR Switch Redundancy
Component:	Drive Motor
Vehicle reaction:	Disable drive F/R-Shutdown Interlock, Shutdown EM Brake
Possible Cause:	1. Either or both Emergency Reverse input switches are inoperative, resulting in an invalid state. NO NC State On Off valid Off On valid On On invalid Off Off invalid 2. Ingress of dirt or moisture in switch(es)

Service Action:	1. Emer Rev Switch NO input does not agree with the Emer Rev Switch NC input. 2. Re-flash the software to latest version available. 3. Try changing the controller if problem persists.

5.67 DTC- 71

	DTC- 71

Machine Fault Codes > DTC- 71

Error code:	**DTC- 71**
ECU	PECU
Description:	Controller Internal Fault
Component:	Motor Controller
Vehicle reaction:	Disable All Function
Possible Cause:	Physical damage from external sources/events.
Service Action:	1. Check motor controller for any external damage. 2. Check harness and connector for any cut, damage or loose connection. 3. 1. CIT version is too old to fully support the FOS version. 4. Reflash the latest software 5. Check Motor Controller if faulty, Reset/Replace.

5.68 DTC- 72

	DTC- 72

Machine Fault Codes > DTC- 72

Error code:	**DTC- 72**
ECU	PECU
Description:	The time between CAN PDO messages received exceeded the PDO Timeout Period as defined by the Event Timer parameter
Component:	Motor Controller

Vehicle reaction:	Disable all function
Possible Cause:	1. During restarting the machine, If any device is externally connected to machine (Like Laptop), this error will appear. 2. If you have recently done software update and it was aborted in between or software not properly updated, this error will appear.
Service Action:	1. Turn OFF and ON the Machine. 2. Check Harness cable and connector for damage, cut or any loose connection. 3. Re-flash the software carefully and ensure the software progress tab is completed 100% and with response "Ready" in left bottom of the screen. **Note - In case DTC - 31,32,74,75,A1,A6,A9,7C if appear along with this main DTC then ignore all these error and follow the above instruction.**

5.69 DTC- 73

	DTC- 73

Machine Fault Codes > **DTC- 73**

Error code:	**DTC- 73**
ECU	PECU
Description:	Controller Internal Fault
Component:	Electric Motor / Motor Controller
Vehicle reaction:	Disable Lift Function
Possible Cause:	1. Stalled motor. 2. Motor encoder failure. 3. Bad crimps or faulty wiring. 4. Problems with power supply for the motor encoder.
Service Action:	1. Check Electric Motor and cable for any loose connection or cut or damage.Repair/Replace if faulty. 2. Check Motor controller if faulty, Replace. 3. Reset/Reflash Motor Controller

5.70 DTC- 79

	DTC- 79

Machine Fault Codes > DTC- 79

Error code:	DTC- 79
ECU	PECU
Description:	Motor Controller Internal Fault
Component:	Motor Controller
Vehicle reaction:	Disable all Motion
Possible Cause:	Motor Controller internal fault or external damage
Service Action:	1. Check motor controller for any external damage. 2. Check harness and connector for any cut, damage or loose connection. Check Motor Controller if faulty, Reset/Replace.

5.71 DTC- 82

	DTC- 82

Machine Fault Codes > DTC- 82

Error code:	DTC- 82
ECU	PECU
Description:	PDO Mapping Error
Component:	Motor Controller
Vehicle reaction:	All Function Disable
Possible Cause:	1.The PDO Map has too many data bytes assigned or has objects mapped that are not compatible. 2. Adjust the POD setting

Service Action:	1. Perform key cycle (OFF/ON) on the machine 2. If the fault still persists, Reflash the software

5.72 DTC- 83

	DTC- 83

Machine Fault Codes > **DTC- 83**

Error code:	**DTC- 83**
ECU	PECU
Description:	Motor Controller Internal Fault
Component:	Motor Controller
Vehicle reaction:	Disable all Motion
Possible Cause:	Motor Controller internal fault or external damage
Service Action:	1. Check motor controller for any external damage. 2. Check harness and connector for any cut, damage or loose connection. 3. Check Motor Controller if faulty, Reset/Replace.

5.73 DTC- 84

	DTC- 84

Machine Fault Codes > **DTC- 84**

Error code:	**DTC- 84**
ECU	PECU
Description:	Motor Braking Impaired
Component:	Battery and Motor Controller
Vehicle reaction:	Drive Function Disable
Possible Cause:	1. Battery overcharged, excessive motor or controller heating, or misadjusted parameters.

	2.Motor braking was impaired beyond a safe threshold.
Service Action:	1. This fault may come during breaking (regen), if battery is overcharged or motor /controller is over heated. 2. Check for battery voltage for correct range. 3. Check motor controller temperature.

5.74 DTC- 87

	DTC- 87

Machine Fault Codes > **DTC- 87**

Error code:	**DTC- 87**
ECU	PECU
Description:	Motor Characterization issue
Component:	Drive Motor and Motor Controller
Vehicle reaction:	All Function Disable
Possible Cause:	Motor characterization failed during characterization process. Motor characterization failed during characterization process. Type 84: During commissioning, if the Type 84 fault occurs, check that the Sin/Cos signal voltages at their maximums and minimums have differences less than 78mV. (i.e., | Sinmax Δ Cosmax| < 78mV and |Sinmin Δ Cosmin| < 78mV). If the differences are greater than 78mV (e.g., 100mV), it will trigger the Type 84 fault and abort the motor characterization routine
Service Action:	1. This fault comes if the drive motor setup parameters are not correct. 2. Re-flash the software to latest version available. 3. If all above OK try replacing the Motor Controller or Drive Motor LH Side (If Error Showing in F2M1 Tab of Service Master) & Drive Motor RH Side (If Error Showing in F2M2 Tab of Service Master).

5.75 DTC- 88

	DTC- 88

Machine Fault Codes > **DTC- 88**

Error code:	DTC- 88
ECU	PECU
Description:	Encoder Pulse Error
Component:	Drive Motor
Vehicle reaction:	All Function Disable
Possible Cause:	1. Encoder Steps parameter does not match the actual motor encoder. 2.Verify parameter settings: . 3. Motor lost IFO control and accelerated without throttle command.
Service Action:	1. This fault comes if the drive motor setup parameters are not correct. 2. Re-flash the software to latest version available. 3. Try changing the motor if problem persists.

5.76 DTC- 89

DTC- 89

Machine Fault Codes > DTC- 89

Error code:	DTC- 89
ECU	PECU
Description:	Parameter Out of Range
Component:	Motor Controller
Vehicle reaction:	All Function Disable
Possible Cause:	1. Parameter value detected outside of the limits. 2. Use CIT to view and write the parameter value and range
Service Action:	Check Harness cable and connector for any cut damage or loose connection. If OK, ON/OFF the key switch. Check drive speed should be 100% in setting menu. If the fault still persists, Reflash the software

5.77 DTC- 91

	DTC- 91

Machine Fault Codes > DTC- 91

Error code:	DTC- 91
ECU	PECU
Description:	ECU parameter out of Range
Component:	Controller
Vehicle reaction:	Disable All Motion
Possible Cause:	The firmware in the controller is incorrect.
Service Action:	Update the new software in Controller.

5.78 DTC- 92

	DTC- 92

Machine Fault Codes > DTC- 92

Error code:	DTC- 92
ECU	PECU
Description:	EM Brake Failed to Set
Component:	Drive Motor
Vehicle reaction:	Warning Only
Possible Cause:	1. Vehicle movement sensed after the EM Brake has been commanded to set. 2. EM Brake will not hold the motor from rotating
Service Action:	1. This fault may come if vehicle movement is sensed even after breaks are set. 2. Check the Motor Connector for any loose or mis wiring. 3. Change the drive motor if problem persists.

5.79 DTC- 93

	DTC- 93

Machine Fault Codes > DTC- 93

Error code:	DTC- 93
ECU	PECU
Description:	EM Brake Failed to Set
Component:	Motor Controller and Drive Motor
Vehicle reaction:	Drive function Issue
Possible Cause:	1. Vehicle movement sensed after the EM Brake has been commanded to set. 2. EM Brake will not hold the motor from rotating
Service Action:	1. This fault comes if the drive motor encoder output is not correct. 2. Re-flash the software to latest version available. 3. Try changing the motor or Motor controller if problem persists.

5.80 DTC- 94

	DTC- 94

Machine Fault Codes > DTC- 94

Error code:	DTC- 94
ECU	PECU
Description:	EM Brake Failed to Set
Component:	Drive Motor
Vehicle reaction:	Drive Function Disable
Possible Cause:	1. Emergency Reverse was activated and concluded because the EMR Timeout timer expired. 2. The emergency reverse input is stuck On.

Service Action:	1. Reflash the software to latest revision level. 2. Try changing the controller if problem persists.

5.81 DTC- 95

	DTC- 95

Machine Fault Codes > **DTC- 95**

Error code:	**DTC- 95**
ECU	PECU
Description:	Pump Over current
Component :	Motor Controller and Pump Motor
Vehicle reaction:	Lift Function Disable
Possible Cause:	1 - Pump current-sensor value is close to its supply voltage. 2 - Pump current-sensor value is close to the sensor ground. 3 - The pump current has exceeded the configured limit.
Service Action:	1. This fault may come if pump motor is defective or shorted. 2. Check for battery cable wiring from controller to pump motor. 3. Check for any external short or damage on pump motor. 4. Replace the pump motor if problem persists. 5. replace motor controller if problem persists.

5.82 DTC- 96

	DTC- 96

Machine Fault Codes > **DTC- 96**

Error code:	**DTC- 96**
ECU	PECU
Description:	Battery voltage issue
Component :	Battery and battery Charger

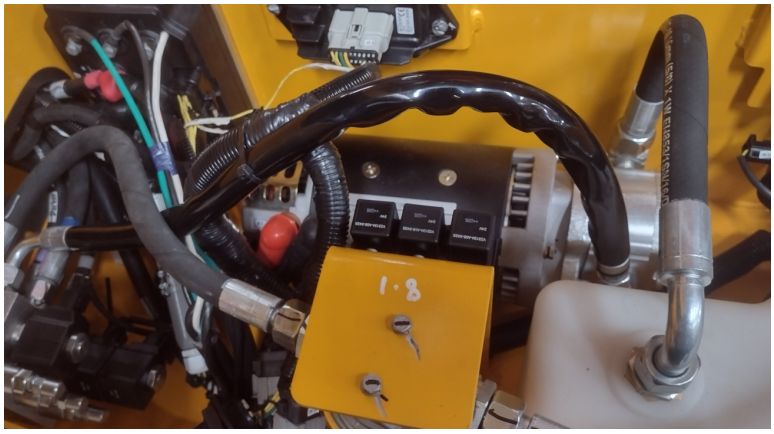
Vehicle reaction:	Disable lift
Possible Cause:	Battery faulty or Charger inoperative
Service Action:	1. Check the electrolyte level. 2. Check all battery cable connection loose or not, if loose re-tighten. 3. Check battery condition and voltage if faulty replace. 4. Check the charger output, if faulty replace charger. 5. Check charger AC input cable connected properly. 6. Check the battery charging socket condition if damage replace.  A USB (Universal Serial Bus) port B LED (Light Emitting Diode) display C AC (Alternating Current) input 

5.83 DTC- 97

	DTC - 97

Machine Fault Codes 80 > **DTC - 97**

Error code:	**DTC - 97**
ECU	PECU

Description:	Pump Hardware failure
Component:	Pump Motor, Motor Controller
Vehicle reaction:	Disable all motion
Possible Cause:	1. External short of the pump motor. 2. Controller defective. 3. Ground control failure
Service Action:	1. Check Pump motor,Controller, harness and fuse, if defective replace. 2. Check Ground control, if defective replace.  1. Check motor controller for any external damage. 2. Check harness and connector for any cut, damage or loose connection. 3. Check Motor Controller if faulty, Reset/Replace. 

5.84 DTC- 99

	DTC- 99

Machine Fault Codes > DTC- 99

Error code:	DTC- 99
ECU	PECU
Description:	Parameter Mismatch
Component:	Motor Controller
Vehicle reaction:	All Function Disable
Possible Cause:	1. A parameter with the [PCF] label was changed. 2. Incorrect position feedback type chosen for motor technology in use. 3. Dual drive is enabled in torque mode. 4. Dual drive enabled on only one controller
Service Action:	1.Check Harness cable and connector for any cut damage or loose connection. 2.If OK, ON/OFF the key switch. 3.If the fault still persists, Reflash the software

5.85 DTC- LL

	DTC- LL

Machine Fault Codes > DTC- LL

Error code:	DTC- LL
ECU	PECU
Description:	Machine Inclination Fault
Component:	Tilt Sensor
Vehicle reaction:	All Function Disable

Possible Cause:	1. Machine Tilted outside limit 2. Faulty Tilt Sensor 3. Tilt Sensor calibration out 4. Faulty Wiring Harness 4.1 Wire Short Circuit 4.2 Wire Open Circuit 4.3 Connector Damage/Loose 4.4 Terminal Back out
Service Action:	1. If the machine is at or above down limit - Check if machine Pitch angle (Along the length of machine) is not exceeding 3.0 Degrees and Roll angle (Along the width of machine) is not exceeding 1.5 degrees. If yes, place the machine on flat ground within this spec. 2. If ground angle is within specification or machine is below down limit and fault is appearing - try re-calibrating the Tilt sensor. (refer procedure below). If problem persists, continue to next step. 3. Check if connector C26_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step 4. Check continuity between Wire 4200B (Pin B) of Tilt Sensor C26_MH and Pin 34 of Controller 35 Pin connector CN1_MH. 5. Check voltage between Pin A of tilt sensor C26_MH and Battery GND. It should show ~24V. if not check the wiring for any damage. 6. Check voltage between Pin C of tilt sensor C26_MH and Battery POS. It should show ~24V. if not check the wiring and grounding for any damage. 7. Check Fuse FU5_MH (5A), Replace if blown otherwise continue to next step. 8. If all above steps are negative, try replacing the Tilt Sensor. 9. Re calibrate the sensor after replacement.

Additional Info :

A) Zero Calibration Method:

1. Ensure that machine is on X = 0 Deg and Y= 0 Deg surface. (Wrong calibration may result in unsafe operation, even machine topple)

2. Power on the machine

3. Locate the zero setting red cable coming out from tilt sensor.

4. Provide 24V power supply from battery to this cable for 7 seconds.

5. The green LED will start to blink faster for a while to show correct zero calibration.

B) LED Visualization :

Green LED	Meaning
Solid ON	Device powered on and curretly supplied
OFF	Tilt outside range
Blink (1-7)	Internal fault

5.86 DTC- OL

	DTC- OL

Machine Fault Codes > DTC- OL

Error code:	**DTC- OL**
ECU	PECU
Description:	Platform Overload Above Set point
Component :	Pressure Sensor
Vehicle reaction:	Shutdown Vehicle, Shutdown Coil Supply
Possible Cause:	1. Load on Platform beyond specification 2. Machine Calibration out
Service Action:	1. Ensure that load on platform is not more than 95% of rated load for that machine. Rated load is mentioned on the platform decal. 2. Remove the load and key cycle the machine to remove error. 3. If machine is giving false overload i.e. platform is not over loaded and yet OL fault is coming; this could be because of calibration out. Re-run the full machine calibration and check again. **Additional Info :** • During OL fault condition, if machine above the 50% of machine height, platform will not lower from joystick or base command. Use Manual descent lever to lower the machine. • In case of OL fault below 50% of machine height, platform can be lowered using joystick or base command. • The machine measures the hydraulic pressure to do load calculation and same is affected with temperature variation. Lower temperature would mean reduced lifting capacity as OL faults will trigger at lesser weight. This is a known behaviour of machine

5.87 DTC- OL AT FULL HEIGHT ONLY

	DTC- OL AT FULL HEIGHT ONLY

Machine Fault Codes > **DTC - OL AT FULL HEIGHT ONLY**

Error code:	**DTC- OL AT FULL HEIGHT ONLY**
ECU	PECU
Description:	OL AT FULL HEIGHT ONLY
Component:	ECU
Vehicle reaction:	ALL FUNCTION DISABLE
Possible Cause:	SOFTWARE ISSUE
Service Action:	UPDATED MAX HEIGHT PARAMETER TO CORRECT VALUE BY LIFTING MACHINE UNTIL THE UP LIMIT SWITCH STOPS IN, RECORDING THE ANGLE SENSOR VALUE AND INPUTTING IT AS THE MAX HEIGHT, SOFTWARE FLASHED.

5.88 DTC- B8

	DTC- B8

Machine Fault Codes > **DTC- B8**

Error code:	**DTC- B8**
ECU	PECU
Description:	Angle Sensor Issue
Component:	Angle Sensor
Vehicle reaction:	All Function Disable
Possible Cause:	1. Faulty Angle Sensor 2. Mounting Issue 3. Faulty Wiring Harness 3.1 Fuse Blown

<table>
<tr><td></td><td>
3.2 Wire Short Circuit

3.3 Wire Open Circuit

3.4 Connector Damage/Loose

3.5 Terminal Back out
<table>
<tr><th>Machine Height</th><th>Angle Sensor Voltage</th></tr>
<tr><td>Stowed</td><td>0.70 ~ 0.85</td></tr>
<tr><td>Above Down Limit</td><td>Very Machine to Machine</td></tr>
<tr><td>Full Height</td><td>For 1932 (1.7~2.0)
For All Others (3.4~3.7)</td></tr>
</table>
</td></tr>
<tr><td>Service Action:</td><td>
1. Connect DLA tool and open M1 programmer & check if analog 8 output voltage (Refer Annexure-B for steps).

//Sensor Valid Output Range : 0.4-4.5 Volts//

2. If sensor output is out of range (i.e. less than 0.4V or greater than 4.5V) check below

2.1 Check if connector C33_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step

2.2 Check Fuse FU5_MH (5A), Replace if blown otherwise continue to next step.

2.3 Check voltage between Pin 1 & Pin 2 of Angle Sensor 1, If it is not ~24V check wiring for loose connection or damage. Otherwise continue to next step.

2.4 Check voltage between Pin 1 & Batt GND, if not 24V, check wiring between Pin 1 & Fuse or else continue to next step.

2.5 Check Voltage between Pin 2 and Batt Positive, if not check grounding or else continue to next step.

2.6 Check continuity between Wire 4200C (Pin 3) of Angle sensor connector C33_MH and Pin 28 of Controller 35 Pin connector CN1_MH.

2.7 If no continuity, check the mating connectors, chassis interconnections for any loose or damaged connection. otherwise continue to next step.

3. Using the Service Mode menu of Joystick controller, raise the machine and apply safety structure.

3.1 Raise and lower the machine to check if the angle sensor voltage is changing or not.

3.2 If not, open the angle sensor mounting and check the D-bit for any damage.
</td></tr>
</table>

	3.3 Check the angle sensor shaft for any damage. Try rotating it with hand and check if the voltage value is changing or not. 4. If all above steps are negative, try replacing the sensor. 5. Re-calibrate the machine after replacement. (Full Calibration starting with Angle Sensor CAL) 6. Check the Height State and Switch position as per Annexure-C to ensure correct machine operation.

5.89 DTC- B9

DTC- B9

Machine Fault Codes > DTC- B9

Error code:	DTC- B9
ECU	PECU
Description:	Pressure Sensor Fault
Component:	Pressure Sensor
Vehicle reaction:	All Function Disable
Possible Cause:	1. Faulty Pressure Sensor 2. Faulty Wiring Harness 2.1 Fuse Blown 2.2 Wire Short Circuit 2.3 Wire Open Circuit 2.4 Connector Damage/Loose 2.5 Terminal Back out
Service Action:	1. Connect DLA tool and open M1 programmer & check if analog 9 output voltage (Refer Annexure-B for steps). //Sensor Valid Output Range : 0.5-4.5 Volts// 2. If sensor output is out of range (i.e. less than 0.5V or greater than 4.5V) check below 2.1 Check if connector C18_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step

	2.2 Check Fuse FU5_MH (5A), Replace if blown otherwise continue to next step. 2.3 Check voltage between Pin 1 & Pin 2 of Pressure Sensor 1, If it is not ~24V check wiring for loose connection or damage. Otherwise continue to next step. 2.4 Check voltage between Pin 2 & Batt GND, if not 24V, check wiring between Pin 2 & Fuse or else continue to next step. 2.5 Check Voltage between Pin 1 and Batt Positive, if not check grounding or else continue to next step. 2.6 Check continuity between Wire 4200G (Pin 4) of Pressure sensor connector C18_MH and Pin 24 of Controller 35 Pin connector CN1_MH. 2.7 If no continuity, check the mating connectors, chassis interconnections for any loose or damaged connection. otherwise continue to next step. 2.8 If all above steps are negative, try replacing the pressure sensor. 3. Re-calibrate the machine after replacement. (No Load and Full Load Calibration)

5.90 DTC- BB

	DTC- BB

Machine Fault Codes > **DTC- BB**

Error code:	**DTC- BB**
ECU	PECU
Description:	Pressure Sensor M2 Fault
Component :	Pressure Sensor M2
Vehicle reaction:	All Function Disable
Possible Cause:	1. Faulty Pressure Sensor 2. Faulty Wiring Harness 2.1 Fuse Blown 2.2 Wire Short Circuit 2.3 Wire Open Circuit 2.4 Connector Damage/Loose 2.5 Terminal Back out

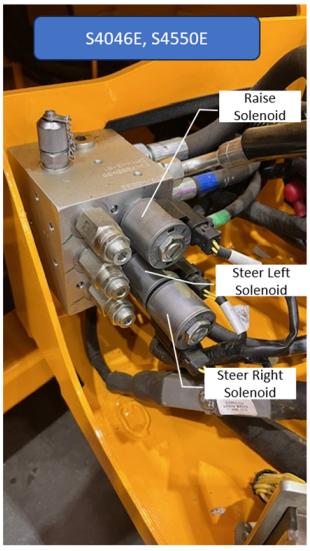
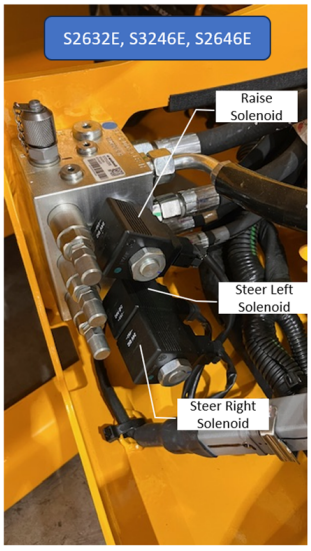
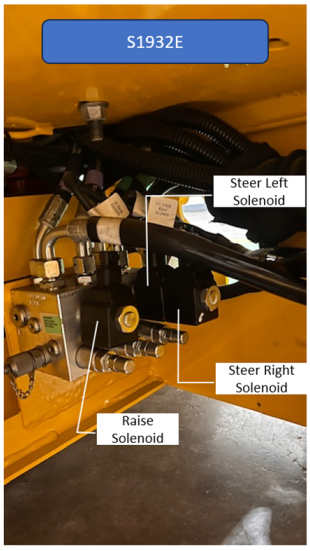
Service Action:	1. Connect DLA tool and open M1 programmer & check if analog 14 output voltage (Refer Annexure-B for steps). //Sensor Valid Output Range : 0.5-4.5 Volts// 2. If sensor output is out of range (i.e. less than 0.5V or greater than 4.5V) check below 2.1 Check if connector C34_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step 2.2 Check Fuse FU8_MH (5A), Replace if blown otherwise continue to next step. 2.3 Check voltage between Pin 1 & Pin 2 of Pressure Sensor 1, If it is not ~24V check wiring for loose connection or damage. Otherwise continue to next step. 2.4 Check voltage between Pin 2 & Batt GND, if not 24V, check wiring between Pin 2 & Fuse or else continue to next step. 2.5 Check Voltage between Pin 1 and Batt Positive, if not check grounding or else continue to next step. 2.6 Check continuity between Wire 4300C (Pin 4) of Pressure sensor connector C34_MH and Pin 25 of Controller 35 Pin connector CN1_MH. 2.7 If no continuity, check the mating connectors, chassis interconnections for any loose or damaged connection. otherwise continue to next step. 3. If all above steps are negative, try replacing the pressure sensor. 4. Re-calibrate the machine after replacement. (No Load and Full Load Calibration)

5.91 DTC- A1

DTC- A1

Machine Fault Codes 80 > DTC- A1

Error code:	**DTC- A1**
ECU	PECU
Description:	Steer right Fault
Component :	Control Valve Solenoid
Vehicle reaction:	Disable all motions except lowering

Possible Cause:	1. Faulty Solenoid 2. Faulty Wiring Harness 2.1 Wire Short Circuit 2.2 Wire Open Circuit 2.3 Connector Damage/Loose 2.4 Terminal Back out
Service Action:	1. Check if connector C11_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step 2.Check continuity between Wire 6000L (Pin 2) of Steer right solenoid C11_MH and Pin 2 of Controller 35 Pin connector CN1_MH. 3. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step. 4. Check continuity between Wire 8401 (Pin 1) of Steer right solenoid C11_MH and Wire 8402 (Pin 13) of Controller 35 Pin connector CN1_MH. 5. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step. 6. If all above steps are negative, try replacing the Main control Valve.    **Additional Info :** • This fault could also come as part secondary fault set along with any primary fault. • Try to identify primary fault in M1 & M2 first. • If this fault Is coming as first fault on display after key cycle and no other fault seem primary - continue to explore the troubleshooting steps.

5.92 DTC- A2

	DTC- A2

Machine Fault Codes > DTC- A2

Error code:	**DTC- A2**
ECU	PECU
Description:	EM Brake RH related fault
Component:	EM Brake RH
Vehicle reaction:	Drive Function Disable
Possible Cause:	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil. 3. Bad connector crimps or faulty wiring. 4. Driver over current, as set by the Driver 1 Over current parameter.
Service Action:	1. This fault may come if a short or open circuit is detected on EM Brake RH 2. Check for loose wiring or mis wiring in EM Brake circuit - Harness side and motor side. 3. Try replacing the RH Motor if problem persists.

5.93 DTC- A3

	DTC- A3

Machine Fault Codes > DTC- A3

Error code:	**DTC- A3**
ECU	PECU
Description:	EM Brake LH Issue
Component:	EM Brake LH

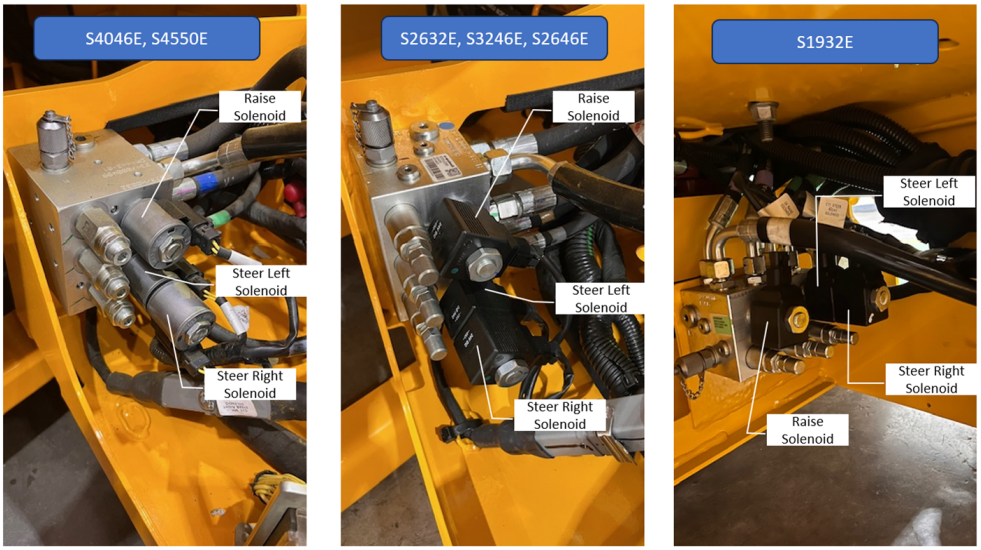
Vehicle reaction:	Drive Function Disable
Possible Cause:	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil. 3. Bad connector crimps or faulty wiring. 4. Driver over current, as set by the Driver 1 Over current parameter.
Service Action:	1. This fault may come if a short or open circuit is detected on EM Brake LH 2. Check for loose wiring or mis wiring in EM Brake circuit - Harness side and motor side. 3. Try replacing the LH Motor if problem persists.

5.94 DTC- A4

	DTC- A4

Machine Fault Codes > **DTC- A4**

Error code:	**DTC- A4**
ECU	PECU
Description:	Lift Up solenoid Fault
Component:	Control Valve Solenoid
Vehicle reaction:	Disable all motions except lowering
Possible Cause:	1. Faulty Solenoid 2. Faulty Wiring Harness 2.1 Wire Short Circuit 2.2 Wire Open Circuit 2.3 Connector Damage/Loose 2.4 Terminal Back out
Service Action:	1. Check if connector C6_MH is properly connected and is not damaged or terminal back out issue is not there. If everthing ok continue to next step 2.Check continuity between Wire 6000U (Pin 2) of Lift Up solenoid C6_MH and Pin 3 of Controller 35 Pin connctor CN1_MH.

	3. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise contiue to next step. 4. Check continuity between Wire 8100 (Pin 1) of Lift Up solenoid C6_MH and Wire 8402 (Pin 13) of Controller 35 Pin connctor CN1_MH. 5. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise contiue to next step. 6. If all above steps are negative, try replacing the Main control Valve.  **Additional Info :** • This fault could also come as part secondary fault set along with any primary fault. • Try to identify primary fault in M1 & M2 first. • If display is only showing DTC74/75 and on M2 programmer this is coming and no other fault seem primary - continue to explore the troubleshooting steps.

5.95 DTC- A5

	DTC- A5

Machine Fault Codes > **DTC- A5**

Error code:	**DTC- A5**
ECU	PECU
Description:	Main Contactor Coil short

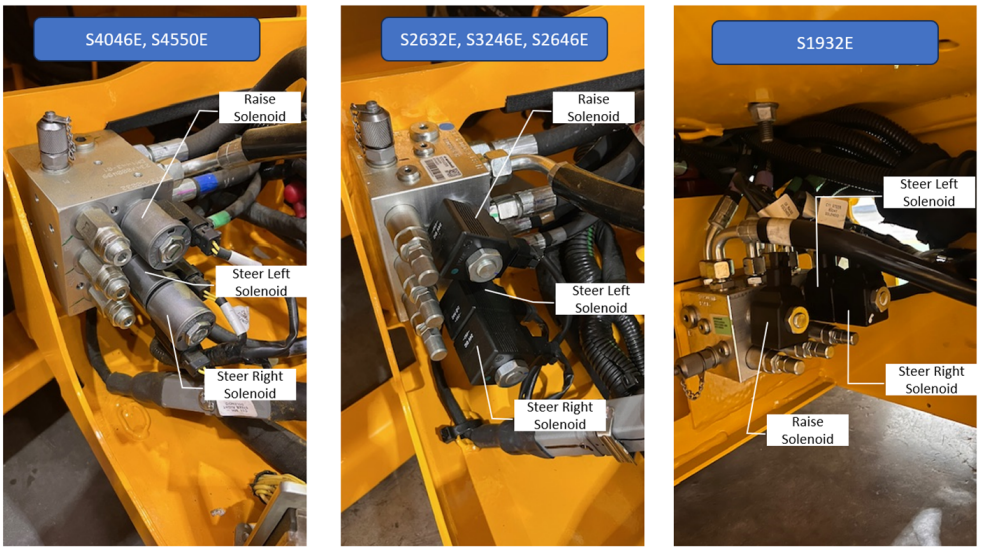
Component :	DC Contactor
Vehicle reaction:	All Function Disable
Possible Cause:	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil. 3. Bad connector crimps or faulty wiring. 4. Driver over current, as set by the Driver 1 Over current parameter.
Service Action:	1. This fault may come if a short or open circuit is detected on DC Contactor. 2. Check for loose wiring or mis wiring/short on DC Contactor. 3. Try replacing the DC Contactor if problem persists.

5.96 DTC- A6

DTC- A6

Machine Fault Codes > **DTC- A6**

Error code:	**DTC- A6**
ECU	PECU
Description:	Steer Left Coil Fault
Component :	Control Valve Solenoid
Vehicle reaction:	Disable all motions except lowering
Possible Cause:	1. Faulty Solenoid 2. Faulty Wiring Harness 2.1 Wire Short Circuit 2.2 Wire Open Circuit 2.3 Connector Damage/Loose 2.4 Terminal Back out
Service Action:	1. Check if connector C10_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step

	2.Check continuity between Wire 6000M (Pin 2) of Steer Left solenoid C10_MH and Pin 19 of Controller 35 Pin connector CN1_MH. 3. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step. 4. Check continuity between Wire 8400 (Pin 1) of Steer Left solenoid C10_MH and Wire 8402 (Pin 13) of Controller 35 Pin connector CN1_MH. 5. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step. 6. If all above steps are negative, try replacing the Main control Valve.  **Additional Info :** • This fault could also come as part secondary fault set along with any primary fault. • Try to identify primary fault in M1 & M2 first. • If this fault Is coming as first fault on display after key cycle and no other fault seem primary - continue to explore the troubleshooting steps.

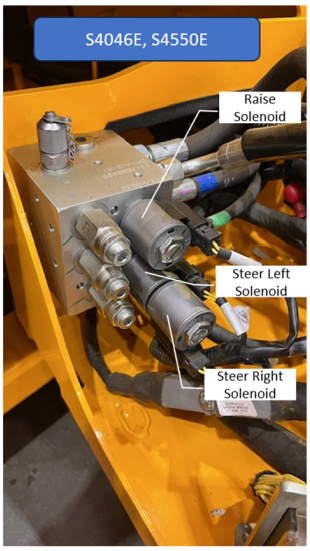
5.97 DTC- A7

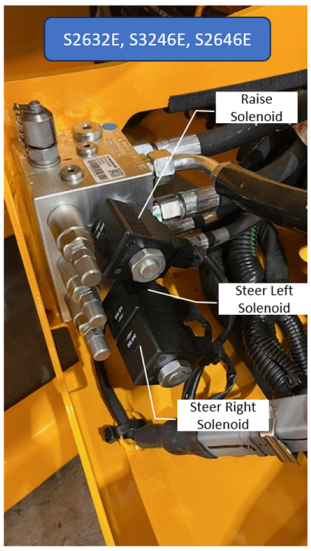
	DTC- A7

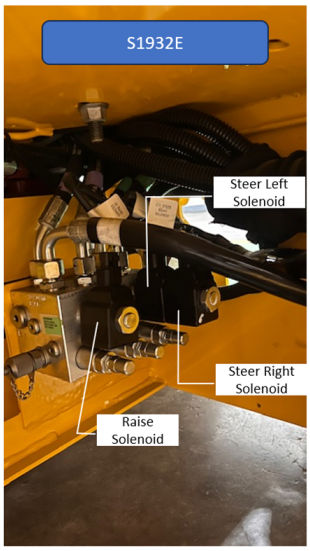
Machine Fault Codes > **DTC- A7**

Error code:	**DTC- A7**
ECU	PECU

Description:	Lift Down Coil Fault
Component :	Control Valve Solenoid
Vehicle reaction:	Disable drive F/R
Possible Cause:	1. Faulty Solenoid 2. Faulty Wiring Harness 2.1 Wire Short Circuit 2.2 Wire Open Circuit 2.3 Connector Damage/Loose 2.4 Terminal Back out
Service Action:	1. Check if connector C8_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step 2.Check continuity between Wire 6000P (Pin 2) of Lift Down Solenoid C8_MH and Pin 20 of Controller 35 Pin connector CN1_MH - (For Single cylinder machine) 2. Check continuity between Wire 6000S (Pin 2) of Lift Down Solenoid C8_MH and 6000R (Pin2) of Lift Down Solenoid 2 C74_MH with Pin 20 of Controller 35 Pin connector CN1_MH - (For Double cylinder machine) 3. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step. 4. Check continuity between Wire 8201 (Pin 1) of Lift Down Solenoid C8_MH and Wire 8402 (Pin 13) of Controller 35 Pin connector CN1_MH - (For Single cylinder machine) 4. Check continuity between Wire 8201A (Pin 1) of Lift Down Solenoid C8_MH and Wire 8201B (Pin1) of Lift Down Solenoid 2 C74_MH with wire 8402 (Pin 13) of Controller 35 Pin connector CN1_MH - (For Double cylinder machine) 5. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step. 6. If all above steps are negative, try replacing the Main control Valve.







Additional Info :

- This fault could also come as part secondary fault set along with any primary fault.
- Try to identify primary fault in M1 & M2 first.
- If display is only showing DTC74/75 and on M2 programmer this is coming and no other fault seem primary - continue to explore the troubleshooting steps.

5.98 DTC- A8

	DTC- A8

Machine Fault Codes 80 > DTC- A8

Error code:	
ECU	DTC- A8
Description:	Driver Assignment
Component :	Motor Controller
Vehicle reaction:	All Function Disable
Possible Cause:	1. A Driver output is used for two or more functions
Service Action:	1. Reflash the software to latest revision level. 2. Try changing the controller if problem persists.

5.99 DTC- A9

	DTC- A9

Machine Fault Codes > DTC- A9

Error code:	DTC- A9
ECU	PECU
Description:	Coil Supply or EM Brake issue
Component:	Solenoid or DC Contactor
Vehicle reaction:	All Function Disable
Possible Cause:	1. Short on driver loads. 2. Dirty connector pins at controller or device. 3. Bad connector crimps or faulty wiring. 4. Controller defectives
Service Action:	1. This is secondary fault indicating that any of the solenoid or Dc Contactor or EM Brake is short or open circuit. 2. Check for any coil related fault active on machine which might be triggering this fault such as A5, A6 etc

5.100 DTC- E5

	DTC- E5

Machine Fault Codes > DTC- E5

Error code:	DTC- E5
ECU	PECU
Description:	Dual zone system related fault/ Over rise protection system related fault
Component:	Dual Zone Mode Box

Vehicle reaction:	All Function Disable except Platform lower
Possible Cause:	Dual Zone Mode Box failure or Harness Issue
Service Action:	Dual height ECU Not connected / Harness Issue Check mode selection switch stuck, short or physical damage. Machine is not dual height, but setup is of dual height Parker ECU software wrong, Reflash correct Software If all above OK try replacing the Dual zone mode box

5.101 DTC- E7

DTC- E7

Machine Fault Codes > **DTC- E7**

Error code:	**DTC- E7**
ECU	PECU
Description:	Dual zone system related fault/ Over rise protection system related fault
Component:	Dual Zone Mode Box
Vehicle reaction:	All Function Disable except Platform lower
Possible Cause:	Dual Zone Mode Box failure or Harness Issue
Service Action:	Dual height ECU Not connected / Harness Issue Machine is not dual height, but setup is of dual height or Machine is Dual Height and Option during VIN Setup not selected as "Dual Zone Fitted" Check mode selection switch stuck, short or physical damage. Parker ECU software wrong, Reflash correct Software If all above OK try replacing the Dual zone mode box

5.102 DTC- E8

DTC- E8

Machine Fault Codes > **DTC- E8**

Error code:	**DTC- E8**
ECU	PECU

Description:	Dual zone system related fault/ Over rise protection system related fault
Component :	Dual Zone Mode Box
Vehicle reaction:	All Function Disable except Platform lower
Possible Cause:	Dual Zone Mode Box failure or Harness Issue
Service Action:	Reach Out to “Vehicle Setup” in Service Master and Set this as above. If it is already set then try following fixes:- 1. Voltage Coming 24V or Not. If not then check dual harness pinching/damaging 2. Try by refreshing the software 3. Check the dual height ECU connector once, no any pin should be damaged.

5.103 DTC- HL

	DTC- HL

Machine Fault Codes > **DTC- HL**

Error code:	**DTC- HL**
ECU	PECU
Description:	Dual Zone Height Issue
Component :	Dual Zone Mode Box
Vehicle reaction:	All Function Disable except Platform lower
Possible Cause:	Platform Reaches Maximum Height on Outdoor Mode or Dual Zone Mode Box Failure
Service Action:	This Error comes when outdoor mode is selected and machine reaches maximum safe height. Lowering is allowed from this point. If machine is in indoors, select the Indoor Mode button on platform control box and it will clear the fault. Check Wire and Harness connected to Dual zone mode box. If all above OK try replacing the Dual zone mode box

5.104 Controller Fault

Controller Fault

Machine Fault Codes > Controller Fault

Note - Key cycle (switch on & off the ignition key) to clear the faults, if fault persist replace components

Motor Controller Internal Faults Code Details				
Sr.No.	**Fault Code**	**Fault Description**	**Type**	**Fault reaction**
1	12	Controller Over current	Controller Interl Fault	Disable all motion
2	13	Current Sensor	Controller Interl Fault	Disable drive F/R
3	14	Precharge Failed	Controller Interl Fault	Disable all motion
4	15	Controller Severe Under temperature	Controller Interl Fault	Disable all motion
5	16	Controller Severe Over temperature	Controller Interl Fault	Disable all motion
6	17	Severe B+ Under voltage	Controller Interl Fault	Disable all motion
7	17	Severe KSI Under voltage	Controller Interl Fault	Disable all motion
8	18	Severe B+ Over voltage	Controller Interl Fault	Disable all motion
9	18	Severe KSI Over voltage	Controller Interl Fault	Disable all motion
10	19	Speed Limit Supervision	Controller Interl Fault	Disable drive F/R
11	1A	Motor Not Stopped	Controller Interl Fault	Disable all motion
12	1B	Critical OS General	Controller Interl Fault	Disable all motion
13	1C	OS General 2	Controller Interl Fault	Warning only
14	1D	Reset Rejected	Controller Interl Fault	Disable Drive
15	1E	Motor Short	Controller Interl Fault	Disable all motion
16	22	Controller Over temperature Cutback	Controller Interl Fault	Warning only
17	23	Under voltage Cutback	Controller Interl Fault	Warning only
18	24	Over voltage Cutback	Controller Interl Fault	Warning only
19	25	Ext 5V Supply Failure	Controller Interl Fault	Disable 5V supply
20	26	Ext 12V Supply Failure	Controller Interl Fault	Disable 12V supply
21	28	Motor Temp Hot Cutback	Controller Interl Fault	Warning only
22	29	Motor Temp Sensor	Controller Interl Fault	Warning only
23	31	Main Driver	Controller Interl Fault	Disable all motion
24	32	EM Brake Driver	Controller Interl Fault	Disable drive F/R
25	33	Pump Driver	Controller Interl Fault	Disable lift
26	34	Load Hold Driver	Controller Interl Fault	Warning only
27	35	Lower Driver	Controller Interl Fault	Warning only

28	36	IM Motor Feedback	Controller Interl Fault	Disable drive F/R
29	36	Sin Cos Motor Feedback	Controller Interl Fault	Disable all motion
30	37	Motor Open	Controller Interl Fault	Disable all motion
31	38	Main Contactor Welded	Controller Interl Fault	Disable all motion
32	39	Main Contactor Did Not Close	Controller Interl Fault	Disable all motion
33	3A	Motor Setup Needed	Controller Interl Fault	Disable drive F/R
34	42	Throttle Input	Controller Interl Fault	Disable drive F/R
35	44	Brake Input	Controller Interl Fault	Disable drive F/R
36	46	NV Memory Failure	Controller Interl Fault	Disable all motion
37	47	HPD Sequencing	Controller Interl Fault	Disable drive F/R
38	47	Emer Rev HPD	Controller Interl Fault	Disable drive F/R
39	47	Pump HPD	Controller Interl Fault	Warning only
40	49	Parameter Change	Controller Interl Fault	Disable all motion
41	4A	EMR Switch Redundancy	Controller Interl Fault	Disable drive F/R
42	68	VCL Run Time Error	Controller Interl Fault	Disable all motion
43	71	OS General	Controller Interl Fault	Disable all motion
44	72	PDO Timeout	Controller Interl Fault	Disable lift
45	73	Stall Detected	Controller Interl Fault	Disable drive F/R
46	77	Supervision	Controller Interl Fault	Disable all motion
47	79	Supervision Input Check	Controller Interl Fault	Disable all motion
48	82	PDO Mapping Error	Controller Interl Fault	Warning only
49	83	Interl Hardware	Controller Interl Fault	Disable all motion
50	84	Motor Braking Impaired	Controller Interl Fault	Disable drive F/R
51	87	Motor Characterization	Controller Interl Fault	Disable all motion
52	88	Encoder Pulse Error	Controller Interl Fault	Disable all motion
53	89	Parameter Out of Range	Controller Interl Fault	Disable all motion
54	91	Bad Firmware	Controller Interl Fault	Disable all motion
55	92	EM Brake Failed to Set	Controller Interl Fault	Warning only
56	93	Encoder LOS	Controller Interl Fault	Warning only
57	94	Emer Rev Timeout	Controller Interl Fault	Disable drive F/R
58	95	Pump Over current	Controller Interl Fault	Disable lift
59	96	Pump BDI	Controller Interl Fault	Disable lift
60	97	Pump Hardware	Controller Interl Fault	Disable all motion
61	99	Parameter Mismatch	Controller Interl Fault	Disable all motion
62	9A	Interlock Braking Supervision	Controller Interl Fault	Disable drive F/R
63	9B	EMR Supervision	Controller Interl Fault	Disable drive F/R
64	BC	Alog Assignment	Controller Interl Fault	Warning only
65	BF	Pump Current Sensor	Controller Interl Fault	Disable lift
66	C1	Branding Error	Controller Interl Fault	Disable all motion
67	C2	BMS Cutback	Controller Interl Fault	Warning only
68	C5	PWM Input 10 Out of Range	Controller Interl Fault	Warning only
69	C8	Invalid CAN Port	Controller Interl Fault	Warning only
70	C9	VCL Watchdog 0x2108	Controller Interl Fault	Warning only

71	CB	PWM Input 28 Out of Range	Controller Interl Fault	Warning only
72	CC	PWM Input 29 Out of Range	Controller Interl Fault	Warning only
73	CB	Primary State Error	Controller Interl Fault	Disable all motion
74	D1	Lift Input	Controller Interl Fault	Disable lift
75	D2	Phase PWM Mismatch	Controller Interl Fault	Disable all motion
76	D3	Hardware Compatibility	Controller Interl Fault	Disable all motion
77	D4	Lower Input	Controller Interl Fault	Disable lower
78	D6	Hazardous Movement	Controller Interl Fault	Disable drive F/R
79	DD	IMU Failure	Controller Interl Fault	Warning only
121	A8	Driver Assignment	Controller Interl Fault	Warning only

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Machine Components

6 Machine Components

	Machine Components

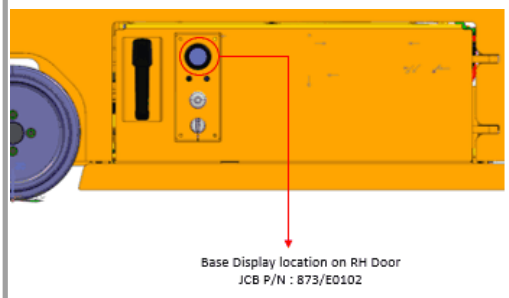
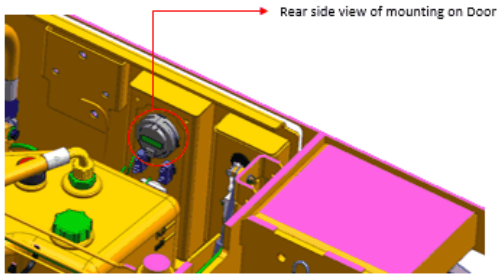
Machine Components

6.1 Base Controller Display

	Base Controller Display

Components 192 > **Base Controller Display**

Component :	**Base Controller Display**
Function:	This is the primary display of machine which will show following detail 1. Controller Software Version - Only during machine start-up. 2.Battery State of Charge - Default Screen. 3.Machine Hours - Default Scree 4 DTC Codes - Only when fault occurs 5.Calibration "In progress" / "End" information - Only during calibration process

Location:	RH Door - Base Panel
Location **Image:**	   Base Display location on RH Door JCB P/N : 873/E0102 

Signal:

Pin	Signal
Pin 1	CAN Hi
Pin 2	Ignition (+24V)
Pin 3	Ground
Pin 4	Empty
Pin 5	Empty
Pin 6	CAN Low

General Technical Details

Base Display

Battery Voltage	24V DC
CAN Enabled	CANOpen
Ingress Protection	Face: IP67; Rear surface: IP67
Operating Temp	-40 C to +85 C

Platform Controller Unit

Operating Voltage	24V DC
CAN Enabled	CANOpen
Ingress Protection	IP65 (Above the panel)
Operating Temp	-20 C to +70 C

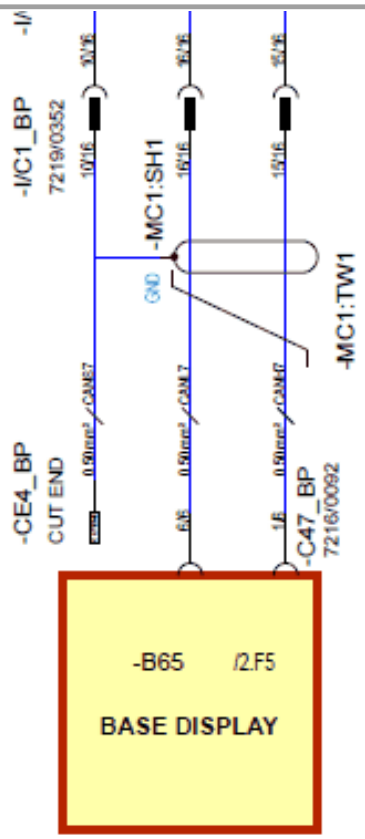
Wires & Connectors:

6 Pole non-waterproof DT Connector JCB P/N 7216/0092

Internal

Electrical

Schematic:



Testing:

Problem	Possible Cause
No Display	Power not connected or too low
Display Present, but counter does not activate.	Input (or enable) wire not connected. Start Input not connected. Input voltage not reaching specified minimum signal level
LED not turning ON during activation condition.	Switch or switch-connection faulty.

Expected Values:

Related Fault Codes:	

6.2 Platform Controller

	Platform Controller

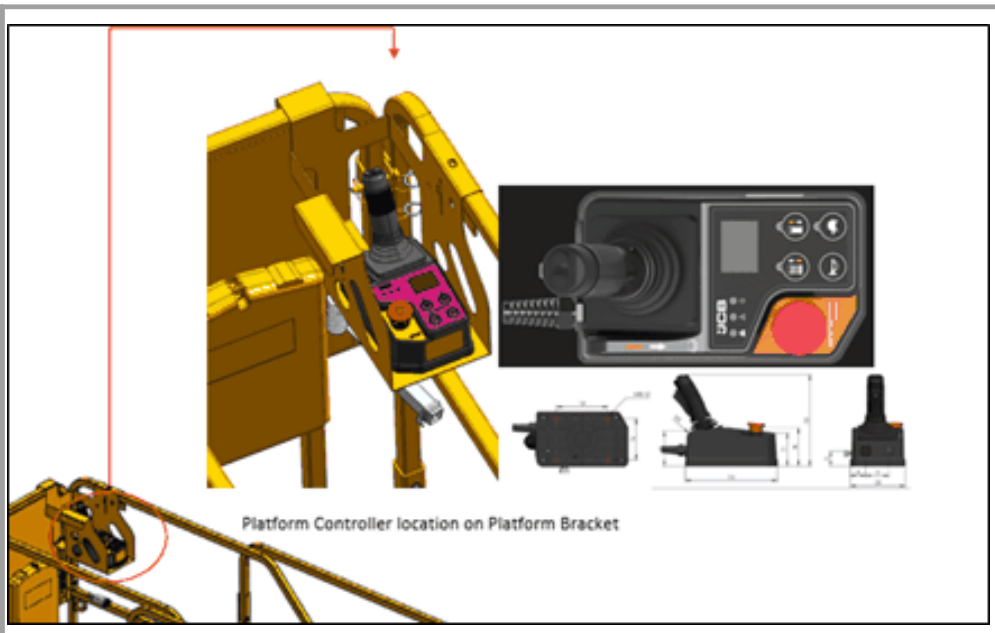
Components 192 > **Platform Controller**

Component :	**Platform Controller**
Function:	Platform Controller Unit (PCU) is the main machine operation control unit with following functions. 1. Start up - 1.1 During machine start-up PCU display shows PCU software version for 1 sec and the shows default screen (see below). 1.2 Drive mode and Lift mode LED's blink at 0.5 Hz frequency indicating Neutral mode 1.3 Green LED at top left corner blinks for 2 sec and then becomes solid - indicating machine is ready for operation. 2. Driving - 2.1 Pressing the drive mode button on PCU enable drive options. Drive mode green LED becomes solid and Lift mode LED goes Off. 2.2 Pressing the enable button and pushing the joystick drives the machine in forward direction. 2.3 Pressing the enable button and pulling the joystick drives the machine in reverse direction 2.4 By default machine drives in "Tortoise" mode i.e. Machine speed is reduced to 50% of max s

	2.5 Joystick has two press buttons at the top - one for steer left and one for steer enable 2.6 Pressing the "Tortoise" button again disables it and green LED on top of the button goes off, now machine operates in "Hare" mode (Max Speed 3. Lift - 3.1 Pressing the Lift mode button on PCU enable Lift options. Lift mode green LED becomes solid and Drive mode/Tortoise LED goes Off. 3.2 Pressing the enable button and pushing the joystick lowers the platform 3.3 Pressing the enable button and pulling the joystick raises the platform 4. Display - 4.1 PCU has 2" multi Information LCD display. 4.2 Default screen shows battery state of charge in bars & percentage at the top of screen and platform load percentage at the bottom. . 4.3 During fault condition - DTC codes are cycled in place of load percentage display. 4.4 Pressing the lift & drive button simultaneously and performing a key cycle - opens the menu options 5. Buzzer - 5.1 Platform Controller has inbuilt buzzer which sounds during fault conditions (Overload, Tilt & Pothole) 5.2 Buzzer beeps for 1/6 S and then off for 1/6 s during above fault conditions. 6. E-Stop - 6.1 PCU has E-Stop button, pressing this button disables all machine operation 6.2 Releasing the E-Stop button enable normal operation
Location:	Mounted on Platform Control Bracket at the platform side rail.

Location

Image:



Signal:

General Technical Details

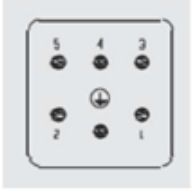
Platform Controller Unit

Operating Voltage 24V DC

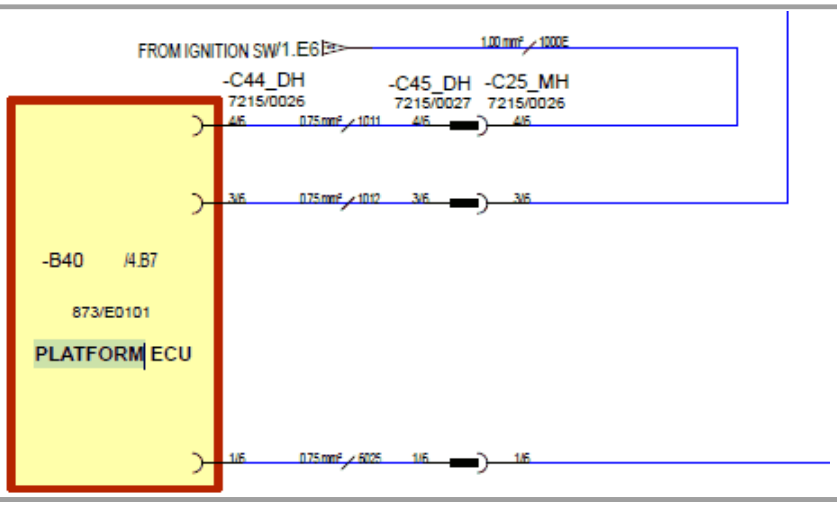
JTC 82C	
Operating voltage	9…36 VDC
LCD size	2.8"
Mechanical angle of the joystick	±20°
Mechanical life of the joystick	≥1 million cycles
Mechanical life of the button	≥0.2 million cycles
Housing material	PC+PBT
Operating temperature	-20...+70°C
Storage temperature	-30...+80°C
Protection rating	IP65 (above the panel)
EMC	IEC 61000-6-2, IEC61000-6-4
Vibration resistance	30Hz, 4g, 4h, 2h, 2h,IEC 60068-2-6
Shock resistance	10g,11ms IEC 60068-2-29

Wires & Connectors:

6 Pole non-waterproof DT Connector JCB P/N 7216/0092



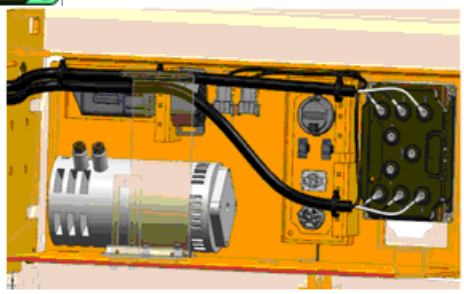
1	GND
2	CAN_H
3	E-STOP OUT (24V OUT)
4	+24V
5	CAN_L

Internal **Electrical** **Schematic:**	
Testing:	Not a serviceable part
Expected **Values:**	
Related **Fault Codes:**	

6.3 Motor Controller (Inverter)

	Motor Controller (Inverter)

Components 192 > **Motor Controller (Inverter)**

Component :	Motor Controller (Inverter)
Function:	It inverts the DC supply to 3 Phase AC .UV W Terminals on the controller feeds 3phase AC supply to wheel motor Right and Left.It also feeds the 24V DC supply to DC pump motor.B- and Pump Terminals feeds DC supply to pump motor.The LV connector is used to feed the signals from joystick and sensors
Location:	On Right Door
Location Image:	  

Signal:

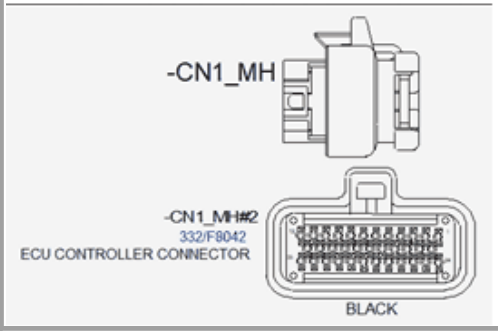
Motor Controller / Inverter

Battery Voltage	24V DC
Current Rating	2 X 200 ARMS (S2-2min)
Pump Current Max	280ADC
Operating Temp	-40 C to +50 C
IP rating	IP65
Power Connections	2x UVW , B+/B-, and Pump
I/O Connections	35 Pin AMPseal Connector

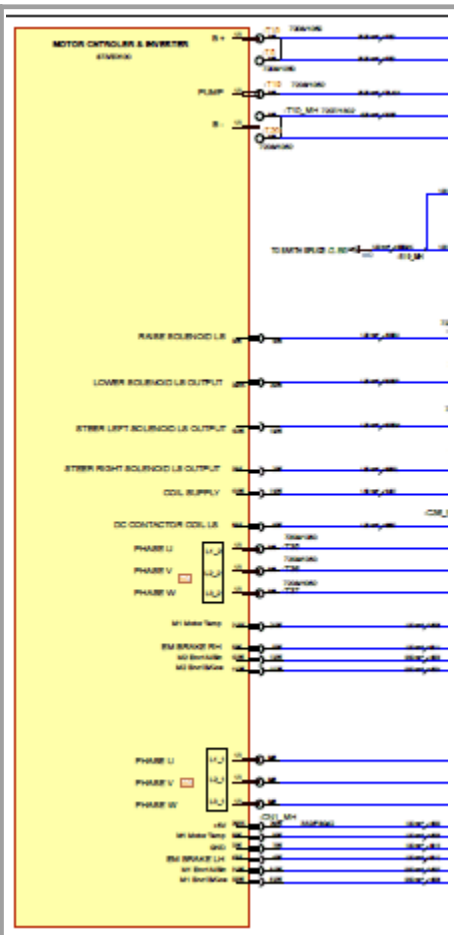
Pin Number	Pin Name Primary Usage	Special I/O (Alternative Usage) [CIT Motor Node]	I/O Type	Usage Options		
				Switch Input	Analog Input	PWM Driver
1	KSI	Input 20 [M1 & M2]	Virtual	✔		
2	M1_Driver 1	Input (Switch) 21 [M1]	Driver	✔		✔
3	M2_Driver 4	Input (Switch) 24 [M2]	Driver	✔		✔
4	M1_Driver 3	Input (Switch) 23 [M1]	Driver	✔		✔
5	M2_Driver 2	Input (Switch) 22 [M2]	Driver	✔		✔
6	M1_Driver 5	Input (Switch) 25 [M1]	Driver	✔		✔
7	I/O GND	Sensor Grounds [M1 & M2]	–			
8	M1_Motor Temp	Input (Switch) 2 [M1]	Analog	✔	✔	
9	Input 5	Switch 5 [M1 & M2]	Analog	✔	✔	
10	M2_EncA/Sin	Input (Switch) 3 [M2]	Analog	✔	✔	
11	M2_EncB/Cos	Input (Switch) 4 [M2]	Analog	✔	✔	
12	M2_EncC	Input (Switch) 11 [M2]	Digital	✔		
13	Coil Supply	Input 30 [M1 & M2]	Virtual	✔		
14	Input 13	Switch 13 [M1 & M2]	Digital	✔		
15	Input 6	Switch 6 [M1 & M2]	Analog	✔	✔	
16	Input 1	Switch 1 [M1 & M2]	Analog	✔	✔	
17	Input 15	Switch 15 [M1 & M2]	Digital	✔		
18	I/O GND	[M1 & M2]	–			
19	M1_Driver 6	Input (Switch) 26 [M1]	Driver	✔		✔
20	M2_Driver 7	Input (Switch) 27 [M2]	Driver	✔		✔
21	M2_Motor Temp	Input (Switch) 2 [M2]	Analog	✔	✔	
22	Input 7	Switch 7 [M1 & M2]	Analog	✔	✔	
23	CAN1 H	[M1 & M2]	–			
24	Input 9	Switch 9 [M1 & M2]	Analog	✔	✔	
25	+12V Ext Supply	Input 14 [M1 & M2]	Analog	✔	✔	
26	+5V Ext Supply	Input 31 [M1 & M2]	Analog	✔	✔	
27	Input 18	Switch 18 [M1 & M2]	Analog	✔	✔	

Wires & Connectors:

35Way socket housing-JCB Part No. 332/F8042



Terminal	Function
B+	Positive Battery to Controller
B–	Negative Battery to Controller
U1	Motor Phase U1 (M1)
V1	Motor Phase V (M1)
W1	Motor Phase W(M1)
U2	Motor Phase U1 (M2)
V2	Motor Phase V (M2)
W2	Motor Phase W(M2)
Pump	DC Pump (F2-T)

Internal **Electrical** **Schematic:**	
Testing:	Not a Serviceable part
Expected **Values:**	

Related Fault Codes:	

6.4 Parker Master I/O ECU

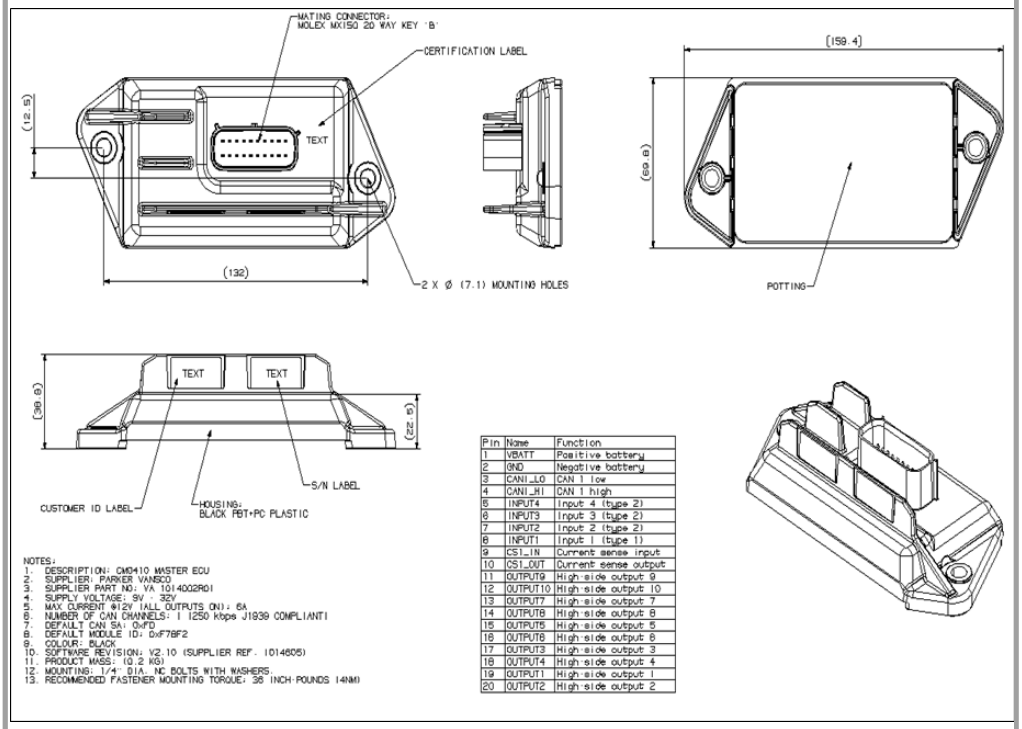
	Parker Master I/O ECU

Components 192 > **Parker Master I/O ECU**

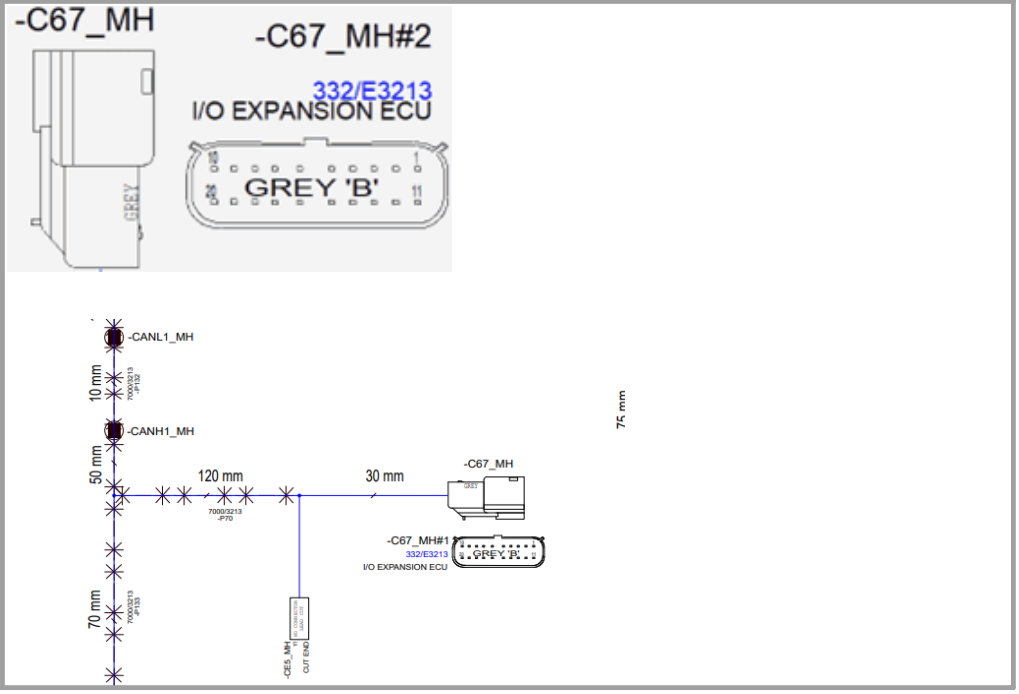
Component :	**Parker Master I/O ECU**
Function:	This ECU is an additional input out (I/O) expansion ECU which controls flash light , chassis buzzer and horn. This ECU has no separate error codes.All the related error code will be displayed on base and platform display (Curtis only)
Location:	On Right Door
Location image:	

Signal:

Wire and Connector 20 Way MX150 Skt hsg Grey Key B JCB Part No. 332/E3213

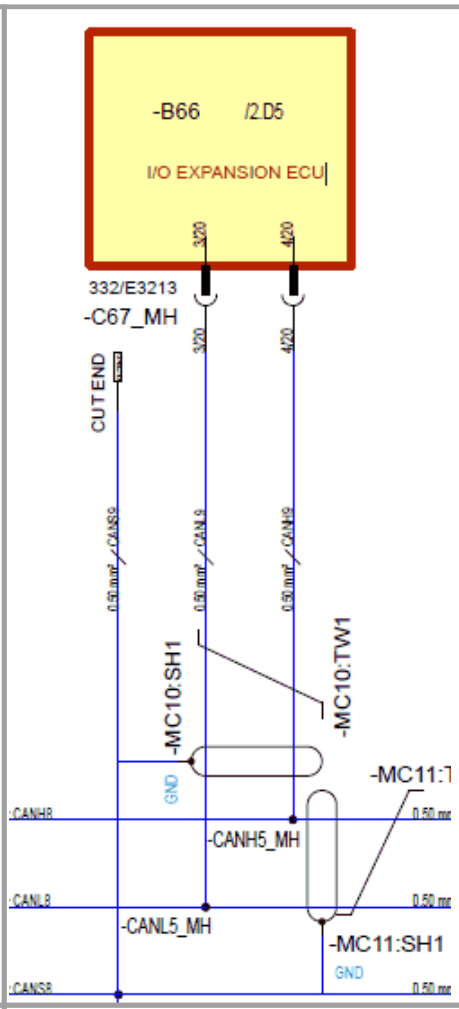


Pin	Name	Function
1	VBATT	Positive battery
2	GND	Negative battery
3	CAN1_LO	CAN 1 low
4	CAN1_HI	CAN 1 high
5	INPUT4	Input 4 (type 2)
6	INPUT3	Input 3 (type 2)
7	INPUT2	Input 2 (type 2)
8	INPUT1	Input 1 (type 1)
9	CS1_IN	Current sense input
10	CS1_OUT	Current sense output
11	OUTPUT9	High-side output 9
12	OUTPUT10	High-side output 10
13	OUTPUT7	High-side output 7
14	OUTPUT8	High-side output 8
15	OUTPUT5	High-side output 5
16	OUTPUT6	High-side output 6
17	OUTPUT3	High-side output 3
18	OUTPUT4	High-side output 4
19	OUTPUT1	High-side output 1
20	OUTPUT2	High-side output 2



Wires &

Connectors:

Internal **Electrical** **Schematic:**	
Testing:	Not a Serviceable
Expected **Values:**	

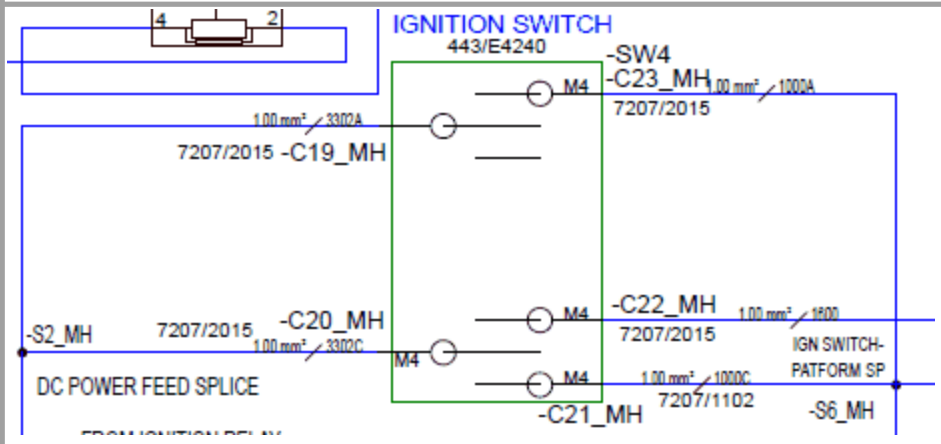
Related Fault Codes:	

6.5 Ignition /Key Switch

	Ignition /Key Switch

Components 192 > **Ignition /Key Switch**

Component :	**Ignition /Key Switch**
Function:	The ignition turns on and off the main power of the machine. Ignition key switch supplies power to the Emergency Stop & and selection of Chassis control or Platform control. There are following 3 selectable positions. 1.Chassis controls- When chassis controls is selected, machine shall only be able to operate from chassis control panel. Platform controls shall be isolated with exception of E-stop and platform horn 2.Ignition OFF- When Ignition position is selected, neither control location shall be active. Machine shall be in 'OFF' state with minimal current draw. 3.Platform Controls- When platform controls is selected, machine shall only be able to operate from platform control panel. Chassis controls shall be isolated with exception of e-stop
Location:	The Ignition Switch is located on hydraulic door compartment

Location **Image:**	
Signal:	The main power is fed from the battery into the lower control box through an 80A primary fuse and into the large din rail terminal S11-21.
Wires & **Connectors:**	
Internal **Electrical** **Schematic:**	

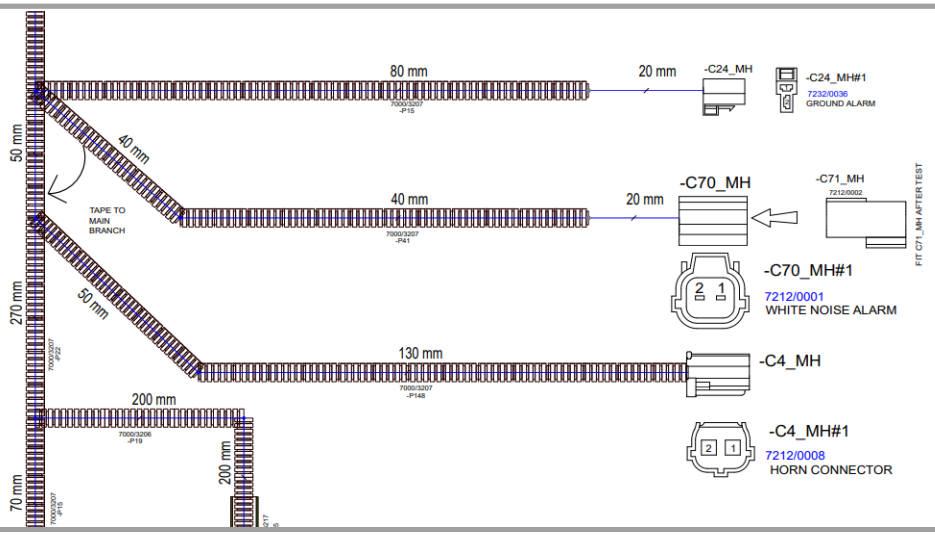
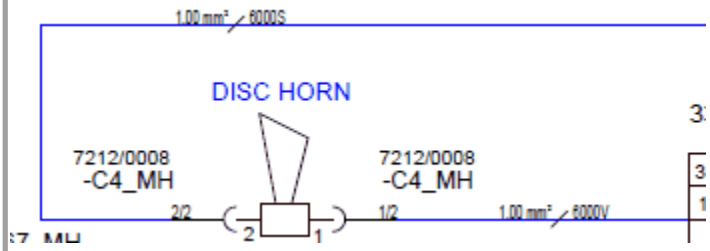
Testing:	Check Power supply in Out put cable, if faulty Replace.
Expected Values:	
Related Fault Codes:	

6.6 Horn

	Horn

Components 192 > **Horn**

Component :	**Horn**
Function:	The horn is activated at the platform control panel and sounds at the ground as a warning to ground personnel. An improperly functioning horn will prevent the operator from alerting the ground personnel of hazards or unsafe conditions

Location:	Horn is location on front side of machine underneath chassis
Location **Image:**	Location is different as per model
Signal:	Pin Number Wire Number 1 6000V 2 6000S
Wires & **Connectors:**	
Internal **Electrical** **Schematic:**	

Testing:	Press horn button , it should sound
Expected Values:	
Related Fault Codes:	

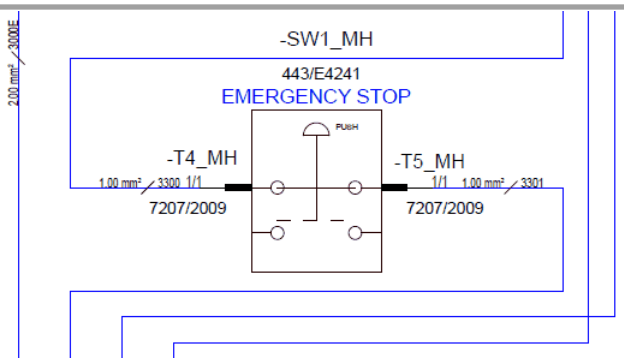
6.7 Emergency Stop

	Emergency Stop

Components 192 > **Emergency Stop**

Component :	**Emergency Stop**
Function:	The E stop switch immediately switches off the 24v power to the inverters by cutting the Inverter key relay, and opening the Contactor. All machine machine functions will be disable by pressing Emergency stop Note- Emergency stop button should be used only in emergency condition and should not be used as n "ON-Off" button

Location:	The E-Stop buttons are located on both the chassis and platform controllers and feed into ignition input via key switch
Location **Image:**	 
Signal:	The main power is fed from the battery into the lower control box through an 80A primary fuse and into the large din rail termil S11-21.

Wires & Connectors:	
Internal Electrical Schematic:	
Testing:	Machine should not start whilst E stop is pressed
Expected Values:	
Related Fault Codes:	

6.8 DC Motor

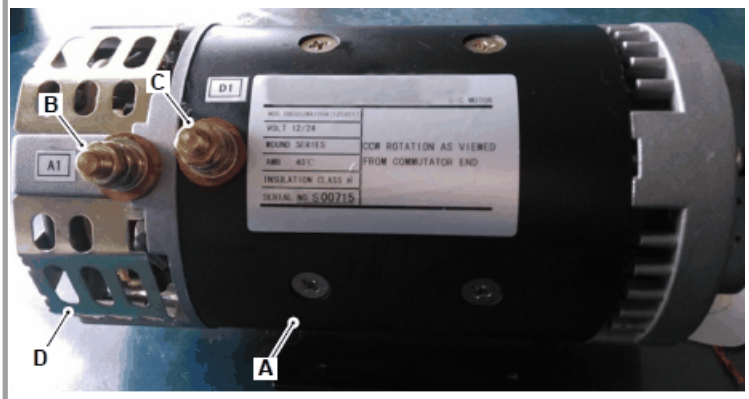
	DC Motor

Components 192 > DC Motor

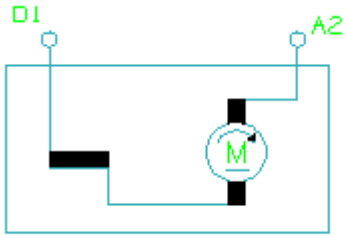
Component :	**DC Motor**
Function:	The pump motor installed on this machine is a DC (Direct Current) motor with a series excited permanent magnet. The resistance between the motor enclosure and any of the binding points is infinite or more than 1 mega ohm. The pump motor rotates in an anticlockwise direction (viewed from commutator end).
Location:	It is fitted on hydraulic door compartment

Location

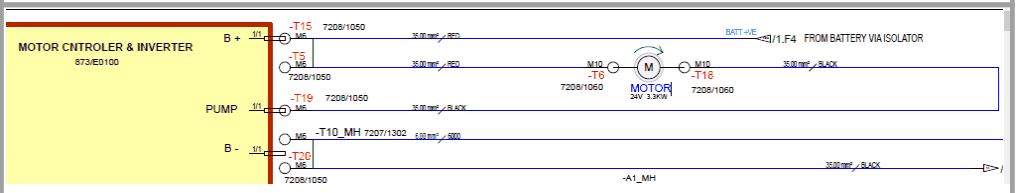
Image:



Signal:



1.	CONSTANT POWER	: 3.3KW
2.	RATED VOLTAGE	: 24V
3.	RATED CURRENT	: 180A
4.	EXCITATION MODE	: SERIES EXCITATION
5.	WEIGHT	: 18.5KG
6.	MAXIMUM SPEED	: 5600 R / MIN
7.	RATED SPEED	: 3050 R / MIN
8.	ROTATION	: CLOCKWISE FROM THE END OF THE SHAFT
9.	PROTECTION GRADE	: IP20
10.	MATING TERMINAL	: 7208/1060 (M10)
11.	SUPPLIER NAME	: NEW UNITED RAIL TRANSIT TECHNOLOGY (X
12.	MODEL NUMBER	: 5BCG2MA100A

	POWER RATING : 4.5KW RATED VOLTAGE : 24V RATED CURRENT : 239A EXCITATION MODE : SERIES EXCITATION MAXIMUM SPEED : 5600 r/min RATED SPEED : 2700 r/min ROTATION : CLOCKWISE FROM THE END OF THE SHAFT PROTECTION GRADE : IP20 AMBIENT WORKING TEMPERATURE : -25° C TO 40° C INSULATION RESISTANCE : 50 MΩ MATING TERMINAL : 7208/1060 (M10) SUPPLIER : NEW UNITED RAIL TRANSIT TECHNOLOGY (X SUPPLIER NUMBER : XQD-4.5H
Wires & Connectors:	
Internal Electrical Schematic:	
Testing:	Check Power supply on terminal.

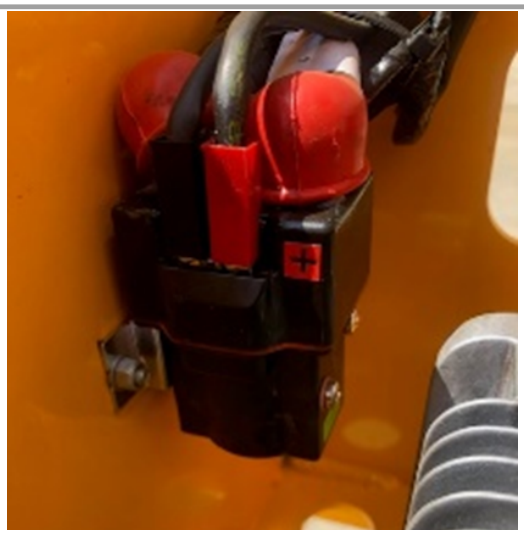
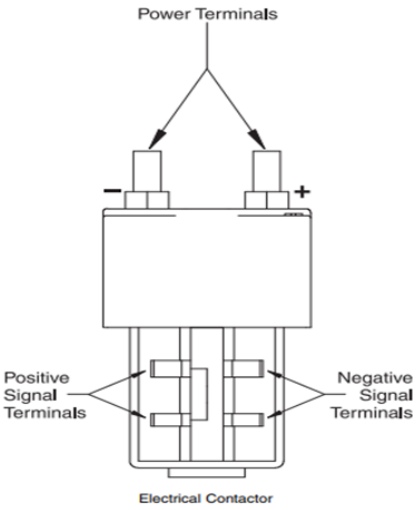
Expected Values:	
Related Fault Codes:	

6.9 DC Contactor

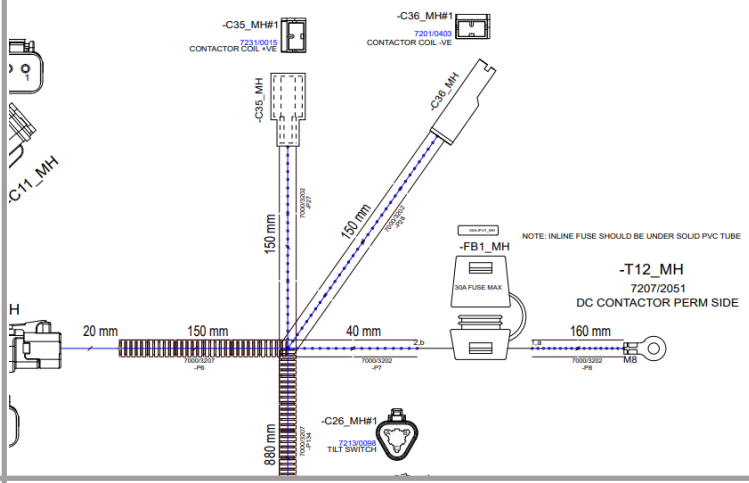
	DC Contactor

Components 192 > **DC Motor**

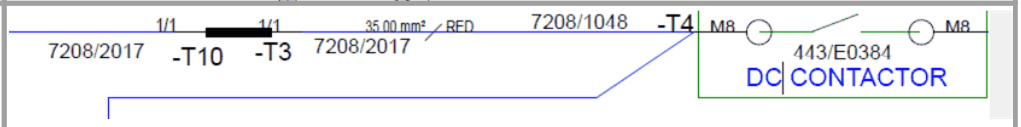
Component :	**DC Contactor**
Function:	The DC Contactor is used as a large relay to turn power on and off to the electric pump. The Contactor is controlled via the Curtis Controller .
Location:	It is fitted on hydraulic door compartment

Location **Image:**	 
Signal:	

Wires & Connectors:



Internal Electrical Schematic:



Testing:

The tests should be done with the unit powered, i.e. with the coil being powered, contacts in a closed position. The main contacts do not need to carry the application load, i.e. a simple (small) test signal to monitor the contact status would be acceptable.

When checking the impaired functionality and mechanical integrity we need the Contactor to be inspected to the stated specification below, along with checking the continuity across the contacts. For the check at the end of the test, we would require the Contactor to be powered OFF and ON to check functionality is correct.

Type: SU80-5321PL (13224238)
Coil Voltage (V) 24 CO DC
Coil Resistance (Ohms) 52.0
Pull In Voltage (V) 16.0 Maximum
Drop Out Voltage (V) 6.0 Maximum
Coil Power Dissipation (W) 11.08
Addition Features
TOP HAT STYLE BRACKET FITTED ON RIGHT HAND SIDE.
DIODE FITTED, +VE AT RIGHT.
LARGE CONTACT TIPS FITTED.
All figures above are stated at 20 degrees Celsius

Expected Values:	
Related Fault Codes:	

6.10 Relays

	Relays

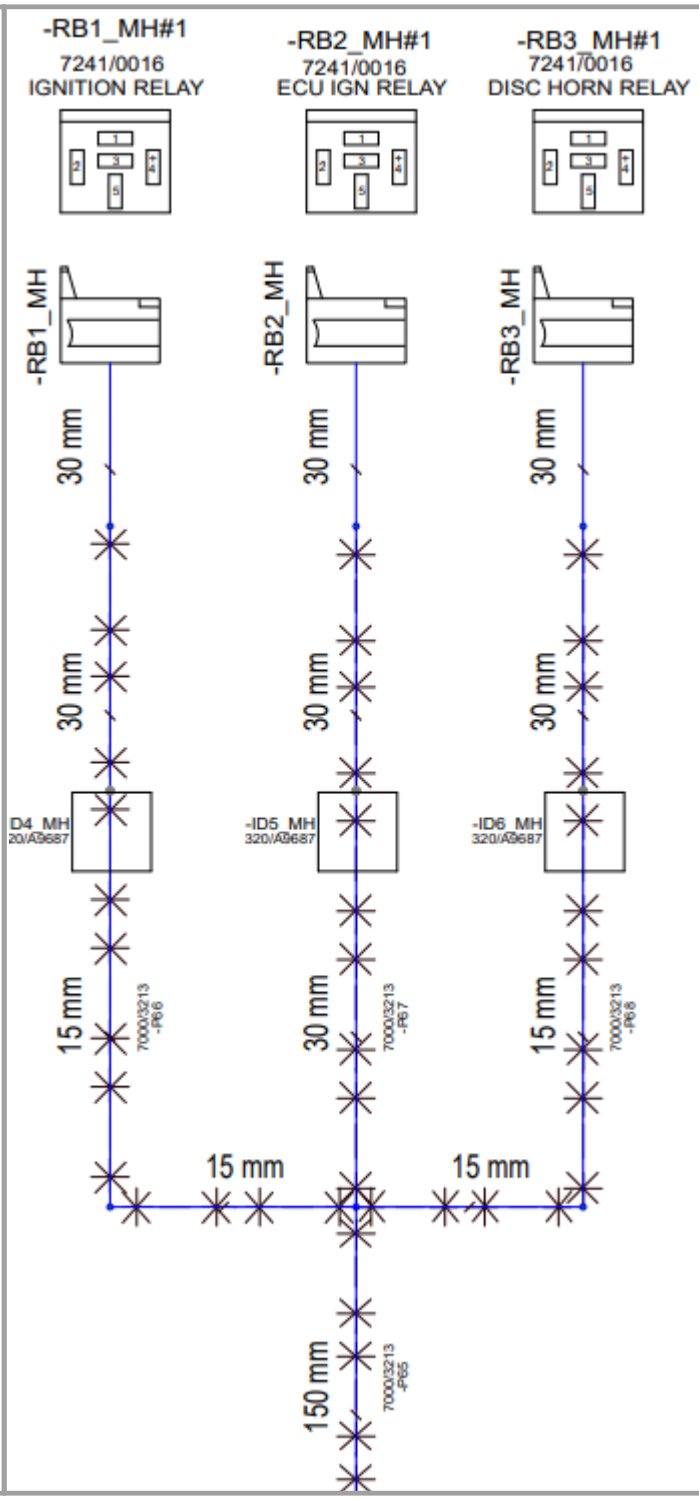
Components 192 > **Relays**

Component :	**Relays**
Function:	Relays are used as a voltage controlled switch. The relay coil controls a switch inside the relay pack. This allows high current devices, such as lamps, to be switched to a supply. This allows high current circuit to be controlled by low current switches and ecu. There 3 relay used in this machine 1 Ignition 2. ECU supply 3.Horn Relay

Location:	All three relays are fitted on RHS door compartment
Location Image:	
Signal:	

Wires &

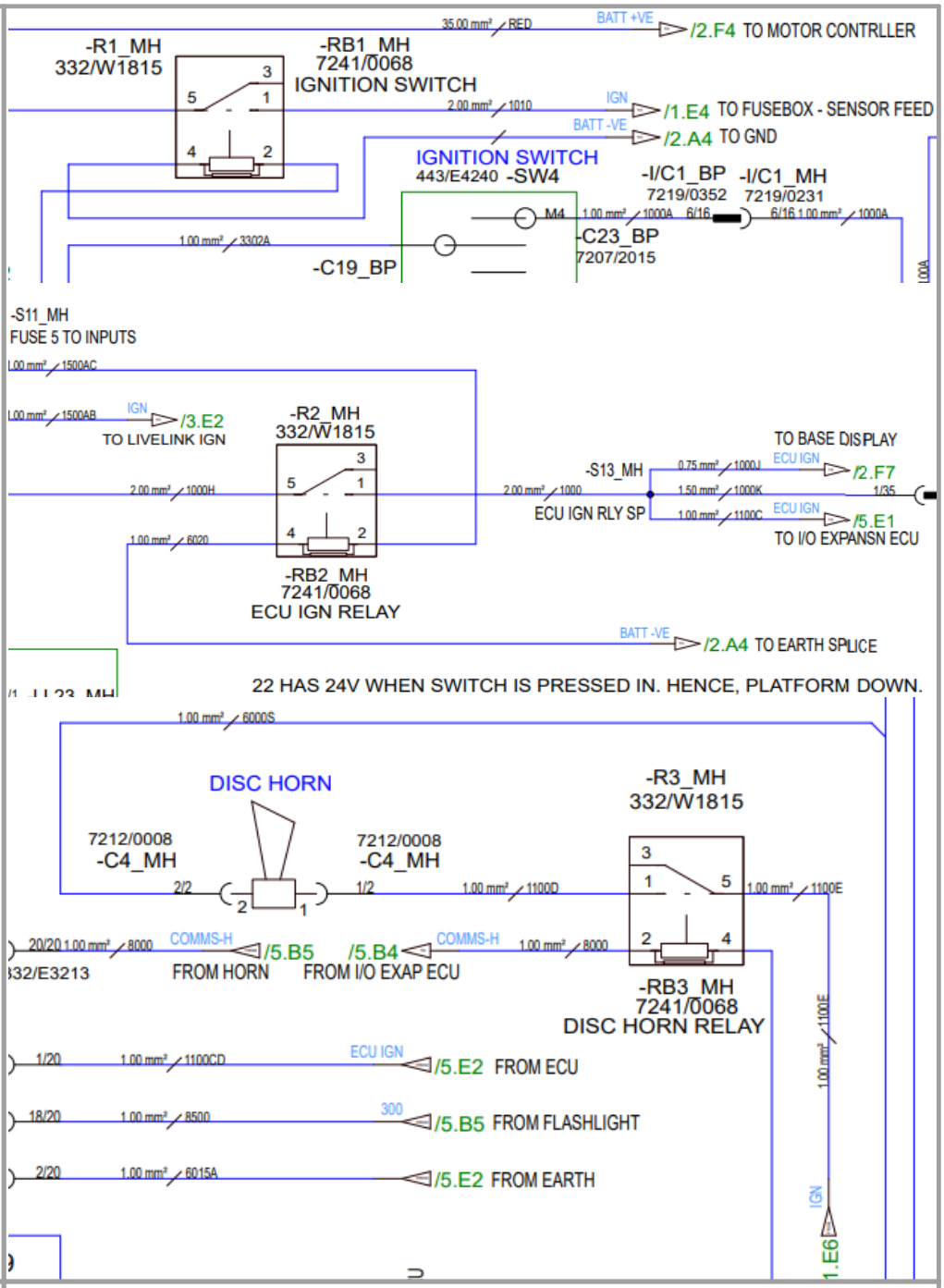
Connectors:



Internal

Electrical

Schematic:



Testing:

Check Continuity between terminal 3 & 5 and terminal 2 & 4

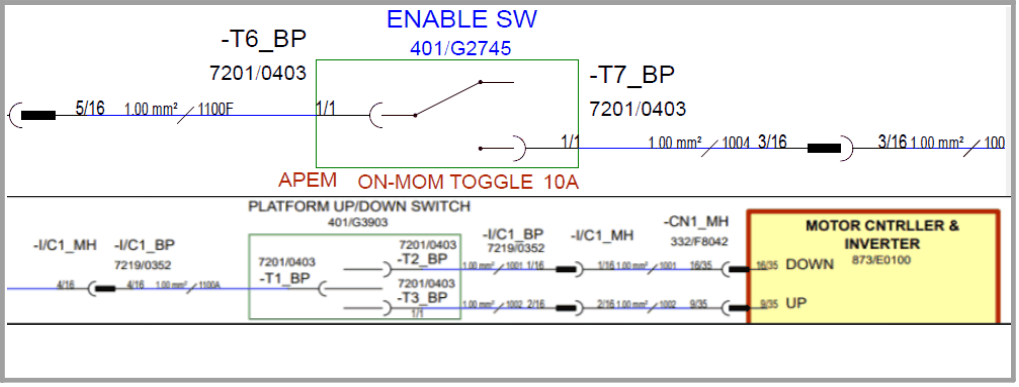
Expected Values:	
Related Fault Codes:	

6.11 Base Toggle Switch

Base Toggle Switch

Components 192 > **Base Toggle Switch**

Component:	**Base Toggle Switch**
Function:	Base Enable Switch When key switch is set to chassis controls, Base Enable switch (momentary) must be pressed and held at the same time as the lift/lower toggle switch to eble movement of platform. There are two enable toggle switches fitted on this machine Lift/Lower Toggle Switch- Switch is a spring loaded to default position. Following are 3 positions of this switch 1. Platform up (momentary) 2. No movement select (default) 3. Platform down (momentary

	Enable switch- Two position
Location:	These toggle switches are fitted on RHS door compartment along with ignition & E stop switches
Location:	
Signal:	
Wires & **Connectors:**	
Internal **Electrical**	

Schematic:	
Testing:	Check Power supply on Terminal 1 and 2 or 3 when actuate.
Expected Values:	
Related Fault Codes:	

6.12 Tilt Sensor

	Tilt Sensor

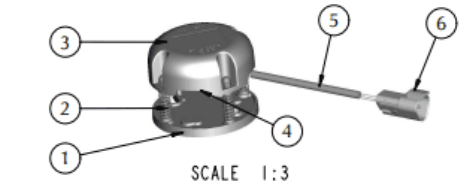
Components 192 > **Tilt Sensor**

Component :	**Tilt Sensor**

Function:	The tilt sensor sends a signal (24V) to the MECU (Machine Electronic Control Unit) if the chassis is within the safe level (below 3° front-to-back and below 1.5° side-to-side). If the chassis is over the safe tilt limit, the sensor sends a signal to the MECU and the warning light is lit at the platform ECU (Electronic Control Unit). Calibration- Make the machine safe with the platform raised. Refer to the Service Manual When the machine is on level ground (specified angle in each direction), do the following. Angle: 0 Connect the tilt sensor calibration lead to the specified power supply. Voltage: 24V Allow the lead to be connected with power supply for the specified duration. Duration: 3–7s This sets the zero position Disconnect tilt sensor calibration lead from the power source The green color LED (Light Emitting Diode) must blink Note that the tilt sensor is Pre-set to sideways tilt by the specified angle from the horizontal. Angle: 1.5° Note that the tilt sensor is Pre-set to lengthways tilt by the specified angle from the horizontal. Angle: 3° Note that the tilt sensor is Pre-set to lengthways tilt by the specified angle from the horizontal. Angle: 3°
Location:	It is mounted directly to the chassis.

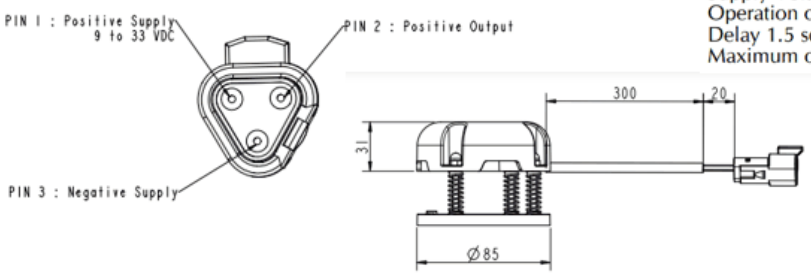
Location **Image:**	 

Signal:



6	Connector Amphenol AT04 3P or Deutsch DT04-4P
5	Cable Grey Sheat PVC 3x0.5
4	Polyurethane Resin Bi-component Black
3	Case Grey PA6 + GB30
2	Spring
1	Flange Grey PA6 + GB30

JCB p/n: 400/x1000
X = 1.5 deg
Y = 3 deg
Supply Voltage [9-33]
Operation curve - Elliptical
Delay 1.5 sec
Maximum output 1A

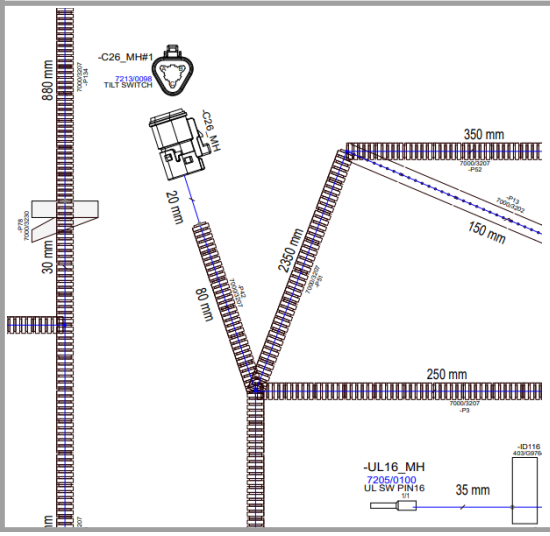


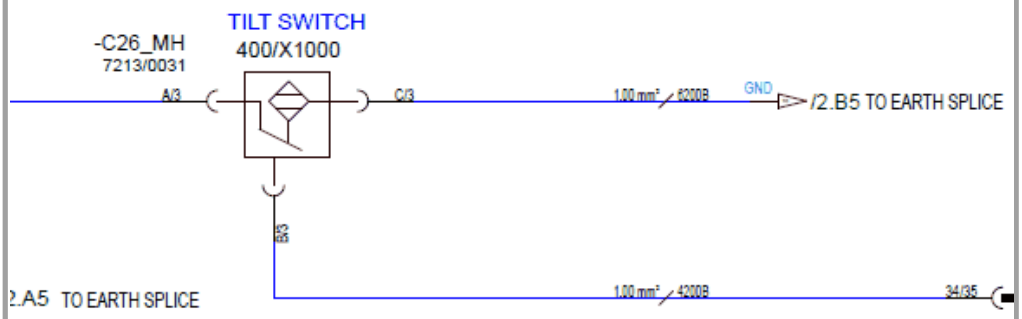
More Information

Effect- Disable Lifting and Driving

Possible Cause 1.Tilt switch detects chassis angle is greater than 1.5° sideways, or 3° lengthways, whilst down limit switch indicates platform is raised 2.Tilt switch fault; sigl stuck at 0v, tilt sensor disconnected, sigl to MECU Pin 11 is open circuit, sigl to MECU Pin 11 is short circuit to 0v 3.Tilt switch calibration fault

Wires & Connectors:

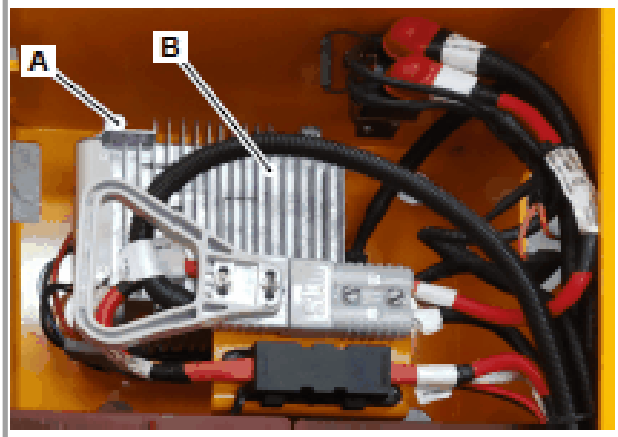


Internal **Electrical** **Schematic:**	
Testing:	
Expected Values:	
Related Fault Codes:	55 Disable all motions except lowering

6.13 Battery Charger

	Battery Charger

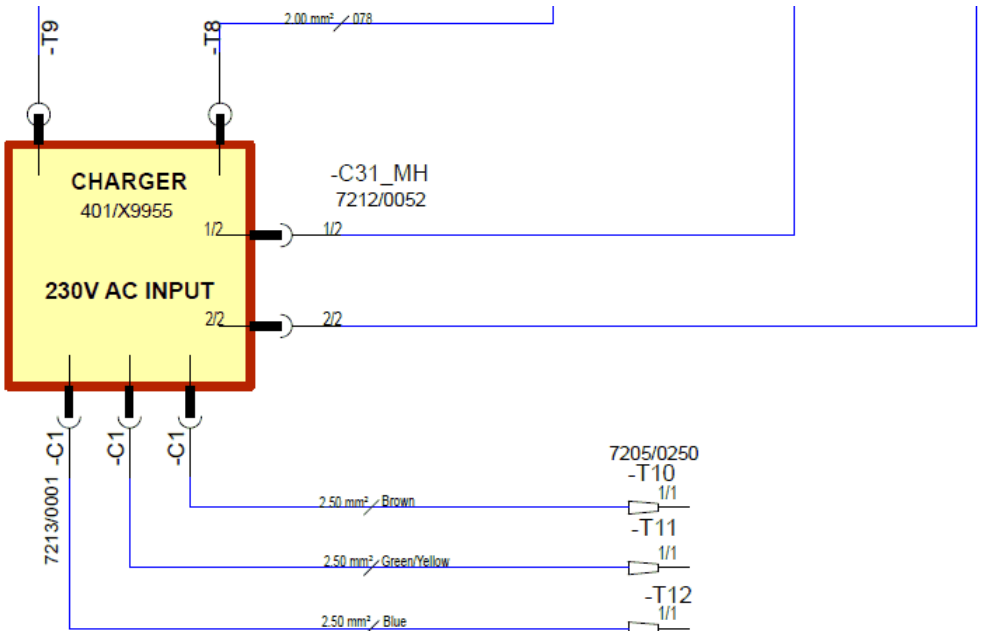
Components 192 > **Battery Charger**

Component :	Battery Charger
Function:	The battery charger is a device used to force the current through the battery to charge it.
Location:	The battery charger installed on battery compartment near to batteries
Location Image:	 A Screw (x4) B Charger
Signal:	
Wires & Connectors:	

Internal

Electrical

Schematic:



Testing:

Check Out voltage

Expected Values:

Related Fault Codes:

Blinking Frequency	Fault Cause	Solution
E01 bAt	The battery is not well connected, or the battery reversely connected or battery damaged.	1) Check battery connection is correct. 2) Check charger connection is correct. 3) Check each battery is good.
E02 AC	Abnormal AC power input (Voltage)	1) Check AC input cord is connected between charger and AC outlet. 2) Make sure AC plug is tightly secured into the AC outlet.
E03 Hot	Charger High Temperature Protection	The charger will shut down and go into protection mode. Please place the charger into an area
E04 bAt	Battery High Temperature Protection	1) Charger will reduce current even stop charging to prevent the battery from overheating when battery temperature exceeds the preset value. 2) When the battery temperature drops, the charger will restart automatically.
E05 Err	Interl error in product	Return to the factory for repairing
E06 bAt	Battery Voltage is too high	Check and assure that the correct output battery voltage is connected

6.14 Battery

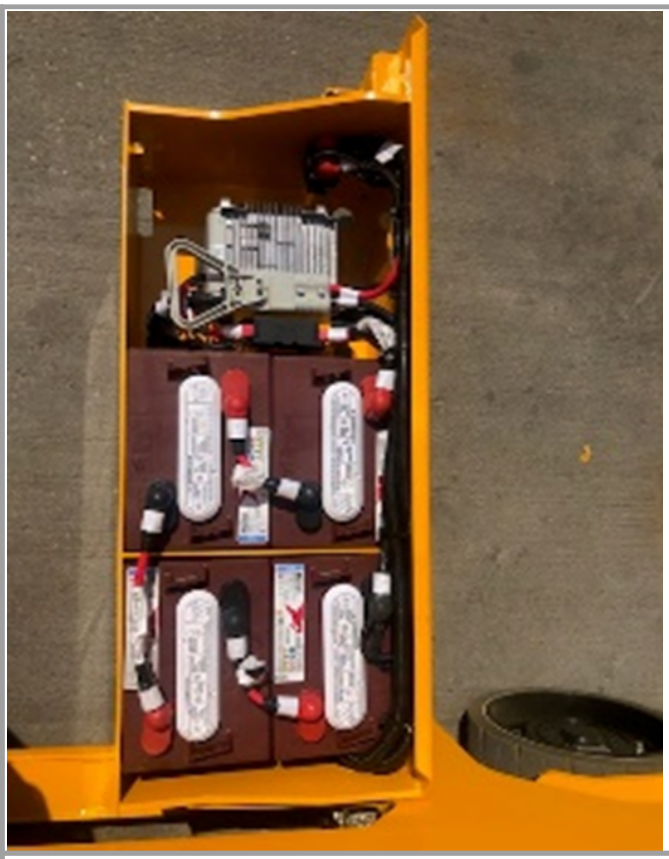
	Battery

Components 192 > **Battery**

Component :	**Battery**
Function:	The 24v battery retains charge, powering all components, e.g Traction Motor, DC Motor, Battery Charger. All 4 Trozen batteries are installed on battery door compartment. (Refer complete details of battery in attached document
Location:	The 24V battery pack is installed on battery door compartment comprising four separate 6V batteries connected in series to give out 24V.

Location

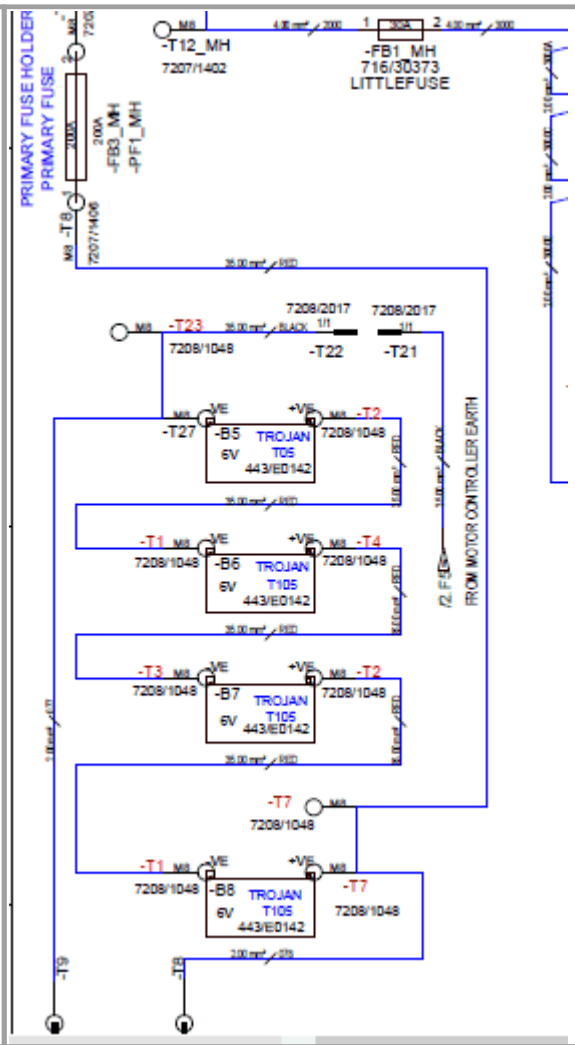
Image:



Signal:

Description	Data
Battery	
Make	Trojan Battery Company
Model	T-105
Quantity	4
Voltage	6V each
Operating temperature	-20–45°C (-4.0–112.9°F)[1]
Capacity Rating[4]	5h - 185 Ah
	10h - 207 Ah
	20h - 225 Ah
	100h - 250 Ah
Weight[5]	28kg
Battery Charge Voltage[2, 3]	
Bulk Charge	7.4V
Float Charge	6.7V
Equalize Charge	8.1V

Wires & Connectors:

Internal **Electrical** **Schematic:**	
Testing:	Check the Battery with Battery Tester and do as per testing report.
Expected **Values:**	

Related Fault Codes:	

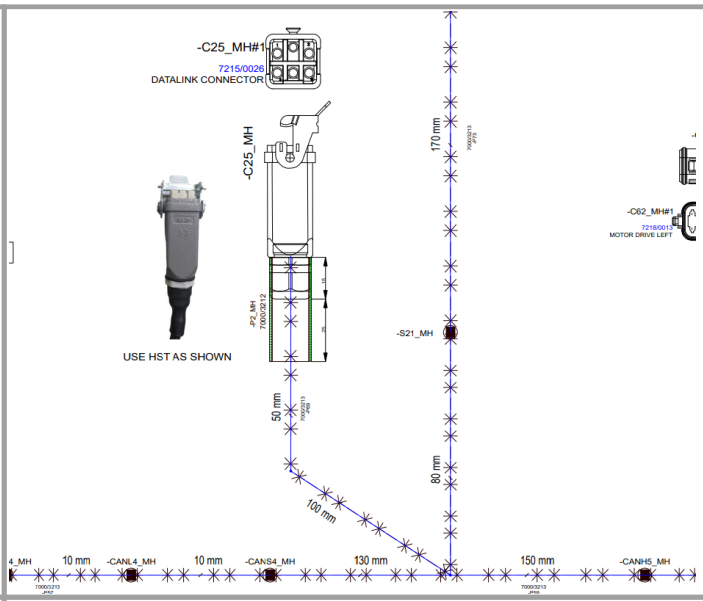
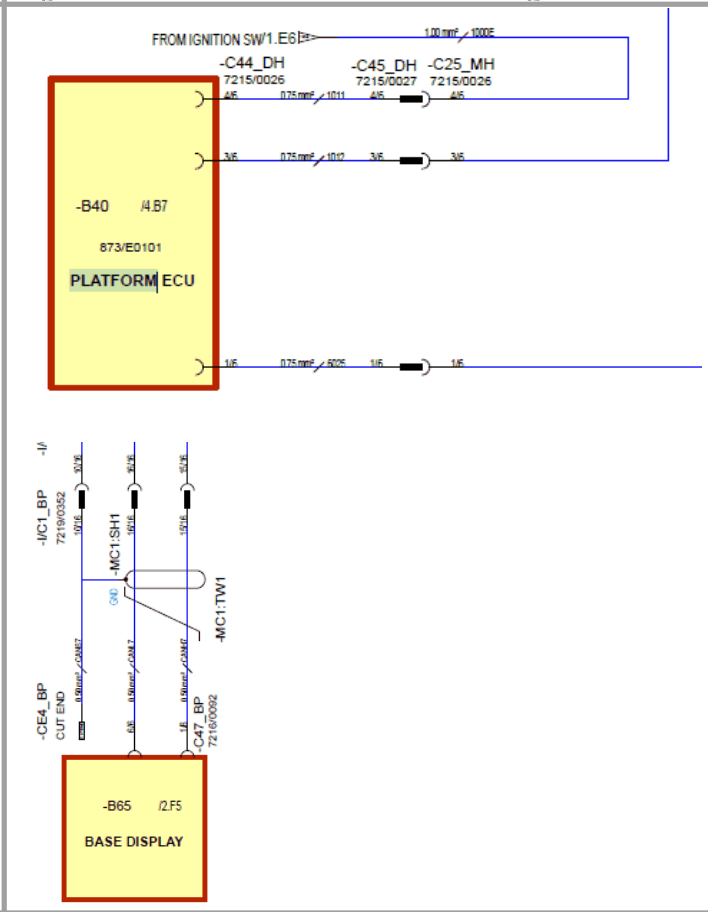
6.15 Display Function

	Display Function

Components 192 > **Display Function**

Component :	**Display Function**
Function:	The Display shows the operator key information relating to the machine, including speed, battery %, warning lamps, fault codes etc. The display also has a menu function operated by the 4way keypad and controls the machine back lighting.
Location:	Display is mounting on Base control Panel and Platform Control Panel

Location **Image:**	 
Signal:	

Wires & Connectors:	
Internal Electrical Schematic:	
Testing:	Check Power supply on connector

Expected Values:	24 volt
Related Fault Codes:	

6.16 Angle Sensor

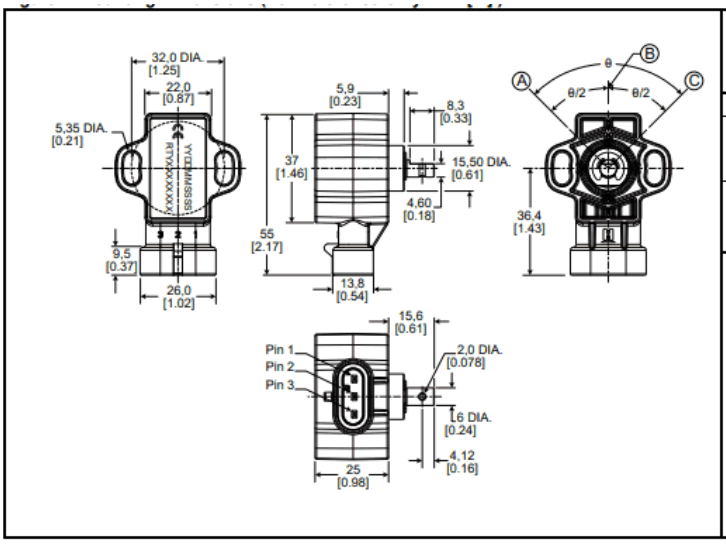
	Angle Sensor

Components 192 > **Angle Sensor**

Component :	**Angle Sensor**
Function:	Angle sensor is used to measure height of the scissor. The shaft of the sensor is coupled with scissor pin, as the scissor pack opens or closes the shaft gets rotated. For every degree rotation a particular digital value is generated. This value is fed to controller and thus.controller determines the position of the scissor.
Location:	On 15 & 19 feet height machine angle sensor is installed on chassis. Rest of the model have angle sensor mounted on the scissor pack

Location **Image:**	 

Signal:



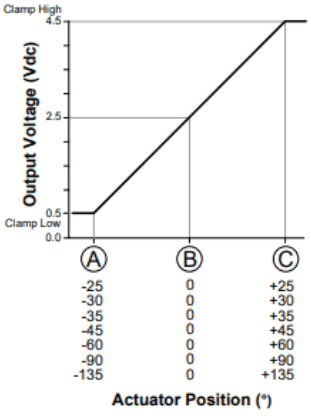
A = Left output: 0.5 Vdc
B = Zero reference
C = Right output: 4.5 Vc

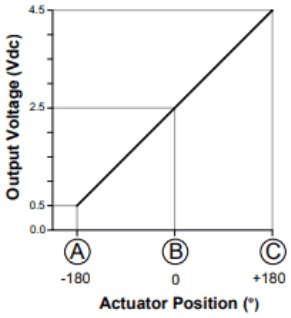
Pinout	
N (North American)	**(Eu**
Pin 1 = VCC	**Pin 1**
Pin 2 = GND	**Pin 2**
Pin 3 = Output	**Pin 3**

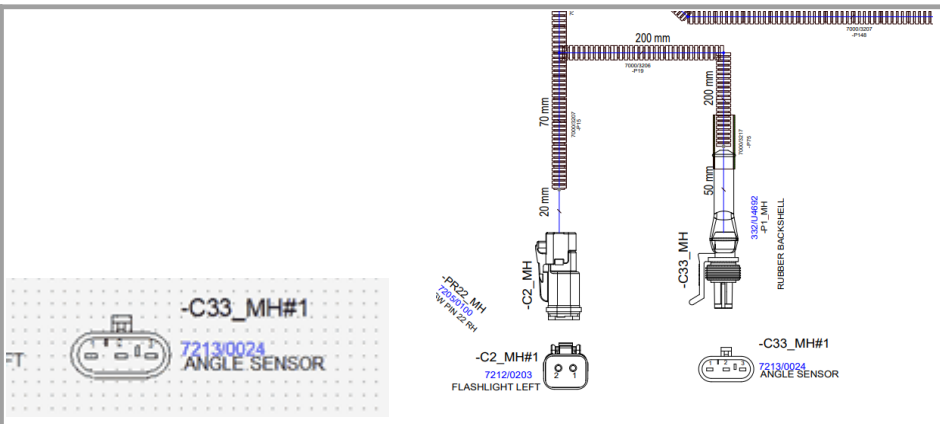
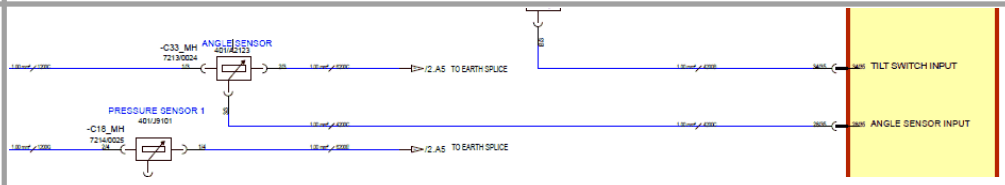
NOTICE

Ferrous or magnetic ma within a 75 mm [2.95 in] from sensor center may sensor performance.

Sensing Angle	Linearity Error[1]	Accuracy Error[2]
50° (±25°)	±1.0%	±1.6%
60° (±30°)		
70° (±35°)		
90° (±45°)		
120° (±60°)		
180° (±90°)		
270° (±135°)		
360° (±180°)		





Wires & Connectors:	
Internal Electrical Schematic:	
Testing:	
Expected Values:	

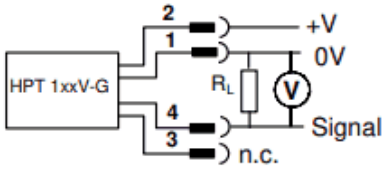
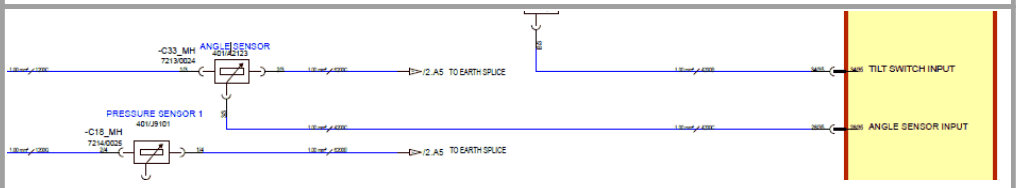
Related **Fault Codes:**	

6.17 Pothole Switches

	Pothole Switches

Components 192 > **Pothole Switches**

Component :	**Pothole Switches**
Function:	When plunger gets pressed the contact of the switch gets closed and the sigl goes to the controller. In case if the scissor is raised but pothole plates are not applied then the limit switch remains un-pressed in this condition controller triggers the pothole plate error.
Location:	Mounted on Chassis rear plate.

Location **Image:**	
Signal:	-PR22_MH 7205/0100 POTHOLE SW2 (RH) Pin connections: 
Wires & **Connectors:**	
Internal **Electrical**	

Schematic:	
Testing:	Check Continuity in Contact Block Terminal
Expected Values:	
Related Fault Codes:	

6.18 Pressure Sensor

	Pressure Sensor

Components 192 >Pressure Sensor

Component :	**Pressure Sensor**

Function:

The Pressure sensor is mounted on the lift valve.

When the weight is added in the platform pressure starts building and this pressure is continuously measured by the sensor and in turn sensor continuously transmits signal.

When the platform weight goes beyond 80% of the rated load of the machine an audible warning message is given by controller controller.

Technical Data

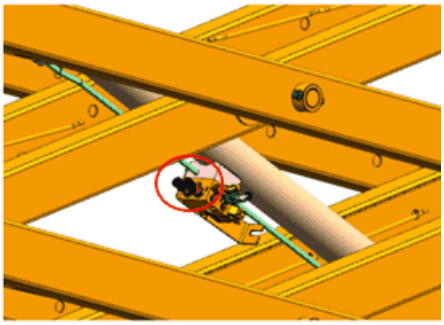
Input data	
Measuring range	250 bar
Overload pressure	800 bar
Burst pressure	2000 bar
Mechanical port	G¼ A ISO 1179-2 (DIN 3852) with snubber 0.5mm
Torque rate, recommended	20 Nm
Parts in contact with media	Stainless steel Seal: HNBR
Output data	
Output signal	0.5 .. 4.5 V
Accuracy at max. setting acc. DIN16086	<= ±0.25 % FS typ. <= ±0.5 % FS max.
Temperature compensation Zero point	<= ±0.015 % FS / °C max.
Temperature compensation Span	<= ±0.015 % FS / °C max.
Repeatability	<= ±0.1 %FS
Long term drift	<= ± 0.3 % FS typ. / year *
Rise time	< 1 ms
Environmental conditions	
Operating temperature range	-25 .. +85°C
Ambient temperature range	-40 .. +100°C
Storage temperature range	-40 .. +100°C
Medium temperature range	-40 .. +125°C
CE - mark / EMC	EN 61000-6-1 / -2 / -3 / -4
E13 - mark	E13*10R05/01*14856*00
Vibration resistance acc. IEC 68-2-6 at 10 ..500H	<= 25 g (196,2 m/s²)
Shock resistance acc. DIN EN 60068-2-27	500 g / 1 ms / half sine
Protection type acc. IEC 60529	IP 69K (with appropriate mating connector)
Additional data	
Supply voltage	8 .. 36 VDC
Electrical connector	Deutsch DT 04, 4 pole
Reverse polarity protection of the supply voltage, Overvoltage, overdrive protection, Load short-circuit resistance	Standard
Life time	>10 Mio. load cycles, 0...100% FS

Location:

Mounted on the Lift Ram Valve block.

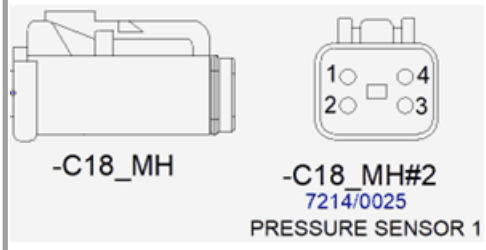
Location

Image:



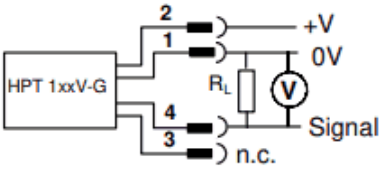
Signal:

PLUG PINS	FUNCTION
1	-COMMON
2	+SUPPLY
3	NOT USED
4	OUTPUT

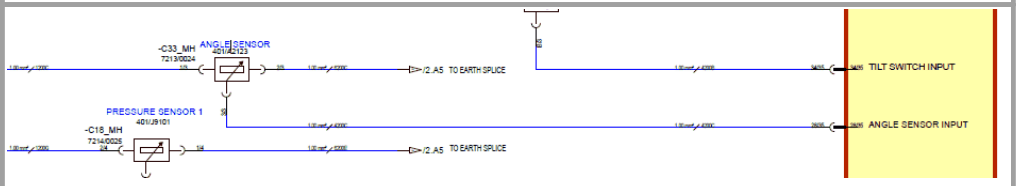


Wires & Connectors:

Pin connections:



Internal Electrical



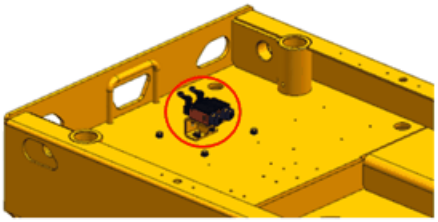
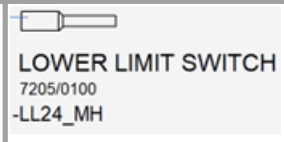
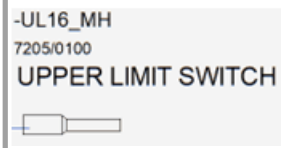
Schematic:	
Testing:	
Expected Values:	
Related Fault Codes:	

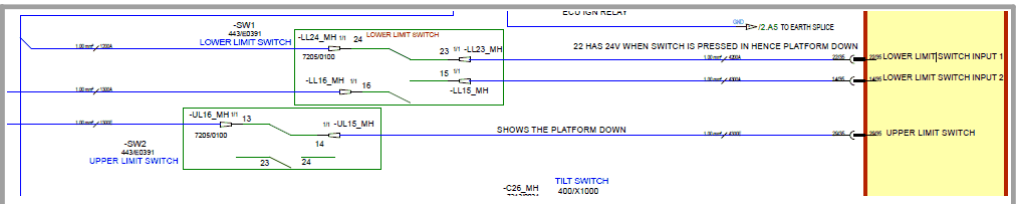
6.19 Down Limit Switch

	Down Limit Switch

Components 192 > **Down Limit Switch**

Component :	**Down Limit Switch**

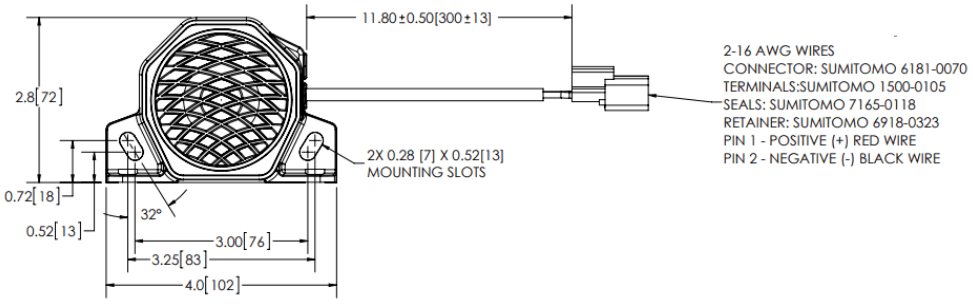
Function:	The down limit switch acts as a safety measure to control and limit the descent of the scissor lift platform, promoting safe operation and preventing unintended lowering beyond the designed level. When the scissor raises, down limit switch is un-pressed and sends signal to controller which makes controller identify that scissor is raised. So the controller activates all the function safety features like Pothole, Alarm, etc. When the machine scissor reaches extreme height, Up limit switch is pressed and sends signal to controller and thus controller identifies that extreme height has been reached and stops the motor
Location :	Mounted on Chassis front plate.
Location **Image:**	 
Signal:	
Wires & **Connectors:**	 

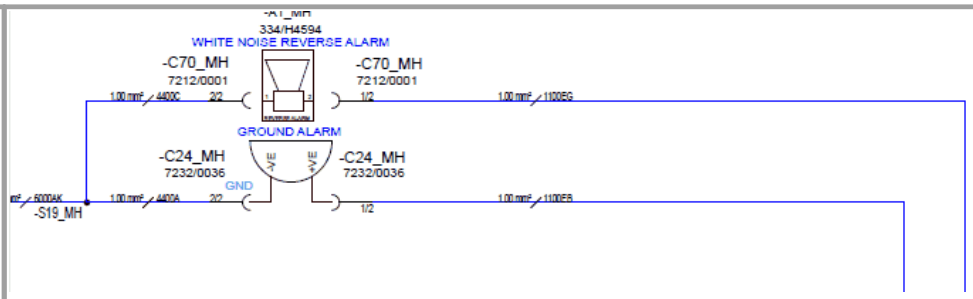
Internal **Electrical** **Schematic:**	
Testing:	
Expected **Values:**	
Related **Fault Codes:**	

6.20 Buzzer

	Buzzer

Components 192 > **Buzzer**

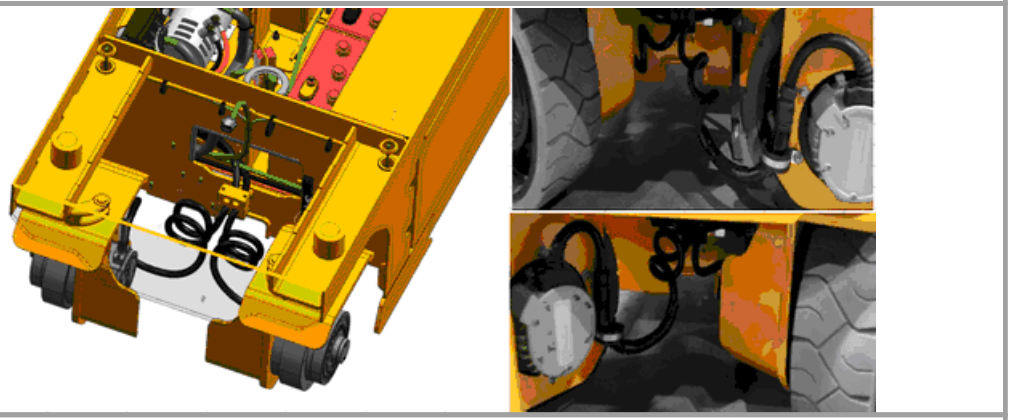
Component :	**Buzzer**
Function:	The function of a buzzer on a machine is to produce an audible warning or alarm sound in order to alert the operator or those nearby of a potential hazard or issue
Location:	It is fitted on hydraulic tank door compartment
Location Image:	
Signal:	Number Wire Number 1 1100EG 2 4400C
Wires & Connectors:	

Internal **Electrical** **Schematic:**	
Testing:	Check Power Supply in connector terminal
Expected **Values:**	24 volt
Related **Fault Codes:**	

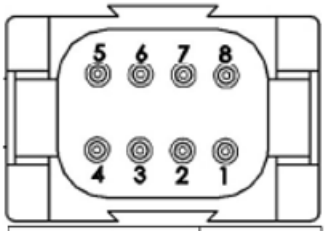
6.21 AC Drive Motor

	AC Drive Motor

Components 192 > **AC Drive Motor**

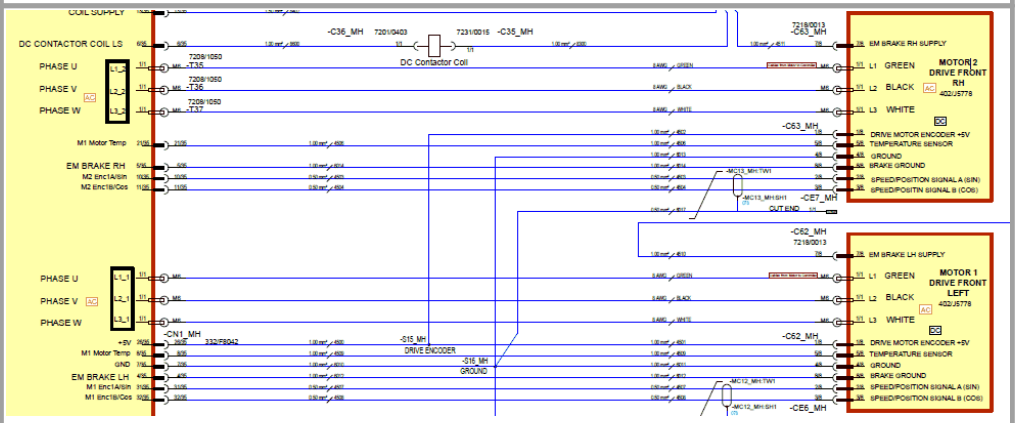
Component :	**AC Drive Motor**
Function:	The Traction Motor or AC motor generates the driving effort of the machine.
Location:	Front side of machine on wheel yoke
Location Image:	
Signal:	**ELECTRIC MOTOR DATA** **DESCRIPTION:** DANA TM4 IPM (120-40-AR03) [A] **NOMINAL BATTERY VOLTAGE:** 24V DC **MAXIMUM SPEED:** 5000 rpm **MAXIMUM TORQUE:** 177 in-lbs [20 Nm] @ 200 A RMS **THERMAL RATINGS:** S2-60': 46.0 in-lbs [5.2 N*m] @ 1800 rpm **INSULATION:** CLASS B **IP RATING:** IP65 PER IEC60529 **NOTE:** ADDITIONAL MOTOR PERFORMANCE CURVES AVAILABLE UPON REQUEST. **INPUT PARKING BRAKE** **DESCRIPTION:** SPRING APPLIED/ELECTRICALLY RELEASED DRY PARKING BRAKE **RELEASE VOLTAGE:** 24±10% V DC **MIN. STATIC TORQUE RATING:** 177 in-lbs [20 N*m] **NOMINAL COIL RESISTANCE:** 17-22 Ω **HOLDING VOLTAGE:** 12-18 V DC **GEARBOX RATIOS** 24 - 24.29:1 30 - 29.84:1 34 - 34.00:1* 39 - 39.31:1 45 - 44.80:1* 52 - 52.48:1 **NOTE:** RATIOS MARKED WITH "*" ARE PREFERRED. CONTACT DANA FOR AVAILABILITY. **GEARBOX OUTPUT TORQUE RATINGS** **CONTINUOUS:** 4,425 in-lbs / 369 ft-lbs / 500 N*m / 51 kg*m **INTERMITTENT:** 8,850 in-lbs / 738 ft-lbs / 1,000 N*m / 102 kg*m **GEARBOX ESTIMATED EFFICIENCY** 96% AT CONTINUOUS TORQUE RATING **LUBRICATION** FILL GEARBOX WITH Mobilgear 600 XP 68, OR DANA APPROVED ALTERNATIVE. OIL VOLUME 5 oz. [150 mL], OR HALF FULL

Wires & Connectors:



DESCRIPTION	PIN NUMBER
ENCODER +5v	1
SIGNAL A (SIN)	2
SIGNAL B (COS)	3
GROUND/SHIELD	4
TEMPERATURE +5V	5
NOT CONNECTED	6
BRAKE +24V	7
BRAKE GROUND	8

Internal Electrical Schematic:



Testing:

Expected Values:

Related Fault Codes:	

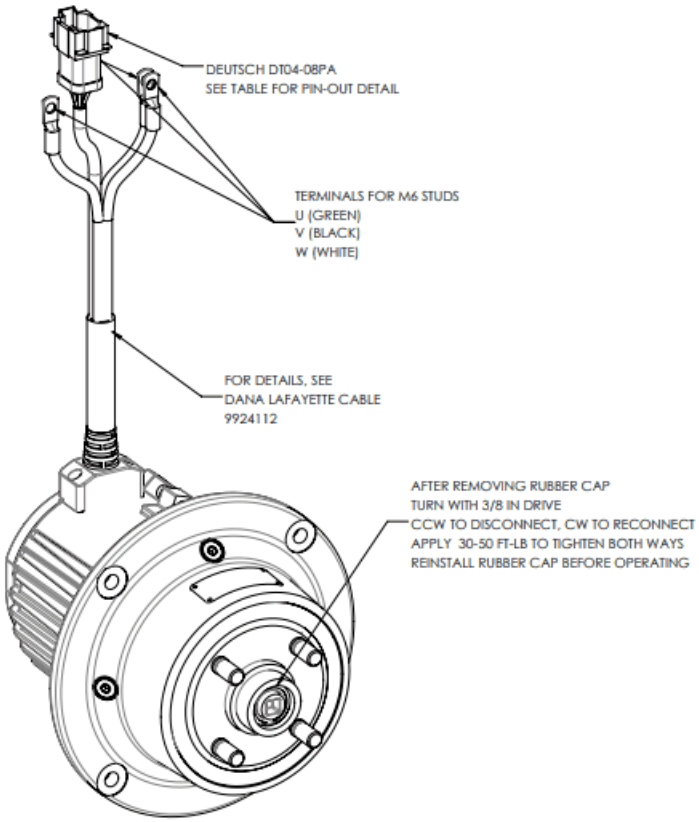
6.22 AC Drive Motor Temp Sensor

	AC Drive Motor Temp Sensor

Components 192 >AC Drive Motor Temp Sensor

Component :	**AC Drive Motor Temp Sensor**
Function:	**Temperature Sensor** - Temperature Sensors can monitor the temperature of the motor, helping to prevent overheating and potential damage. **Speed Sensor** - The Speed Sensors measure the rotation speed of the motor shaft, allowing for speed control and monitoring
Location:	This integral part of Drive Motors
Location Image:	

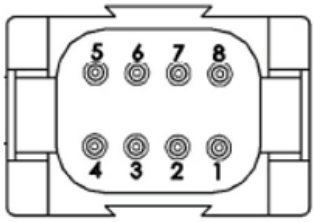
Signal:

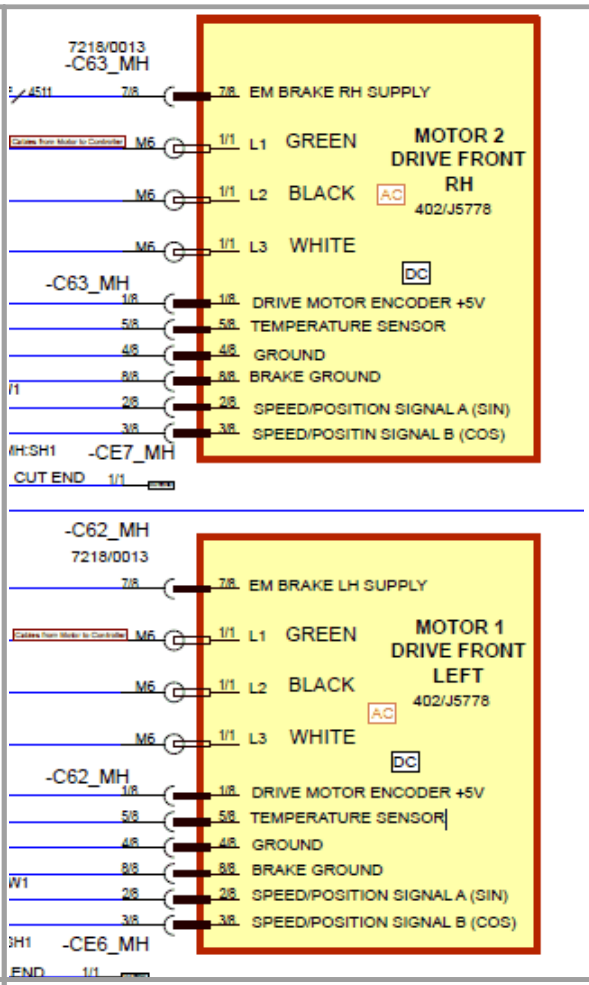


Wires &

Connectors:

CONNECTING INSTRUCTIONS FOR ENCODER, TEMP SENSOR, AND BRAKE		
DESCRIPTION	CONNECTOR PART NUMBER	PIN NUMBER
ENCODER +5V	DT04-08PA	1
SIGNAL A (SIN)		2
SIGNAL B (COS)		3
GROUND		4
SHIELD		
TEMPERATURE + 5V		5
NOT CONNECTED		6
BRAKE +24V		7
BRAKE GROUND		8



Internal **Electrical** **Schematic:**	
Testing:	
Expected **Values:**	

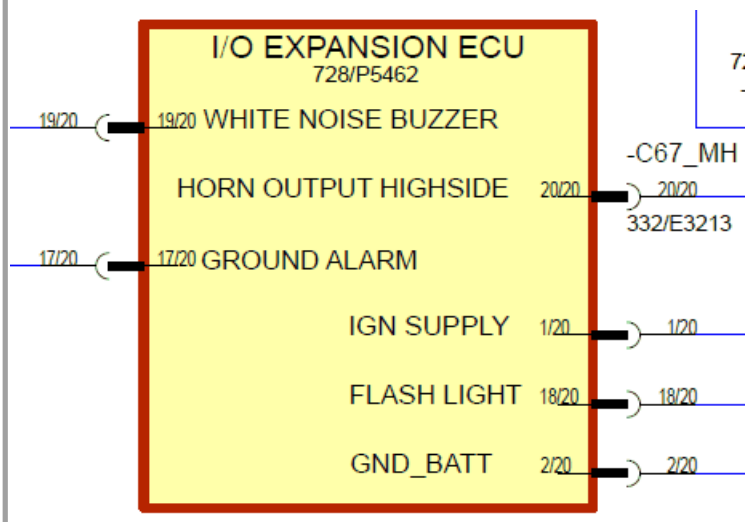
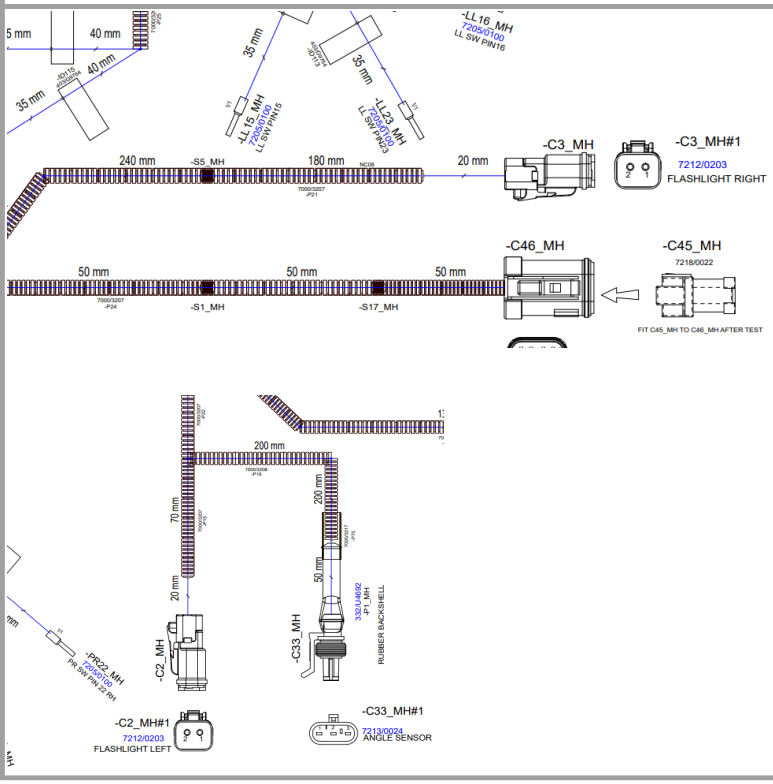
Related Fault Codes:	

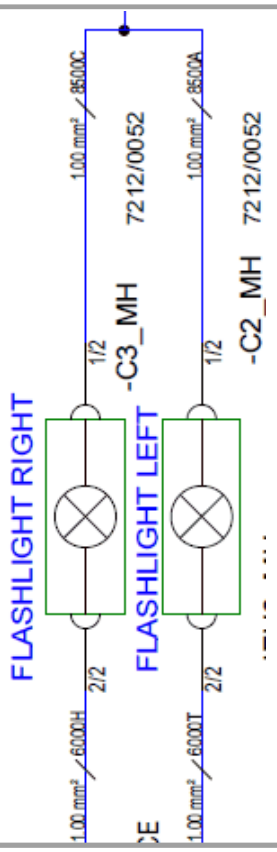
6.23 Flash Light

	Flash Light

Components 192 > **Flash Light**

Component :	**Flash Light**
Function:	Flashing lights are driven by an IO expansion module on basis of command from motor controller- If the machine is powered on AND Idle Flashing lights is disabled AND NO active fault. Then The flashing lights shall flash at 1 Hz (1/2s on and 1/2s off and repeat) only when machine is in any motion (drive/steer/raise/lower) Else if machine is powered on AND Idle Flashing lights is enabled AND NO active fault Then The flashing lights shall flash at 1 Hz (1/2s on and 1/2s off and repeat) all the times Note- In case of fault the Flashing lights shall flash at 2 Hz (1/4s on and 1/4s off)
Location:	Two Flash light are fitted on both side of chassis L plate

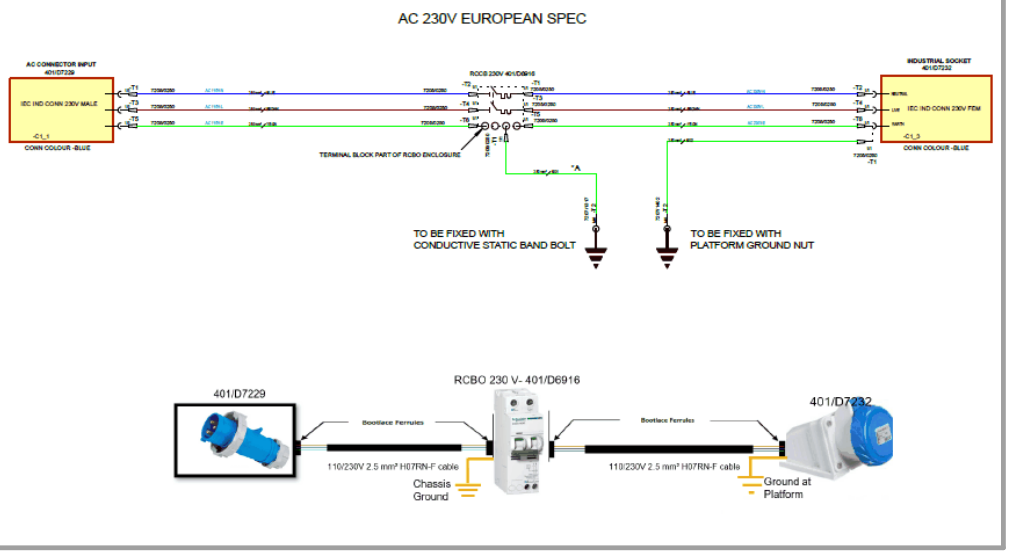
Location **Image:**	
Signal:	
Wires & **Connectors:**	

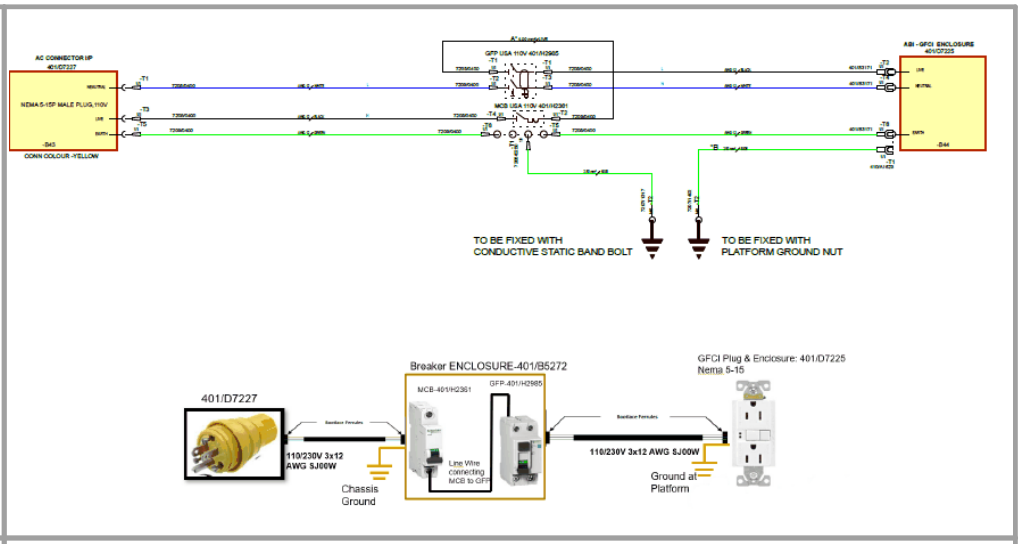
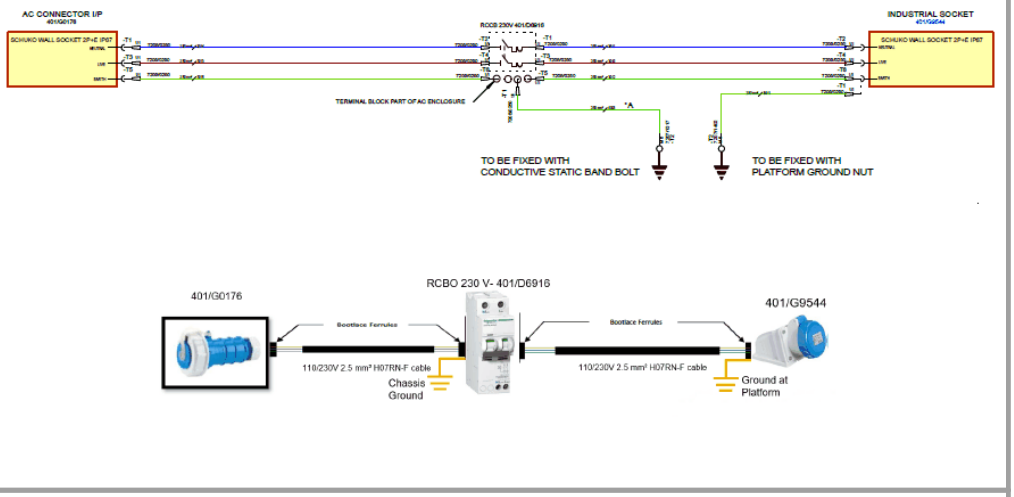
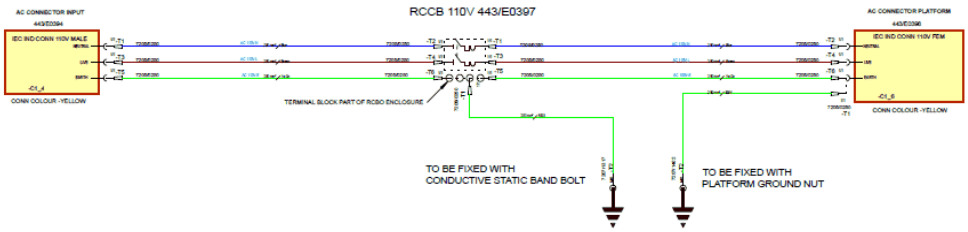
Internal **Electrical** **Schematic:**	
Testing:	Check Power supply in connector terminals
Expected Values:	24 volt
Related Fault Codes:	

6.24 AC Connector

	AC Connector

Components 192 > AC Connector

Component :	AC Connector
Function:	AC connected on machine are fitted on External power supply to platform
AC Connector EUROPEAN SPEC	

AC Connector US Spec	
AC Connector -SCHUKO	
AC Connector UK Spec	

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Machine Calibration

7 Machine Calibration

	Machine Calibration

Machine Calibration

7.1 Display Function

Display Function

7.1.1 Calibration Sequence

	Calibration Sequence

Display Function 264 **Calibration Sequence**

Sequence	Check	Description
1	Angle sensor mounting position	Check the angle sensor. Check if the angle sensor bracket is mounted properly with angle sensor position at 45° angle (fully tilted in bracket slot).
2	Tilt sensor calibration	As per procedure given below.
2.1	Lateral tilt test	Drive machine on 1.6° ramp
		such that machine is tilted laterally. LL error should occur.

2.2	Longitudinal tilt test	Drive machine on 3° ramp in forward and reverse. LL error should occur.
3	Descent delay height	Check the first descent limit automatically stops the platform descent from height. If the height is not in correct range, adjust it by varying the descent height parameter inside PCU menu height setting option. The value is shown as percentage of angle sensor. Reducing this value will reduce the descent height and vice-verse.
4	Pot hole protection system	Check the pot hole protection system is deployed as the platform is raised both side.
4.1	Pot hole protection system	Pot hole switch check securely mounted.
5	Lower limit switch	Block the pothole guard and raise the platform from base and check the height at which DTC56 comes. This is the initial or preset height of down limit switch. Adjust the down limit switch using down limit switch screw and re-check the preset height again. Turning the down limit switch screw in clockwise direction from top will increase the height and vice verse.
5.1	Lower limit switch	Setting of lower limit switch in ECU (Electronic Control Unit) as per procedure given below.
6	Upper limit switch	Check the higher limit switch. Position it such that the motor should stop on maximum limit height.
6.1	Upper limit switch check	As per Model specification with +/- 1 inch.
7	No load calibration	As per procedure given below.
7.1	Structural check - No load	Raise and lower the platform to full working height 5 cycles with no load in the platform. Visual check for no evidence of structural damage /weakness in the scissor pack and hydraulic cylinder.
8	Full load calibration	As per SOP with 102% Rated Load.
8.1	Overload alarm check	Overload alarm should not activate at 95% load, but must activate at 105% load.
8.2	Structural check - Full Load	Raise and lower the platform to full working height 5 cycles with full rated load in the platform. Visual check for no evidence of structural damage /weakness in the scissor pack and hydraulic cylinder.
9	Ascent / Descent speeds	On elevated with unladen descent speed unladen Orifice / Restrict or change.
10	Travel speed	Check and record maximum travel speed in Tortoise, Hare and elevated condition (eg. for S1932E above 2.1m it should be less than 0.8km/h (0.5 mph) [10m distance in not less than 45 -0/+5s].
10.1	Stopping distance test	The brake function must operate smoothly, free of hesitation, jerking and unusual noise and should come to complete stop on flat ground. Braking distance should not be more than 1m (testing to be done on hare mode).
11	Gradeability test	Check the machine can drive on 25% ramp.
11.1	Parking brake test	Check the parking brake holds the machine on 25% ramp.
12	Manual descent lever	Check the manual descent level is fully functional by lowering the machine with manual descent lever. Before operation, ensure the machine and surrounding area is safe to operate.
13	Hydraulic leak	Check for any hydraulic oil leaks.

14	Clear fault history	If necessary, delete all fault history.

7.1.2 Base Display

Base Display

Display Function 264 **Base Display**

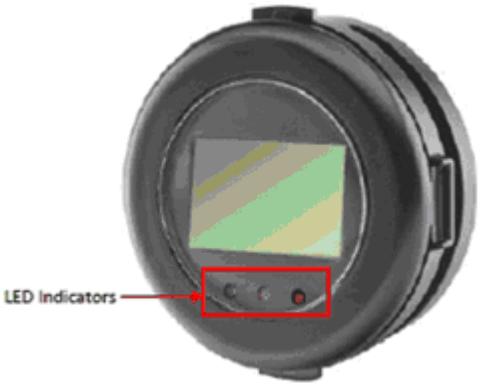
Functions - The Chassis Display shows the operator key information related to:

1. Machine Start UP- During start-up the Base pane display shall show the software version for the Main ECU/motor controller for 3 sec.

2. Machine Operating hours- By default this will display machine operating hours and this will be determined to one decimal place Machine operating hours shall be incremented either when traction motors are active or when DC/pump motor is active

3. Error Code- All active error code shall be displayed on the base display on a 5 second cycle with the default screen.

4. Machine out of Limit- In case machine is operated outside of defined limits relevant warning will be displayed (OL,LL etc.) This shall be on a 3 second cycle



Chassis LED- Following are 3 separate indicator on chassis display

1. Red LED shall be energized (1 sec on/ 1 sec off) if the overload alarm is activated.

2. Amber LED shall be energized, for any other warning / fault

3. Green LED shall be energized when power is on at the chassis controller

7.1.3 Platform Control

Platform Control

Display Function 264 **Platform Control**

Functions - The Platform Display shows the operator key i on related to:

1. Machine Start UP- During start-up the platform display shall show the software version for the platform ECU for 3 sec

2.Control Position- This will show show ‘CH’ (or equivalent icon) to identify the chassis control position is selected when key switch position = chassis

3. State of Charge- This will show percentage of battery state of charge

4. Error Code- All active error code shall be displayed on platform display. In case of multiple errors, error codes shall be cycled.

5. Machine out of Limit- In case machine is operated outside of defined limits relevant warning will be displayed (OL, LL etc.)

6. Load Percentage-This will display platform load (gauge & %) during normal operation. In case load sensing system fail, this will stop showing load %

PCU Setting & Configuration	
Adjust Top Speed	There shall be a method to enter into top speed adjustment menu by operating specific buttons on PCU There shall be a provision to 'Save' or 'Discard' the changed configurations by operating specific buttons
	There shall be 5 speeds user can adjust 1. top speed of drive in hare mode (0~100%), 2. top speed of drive in tortoise mode (0~100%) 3. top speed of drive elevated (0~25%), of maximum theoretical speed and should never exceed 0.8kph 4. top speed of lift (0~100%), 5. steering speed (0~100%)
Adjust Machine Options	There shall be a method to enter into top speed adjustment menu by operating specific buttons on PCU There shall be a provision to 'Save' or 'Discard' the changed configurations by operating specific buttons There shall be 5 speeds user can adjust 1.top speed of drive in hare mode (0~100%), 2.top speed of drive in tortoise mode (0~100%), 3.top speed of drive elevated (0~25%), of maximum theoretical speed and should never exceed 0.8kph 4.top speed of lift (0~100%), 5.steering speed (0~100%)
	Options 1 and 4 can be disabled for one power cycle only. They shall be enabled automatically after second machine restart. Option 2 - In European version, descent delay can only be disabled for one power cycle. In American version descent delay can be enabled/disabled permanently (until next setting change) Option 3 and 5 can be enabled/disabled permanently (until next setting change) For option 6 above, when user enters this menu brakes shall release electrically. When this mode is selected, there shall be an audible warning and the brake coils shall be energised, allowing the wheels to rotate freely. When the machine is restarted, this mode shall be switched off
Adjust Battery Drain Delay	There shall be a method to enter into battery drain adjustment menu by operating specific buttons on PCU There shall be a provision to 'Save' or 'Discard' the changed configurations by operating specific buttons There shall be a delay user can adjust: 1.battery drain alarm delay (0~60min)
Perform Calibration	There shall be a method to enter into calibration menu by operating specific buttons on PCU &menu shall have limited access by passcode
	There shall be 3 calibration user can select to perform-
	1. No Load Calibration
	2. Full Load Calibration
	3. Tilt Sensor Calibration (reserved for future)
	After Calibration, the display shall show one of the results as below for the respective calibration selected -
	1- No load/Full load/Tilt Sensor calibration complete OR
	2- Pressure Sensor Failure OR
	3- Angle Sensor Failure OR
	4- Tilt OR
	5- Calibration data has changed
	There shall be a provision to return from calibration menu by operating specific buttons
Height Settings	There shall be a method to enter into machine mode menu by operating specific buttons on PCU
	There shall be 2 modes -
	1. Descent delay height/angle
	2. Down limit height
	User shall raise platform to desired height for descent delay by using toggle switch on chassis and then user operate in menu to save the corresponding angle
	To calibrate down limit height, ECU saves the rotary encoder/angle sensor value when the Down limit switch contacts change the voltage
	There shall be a provision to 'Save' and 'Return' to save the configurations by operating specific buttons
Fault History	There shall be a method to enter into fault history menu by operating specific buttons on PCU There shall be provision to view and store last 10 pieces of logs Each log shall be composed with fault code, fault name and trigger time There shall be a provision to clear the fault history by operating specific buttons

7.1.4 Battery Charger Display

Battery Charger Display

Display Function 264 **Battery Charger Display**

This section contains a summary of the errors that can occur when charging the battery

Blinking Frequency	Fault Cause	Solution
E01 bAt	The battery is not well connected, or the battery reversely connected or battery damaged.	1) Check battery connection is correct. 2) Check charger connection is correct. 3) Check each battery is good.
E02 AC	Abnormal AC power input (Voltage)	1) Check AC input cord is connected between charger and AC outlet. 2) Make sure AC plug is tightly secured into the AC outlet.
E03 Hot	Charger High Temperature Protection	The charger will shut down and go into protection mode. Please place the charger into an area
E04 bAt	Battery High Temperature Protection	1) Charger will reduce current even stop charging to prevent the battery from overheating when battery temperature exceeds the preset value. 2) When the battery temperature drops, the charger will restart automatically.
E05 Err	Interl error in product	Return to the factory for repairing
E06 bAt	Battery Voltage is too high	Check and assure that the correct output battery voltage is connected

Specific Gravity Test

1. Make the machine safe.
2. Open the battery compartment door.
3. Disconnect the battery quick disconnect handle.
4. Remove the battery vent caps.
5. Do not add water at this time.
6. Fill and drain the hydrometer 2 to 4 times before you pull out a sample.
7. Make sure that there is enough sample electrolyte in the hydrometer to completely support the float.
8. Make a note of the reading on the Hydrometer. Return the electrolyte back to the cell.
9. Do the step 6 to step 8 for each cell of the battery.
10. Install the battery vent caps. Wipe off any spilled electrolyte.
11. Correct the readings to ambient temperature. Refer to Table.
12. Check the state of charge with reference to the table

13. Make sure that the specific gravity reading is as specified. 1.277 +/- 0.007.

14. If any specific gravity reading is low, do the following

- Check and record voltage levels.
- Put the battery on a complete charge
- Take specific gravity readings again
- If any specific gravity reading is low, do the battery equalizing procedure

Open Circuit Voltage Test

For accurate voltage readings, batteries must remain idle (no charging, no discharging) for at least 6h, preferably 24h.

1. Disconnect all loads from the batteries.
2. Measure the voltage with a DC voltmeter.
3. Check the state of charge.
4. Charge the battery if it reads 0% to 70% charged.

State of Charge at 20 degrees C

Percentage of Charge	Specific Gravity (Corrected)*(1, 2)*	Open Circuit Voltage	
		6V battery	12V battery
100	1.277	6.37V	12.73V
90	1.258	6.31V	12.62V
80	1.238	6.25V	12.5V
70	1.217	6.19V	12.37V
60	1.195	6.12V	12.27V
50	1.172	6.02V	12.1V
40	1.148	5.98V	11.89V
30	1.124	5.91V	11.81V
20	1.098	5.83V	11.66V
10	1.073	5.75V	11.51V

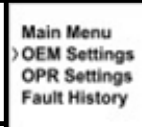
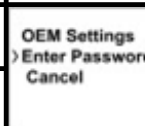
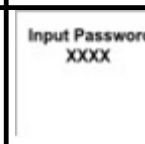
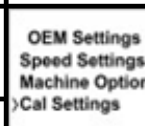
(1) Add 0.004 to readings for every 5.6°C (42.1 °F) above charge temperature.

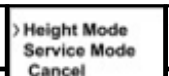
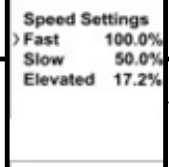
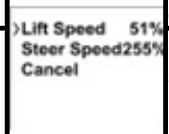
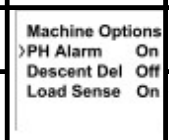
(2) Subtract 0.004 from readings for every 5.6°C (42.1 °F) below charge temperature.

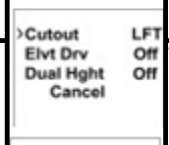
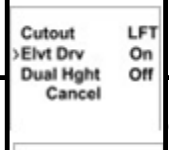
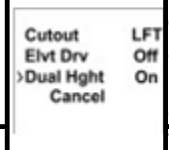
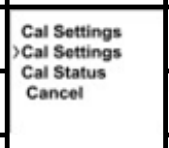
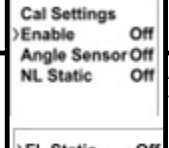
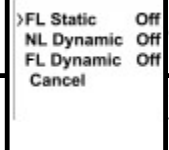
7.1.5 Calibration Platform Control

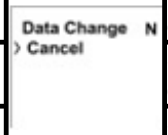
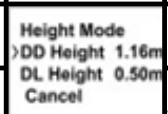
Calibration Platform Control

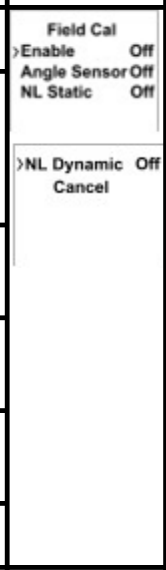
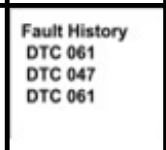
Display Function 264 **Calibration Platform Control**

Screen	Command	Graphic	Description
Main menu			Displays when the diagnostic menu access is successful. Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.
	OEM Settings		Select to access the diagnostic menu settings.
	OPR Settings		Select to access the operator menu settings.
	Fault History		Select to display the list of errors generated.
OEM settings			
	Enter Password:		Select to enter the passcode to enter the diagnostic menu. Contact JCB dealer for passcode.
	Cancel		Select to exit the main menu.
Input password			Use the safety trigger/enable switch to select digit, turn left/turn right switch to increase/decrease value, and drive mode button for enter.
OEM settings			Displays when the correct passcode is entered. Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.
	Speed Settings		Select to enter the speed settings menu.
	Machine Options		Select to enter the machine options menu.

	Cal Settings		Select to enter the calibration settings menu.
	Height Mode		Select to enter the height mode menu.
	Service Mode		Select to enter the service mode.
	Cancel		Select to exit the OEM settings main menu.
Speed settings			Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.
	Fast		Select to set the maximum machine travel speed in the fast speed mode. Use turn left/turn right switch to increase/decrease value, and drive mode button for enter.
	Slow		Select to set the maximum machine travel speed in slow speed mode. Use turn left/turn right switch to increase/decrease value, and drive mode button for enter.
	Elevated		Select to set the maximum machine travel speed when platform is elevated. Use turn left/turn right switch to increase/decrease value, and drive mode button for enter.
	Lift Speed		Select to set the maximum elevation/descent speed of platform. Use turn left/turn right switch to increase/decrease value, and drive mode button for enter.
	Steer Speed		Select to set the maximum steer speed. Use turn left/turn right switch to increase/decrease value, and drive mode button for enter.
	Cancel		Select to exit the speed settings menu.
Machine options			Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.
	PH Alarm		Select to set the pothole alarm ON/OFF. Use turn left/turn right switch to change value, and drive mode button for enter.
	Descent delay		Select to set the platform descent delay ON/OFF. Use turn left/turn right switch to change value, and drive mode button for enter.
	Load Sense		Select to set the load sensing ON/OFF. Use turn left/turn right switch to change value, and drive mode button for enter.
	Miscellaneous		Select to enter the miscellaneous settings menu.

Miscellaneous			Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.
	Joystick Direction(2)		The menu has 2 options, NOR = Normal and INV = Inverted. The joystick direction for lift/lower operation will be inverted if this is changed to INV.
	Foot Switch(2)		This is only applicable to machines that have a foot pedal installed. To turn this ON, the foot pedal needs to be pressed along with the joystick to drive or lift the machine.
	Overrise Prevention(2)		This is only applicable to machines fitted with an overrise prevention system.
	Cutout(2)	 	If overrise prevention is activated and LFT is appearing on the display, the machine lift will be disabled until the overrise condition is cleared. If overrise prevention is activated and ALL is appearing on the display, the machine lift and drive will be disabled until the overrise condition is cleared.
	Elevated Drive(2)		This option is only available for machines equipped with an elevated drive prevention switch. If this option is activated, the machine will not operate if the platform is raised more than 80mm.
	Dual Height(3)		This option is only available for machines fitted with the dual height feature.
	Cancel(2, 3)		Select to exit the miscellaneous settings menu.
Calibration settings			Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.
	Cal Settings		Select to enter the calibration settings menu.
	Cal Status		Select to enter the calibration status menu.
	Cancel		Select to exit to Cal settings menu.
Calibration settings			Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.
	Enable		After changing the value from the selected calibration, go to enable option and select to set the enable ON/OFF. Use turn left/turn right switch to change the value, and drive mode button for enter to start the calibration process.
	Angle Sensor		Select to set the angle sensor calibration ON/OFF. Use turn left/ turn right switch to change value, and drive mode button for enter.

	NL Static		Select to set the no load static calibration ON/OFF. Use turn left/ turn right switch to change value, and drive mode button for enter.
	FL Static		Select to set the full load static calibration ON/OFF. Use turn left/turn right switch to change value, and drive mode button for enter.
	NL Dynamic		Select to set the no load dynamic calibration ON/OFF. Use turn left/ turn right switch to change value, and drive mode button for enter.
	FL Dynamic		Select to set the full load dynamic calibration ON/OFF. Use turn left/ turn right switch to change value, and drive mode button for enter.
	Cancel		Select to exit the calibration settings main menu.
Calibration status			Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.
	AS Complete		Shows the completion status of the angle sensor calibration.
	NL static		Shows the completion status of the no load static calibration.
	FL static		Shows the completion status of the full load static calibration.
	NL Dynamic		Shows the completion status of the no load dynamic calibration.
	FL Dynamic		Shows the completion status of the full load dynamic calibration.
	PS Failure		Shows the failure status of the pressure sensor.
	AS Failure		Shows the failure status of the angle sensor.
	Data Change		Select to accept the updated calibration data. Use turn left/turn right switch to change value, and drive mode button for enter.
	Cancel		Select to exit the calibration status main menu.
Height mode			Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.
	DD height		Select to set the DD height. Use turn left/turn right switch to increase/decrease value, and drive mode button for enter.
	DL height		Select to set the DL height. Use turn left/turn right switch to increase/decrease value, and drive mode button for enter.
Service mode	Enable		Select to enable the service mode ON/OFF. Use turn left/turn right switch to increase/decrease value, and drive mode button for enter.

OPR Settings			Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.
	Battery Alarm		Select to set the low battery alarm ON/OFF. Use turn left/turn right switch to change the value, and drive mode button for enter.
	Battery Delay		Select to set the battery alarm delay. Use turn left/turn right switch to increase/decrease value, and drive mode button for enter.
	Brake Release		Select to set the brake release ON/OFF. Use turn left/turn right switch to change the value, and drive mode button for enter.
	Idle Light		Select to set the idle lights ON/OFF. Use turn left/turn right switch to change the value, and drive mode button for enter.
	Motion Alarm		Select to set the motion alarm ON/OFF. Use turn left/turn right switch to change the value, and drive mode button for enter.
	Field Cal(1)		Select to enter the field calibration menu.
	Cancel		Select to exit the OPR settings menu.
Field calibration			Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.
	Enable		After changing the value from the selected calibration, go to enable option and select to set the enable ON/OFF. Use turn left/turn right switch to change the value, and drive mode button for enter to start the calibration process.
	Angle Sensor		Select to set the angle sensor calibration ON/OFF. Use turn left/ turn right switch to change value, and drive mode button for enter.
	NL Static		Select to set the no load static calibration ON/OFF. Use turn left/ turn right switch to change value, and drive mode button for enter.
	NL Dynamic		Select to set the no load dynamic calibration ON/OFF. Use turn left/ turn right switch to change value, and drive mode button for enter.
	Cancel		Select to exit the field calibration menu.
Fault history			Displays the list of errors generated.

(1) Joystick firmware must be updated to version 00.00.26 or above to perform the field calibration.

(2) Applicable for South-East Asia.

(3) Applicable for North America and Canada.

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Diagnostic Fault Table

8 Diagnostic Fault Table

	Diagnostic Fault Table

Diagnostic Fault Table

8.1 General Sensor fault Table

	General Sensor fault Table

General Sensor fault Table

Important: Use the multi-meter on the harness connector pins. DO NOT use the meter on the ECU pins		
Step	Trouble	Action
1	Sensor supply voltage fault	Disconnect the sensor, check sensor voltage supply at the harness connector (see relevant sensor help file for pin numbers or refer to engine electrical schematic). If voltage supply is faulty, disconnect all other sensors in turn until the voltage supply returns. If sensor supply voltage is OK, proceed to Step 2
2	Sensor connection faulty	Check condition of sensor to harness connection, make sure the seals are in place. Check for signs of corrosion or contamination. Repair/replace as necessary. If no fault is found, proceed to Step 3.
3	Sensor failure	Check the sensor resistance (see relevant help file for values). If sensor is out of specification, replace. If no fault is found, proceed to Step 4
4	Wiring fault	Check the harness continuity, and machine and earth contacts. Repair/replace as necessary. If no fault is found, proceed to Step 5

5	ECU fault	Disconnect the harness from the ECU and inspect. Check seals are in place, check for signs of corrosion and pin damage. If harness is damaged repair/replace as necessary. If ECU pins are damaged, replace ECU and Reflash, see section on ECU flashing. If no fault is found, raise a Tech web Help desk Call.

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Service Master Tool

9 Service Master Tool

	Service Master Tool

Service Master Tool

9.1 Install Software - Service Master

	Install Software - Service Master

Install Software - Service Master

General

The Service Master Tools allows communication between the service laptop and the machine.

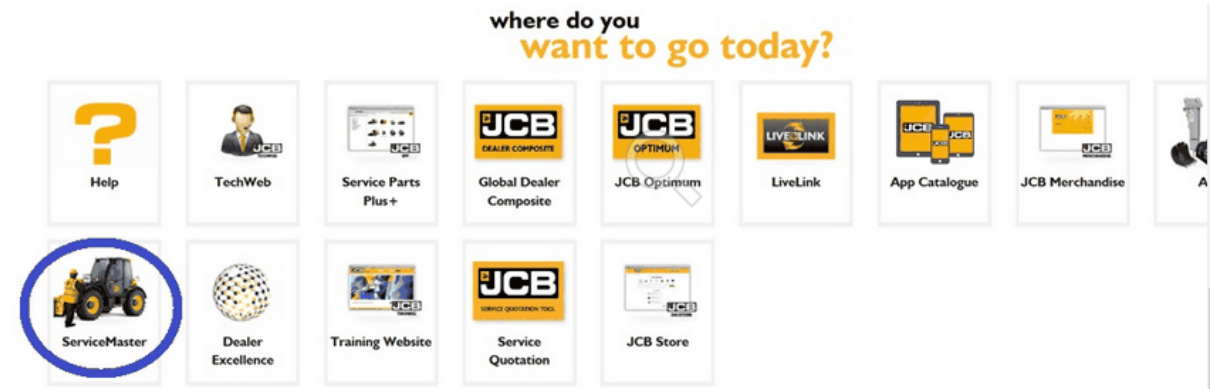
To use the 'Service Master Tool', the operator must install the latest version software into service laptop

Follow the below steps to install the software

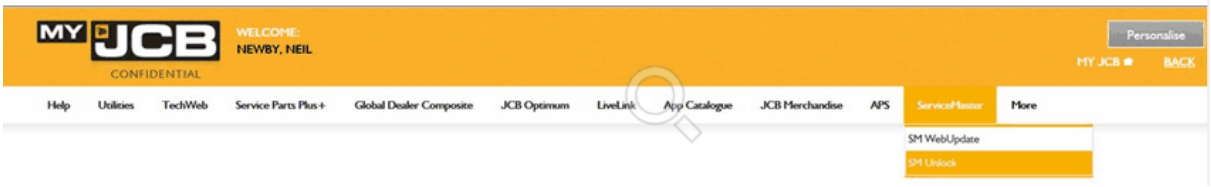
Step 1: Visit the JCB Dealer Business Portal

Step 2: Enter your User and password details to login

Step 3: Click on 'Service Master' icon



Step 4: Go to ServiceMaster tab --> SM WebUpdate



Step 5: Download or update the Service Master tool software (check the text 'click here' to download)

9.2 Using JCB Service Master

	Using JCB Service Master

Using JCB Service Master

Overview

The Service Master Tools allows communication between the service laptop and the machine.

A 'Data Link Adapter (DLA)' connects the computer USB Port to the machine Can-Bus through the Diagnostic Connector.

Fault Codes:

Each ECU can generate a fault code if it detects the behaviour of an input or output is not as expected. Fault codes are transmitted by each ECU over the Can Bus and stored on the DECU for future reference. View a complete list of error codes.

The states of ECU inputs (switches and sensors) and outputs (solenoids, LED's etc) are broadcast on the Can Bus. These values can be monitored using the Diagnostic Tool.

If a switch is ‘hardwired’ directly to a component (e.g. the horn), rather than being wired to an ECU, then there is no means of monitoring its state on the Can Bus using the Diagnostic Tool.

Information Pages detail many ECU inputs and outputs.

The Flash loader Tool is used to program ECU’s with new software, sending information to the ECU over the Can Bus.

9.3 Using DLA (Data Link Adapter)

Using DLA (Data Link Adapter)

Using DLA (Data Link Adapter)

Overview

Installation Procedure - DLA Drives

DLA Connections and Parts

Note- DLA 1 will not work in E-Drive Machine

Overview

The DLA (Data Link Adapter) allows Can-Bus communication between a service laptop and the Machine ECU’s through the Diagnostic Socket.

The DLA must be installed on the Laptop before it can be used.

Note: Some computers install the DLA on only one USB port. In this case, if the DLA is connected to a different USB port then no communication can be made with the Machine.

Installation Procedure - DLA Drives

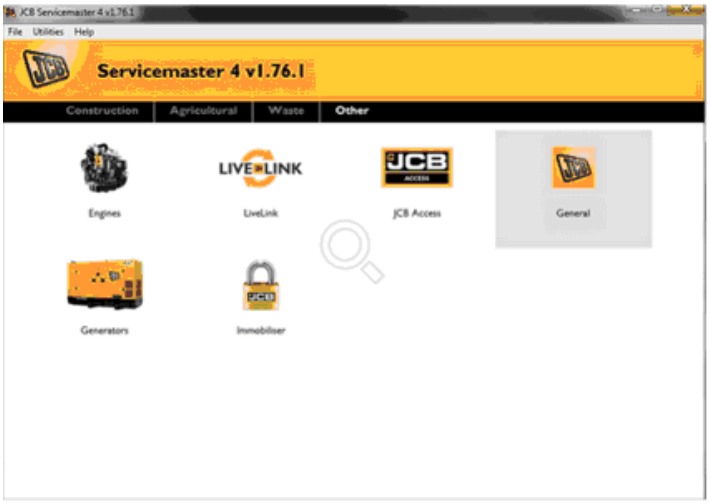
Follow the below steps to install the drive

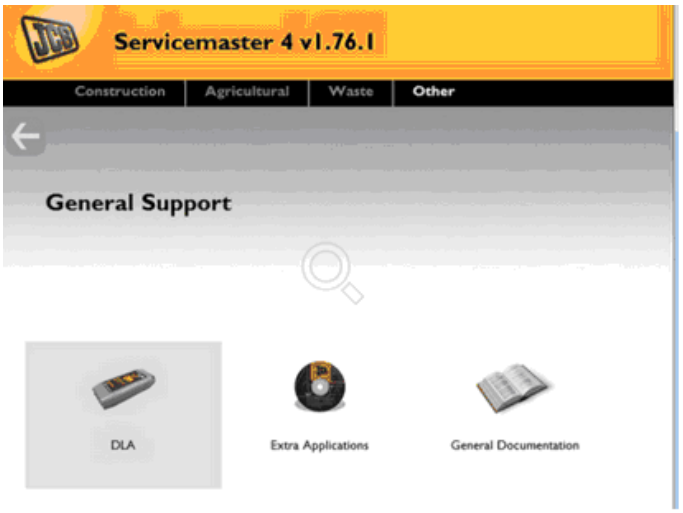
When you use Service master for the first time on your laptop/PC (which is newly installed with Service master software), the DLA driver software is

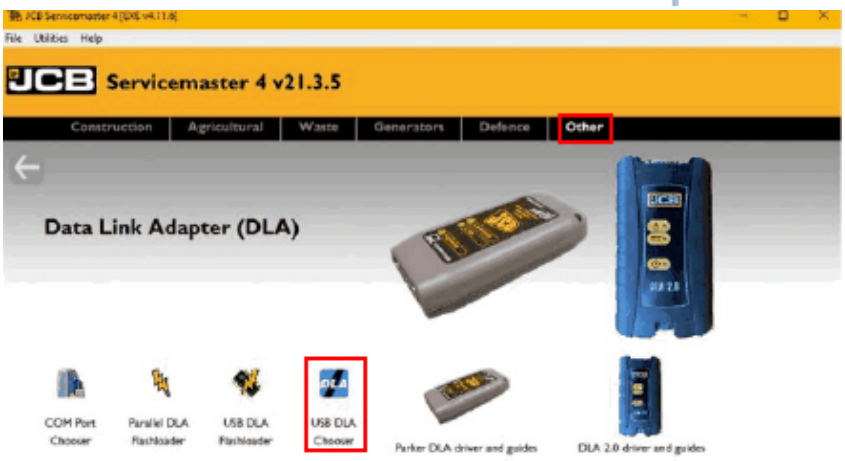
necessary to install first. Do the below steps to install the DLA driver software

Step 1: After Service Master software install into the service laptop,

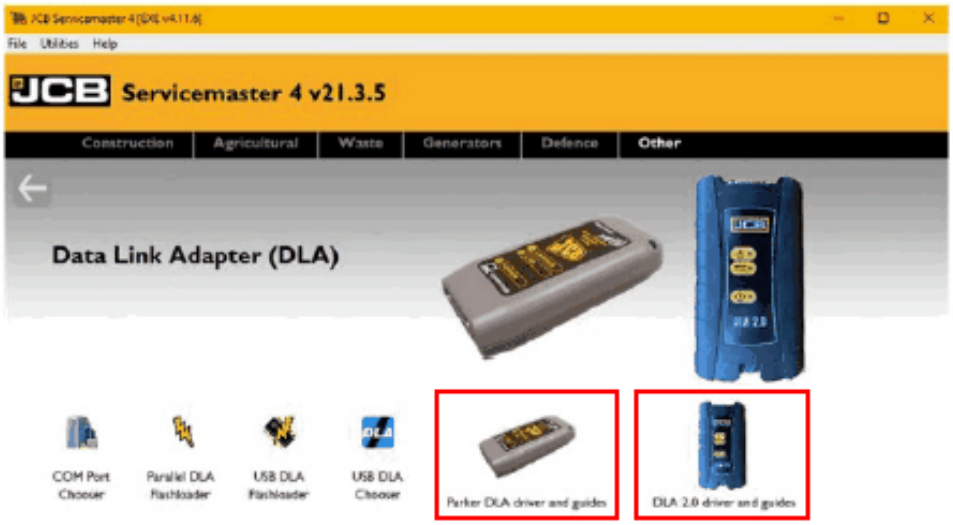
- Open 'Service Master' tool link
- Click the "Other" tab to get access to the "General" icon
- Click the "General" icon to get access to the "DLA" icon.
- Click the "DLA" icon. Refer to attached figure







- Click on DLA driver and guides icon.

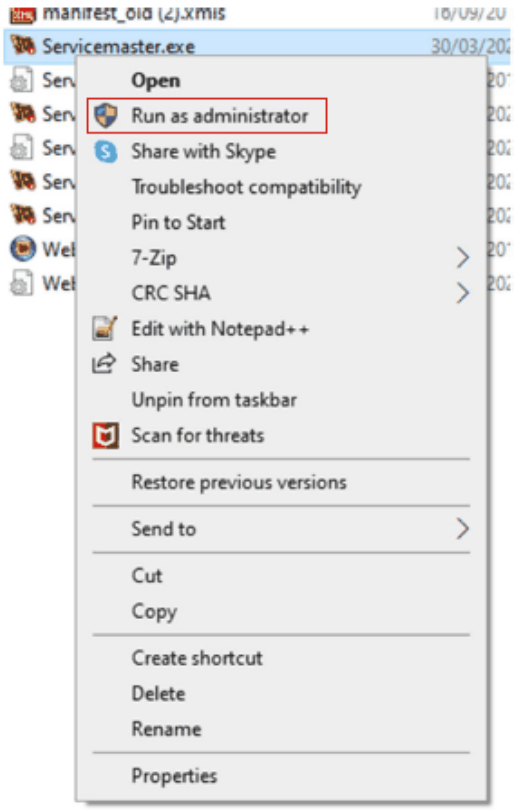


- Based upon the driver you want to install. Select the appropriate version of DLA. Select V1.10 USB DLA. Obey the window instructions to complete

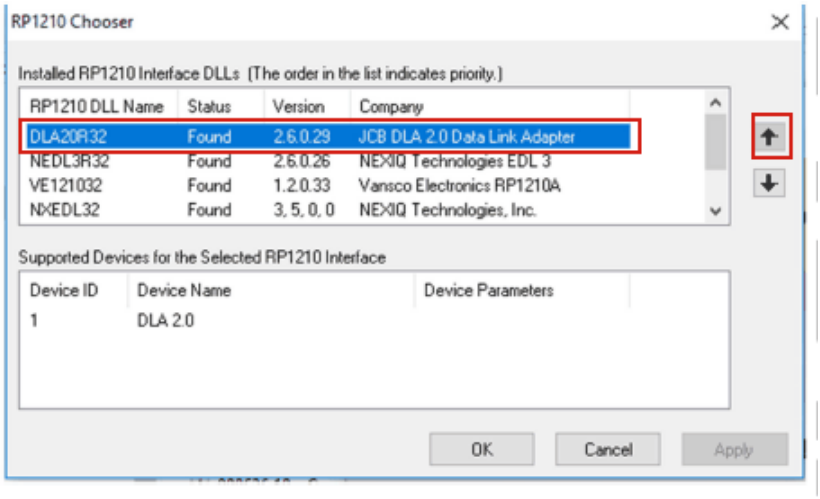
the DLA driver software installation Select DLA 2.0 Drivers [v2.6.0.29]. Refer attach image Figure

Switch between Parker and DLA 2.0- On your laptop/PC go to “C: \JCB_Servicemaster_. Right click on “Servicemaster.exe” file and

select “Run as Administrator In Servicemaster go to “Other>General>DLA”. Left click on “USB DLA Chooser”. Refer attached images



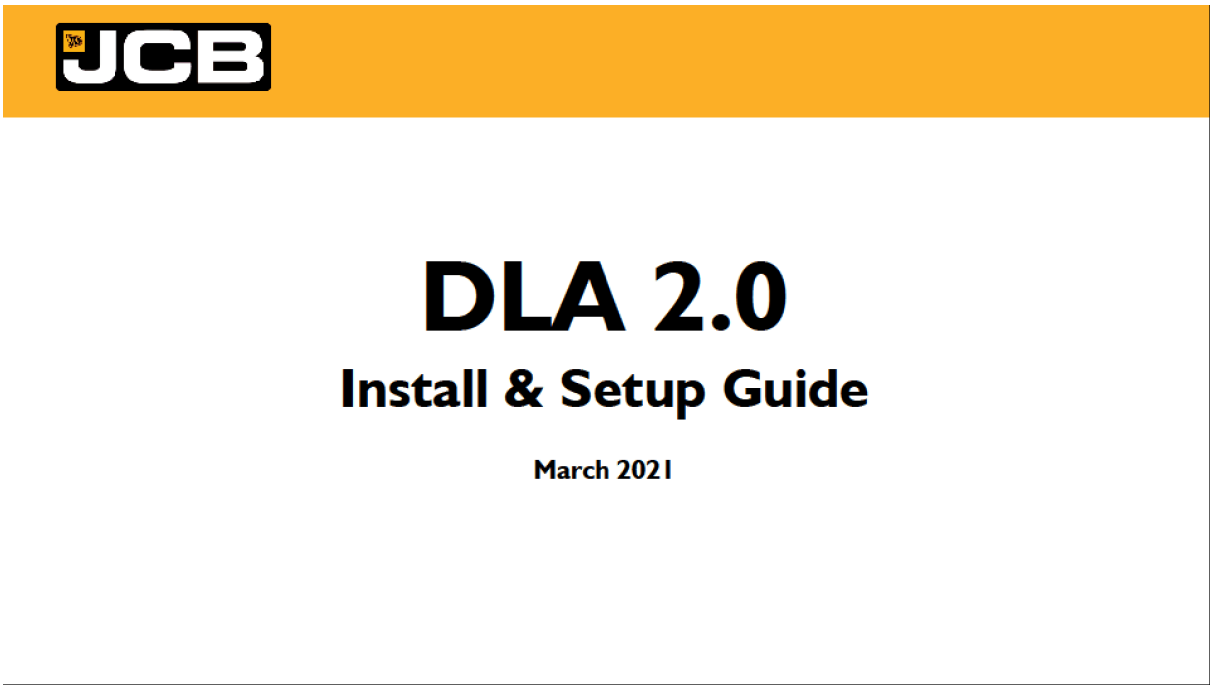
- A New window will open. Select the “DLA20R32” item and move it to the top of the box with the highlighted arrow on the right side.Click “Apply” and then click on “Ok”.



- The DLA2 is now ready to use

DLA Connections and Parts

Data Link Adapter should connect between service laptop and machine as shown below.



9.4 Flashloader Tool

	Flash loader Tool

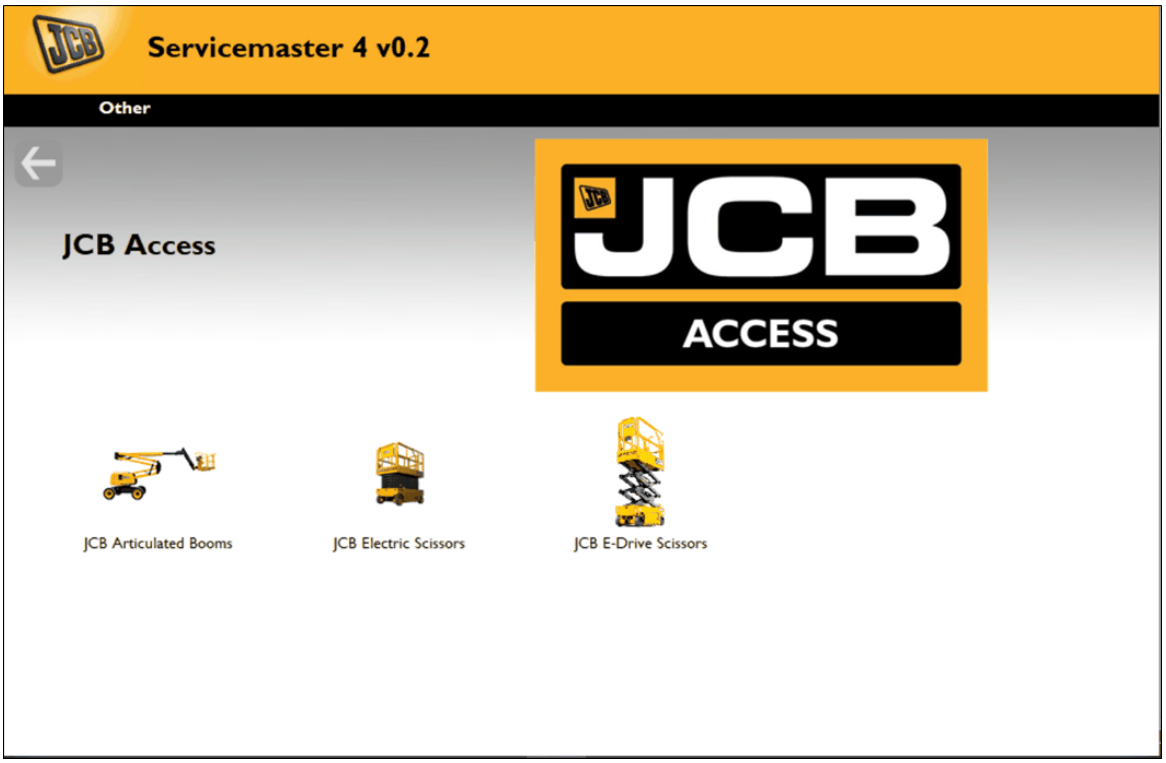
Flash loader Tool

Overview

The Service Master Flashloader program is used to load software into the Electronic Control Units (ECU's) on JCB machines. During the process, the Vehicle Ignition should remain 'On' and the Laptop should not be disconnected or allowed to enter 'Standby'. Close other programs running on the laptop.

Step -

- Connect DLA to diagnostic connector in RH door and open service master & click JCB Access
- Click on JCB E-Drive Scissor.



Step -

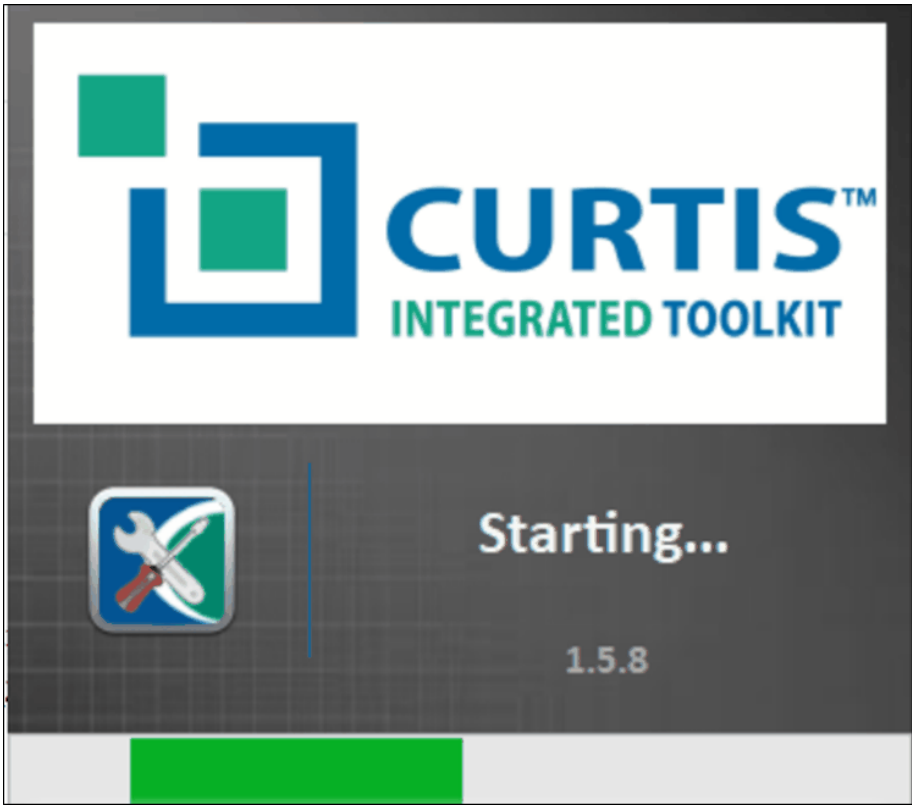
- Opening JCB E-Drive Scissors section should present with CIT & CM0410
- Click on CIT.

Step -

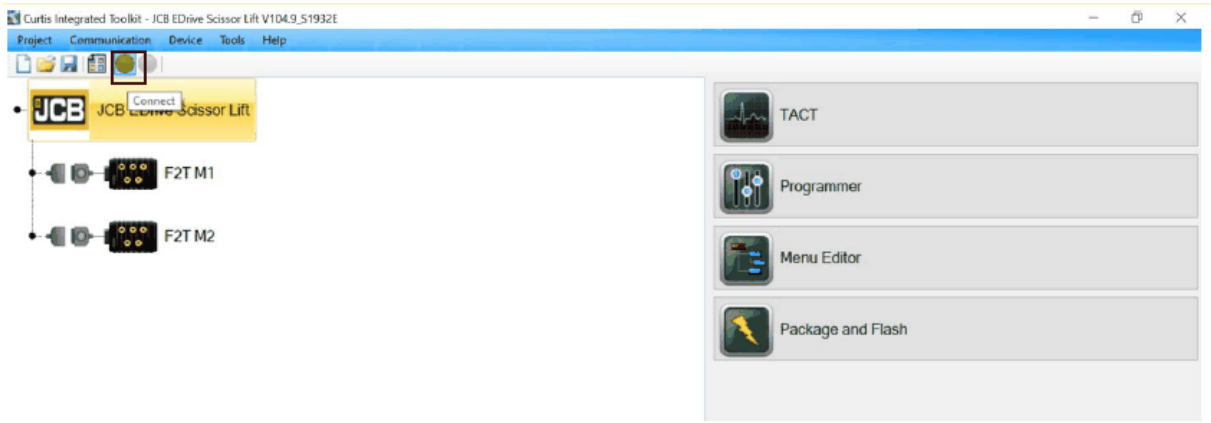
- Opening CIT, ECU Assistant & Vehicle Setup icon should be available
- Click on ECU assistant.

Step -

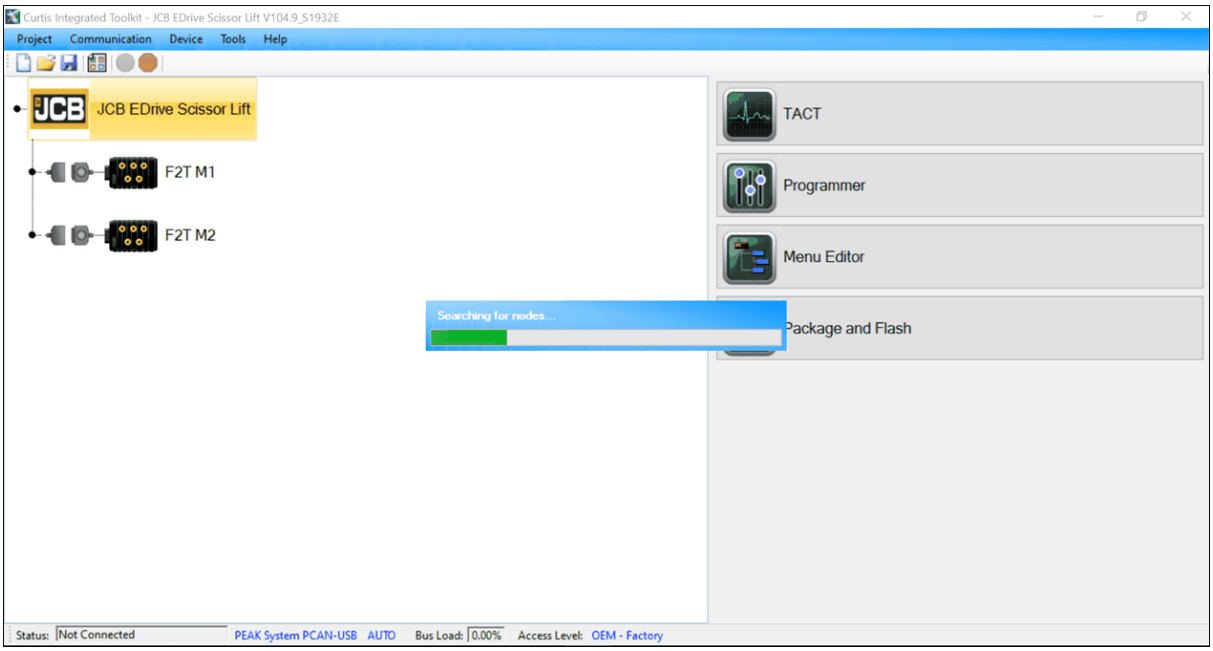
- Wait for Curtis Integrated tool to open.



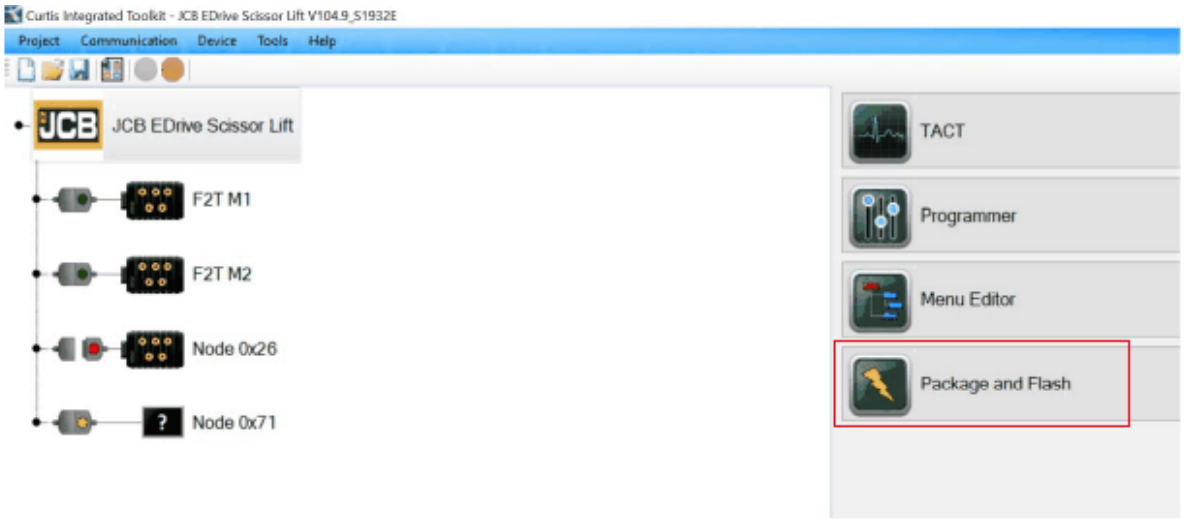
- Click on green button to connect.



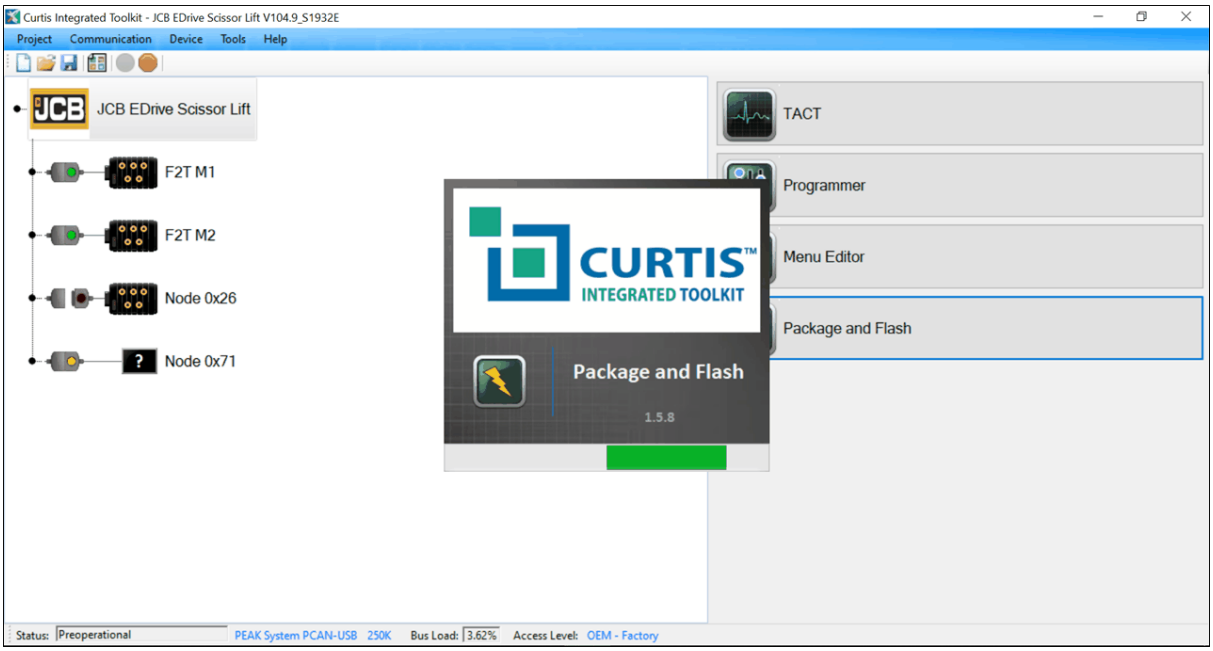
- Wait for CIT to connect



- Once online, click on package and flash.



- Wait for package and flash to open



- Click on blue arrow at the top.

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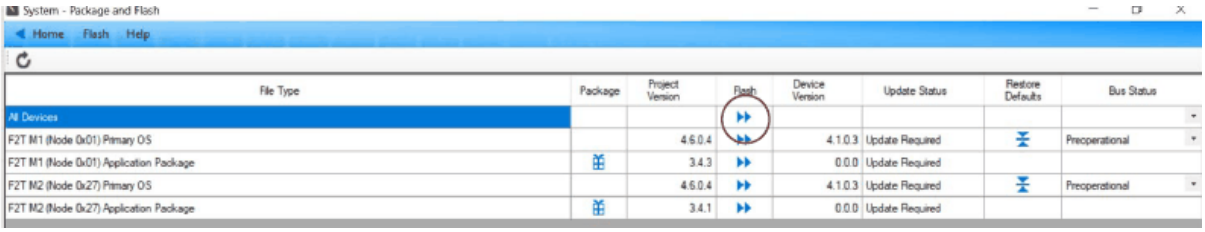
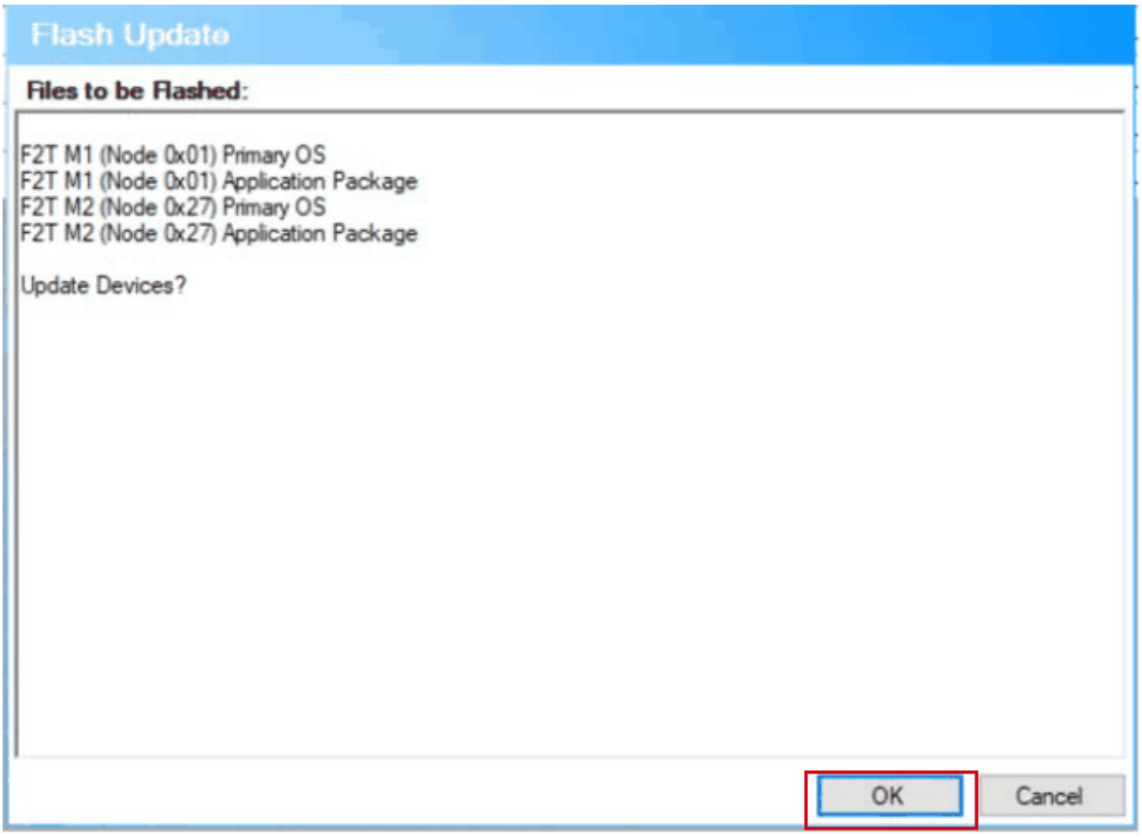
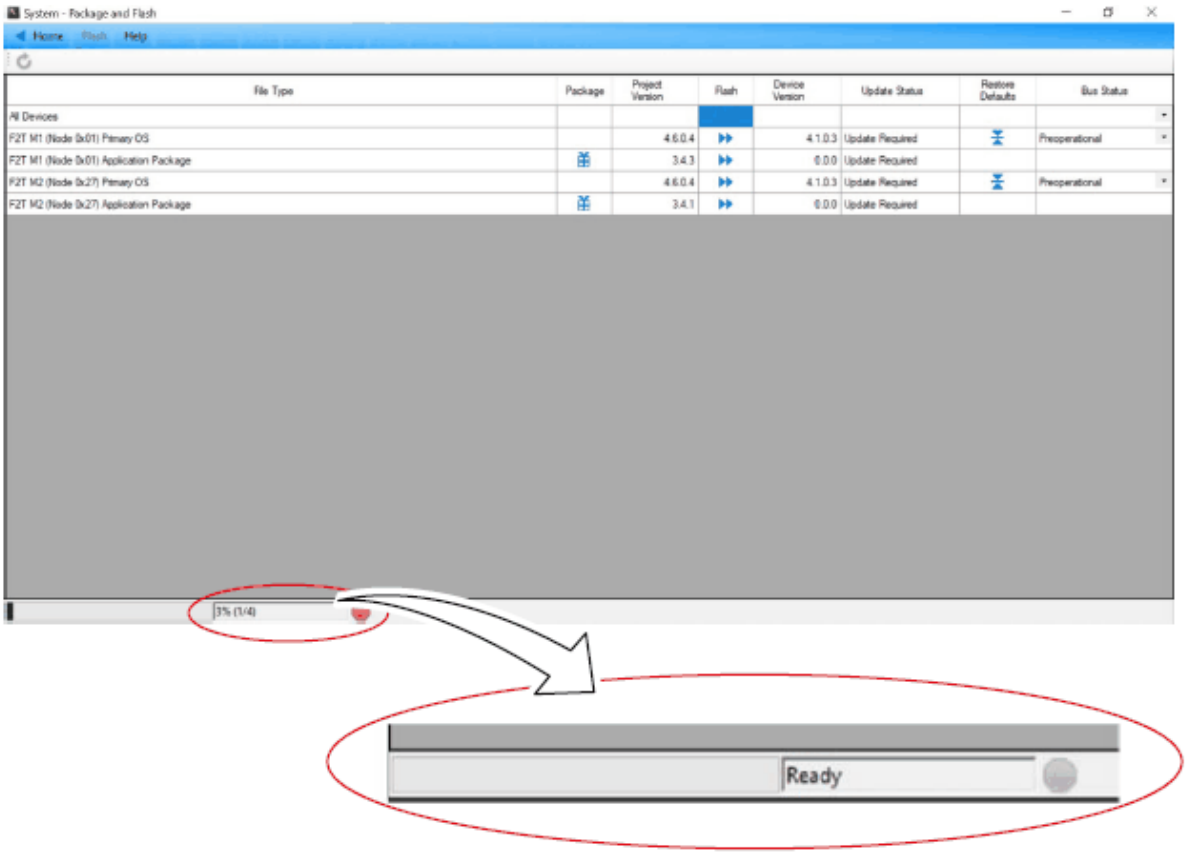


- Click OK.



- Wait for software to flash. One the status changes to ready, key cycle the machine and disconnect the DLA.



Flash Loader

- Check the service machine has installed the ServiceMaster software and DLA drives.
- Connect the Data Link Adapter (DLA) USB port to service laptop and Data Link Adapter (DLA) diagnostic connector to machine (see DLA connections and parts)
- Follow the below steps for Flash loader tool
- Step 1: Open ServiceMaster --> Others
- Step 2: Go to Others --> JCB Access
- Step 3: Go to Articulated boom
- Step 4: Click on 'Flash Loader' icon (single click only)

Flashing the ECU

- Flashloader tool searches the ECU's connected in the machine

Communication Faults

- “Unable to connect to the DLA … ”
- This screen is shown if:
- The Vehicle Ignition is not ‘On’
- The DLA is not connected to the laptop/machine
- The DLA is not configured for the USB port which it is plugged into
- The wrong type of DLA is configured Selecting the DLA
- The DLA does not show a red ‘power’ light – possibly due to a supply / earth fault with the Diagnostic Socket (fuse blown).
- “No modules found …”
- The machine is not fitted with any programmable ECU’s
- There is a supply fault to the ECU’s. fuse fault/ Primary fuse fault / wiring fault
- The Diagnostic socket is not connected to the CAN-Bus.
- There are no ECU’s disconnected from the CAN-Bus.
- There is a CAN-Bus fault – Refer to 4000 Help Pages (CAN-Bus Tests)

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Service Operation Procedure

10 Service Operation Procedure

	Service Operation Procedure

Service Operation Procedure

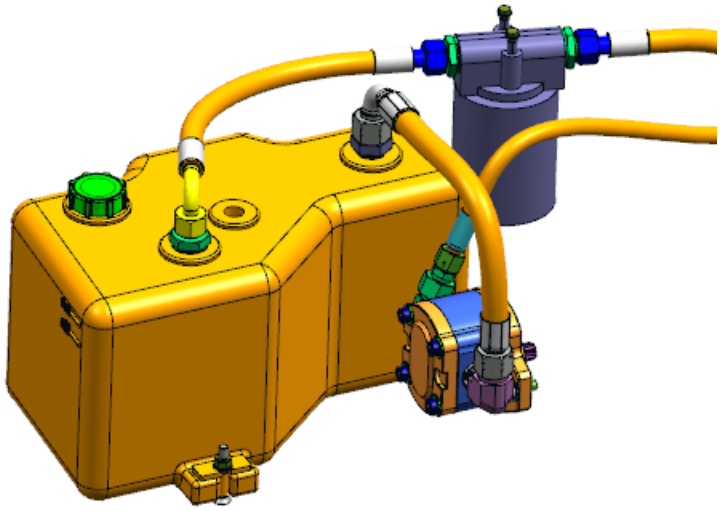
10.1 Hydraulic Oil Change

	Hydraulic Oil Change

Procedure for oil change

- Place the machine in safe zone in scissor pack stowed condition.
- Both cylinders should be fully closed.
- Open the tank and take out the used oil from tank.
- Clean the tank with fresh oil.

- Fill the tank with fresh oil.
- Don’t operate the machine.
- Open the return line hose end from tank (marked in red circle) and put it in a separate bucket.
- Now lift the cylinders and used oil in system will come from return line and collect in separate bucket.
- Similar do for steering cylinder, steer full left and right.
- Top-up the oil tank with fresh oil again.
- Replace the return line filter.
- Connect the hose to the tank again.



10.2 Battery Charger Charge Curves

	Battery Charger Charge Curves

Charge Curves and History

The below procedure is the process to extract historic data from the charger and upload new charge curve data to the charger. This allows you to see the charge history through ServiceMaster, and change the charge parameters to control the battery charger. These should only need to be updated if charger is replaced or battery type or size is changed.

To extract data from charger

1. Format the USB (Universal Serial Bus) stick (capacity does not exceed 8GB) to be FAT32.
2. Insert the USB stick to the charger.
3. Wait until the USB status LED (Light Emitting Diode) of charger stops flashing. This will download to two files to the USB stick. One file will be saved under a serial number of the charger and other will be PYLODATA.PYL document.
4. If the USB status LED of charger flashes each for specified frequency or specified time, the update work has not completed.

Frequency: 1Hz

Duration: 1s

- The following are the potential reasons.
- Poor contact between the USB and USB port of the charger.
- The USB stick has not been formatted to FAT32.

- The USB stick capacity exceeds 8GB.

5. Take out the USB stick from the charger.
6. Access the charger profile data.

- Open the serial number file in Servicemaster battery history tool. This will tell you the code loaded into the PYLODATA.PYL to the dates they were uploaded.
- Check the excel sheet for correct curves to battery type.

To update the charger profile

1. Format the USB (capacity does not exceed 8GB) to be FAT32.
2. Upload the new PYLODATA.PYL document into root of USB. Refer to Table 1.
3. Insert the USB stick to the charger.
4. Wait until the USB status LED of charger stops flashing. This will update the battery charger profile.

Battery category and program code contrast

Code	Battery type
2	TROJAN T105
7	Trojan T125
11	Trojan T1275
114	Vision - EV12-155A-AM
161	Vision - EVGC-220A-AM

Charger Profile Applicability

Model/ Option	Charger Profile	Batteries
S1932EDRV	T105- Profile B02	T105
S2632EDRV	T105 - profile B02	T105
S2646EDRV	T125 - profile B07	T125
S3246EDRV	T125 - profile B07	T125
S4046EDRV	T1275- Profile B11	T1275
S4550EDRV	T1275- Profile B11	T1275

Charger Profile Applicability - Optional Battery

Model/ Option	Charger Profile	Batteries
S1932EDRV	161	Vision - EVGC-220A-AM
S2632EDRV	161	Vision - EVGC-220A-AM

S2646EDRV	161	Vision - EVGC-220A-AM
S3246EDRV	161	Vision - EVGC-220A-AM
S4046EDRV	161	Vision - EV12-155A-AM
S4550EDRV	161	Vision - EV12-155A-AM

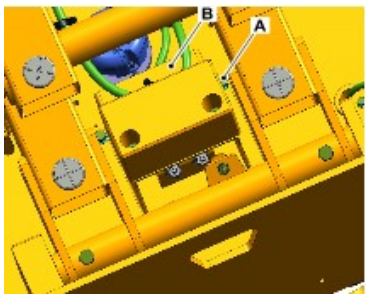
10.3 Down Limit Switch Setting and Calibration

Down Limit Switch Setting and Calibration

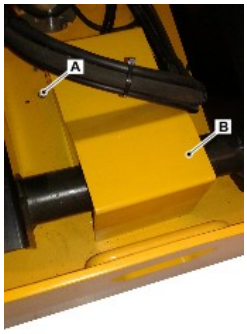
Platform Down Limit Height Setting -

Set the down limit switch position as follows -

- Make the machine safe..
- Lower the platform to the stowed position.
- Make sure that there is no load on the platform.
- Block the pothole guard using a wooden log.
- Raise the platform from base switches till DTC 56 is triggered.
- Measure the platform height.
- This should identify the switching position of the down limit switch.
- Remove the screw 1 (x4).
- Remove the bracket to access the platform down limit switch.



For S1932E EDRV



For S2632E EDRV, S2646E EDRV, S3246E EDRV, S4046E EDRV, S4550E EDRV

- Adjust the down limit switch up or down position according to the platform height.
- Set the down limit switch position as follows.
- Adjust the cam position to increase or decrease the switching position of the down limit switch according to the platform height.
- Moving the down limit switch screw upwards will reduce the height and vice verse.

- Do the above step until the correct lower limit is set.
- Unblock the pothole guard after the correct lower limit is set.

Down Limit Height

Machine Model	Down Limit Height(1)
S1932E EDRV	1.6 –1.8m
S2632E EDRV	2.2 –2.4m
S2646E EDRV	2.2 –2.4m
S3246E EDRV	2.4 –2.6m
S4046E EDRV	2.5 –2.7m
S4550E EDRV	2.7 –2.9m

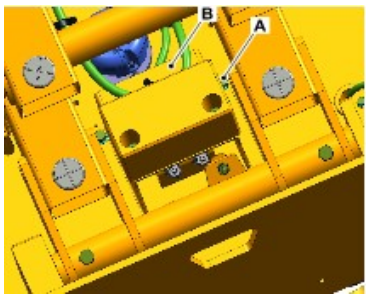
(1) Make a note that the heights are measured from the ground to the base of the platform.

10.4 Up Limit Switch Setting and Calibration

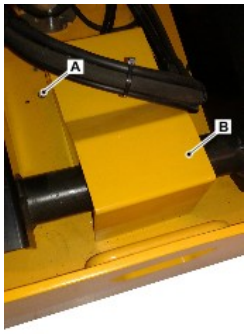
Up Limit Switch Setting and Calibration

Platform Upper Limit Height Setting -

- Make the machine safe.
- Raise the platform to full extension of the lift cylinder.
- Remove the screw 1 (x4).
- Remove the bracket to access the platform upper limit switch.



For S1932E EDRV



For S2632E EDRV, S2646E EDRV, S3246E EDRV, S4046E EDRV, S4550E EDRV

- Turn the upper limit switch screw in clockwise direction from top to fully release the limit switch plunger.
- Lift the platform to the specified height. Refer to below Table
- Turn the upper limit switch screw in counterclockwise direction from top to engage the limit switch plunger.
- If 'DTC 5A' occurs, lower the platform manually by specified height.

Length: 1m

- Turn ON the machine.
- Lift the platform to verify the height where motor stops.
- If 'DTC 5A' does not occur, proceed with below step.
- Turn ON the machine, lower the machine by specified height, and lift the platform to verify the height where motor stops. Length: 1m
- Adjust the upper limit switch screw clockwise or counterclockwise and repeat step above to make sure that the specified upper limit height is achieved.
- Tighten the upper limit switch screw to the correct torque value.
- If motor does not stop, check and make sure that the upper limit switch connections are in correct order.

Upper Limit Height

Machine Model	Upper Limit Height(1)
S1932E EDRV	18ft-8in to 18ft-10in
S2632E EDRV	25ft-11in to 26ft-1in
S2646E EDRV	25ft-11in to 26ft-1in
S3246E EDRV	31ft-9in to 31ft-11in
S4046E EDRV	38ft-11in to 39ft-1in
S4550E EDRV	45ft-2in to 45ft-4in

(1) Make a note that the heights are measured from the ground to the base of the platform.

10.5 TIlt Sensor Calibration

	Flash loader Tool

Special Tools		
Description	**Part No.**	**Qty.**
Tilt sensor calibration lead	400/J2673	1

Important: It is safety critical that the level of the ground is confirmed as flat during this calibration.

Make the machine safe with the platform raised.
When the machine is on level ground (specified angle in each direction), do the following.

Angle: 0 °

- Switch the ignition on. Make sure there is power to the tilt switch. Check the green LED (Light Emitting Diode) is lit.
- Connect the tilt sensor calibration lead to the specified power supply.

Voltage: 24 V

Special Tool: Tilt sensor calibration lead (Qty.: 1)
- Allow the lead to be connected with power supply for the specified duration.

Duration: 3 –7 s

- This sets the zero position.

- Disconnect the tilt sensor calibration lead from the power source.
- The green color LED must blink. If the LED is not blinking it could be that the electrical terminal is corroded at A.
- Note that the tilt sensor is Pre-set to sideways tilt by the specified angle from the horizontal.

Do the following steps to check tilt sensor is qualified on the X-axis -

- Put the right side machine tyres on blocks so that the machine is at specified angle to the ground. Angle: 1.6
- Put the machine to ground control mode.
- Raise the platform
- If the machine stops above the down limit height, the tilt sensor qualifies on X-axis.
- Put the machine to platform control mode.
- Make sure that the error code 'LL' is displayed and alarm sounds.

Do the following steps to check tilt sensor is qualified on the Y-axis -

- Put the front machine tyres on blocks so that the machine is at specified angle to the ground. Angle: 3.1°.
- Put the machine to ground control mode.
- Raise the platform.
- Raise the platform.
- Put the machine to platform control mode.
- Make sure that the error code 'LL' is displayed and alarm sounds.

10.6 Decent Delay Height Setting

Decent Delay Height Setting

Decent Delay Height Setting -

- Descent delay height is preset in machine software.
- Raise the machine to around 50% of machine height and start lowering.
- Machine will stop mid way while lowering, ,measure this height.
- This height is your Pre-set Descent delay height.
- If it does not come in standard range, you can adjust this using PCU menu.
- Press the lift and travel button together on PCU while switching on the key to platform control position.
- The LCD will display 'menu'.
- Select 'OEM settings' and press enter
- You will be asked to enter the password, enter password.
- Press the up/down switch to find 'Height settings' function.
- Press the 'ENTER' button.
- Scroll down and select Descent Height, press enter.
- This parameter shows angle sensor percentage at which descent height is set.
- Adjust this parameter using scroll and up/down switch.
- Increasing this value will increase the descent height and vice verse.
- Press enter to save the value and recheck the height as mentioned above.

Decent Height Limits

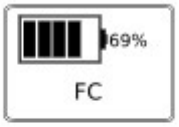
Machine Model	Descent Height Limits
S1932E EDRV	2.1 ± 0.1m
S2632E EDRV	2.4 ± 0.1m
S2646E EDRV	2.2 ± 0.1m
S3246E EDRV	2.6 ± 0.1m
S4046E EDRV	2.9 ± 0.1m
S4550E EDRV	3 ± 0.1m

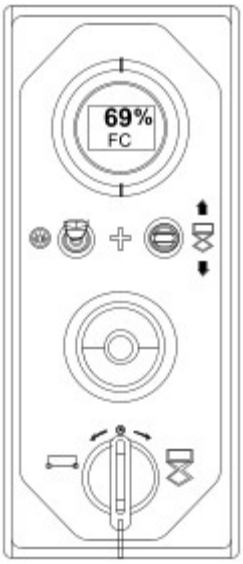
10.7 Field Calibration

Field Calibration

Field Calibration -

- When the load sensing system of a machine (angle sensor/pressure sensor) is repaired/reworked, field calibration can help to restore machine functionality with a de-rated capacity temporarily until the machine is fully calibrated with the rated load. Machine load capacity after field calibration will be reduced to approximately 75%-85% of the rated load.
- It is always recommended to do the full calibration sequence on machine whenever required. However, in case of non-availability of the suitable weights, field calibration can be performed (lift capacity will be reduced).
- To indicate the machine is running in no load (NL) field calibration, the platform and base display will show 'FC' while raising and lowering operation.





A standard calibration will restore the 100% load capacity, and 'FC' indication will no longer be visible on the platform or base control panel display.

Field calibration must be completed in one go with all the three below steps in sequence.

Angle Sensor Calibration -

1. The machine will be raised to the full height during the calibration procedure.

1.1 Make sure that there is sufficient clearance above the platform before starting the calibration.

2. The calibration can be interrupted if there is a hazardous event by pressing an emergency stop.

3. Any button pressed outside of this time frame will nullify the sequence and require starting from the beginning.

4. Take the machine to a suitable testing area.

5. Lower the platform to the stowed position.

6. Make sure that there is no load on the platform.

7. Make sure that the both (base and PCU) emergency switches are in the ON position.

8. Press the lift and travel button together on the PCU while switching ON the key to the platform control position.

9. The PCU display will display 'Menu'.

10. Select 'OPR settings' and press enter.

11. Move the platform raise/lower toggle switch to select 'Field cal' function.

12. Press the enter button.

13. Scroll down and select 'Angle sensor', and press enter.

14. Select ON by pressing the left/right button for the angle sensor calibration and press enter.

15. Wait for the green light to blink once.

15.1. Scroll up to enable and change the status to ON, and press enter.

16. Wait for the green light to blink.

16.1. The calibration will start automatically and platform will move up and down once.

17. Once the calibration is complete, the base display will show 'FC AS OK'. Perform a key cycle to save the calibration.

18. If the calibration result shows 'FC AS NOK' error, do the steps that follow:

18.1. Check the error code.

18.2. Inspect the condition of the corresponding sensors to ensure correct operation.

18.3. Perform the calibration process again.

No Load Static Calibration -

1. The machine will be raised to the full height during the calibration procedure.

1.1 Make sure that there is sufficient clearance above the platform before starting the calibration.

2. The calibration can be interrupted if there is a hazardous event by pressing an emergency stop.

2.1. If field calibration is aborted for any reason, the machine will display 'FC reqd' and cannot be operated until field calibration is finished.

3. Any button pressed outside of this time frame will nullify the sequence and require starting from the beginning.

4. Take the machine to a suitable testing area.

5. Lower the platform to the stowed position.

6. Make sure that there is no load on the platform.

7. Make sure that the both (base and PCU) emergency switches are in the ON position.

8. Press the lift and travel button together on the PCU while switching ON the key to the platform control position.

9. The PCU display will display 'Menu'.

10. Select 'OPR settings' and press enter.

11. Move the platform raise/lower toggle switch to select 'Field cal' function.

12. Press the enter button.

13. Scroll down and select 'NL Static', and press enter.

14. Select ON by pressing the left/right button for the No Load Static calibration and press enter.

15. Wait for the green light to blink once.

15.1. Scroll up to enable and change the status to ON, and press enter.

16. Wait for the green light to blink.

16.1. The calibration will start automatically The platform will raise and lower once, and then stop periodically to capture calibration data.

17. Once the calibration is complete, the base display will show 'FC AS OK'. Perform a key cycle to save the calibration.

18. If the calibration result shows 'FC AS NOK' error, do the steps that follow:

18.1. Check the error code.

18.2. Inspect the condition of the corresponding sensors to ensure correct operation.

18.3. Perform the calibration process again.

No Load Dynamic Calibration -

1. The machine will be raised to the full height during the calibration procedure.

1.1 Make sure that there is sufficient clearance above the platform before starting the calibration.

2. The calibration can be interrupted if there is a hazardous event by pressing an emergency stop.

2.1. If field calibration is aborted for any reason, the machine will display 'FC reqd' and cannot be operated until field calibration is finished.

3. Any button pressed outside of this time frame will nullify the sequence and require starting from the beginning.

4. Take the machine to a suitable testing area.

5. Lower the platform to the stowed position.

6. Make sure that there is no load on the platform.

7. Make sure that the both (base and PCU) emergency switches are in the ON position.

8. Press the lift and travel button together on the PCU while switching ON the key to the platform control position.

9. The PCU display will display 'Menu'.

10. Select 'OPR settings' and press enter.

11. Move the platform raise/lower toggle switch to select 'Field cal' function.

12. Press the enter button.

13. Scroll down and select 'NL Dynamic', and press enter.

14. Select ON by pressing the left/right button for the No Load Dynamic calibration and press enter.

15. Wait for the green light to blink once.

15.1. Scroll up to enable and change the status to ON, and press enter.

16. Wait for the green light to blink.

16.1. The calibration will start automatically The platform will raise and lower once, and then stop periodically to capture calibration data.

17. Once the calibration is complete, the base display will show 'FC AS OK'. Perform a key cycle to save the calibration.

18. If the calibration result shows 'FC AS NOK' error, do the steps that follow:

18.1. Check the error code.

18.2. Inspect the condition of the corresponding sensors to ensure correct operation.

18.3. Perform the calibration process again.