

# **Scissor EDRV Helpfile**

## **USER MANUAL**

**© 2026 Ravi Dogne  
Ravi Dogne**

This page is intentionally left blank.  
Remove this text from the manual  
template if you want it completely blank.

|  |           |
|--|-----------|
| <b>1. Introduction</b>                             | <b>11</b> |
| 1.1 Contents .....                                 | 13        |
| <b>2. Machine Details</b>                          | <b>15</b> |
| 2.1 Can Layout .....                               | 17        |
| 2.2 System Block Diagram .....                     | 18        |
| 2.3 Wiring & Battery Lead Layout .....             | 18        |
| <b>3. System Level Function</b>                    | <b>21</b> |
| 3.1 System Startup Diagram .....                   | 23        |
| 3.2 Drive .....                                    | 24        |
| 3.3 Steering .....                                 | 28        |
| 3.4 Horn .....                                     | 30        |
| 3.5 Pothole Protection .....                       | 32        |
| 3.6 Load Sensing .....                             | 35        |
| 3.7 Platform Raise .....                           | 38        |
| 3.8 Platform Lower .....                           | 41        |
| 3.9 E-Stop .....                                   | 44        |
| 3.10 Load Calibration .....                        | 46        |
| 3.11 Pressure Sensor .....                         | 47        |
| 3.12 Platform Controller .....                     | 48        |
| 3.13 Base Control .....                            | 50        |
| 3.14 Tilt Alarm .....                              | 52        |
| 3.15 Dual Height Mode .....                        | 55        |
| 3.16 Sensor & Switches .....                       | 58        |
| 3.17 Battery Management System .....               | 58        |
| 3.18 Service Mode .....                            | 62        |
| 3.19 E-stop Override .....                         | 64        |
| 3.20 Korea Homologation Requirement .....          | 68        |
| 3.21 Service Brake Release .....                   | 72        |
| <b>4. DTC &amp; Scissor Trouble shooting Guide</b> | <b>77</b> |
| 4.1 115 Version & Below .....                      | 78        |
| 4.1.1 Index .....                                  | 79        |
| 4.1.2 Annexure - A .....                           | 82        |
| 4.1.3 Annexure - B .....                           | 83        |

|        |                    |     |
|--------|--------------------|-----|
| 4.1.4  | Annexure - C ..... | 86  |
| 4.1.5  | CAN Test .....     | 87  |
| 4.1.6  | DTC- 74-75 .....   | 88  |
| 4.1.7  | DTC - B9 .....     | 90  |
| 4.1.8  | DTC- BB .....      | 92  |
| 4.1.9  | DTC- B8 .....      | 94  |
| 4.1.10 | DTC- A1 .....      | 97  |
| 4.1.11 | DTC- A6 .....      | 99  |
| 4.1.12 | DTC- A4 .....      | 101 |
| 4.1.13 | DTC- A7 .....      | 102 |
| 4.1.14 | DTC- 51 .....      | 104 |
| 4.1.15 | DTC- LL .....      | 107 |
| 4.1.16 | DTC- 56 .....      | 109 |
| 4.1.17 | DTC- 61 .....      | 111 |
| 4.1.18 | DTC- OL .....      | 113 |
| 4.1.19 | DTC- 5A .....      | 115 |
| 4.1.20 | DTC- 6D .....      | 116 |
| 4.1.21 | DTC- 5B .....      | 118 |
| 4.1.22 | DTC- 7B .....      | 119 |
| 4.1.23 | DTC- 12 .....      | 120 |
| 4.1.24 | DTC- 13 .....      | 121 |
| 4.1.25 | DTC- 14 .....      | 122 |
| 4.1.26 | DTC- 15 .....      | 123 |
| 4.1.27 | DTC- 16 .....      | 124 |
| 4.1.28 | DTC- 17 .....      | 124 |
| 4.1.29 | DTC- 18 .....      | 125 |
| 4.1.30 | DTC- 19 .....      | 126 |
| 4.1.31 | DTC- 22 .....      | 130 |
| 4.1.32 | DTC- 25 .....      | 131 |
| 4.1.33 | DTC- 28 .....      | 132 |
| 4.1.34 | DTC- 29 .....      | 134 |
| 4.1.35 | DTC- 31 .....      | 135 |
| 4.1.36 | DTC- 32 .....      | 138 |
| 4.1.37 | DTC- 33 .....      | 139 |
| 4.1.38 | DTC- 34 .....      | 144 |
| 4.1.39 | DTC- 36 .....      | 148 |
| 4.1.40 | DTC- 37 .....      | 150 |
| 4.1.41 | DTC- 38 .....      | 151 |
| 4.1.42 | DTC- 39 .....      | 152 |
| 4.1.43 | DTC- 3A .....      | 154 |
| 4.1.44 | DTC- 42 .....      | 155 |

|            |                          |            |
|------------|--------------------------|------------|
| 4.1.45     | DTC- 44 .....            | 159        |
| 4.1.46     | DTC- 46 .....            | 163        |
| 4.1.47     | DTC- 49 .....            | 168        |
| 4.1.48     | DTC- 71 .....            | 168        |
| 4.1.49     | DTC- 72 .....            | 173        |
| 4.1.50     | DTC- 73 .....            | 174        |
| 4.1.51     | DTC- 7D .....            | 175        |
| 4.1.52     | DTC- 83 .....            | 176        |
| 4.1.53     | DTC- 87 .....            | 180        |
| 4.1.54     | DTC- 89 .....            | 185        |
| 4.1.55     | DTC- 91 .....            | 185        |
| 4.1.56     | DTC- 92 .....            | 190        |
| 4.1.57     | DTC- 95 .....            | 191        |
| 4.1.58     | DTC- 96 .....            | 192        |
| 4.1.59     | DTC- 97 .....            | 194        |
| 4.1.60     | DTC- 99 .....            | 194        |
| 4.1.61     | DTC- A2 .....            | 195        |
| 4.1.62     | DTC- A3 .....            | 196        |
| 4.1.63     | DTC- A9 .....            | 198        |
| 4.1.64     | DTC- E5 .....            | 199        |
| 4.1.65     | DTC- E7 .....            | 200        |
| 4.1.66     | DTC- E8 .....            | 204        |
| 4.1.67     | DTC- HL .....            | 205        |
| 4.1.68     | Controller Fault .....   | 207        |
| <b>4.2</b> | <b>116 Version .....</b> | <b>210</b> |
| 4.2.1      | Index .....              | 210        |
| 4.2.2      | Annexure - A .....       | 213        |
| 4.2.3      | Annexure - B .....       | 215        |
| 4.2.4      | Annexure - C .....       | 221        |
| 4.2.5      | Annexure - D .....       | 224        |
| 4.2.6      | CAN TEST .....           | 228        |
| 4.2.7      | AC .....                 | 229        |
| 4.2.8      | B9 .....                 | 234        |
| 4.2.9      | BB .....                 | 237        |
| 4.2.10     | B8 .....                 | 241        |
| 4.2.11     | A1 .....                 | 244        |
| 4.2.12     | A6 .....                 | 246        |
| 4.2.13     | A4 .....                 | 248        |
| 4.2.14     | A7 .....                 | 250        |
| 4.2.15     | 5F .....                 | 252        |
| 4.2.16     | LL .....                 | 254        |

|        |          |     |
|--------|----------|-----|
| 4.2.17 | 56       | 257 |
| 4.2.18 | 61       | 259 |
| 4.2.19 | OL       | 262 |
| 4.2.20 | 5A       | 264 |
| 4.2.21 | 6D       | 267 |
| 4.2.22 | 6A       | 269 |
| 4.2.23 | 7B       | 270 |
| 4.2.24 | 28       | 272 |
| 4.2.25 | 29       | 273 |
| 4.2.26 | 0B       | 274 |
| 4.2.27 | 32       | 276 |
| 4.2.28 | A2       | 278 |
| 4.2.29 | 36       | 279 |
| 4.2.30 | 0D       | 281 |
| 4.2.31 | 37       | 283 |
| 4.2.32 | 0E       | 284 |
| 4.2.33 | 38       | 285 |
| 4.2.34 | 39       | 287 |
| 4.2.35 | 17       | 289 |
| 4.2.36 | 31       | 291 |
| 4.2.37 | E9 (OHL) | 293 |
| 4.2.38 | E0       | 295 |
| 4.2.39 | 18       | 296 |
| 4.2.40 | 25       | 297 |
| 4.2.41 | E5       | 298 |
| 4.2.42 | 22       | 299 |
| 4.2.43 | E6       | 300 |
| 4.2.44 | E7       | 301 |
| 4.2.45 | E8       | 305 |
| 4.2.46 | E1       | 307 |
| 4.2.47 | E2       | 307 |
| 4.2.48 | E3 (EL)  | 310 |
| 4.2.49 | E4 (UP)  | 311 |
| 4.2.50 | EA       | 312 |
| 4.2.51 | 7D       | 314 |
| 4.2.52 | 12       | 315 |
| 4.2.53 | 02       | 315 |
| 4.2.54 | 14       | 317 |
| 4.2.55 | 15       | 318 |
| 4.2.56 | 16       | 318 |
| 4.2.57 | 92       | 319 |

|            |                                |            |
|------------|--------------------------------|------------|
| 4.2.58     | 43                             | 320        |
| 4.2.59     | 89                             | 321        |
| 4.2.60     | A9                             | 321        |
| 4.2.61     | 73                             | 322        |
| 4.2.62     | 2C                             | 323        |
| 4.2.63     | 3A & OF                        | 323        |
| 4.2.64     | 3B                             | 324        |
| 4.2.65     | 95                             | 324        |
| 4.2.66     | 97                             | 326        |
| 4.2.67     | 9A                             | 326        |
| 4.2.68     | D6                             | 327        |
| 4.2.69     | Battery Charger Fault          | 328        |
| <b>4.3</b> | <b>Diagnostic Fault Table</b>  | <b>329</b> |
| 4.3.1      | General Sensor fault Table (2) | 329        |

## **5. Machine Components 331**

|      |                             |     |
|------|-----------------------------|-----|
| 5.1  | Base Control Panel          | 333 |
| 5.2  | Base Control Display        | 336 |
| 5.3  | Platform Controller         | 340 |
| 5.4  | Motor Controller (Inverter) | 345 |
| 5.5  | Parker I/O Expansion ECU    | 349 |
| 5.6  | Ignition/Key Switch         | 352 |
| 5.7  | Horn                        | 355 |
| 5.8  | E-Stop                      | 357 |
| 5.9  | DC Motor                    | 359 |
| 5.10 | DC Contactor                | 361 |
| 5.11 | Relay                       | 362 |
| 5.12 | Base Toggle Switch          | 365 |
| 5.13 | Tilt Sensor                 | 368 |
| 5.14 | Battery Charger             | 370 |
| 5.15 | Battery 6V                  | 373 |
| 5.16 | Display Function            | 377 |
| 5.17 | Angle Sensor                | 379 |
| 5.18 | Joystick                    | 381 |
| 5.19 | Pothole Switches            | 384 |
| 5.20 | Pressure Sensor             | 385 |
| 5.21 | Up & Down Limit Switch      | 389 |

|           |  |            |
|-----------|--|------------|
| 5.22      | Buzzer .....   | 391        |
| 5.23      | White Noise Alarm .....                                      | 393        |
| 5.24      | AC Drive Motor .....   | 394        |
| 5.25      | AC Drive Motor Sensor .....                                  | 397        |
| 5.26      | Flash Light .....  | 400        |
| 5.27      | AC Connector .....   | 404        |
| 5.28      | Foot Switch (Korean Region) .....                            | 406        |
| 5.29      | Dual Height Box (USA Region) .....                           | 409        |
| 5.30      | Livelihood .....   | 411        |
| 5.31      | Isolator .....   | 413        |
| 5.32      | Elevated Switch .....  | 416        |
| 5.33      | Override Switch .....  | 418        |
| 5.34      | Brake Release Switch .....                                   | 421        |
| 5.35      | Override Switch .....  | 423        |
| 5.36      | MC41 Controller .....  | 426        |
| 5.37      | Main Control Valve .....                                     | 428        |
| 5.38      | Lowering Valve .....   | 430        |
| 5.39      | Perimeter Light (Optional) .....                             | 431        |
| <b>6.</b> | <b>Machine Calibration</b>                                   | <b>435</b> |
| 6.1       | Calibration Sequence .....                                   | 436        |
| 6.2       | Platform Control Menu Options .....                          | 438        |
| 6.3       | Standard Calibration .....                                   | 443        |
| 6.4       | Field Calibration .....                                      | 448        |
| 6.5       | Rapid Calibration .....                                      | 453        |
| 6.6       | Tilt Sensor Calibration .....                                | 457        |
| <b>7.</b> | <b>Service Master Tool</b>                                   | <b>461</b> |
| 7.1       | Install Software - Service Master .....                      | 462        |
| 7.2       | Using JCB Service Master .....                               | 464        |
| 7.3       | Using DLA (Data Link Adapter) .....                          | 465        |
| 7.4       | Flashloader Tool .....                                       | 470        |
| <b>8.</b> | <b>Software Flashing</b>                                     | <b>481</b> |
| 8.1       | CIT Installation & Application Software Flashing .....       | 482        |
| 8.2       | IQAN Tool Installation & Dual Height Software Flashing ..... | 499        |

|              |   |            |
|--------------|---|------------|
| 8.3          | Parker Extension Unit(CM0410) Software Flashing .....                 | 509        |
| 8.4          | Peak Tool Driver Installation & WIKA Joystick Software Flashing ..... | 515        |
| <b>9.</b>    | <b>Service Operation Procedure</b>                                    | <b>523</b> |
| 9.1          | Hydraulic Oil Change .....  | 524        |
| 9.2          | Battery Charger Charge Curves .....                                   | 525        |
| 9.3          | Down Limit Switch Setting and Calibration .....                       | 527        |
| 9.4          | Up Limit Switch Setting and Calibration .....                         | 528        |
| 9.5          | Decent Delay Height Setting .....                                     | 530        |
| <b>Index</b> |   | <b>0</b>   |

This page is intentionally left blank.  
Remove this text from the manual  
template if you want it completely blank.

# Introduction

## 1 Introduction

List of Introduction

| Number | Component                    |
|--------|------------------------------|
| 1      | <a href="#">Content</a>   13 |



**Electric Drive**

**Scissor**



## 1.1 Contents

### List of Introduction

| Number | Components                           |
|--------|--------------------------------------|
| 1      | <a href="#">Introduction</a>   12    |
| 2      | <a href="#">Machine Details</a>   16 |

|   |  |     |
|---|--|-----|
| 3 | <a href="#">System Level Function</a>                    | 22  |
| 4 | <a href="#">DTC &amp; Scissor Trouble shooting Guide</a> | 78  |
| 5 | <a href="#">Machine Components</a>                       | 332 |
| 6 | <a href="#">Machine Calibration</a>                      | 436 |
| 7 | <a href="#">Service Master Tool</a>                      | 462 |
| 8 | <a href="#">Service Operation Procedure</a>              | 524 |

# Machine Details

## 2 Machine Details

List of [Machine Details](#) <sup>16</sup>

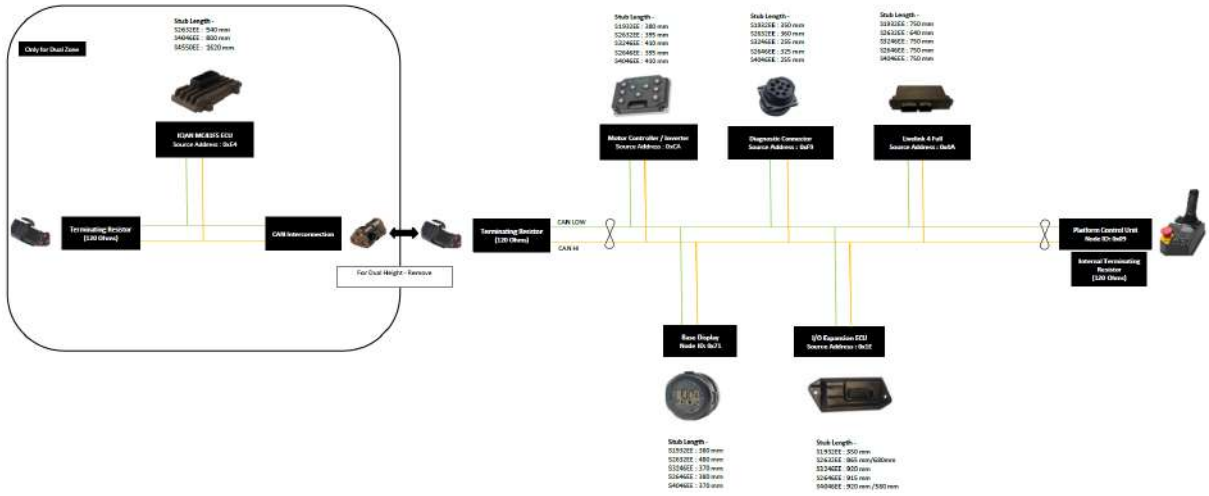
| Number | Component  |
|--------|--|
| 1      | <a href="#">CAN Layout</a> <sup>17</sup>                       |
| 2      | <a href="#">System Block Diagram</a> <sup>18</sup>             |
| 3      | <a href="#">Wiring &amp; Battery Lead Layout</a> <sup>18</sup> |

## Machine Details



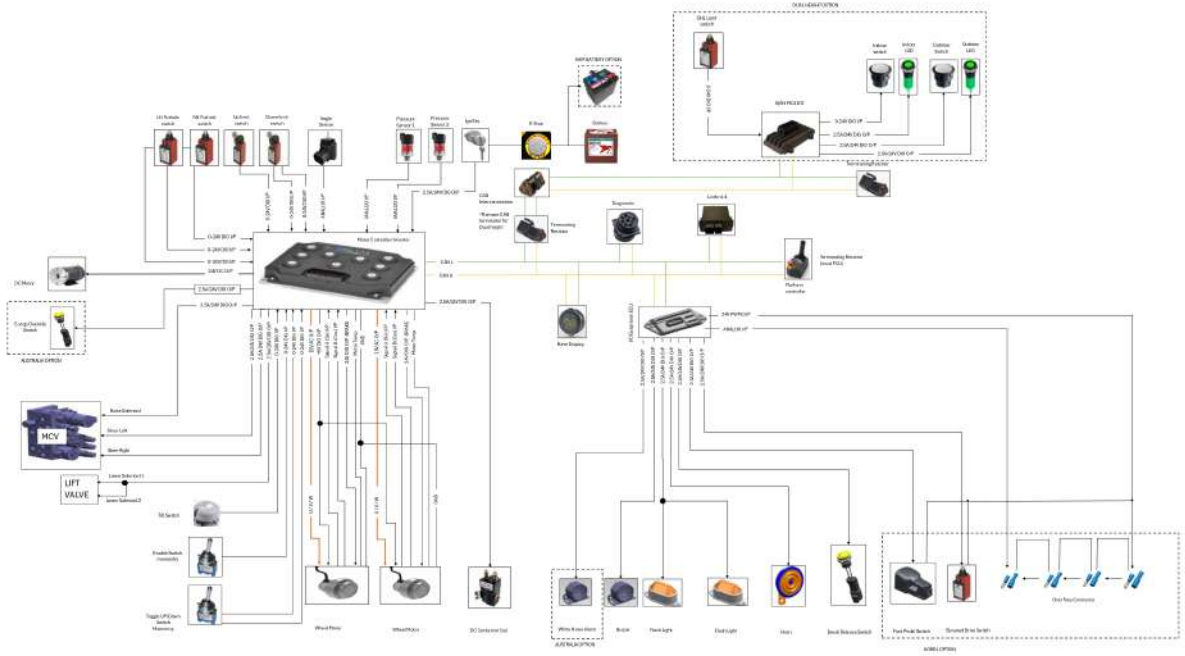
## 2.1 Can Layout

### Can Layout



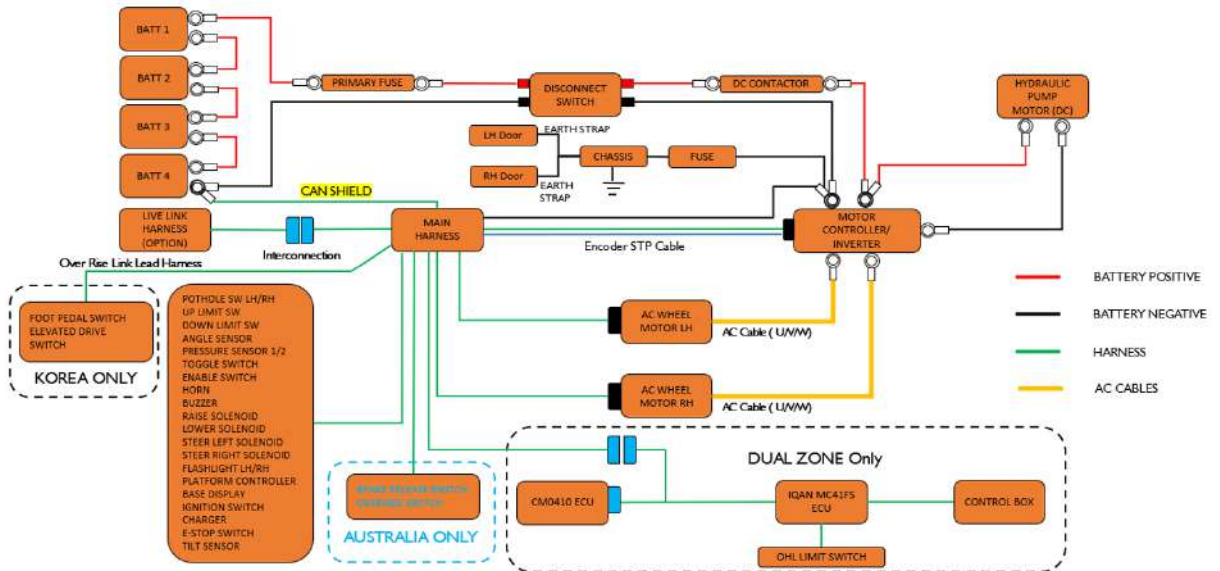
2.2 System Block Diagram

System Block Diagram



2.3 Wiring & Battery Lead Layout

Wiring & Battery Lead Layout



This page is intentionally left blank.  
Remove this text from the manual  
template if you want it completely blank.

# System Level Function

## 3 System Level Function

List of System Level Function

| Number | Component   |
|--------|---|
| 1      | <a href="#">System Startup Diagram</a>   23         |
| 2      | <a href="#">Drive</a>   24                          |
| 3      | <a href="#">Steering</a>   28                       |
| 4      | <a href="#">Horn</a>   30                           |
| 5      | <a href="#">Pothole Protection</a>   32             |
| 6      | <a href="#">Load Sensing</a>   35                   |
| 7      | <a href="#">Platform Raise</a>   38                 |
| 8      | <a href="#">Platform Lower</a>   41                 |
| 9      | <a href="#">E-Stop</a>   44                         |
| 10     | <a href="#">Load Calibration</a>   46               |
| 11     | <a href="#">Pressure Sensor</a>   47                |
| 12     | <a href="#">Platform Controller</a>   48            |
| 13     | <a href="#">Base Control</a>   50                   |
| 14     | <a href="#">Tilt Alarm</a>   52                     |
| 15     | <a href="#">Dual Height Mode</a>   55               |
| 16     | <a href="#">Sensor &amp; Switches</a>   58          |
| 17     | <a href="#">Battery Management System</a>   58      |
| 18     | <a href="#">Service Mode</a>   62                   |
| 19     | <a href="#">E-Stop Override</a>   64                |
| 20     | <a href="#">Korea Homologation Requirement</a>   68 |
| 21     | <a href="#">Service Brake Release</a>   72          |

## System Level Function



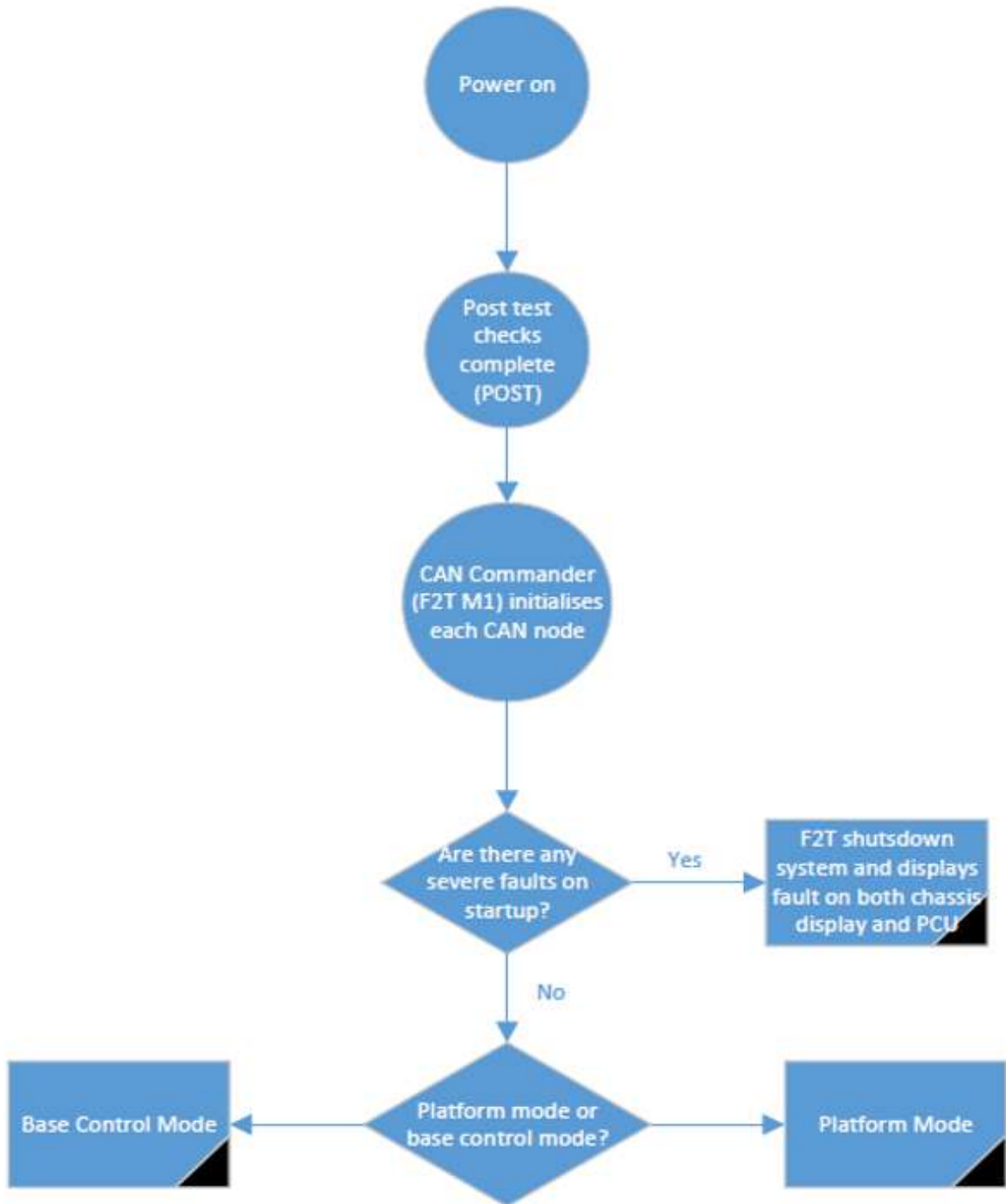
### 3.1 System Startup Diagram

#### System Start up Diagram

#### Function

System Startup Diagram basically defines the tasks and transfer conditions of each state through which motor controller shall operate once the power is ON.

## System Diagram



### 3.2 Drive Function

The Drive function allows the operator to move the machine in Forward or Reverse direction for operational mobility.

Drive and brake functions are powered by electric motors and controlled by a Motor Controller/Inverter.

## Pre-Conditions

Key Switch Position: Must be set to Platform Mode at the base station.

E-Stop: Must be released at both chassis and platform controls.

## Control Position

Platform Control Panel:

Drive Button: Toggles between Tortoise and Hare modes.

Joystick: Controls direction (Forward/Reverse) when Enable button is held.

Enable Button: Safety interlock for all joystick operations.

## How to Perform Drive Operation

### Drive Mode Selection

Set key switch to Platform Mode.

Press Drive button once to enable drive mode.

Toggle between:

Tortoise Mode: 50% machine speed (default after key cycle).

Hare Mode: 100% machine speed.(Max machine speed is 4.5km/h)

Elevated Drive Mode: If platform is above down-limit height, speed is limited to approx. 0.8 km/h.

### Joystick Operation

Ensure Drive mode is selected.

Press and hold Enable button on joystick.

Push joystick forward → Drive forward.

Pull joystick backward → Drive backward.

Release Enable button → All operations stop immediately.

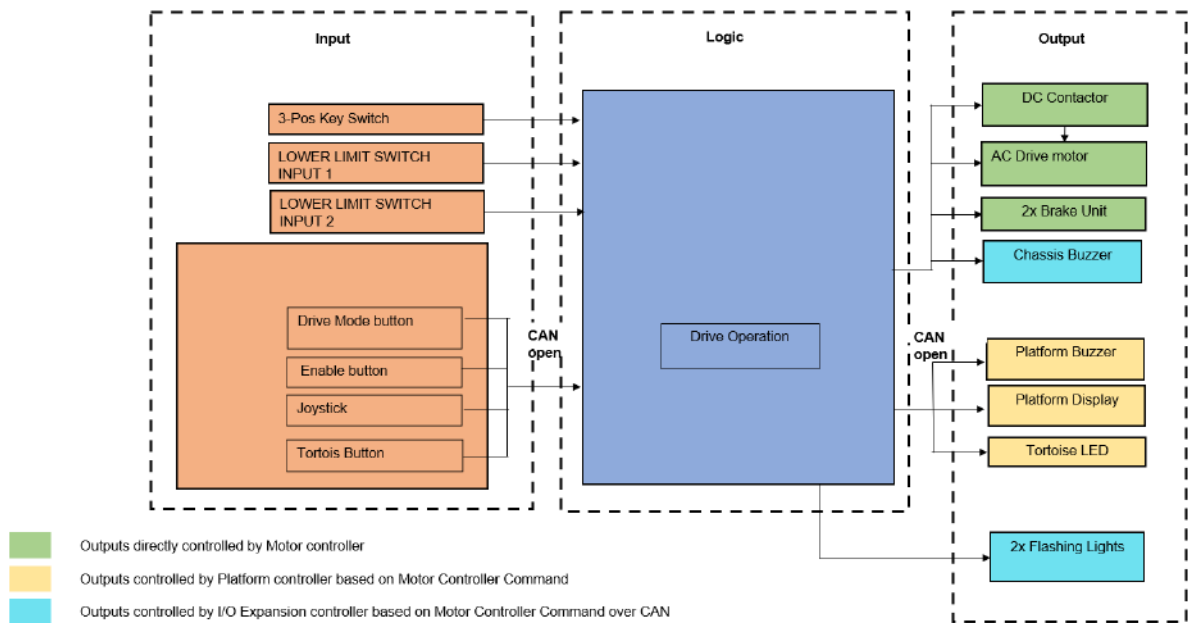
Steer function works independently and is not affected by drive.

All joystick operations (Drive/Steer/Lift/Lower) require Enable button pressed.

Releasing Enable button immediately deactivates ongoing operation.

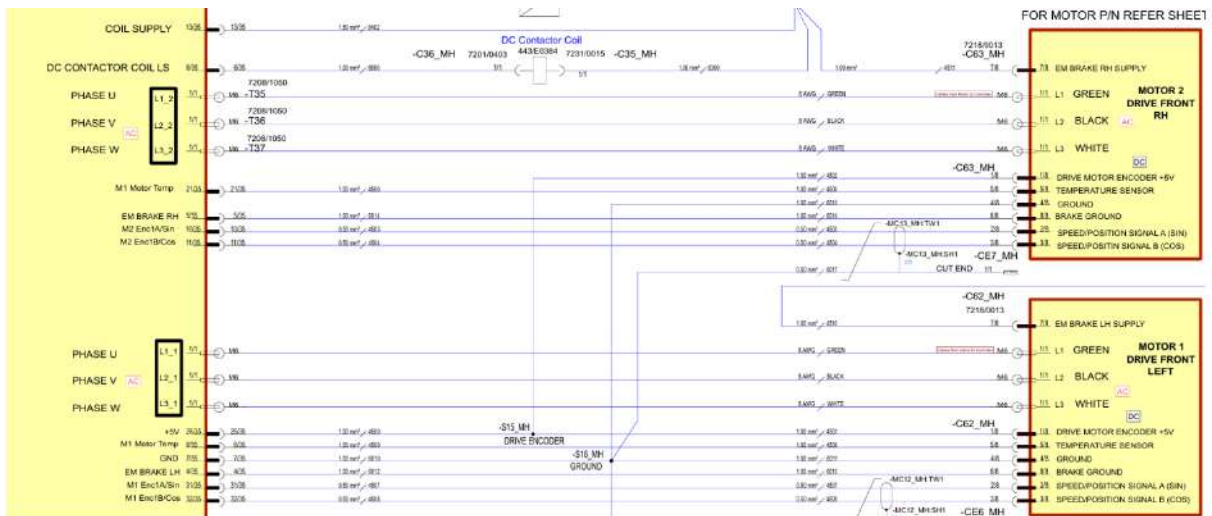
## System Diagram

Below figure explains the Drive system as a whole –



## Signal

The ignition signal is a 24V signal.



## Parts in Circuit

- [3-Pos Key Switch](#) <sup>352</sup>
- [LOWER LIMIT SWITCH INPUT 1](#) <sup>389</sup>

- [LOWER LIMIT SWITCH INPUT 2](#) <sup>389</sup>
- [Joystick](#) <sup>381</sup>
- [Motor controller](#) <sup>345</sup>
- [DC Contactor](#) <sup>361</sup>
- [2x Brake Unit](#) <sup>394</sup>
- [Chassis Buzzer](#) <sup>391</sup>
- [Base Display](#) <sup>336</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [Platform Display](#) <sup>340</sup>
- [2x Flashing Lights](#) <sup>400</sup>

## Related Fault Code

| Fault Code                        | Description   |
|-----------------------------------|---|
| <a href="#">12</a> <sup>315</sup> | Controller Over current (Motor phase current) (Left Motor)  |
| <a href="#">2</a> <sup>315</sup>  | Controller Over current (Motor phase current) (Right Motor) |
| <a href="#">28</a> <sup>272</sup> | Motor Temp Hot Cutback - Left Motor                         |
| <a href="#">0A</a> <sup>272</sup> | Motor Temp Hot Cutback - Right Motor                        |
| <a href="#">29</a> <sup>273</sup> | Motor Temp Sensor - Left Motor                              |
| <a href="#">0B</a> <sup>274</sup> | Motor Temp Sensor - Right Motor                             |
| <a href="#">32</a> <sup>276</sup> | EM Brake Driver - Left Motor                                |
| <a href="#">A2</a> <sup>278</sup> | EM Brake Driver - Right Motor                               |
| <a href="#">36</a> <sup>279</sup> | Sin Cos Motor Feedback - Left Motor                         |
| <a href="#">0D</a> <sup>281</sup> | Sin Cos Motor Feedback - Right Motor                        |
| <a href="#">37</a> <sup>283</sup> | Motor Open - Left Motor                                     |
| <a href="#">0E</a> <sup>284</sup> | Motor Open - Right Motor                                    |
| <a href="#">3A</a> <sup>323</sup> | Motor Setup Needed - Left Motor                             |
| <a href="#">0F</a> <sup>323</sup> | Motor Setup Needed - Right Motor                            |
| <a href="#">6B</a> <sup>272</sup> | Motor_Temperature_Shutdown_Fault                            |
| <a href="#">84</a> <sup>276</sup> | Motor Braking Impaired - Left Motor                         |
| <a href="#">3E</a> <sup>278</sup> | Motor Braking Impaired - Right Motor                        |
| <a href="#">92</a> <sup>319</sup> | EM Brake Failed to Set - Left Motor                         |
| <a href="#">43</a> <sup>320</sup> | EM Brake Failed to Set - Right Motor                        |

## 3.3 Steering

### Function

The Steer Operation allows the machine to turn left or right. Steering is controlled by the hydraulic system, powered by a hydraulic pump in conjunction with an electric motor, which also powers lift functions.

### Control Position

Platform Control Only (Steer operation is not available from chassis control).

Joystick Control at Platform Station: Joystick has a 3-position switch on top for steer operation:

Steer Left (momentary)

No Steer Selected (default)

Steer Right (momentary)

### Pre-Conditions

Ignition switch should be On.

Key Switch set to Platform Control.

Drive Mode selected on PCU.

Joystick Enable button must be pressed and held during operation.

### Working

Set Key Switch to Platform Control.

Select Drive Mode on PCU.

Press and hold Joystick Enable button.

Move Joystick forward/backward for drive and use top switch for steer:

Push left for Steer Left.

Push right for Steer Right.

Center position = No Steer.

Steer operation is possible:

When machine is stationary or driving forward/reverse.

Steer operation is NOT allowed during platform raise/lower operations.

All joystick operations (drive/steer/raise/lower) require Enable button held continuously.

Releasing the Enable button immediately stops ongoing operation.

### Steer operation during live fault

Steer operation is disabled if any of the following faults occur:

Overload

Pothole Guard Fault

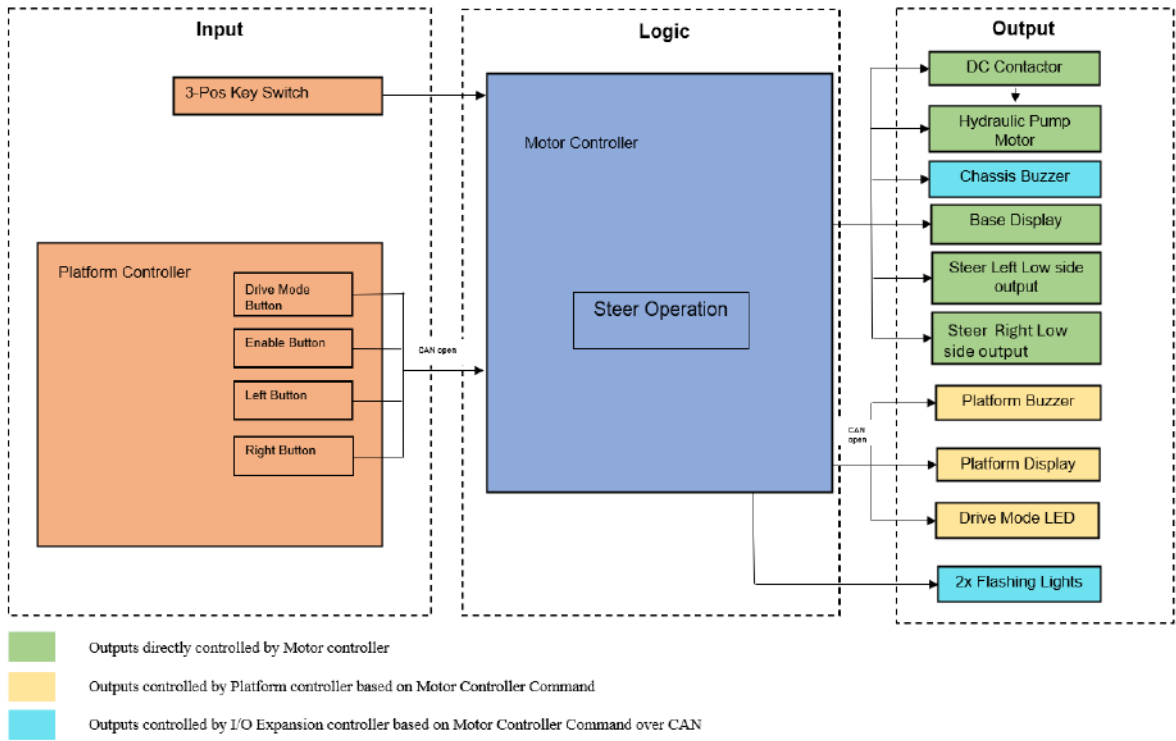
Battery Low Voltage Fault

Lift Motion Fault

Tilt Alarm  
Any fault that disables all motions (drive/steer).

## System Diagram

Below figure explains the Steer system as a whole –



## Signal

The ignition signal is a 24V signal.



## Parts in Circuit

- [3-Pos Key Switch](#) <sup>352</sup>
- [Platform Controller](#) <sup>340</sup>

- [Motor Controller](#) <sup>345</sup>
- [Hydraulic Pump Motor](#) <sup>359</sup>
- [MCV](#) <sup>428</sup>
- [DC Contactor](#) <sup>361</sup>
- [Base Display](#) <sup>336</sup>
- [Chassis Buzzer](#) <sup>391</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [Platform Display](#) <sup>340</sup>
- [Drive Mode LED](#) <sup>340</sup>
- [Flash Lights](#) <sup>400</sup>

## Related Fault Codes

| Fault Code                        | Description           |
|-----------------------------------|-----------------------|
| <a href="#">A1</a> <sup>244</sup> | Steer right Fault     |
| <a href="#">A6</a> <sup>246</sup> | Steer Left Coil Fault |

## 3.4 Horn

### Function

The Horn function provides an audible warning to ground personnel when activated from the platform control panel. It enhances safety by alerting people near the machine during operation or movement.

### Pre-Condition-Key Switch Position:

Must be set to Platform Control Mode (via 3-Position Key Switch).

Machine Power:

Ignition ON and E-Stop released.

### Control Position

Platform Control Panel:

Horn push button for activation.

Horn Output:

Located at the ground level for maximum audibility.

Control Logic:

Horn output is driven by an I/O expansion module based on commands from the Motor Controller.

## How to Perform This Function

Set key switch to Platform Control Mode.

Ensure E-Stop is released and machine is powered ON.

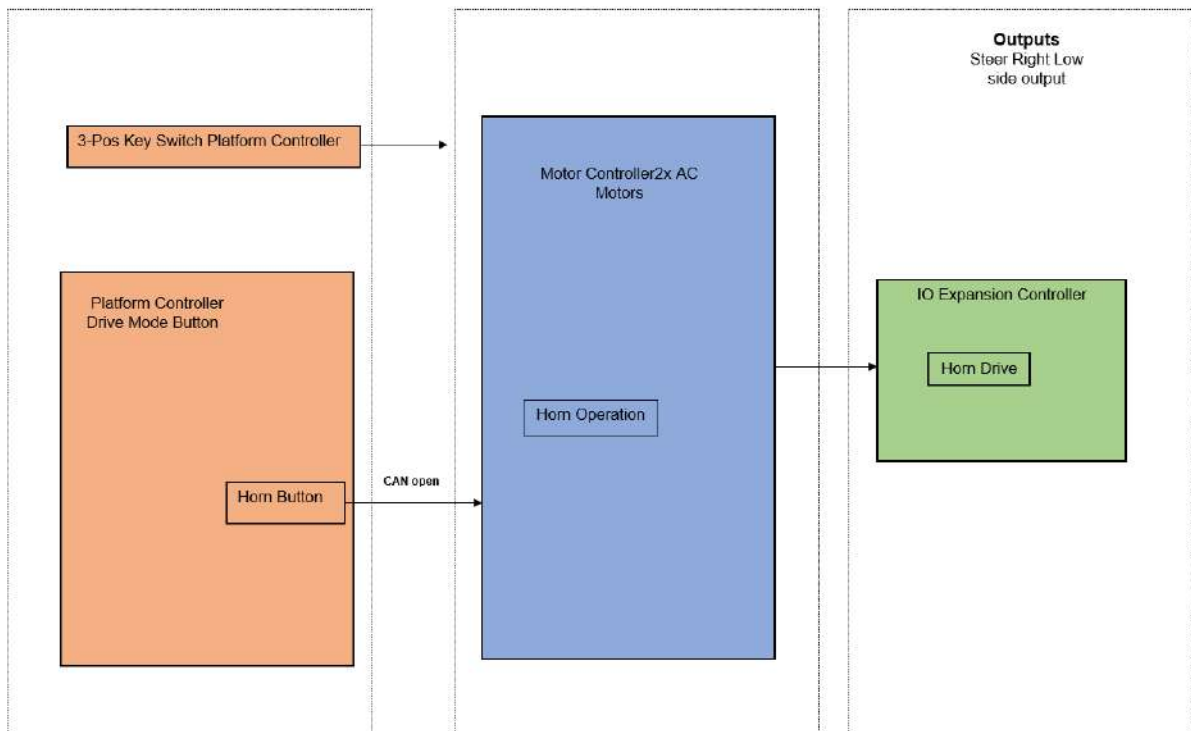
Press the Horn push button on the platform control panel.

Horn sounds at the ground level as a warning signal.

Release the button to stop the horn.

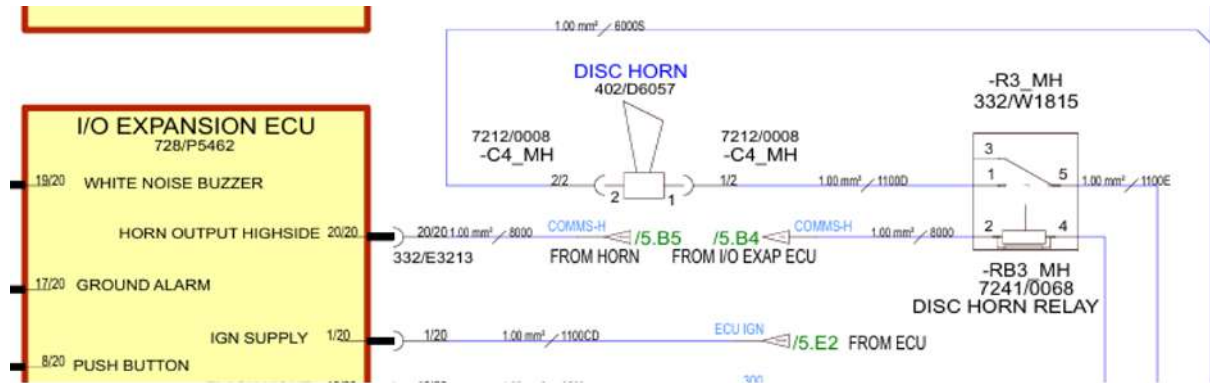
## System Diagram

Below figure explains the Horn as a whole –



## Signal

The ignition signal is a 24V signal.



## Parts in Circuit

- [3-Pos Key Switch](#) <sup>352</sup>
- [Platform Controller](#) <sup>340</sup>
- [Horn Button](#) <sup>340</sup>
- [Motor Controller](#) <sup>345</sup>
- [I/O Expansion ECU](#) <sup>349</sup>

## Related Fault Codes

N/A

## 3.5 Pothole Protection

### Function

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.

It ensures stability by:

Deploying protection plates when the platform is raised.

Retracting protection plates when the platform is lowered, allowing the machine to drive over ramps or obstacles safely.

Drive operation is always disabled in case of any pothole error or fault.

## **Raise Enable/Disable Rules From service master tool**

Europe/UK Region: Raise enable during pothole fault = Disabled.

Rest of World (ROW): Raise enable during pothole fault = Enabled.

## **Raise Operation From Base Control Panel:**

From Chassis Control Panel:

Key switch set to Chassis mode.

Press and hold Base Enable switch.

Push Raise toggle switch UP and hold.

## **Raise Operation From Platform Control Panel:**

Key switch set to Platform mode.

Select Lift/Lower Mode on PCU.

Press and hold Enable button on joystick.

Push joystick backward to raise the platform.

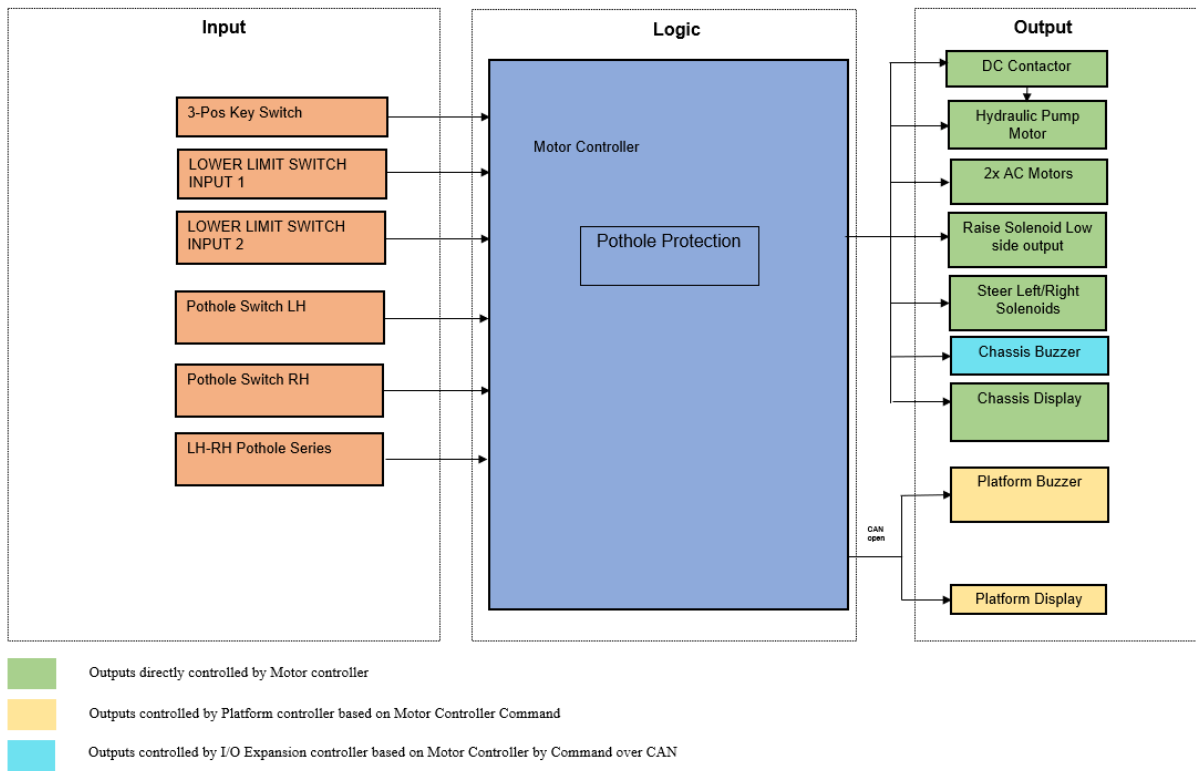
If a pothole guard fault occurs:

Alarm option = Enable: Machine sounds an alarm.

Alarm option = Disable: No alarm is sounded.

## **System Diagram**

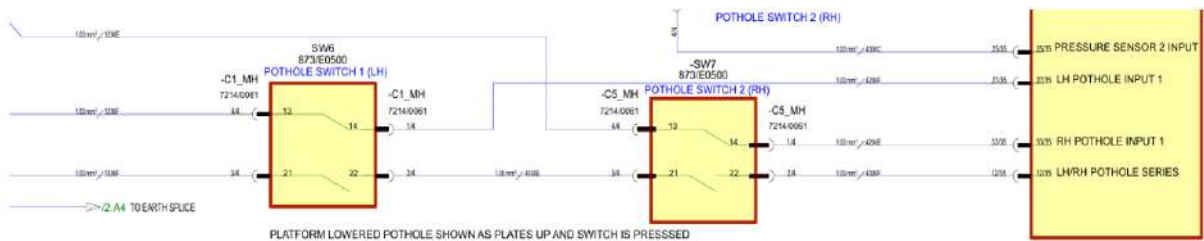
Below figure explains the Pothole Protection as a whole –



## Signal

The ignition signal is a 24V signal.

Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [3-Pos Key Switch](#) <sup>352</sup>
- [LOWER LIMIT SWITCH INPUT 1](#) <sup>389</sup>
- [LOWER LIMIT SWITCH INPUT 2](#) <sup>389</sup>
- [Pothole Switch LH](#) <sup>384</sup>

- [Pothole Switch RH](#) <sup>384</sup>
- [LH-RH Pothole Series](#) <sup>384</sup>
- [Motor Controller](#) <sup>345</sup>
- [DC Contactor](#) <sup>361</sup>
- [Hydraulic Pump Motor](#) <sup>359</sup>
- [2x AC Motors](#) <sup>394</sup>
- [Raise Solenoid Low side output](#) <sup>428</sup>
- [Steer Left/Right Solenoids](#) <sup>428</sup>
- [Chassis Buzzer](#) <sup>391</sup>
- [Chassis Display](#) <sup>336</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [Platform Display](#) <sup>340</sup>

## Related Fault Codes

| Fault Code                        | Description          |
|-----------------------------------|----------------------|
| <a href="#">56</a> <sup>257</sup> | Pothole Switch Fault |

## 3.6 Load Sensing

### Function

The Load Sensing System ensures safe machine operation by detecting platform load and preventing overload conditions that could lead to instability or tipping. 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.

### System Components

Two Pressure Sensors mounted on the hydraulic lift cylinder to measure cylinder pressure.

Analog Rotary Encoder mounted on the scissor pack boss to determine scissor pack position (height).

### Working

Pressure in the lift cylinder is proportional to:

Platform Load

Scissor Pack Position

The system calculates load based on:  
 Height (from angle sensor/rotary encoder)  
 Pressure (from hydraulic cylinder sensors)

## Overload Detection Range

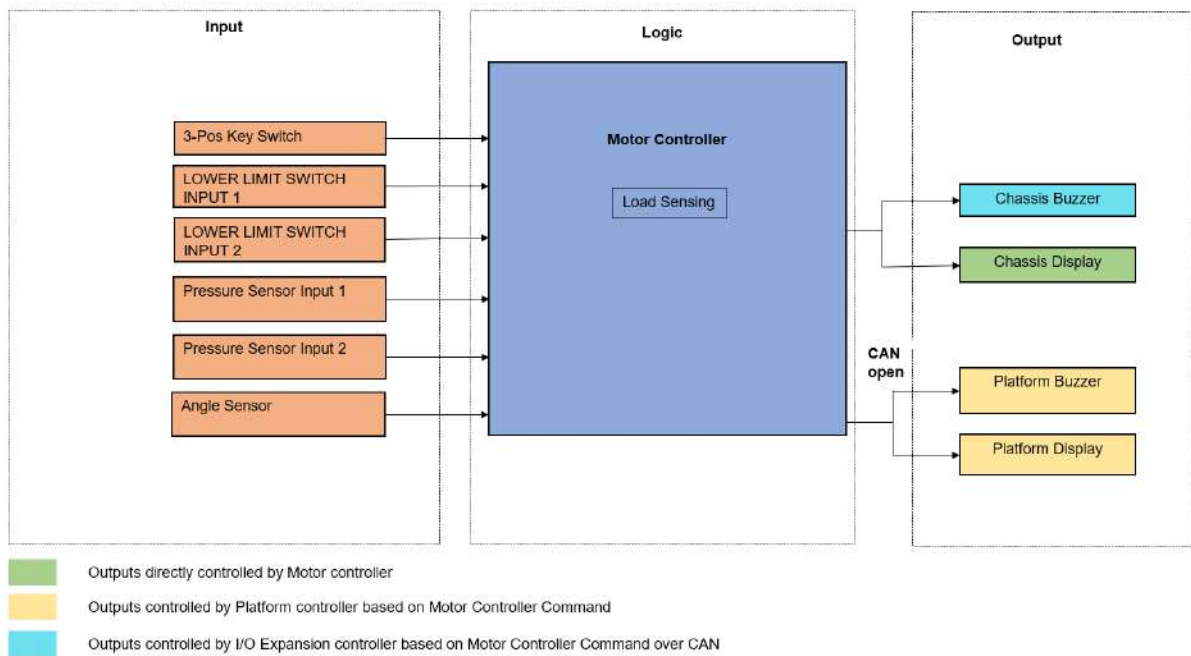
Detection Range: 96% to 105% of rated load capacity.  
 Overload Condition: Must be detected at 105% of rated load.

## Calibration Requirement

Whenever a faulty angle sensor and/or pressure sensor is replaced with a new sensor, the Load Sensing System must be calibrated to ensure accurate load detection.

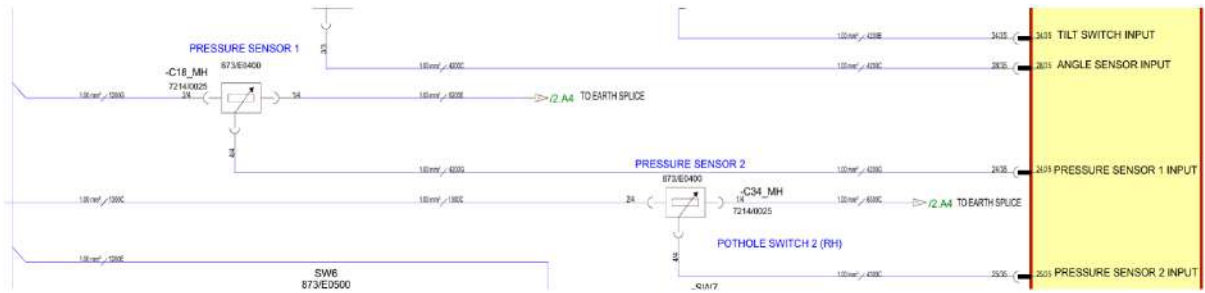
## System Diagram

Below figure explains the Load Sensing system as a whole -



## Signal

The ignition signal is a 24V signal.  
 Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [3-Pos Key Switch](#) <sup>352</sup>
- [LOWER LIMIT SWITCH INPUT 1](#) <sup>389</sup>
- [LOWER LIMIT SWITCH INPUT 2](#) <sup>389</sup>
- [Pressure Sensor Input 1](#) <sup>385</sup>
- [Pressure Sensor Input 2](#) <sup>385</sup>
- [Angle Sensor](#) <sup>379</sup>
- [Motor Controller](#) <sup>345</sup>
- [Chassis Buzzer](#) <sup>391</sup>
- [Chassis Display](#) <sup>336</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [Platform Display](#) <sup>340</sup>

## Related Fault Codes

| Fault Code                        | Description                        |
|-----------------------------------|------------------------------------|
| <a href="#">B8</a> <sup>241</sup> | Angle Sensor Fault                 |
| <a href="#">54</a> <sup>234</sup> | Pressure Sensors Correlation Fault |
| <a href="#">B9</a> <sup>234</sup> | Pressure Sensor 1 Fault            |
| <a href="#">BB</a> <sup>237</sup> | Pressure Sensor 2 Fault            |
| <a href="#">OL</a> <sup>262</sup> | Platform Overload                  |
| <a href="#">65</a> <sup>241</sup> | Angle Sensor Calibration Fault     |

## 3.7 Platform Raise

### Function

The Platform Raise function allows the operator to lift the machine's platform to the desired height for performing work at elevation.

This function ensures safe lifting under controlled conditions and prevents operation during faults or unsafe scenarios.

### Pre-Conditions for Raise Operation

#### Key Switch Position:

For Chassis Control = Key switch set to Chassis Mode.

For Platform Control = Key switch set to Platform Mode.

E-Stop: Must be released at both chassis and platform.

### Control Position

#### Chassis Control Panel:

Base Enable Switch (momentary).

Lift/Lower Toggle Switch (3 positions: UP, Neutral, DOWN).

Platform Control Panel:

Lift Mode Button.

Joystick with Enable Button.

### How to Perform Raise Operation

#### A. From Chassis Control Panel

- Set key switch to Chassis Mode.
- Press and hold Base Enable switch.
- Push and hold Lift/Lower toggle switch UP to raise platform.

#### B. From Platform Control Panel

- Set key switch to Platform Mode.
- Select Lift Mode by pressing Lift button.
- Press and hold Enable button on joystick.
- Pull joystick backward to raise platform.

### Raise operation during Fault condition-

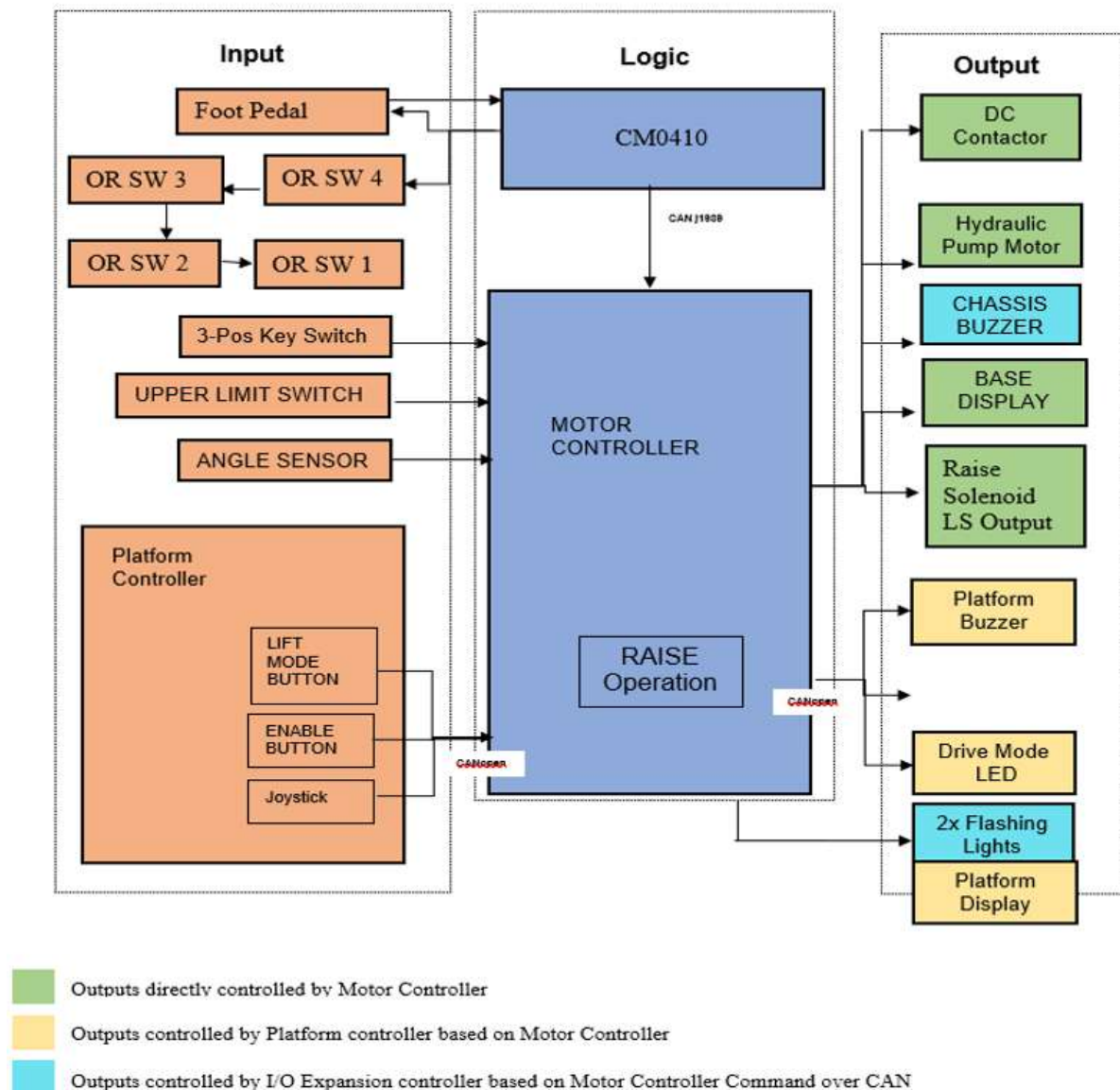
If any of the following faults occur, raise operation can still be performed by enabling Service Mode:

- Pressure sensor output out of range or disagreement.
- Angle sensor output out of range or stuck.
- Down limit or upper limit switch stuck.
- Overload fault.
- Pothole fault.
- Lift motion fault.

**Safety Notes :** Lift and drive modes cannot be operated simultaneously.

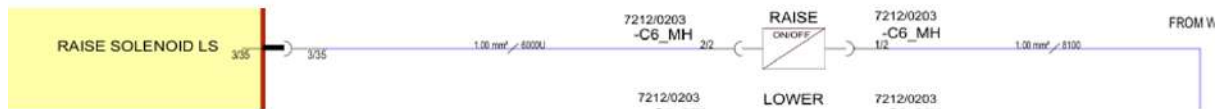
## System Diagram

Below figure explains Platform Raise as a whole –



## Signal

The ignition signal is a 24V signal.  
Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [3-Pos Key Switch](#) <sup>352</sup>
- [UPPER LIMIT SWITCH](#) <sup>389</sup>
- [ANGLE SENSOR](#) <sup>379</sup>
- [Platform Controller](#) <sup>340</sup>
- [Foot Pedal](#) <sup>406</sup>
- [CM0410](#) <sup>349</sup>
- [MOTOR CONTROLLER](#) <sup>345</sup>
- [DC Contactor](#) <sup>361</sup>
- [Hydraulic Pump Motor](#) <sup>359</sup>
- [CHASSIS BUZZER](#) <sup>391</sup>
- [BASE DISPLAY](#) <sup>336</sup>
- [Raise Solenoid LS Output](#) <sup>428</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [Drive Mode LED](#) <sup>340</sup>
- [2x Flashing Lights](#) <sup>400</sup>
- [Platform Display](#) <sup>340</sup>

## Related Fault Codes

| Fault Code                        | Description   |
|-----------------------------------|---|
| <a href="#">A4</a> <sup>248</sup> | Lift Up solenoid  |
| <a href="#">B8</a> <sup>241</sup> | Angle Sensor Fault                                      |
| <a href="#">E1</a> <sup>307</sup> | Override Detection Limit Switch or Related Wiring Fault |
| <a href="#">E2</a> <sup>307</sup> | Elevated Drive Limit Switch or Related Wiring Fault     |
| <a href="#">E3</a> <sup>310</sup> | Elevated Conditions Detected - EL                       |
| <a href="#">E4</a> <sup>311</sup> | Override Condition Detected                             |

## 3.8 Platform Lower

### Function

To allow the operator to lower the machine's platform safely from either platform control panel or the chassis control panel.

### Switch Location

**Chassis Control Panel:** Lift/Lower toggle switch  
Base Enable switch

**Platform Control Panel:** Joystick with Enable button  
Lift/Lower Mode button on PCU

### Pre-Conditions

Ignition should be ON  
Key switch set to:  
Chassis mode for lowering from base.  
Platform mode for lowering from platform.  
E-stop=Released state

### Activation from Chassis

Set Key switch to Chassis mode.  
Press and hold Base Enable switch.  
Push and hold Lower toggle switch in DOWN position

### Activation from Platform

Set Key switch to Platform mode.  
Select Lift/Lower Mode on PCU.  
Press and hold Enable button on joystick.

Pull joystick forward to lower the platform.

## Lower operation during active faults

If any of the following faults occur, operator can still lower the platform by enabling Service Mode:

Pressure sensor output out of range (one or both).

Pressure sensor values disagree.

Angle sensor output out of range.

Angle sensor output does not change for defined time but down limit contacts changeover.

Down limit switch stuck.

Upper limit switch stuck or preventing lift.

Overload fault scenario.

Pothole fault scenario.

Lift motion fault.

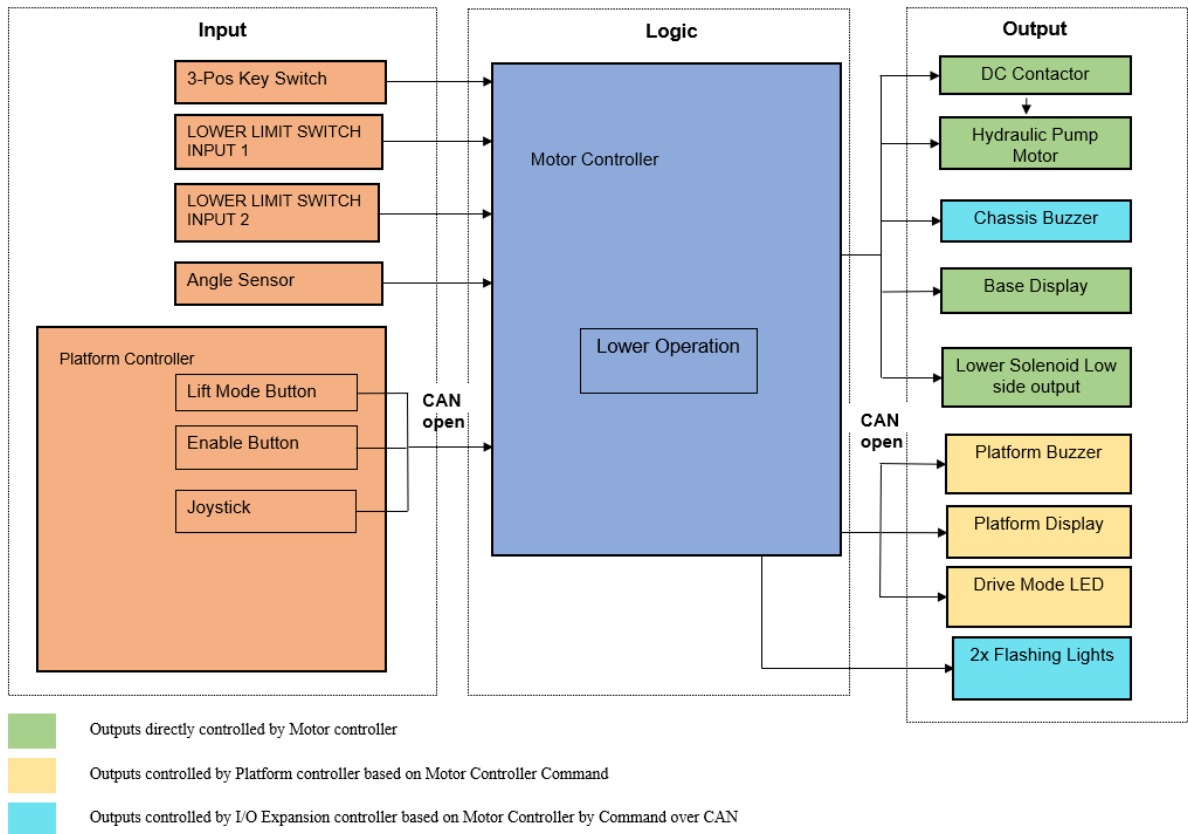
## Descent Delay:

Option to pause lowering at a predefined height for 3 seconds with audible warning.

Operator must release and press joystick Enable again to continue lowering.

## System Diagram

Below figure explains the Platform Lower function as a whole –



## Signal

The ignition signal is a 24V signal.

Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [3-Pos Key Switch](#) <sup>352</sup>
- [LOWER LIMIT SWITCH INPUT 1](#) <sup>389</sup>
- [LOWER LIMIT SWITCH INPUT 2](#) <sup>389</sup>
- [Upper Limit Switch](#) <sup>389</sup>
- [Pressure Sensor Input 1](#) <sup>385</sup>
- [Pressure Sensor Input 2](#) <sup>385</sup>
- [Angle Sensor](#) <sup>379</sup>

- [Motor Controller](#) <sup>345</sup>
- [Chassis Buzzer](#) <sup>391</sup>
- [Chassis Display](#) <sup>336</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [Platform Display](#) <sup>340</sup>
- [DC Contactor](#) <sup>361</sup>
- [Hydraulic Pump Motor](#) <sup>359</sup>
- [Raise Solenoid Low side output](#) <sup>428</sup>
- [Lower Solenoid Low side output](#) <sup>430</sup>
- [2x Flashing Lights](#) <sup>400</sup>
- [HORN](#) <sup>355</sup>

## Related Fault Codes

| Fault Code                        | Description             |
|-----------------------------------|-------------------------|
| <a href="#">A7</a> <sup>250</sup> | Lift Down Coil Fault    |
| <a href="#">B8</a> <sup>241</sup> | Angle Sensor Fault      |
| <a href="#">B9</a> <sup>234</sup> | Pressure Sensor 1 Fault |
| <a href="#">BB</a> <sup>241</sup> | Pressure Sensor 2 Fault |
| <a href="#">5A</a> <sup>264</sup> | Down limit Switch Fault |

## 3.9 E-Stop

### Function

The Emergency Stop (E-Stop) function is used in emergency conditions when it is necessary to immediately cut power to the machine to prevent hazards or accidents.

E-Stop is located at both Chassis and platform control station .Both E-Stop buttons feed into the ignition input via the key switch.

If E-Stop is pressed at either control position, machine will not function.

### Pre-Conditions

E-Stop must be released (pulled out).  
Key switch should be set to either chassis or Platform

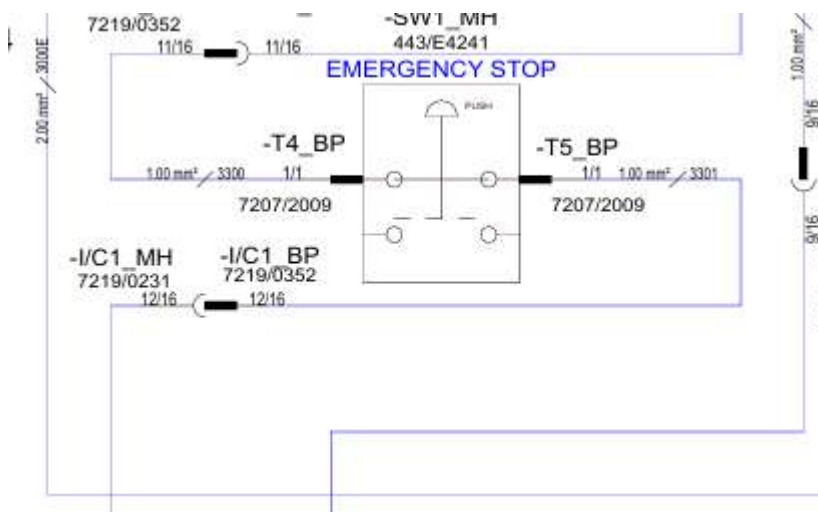
## To Activate Emergency Stop

Press the E-Stop button at either chassis or platform control.  
Machine power is cut; all operations stop.  
To Resume Operation:  
Pull out the E-Stop button (release).  
Ensure key switch is ON to restore power.

## Signal

The ignition signal is a 24V signal.

Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [E-Stop](#) <sup>357</sup>
- [Key Switch](#) <sup>352</sup>
- [Motor controller](#) <sup>345</sup>
- [Platform control unit](#) <sup>340</sup>
- [Chassis buzzer](#) <sup>391</sup>

## Related Fault Codes

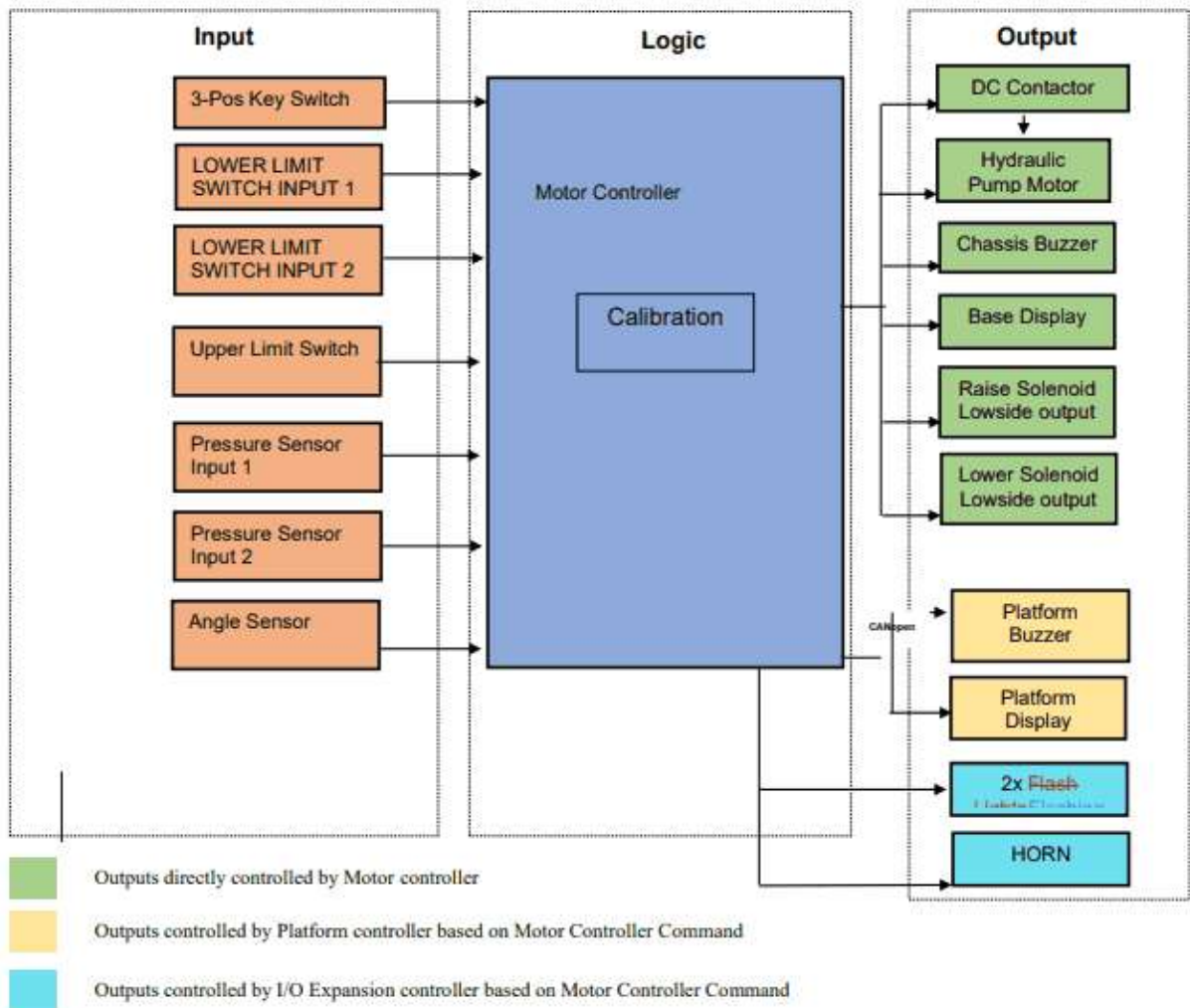
| Fault Code                        | Description               |
|-----------------------------------|---------------------------|
| <a href="#">7D</a> <sub>314</sub> | E_STOP_Override_STB_Fault |

## 3.10 Load Calibration

### Function

#### 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.

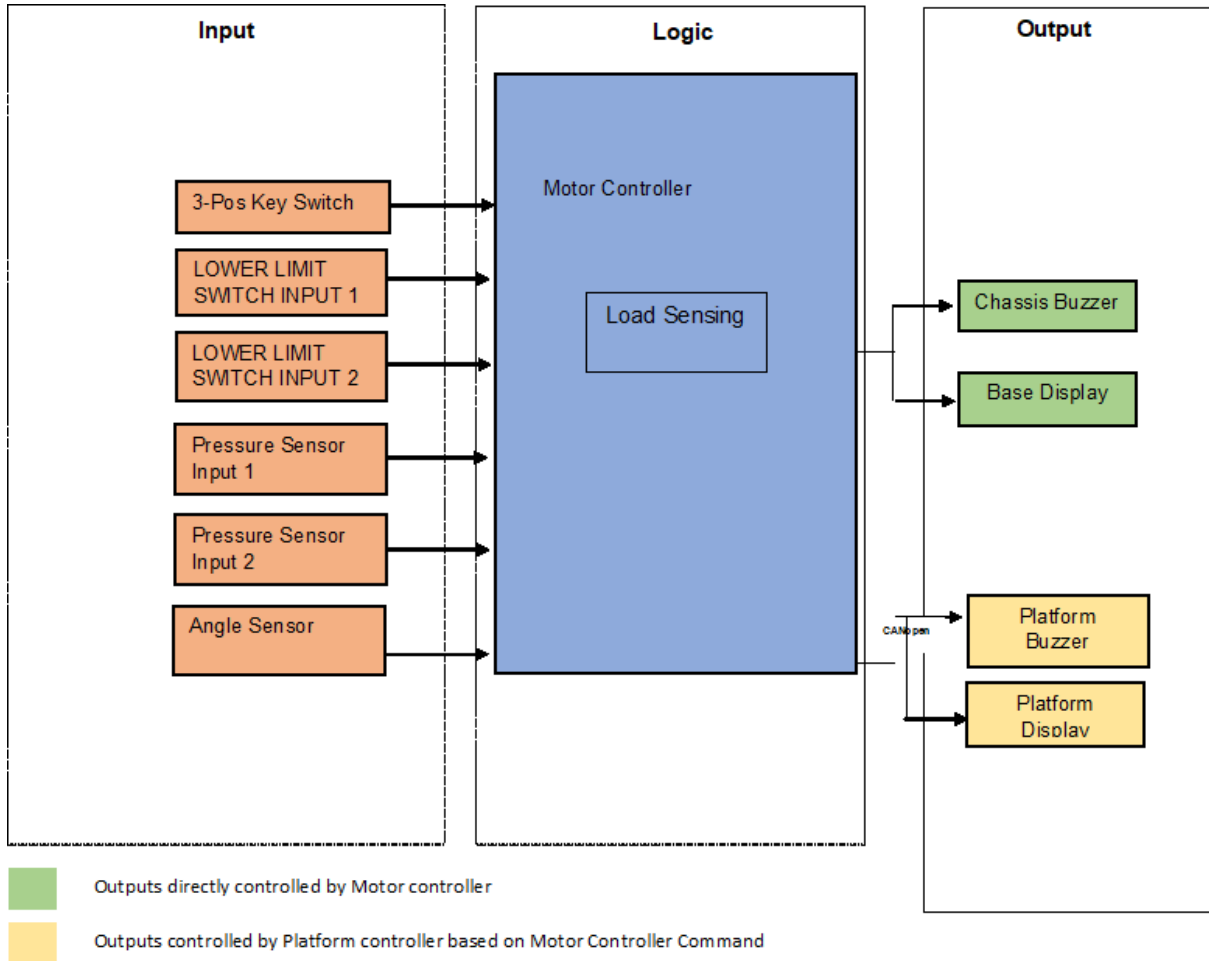


| Signal Name                 | Input Type          | Value   |
|-----------------------------|---------------------|---|
| Rotary Encoder/Angle sensor | ANALOG INPUT        | 0.5V - 4.5V                                       |
| PRESSURE SENSOR INPUT 1     | ANALOG INPUT        | 0.5V - 4.5V                                       |
| PRESSURE SENSOR INPUT 2     | ANALOG INPUT        | 0.5V - 4.5V                                       |
| Upper limit Switch          | 0-24V DIGITAL INPUT | Off – Low<br>On - High                            |
| LOWER LIMIT SWITCH INPUT 1  | 0-24V DIGITAL       | 24VDC: below down limit<br>0VDC: above down limit |
| LOWER LIMIT SWITCH INPUT 2  | 0-24V DIGITAL       | 24VDC: above down limit<br>0VDC: below down limit |

## 3.11 Pressure Sensor

### Function

### Pressure Sensor



## Related Fault Codes

| Fault Code                        | Description                        |
|-----------------------------------|------------------------------------|
| <a href="#">54</a> <sup>234</sup> | Pressure Sensors Correlation Fault |
| <a href="#">7A</a> <sup>234</sup> | Percentage_To_Max_Difference_Fault |
| <a href="#">B9</a> <sup>234</sup> | Pressure Sensor 1 Fault            |
| <a href="#">BB</a> <sup>237</sup> | Pressure Sensor 2 Fault            |

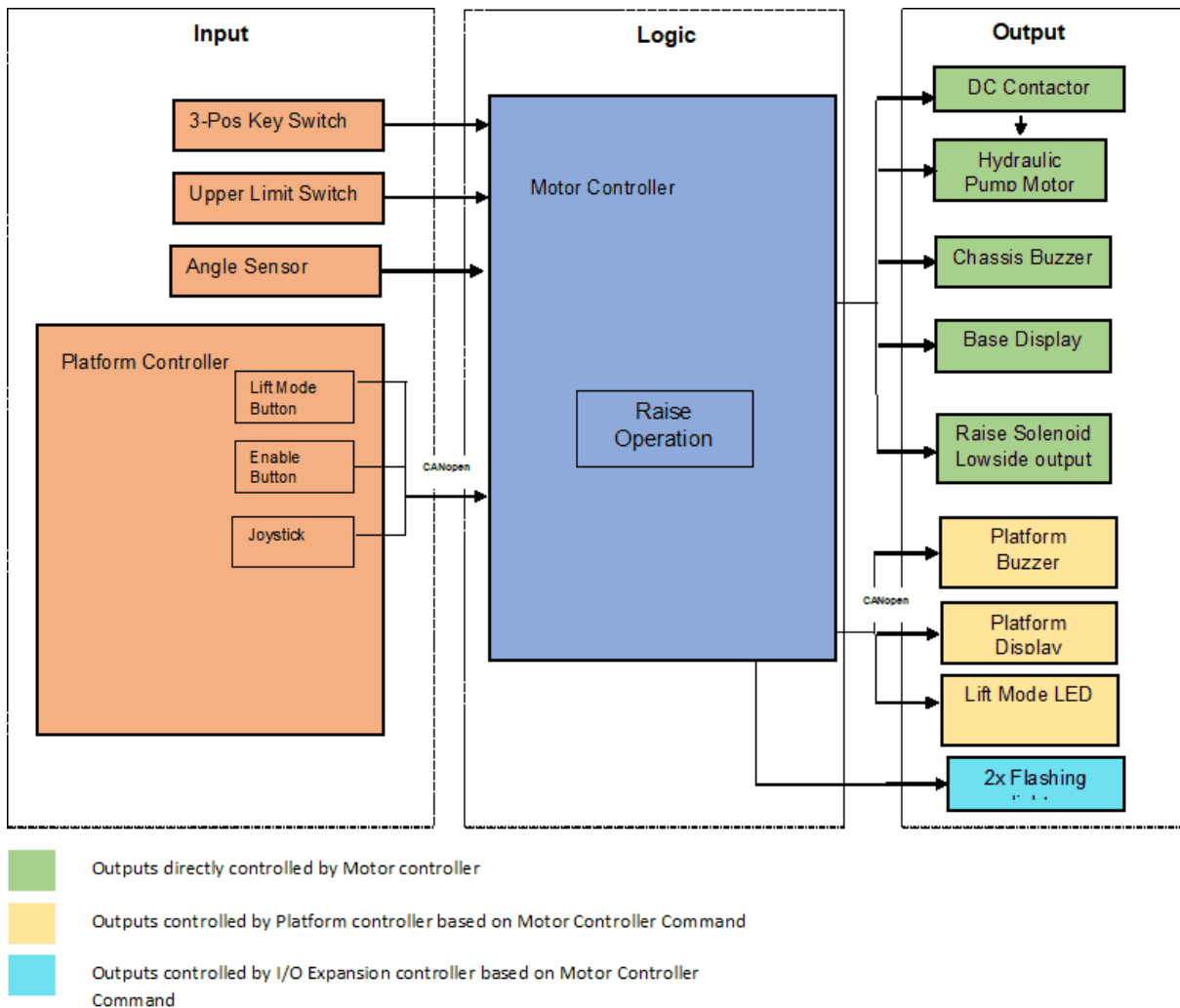
## 3.12 Platform Controller

### Function

## 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



## Related Fault Codes

| Fault Code                            | Description                       |
|---------------------------------------|-----------------------------------|
| <a href="#">5F</a> <small>252</small> | PCU HW Fault                      |
| <a href="#">52</a> <small>252</small> | Wika PCU PDO Timeout Fault        |
| <a href="#">5C</a> <small>269</small> | PCU Enable Trigger Sequence Fault |
| <a href="#">5D</a> <small>269</small> | PCU Passcode Fault                |

|                        |                                     |
|------------------------|-------------------------------------|
| <a href="#">6A</a> 269 | PCU Steer Right/Left Sequence Fault |
|------------------------|-------------------------------------|

### 3.13 Base Control

#### Function

The Base Control function enables the operator to Operate the machine from the chassis control panel.

Enter Service Mode for maintenance and diagnostics.

Activate E-Stop override mode for emergency conditions.

View error codes on the base display for troubleshooting.

#### Pre-Conditions

Key Switch Position:

Must be set to Chassis Controls for base operation.

E-Stop:

Must be released (pulled out) at both chassis and platform controls.

Base Enable Switch:

Must be pressed and held along with Lift/Lower toggle switch to enable platform movement.

#### Control Position & Components

Chassis Control Panel includes:

3-Position Key Switch:

Chassis Controls → 0 V at Pin 15

Ignition OFF

Platform Controls → 24 V at Pin 15

**E-Stop Button:**

Located on chassis, feeds into ignition input via key switch.

**Base Enable Switch (Momentary):**

Required for lift/lower operation in chassis mode.

Also used to initiate Service Mode.

**Lift/Lower Toggle Switch (3 positions):**

- Platform Up (momentary)
- No Movement (default)
- Platform Down (momentary)

**Base Display:**

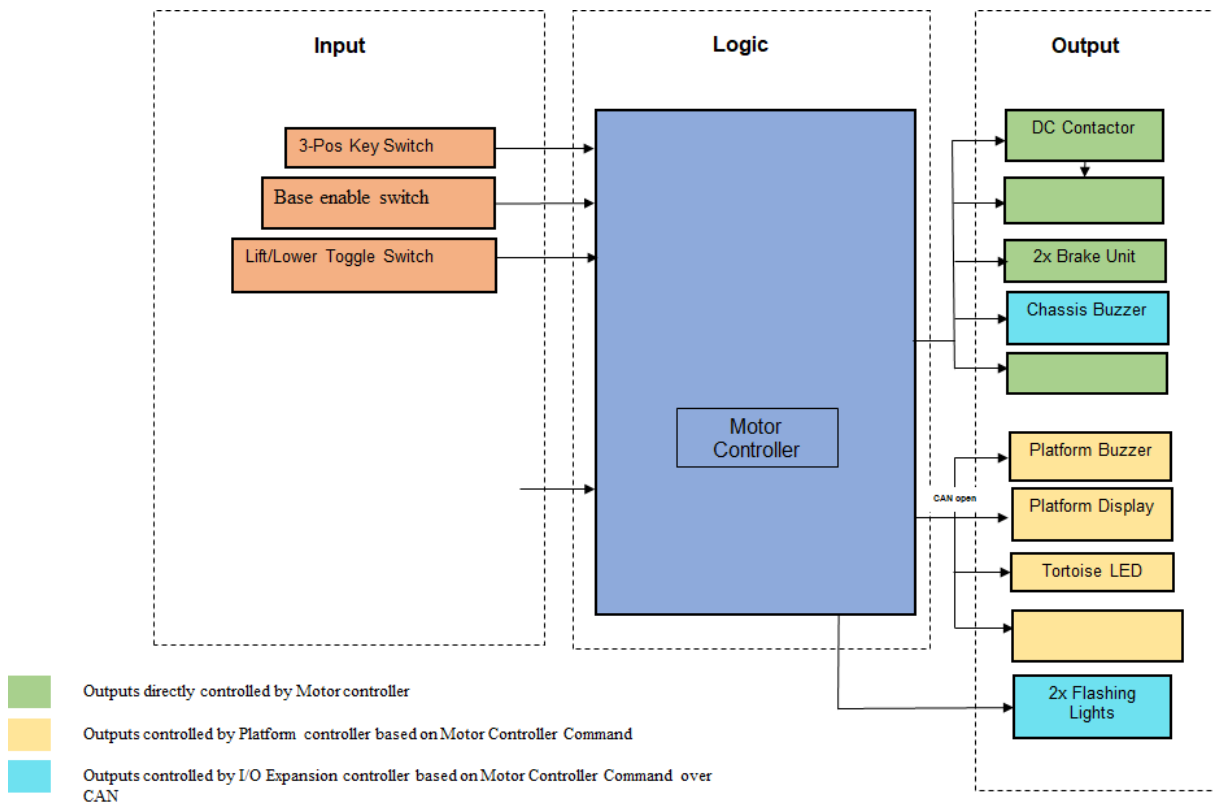
Shows error codes, status messages, and Service Mode indication

## Base control operations

- 1.Lift/Lower Operation
- 2.Service Mode Initiation
- 3.E-Stop Override

## System Diagram

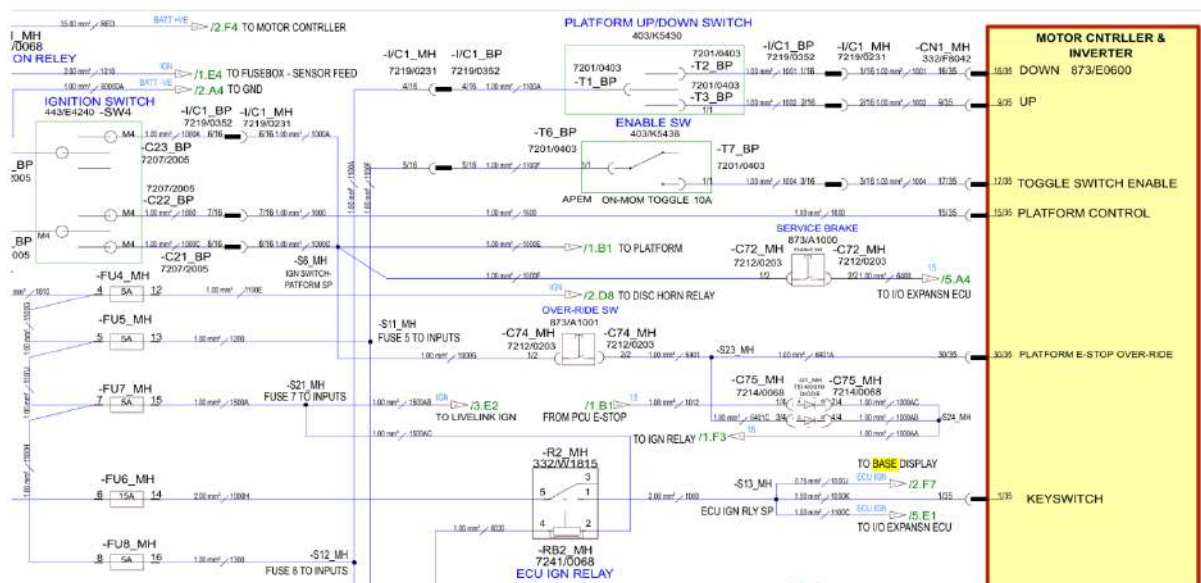
Below figure explains the Base control functions as a whole –



## Signal

The ignition signal is a 24V signal.

Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [3-Pos Key Switch](#) <sup>352</sup>
- [Motor Controller](#) <sup>345</sup>
- [Chassis Buzzer](#) <sup>391</sup>
- [Chassis Display](#) <sup>336</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [Platform Display](#) <sup>340</sup>
- [DC Contactor](#) <sup>361</sup>
- [Hydraulic Pump Motor](#) <sup>359</sup>
- [Raise Solenoid Low side output](#) <sup>428</sup>
- [Lower Solenoid Low side output](#) <sup>430</sup>
- [2x Flashing Lights](#) <sup>400</sup>
- [HORN](#) <sup>355</sup>

## Related Fault Codes

N/A

### 3.14 Tilt Alarm

## Function

The Tilt Function ensures machine stability and operator safety by monitoring the inclination of the chassis when the platform is elevated from (Base/Platform).

If the machine is tilted beyond defined limits, or operated outside safe conditions, the system:

Disables all motions immediately.

Displays clear warnings on the chassis display

## Pre-Conditions for Normal Operation

Key Switch: Must be in Platform or Chassis mode for machine operation.

Tilt Sensor: Internal to Motor Controller/ECU and continuously monitors chassis inclination.

Machine must remain within defined tilt limits:

Front-to-Rear Inclination:  $\pm 3^\circ$

Left-to-Right Inclination:  $\pm 1.5^\circ$

## How the Function Works

During platform elevation, the tilt sensor measures chassis inclination.

If inclination exceeds defined limits:

Tilt Alarm fault is triggered.

Machine disables all motions (lift, drive, steer).

Operator is informed via:

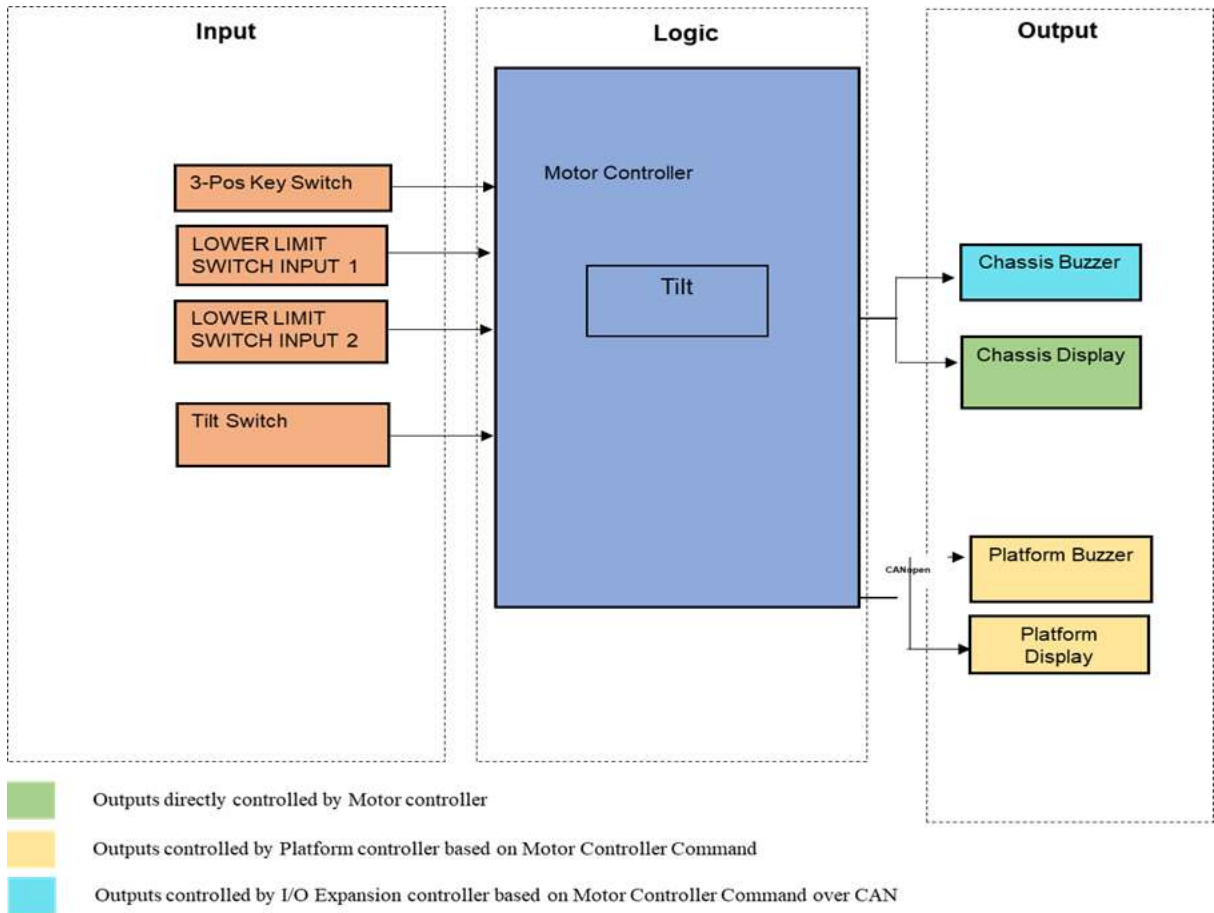
Chassis display warning (LL for tilt alarm).

Audible alarm (if configured).

Machine remains locked until tilt condition is corrected and fault cleared.

## System Diagram

Below figure explains the Tilt Function as a whole –



## Signal

The ignition signal is a 24V signal.

Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [3-Pos Key Switch](#)  352

- [LOWER LIMIT SWITCH INPUT 1](#) <sup>389</sup>
- [LOWER LIMIT SWITCH INPUT 2](#) <sup>389</sup>
- [Tilt Sensor](#) <sup>368</sup>
- [Chassis Buzzer](#) <sup>391</sup>
- [Chassis Display](#) <sup>336</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [Platform Display](#) <sup>340</sup>

## Related Fault Codes

| Fault Code                        | Description                             |
|-----------------------------------|---|
| <a href="#">LL</a> <sup>254</sup> | Inclination Fault                       |
| <a href="#">55</a> <sup>254</sup> | Machine Tilted Beyond Safe Limits Fault |

### 3.15 Dual Height Mode

#### Function

To restrict machine raise or drive/steer operations outside the safe operating height in outdoor conditions where wind can affect stability.

In Indoor mode, operations are allowed to the maximum extent since wind effect is negligible.

In Outdoor mode, raise and/or drive/steer operations are restricted beyond defined safe limits.

#### Switch/Enable Location

Dual Height Mode selection is available at the Platform Control Station.

**Applicable Regions - AUS Region (Optional feature).**

#### Pre-Conditions

Machine must be powered ON.

Key switch in Platform mode.

Dual height Box available on platform

Operator selects Outdoor mode when operating in outdoor conditions.

## Working

Operator enables Dual Height Mode from the Platform Control Station.

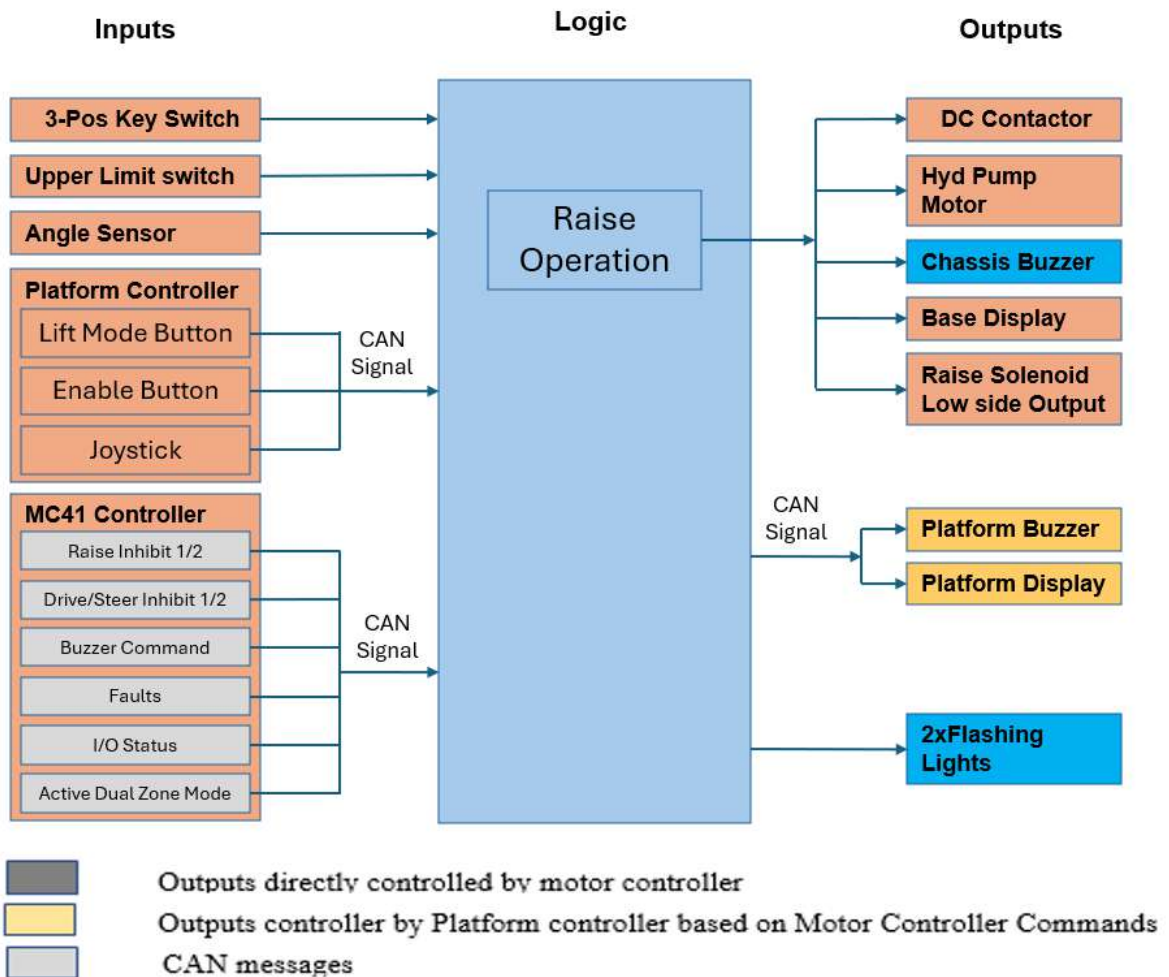
Controller (MC41) monitors height and mode selection:

If machine exceeds defined height in Outdoor mode, raise and/or drive/steer operations are restricted.

Operator is informed via display indication when limits are exceeded.

## System Diagram

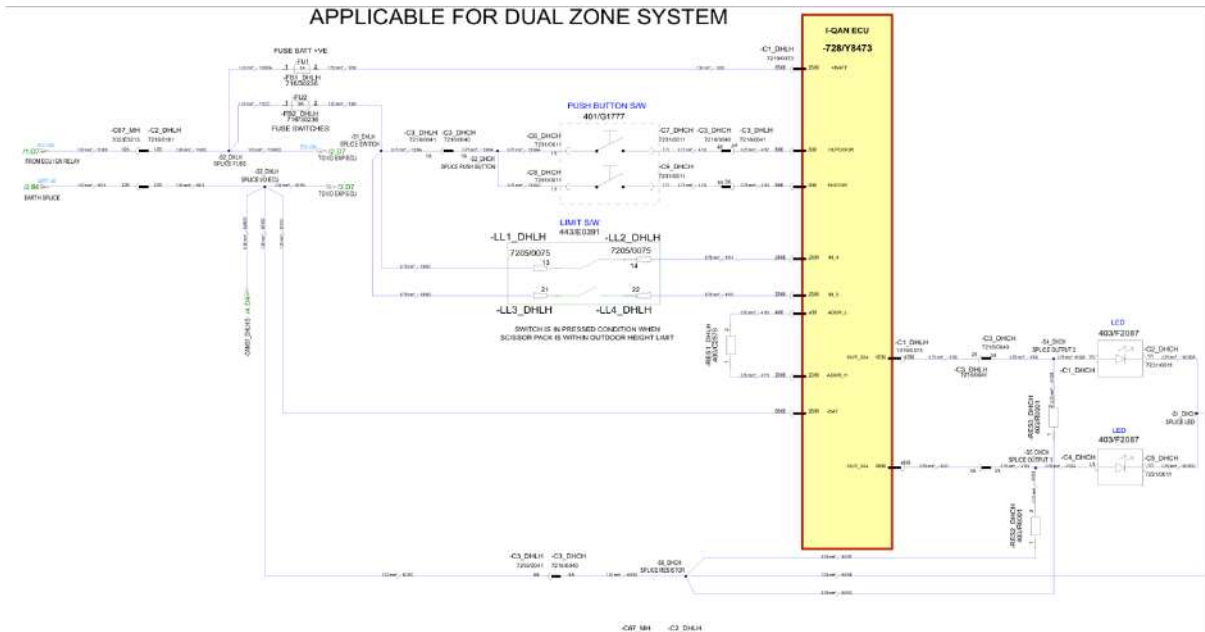
Below figure explains the Dual Height mode function as a whole –



## Signal

The ignition signal is a 24V signal.

Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [3-Pos Key Switch](#) <sup>352</sup>
- [Upper Limit Switch](#) <sup>389</sup>
- [Angle Sensor](#) <sup>379</sup>
- [Platform Controller](#) <sup>340</sup>
- [MC41 Controller](#) <sup>409</sup>
- [DC Contractor](#) <sup>361</sup>
- [Hydraulic Pump Motor](#) <sup>359</sup>
- [Chassis Buzzer](#) <sup>391</sup>
- [Base Display](#) <sup>336</sup>
- [Raise Solenoid low side output](#) <sup>428</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [Platform Display](#) <sup>340</sup>
- [2x Flashing Lights](#) <sup>400</sup>

## Related Fault Codes

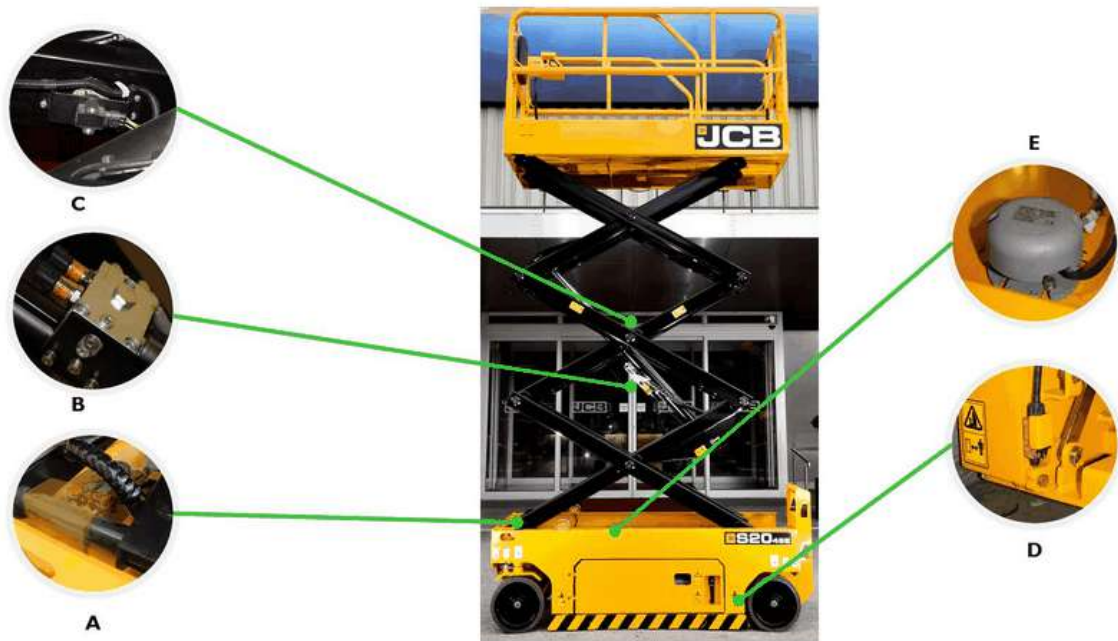
| Fault Code                        | Description   |
|-----------------------------------|---|
| <a href="#">E1</a> <sup>307</sup> | Override Detection Limit Switch or Related Wiring Fault |

|                          |     |   |
|--------------------------|-----|---|
| <a href="#">E2</a>       | 307 | Elevated Drive Limit Switch or Related Wiring Fault   |
| <a href="#">E3</a>       | 310 | Elevated Conditions Detected - EL                     |
| <a href="#">E4</a>       | 311 | Override Condition Detected                           |
| <a href="#">E5</a>       | 298 | Dual Zone Push Button or Related Wiring Fault         |
| <a href="#">E6</a>       | 300 | Dual Zone Height Limit Switch or Related Wiring Fault |
| <a href="#">E7</a>       | 301 | Dual_Zone_Fault: CAN Data error from CM410            |
| <a href="#">E8</a>       | 305 | Dual_Zone_Fault: Incorrect Dual Zone Configuration    |
| <a href="#">E9 (OHL)</a> | 293 | At or about Outdoor Height Limit - OHL                |

## 3.16 Sensor & Switches

### Function

### Sensor & Switches



## 3.17 Battery Management System

### Function

The Battery Management System (BMS) ensures the machine’s battery health, performance, and safety.

Proper battery management is critical because-  
It extends battery life.

Maintains accurate state of charge (SOC) for reliable operation.

Prevents unsafe conditions caused by low voltage or battery drain.

Operating with poor battery health can lead to machine downtime, reduced performance, or safety hazards.

Replacing batteries becomes unavoidable when they can no longer power the machine due to deep discharge, limp mode, or excessive voltage drain.

Operating with degraded batteries reduces machine reliability and can lead to unexpected shutdowns.

**Timely monitoring and charging prevent:**

Premature battery failure

Reduced capacity

Safety risks during operation

The SOC shall be displayed in \*bars and % as shown in image below.



## Battery Types Used in Scissor Machines

**Flooded Batteries:**

TROJAN T105 – 6V, 225AH

TROJAN T125 – 6V, 240AH

TROJAN T1275 – 12V, 150AH

**AGM Batteries:**

VISION – 6V, 220AH

VISION – 12V, 155AH

## Pre-Conditions for Battery Management

Ignition - ON

**Battery Discharge Indicator (BDI):**

Motor Controller continuously calculates SOC from key switch voltage (KSI, pin 1) whenever the main contactor is closed.

Battery Charger used to recharge batteries ,voltage can be checked on BDI display.

**Limp Mode Trigger:**

If SOC falls below Limp Mode level for 120 seconds, machine enters Limp Mode (restricted operation).

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

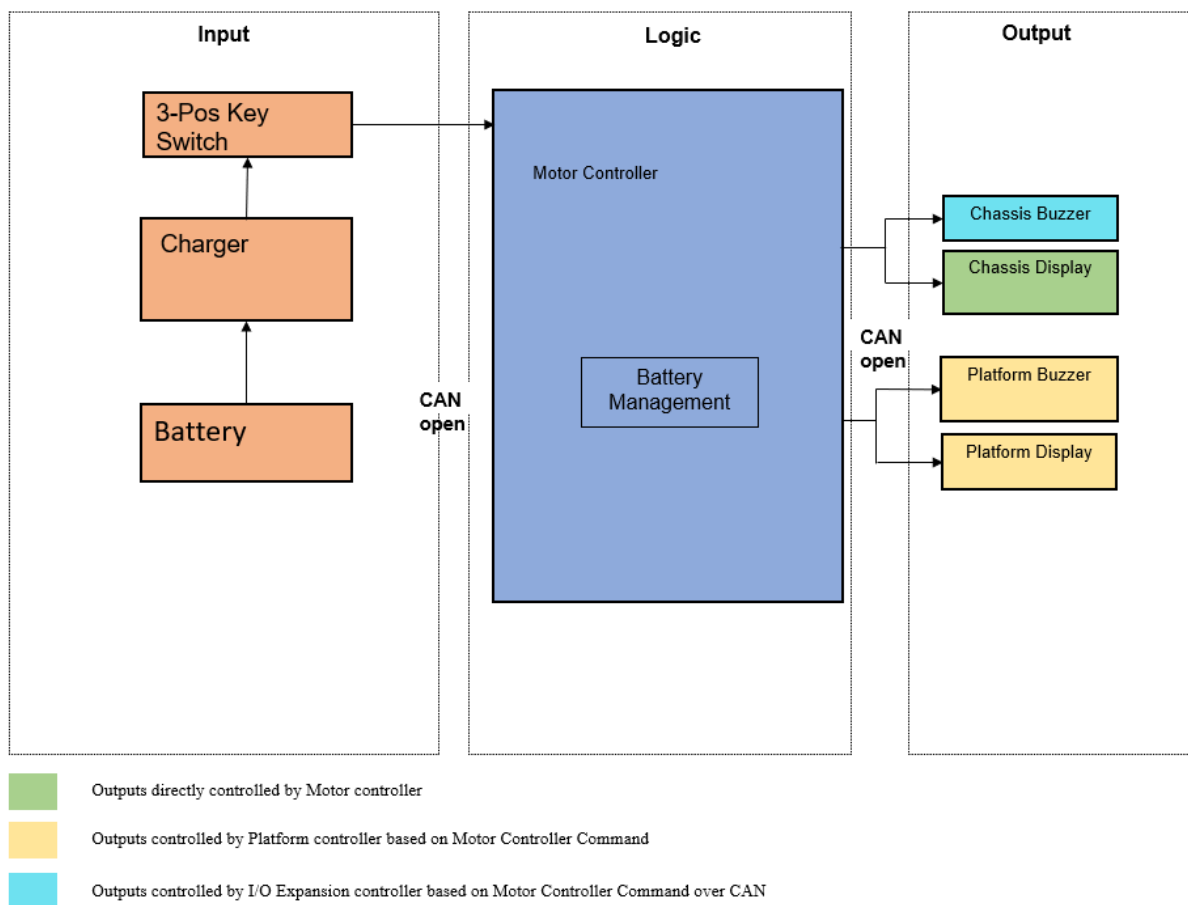
**Battery Drain Alarm:**

If enabled and machine remains inactive for the configured Battery Drain Delay, an audible warning sounds on chassis buzzer.

Pressing Drive or Lift button stops the warning.

## System Diagram

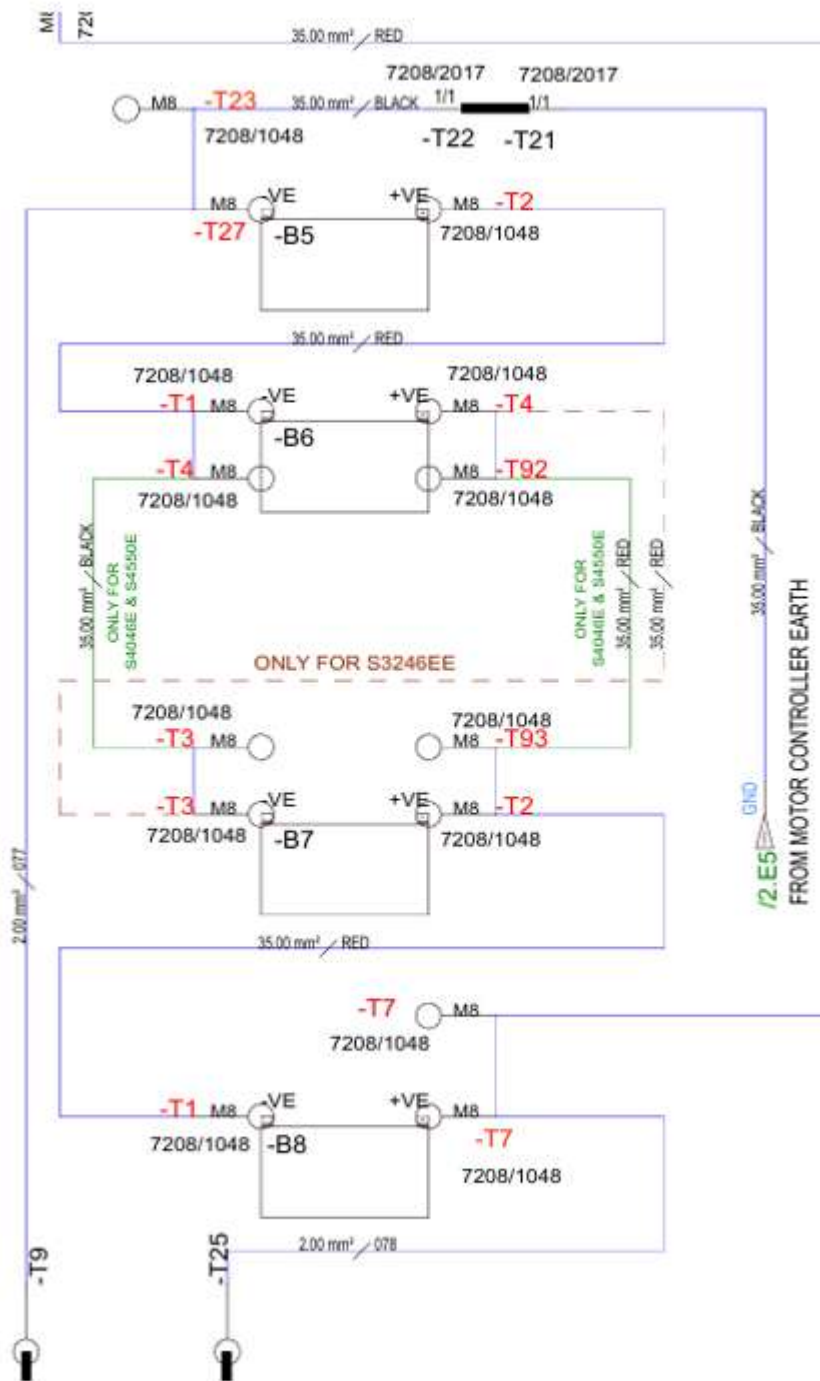
Below figure explains the Battery management System as a whole –



## Signal

The ignition signal is a 24V signal.

Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [3-Pos Key Switch](#) 352
- [Battery 6V](#) 373
- [Battery Charger](#) 370
- [Chassis Buzzer](#) 391
- [Chassis Display](#) 336
- [Platform Buzzer](#) 340
- [Platform Display](#) 340

## Related Fault Codes

| Fault Code                            | Description               |
|---------------------------------------|---------------------------|
| <a href="#">17</a> <small>289</small> | Severe B+ Under voltage   |
| <a href="#">18</a> <small>296</small> | Severe B+ Over voltage    |
| <a href="#">23</a> <small>289</small> | Under voltage Cutback     |
| <a href="#">24</a> <small>296</small> | Over voltage Cutback      |
| <a href="#">7B</a> <small>270</small> | Limp Mode Fault           |
| <a href="#">6E</a> <small>270</small> | Battery Low Voltage Fault |

## 3.18 Service Mode

### Function

The Service Mode function allows technicians to perform maintenance and diagnostic operations that are not available during normal machine operation. It is used for tasks such as brake release, calibration, and troubleshooting, ensuring safe and controlled servicing of the machine.

Lift/Lower Motion Fault is bypassed during Service Mode.

Service mode can be enable either from base or Platform.

## Pre-Conditions

Ignition=ON

There shall not be any “FC” or “RC” message shown on base or platform display during machine is in Service mode.

## Working- To enable service mode from Chassis Control Panel:

Key Switch Position: Must be in Chassis Mode

Press and hold Base Enable switch for more than 10 seconds till Amber LED starts blinking .

Release the base enable switch and turn the ignition off. Set the key switch to chassis mode again .

Machine provides indication of successful Service Mode recognition.

Machine must be restarted within 10 seconds after indication to enter Service Mode.

If not restarted within 10 seconds, Service Mode request is discarded and Amber LED blinks.

While Service Mode is Active , chassis display shall show below screens with flashing at 0.5 sec rate



If Base Enable switch remains pressed for more than 5 seconds after indication (total 15 seconds), it is treated as false press:

Service Mode request discarded.

Service Mode is automatically disabled after the second restart.

## Working -To enable service mode from Platform Control Panel:

Service Mode can also be enabled via PCU menu:

Navigate to Service Mode option.

Enter password to authorize.

Select ON → This enables Service Mode for one power cycle only.

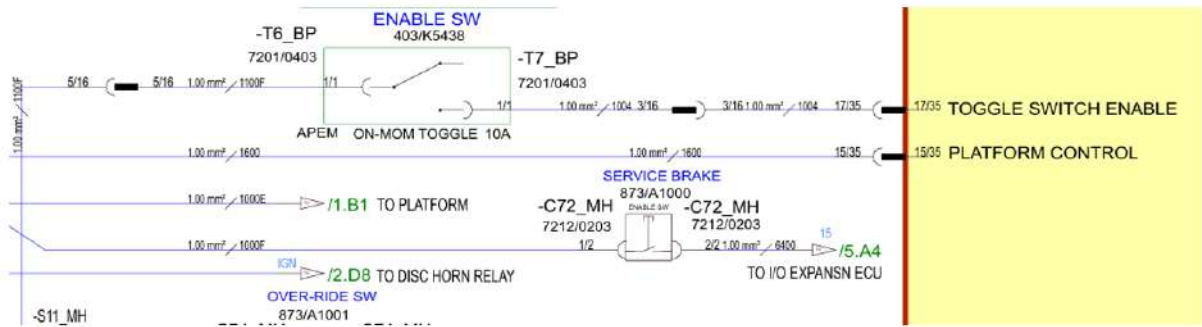
After selecting ON, restart machine once to make Service Mode active.

Service Mode is automatically disabled after the second restart.

## Signal

The ignition signal is a 24V signal.

Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [3-Pos Key Switch](#) <sup>352</sup>
- [Base Enable](#) <sup>365</sup>
- [CM0410 ECU](#) <sup>349</sup>
- [Motor controller](#) <sup>345</sup>
- [Platform control unit](#) <sup>340</sup>
- [Chassis Buzzer](#) <sup>391</sup>
- [Base Display](#) <sup>336</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [Platform Display](#) <sup>340</sup>
- [2x Flashing Lights](#) <sup>400</sup>
- [Joystick](#) <sup>381</sup>
- [Lift/lower switch](#) <sup>340</sup>

## Related Fault Codes

N/A

### 3.19 E-stop Override

#### Function

Enable safe base control of the machine to lower the platform when the platform E-Stop is pressed and unreachable for reset, by temporarily allowing a limited override from the chassis (base) controls.

**Applicable Regions:** Australia

### Preconditions to Enter Override Mode

Platform E-stop = Pressed.  
Key switch = Chassis mode.  
Chassis E-stop = Released (Not pressed).

Switch Location-Platform E-stop Override switch is a momentary push button, located on the Base (Chassis) Control Panel.

### Working of Platform E-Stop override

Set Key switch to Chassis mode.  
Press & hold the Platform E-stop Override switch until the controller boots up.

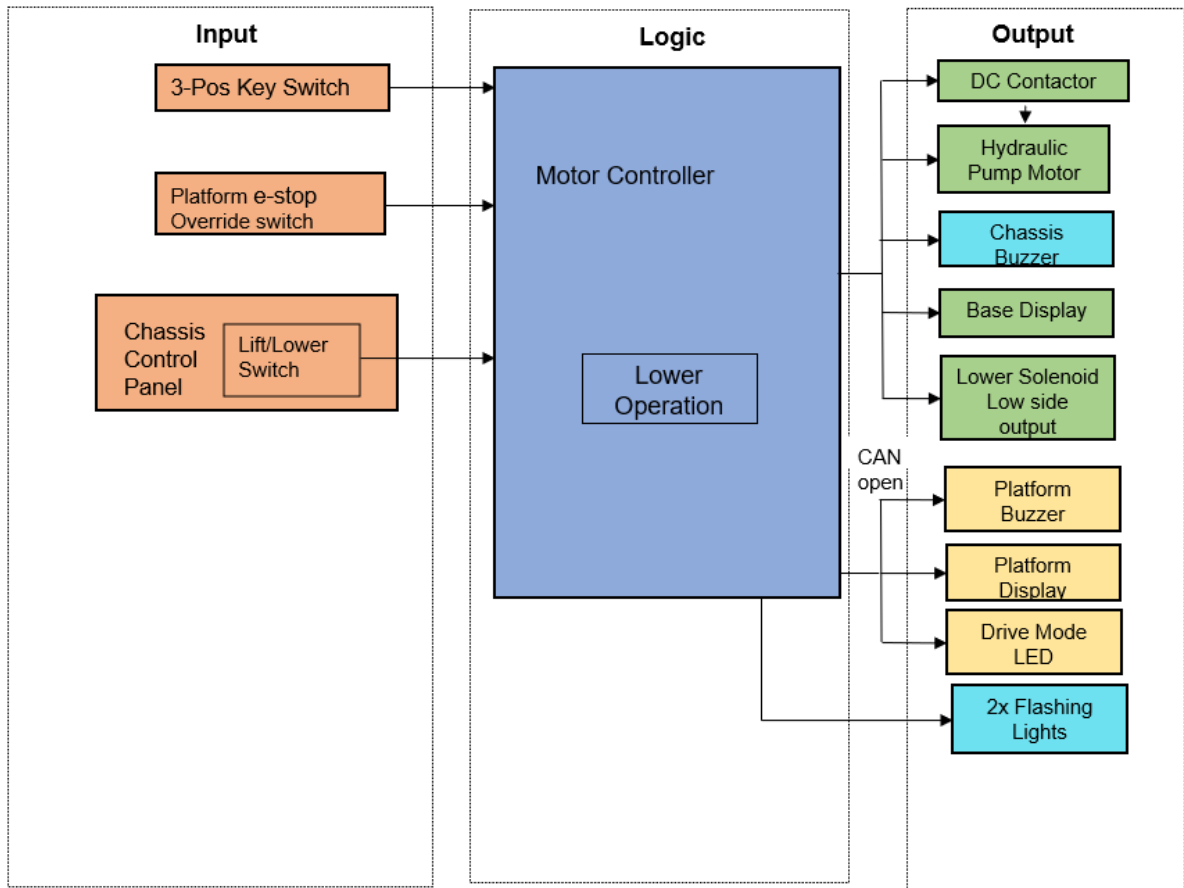
Display shows “ORD ACT” flashing at 0.5 sec rate.



Press lift/lower toggle switch to lower the platform.  
Restricted operation: Raise, drive and steer operation shall be restricted in “Platform e-stop override” mode.  
Override switch must be held throughout operation.  
Releasing the switch turns machine OFF and exits override mode.

### System Diagram

Below figure explains the E-Stop Override system as a whole –



- Outputs directly controlled by Motor controller
- Outputs controlled by Platform controller based on Motor Controller Command
- Outputs controlled by I/O Expansion controller based on Motor Controller Command over CAN

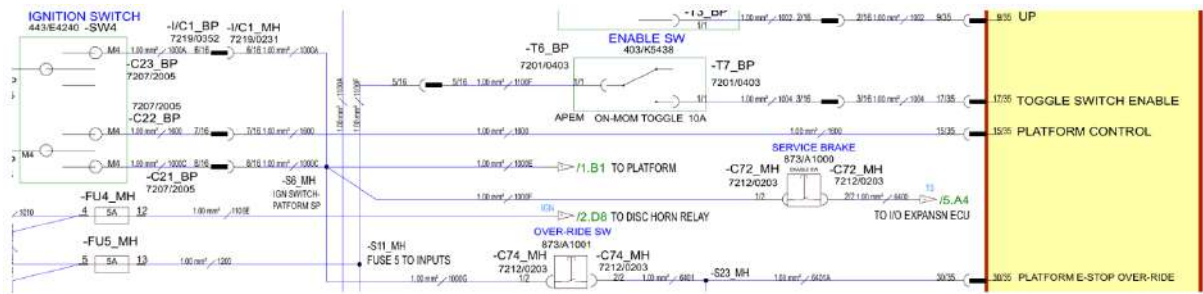
## Signal

The ignition signal is a 24V signal.

24VDC: Switch pressed

0VDC: Switch released

Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [3-Pos Key Switch](#) <sup>352</sup>
- [Platform E-Stop Override switch](#) <sup>423</sup>
- [Lift/Lower Switch](#) <sup>365</sup>
- [Platform control panel](#) <sup>340</sup>
- [Chassis Buzzer](#) <sup>391</sup>
- [Base Display](#) <sup>336</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [Platform Display](#) <sup>340</sup>
- [DC Contactor](#) <sup>361</sup>
- [Hydraulic Pump Motor](#) <sup>359</sup>
- [Lower Solenoid Low side](#) <sup>430</sup>
- [2x Flashing Lights](#) <sup>400</sup>
- [Lift Mode LED](#) <sup>340</sup>

## Related Fault Codes

| Fault Code                        | Description               |
|-----------------------------------|---------------------------|
| <a href="#">7D</a> <sup>314</sup> | E_STOP_Override_STB_Fault |

## 3.20 Korea Homologation Requirement

### Function

These requirements are additional to standard machine requirements and configured for Korean homologation.

They enable safety features such as:

Elevated Drive Prevention (EL)-Prevent drive operation when machine is in elevated position(raised position)

Over Rise Prevention (UP)-to ensure safe operation when the platform is raised beyond defined limits.

**Applicable Regions:** Korea only

### Pre-Conditions

Ignition switch =ON

Key Switch Position: Set to Platform mode

E-Stop: Must be released at both chassis and platform controls.

Service Master Tool: To enable these function , ensure function should be enabled from service master tool

The following components must be present on machine :

Foot Pedal Switch

Elevated Drive Prevention Switch

Over Rise Prevention Switch

CM410 Controller

### Control Position

Platform Control Panel:

Drive joystick for forward/reverse and platform lift/lower function

Foot pedal switch (must be pressed to enable above function)

### Working of Elevated Drive Prevention (EL)

Objective: Disable drive when the machine is at or above the Elevated Drive Prevention height limit.

Operating sequence:

Key switch set to Platform mode at base

Press the Foot Pedal switch (Foot pedal must remain pressed to attempt drive)

Command drive via joystick (forward/reverse).

If elevated height is detected, Drive is disabled immediately

“EL” flashes on the chassis display to inform the operator.

## **Working of Over Rise Prevention**

Objective: Prevent further raising and disable drive if the machine height reaches the Over Rise limit.

Operating sequence:

key switch- set to Platform mode.

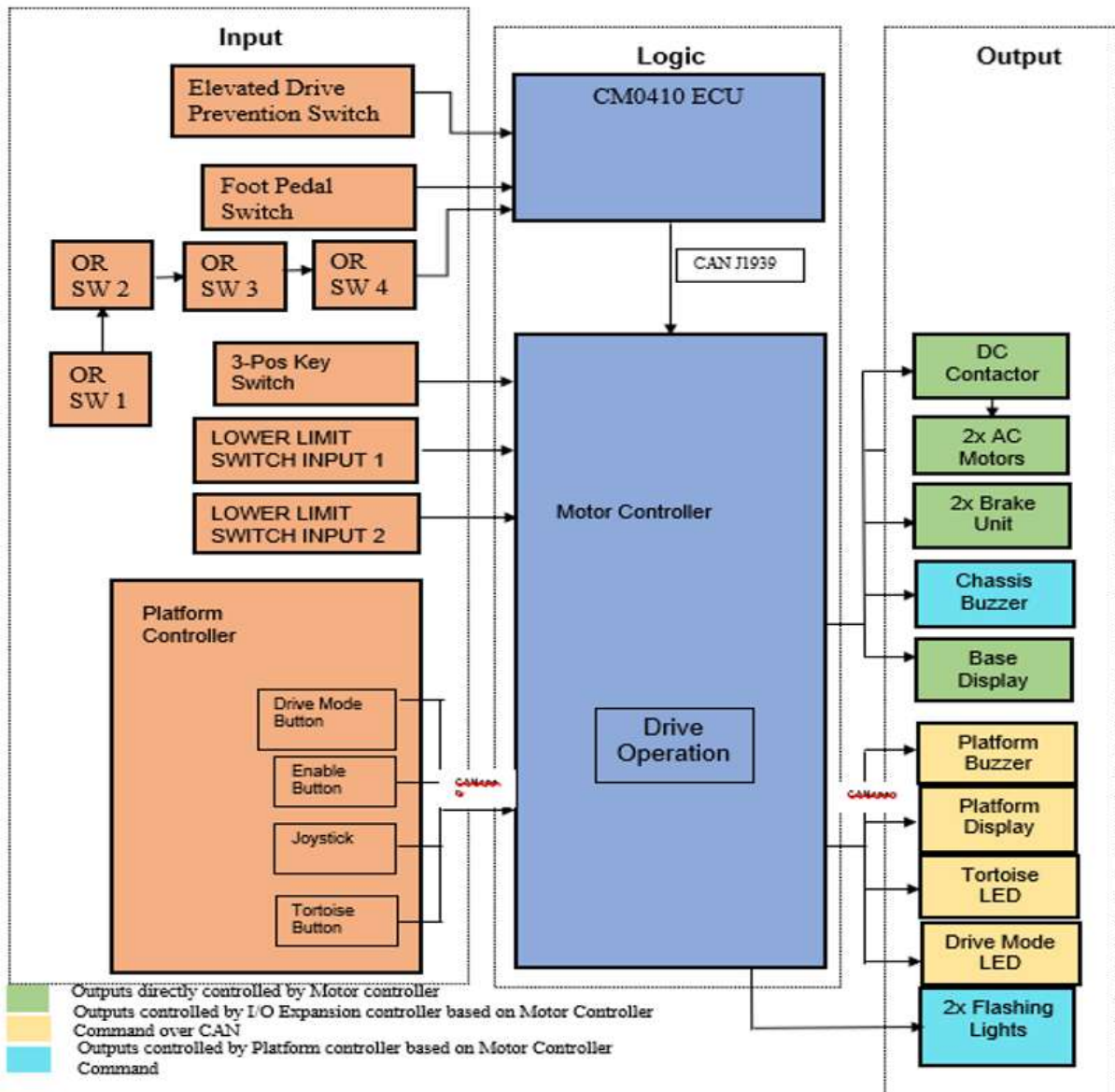
Machine height reaches or exceeds the Over Rise Height Limit (UP)

Machine cannot raise further (raise command blocked).

Drive is disabled during UP condition

## **System Diagram**

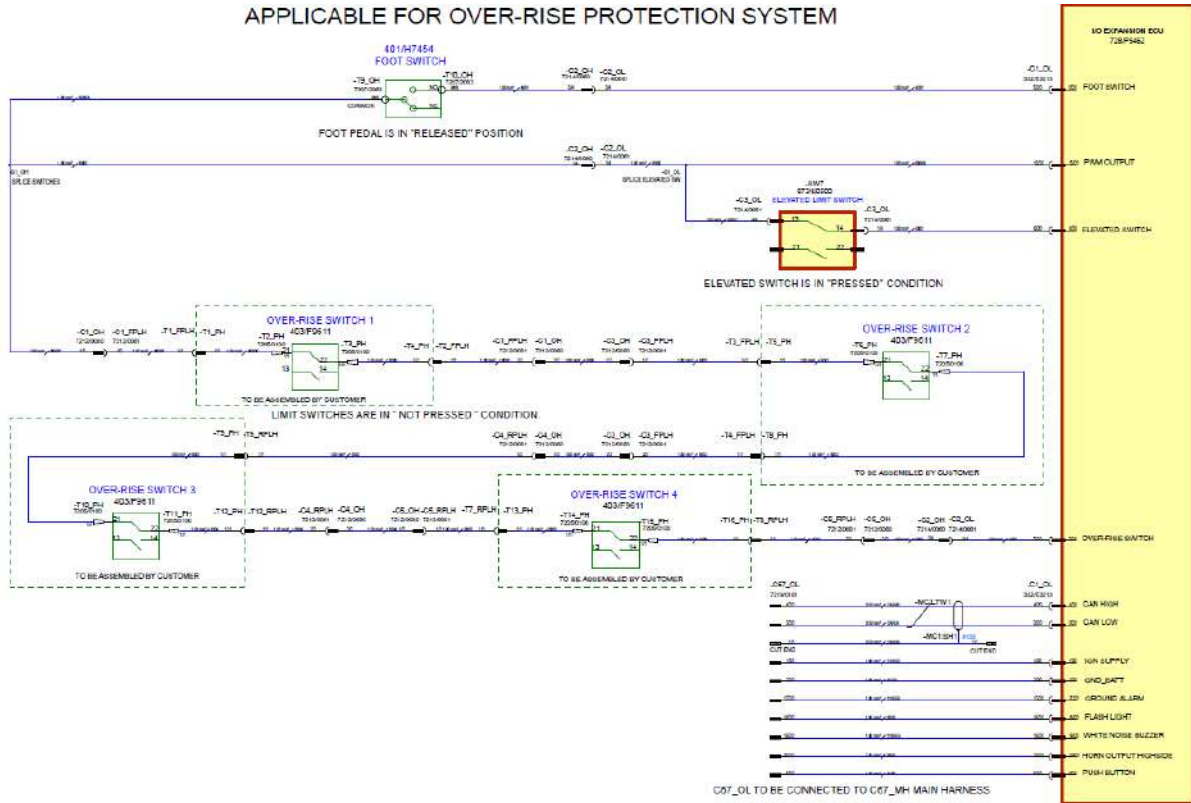
Below figure explains the Korea Homologation features as a whole –



## Signal

The ignition signal is a 24V signal.

Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [Elevated Drive Prevention Switch](#) <sup>416</sup>
- [Foot Pedal Switch](#) <sup>406</sup>
- [Over rise switch](#) <sup>418</sup>
- [Platform controller](#) <sup>340</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [CM0410 ECU](#) <sup>349</sup>
- [Motor Controller](#) <sup>345</sup>
- [DC Contactor](#) <sup>361</sup>
- [2x AC Motors](#) <sup>394</sup>
- [Chassis Buzzer](#) <sup>391</sup>
- [Base Display](#) <sup>336</sup>
- [2x Brake Unit](#) <sup>394</sup>

## Related Fault Codes

| Fault Code                        | Description   |
|-----------------------------------|---|
| <a href="#">E1</a> <sup>307</sup> | Overrise Detection Limit Switch or Related Wiring Fault |

|                                |   |
|--------------------------------|---|
| <a href="#">E2</a>   307       | Elevated Drive Limit Switch or Related Wiring Fault   |
| <a href="#">E3</a>   310       | Elevated Conditions Detected - EL                     |
| <a href="#">E4</a>   311       | Overrise Condition Detected                           |
| <a href="#">E5</a>   298       | Dual Zone Push Button or Related Wiring Fault         |
| <a href="#">E6</a>   300       | Dual Zone Height Limit Switch or Related Wiring Fault |
| <a href="#">E7</a>   301       | Dual_Zone_Fault: CAN Data error from CM410            |
| <a href="#">E8</a>   305       | Dual_Zone_Fault: Incorrect Dual Zone Configuration    |
| <a href="#">E9 (OHL)</a>   293 | At or about Outdoor Height Limit - OHL                |
| <a href="#">E0</a>   295       | Foot Switch or Related Wiring Faults                  |

## 3.21 Service Brake Release

### Function

This function allows the operator to electrically release the AC Drive motor brake during service operations(during live fault codes)—particularly useful when the machine is unable to drive.

Once service brake release enabled, the operator can push or pull the machine manually for positioning or towing during maintenance.

Brake release can be performed in two ways: either from the base control station or from the platform control station

**ECU/Controller unit** - Brake release switch shall be connected to CM410 controller. CM410 controller shall process the switch state detection and send the Brake release command over CAN to motor controller.

**Switch Location** - Service Brake release switch is a momentary push button ,located inside the RH Door (Hydraulic ) compartment.

**Applicable Regions-** For all regions (If fitted on machine)

### Pre-Conditions

Ensure Brake release switch is in unpressed condition.

If the Brake Release switch is already pressed at system startup, the system will:

Generate a switch fault .

Disable the Brake Release function until the switch fault is cleared and the switch is released.

**Brake Release Control Methods** - Brake release can be performed in two ways: either from the base control station or from the platform control station

### Activation from base -

Set key switch to Chassis mode.

Ensure switch was not pressed at startup.

Press and hold Brake Release switch for  $\geq 100$  ms.

While Brake release Mode is Active ,chassis display flashes Brake Release status at 0.5 sec rate.



### Activation from platform via PCU Settings-

Key Switch Position: Set to Platform mode

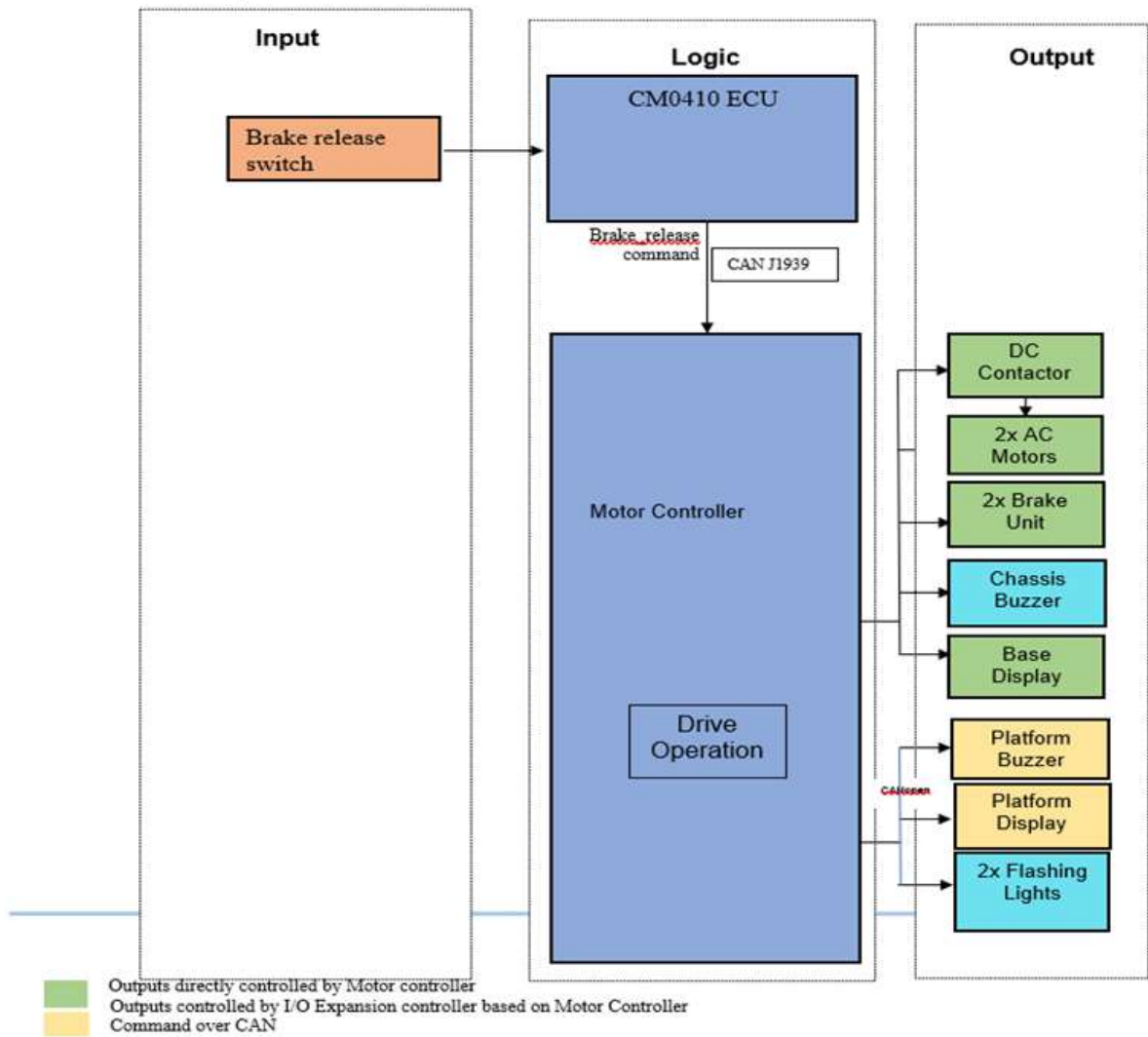
Navigate to the PCU settings and select "Brake Release" under operator setting "OPR SETT".

Enable Brake Release by selecting ON from the PCU .



### System Diagram

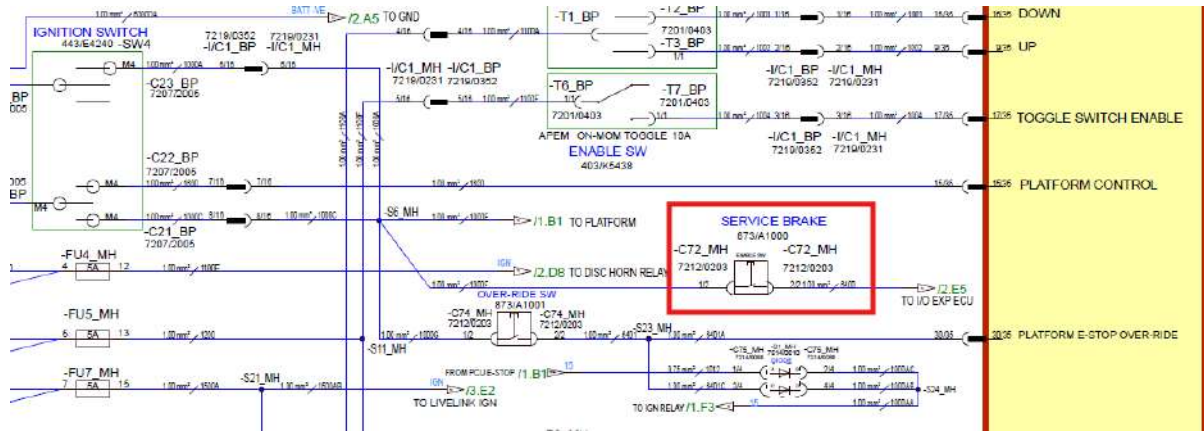
Below figure explains the Service Brake release system as a whole –



## Signal

The ignition signal is a 24V signal.  
 When switch is pressed - 24VDC  
 when switch is unpressed - 0VDC

Please follow the schematic diagram for more details and exact wiring.



## Parts in Circuit

- [3-Pos Key Switch](#) <sup>352</sup>
- [Brake release switch](#) <sup>421</sup>
- [CM0410 ECU](#) <sup>349</sup>
- [Motor controller](#) <sup>345</sup>
- [DC Contactor](#) <sup>361</sup>
- [2x AC Motors](#) <sup>394</sup>
- [2x Brake Unit](#) <sup>394</sup>
- [Chassis Buzzer](#) <sup>391</sup>
- [Base Display](#) <sup>336</sup>
- [Platform Buzzer](#) <sup>340</sup>
- [Platform Display](#) <sup>340</sup>
- [2x Flashing Lights](#) <sup>400</sup>

## Related Fault Codes

N/A

This page is intentionally left blank.  
Remove this text from the manual  
template if you want it completely blank.

# **DTC & Scissor Trouble shooting Guide**

## 4 DTC & Scissor Trouble shooting Guide

# DTC & Scissor Trouble Shooting Guide

List of DTC & Scissor Trouble Shooting Guide

| Number | Component   |
|--------|---|
| 1      | <a href="#">115 Version &amp; Below</a> <small>79</small> |
| 2      | <a href="#">116 Version</a> <small>210</small>            |
| 3      | <a href="#">Diagnostic Fault Table</a> <small>329</small> |

































### 4.1 115 Version & Below



4.1.1 Index

| Sr No. | Fault Code                                 | Description |
|--------|--|-------------|
| 1      | <a href="#">Annexure - A</a> <sup>82</sup> |             |
| 2      | <a href="#">Annexure - B</a> <sup>83</sup> |             |
| 3      | <a href="#">Annexure - C</a> <sup>86</sup> |             |

|    |   |  |
|----|---|--|
| 4  | <a href="#">DTC 74-75</a> <small>88</small> | Fault on other traction Controller / Dual Severe |
| 5  | <a href="#">B9</a> <small>90</small>        | Pressure Sensor 1 Fault                          |
| 6  | <a href="#">54</a> <small>90</small>        | Pressure Sensors Correlation Fault (Elevate)     |
| 7  | <a href="#">58</a> <small>90</small>        | Pressure sensor 1 fault                          |
| 8  | <a href="#">63</a> <small>90</small>        | Pressure sensor 1 warning (stowed)               |
| 9  | <a href="#">66</a> <small>90</small>        | Pressure Sensor 1 Warning (Elevated)             |
| 10 | <a href="#">6C</a> <small>90</small>        | Pressure Sensor Correlation Elevated Fault       |
| 11 | <a href="#">BB</a> <small>92</small>        | Pressure Sensor 2 Fault                          |
| 12 | <a href="#">B8</a> <small>94</small>        | Angle Sensor Fault                               |
| 13 | <a href="#">53</a> <small>94</small>        | Angle Sensor Fault                               |
| 14 | <a href="#">65</a> <small>94</small>        | Angle Sensor Calibration Fault                   |
| 15 | <a href="#">A1</a> <small>97</small>        | Steer right Fault                                |
| 16 | <a href="#">A6</a> <small>99</small>        | Steer Left Coil Fault                            |
| 17 | <a href="#">A4</a> <small>101</small>       | Lift Up solenoid                                 |
| 18 | <a href="#">A7</a> <small>102</small>       | Lift Down Coil Fault                             |
| 19 | <a href="#">51</a> <small>104</small>       | Wika PCU Throttle Fault                          |
| 20 | <a href="#">5F</a> <small>104</small>       | PCU HW Fault                                     |
| 21 | <a href="#">52</a> <small>104</small>       | Wika PCU PDO Timeout Fault                       |
| 22 | <a href="#">5E</a> <small>104</small>       | PCU Data Freeze Fault                            |
| 23 | <a href="#">59</a> <small>104</small>       | F2T M2 PDO Timeout Fault                         |
| 24 | <a href="#">LL</a> <small>107</small>       | Inclination Fault                                |
| 25 | <a href="#">56</a> <small>109</small>       | Pothole Switch Fault                             |
| 26 | <a href="#">57</a> <small>104</small>       | F2T M2 Not Operational Fault                     |
| 27 | <a href="#">61</a> <small>111</small>       | Hydraulic SRO Fault                              |
| 28 | <a href="#">47</a> <small>111</small>       | HPD Sequencing                                   |
| 29 | <a href="#">67</a> <small>111</small>       | Hydraulic HPD Fault                              |
| 30 | <a href="#">OL</a> <small>113</small>       | Platform Overload Above Set point                |
| 31 | <a href="#">64</a> <small>113</small>       | Platform Overload Below Set point                |
| 32 | <a href="#">5A</a> <small>115</small>       | Down limit Switch Fault                          |
| 33 | <a href="#">6D</a> <small>116</small>       | Lift Motion Fault                                |
| 34 | <a href="#">5B</a> <small>118</small>       | PCU Steer Left Sequence Fault                    |
| 35 | <a href="#">5C</a> <small>118</small>       | PCU Enable Trigger Sequence Fault                |

|    |  |  |
|----|--|--|
| 36 | <a href="#">5D</a>    | PCU Pass code Fault                              |
| 37 | <a href="#">6A</a>    | PCU Steer Right Sequence Fault                   |
| 38 | <a href="#">7B</a>    | Limp Mode Fault                                  |
| 39 | <a href="#">6E</a>    | Battery Low Voltage Fault                        |
| 40 | <a href="#">7C</a>    | Severe Fault Active                              |
| 41 | <a href="#">12</a>    | Controller Over current                          |
| 42 | <a href="#">13</a>    | Current Sensor                                   |
| 43 | <a href="#">14</a>    | Precharge Failed                                 |
| 44 | <a href="#">15</a>    | Controller Severe Under temperature              |
| 45 | <a href="#">16</a>    | Controller Severe Over temperature               |
| 46 | <a href="#">17</a>    | Severe B+ Under voltage/Severe KSI Under voltage |
| 47 | <a href="#">18</a>    | Severe B+ Over voltage/Severe KSI Over voltage   |
| 48 | <a href="#">19</a>    | Speed Limit Supervision                          |
| 49 | <a href="#">22</a>    | Controller Over temperature Cutback              |
| 50 | <a href="#">23</a>    | Under voltage Cutback                            |
| 51 | <a href="#">24</a>  | Over voltage Cutback                             |
| 52 | <a href="#">25</a>  | Ext 5V Supply Failure                            |
| 53 | <a href="#">28</a>  | Motor Temp Hot Cutback                           |
| 54 | <a href="#">29</a>  | Motor Temp Sensor                                |
| 55 | <a href="#">31</a>  | Main Driver                                      |
| 56 | <a href="#">32</a>  | EM Brake Driver                                  |
| 57 | <a href="#">33</a>  | Pump Driver                                      |
| 58 | <a href="#">34</a>  | Load Hold Driver                                 |
| 59 | <a href="#">35</a>  | Lift Valve Solenoid Fault                        |
| 60 | <a href="#">36</a>  | IM Motor Feedback/Sin Cos Motor Feedback         |
| 61 | <a href="#">37</a>  | Motor Open                                       |
| 62 | <a href="#">38</a>  | Main Contactor Welded                            |
| 63 | <a href="#">39</a>  | Main Contactor Did Not Close                     |
| 64 | <a href="#">3A</a>  | Motor Setup Needed                               |
| 65 | <a href="#">42</a>  | Throttle Input                                   |
| 66 | <a href="#">44</a>  | Brake Input                                      |
| 67 | <a href="#">46</a>  | NV Memory Failure                                |

|    |  |  |
|----|--|--|
| 68 | <a href="#">49</a>                  | Parameter Change                                   |
| 69 | <a href="#">55</a>                  | Machine Tilted Beyond Safe Limits Fault            |
| 70 | <a href="#">62</a>                  | Platform_Overload_Above_Setpoint                   |
| 71 | <a href="#">6B</a>                  | Motor temperature shutdown fault                   |
| 72 | <a href="#">71</a>                  | OS General   |
| 73 | <a href="#">72</a>                  | PDO Timeout  |
| 74 | <a href="#">73</a>                  | Stall Detected                                     |
| 75 | <a href="#">7A</a>                  | Percentage to max load difference fault            |
| 76 | <a href="#">7D</a>                  | Address Claim Fault                                |
| 77 | <a href="#">83</a>                  | Internal Hardware                                  |
| 78 | <a href="#">84</a>                  | Motor Braking Impaired - Left Motor                |
| 79 | <a href="#">87</a>                  | Motor Characterization                             |
| 80 | <a href="#">89</a>                  | Parameter Out of Range                             |
| 81 | <a href="#">91</a>                  | Bad Firmware                                       |
| 82 | <a href="#">92</a>                | EM Brake Failed to Set                             |
| 83 | <a href="#">95</a>                | Pump Over current                                  |
| 84 | <a href="#">96</a>                | Pump BDI   |
| 85 | <a href="#">97</a>                | Pump Hardware                                      |
| 86 | <a href="#">99</a>                | Parameter Mismatch                                 |
| 87 | <a href="#">A2</a>                | EM Brake Driver - Right Motor                      |
| 88 | <a href="#">A3</a>                | EM Brake LH  |
| 89 | <a href="#">A5</a>                | Main Contactor Coil Short                          |
| 90 | <a href="#">A9</a>                | Coil Supply  |
| 91 | <a href="#">E5</a>                | Dual Zone Push Button or Related Wiring Fault      |
| 92 | <a href="#">E7</a>                | Dual_Zone_Fault: CAN Data error from CM410         |
| 93 | <a href="#">E8</a>                | Dual_Zone_Fault: Incorrect Dual Zone Configuration |
| 94 | <a href="#">HL</a>                | Dual Zone Height Issue                             |
| 95 | <a href="#">Controller Fault</a>  | Controller Fault                                   |

## 4.1.2 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                | <b>31</b> , 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                | <b>B8</b> , 53, 65, 6D, 5A     |
| 9      | Analog 9                 | Pressure Sensor 1                    | 24                                    | M1                | <b>B9</b> , 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 |

### 4.1.3 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

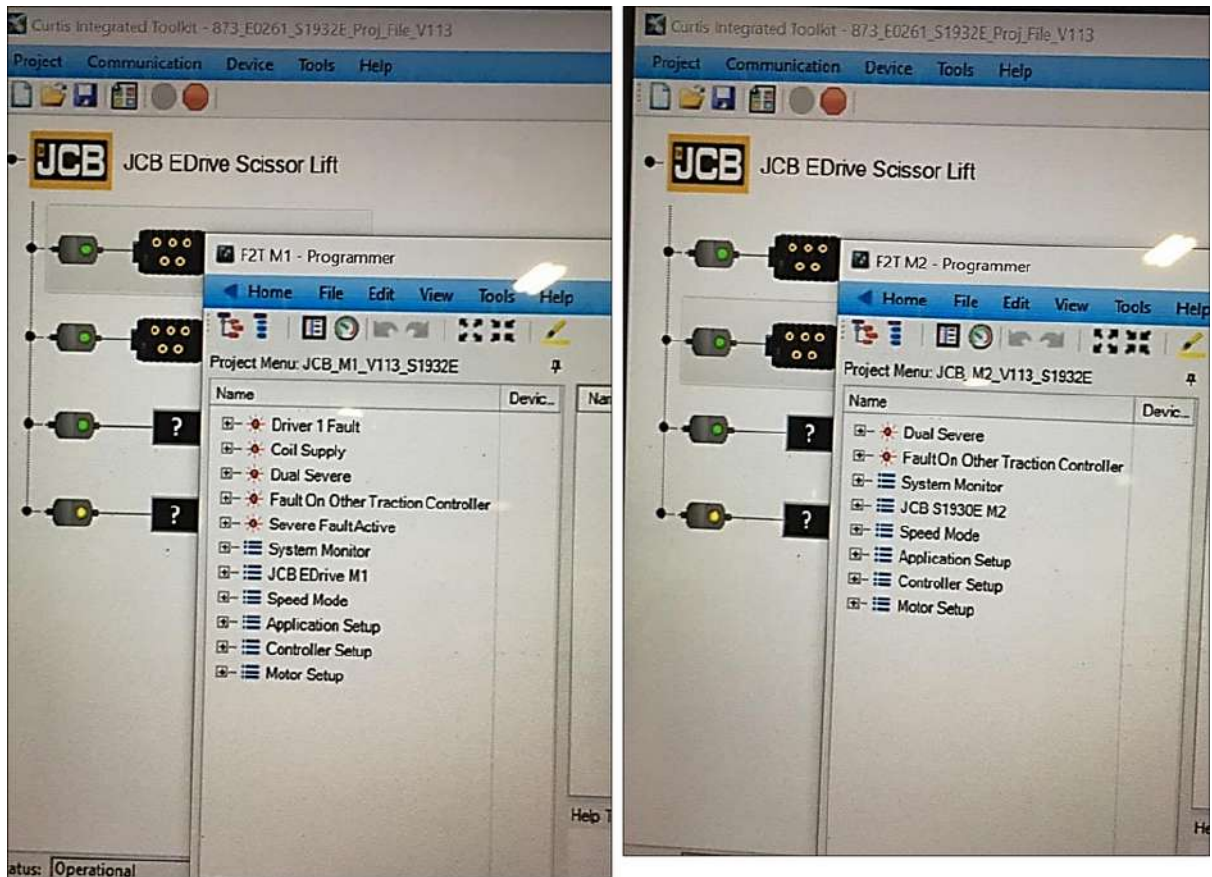
- Click on "ECU Assistant Launchpad"
- Ensure DLA 2.0 and 250k are selected in bottom drop down menu.
- Click on Project >> Open >> Select the machine specific file

- 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

- 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

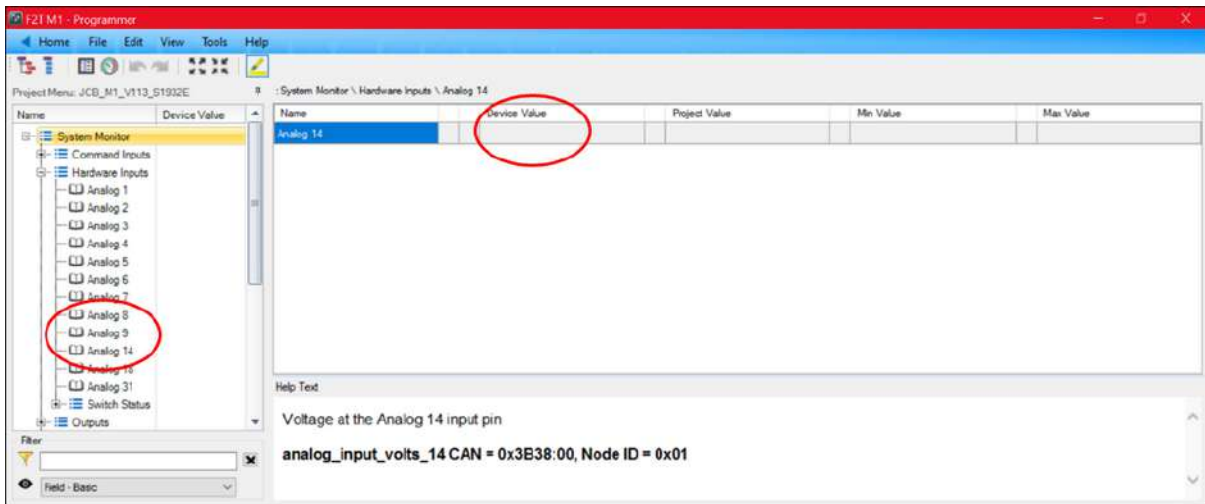
- Select JCB Edrive Scissor Lift and click on green button
- Controller will connect and become online
- F2T M1 and F2T M2 icons will become green.
- Once online click on F2T M1 and then Programmer and similarly for F2T M2

- 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



## 4.1.4 Annexure - C

### Steps to check correct Sensor and Switch position in Machine -

Switch & Sensor Logic :

| Component          | Software ID    | Description             | Logical State at Platform State  |                  |              |
|--------------------|----------------|-------------------------|----------------------------------|------------------|--------------|
|                    |                |                         | Fully Stowed                     | Above Down Limit | Fully Raised |
| Lower Limit Switch | Switch 13      | Lower_Limit_Switch_2    | OFF                              | ON               | ON           |
|                    | Switch 7       | Lower_Limit_Switch_1    | ON                               | OFF              | OFF          |
| Upper Limit Switch | Switch 10      | Upper_Limit_Switch      | ON                               | ON               | OFF          |
| Pothole Switch     | Switch 18      | LH_Pothole_Input        | ON                               | OFF              | OFF          |
|                    | Switch 11      | RH_Pothole_Input        | ON                               | OFF              | OFF          |
|                    | Switch 11 - M2 | LH_RH_Pothole_Series    | OFF                              | ON               | ON           |
| Pressure Sensor    | Analog 9       | Pressure_Sensor_Input_1 | Valid output range : 0.5 to 4.5V |                  |              |
|                    | Analog 14      | Pressure_Sensor_Input_2 | Valid output range : 0.5 to 4.5V |                  |              |
| Angle Sensor       | Analog 8       | Angle_Sensor_Input      | Valid output range : 0.5 to 4.5V |                  |              |

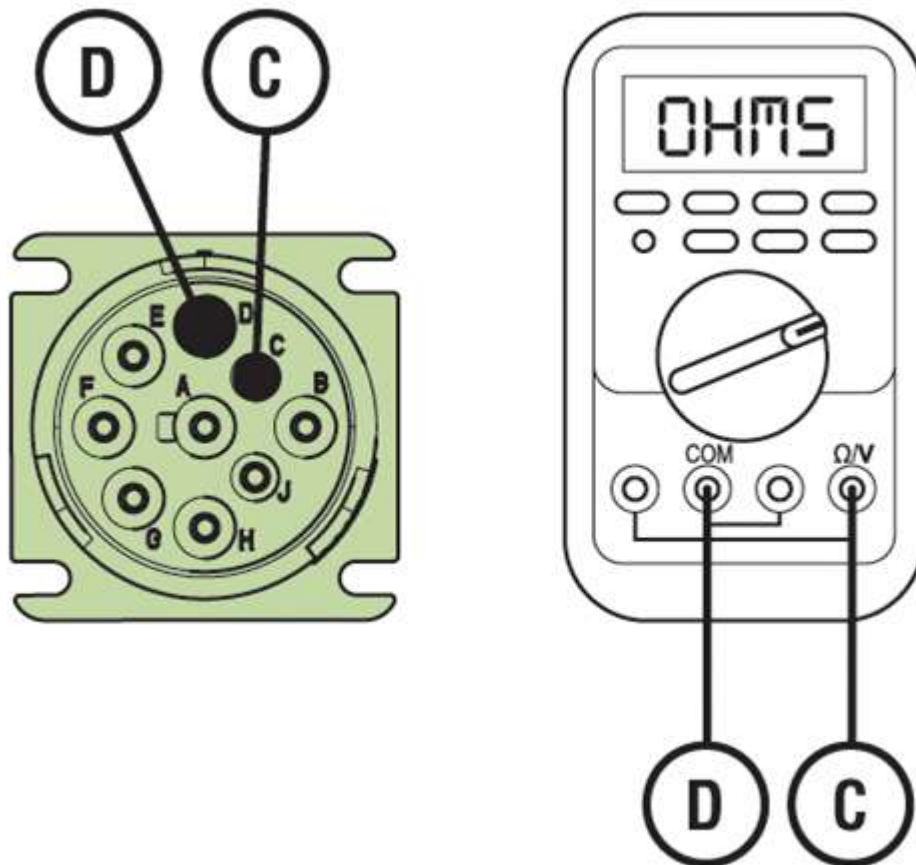
Height State Logic :

| 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                     |

## 4.1.5 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.
- 6.1 Terminating resistor can be located in Main Harness near Ignition Switch Branch. It is a 3 pole connector tapped to main Branch.
- 7.2 Second terminating resistor is inside WIKA PCU. Try replacing that with a new one.
8. If resistance is very less CAN wires might be shorted. Check for any damage on Harness or else replace the Harness.



## 4.1.6 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. For information on this fault, connect the service master and check programmer. | No Action         |
| 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 :

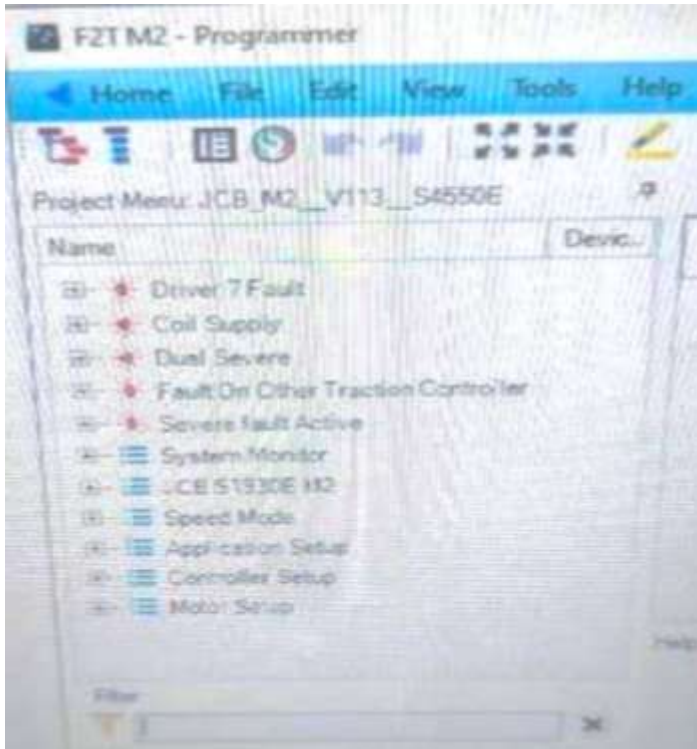
*If only DTC 74/75 is coming*

- 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<br>User_31_Fault | If any of the below OS faults are active:<br>Driver_1_Fault<br>EM_Brake_Driver<br>Driver_3_Fault<br>Driver_6_Fault | Shutdown Vehicle<br>Shutdown Coil Supply |

## 4.1.7 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<br><br>OR<br><br>If filtered pressure value is greater than 4.6V for 1500ms | When platform is above down limit switch, disable all motions.<br><br>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 :**

| <b>Fault Code</b> | <b>Fault Detail</b>  | <b>Description</b>   | <b>Fault Action</b>  |
|-------------------|--|--|--|
| 54                | Pressure Sensors Correlation Fault (Elevate)<br><br>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:<br><br>Faulty pressure sensor<br>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<br><br>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:<br><br>Pressure sensor wiring issue<br>Pressure sensor hardware failure   | Shutdown Vehicle   |
| 63                | Pressure sensor 1 warning (stowed)<br><br>User_12_Fault          | If the platform is fully lowered and analog 9 out of range fault is active. The following are possible causes:<br><br>Pressure sensor wiring issue<br>Pressure sensor hardware failure   | NA   |

|    |   |   |  |
|----|---|---|--|
| 66 | Pressure Sensor 1 Warning (Elevated)<br>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:<br><br>Pressure sensor wiring issue<br>Pressure sensor hardware failure   | Shut down Throttle<br>Shutdown Pump      |
| 6C | Pressure Sensor Correlation Elevated Fault<br>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:<br><br>Pressure sensor wiring issue<br>Pressure sensor hardware failure  | Shutdown Vehicle<br>Shutdown Coil Supply |
| 7A | Percentage To Max Load Difference Fault<br>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.<br><br>Possible causes for this fault includes:<br>Calibration failure<br>Pressure sensor failure<br>Electrical noise issue on one of the pressure sensors | Shutdown Vehicle<br>Shutdown Coil Supply |

### 4.1.8 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<br><br>OR<br>If filtered pressure value is greater than 4.6V for 1500ms | When platform is above down limit switch, disable all motions.<br>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)<br>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:<br><br>Faulty pressure sensor<br>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<br>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:<br><br>Pressure sensor wiring issue<br>Pressure sensor hardware failure                                 | Shutdown Vehicle<br>Shutdown Coil Supply   |
| 6C | Pressure Sensor Correlation Elevated Fault<br>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:<br><br>Pressure sensor wiring issue<br>Pressure sensor hardware failure                                 | Shutdown Vehicle<br>Shutdown Coil Supply   |

## 4.1.9 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<br><br>OR<br><br>If filtered angle value is greater than 4.6V for 50 ms | When platform is above down limit switch, disable all motions.<br><br>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 :**

| <b>Fault Code</b> | <b>Fault Detail</b>                             | <b>Description</b>   | <b>Fault Action</b> |
|-------------------|---|--|---------------------|
| 53                | Angle Sensor Fault<br>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:<br><br>Wiring issue<br>Angle sensor hardware fault          | Shutdown Vehicle    |
| 65                | Angle Sensor Calibration Fault<br>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:<br><br>Wiring issue<br>Angle sensor hardware fault | Shutdown Vehicle    |

|    |  |  |  |
|----|--|--|--|
| 6D | Lift Motion Fault<br><br>User_26_Fault       | <p>Type 0: If the pump PWM &gt; 30%, raise solenoid driver PWM is applied and the angle sensor percent hasnt increased by 5% within 10 seconds.</p> <p>Type 1: If the pump PWM is 0%, lower solenoid driver PWM is applied and the angle sensor percent hasnt decreased by 5% within 10 seconds.</p> <p>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.</p> <p>Possible causes for these faults include:<br/>         Faulty angle sensor<br/>         Electrical noise on angle sensor input<br/>         Hydraulic issue<br/>         Lift or lower solenoid mechanical failure</p> | Shutdown Vehicle<br><br>Shutdown Coil Supply |
| 5A | Down limit Switch Fault<br><br>User_17_Fault | Down limit switch faults for 500ms OR<br>If 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  | Shutdown Vehicle<br><br>Shutdown Coil Supply |

### 4.1.10 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)<br>OR<br>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 :**

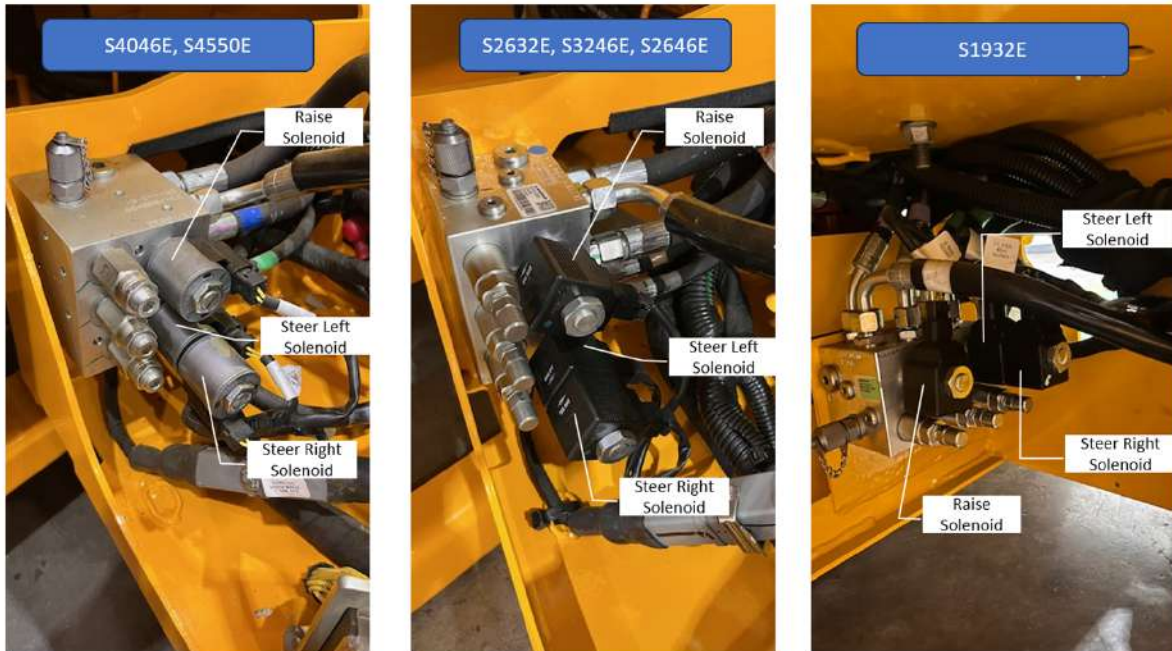
1. Faulty Solenoid
2. Faulty Wiring Harness
  - 2.1 Wire Short Circuit
  - 2.2 Wire Open Circuit
  - 2.3 Connector Damage/Loose
  - 2.4 Terminal Back out

**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 :**



**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.

**4.1.11 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

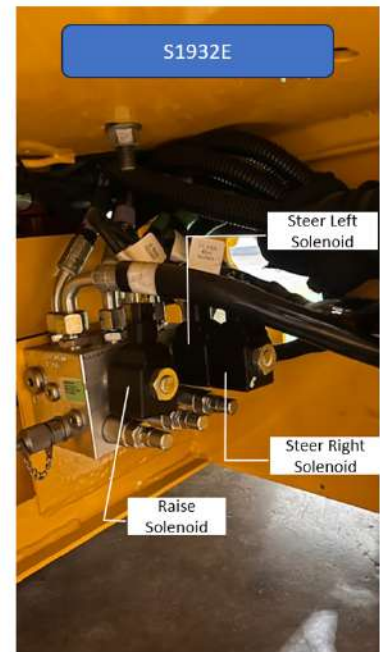
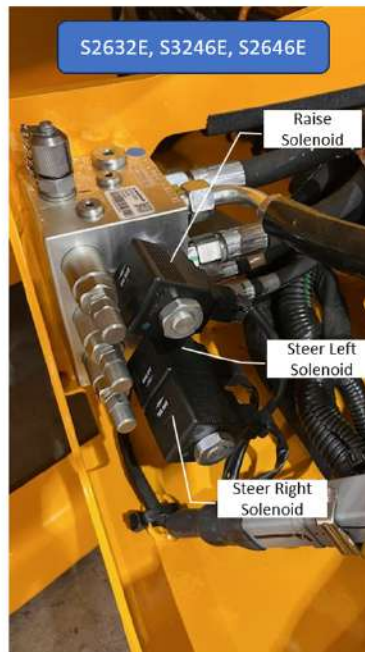
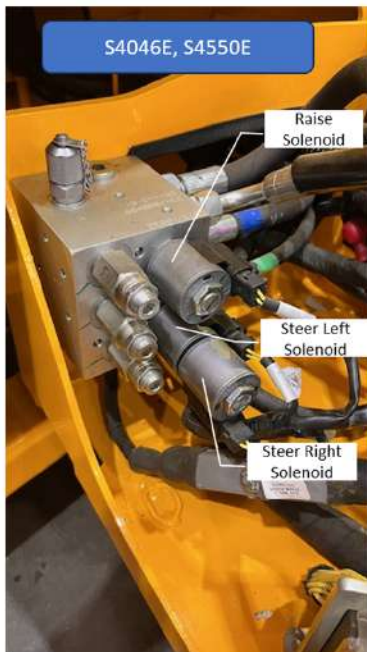
2.4 Terminal Back out

**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 :**



**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.

**4.1.12 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.

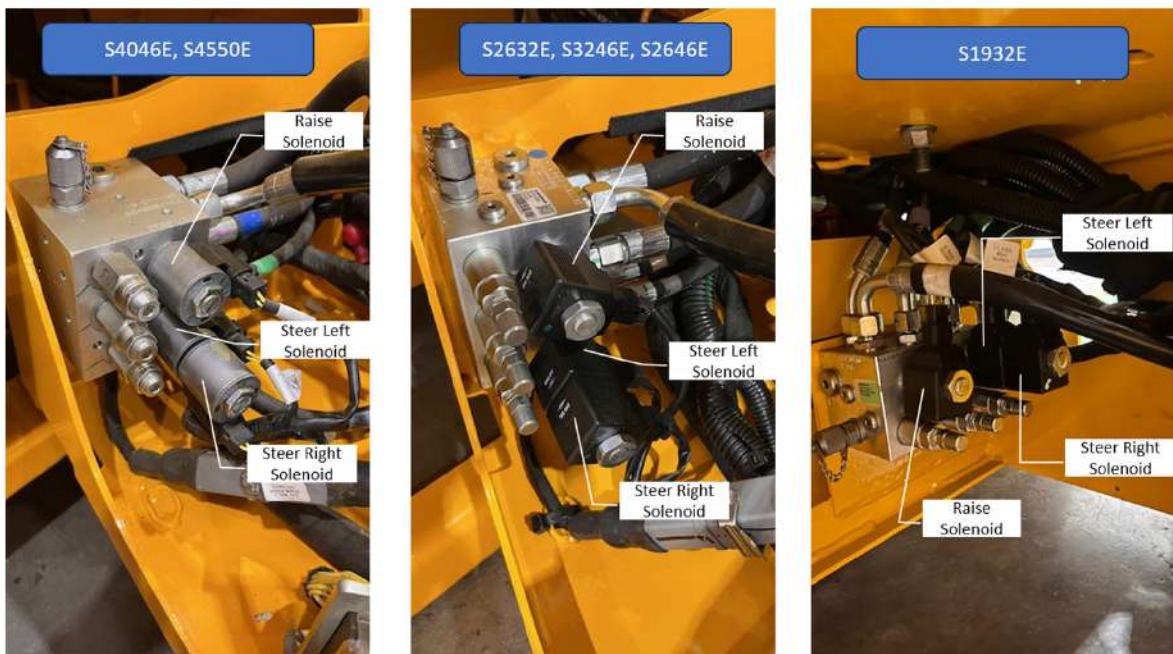
5. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.

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

**Related / Similar Faults :**

NA

**Location :**



**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.

**4.1.13 DTC- A7**

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|    |                      |   |                   |
|----|----------------------|---|-------------------|
| A7 | Lift Down Coil Fault | <p>If measured solenoid drive current is greater than short current (900, about 8A) for a configurable delay time (default is 0.7s)</p> <p style="text-align: center;">OR</p> <p>If measured solenoid drive If measured solenoid drive current is less than open current) for a configurable delay time (default is 0.7s)</p> | Disable drive F/R |
|----|----------------------|---|-------------------|

**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 :**

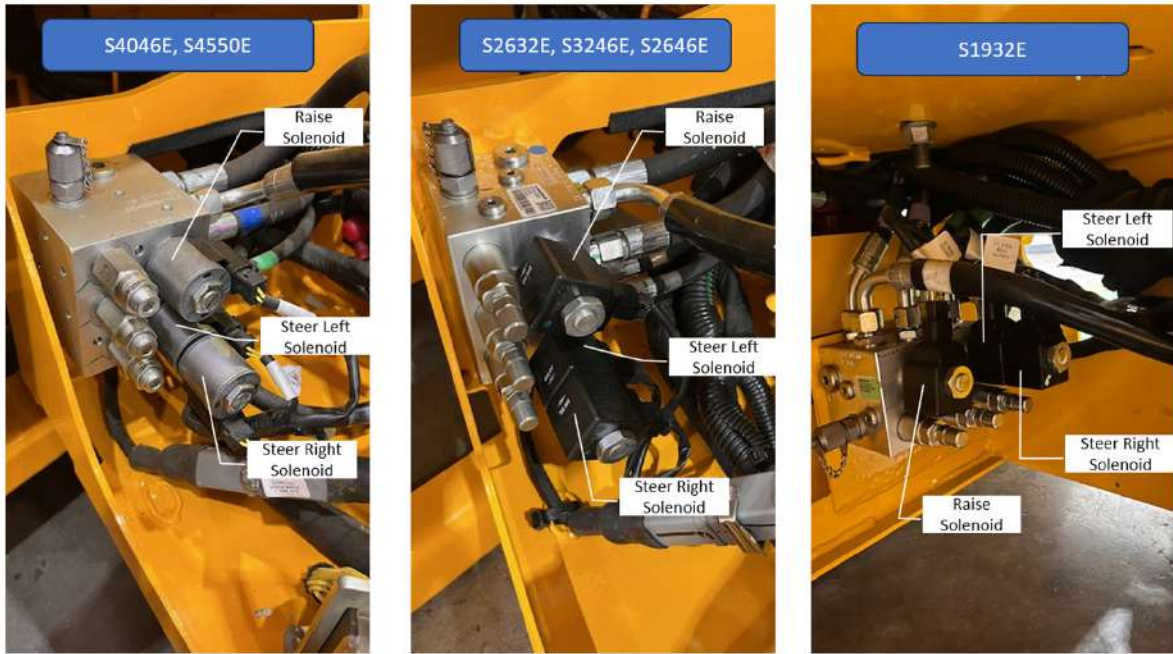
1. Check if connector C8\_MH is properly connected and is not damaged or terminal back out issue is not there. If everything OK continue to next step
2. Check continuity between Wire 6000P (Pin 2) of Lift Down Solenoid C8\_MH and Pin 20 of Controller 35 Pin connector CN1\_MH - (For Single cylinder machine)
3. 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)
4. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.
5. 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)
6. 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)
7. If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.

8. 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.

**4.1.14 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<br>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<br>User_22_Fault | Type 0: PCU button 1 HW fault (Lift/Lower mode)<br>Type 1: PCU button 2 HW fault (Traction mode)<br>Type 2: PCU button 3 HW fault (Horn)<br>Type 3: PCU button 4 HW fault (Speed mode)<br>Type 4: PCU steer left or right button HW fault<br>Type 5: PCU enable trigger button HW fault<br><br>All of these are reported by the PCU and HW faults. | Shutdown Vehicle<br>Shutdown Coil Supply |

|    |   |  |  |
|----|---|--|--|
| 52 | Wika PCU PDO<br>Timeout Fault<br><br>User_2_Fault   | If the cyclic PDO isnt received within 100ms. The potential cause could be:<br>CAN wiring issue<br>Incorrect baud rate or node ID set in the PCU<br>CAN hardware issue on node<br>CAN node not in CAN NMT operational state    | Shutdown Vehicle<br><br>Shutdown Coil Supply |
| 5E | PCU Data Freeze<br>Fault<br><br>User_21_Fault       | Type 1: PDO1 from PCU (0x189) data freezes<br>Type 2: PDO2 from PCU (0x289) data freezes<br>Type 3: PDO1 from PCU (0x189) & PDO2 from PCU (0x289) data freezes<br><br>Possible causes could be:<br>PCU HW issue                | Shutdown Vehicle                             |
| 59 | F2T M2 PDO<br>Timeout Fault<br><br>User_9_Fault     | If the cyclic PDO isnt received within 100ms. The potential cause could be:<br>CAN wiring issue<br>Incorrect baud rate or node ID set in the F2T M1<br>CAN hardware issue on node<br>CAN node not in CAN NMT operational state | Shutdown Vehicle                             |
| 57 | F2T M2 Not<br>Operational Fault<br><br>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:<br>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.

## 4.1.15 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<br>Shutdown Interlock<br>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, 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.

**Related / Similar Faults :**

| <b>Fault Code</b> | <b>Fault Detail</b>                     | <b>Description</b>  | <b>Fault Action</b>                      |
|-------------------|---|---|--|
| 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<br>Shutdown Coil Supply |

**Location :**

NA

**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 :

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

## 4.1.16 DTC- 56

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

### **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.

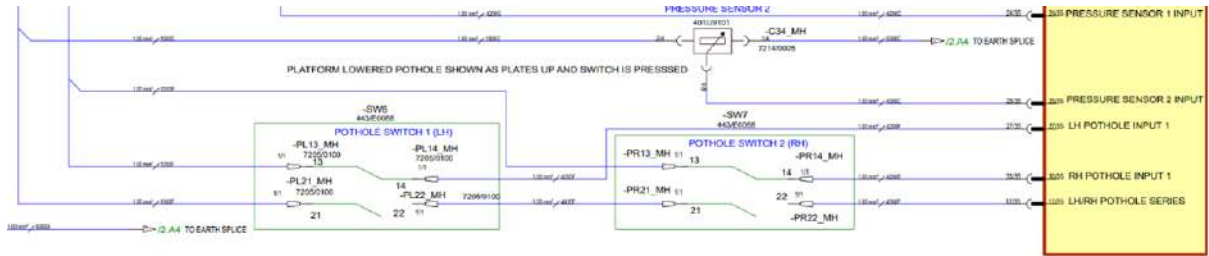
**Related / Similar Faults :**

NA

**Location :**

NA

**Additional Info :**



### 4.1.17 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.<br>Type 2: If the PCU joystick is in the lift position OR the base upper switch is ON at start up. | Shutdown Throttle<br>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.

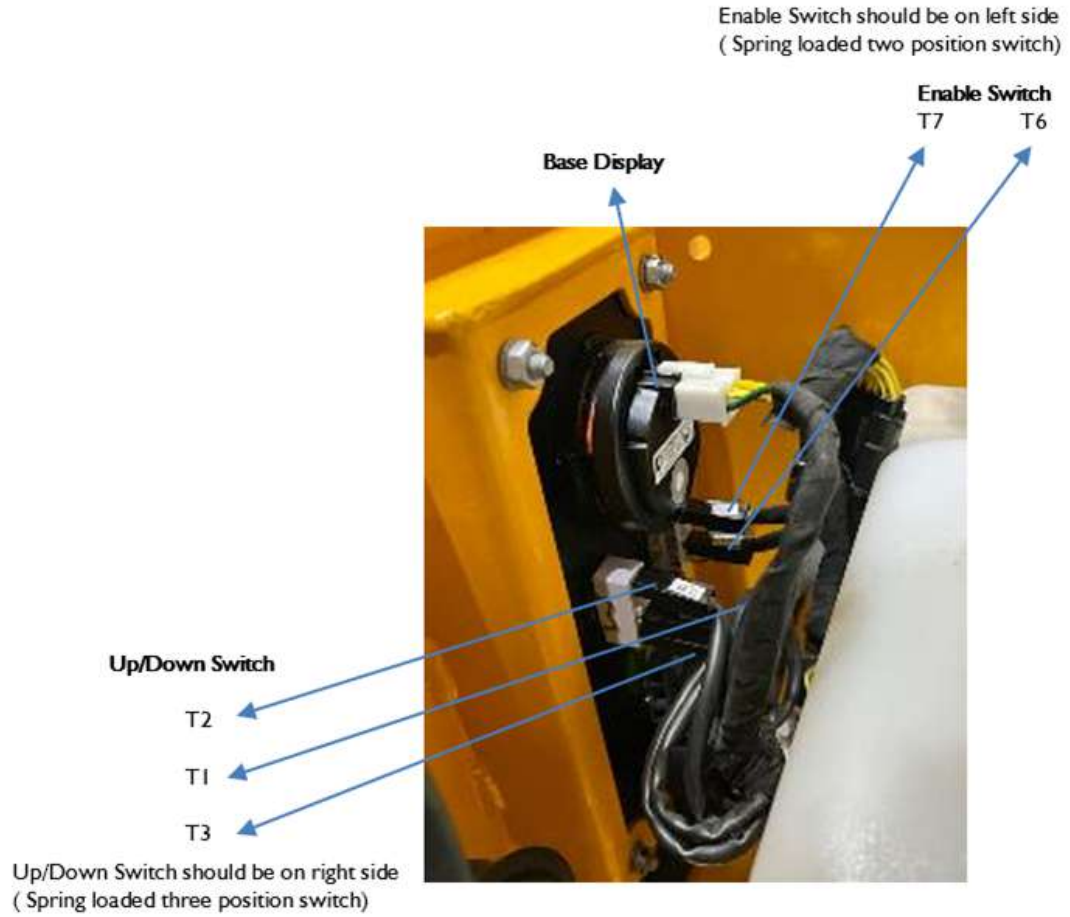
**Related / Similar Faults :**

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

**Location :**

NA

**Additional Info :**



## 4.1.18 DTC- OL

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|    |                                   |  |   |
|----|-----------------------------------|--|---|
| OL | Platform Overload Above Set point | <p>If the averaged percentage to max load is &gt;99% and the platform is above 50% height, this fault will be set. Below are the fault types:</p> <p>Type 0: Static overload checks<br/>                 Type 1: Dynamic lift overload checks<br/>                 Type 2: Dynamic lower overload checks</p> | <p>Shutdown Vehicle<br/>                 Shutdown Coil Supply</p> |
|----|-----------------------------------|--|---|

**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<br><br>User_13_Fault | <p>If the averaged percentage to max load is &gt;99% and the platform is below 50% height, this fault will be set. Below are the fault types:</p> <p>Type 0: Static overload checks<br/>                 Type 1: Dynamic lift overload checks<br/>                 Type 2: Dynamic lower overload checks</p> | <p>Shutdown Throttle<br/>                 Shutdown Pump</p> |

**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.

**4.1.19 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.<br>OR<br>The NC switched input of Lower Limit Switch is OFF below the down limit height for more than 500ms.<br>OR<br>The NC switched input of Lower Limit Switch is ON above the down limit height for more than 500ms.<br>OR<br>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<br>OR<br>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<br><br>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.

**4.1.20 DTC- 6D**

| Fault Code | Fault Detail      | Description  | Fault Action  |
|------------|-------------------|--|---|
| 6D         | Lift Motion Fault | <p>Type 0: If the pump PWM &gt; 30%, raise solenoid driver PWM is applied and the angle sensor percent has not increased by 5% within 10 seconds.</p> <p>Type 1: If the pump PWM is 0%, lower solenoid driver PWM is applied and the angle sensor percent has not decreased by 5% within 10 seconds.</p> <p>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.</p> | <p>Shutdown Vehicle</p> <p>Shutdown Coil Supply</p> |

**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

## 4.1.21 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<br>User_23_Fault    | If the PCU steer right button is ON at start up.                  | NA           |
| 5C         | PCU Enable Trigger Sequence Fault<br>User_19_Fault | If the PCU enable trigger is ON at start up.                      | NA           |
| 5D         | PCU Passcode Fault<br>User_20_Fault                | Type 0: SDO write failure when requesting to change PCU passcode. | NA           |

|  |  |  |  |
|--|--|--|--|
|  |  | Type 1: SDO response failure when requesting to change PCU passcode. |  |
|--|--|--|--|

### 4.1.22 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<br>User_27_Fault | If the BDI percentage lower than the low BDI percentage parameter i.e. 5% for more than 3600ms. | Shutdown Vehicle<br>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.

**4.1.23 DTC- 12**

| <b>Fault Code</b> | <b>Fault Detail</b>  | <b>Description</b>  | <b>Fault Action</b> |
|-------------------|--|---|---------------------|
| 0x12              | Controller Over current (Motor phase current) (Left Motor) | Fault Type(s):<br>1 = Controller Over Current Phase U<br>2 = Controller Over Current Phase W<br>3 = Controller Over Current Phase V<br>4 = Irms > 120 % Current Limit | Disable all motion  |

**Possible Causes :**

1. short on left motor phases
2. Controller defective.

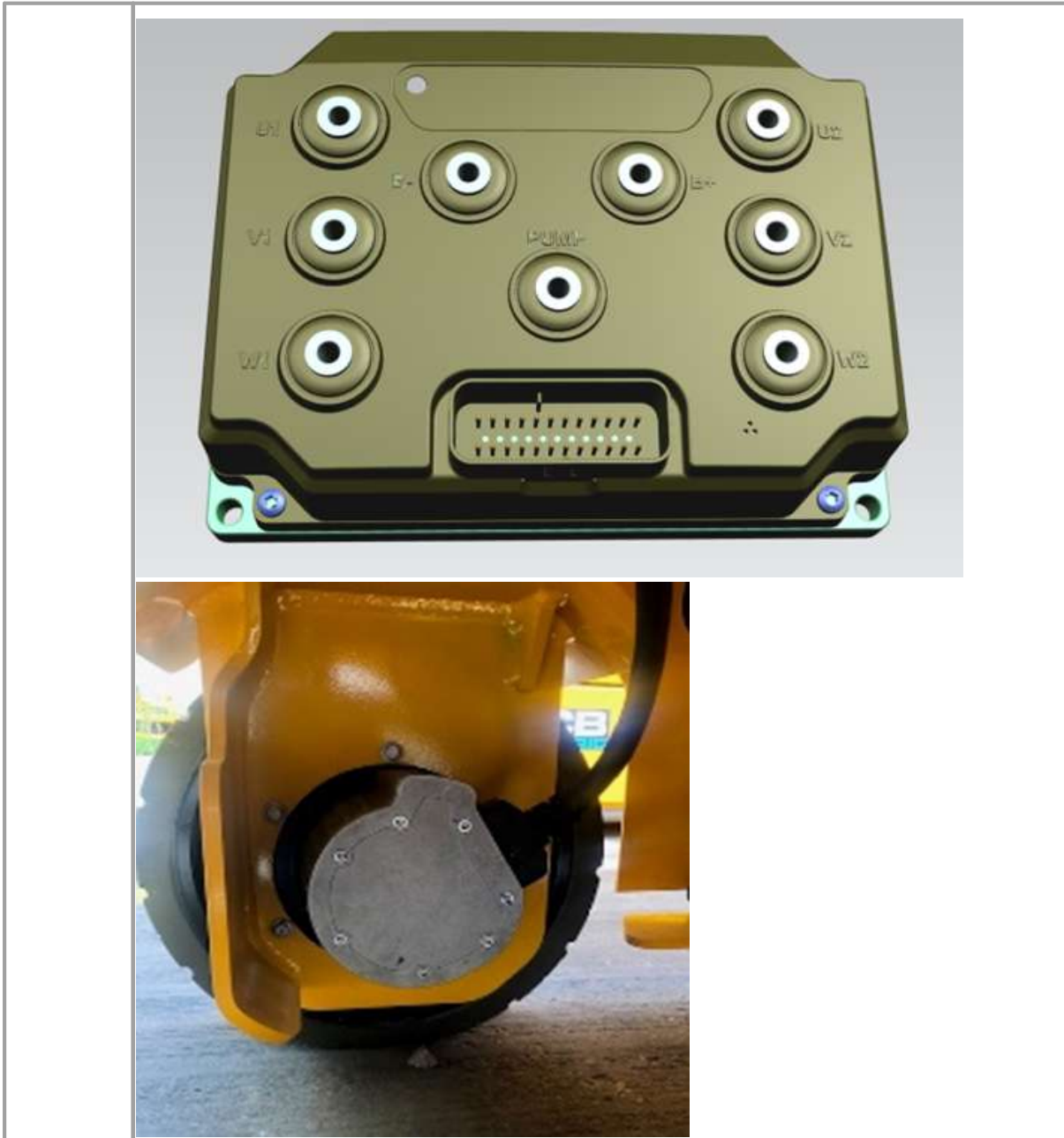
**Troubleshooting Steps :**

1. Check for short circuit on phases U1, VI, W1.
2. If short circuit is there , then replace the left motor.

3. If the fault still persists, replace the motor controller.

### 4.1.24 DTC- 13

|                           |   |
|---------------------------|---|
| <b>Error code:</b>        | DTC- 13   |
| <b>ECU</b>                | PECU  |
| <b>Description:</b>       | Motor controller issue  |
| <b>Component:</b>         | Motor Controller  |
| <b>Vehicle reaction :</b> | All function Disable  |
| <b>Possible Cause:</b>    | <ol style="list-style-type: none"> <li>1. External short of phase U, V or W motor connections.</li> <li>2. Speed encoder noise problems.</li> <li>3. Motor parameters are mistuned.</li> <li>4. Controller defective.</li> <li>5. Drive Motor cable Pinched/ Damaged</li> </ol>   |
| <b>Service Action:</b>    | <ol style="list-style-type: none"> <li>1. Check Motor controller harness and connector for any cut, damage and loose connection</li> <li>2. Check Drive Motor cable and Motor Controller connection U, V and W harness, Repair/Replace if faulty.</li> <li>3. Check Drive motor condition, if faulty Repair/Replace.</li> <li>4. Check Motor Controller Condition, Reset/ Replace if faulty.</li> <li>5. Try re flashing the software.</li> </ol> |



4.1.25 DTC- 14

| Fault Code | Fault Detail     | Description   | Fault Action       |
|------------|------------------|---|--------------------|
| 0x14       | Precharge Failed | Fault Type(s):<br>1 = Abort<br>2 = Energy Limit Exceeded<br>3 = Time Limit Exceeded | Disable all motion |

**Possible Causes :**

1. An external load on the capacitor bank (B+ connection terminal) that prevents the capacitor bank from charging.
2. Controller defective.

**Troubleshooting Steps :**

1. Check the connections at Curtis controller pin 1 / 35. Ensure no pin back-out
2. Check continuity between wire 1000K connected at Curtis controller connector Pin 1/35 & wire 1000 connected at Ignition relay..
3. Check ignition relay connection (-R2\_MH) as per schematic.
4. Check ignition relay working by switch ON the ignition switch to chassis or platform condition. Check voltage at Curtis controller pin 1/35, it should be approx 24V.
5. Key cycle the machine.
6. If fault still persists, re-flash the Curtis controller with respective software file.
7. If fault still persists, replace the Curtis controller.

**4.1.26 DTC- 15**

| <b>Fault Code</b> | <b>Fault Detail</b>                 | <b>Description</b> | <b>Fault Action</b> |
|-------------------|-------------------------------------|--------------------|---------------------|
| 0x15              | Controller Severe Under temperature |                    | Disable all motion  |

**Possible Causes :**

1. Controller is operating in an extreme environment below -40°C .
2. Controller defective.

**Troubleshooting Steps :**

1. Bring the controller in the environment with temperature above -40°C
2. If the controller is in the within normal temperature range between -12°C to +60°C and the fault still persists, re-flash the Curtis controller with respective software file.
3. If still fault persist, replace the Curtis controller.

## 4.1.27 DTC- 16

| Fault Code | Fault Detail                       | Description | Fault Action       |
|------------|------------------------------------|-------------|--------------------|
| 0x16       | Controller Severe Over temperature |             | Disable all motion |

### Possible Causes :

1. Controller is operating in an extreme environment above +95°C .
2. Controller defective.

### Troubleshooting Steps :

1. Bring the controller in the environment with temperature below +95°C
2. If the controller is in the within normal temperature range between -12°C to +60°C and the fault still persists, re-flash the Curtis controller with respective software file.
3. If still fault persist, replace the Curtis controller.

## 4.1.28 DTC- 17

| Fault Code | Fault Detail            | Description  | Fault Action                        |
|------------|-------------------------|--|-------------------------------------|
| 17         | Severe B+ Under voltage | Fault Type(s):<br>1 = Under voltage cutback (0x343B = 0%) or capacitor voltage below safe limits for 64ms.<br>2 = Commanded voltage could not be achieved due to low capacitor voltage | Disable all motions<br>Shutdown All |

|    |                          |   |                                     |
|----|--------------------------|---|-------------------------------------|
| 17 | Severe KSI Under voltage | <b>Fault Type(s):</b><br>1 = Brownout is disabled due to invalid product data configuration.<br>2 = Keyswitch_Voltage below brownout threshold at bootup.<br>3 = Keyswitch_Voltage below low brownout threshold for 5 ms.<br>4 = Keyswitch_Voltage below high brownout threshold for 64 ms. | Disable all motions<br>Shutdown All |
|----|--------------------------|---|-------------------------------------|

**Possible Causes :**

1. Machine is discharged because of which battery has reached the under voltage cutback limit i.e. 16V.
2. Battery disconnected while driving
3. Blown 200A fuse or main contactor did not close
4. KSI disconnected or Open Circuit while driving.

**4.1.29 DTC- 18**

| Fault Code | Fault Detail                                      | Description | Fault Action                        |
|------------|---|-------------|-------------------------------------|
| 18         | Severe B+ Over voltage<br>Severe KSI Over voltage |             | Disable all motions<br>Shutdown All |

**Possible Causes :**

1. Battery disconnected while regen braking
2. Battery-voltage applied to KSI (pin 1) exceeds the Severe Over voltage limit.
3. Machine has reached over voltage cutback limit i.e. 30V

**Troubleshooting Steps :**

1. Key cycle the machine .

2. If the fault still persists, check the battery pack voltage which should be ~ 24V. If it turns out to be >= 30V check if the battery configuration is as per spec.

3. Check the individual battery voltage to identify faulty battery

**Related / Similar Faults :**

| Fault Code | Fault Detail         | Description   | Fault Action |
|------------|----------------------|---|--------------|
| 24         | Over voltage Cutback | Battery voltage is at or above over voltage cutback limit | Warning only |

**4.1.30 DTC- 19**

**Note:** This mainly comes as a secondary fault code. In that case, first solve the primary fault code.

If the AC fault code appears as a single fault, then first refer Annexure B to check the fault name and accordingly follow the steps from the below table

| Fault Code | Fault Detail                        | Troubleshooting steps  |
|------------|-------------------------------------|--|
|            | Current Sensor Left Motor           | -Key cycle the machine<br>- if the fault still persists , Replace left motor   |
|            | Current Sensor Right Motor          | -Key cycle the machine<br>- if the fault still persists , Replace Right motor  |
| 19         | Speed Limit Supervision Left Motor  | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller |
| 19         | Speed Limit Supervision Right Motor | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller |
|            | Motor Not Stopped Left Motor        | -Key cycle the machine<br>- if the fault still persists , Replace left motor   |
|            | Motor Not Stopped Right Motor       | -Key cycle the machine<br>- if the fault still persists , Replace right motor  |

|  |                              |  |
|--|------------------------------|--|
|  | Critical OS General          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | OS General 2                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | Reset Rejected               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | Motor Short                  | -Key cycle the machine<br>'- If the fault still persists , replace the respective motor<br>'- if the fault still persists , Replace motor controller |
|  | Pump Driver                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | Load-Hold Driver             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | Lower Driver                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | Throttle Input               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | Brake Input                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | NV Memory Failure            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | F2T_M2_Not_Operational_Fault | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |

|                                       |   |
|---------------------------------------|---|
| F2T_M2_CAN_Timeout                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller     |
| F2T_M1_CAN_Timeout                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller     |
| VCL Run Time Error                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| OS General                            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| CAN Timeout                           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller     |
| Supervision                           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| Supervision Input Check               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| Internal Hardware                     | -Key cycle the machine<br>'- If the fault still persists, replace the motor controller  |
| Motor Characterization<br>Left Motor  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the left motor<br>'- If the fault is still there,replace the motor controller  |
| Motor Characterization<br>Right Motor | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |

|                                    |  |
|------------------------------------|--|
| Encoder Pulse Error Left Motor     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller      |
| Encoder Pulse Error Right Motor    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller      |
| Bad Firmware                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Encoder LOS Left Motor             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller      |
| Encoder LOS Right Motor            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller      |
| Driver 6 Fault                     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Driver Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 18 Out of range(LH pothole) | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>-If the fault still persists, replace the LH pothole switch<br>'- If the fault still persists, replace the motor controller |
| PWM Input 10 Out of Range          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |

|  |                        |   |
|--|------------------------|---|
|  | Analog 31 Out of Range | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | VCL Watchdog           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Primary State Error    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Lift Input             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Phase PWM Mismatch     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Hardware Compatibility | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Lower Input            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Memory Parity          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |

### 4.1.31 DTC- 22

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|    |                                 |   |              |
|----|---------------------------------|---|--------------|
| 22 | Controller Over temp<br>Cutback | <b>Fault Type(s):</b><br>1 = Controller heat sink high temperature (affecting AC phases)<br>2 = Controller heat sink high temperature (affecting pump phase)<br>3 = Capacitor bank high temperature<br>4 = AC phase FET high temperature<br>5 = Pump phase FET high temperature<br>6 = Low Frequency single phase high temperature. | Warning Only |
|----|---------------------------------|---|--------------|

**Possible Causes :**

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.

**Troubleshooting Steps :**

1. Check if the controller is properly mounted.
2. If the fault still persists , replace the controller.

**4.1.32 DTC- 25**

| <b>Fault Code</b> | <b>Fault Detail</b>   | <b>Description</b>   | <b>Fault Action</b> |
|-------------------|-----------------------|--|---------------------|
| 25                | Ext 5V Supply Failure | <b>Fault Type(s):</b><br>1 = The 5V supply is outside 5V ± 10%.<br>2 = The current is outside the limits defined by:<br>– Ext_5V_Supply_Min.<br>– Ext_5V_Supply_Max. | Disable 5V supply   |

**Possible Causes :**

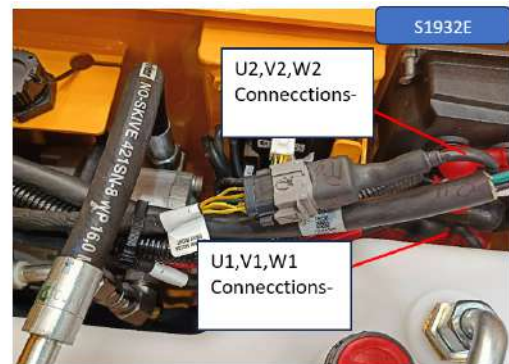
1. Short circuit

2. Open circuit
3. Loose or damaged wiring harness.

**Troubleshooting Steps :**

1. Check if the pin 26 of Controller 35 Pin connector CN1\_MH is not backed out.
2. Check if pin 1 on the left motor connector(C62\_MH) and right motor connector(C63\_MH) are not backed out.
3. Check continuity between wire 4501 (pin 1) of LH motor connector and pin 26 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage .
4. Check continuity between wire 4502 (pin 1) of RH motor connector and pin 26 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage .
5. Check for short to battery and short to ground.
6. If the fault still persists replace the motor

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#). <sup>213</sup>

**4.1.33 DTC- 28**

| <b>Fault Code</b> | <b>Fault Detail</b>                 | <b>Description</b>   | <b>Fault Action</b> |
|-------------------|-------------------------------------|--|---------------------|
| 28                | Motor Temp Hot Cutback - Left Motor | When the temperature of the left motor reaches the hot cutback limit | Warning only        |

**Possible Causes :**

1. Motor winding temperature is at or above the hot cutback limit i.e. 110°C.
2. Machine is working on a harsh duty cycle for a long time.
3. Machine is driving on a gradient for a long time.

**Troubleshooting Steps :**

1. Cool down the machine for 20 - 30 minutes before working again.
2. If the fault persists even after cooling for a long time , try re flashing the software.
3. If the fault still persists , try replacing the motor.

**Related / Similar Faults :**

| <b>Fault Code</b> | <b>Fault Detail</b>                  | <b>Description</b>  | <b>Fault Action</b> |
|-------------------|--------------------------------------|---|---------------------|
| 0A                | Motor Temp Hot Cutback - Right Motor | When the temperature of the Right motor reaches the hot cutback limit | Warning only        |
| 6B                | Motor_Temperature_Shutdown_Fault     | When the temperature of the motor winding reaches 130°C               | Disable all motions |

**Location :**



**Additional Info :**

1. Ensure that the right and left motor identifications are as per [Annexure A.](#)<sup>213</sup>
2. This is just a warning fault, motor current will gradually start decreasing which in turn would reduce the driving speed till the winding temperature reaches 130°C which would lead to fault code 6B in which machine will disable all motions.

**4.1.34 DTC- 29**

| <b>Fault Code</b> | <b>Fault Detail</b>            | <b>Description</b>                                 | <b>Fault Action</b> |
|-------------------|--------------------------------|--|---------------------|
| 29                | Motor Temp Sensor - Left Motor | The temperature sensor of the left motor is faulty | Warning only        |

**Possible Causes :**

1. Motor thermistor connection loose
2. Faulty wiring harness.

**Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.
- 2 . If fault code does not change, there is a problem with wiring harness. Follow the below steps :
3. Check if pin 5 on the left motor connector(C62\_MH) and pin 8 of Controller 35 Pin connector CN1\_MH is not backed out.
4. Check continuity between wire 4509 (pin 5) of LH motor connector and pin 8 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
5. Check the circuit for short to battery and short to ground.

**Location :****Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A.](#) <sup>213</sup>

**4.1.35 DTC- 31**

| Fault Code | Fault Detail | Description  | Fault Action   |
|------------|--------------|--|--|
| 31         | Main Driver  | Fault Type(s):<br>1 = Driver current exceeded hardware limits.<br>2 = Driver current exceeded configured over-current limits<br>3 = Driver commanded PWM active, using diagnostic pulses. Voltage measured high, should be low. Typically caused by driver failure, or driver pin short to high.<br>4 = Driver commanded PWM active, using diagnostic pulses. Voltage measured low, should be high. Either open circuit, or driver pin short to ground.<br>5 = Driver commanded PWM is 0, and voltage measured low (should be high). Either open circuit, or driver pin short to ground.<br>7 = Driver undercurrent - Monitored current is below undercurrent threshold. | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |

**Possible Causes :**

1. Open or short on Contactor Coil .
2. Dirty connector pins at controller or contactor coil
3. Bad connector crimps or faulty wiring.

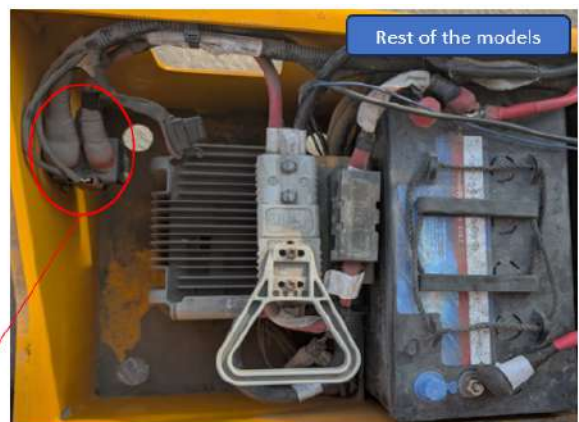
**Troubleshooting Steps :**

1. Check if the contacts on the DC contactor have become loose.
2. Check if pin 6 of Controller 35 Pin connector CN1\_MH is backed out
3. Follow the steps for "38" fault code .
4. If the fault still persists, follow the steps for "39" fault code

**Related / Similar Faults :**

| Fault Code | Fault Detail                 | Description  | Fault Action   |
|------------|------------------------------|--|--|
| 38         | Main Contactor Welded        | Main contactor tips are welded closed  | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |
| 39         | Main Contactor Did Not Close | Type 1: Main did not close when commanded.<br>Type 2: Main disconnected during operation<br>Type 3: Battery disconnected with main enable off. | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |

**Location :**



Main Contactor

## 4.1.36 DTC- 32

| Fault Code | Fault Detail                 | Description   | Fault Action  |
|------------|------------------------------|---|---|
| 32         | EM Brake Driver - Left Motor | Fault Type(s):<br>1 = Driver current exceeded hardware limits.<br>2 = Driver current exceeded configured over-current limits. | Disable Drive<br>Shutdown throttle<br>Shutdown EM Brake<br>Full Brake |

### **Possible Causes :**

1. Open circuit on driver load.
2. Faulty wiring harness
3. Connector pin loose on connector or motor end

### **Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.
- 2 . If fault code does not change, there is a problem with wiring harness. Follow the below steps :
  - a) Check if pin 8 on the left motor connector(C62\_MH) and pin 4 of Controller 35 Pin connector CN1\_MH is not backed out.
  - b) Check continuity between wire 6012 (pin 8) of LH motor connector and pin 4 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
  - c) Check the circuit for short to battery and short to ground .

### **Related / Similar Faults :**

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|      |  |  |                   |
|------|--|--|-------------------|
| 0x84 | Motor Braking Impaired<br>- Left Motor |  | Disable drive F/R |
|------|--|--|-------------------|

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#) <sup>213</sup>.

**4.1.37 DTC- 33**

**Note:** This mainly comes as a secondary fault code. In that case, first solve the primary fault code.

If the AC fault code appears as a single fault, then first refer Annexure B to check the fault name and accordingly follow the steps from the below table

| Fault Code | Fault Detail                        | Troubleshooting steps  |
|------------|-------------------------------------|--|
|            | Current Sensor Left Motor           | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Current Sensor Right Motor          | -Key cycle the machine<br>'- if the fault still persists , Replace Right motor   |
|            | Speed Limit Supervision Left Motor  | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|            | Speed Limit Supervision Right Motor | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|            | Motor Not Stopped Left Motor        | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Motor Not Stopped Right Motor       | -Key cycle the machine<br>'- if the fault still persists , Replace right motor   |
|            | Critical OS General                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | OS General 2                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Reset Rejected                      | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Motor Short                         | -Key cycle the machine<br>'- If the fault still persists , replace the respective motor<br>'- if the fault still persists , Replace motor controller   |
| 33         | Pump Driver                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Load-Hold Driver                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software  |

|  |                              |   |
|--|------------------------------|---|
|  |                              | '- If the fault still persists, replace the motor controller  |
|  | Lower Driver                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Throttle Input               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Brake Input                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | NV Memory Failure            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | F2T_M2_Not_Operational_Fault | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | F2T_M2_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|  | F2T_M1_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|  | VCL Run Time Error           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | OS General                   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | CAN Timeout                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |

|  |                                    |   |
|--|------------------------------------|---|
|  | Supervision                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Supervision Input Check            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Internal Hardware                  | -Key cycle the machine<br>'- If the fault still persists, replace the motor controller  |
|  | Motor Characterization Left Motor  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the left motor<br>'- If the fault is still there,replace the motor controller  |
|  | Motor Characterization Right Motor | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Encoder Pulse Error Left Motor     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Encoder Pulse Error Right Motor    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Bad Firmware                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Encoder LOS Left Motor             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Encoder LOS Right Motor            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |

|                                    |  |
|------------------------------------|--|
| Driver 6 Fault                     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Driver Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 18 Out of range(LH pothole) | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>-If the fault still persists, replace the LH pothole switch<br>'- If the fault still persists, replace the motor controller |
| PWM Input 10 Out of Range          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 31 Out of Range             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| VCL Watchdog                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Primary State Error                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Lift Input                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Phase PWM Mismatch                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Hardware Compatibility             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |

|  |               |   |
|--|---------------|---|
|  | Lower Input   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Memory Parity | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |

### 4.1.38 DTC- 34

**Note:** This mainly comes as a secondary fault code. In that case, first solve the primary fault code.

If the AC fault code appears as a single fault, then first refer Annexure B to check the fault name and accordingly follow the steps from the below table

| Fault Code | Fault Detail                        | Troubleshooting steps  |
|------------|-------------------------------------|--|
|            | Current Sensor Left Motor           | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Current Sensor Right Motor          | -Key cycle the machine<br>'- if the fault still persists , Replace Right motor   |
|            | Speed Limit Supervision Left Motor  | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|            | Speed Limit Supervision Right Motor | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|            | Motor Not Stopped Left Motor        | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Motor Not Stopped Right Motor       | -Key cycle the machine<br>'- if the fault still persists , Replace right motor   |
|            | Critical OS General                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software  |

|  |                              |  |
|--|------------------------------|--|
|  |                              | '- If the fault still persists, replace the motor controller   |
|  | OS General 2                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | Reset Rejected               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | Motor Short                  | -Key cycle the machine<br>'- If the fault still persists , replace the respective motor<br>'- if the fault still persists , Replace motor controller |
|  | Pump Driver                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | Load-Hold Driver             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | Lower Driver                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | Throttle Input               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | Brake Input                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | NV Memory Failure            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
|  | F2T_M2_Not_Operational_Fault | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |

|                                       |   |
|---------------------------------------|---|
| F2T_M2_CAN_Timeout                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller     |
| F2T_M1_CAN_Timeout                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller     |
| VCL Run Time Error                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| OS General                            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| CAN Timeout                           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller     |
| Supervision                           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| Supervision Input Check               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| Internal Hardware                     | -Key cycle the machine<br>'- If the fault still persists, replace the motor controller  |
| Motor Characterization<br>Left Motor  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the left motor<br>'- If the fault is still there,replace the motor controller  |
| Motor Characterization<br>Right Motor | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |

|                                    |  |
|------------------------------------|--|
| Encoder Pulse Error Left Motor     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller      |
| Encoder Pulse Error Right Motor    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller      |
| Bad Firmware                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Encoder LOS Left Motor             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller      |
| Encoder LOS Right Motor            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller      |
| Driver 6 Fault                     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Driver Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 18 Out of range(LH pothole) | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>-If the fault still persists, replace the LH pothole switch<br>'- If the fault still persists, replace the motor controller |
| PWM Input 10 Out of Range          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |

|  |                        |   |
|--|------------------------|---|
|  | Analog 31 Out of Range | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | VCL Watchdog           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Primary State Error    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Lift Input             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Phase PWM Mismatch     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Hardware Compatibility | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Lower Input            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Memory Parity          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |

### 4.1.39 DTC- 36

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|    |                                     |   |   |
|----|-------------------------------------|---|---|
| 36 | Sin Cos Motor Feedback - Left Motor | <b>Fault Type(s):</b><br>1. Controller saw a fast transition to zero speed.<br>2. Encoder supply failed.<br>3. Sine or Cosine input differs from expected.<br>4. Controller saw sensor failure at speed.<br>5. Unrealistic motor acceleration seen.<br>6. Resolver loss of signal.<br>7. Resolver degradation of signal.<br>8. Resolver loss of tracking. | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump Full Brake. |
|----|-------------------------------------|---|---|

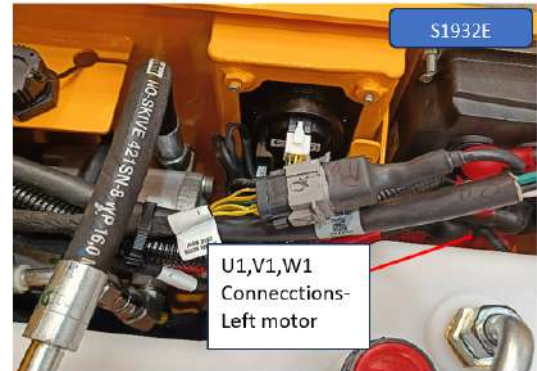
**Possible Causes :**

1. Motor encoder failure.
2. Faulty wiring harness
3. Encoder pin loose on connector or motor end

**Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.
- 2 . If fault code does not change, there is a problem with wiring harness. Follow the below steps :
  - I. Check if the pin 2 and 3 of the left motor connector(C62\_MH) and pin 31 and 32 of Controller 35 Pin connector CN1\_MH is not backed out.
  - II. Check continuity between wire 4507 (pin 2) of LH motor connector and pin 31 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
  - III. Check continuity between wire 4508 (pin 3) of LH motor connector and pin 32 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
  - IV. Check the circuit for short to battery and short to ground

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#)<sup>213</sup>.

**4.1.40 DTC- 37**

| Fault Code | Fault Detail            | Description                       | Fault Action   |
|------------|-------------------------|-----------------------------------|--|
| 37         | Motor Open - Left Motor | Open circuit in motor connections | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |

**Possible Causes :**

1. Motor phase open.
2. Faulty wiring harness

**Troubleshooting Steps :**

1. Check if the connections on U1 , V1, W1 ports are not loose(Lower side).

2. If the fault still persists, Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#).<sup>213</sup>

**4.1.41 DTC- 38**

| Fault Code | Fault Detail          | Description                           | Fault Action   |
|------------|-----------------------|---------------------------------------|--|
| 38         | Main Contactor Welded | Main contactor tips are welded closed | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |

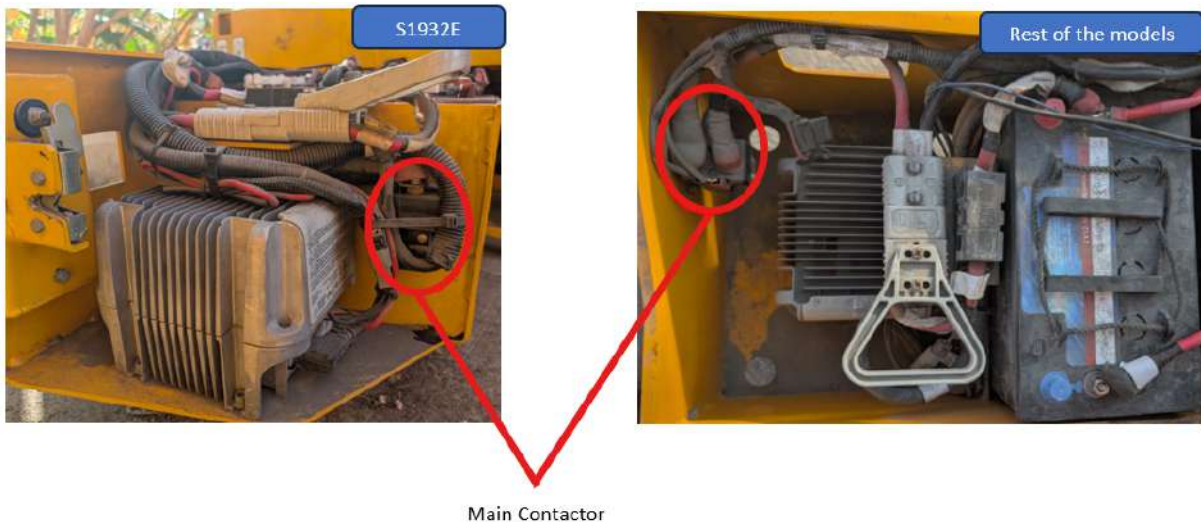
**Possible Causes :**

1. Main contactor tips are welded closed.
2. Motor phase U or V is disconnected or open.

**Troubleshooting Steps :**

1. Ensure the Isolator Switch is disconnected.
2. Remove the cables from the two contacts of the DC contactor and check continuity .
3. If continuity is there, replace the DC contactor.
4. If continuity is not present, connect the cables properly and connect the isolator switch
5. If fault still persists, Check if the motor phases U1, V1, U2 and V2 are connected properly on the controller side.

**Location :**



**4.1.42 DTC- 39**

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|    |                              |  |  |
|----|------------------------------|--|--|
| 39 | Main Contactor Did Not Close | Type 1: Main did not close when commanded.<br>Type 2: Main disconnected during operation<br>Type 3: Battery disconnected with main enable off. | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |
|----|------------------------------|--|--|

**Possible Causes :**

Type 1:

1. Main contactor did not close.
2. Main contactor tips are oxidized, burned or not making good contact
3. Blown Mega fuse(200A)

Type 2:

1. Main contactor opened during operation
2. Harness Wiring loose
3. Faulty Contactor

Type 3:

1. Battery not connected to B+ when main enable is off and interlock applied.

**Troubleshooting Steps :**

1. Check the voltage on the contactor where cable is connected from mega fuse while machine is idle and during an operation . It should give 24V. If not received , follow below steps:

- Check if the 200A mega fuse is blown.
- Check if the 30A fuse is blown. Location shown below.
- Check if the contacts on the DC contactor have become loose.
- Check if the isolator is connected properly.
- Check if the positive supply battery cable is connected properly.

- Check if the B+ terminal on the main controller is not loose.
- Check the supply contacts are connected properly or not swapped.

2. Check the voltage on the contactor cable going to the controller. During an operation, it should give 24V.

3. If the voltage is not received , replace the main contactor.

**Location :**



**4.1.43 DTC- 3A**

| Fault Code | Fault Detail                     | Description             | Fault Action      |
|------------|----------------------------------|-------------------------|-------------------|
| 0x3A       | Motor Setup Needed - Left Motor  | Motor setup is required | Disable drive F/R |
| 0x0F       | Motor Setup Needed - Right Motor | Motor setup is required | Disable drive F/R |

**Possible Causes :**

1. Controller Defective
2. Software corrupt

**Troubleshooting Steps :**

1. Reflash the software
2. Replace the motor controller if the fault still persists.

**Additional Info :**

This is a very rare fault code scenario.

## 4.1.44 DTC- 42

**Note:** This mainly comes as a secondary fault code. In that case, first solve the primary fault code.

If the AC fault code appears as a single fault, then first refer Annexure B to check the fault name and accordingly follow the steps from the below table

| Fault Code | Fault Detail                        | Troubleshooting steps  |
|------------|-------------------------------------|--|
| AC         | Current Sensor Left Motor           | -Key cycle the machine<br>- if the fault still persists , Replace left motor   |
|            | Current Sensor Right Motor          | -Key cycle the machine<br>- if the fault still persists , Replace Right motor  |
|            | Speed Limit Supervision Left Motor  | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller |
|            | Speed Limit Supervision Right Motor | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller |
|            | Motor Not Stopped Left Motor        | -Key cycle the machine<br>- if the fault still persists , Replace left motor   |
|            | Motor Not Stopped Right Motor       | -Key cycle the machine<br>- if the fault still persists , Replace right motor  |
|            | Critical OS General                 | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller  |
|            | OS General 2                        | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller  |
|            | Reset Rejected                      | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller  |

|                              |   |
|------------------------------|---|
| Motor Short                  | -Key cycle the machine<br>'- If the fault still persists , replace the respective motor<br>'- if the fault still persists , Replace motor controller  |
| Pump Driver                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| Load-Hold Driver             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| Lower Driver                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| Throttle Input               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| Brake Input                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| NV Memory Failure            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| F2T_M2_Not_Operational_Fault | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| F2T_M2_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
| F2T_M1_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
| VCL Run Time Error           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |

|  |                                       |   |
|--|---------------------------------------|---|
|  | OS General                            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | CAN Timeout                           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller     |
|  | Supervision                           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Supervision Input Check               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Internal Hardware                     | -Key cycle the machine<br>'- If the fault still persists, replace the motor controller  |
|  | Motor Characterization<br>Left Motor  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the left motor<br>'- If the fault is still there,replace the motor controller  |
|  | Motor Characterization<br>Right Motor | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Encoder Pulse Error Left<br>Motor     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Encoder Pulse Error<br>Right Motor    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Bad Firmware                          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |

|                                    |  |
|------------------------------------|--|
| Encoder LOS Left Motor             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller      |
| Encoder LOS Right Motor            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller      |
| Driver 6 Fault                     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Driver Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 18 Out of range(LH pothole) | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>-If the fault still persists, replace the LH pothole switch<br>'- If the fault still persists, replace the motor controller |
| PWM Input 10 Out of Range          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 31 Out of Range             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| VCL Watchdog                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Primary State Error                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Lift Input                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software  |

|  |                        |   |
|--|------------------------|---|
|  |                        | '- If the fault still persists, replace the motor controller  |
|  | Phase PWM Mismatch     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Hardware Compatibility | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Lower Input            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Memory Parity          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |

### 4.1.45 DTC- 44

**Note:** This mainly comes as a secondary fault code. In that case, first solve the primary fault code.

If the AC fault code appears as a single fault, then first refer Annexure B to check the fault name and accordingly follow the steps from the below table

| Fault Code | Fault Detail                       | Troubleshooting steps  |
|------------|------------------------------------|--|
| AC         | Current Sensor Left Motor          | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Current Sensor Right Motor         | -Key cycle the machine<br>'- if the fault still persists , Replace Right motor   |
|            | Speed Limit Supervision Left Motor | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |

|  |  |
|--|--|
| Speed Limit Supervision<br>Right Motor | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Motor Not Stopped Left<br>Motor        | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
| Motor Not Stopped Right<br>Motor       | -Key cycle the machine<br>'- if the fault still persists , Replace right motor   |
| Critical OS General                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| OS General 2                           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Reset Rejected                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Motor Short                            | -Key cycle the machine<br>'- If the fault still persists , replace the respective motor<br>'- if the fault still persists , Replace motor controller   |
| Pump Driver                            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Load-Hold Driver                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Lower Driver                           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Throttle Input                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Brake Input                            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |

|  |                                   |  |
|--|-----------------------------------|--|
|  | NV Memory Failure                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | F2T_M2_Not_Operational_Fault      | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | F2T_M2_CAN_Timeout                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller    |
|  | F2T_M1_CAN_Timeout                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller    |
|  | VCL Run Time Error                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | OS General                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | CAN Timeout                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller    |
|  | Supervision                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | Supervision Input Check           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | Internal Hardware                 | -Key cycle the machine<br>'- If the fault still persists, replace the motor controller   |
|  | Motor Characterization Left Motor | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the left motor<br>'- If the fault is still there,replace the motor controller |

|                                       |  |
|---------------------------------------|--|
| Motor Characterization<br>Right Motor | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the right motor<br>- If the fault is still there,replace the motor controller       |
| Encoder Pulse Error Left<br>Motor     | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the right motor<br>- If the fault is still there,replace the motor controller       |
| Encoder Pulse Error<br>Right Motor    | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the right motor<br>- If the fault is still there,replace the motor controller       |
| Bad Firmware                          | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller  |
| Encoder LOS Left Motor                | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the right motor<br>- If the fault is still there,replace the motor controller       |
| Encoder LOS Right<br>Motor            | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the right motor<br>- If the fault is still there,replace the motor controller       |
| Driver 6 Fault                        | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller  |
| Driver Assignment                     | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller  |
| Analog Assignment                     | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller  |
| Analog 18 Out of<br>range(LH pothole) | -Key cycle the machine<br>- if the fault still persists , Reflash the software<br>-If the fault still persists, replace the LH pothole switch<br>- If the fault still persists, replace the motor controller |

|                           |   |
|---------------------------|---|
| PWM Input 10 Out of Range | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Analog 31 Out of Range    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| VCL Watchdog              | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Primary State Error       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Lift Input                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Phase PWM Mismatch        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Hardware Compatibility    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Lower Input               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Memory Parity             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |

#### 4.1.46 DTC- 46

**Note:** This mainly comes as a secondary fault code. In that case, first solve the primary fault code.

If the AC fault code appears as a single fault, then first refer Annexure B to check the fault name and accordingly follow the steps from the below table

| Fault Code | Fault Detail                        | Troubleshooting steps  |
|------------|-------------------------------------|--|
| AC         | Current Sensor Left Motor           | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Current Sensor Right Motor          | -Key cycle the machine<br>'- if the fault still persists , Replace Right motor   |
|            | Speed Limit Supervision Left Motor  | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|            | Speed Limit Supervision Right Motor | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|            | Motor Not Stopped Left Motor        | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Motor Not Stopped Right Motor       | -Key cycle the machine<br>'- if the fault still persists , Replace right motor   |
|            | Critical OS General                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | OS General 2                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Reset Rejected                      | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Motor Short                         | -Key cycle the machine<br>'- If the fault still persists , replace the respective motor<br>'- if the fault still persists , Replace motor controller   |
|            | Pump Driver                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Load-Hold Driver                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software  |

|  |                              |   |
|--|------------------------------|---|
|  |                              | '- If the fault still persists, replace the motor controller  |
|  | Lower Driver                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Throttle Input               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Brake Input                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | NV Memory Failure            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | F2T_M2_Not_Operational_Fault | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | F2T_M2_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|  | F2T_M1_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|  | VCL Run Time Error           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | OS General                   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | CAN Timeout                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |

|  |                                    |   |
|--|------------------------------------|---|
|  | Supervision                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Supervision Input Check            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Internal Hardware                  | -Key cycle the machine<br>'- If the fault still persists, replace the motor controller  |
|  | Motor Characterization Left Motor  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the left motor<br>'- If the fault is still there,replace the motor controller  |
|  | Motor Characterization Right Motor | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Encoder Pulse Error Left Motor     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Encoder Pulse Error Right Motor    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Bad Firmware                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Encoder LOS Left Motor             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Encoder LOS Right Motor            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |

|                                    |  |
|------------------------------------|--|
| Driver 6 Fault                     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Driver Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 18 Out of range(LH pothole) | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>-If the fault still persists, replace the LH pothole switch<br>'- If the fault still persists, replace the motor controller |
| PWM Input 10 Out of Range          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 31 Out of Range             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| VCL Watchdog                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Primary State Error                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Lift Input                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Phase PWM Mismatch                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Hardware Compatibility             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |

|  |               |   |
|--|---------------|---|
|  | Lower Input   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Memory Parity | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |

**4.1.47 DTC- 49**

| Fault Code | Fault Detail           | Description | Fault Action       |
|------------|------------------------|-------------|--------------------|
| 0x49       | Parameter Out of Range |             | Disable all motion |

**Possible Causes :**

1. Parameter value detected outside of the limits.

**Troubleshooting Steps :**

- 1.Key cycle the machine to clear the fault.
2. If the fault still persists , Reflash the software.

**Related / Similar Faults :**

| Fault Code | Fault Detail                       | Description | Fault Action       |
|------------|------------------------------------|-------------|--------------------|
| 0x89       | Software Parameter Change/Mismatch |             | Disable all motion |

**4.1.48 DTC- 71**

**Note:** This mainly comes as a secondary fault code. In that case, first solve the primary fault code.

If the AC fault code appears as a single fault, then first refer Annexure B to check the fault name and accordingly follow the steps from the below table

| Fault Code | Fault Detail | Troubleshooting steps |
|------------|--------------|-----------------------|
|            |              |                       |

|                                     |  |
|-------------------------------------|--|
| Current Sensor Left Motor           | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
| Current Sensor Right Motor          | -Key cycle the machine<br>'- if the fault still persists , Replace Right motor   |
| Speed Limit Supervision Left Motor  | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Speed Limit Supervision Right Motor | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Motor Not Stopped Left Motor        | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
| Motor Not Stopped Right Motor       | -Key cycle the machine<br>'- if the fault still persists , Replace right motor   |
| Critical OS General                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| OS General 2                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Reset Rejected                      | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Motor Short                         | -Key cycle the machine<br>'- If the fault still persists , replace the respective motor<br>'- if the fault still persists , Replace motor controller   |
| Pump Driver                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Load-Hold Driver                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |

|  |                              |   |
|--|------------------------------|---|
|  | Lower Driver                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Throttle Input               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Brake Input                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | NV Memory Failure            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | F2T_M2_Not_Operational_Fault | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | F2T_M2_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|  | F2T_M1_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|  | VCL Run Time Error           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | OS General                   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | CAN Timeout                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|  | Supervision                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |

|  |                                    |   |
|--|------------------------------------|---|
|  | Supervision Input Check            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Internal Hardware                  | -Key cycle the machine<br>'- If the fault still persists, replace the motor controller  |
|  | Motor Characterization Left Motor  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the left motor<br>'- If the fault is still there,replace the motor controller  |
|  | Motor Characterization Right Motor | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Encoder Pulse Error Left Motor     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Encoder Pulse Error Right Motor    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Bad Firmware                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Encoder LOS Left Motor             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Encoder LOS Right Motor            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|  | Driver 6 Fault                     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |

|  |                                    |  |
|--|------------------------------------|--|
|  | Driver Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | Analog Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | Analog 18 Out of range(LH pothole) | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>-If the fault still persists, replace the LH pothole switch<br>'- If the fault still persists, replace the motor controller |
|  | PWM Input 10 Out of Range          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | Analog 31 Out of Range             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | VCL Watchdog                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | Primary State Error                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | Lift Input                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | Phase PWM Mismatch                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | Hardware Compatibility             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|  | Lower Input                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |

|  |               |   |
|--|---------------|---|
|  | Memory Parity | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|--|---------------|---|

## 4.1.49 DTC- 72

| Fault Code | Fault Detail | Description  | Fault Action  |
|------------|--------------|--|---|
| 72         | PDO Timeout  | <p>If difference between the throttle channels from the PCU is greater than 3x then this fault is set.</p> <p>Type 0: PCU button 1 HW fault (Lift/Lower mode)<br/>                     Type 1: PCU button 2 HW fault (Traction mode)<br/>                     Type 2: PCU button 3 HW fault (Horn)<br/>                     Type 3: PCU button 4 HW fault (Speed mode)<br/>                     Type 4: PCU steer left or right button HW fault<br/>                     Type 5: PCU enable trigger button HW fault</p> <p>All of these are reported by the PCU and HW faults.</p> | <p>Shutdown Vehicle</p> <p>Shutdown Coil Supply</p> |

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

### **Possible Causes :**

1. Faulty Hardware
2. Faulty CAN Wiring

3. Random buttons pressed on joystick before startup

**Troubleshooting Steps :**

1. If any button on the joystick is selected at random, key cycle the machine.
2. If the fault still persists, check the CAN resistance as explained in CAN Test Tab. If resistance is as per specification continue to next step.
3. Try replacing the Joystick with a new one.
4. If problem still persists, try wiggling the wire bunch near door hinge area and check for any possible loose connection or damage to Harness.
5. If problem still persists, replace Main Harness.

**Related / Similar Faults :**

| <b>Fault Code</b> | <b>Fault Detail</b>                        | <b>Description</b>   | <b>Fault Action</b>                      |
|-------------------|--|--|--|
| 52                | Wika PCU PDO Timeout Fault<br>User_2_Fault | If the cyclic PDO isn't received within 100ms. The potential cause could be:<br>CAN wiring issue<br>Incorrect baud rate or node ID set in the PCU<br>CAN hardware issue on node<br>CAN node not in CAN NMT operational state | Shutdown Vehicle<br>Shutdown Coil Supply |

**4.1.50 DTC- 73**

| <b>Fault Code</b> | <b>Fault Detail</b>         | <b>Description</b> | <b>Fault Action</b> |
|-------------------|-----------------------------|--------------------|---------------------|
| 0x73              | Stall Detected - Left Motor |                    | Disable drive F/R   |

**Possible Causes :**

1. Stalled motor
2. Bad crimps or faulty wiring.
3. Motor encoder failure.
4. Problems with power supply for the motor encoder

**Troubleshooting Steps :**

1. Check if the motor is stalled because of the obstacle , move machine away from the obstacle i.e. free path.
2. If the fault still persists, try swapping the right and left motor connectors. If the fault code shifts to '2C', then there is problem with the motor. Replace the part.
3. If fault code does not change, follow the steps for fault code "25".
4. If the fault still persists, Reflash the software.

**4.1.51 DTC- 7D**

| <b>Fault Code</b> | <b>Fault Detail</b>       | <b>Description</b>  | <b>Fault Action</b>   |
|-------------------|---------------------------|---|---|
| 0x7D              | E_STOP_Override_STB_Fault | Wherever controller pin J1-30 detected as HIGH due to Platform e-stop override switch press/ stuck press/ STB in other than "Platform e-stop override" mode | Prevent Raise / Drive / Steer. Only lower allowed from chassis controls operating in Chassis mode |

**Possible Causes :**

1. Switch stuck
2. Short Circuit
3. Switch pressed in normal mode

**Troubleshooting Steps :**

1. If the override switch is pressed when both e-stops are released and key is not in neutral position, then 7D fault code will appear. Keycycle the machine to clear the fault.

2. If the fault still persists in normal operation, even if the switch is not pressed manually, check if the switch is stuck. If stuck, then replace the part.

**Location :**



4.1.52 DTC- 83

**Note:** This mainly comes as a secondary fault code. In that case, first solve the primary fault code.

If the AC fault code appears as a single fault, then first refer Annexure B to check the fault name and accordingly follow the steps from the below table

| Fault Code | Fault Detail                        | Troubleshooting steps  |
|------------|-------------------------------------|--|
|            | Current Sensor Left Motor           | -Key cycle the machine<br>- if the fault still persists , Replace left motor   |
|            | Current Sensor Right Motor          | -Key cycle the machine<br>- if the fault still persists , Replace Right motor  |
|            | Speed Limit Supervision Left Motor  | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller |
|            | Speed Limit Supervision Right Motor | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>- if the fault still persists , Reflash the software<br>- If the fault still persists, replace the motor controller |

|                               |  |
|-------------------------------|--|
| Motor Not Stopped Left Motor  | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
| Motor Not Stopped Right Motor | -Key cycle the machine<br>'- if the fault still persists , Replace right motor   |
| Critical OS General           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
| OS General 2                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
| Reset Rejected                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
| Motor Short                   | -Key cycle the machine<br>'- If the fault still persists , replace the respective motor<br>'- if the fault still persists , Replace motor controller |
| Pump Driver                   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
| Load-Hold Driver              | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
| Lower Driver                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
| Throttle Input                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
| Brake Input                   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |
| NV Memory Failure             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller      |

|                                    |  |
|------------------------------------|--|
| F2T_M2_Not_Operational_Fault       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| F2T_M2_CAN_Timeout                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller    |
| F2T_M1_CAN_Timeout                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller    |
| VCL Run Time Error                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| OS General                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| CAN Timeout                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller    |
| Supervision                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Supervision Input Check            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Internal Hardware                  | -Key cycle the machine<br>'- If the fault still persists, replace the motor controller   |
| Motor Characterization Left Motor  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the left motor<br>'- If the fault is still there,replace the motor controller |
| Motor Characterization Right Motor | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor   |

|  |                                    |  |
|--|------------------------------------|--|
|  |                                    | <ul style="list-style-type: none"> <li>'- If the fault is still there,replace the motor controller</li> </ul>  |
|  | Encoder Pulse Error Left Motor     | <ul style="list-style-type: none"> <li>-Key cycle the machine</li> <li>'- if the fault still persists , Reflash the software</li> <li>'- If the fault still persists, replace the right motor</li> <li>'- If the fault is still there,replace the motor controller</li> </ul>      |
|  | Encoder Pulse Error Right Motor    | <ul style="list-style-type: none"> <li>-Key cycle the machine</li> <li>'- if the fault still persists , Reflash the software</li> <li>'- If the fault still persists, replace the right motor</li> <li>'- If the fault is still there,replace the motor controller</li> </ul>      |
|  | Bad Firmware                       | <ul style="list-style-type: none"> <li>-Key cycle the machine</li> <li>'- if the fault still persists , Reflash the software</li> <li>'- If the fault still persists, replace the motor controller</li> </ul>  |
|  | Encoder LOS Left Motor             | <ul style="list-style-type: none"> <li>-Key cycle the machine</li> <li>'- if the fault still persists , Reflash the software</li> <li>'- If the fault still persists, replace the right motor</li> <li>'- If the fault is still there,replace the motor controller</li> </ul>      |
|  | Encoder LOS Right Motor            | <ul style="list-style-type: none"> <li>-Key cycle the machine</li> <li>'- if the fault still persists , Reflash the software</li> <li>'- If the fault still persists, replace the right motor</li> <li>'- If the fault is still there,replace the motor controller</li> </ul>      |
|  | Driver 6 Fault                     | <ul style="list-style-type: none"> <li>-Key cycle the machine</li> <li>'- if the fault still persists , Reflash the software</li> <li>'- If the fault still persists, replace the motor controller</li> </ul>  |
|  | Driver Assignment                  | <ul style="list-style-type: none"> <li>-Key cycle the machine</li> <li>'- if the fault still persists , Reflash the software</li> <li>'- If the fault still persists, replace the motor controller</li> </ul>  |
|  | Analog Assignment                  | <ul style="list-style-type: none"> <li>-Key cycle the machine</li> <li>'- if the fault still persists , Reflash the software</li> <li>'- If the fault still persists, replace the motor controller</li> </ul>  |
|  | Analog 18 Out of range(LH pothole) | <ul style="list-style-type: none"> <li>-Key cycle the machine</li> <li>'- if the fault still persists , Reflash the software</li> <li>-If the fault still persists, replace the LH pothole switch</li> <li>'- If the fault still persists, replace the motor controller</li> </ul> |

|                           |   |
|---------------------------|---|
| PWM Input 10 Out of Range | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Analog 31 Out of Range    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| VCL Watchdog              | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Primary State Error       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Lift Input                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Phase PWM Mismatch        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Hardware Compatibility    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Lower Input               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| Memory Parity             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |

### 4.1.53 DTC- 87

**Note:** This mainly comes as a secondary fault code. In that case, first solve the primary fault code.

If the AC fault code appears as a single fault, then first refer Annexure B to check the fault name and accordingly follow the steps from the below table

| Fault Code | Fault Detail                        | Troubleshooting steps  |
|------------|-------------------------------------|--|
|            | Current Sensor Left Motor           | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Current Sensor Right Motor          | -Key cycle the machine<br>'- if the fault still persists , Replace Right motor   |
|            | Speed Limit Supervision Left Motor  | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|            | Speed Limit Supervision Right Motor | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|            | Motor Not Stopped Left Motor        | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Motor Not Stopped Right Motor       | -Key cycle the machine<br>'- if the fault still persists , Replace right motor   |
|            | Critical OS General                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | OS General 2                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Reset Rejected                      | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Motor Short                         | -Key cycle the machine<br>'- If the fault still persists , replace the respective motor<br>'- if the fault still persists , Replace motor controller   |
|            | Pump Driver                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Load-Hold Driver                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software  |

|  |                              |   |
|--|------------------------------|---|
|  |                              | '- If the fault still persists, replace the motor controller  |
|  | Lower Driver                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Throttle Input               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Brake Input                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | NV Memory Failure            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | F2T_M2_Not_Operational_Fault | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | F2T_M2_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|  | F2T_M1_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|  | VCL Run Time Error           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | OS General                   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | CAN Timeout                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |

|    |                                    |   |
|----|------------------------------------|---|
|    | Supervision                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | Supervision Input Check            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | Internal Hardware                  | -Key cycle the machine<br>'- If the fault still persists, replace the motor controller  |
| 87 | Motor Characterization Left Motor  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the left motor<br>'- If the fault is still there,replace the motor controller  |
|    | Motor Characterization Right Motor | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|    | Encoder Pulse Error Left Motor     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|    | Encoder Pulse Error Right Motor    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|    | Bad Firmware                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | Encoder LOS Left Motor             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|    | Encoder LOS Right Motor            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |

|                                    |  |
|------------------------------------|--|
| Driver 6 Fault                     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Driver Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 18 Out of range(LH pothole) | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>-If the fault still persists, replace the LH pothole switch<br>'- If the fault still persists, replace the motor controller |
| PWM Input 10 Out of Range          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 31 Out of Range             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| VCL Watchdog                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Primary State Error                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Lift Input                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Phase PWM Mismatch                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Hardware Compatibility             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |

|  |               |   |
|--|---------------|---|
|  | Lower Input   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Memory Parity | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |

#### 4.1.54 DTC- 89

| Fault Code | Fault Detail           | Description | Fault Action       |
|------------|------------------------|-------------|--------------------|
| 0x89       | Parameter Out of Range |             | Disable all motion |

**Possible Causes :**

1. Parameter value detected outside of the limits.

**Troubleshooting Steps :**

- 1.Key cycle the machine to clear the fault.
2. If the fault still persists , Reflash the software.

**Related / Similar Faults :**

| Fault Code | Fault Detail                       | Description | Fault Action       |
|------------|------------------------------------|-------------|--------------------|
| 0x49       | Software Parameter Change/Mismatch |             | Disable all motion |

#### 4.1.55 DTC- 91

**Note:** This mainly comes as a secondary fault code. In that case, first solve the primary fault code.

If the AC fault code appears as a single fault, then first refer Annexure B to check the fault name and accordingly follow the steps from the below table

| Fault Code | Fault Detail                        | Troubleshooting steps  |
|------------|-------------------------------------|--|
|            | Current Sensor Left Motor           | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Current Sensor Right Motor          | -Key cycle the machine<br>'- if the fault still persists , Replace Right motor   |
|            | Speed Limit Supervision Left Motor  | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|            | Speed Limit Supervision Right Motor | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|            | Motor Not Stopped Left Motor        | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Motor Not Stopped Right Motor       | -Key cycle the machine<br>'- if the fault still persists , Replace right motor   |
|            | Critical OS General                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | OS General 2                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Reset Rejected                      | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Motor Short                         | -Key cycle the machine<br>'- If the fault still persists , replace the respective motor<br>'- if the fault still persists , Replace motor controller   |
|            | Pump Driver                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Load-Hold Driver                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software  |

|  |                              |   |
|--|------------------------------|---|
|  |                              | '- If the fault still persists, replace the motor controller  |
|  | Lower Driver                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Throttle Input               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | Brake Input                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | NV Memory Failure            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | F2T_M2_Not_Operational_Fault | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | F2T_M2_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|  | F2T_M1_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|  | VCL Run Time Error           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | OS General                   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|  | CAN Timeout                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |

|    |                                    |   |
|----|------------------------------------|---|
|    | Supervision                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | Supervision Input Check            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | Internal Hardware                  | -Key cycle the machine<br>'- If the fault still persists, replace the motor controller  |
|    | Motor Characterization Left Motor  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the left motor<br>'- If the fault is still there,replace the motor controller  |
|    | Motor Characterization Right Motor | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|    | Encoder Pulse Error Left Motor     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|    | Encoder Pulse Error Right Motor    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
| 91 | Bad Firmware                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | Encoder LOS Left Motor             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|    | Encoder LOS Right Motor            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |

|                                    |  |
|------------------------------------|--|
| Driver 6 Fault                     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Driver Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 18 Out of range(LH pothole) | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>-If the fault still persists, replace the LH pothole switch<br>'- If the fault still persists, replace the motor controller |
| PWM Input 10 Out of Range          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 31 Out of Range             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| VCL Watchdog                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Primary State Error                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Lift Input                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Phase PWM Mismatch                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Hardware Compatibility             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |

|  |               |   |
|--|---------------|---|
|  | Lower Input   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Memory Parity | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |

**4.1.56 DTC- 92**

| Fault Code | Fault Detail                        | Description | Fault Action |
|------------|-------------------------------------|-------------|--------------|
| 0x92       | EM Brake Failed to Set - Left Motor |             | Warning only |

**Possible Causes :**

1. EM Brake failure.
2. Faulty wiring harness

**Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to '43', then there is problem with the motor brake. Replace the motor.
- 2 . If fault code does not change, there is a problem with wiring harness. Follow the below steps :
3. Check if pin 8 on the left motor connector(C62\_MH) and pin 4 of Controller 35 Pin connector CN1\_MH are connected as per schematic.
4. Check the circuit for short to battery and short to ground on the controller pin 4 and pin 8 of the left motor.

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#)<sup>213</sup>.

**4.1.57 DTC- 95**

| Fault Code | Fault Detail      | Description  | Fault Action |
|------------|-------------------|--|--------------|
| 0x95       | Pump Over current | Fault Type(s): 3<br>1 = Pump current-sensor value is close to its supply voltage.<br>2 = Pump current-sensor value is close to the sensor ground.<br>3 = The pump current has exceeded the configured limit. | Disable lift |

**Possible Causes :**

1. Faulty Wiring harness

- 2. Short to ground
- 3. Pump motor defective
- 4. Controller defective

**Troubleshooting Steps :**

- 1. Check if there is no visible damage in wiring harness or insulation
- 2. Refer Annexure B to check the fault type.
- 3. Fault Type 1:
  - Make sure pump motor is not short to supply
  - If the fault still persists, replace the pump motor
- 4. Fault Type 2:
  - Make sure the pump motor is not short to ground.
  - If the fault still persists, replace the pump motor
- 5. Fault type 3:
  - Reflash the software .
  - If the fault still persists, replace the motor controller

**Related / Similar Faults :**

| Fault Code | Fault Detail        | Description  | Fault Action |
|------------|---------------------|--|--------------|
| 0xBF       | Pump Current Sensor | Fault Type(s):<br>1 = Pump current-sensor value is close to its supply voltage.<br>2 = Pump current-sensor value is close to the sensor ground | Disable lift |

**4.1.58 DTC- 96**

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|    |                           |   |  |
|----|---------------------------|---|--|
| 96 | Battery Low Voltage Fault | If the BDI percentage lower than the low BDI percentage parameter i.e. 5% for more than 3600ms. | Shutdown Vehicle<br>Shutdown Coil Supply |
|----|---------------------------|---|--|

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>

**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.
3. If battery is not able to retain charge and the water level is adequate, then replace the battery.

**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.

## 4.1.59 DTC- 97

| Fault Code | Fault Detail  | Description  | Fault Action       |
|------------|---------------|--|--------------------|
| 0x97       | Pump Hardware | Fault Type(s): 1<br>1 = Duty cycle not updated with the update time frame.<br>2 = Mismatch of the commanded pump duty cycle vs. output | Disable all motion |

### Possible Causes :

1. Faulty Wiring harness
2. Short to ground
3. Pump motor defective
4. Controller defective

### Troubleshooting Steps :

1. Check if there is no visible damage in wiring harness or insulation
2. Make sure the pump motor is not short to ground
3. Reflash the software
4. If the fault still persists, replace the pump motor
5. If the fault still persists, replace the motor controller

## 4.1.60 DTC- 99

| Fault Code | Fault Detail           | Description | Fault Action       |
|------------|------------------------|-------------|--------------------|
| 0x99       | Parameter Out of Range |             | Disable all motion |

**Possible Causes :**

1. Parameter value detected outside of the limits.

**Troubleshooting Steps :**

- 1.Key cycle the machine to clear the fault.
2. If the fault still persists , Reflash the software.

**4.1.61 DTC- A2**

| <b>Fault Code</b> | <b>Fault Detail</b>           | <b>Description</b>  | <b>Fault Action</b>   |
|-------------------|-------------------------------|---|---|
| A2                | EM Brake Driver - Right Motor | Fault Type(s):<br>1 = Driver current exceeded hardware limits.<br>2 = Driver current exceeded configured over-current limits. | Disable Drive<br>Shutdown throttle<br>Shutdown EM Brake<br>Full Brake |

**Possible Causes :**

1. Open circuit on driver load.
2. Faulty wiring harness
3. Connector pin loose on connector or motor end

**Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.
- 2 . If fault code does not change, there is a problem with wiring harness. Follow the below steps :
  - i. Check if pin 8 on the Right motor connector(C63\_MH) and pin 5 of Controller 35 Pin connector CN1\_MH is not backed out.
  - ii. Check continuity between wire 6014 (pin 8) of RH motor connector and pin 5 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
  - iii. Check the circuit for short to battery and short to ground

**Related / Similar Faults :**

| Fault Code | Fault Detail                         | Description | Fault Action      |
|------------|--------------------------------------|-------------|-------------------|
| 0x3E       | Motor Braking Impaired - Right Motor |             | Disable drive F/R |

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#)<sup>213</sup>.

**4.1.62 DTC- A3**

| Fault Code | Fault Detail                 | Description   | Fault Action  |
|------------|------------------------------|---|---|
| A3         | EM Brake Driver - Left Motor | Fault Type(s):<br>1 = Driver current exceeded hardware limits.<br>2 = Driver current exceeded configured over-current limits. | Disable Drive<br>Shutdown throttle<br>Shutdown EM Brake<br>Full Brake |

**Possible Causes :**

1. Open circuit on driver load.
2. Faulty wiring harness
3. Connector pin loose on connector or motor end

**Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.
- 2 . If fault code does not change, there is a problem with wiring harness. Follow the below steps :
  - a) Check if pin 8 on the left motor connector(C62\_MH) and pin 4 of Controller 35 Pin connector CN1\_MH is not backed out.
  - b) Check continuity between wire 6012 (pin 8) of LH motor connector and pin 4 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
  - c) Check the circuit for short to battery and short to ground .

**Related / Similar Faults :**

| Fault Code | Fault Detail                        | Description | Fault Action      |
|------------|-------------------------------------|-------------|-------------------|
| 0x84       | Motor Braking Impaired - Left Motor |             | Disable drive F/R |

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#)<sup>213</sup>.

**4.1.63 DTC- A9**

| Fault Code | Fault Detail | Description | Fault Action       |
|------------|--------------|-------------|--------------------|
| 0xA9       | Coil Supply  |             | Disable all motion |

**Possible Causes :**

1. Short circuit.
2. Faulty wiring harness
3. Pin Short to battery at controller, contactor, coil or motor end

**Troubleshooting Steps :**

1. Check if pin 13 and 6 of 35 pin connector CN1\_MH are not backed out.
2. Check if pin 7 of LH(C62\_MH) and RH(C63\_MH) motor connector are not backed out
3. Switch off the ignition. Check the voltage at DC Contactor coil wire 8300 w.r.t. ground. Voltage should not be available.
4. If ~24 voltage present then suspect that coil supply is short to battery.

5. Check wires 8402, 8401, 8400, 8201, 8100, 4511, 4510. there should not be voltage w.r.t. during ignition off condition. If yes, replace the wiring harness.
6. If the fault still persists, replace the motor controller.

#### 4.1.64 DTC- E5

| Fault Code | Fault Detail                                  | Description            | Fault Action                        |
|------------|---|------------------------|-------------------------------------|
| E5         | Dual Zone Push Button or Related Wiring Fault | Dual height Box Wiring | Disable all motions except lowering |

#### **Possible Causes :**

1. Short circuit
2. Open circuit
3. Loose or damaged wiring harness.

#### **Troubleshooting Steps :**

1. Check if the push button switches on the dual height box are connected properly. There should be no visible damage in the wiring inside the dual height box.
2. Check if the pin 8 and 9 of the IQAN ECU connector are not backed out .
3. Check if the push button connectors in the dual height box are connected properly.
4. Check if the fuses FB1\_DHLH and FB2\_DHLH are not blown.
5. Check for short to battery and short to ground.
6. If the fault still persists , replace the push buttons.

#### **Location :**



### 4.1.65 DTC- E7

| Fault Code | Fault Detail   | Description   | Fault Action  |
|------------|--|---|---|
| E7         | CAN Data error on received CAN message by Motor controller | If any of the following conditions occurs for received CAN data<br>- Dual Zone option fitted and no CAN message (0xFFB5) related to Dual Zone functionality from MC41 controller (address 0xE4) for 3 consecutive attempts (AP00001533-4.6)<br>- No message regarding input status (0xFF30) is received from CM410 controller (address 0x1E) for 3 consecutive attempts (AP00001533- 4.6) | Below are the reaction from Curtis controller -<br>'-For Dual Zone - when E7 is raised based on 0xFFB5 from MC41 - Prevent Raise / Drive / Steer but lower shall be allowed<br><br>E7 raised due to CM0410 disconnection:<br>- For Korean functionality- Prevent Raise / Drive but lower shall be allowed |

|  |  |   |  |
|--|--|---|--|
|  |  | <ul style="list-style-type: none"> <li>- difference observed in CAN data received in redundancy pair messages - Raise Inhibit_1/2, Drive/Steer Inhibit 1/2 (AP00001533-4.2)</li> <li>- Check sum error (AP00001533- 4.3)</li> <li>- CRC error (AP00001533-4.4)</li> <li>- 0xFFB5 is received from node other than 0xE4</li> </ul> | <ul style="list-style-type: none"> <li>- For standard machine without Korea option- no functionality shall be restricted. If brake release was performed before E7 fault, brake shall be re-engaged</li> <li>- Flashing lamp and buzzer sound as per reqd doc</li> </ul> |
|--|--|---|--|

**Possible Causes :**

1. IQAN /CM410 ECU not flashed properly.
2. Incorrect option setting in VIN setup

**Troubleshooting Steps :**

Refer the CAN test tab for CAN communication test

1. If the machine is dual height, Reflash the IQAN ECU software.
2. If the fault still persists , try replacing the IQAN ECU.
3. If the machine is not dual height, check that the dual height option in VIN setup is selected to "Not Fitted".
4. If the machine is for Korea region , then Reflash the CM0410 software.
5. If the Korea features are not applicable in the machine , then make sure that the options are as per standard machine shown below.
6. If the fault still persists, try replacing the CM410 ECU.
7. Check for short to ground in CAN connection line.

**Related / Similar Faults :**

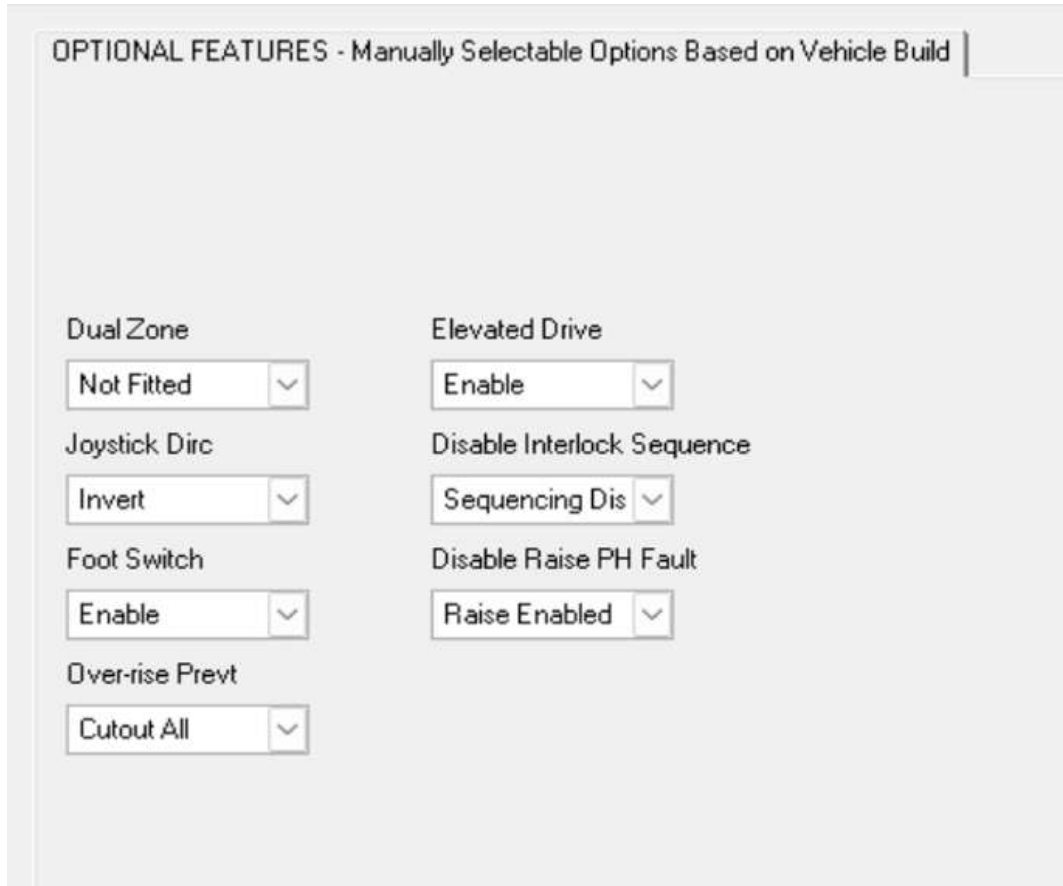
| Fault Code | Fault Detail                                  | Description   | Fault Action       |
|------------|---|---|--------------------|
| 1          | Invalid Mode - Dual zone system related fault | Once fault 0xE5 or 0xE6 is healed, 0x01 shall be transmitted as a fault code till a valid mode (Indoor/ Outdoor) is selected by an operator | Disable all Motion |

**Location :**

Following options should be selected for a standard machine:  
 Following options should be selected for a Korea machine:

OPTIONAL FEATURES - Manually Selectable Options Based on Vehicle Build

|   |   |
|---|---|
| Dual Zone                               | Elevated Drive                              |
| <input type="text" value="Not Fitted"/> | <input type="text" value="Disable"/>        |
| Joystick Dirc                           | Disable Interlock Sequence                  |
| <input type="text" value="Normal"/>     | <input type="text" value="Sequencing En."/> |
| Foot Switch                             | Disable Raise PH Fault                      |
| <input type="text" value="Disable"/>    | <input type="text" value="Raise Disabled"/> |
| Over-rise Prevt                         |   |
| <input type="text" value="Disable"/>    |   |



### 4.1.66 DTC- E8

| Fault Code | Fault Detail                                       | Description  | Fault Action |
|------------|--|--|--------------|
| 0xE8       | Dual_Zone_Fault: Incorrect Dual Zone Configuration | If Dual zone option is selected as "Not Fitted" thru service tool, however CAN messages (0xFFB5) related to Dual Zone functionality are present on the bus from valid MC41 controller (address 0xE4) | Disable lift |

**Possible Causes :**

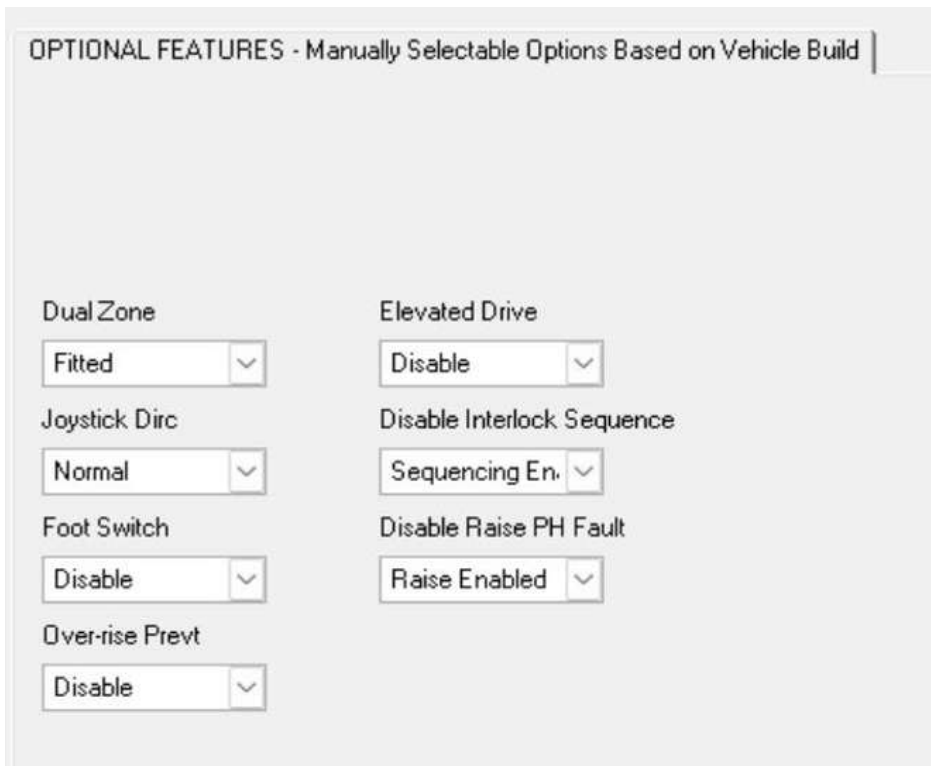
1. Incorrect option selected during VIN setup.

**Troubleshooting Steps :**

1. Connect DLA 2.0 and open the vehicle setup window through the service master .
2. The dual height option should be selected as "fitted".
3. After write the setting ,key cycle the machine.

**Location :**

For the dual height machine following selections should be done:



**4.1.67 DTC- HL**

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|          |                                  |  |                                     |
|----------|----------------------------------|--|-------------------------------------|
| E9(OH L) | At or above Outdoor height limit | Machine reached the limit for Outdoor mode | Disable all motions except lowering |
|----------|----------------------------------|--|-------------------------------------|

**Possible Causes :**

1. Machine reached outdoor height limit
2. Dual height limit switch connection open .
3. Dual height switch faulty.

**Troubleshooting Steps :**

1. If operator is indoor and OHL is coming , press the indoor mode button on the dual height box mounted on platform. The machine can go to full height in this case.
2. If the machine is outdoor, lower the machine as the outdoor height limit is reached.
3. Check if the limit switch is properly mounted. Make sure the limit switch is pressed within Outdoor height limit.

**Location :**



→ Dual Height switch

**Additional Info :**

- If OHL occurs at outdoor height limit mentioned in manual , then this is not a fault condition. Just a warning to indicate that machine has reached the outdoor height limit. To lift the machine further to full height, indoor mode needs to be selected.

**4.1.68 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       |

## 4.2 116 Version



### 4.2.1 Index

**Note:** Before going for any trouble shooting , check if the fuses are connected properly and not blown

| Fault Code                                  | Description   |
|---|---|
| <a href="#">Annexure - A</a> <sup>213</sup> | Annexure - A  |
| <a href="#">Annexure - B</a> <sup>215</sup> | Annexure - B  |
| <a href="#">Annexure - C</a> <sup>221</sup> | Annexure - C  |
| <a href="#">Annexure - D</a> <sup>224</sup> | Annexure - D  |
| <a href="#">CAN Test</a> <sup>228</sup>     | CAN Test  |
| <a href="#">AC</a> <sup>229</sup>           | Fault on other traction Controller / Dual Severe            |
| <a href="#">1</a> <sup>301</sup>            | Invalid Mode - Dual zone system related fault               |
| <a href="#">2</a> <sup>315</sup>            | Controller Over current (Motor phase current) (Right Motor) |
| <a href="#">12</a> <sup>315</sup>           | Controller Over current (Motor phase current) (Left Motor)  |
| <a href="#">14</a> <sup>317</sup>           | Precharge Failed  |
| <a href="#">15</a> <sup>318</sup>           | Controller Severe Under temperature                         |
| <a href="#">16</a> <sup>318</sup>           | Controller Severe Over temperature                          |
| <a href="#">17</a> <sup>289</sup>           | Severe B+ Under voltage/Severe KSI Under voltage            |
| <a href="#">18</a> <sup>296</sup>           | Severe B+ Over voltage/Severe KSI Over voltage              |
| <a href="#">19</a> <sup>229</sup>           | Speed Limit Supervision Left Motor/Right Motor              |
| <a href="#">22</a> <sup>299</sup>           | Controller Over temperature Cutback                         |
| <a href="#">23</a> <sup>289</sup>           | Under voltage Cutback                                       |
| <a href="#">24</a> <sup>296</sup>           | Over voltage Cutback  |
| <a href="#">25</a> <sup>297</sup>           | Ext 5V Supply Failure                                       |
| <a href="#">28</a> <sup>272</sup>           | Motor Temp Hot Cutback - Left Motor                         |
| <a href="#">0A</a> <sup>272</sup>           | Motor Temp Hot Cutback - Right Motor                        |
| <a href="#">29</a> <sup>273</sup>           | Motor Temp Sensor - Left Motor                              |
| <a href="#">0B</a> <sup>274</sup>           | Motor Temp Sensor - Right Motor                             |
| <a href="#">31</a> <sup>291</sup>           | Main Driver   |
| <a href="#">32</a> <sup>276</sup>           | EM Brake Driver - Left Motor                                |
| <a href="#">A2</a> <sup>278</sup>           | EM Brake Driver - Right Motor                               |
| <a href="#">36</a> <sup>279</sup>           | Sin Cos Motor Feedback - Left Motor                         |
| <a href="#">0D</a> <sup>281</sup>           | Sin Cos Motor Feedback - Right Motor                        |
| <a href="#">37</a> <sup>283</sup>           | Motor Open - Left Motor                                     |
| <a href="#">0E</a> <sup>284</sup>           | Motor Open - Right Motor                                    |
| <a href="#">38</a> <sup>285</sup>           | Main Contactor Welded                                       |
| <a href="#">39</a> <sup>287</sup>           | Main Contactor Did Not Close                                |
| <a href="#">43</a> <sup>320</sup>           | EM Brake Failed to Set - Right Motor                        |
| <a href="#">46</a> <sup>229</sup>           | NV Memory Failure   |
| <a href="#">3A</a> <sup>323</sup>           | Motor Setup Needed - Left Motor                             |
| <a href="#">0F</a> <sup>323</sup>           | Motor Setup Needed - Right Motor                            |

|   |   |
|---|---|
| <a href="#">3B</a> <small>324</small>       | Misalignment Error                                      |
| <a href="#">49</a> <small>321</small>       | Software Parameter Change /Mismatch                     |
| <a href="#">5F</a> <small>252</small>       | PCU HW Fault  |
| <a href="#">52</a> <small>252</small>       | Wika PCU PDO Timeout Fault                              |
| <a href="#">B8</a> <small>241</small>       | Angle Sensor Fault                                      |
| <a href="#">54</a> <small>234</small>       | Pressure Sensors Correlation Fault                      |
| <a href="#">LL</a> <small>254</small>       | Inclination Fault                                       |
| <a href="#">55</a> <small>254</small>       | Machine Tilted Beyond Safe Limits Fault                 |
| <a href="#">56</a> <small>257</small>       | Pothole Switch Fault                                    |
| <a href="#">B9</a> <small>234</small>       | Pressure Sensor 1 Fault                                 |
| <a href="#">BB</a> <small>237</small>       | Pressure Sensor 2 Fault                                 |
| <a href="#">5A</a> <small>264</small>       | Down limit Switch Fault                                 |
| <a href="#">5C</a> <small>269</small>       | PCU Enable Trigger Sequence Fault                       |
| <a href="#">5D</a> <small>269</small>       | PCU Passcode Fault                                      |
| <a href="#">6A</a> <small>269</small>       | PCU Steer Right/Left Sequence Fault                     |
| <a href="#">OL</a> <small>262</small>       | Platform Overload                                       |
| <a href="#">65</a> <small>241</small>       | Angle Sensor Calibration Fault                          |
| <a href="#">61</a> <small>259</small>       | Hydraulic SRO Fault/HPD Sequencing                      |
| <a href="#">67</a> <small>259</small>       | Hydraulic HPD Fault                                     |
| <a href="#">6B</a> <small>272</small>       | Motor_Temperature_Shutdown_Fault                        |
| <a href="#">6D</a> <small>267</small>       | Lift Motion Fault                                       |
| <a href="#">6E</a> <small>270</small>       | Battery Low Voltage Fault                               |
| <a href="#">EA</a> <small>312</small>       | Brake release switch or Related Wiring Fault            |
| <a href="#">E0</a> <small>295</small>       | Foot Switch or Related Wiring Faults                    |
| <a href="#">E1</a> <small>307</small>       | Override Detection Limit Switch or Related Wiring Fault |
| <a href="#">E2</a> <small>307</small>       | Elevated Drive Limit Switch or Related Wiring Fault     |
| <a href="#">E3</a> <small>310</small>       | Elevated Conditions Detected - EL                       |
| <a href="#">E4</a> <small>311</small>       | Override Condition Detected                             |
| <a href="#">E5</a> <small>298</small>       | Dual Zone Push Button or Related Wiring Fault           |
| <a href="#">E6</a> <small>300</small>       | Dual Zone Height Limit Switch or Related Wiring Fault   |
| <a href="#">E7</a> <small>301</small>       | Dual_Zone_Fault: CAN Data error from CM410              |
| <a href="#">E8</a> <small>305</small>       | Dual_Zone_Fault: Incorrect Dual Zone Configuration      |
| <a href="#">E9 (OHL)</a> <small>293</small> | At or about Outdoor Height Limit - OHL                  |
| <a href="#">72</a> <small>229</small>       | CAN Timeout   |
| <a href="#">73</a> <small>322</small>       | Stall Detected - Left Motor                             |
| <a href="#">2C</a> <small>323</small>       | Stall Detected - Right Motor                            |
| <a href="#">7A</a> <small>234</small>       | Percentage_To_Max_Difference_Fault                      |
| <a href="#">7B</a> <small>270</small>       | Limp Mode Fault   |
| <a href="#">7D</a> <small>314</small>       | E_STOP_Override_STB_Fault                               |
| <a href="#">84</a> <small>276</small>       | Motor Braking Impaired - Left Motor                     |
| <a href="#">3E</a> <small>278</small>       | Motor Braking Impaired - Right Motor                    |

|  |                                      |
|--|--------------------------------------|
| <a href="#">89</a>   321                     | Parameter Out of Range               |
| <a href="#">92</a>   319                     | EM Brake Failed to Set - Left Motor  |
| <a href="#">43</a>   320                     | EM Brake Failed to Set - Right Motor |
| <a href="#">91</a>   229                     | Bad Firmware                         |
| <a href="#">95</a>   324                     | Pump Over current                    |
| <a href="#">97</a>   326                     | Pump Hardware                        |
| <a href="#">9A</a>   326                     | Interlock Braking Supervision        |
| <a href="#">A1</a>   244                     | Steer right Fault                    |
| <a href="#">A4</a>   248                     | Lift Up solenoid                     |
| <a href="#">A6</a>   246                     | Steer Left Coil Fault                |
| <a href="#">A7</a>   250                     | Lift Down Coil Fault                 |
| <a href="#">A9</a>   321                     | Coil Supply                          |
| <a href="#">BF</a>   324                     | Pump Current Sensor                  |
| <a href="#">D6</a>   327                     | Hazardous Movement                   |
| <a href="#">Battery Charger Faults</a>   328 | Battery Charger Faults               |

## 4.2.2 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 | <b>31, 38, 39</b>     |
| 6  | Driver 6                 | Steer Left Solenoid                  | 19    | M1 | A6                    |
| 7  | Driver 7                 | Lower Solenoid                       | 20    | M2 | A7                    |
| 8  | Analog 8                 | Angle Sensor                         | 28    | M1 | <b>B8, 65, 6D, 5A</b> |
| 9  | Analog 9                 | Pressure Sensor 1                    | 24    | M1 | <b>B9, 54</b>         |
| 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 |

**Left and Right motor Identification:**



### 4.2.3 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

- Key Off the machine and connect DLA 2.0 on the diagnostic connector located on RH Door.
- Key on the machine and open Service Master.
- Ensure Service master is updated to latest revision.
- Click on "Other" >> JCB Access>> JCB E-Drive Scissors
- Click on CIT

**1**

**2**

**3**

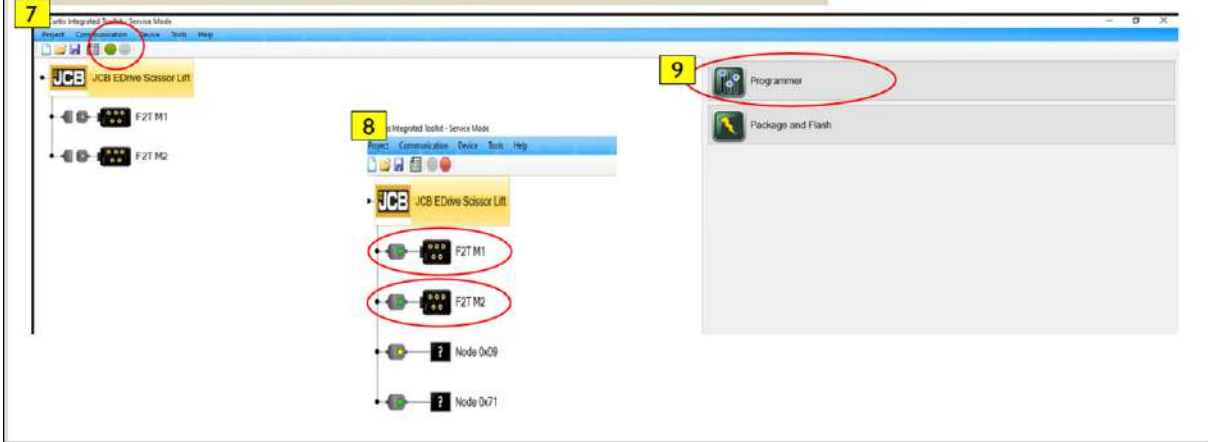
**4**

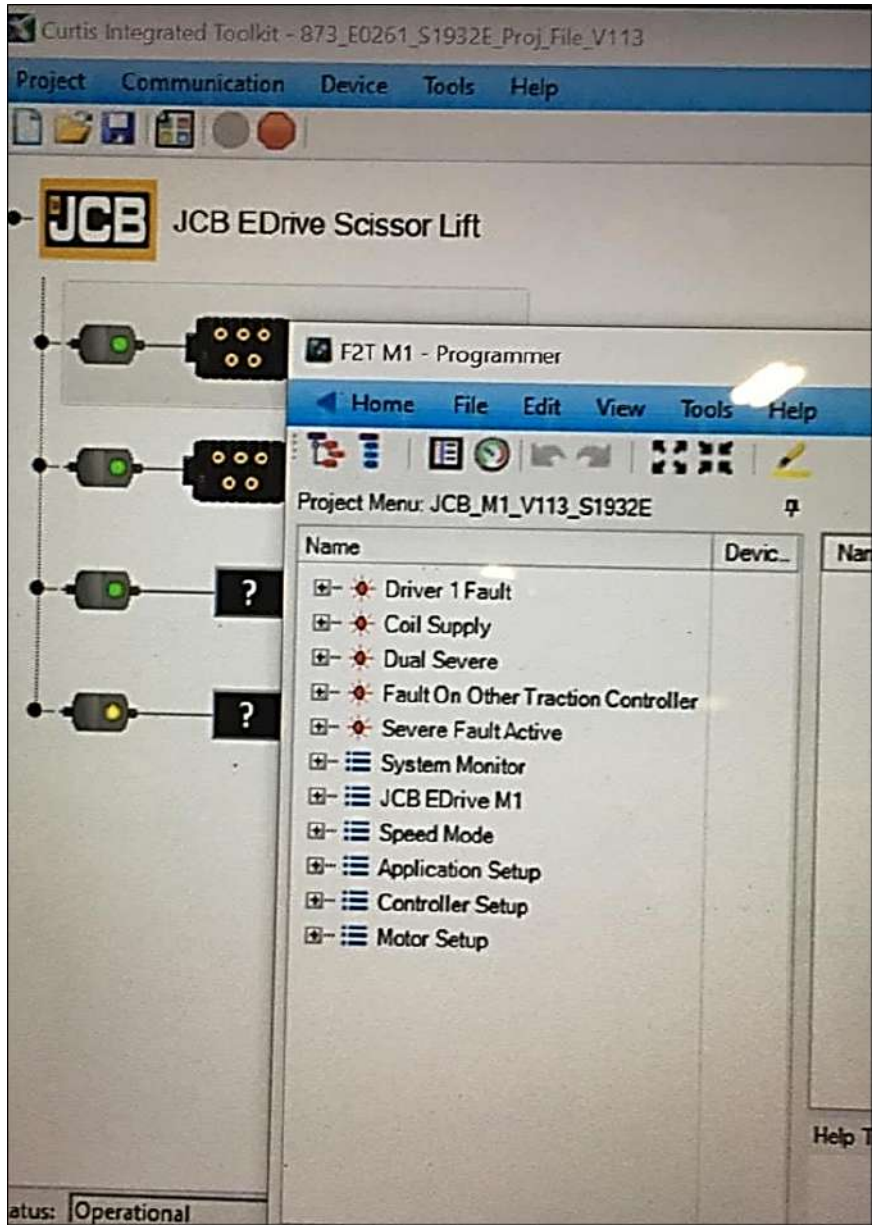
- Click on "ECU Assistant Launchpad"
- Ensure DLA 2.0 and 250k are selected in bottom drop down menu.
- Click on Project >> Open >> Select the machine specific file

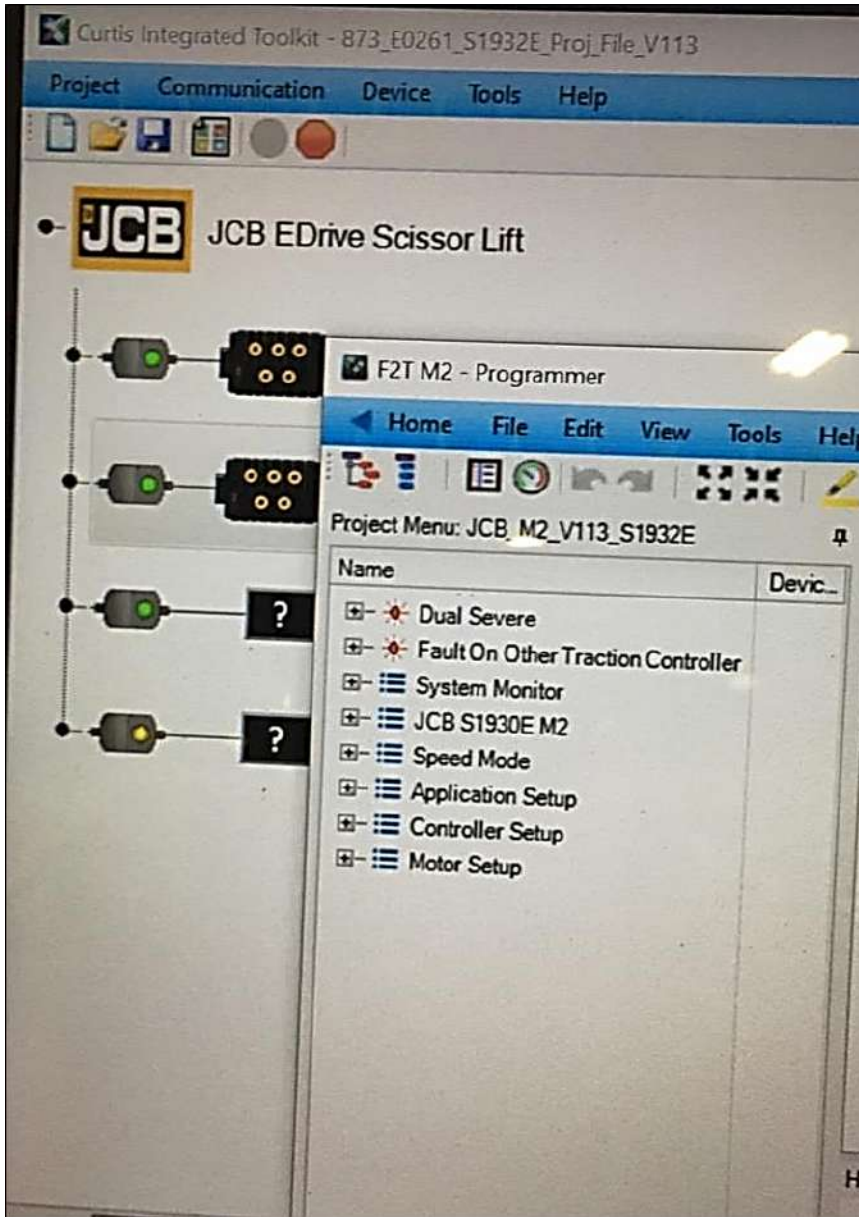
**5**

**6**

- 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

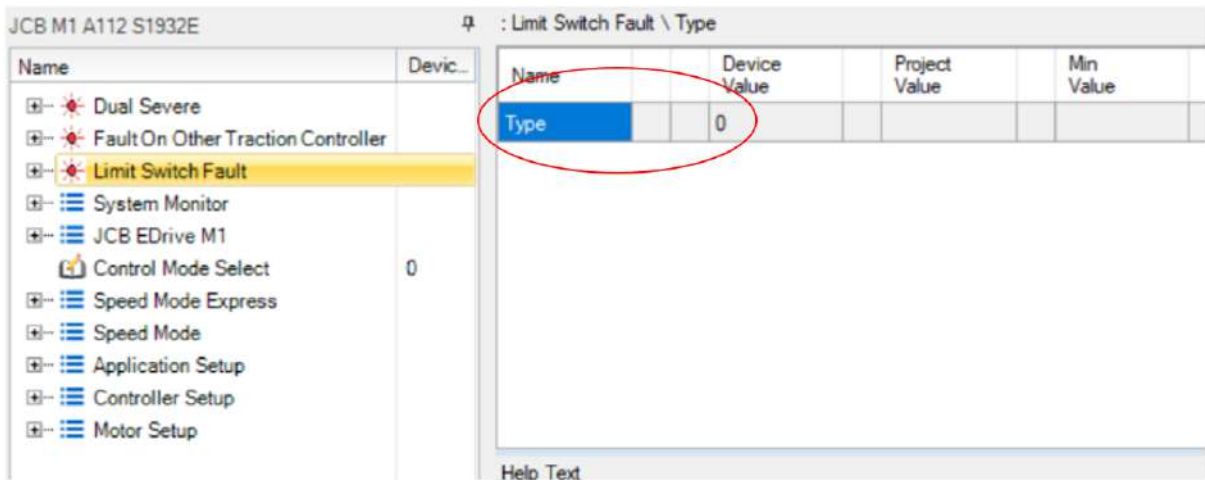






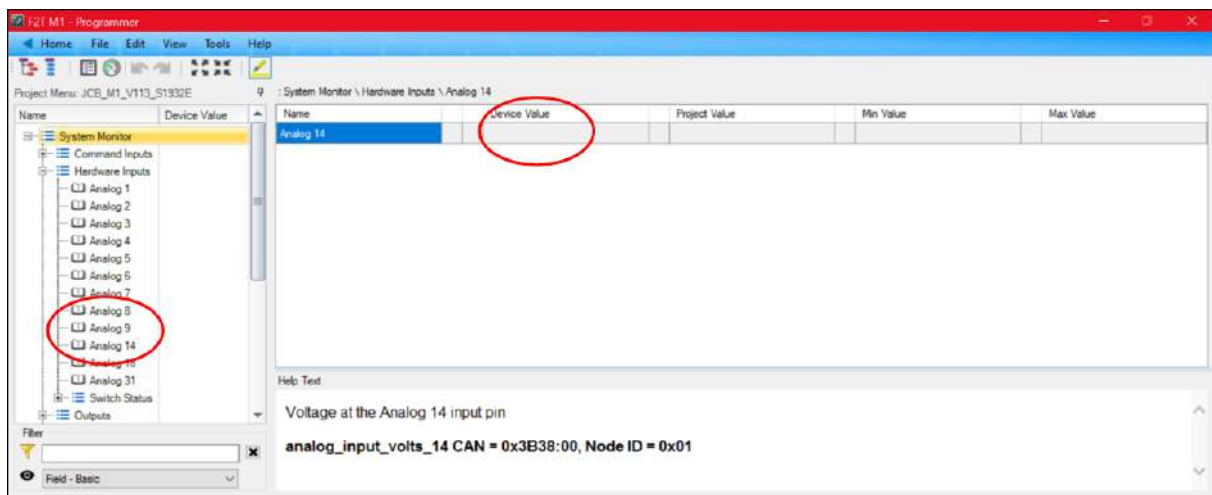
B) Steps to check fault type :

- Navigate to the window where fault is present.
- Click on the fault to check the fault type
- Fault type would be displayed on the right side



C) 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



## 4.2.4 Annexure - C

Steps to check correct Sensor and Switch position in Machine

Switch & Sensor Logic :

| Component          | Software ID    | Description             | Logical State at Platform State  |                  |              |
|--------------------|----------------|-------------------------|----------------------------------|------------------|--------------|
|                    |                |                         | Fully Stowed                     | Above Down Limit | Fully Raised |
| Lower Limit Switch | Switch 13      | Lower_Limit_Switch_2    | OFF                              | ON               | ON           |
|                    | Switch 7       | Lower_Limit_Switch_1    | ON                               | OFF              | OFF          |
| Upper Limit Switch | Switch 10      | Upper_Limit_Switch      | ON                               | ON               | OFF          |
| Pothole Switch     | Switch 18      | LH_Pothole_Input        | ON                               | OFF              | OFF          |
|                    | Switch 11      | RH_Pothole_Input        | ON                               | OFF              | OFF          |
|                    | Switch 11 - M2 | LH_RH_Pothole_Series    | OFF                              | ON               | ON           |
| Pressure Sensor    | Analog 9       | Pressure_Sensor_Input_1 | Valid output range : 0.5 to 4.5V |                  |              |
|                    | Analog 14      | Pressure_Sensor_Input_2 | Valid output range : 0.5 to 4.5V |                  |              |
| Angle Sensor       | Analog 8       | Angle_Sensor_Input      | Valid output range : 0.5 to 4.5V |                  |              |

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                     |

Steps to check and manually add angle sensor values:


- Key Off the machine and connect DLA 2.0 on the diagnostic connector located on RH Door.
- Key on the machine and open Service Master.
- Ensure Service master is updated to latest revision.
- Click on "Other" >> JCB Access>>JCB E-Drive Scissors
- Click on CIT

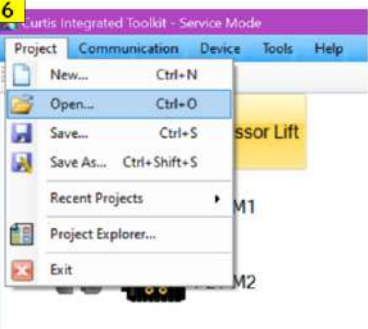


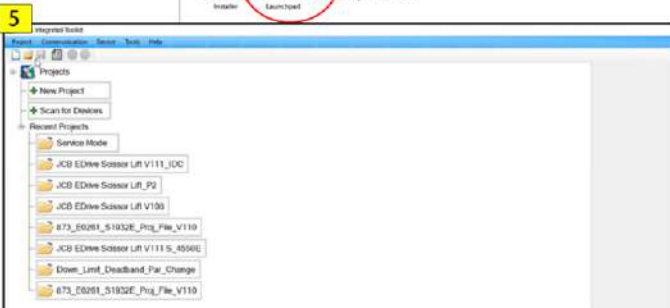




- Click on "ECU Assistant Launchpad"
- Ensure DLA 2.0 and 250k are selected in the bottom drop down menu
- Click on Project >> Open>> Service Mode\_3.cprj

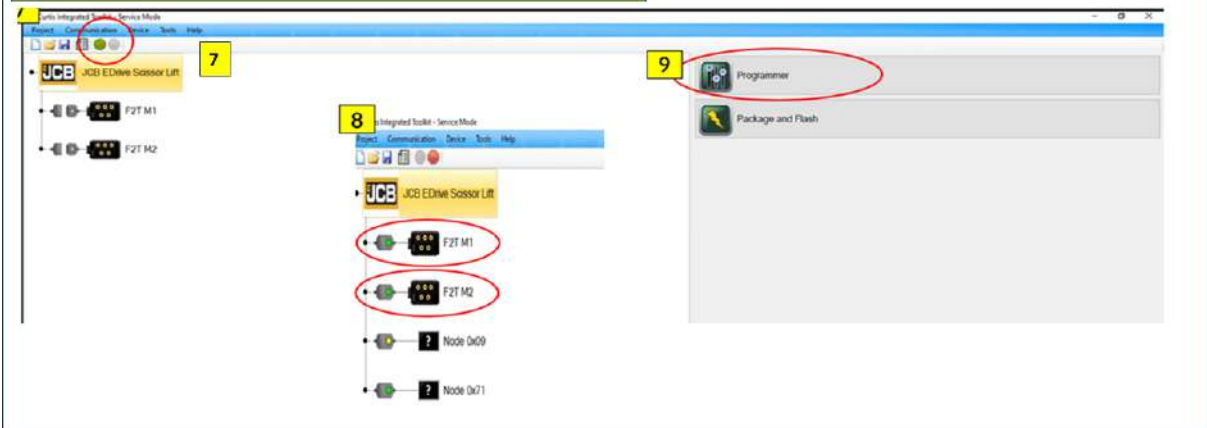




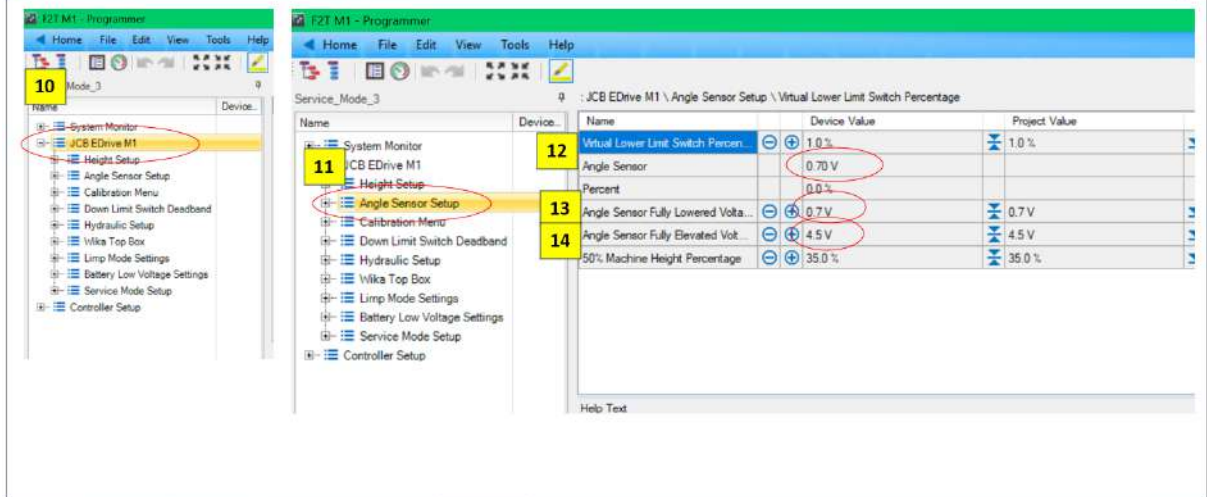


The Location for the Service mode\_3.cprj file is:  
 C:\JCB\_Servicemaster\_2\Extras\Access\E-Drive Scissor\For Service\Service Mode

- 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



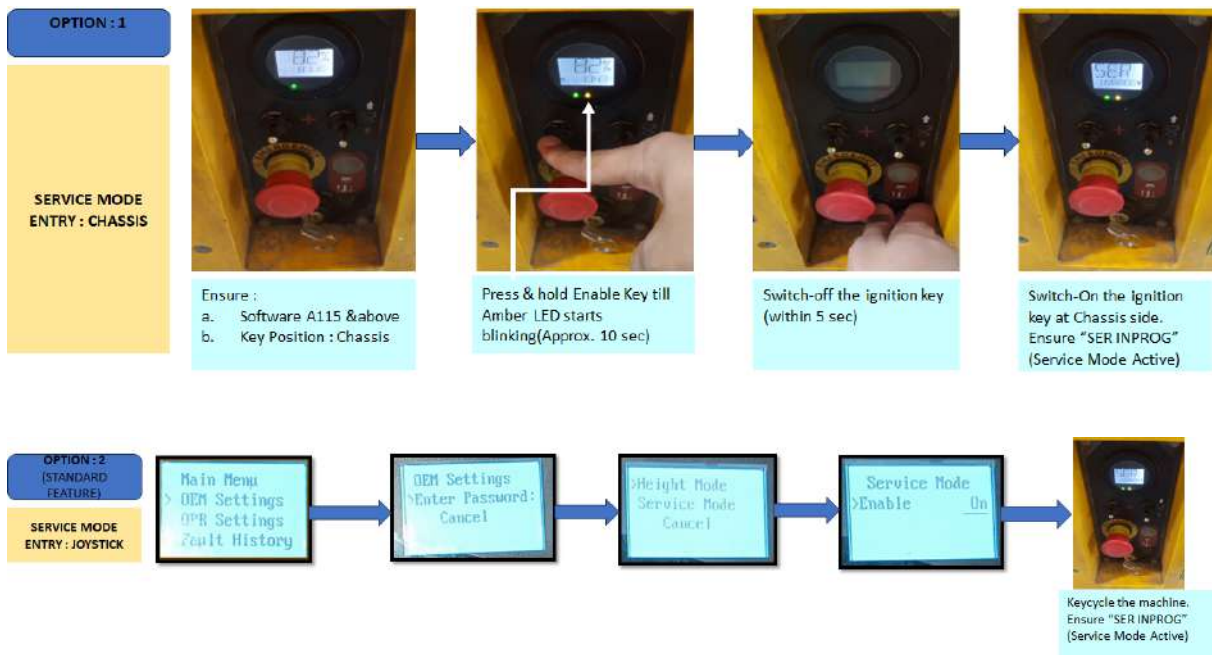
- Once in M1, expand JCB EDrive M1
- Select Angle Sensor Setup
- Ensure that the machine is fully stowed, Note the angle sensor value and input in the Angle Sensor Fully Lowered Voltage.
- Raise the machine to full height in service mode and note the angle sensor value and input in the Angle Sensor Fully Elevated Voltage
- Keycycle the machine.



## 4.2.5 Annexure - D

### Entry to service mode and Live sensor Values Display:

In addition to the entry from joystick , service mode can also be entered through base. Follow below steps:



**Note:** If entering from joystick, key cycle should be at chassis mode to check the live sensor values.

### Live Values Display

Enter in service mode through any of the above methods but the key should be in chassis mode.

- Press Toggle Down to view Next Parameter

- Press Toggle UP to view Previous Parameter



0 - OFF

1 - ON

## Steps to check sensor values from Service Master:


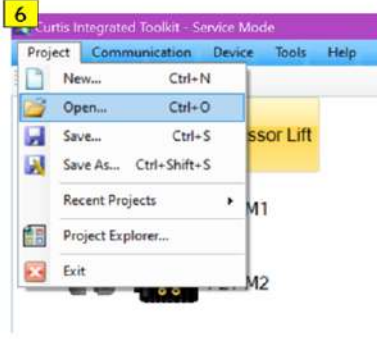

- Key Off the machine and connect DLA 2.0 on the diagnostic connector located on RH Door.
- Key on the machine and open Service Master.
- Ensure Service master is updated to latest revision.
- Click on "Other" >> JCB Access >> JCB E-Drive Scissors
- Click on CIT

**1**




**2**

**3**

- Click on "ECU Assistant Launchpad"
- Ensure DLA 2.0 and 250k are selected in the bottom drop down menu
- Click on Project >> Open>> Select any machine 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 JCB Edrive Scissor Lift and then programmer

- Once in programmer, Click on File >>Import>> Dashboard
- Select the file Machine\_Diagnostic\_Dashboard.pcfg
- After selecting the file click on the dashboard icon
- Then Click on F2T M1 & M2 once..
- The live values of the sensors will be displayed . For the switch values ,refer Annexure C..

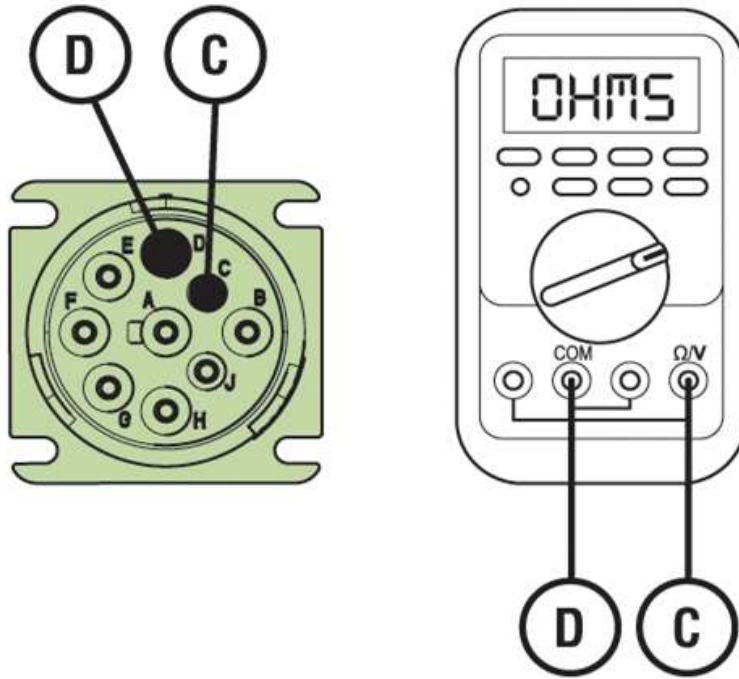
The screenshot shows three stages of the software interface. The top window (labeled 10) shows the 'File' menu with 'Import...' selected, and a sub-menu where 'Dashboard...' is highlighted. The middle window (labeled 11) shows the 'Dashboard' icon in the 'Factory Menu' on the left. The bottom window (labeled 12) shows the 'Dashboard' view with six sensor status indicators, each labeled 'Off'. The 'F2T M1 (Slide Switch)' and 'F2T M2 (Slide Switch)' are circled in red in the bottom-left corner of the dashboard.

The location for the Diagnostic Dashboard file is:

## 4.2.6 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.
  - A. Terminating resistor can be located in Main Harness near Ignition Switch Branch. It is a 3 pole connector tapped to main Branch.
  - B. 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.



4.2.7 AC

**Note:** This mainly comes as a secondary fault code. In that case, first solve the primary fault code.

If the AC fault code appears as a single fault, then first refer Annexure B to check the fault name and accordingly follow the steps from the below table

| Fault Code | Fault Detail                        | Troubleshooting steps  |
|------------|-------------------------------------|--|
| AC         | Current Sensor Left Motor           | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Current Sensor Right Motor          | -Key cycle the machine<br>'- if the fault still persists , Replace Right motor   |
| 19         | Speed Limit Supervision Left Motor  | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
| 19         | Speed Limit Supervision Right Motor | -Key cycle the machine<br>-Check if the machine is not on gradient and machine is fully charged<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|            | Motor Not Stopped Left Motor        | -Key cycle the machine<br>'- if the fault still persists , Replace left motor  |
|            | Motor Not Stopped Right Motor       | -Key cycle the machine<br>'- if the fault still persists , Replace right motor   |
|            | Critical OS General                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | OS General 2                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Reset Rejected                      | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Motor Short                         | -Key cycle the machine<br>'- If the fault still persists , replace the respective motor<br>'- if the fault still persists , Replace motor controller   |
|            | Pump Driver                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
|            | Load-Hold Driver                    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software  |

|    |                              |   |
|----|------------------------------|---|
|    |                              | '- If the fault still persists, replace the motor controller  |
|    | Lower Driver                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | Throttle Input               | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | Brake Input                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| 46 | NV Memory Failure            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | F2T_M2_Not_Operational_Fault | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | F2T_M2_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|    | F2T_M1_CAN_Timeout           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |
|    | VCL Run Time Error           | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | OS General                   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
| 72 | CAN Timeout                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'-If the fault still persists, follow can test tab<br>'- If the fault still persists, replace the motor controller |

|    |                                    |   |
|----|------------------------------------|---|
|    | Supervision                        | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | Supervision Input Check            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | Internal Hardware                  | -Key cycle the machine<br>'- If the fault still persists, replace the motor controller  |
|    | Motor Characterization Left Motor  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the left motor<br>'- If the fault is still there,replace the motor controller  |
|    | Motor Characterization Right Motor | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|    | Encoder Pulse Error Left Motor     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|    | Encoder Pulse Error Right Motor    | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
| 91 | Bad Firmware                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller   |
|    | Encoder LOS Left Motor             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |
|    | Encoder LOS Right Motor            | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the right motor<br>'- If the fault is still there,replace the motor controller |

|                                    |  |
|------------------------------------|--|
| Driver 6 Fault                     | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Driver Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog Assignment                  | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 18 Out of range(LH pothole) | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>-If the fault still persists, replace the LH pothole switch<br>'- If the fault still persists, replace the motor controller |
| PWM Input 10 Out of Range          | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Analog 31 Out of Range             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| VCL Watchdog                       | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Primary State Error                | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Lift Input                         | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Phase PWM Mismatch                 | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |
| Hardware Compatibility             | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller  |

|  |               |   |
|--|---------------|---|
|  | Lower Input   | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |
|  | Memory Parity | -Key cycle the machine<br>'- if the fault still persists , Reflash the software<br>'- If the fault still persists, replace the motor controller |

**4.2.8 B9**

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

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

**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 Backout

**Troubleshooting Steps :**

1. Enter service mode from base and key cycle in chassis mode. Check pressure sensor 1 voltage with the help of lift/lower toggle.(refer Annexure D for steps).

//Sensor Valid Output Range : 0.5-4.5 Volts// OR connect the DLA 2.0 and check the values in Service Master(Refer Annexure B for steps)

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.

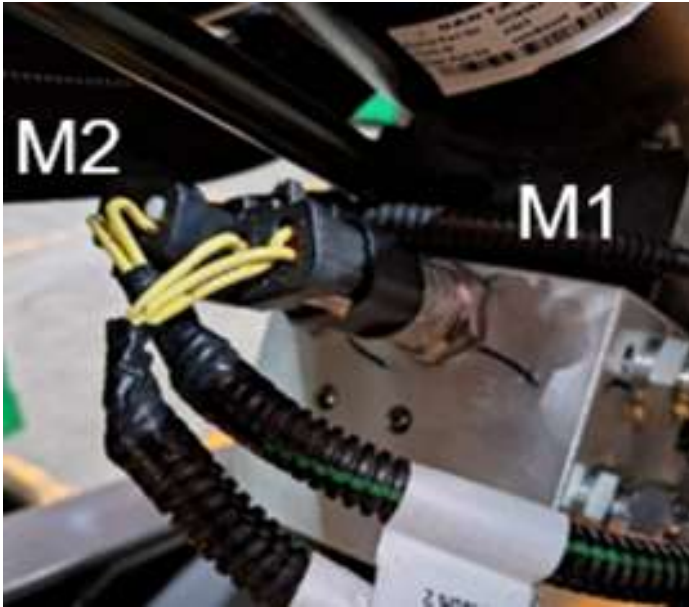
3. Re-calibrate the machine after replacement. ( No Load and Full Load Calibration)

**Related / Similar Faults :**

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|            |              |             |              |

|    |   |  |  |
|----|---|--|--|
| 54 | <p>Pressure Sensors Correlation Fault</p> <p>User_4_Fault</p>       | <p>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.</p> <p>If the difference between both pressure sensors is greater than the tolerance when the platform is stowed, then this fault is set</p> <p>The potential cause could be:</p> <p>Faulty pressure sensor<br/>Pressure sensor(s) wiring issue</p> | <p>When platform is above down limit switch, disable all motions.</p> <p>When platform is below down limit switch, disable all motions except lowering</p> |
| 7A | <p>Percentage To Max Load Difference Fault</p> <p>User_25_Fault</p> | <p>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.</p> <p>Possible causes for this fault includes:</p> <p>Calibration failure<br/>Pressure sensor failure<br/>Electrical noise issue on one of the pressure sensors</p>   | <p>Shutdown Vehicle<br/>Shutdown Coil Supply</p>   |

**Location :**



4.2.9 BB

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

|  |  |  |  |
|--|--|--|--|
|  |  | If filtered pressure value is greater than 4.6V for 1500ms |  |
|--|--|--|--|

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

### **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 Backout

### **Troubleshooting Steps :**

1. Enter service mode from base and key cycle in chassis mode. Check pressure sensor 1 voltage with the help of lift/lower toggle.(refer Annexure D for steps).

//Sensor Valid Output Range : 0.5-4.5 Volts// OR connect the DLA 2.0 and check the values in Service Master(Refer Annexure B for steps)

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.

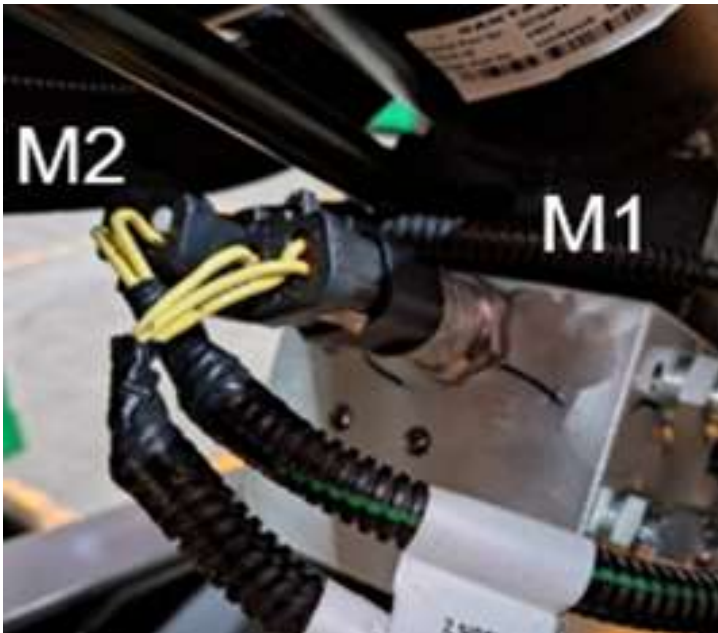
4. Re-calibrate the machine after replacement. ( No Load and Full Load Calibration)

**Related / Similar Faults :**

| Fault Code | Fault Detail   | Description  | Fault Action  |
|------------|--|--|---|
| 54         | Pressure Sensors Correlation Fault (Elevate)<br>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.<br>If the difference between both pressure sensors is greater than the tolerance when the platform is stowed, then this fault is set<br>The potential cause could be:<br><br>Faulty pressure sensor<br>Pressure sensor(s) wiring issue | When platform is above down limit switch, disable all motions.<br>When platform is below down limit switch, disable all motions except lowering |
| 7A         | Percentage To Max Load Difference Fault<br>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.   | Shutdown Vehicle<br>Shutdown Coil Supply  |

|  |  |   |  |
|--|--|---|--|
|  |  | Possible causes for this fault includes:<br>Calibration failure<br>Pressure sensor failure<br>Electrical noise issue on one of the pressure sensors |  |
|--|--|---|--|

**Location :**



## 4.2.10 B8

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

[Link :](#) [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

### **Possible Causes :**

1. Faulty Angle Sensor
2. Connector 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 Backout

### **Troubleshooting Steps :**

1. Enter service mode from base and key cycle in chassis mode. Check pressure sensor 1 voltage with the help of lift/lower toggle.(refer Annexure D for steps).

//Sensor Valid Output Range : 0.5-4.5 Volts// OR connect the DLA 2.0 and check the values in Service Master(Refer Annexure B for steps)

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.

**Related / Similar Faults :**

| Fault Code | Fault Detail                                    | Description   | Fault Action     |
|------------|---|---|------------------|
| 65         | Angle Sensor Calibration Fault<br>User_14_Fault | If the lower limit switch (NC contact) is open circuit and the angle sensor voltage is below 0.5V when lifting during angle sensor calibration.<br>Potential cause for this fault are:<br>Wiring issue<br>Angle sensor hardware fault | Shutdown Vehicle |

|           |  |  |  |
|-----------|--|--|--|
| <p>6D</p> | <p>Lift Motion Fault<br/>User_26_Fault</p>       | <p>Type 1: If the platform is stationary (no lift or lower requested) and the angle sensor percent has changed by more than 4% for 10 seconds.</p> <p>Type 2: If Platform is raising &amp; limit switch change over is completed ( Off-On to On-Off) but the angle sensor value is still around fully lowered voltage</p> <p>Type 3: If Platform is raising &amp; angle sensor value is above descent height but the limit switch change over is not completed (Off-On to On-Off)</p> <p>Type 4: If the pump PWM &gt; "Parameter" % and during lift operation- angle sensor percent hasn't increased by defined percentage within defined seconds. ( Refer table below).</p> <p>Possible causes for these faults include:<br/>                     Faulty angle sensor<br/>                     Electrical noise on angle sensor input<br/>                     Hydraulic issue<br/>                     Lift or lower solenoid mechanical failure</p> | <p>Shutdown Vehicle<br/>Shutdown Coil Supply</p> |
| <p>5A</p> | <p>Down limit Switch Fault<br/>User_17_Fault</p> | <p>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 than 90% of max angle of calibration for 500ms<br/>Check the down limit height range from the service manual.</p>   | <p>Shutdown Vehicle<br/>Shutdown Coil Supply</p> |

**Location :**



### 4.2.11 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)<br><br>OR<br><br>If measured solenoid drive current is less than open current) for a configurable delay time (default is 0.7s) | Disable all motions except lowering |
|----|-------------------|---|-------------------------------------|

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

**Possible Causes :**

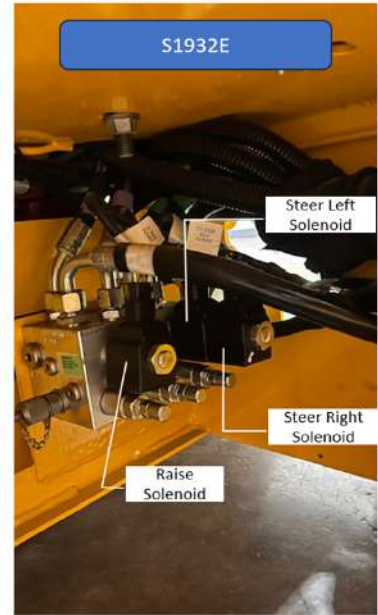
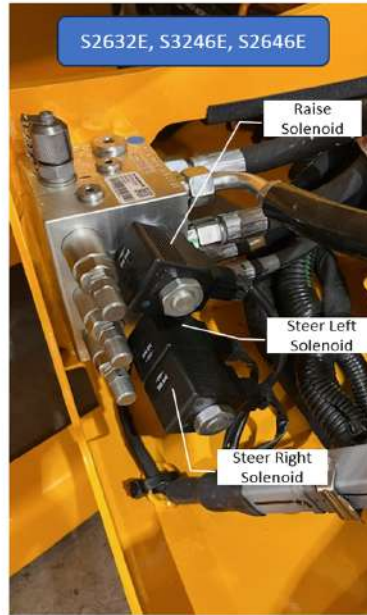
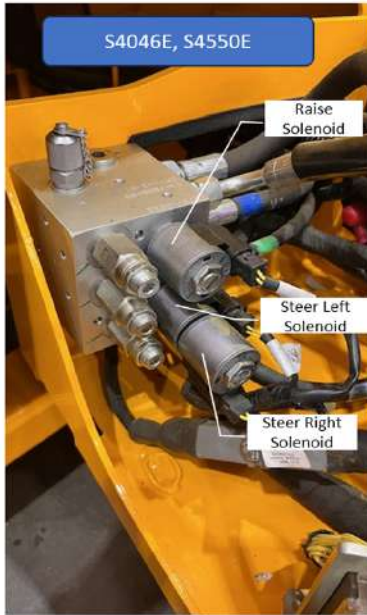
1. Faulty Solenoid
2. Faulty Wiring Harness
  - 2.1 Wire Short Circuit
  - 2.2 Wire Open Circuit
  - 2.3 Connector Damage/Loose
  - 2.4 Terminal Backout

**Troubleshooting Steps :**

1. Swap the C11\_MH connector with C6\_MH(raise solenoid connector). Keycycle the machine , check if the fault code has changed to A4 , then replace the Main control valve.
2. If the fault codes do not change , then follow the below steps:
  - Check if connector C11\_MH is properly connected and is not damaged or terminal back out issue is not there. If everthing ok continue to next step
  - Check continuity between Wire 6000L (Pin 2) of Steer right solenoid C11\_MH and Pin 2 of Controller 35 Pin connector CN1\_MH.
  - If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise contiue to next step.
  - 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.

- If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection.

**Location :**



**4.2.12 A6**

| Fault Code | Fault Detail          | Description                         | Fault Action                        |
|------------|-----------------------|-------------------------------------|-------------------------------------|
| A6         | Steer Left Coil Fault | Short circuit<br>OR<br>Open circuit | Disable all motions except lowering |

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

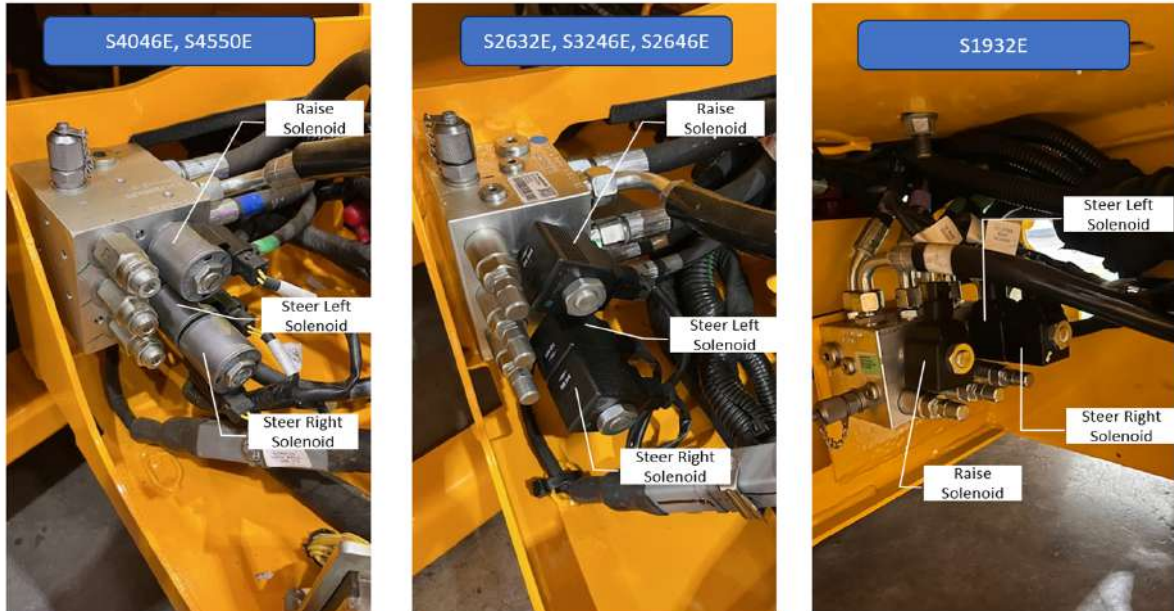
**Possible Causes :**

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 Backout

**Troubleshooting Steps :**

1. Swap the C10\_MH connector with C6\_MH(raise solenoid connector). Key cycle the machine , check if the fault code has changed , then try replacing the Main control valve.
2. If the fault codes do not change , then follow the below steps:
  - Check continuity between Wire 6000M (Pin 2) of Steer Left solenoid C10\_MH and Pin 19 of Controller 35 Pin connector CN1\_MH.
  - If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.
  - 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.
  - If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection.

**Location :**



### 4.2.13 A4

| Fault Code | Fault Detail     | Description   | Fault Action                        |
|------------|------------------|---|-------------------------------------|
| A4         | Lift Up solenoid | Fault Type(s):<br>1 = Driver current exceeded hardware limits.<br>2 = Driver current exceeded configured over-current limits.<br>3 = Driver commanded PWM active, using diagnostic pulses. Voltage measured high, should be low. Typically caused by driver failure, or driver pin short to high.<br>4 = Driver commanded PWM active, using diagnostic pulses. Voltage measured low, should be high. Either open circuit, or driver pin short to ground.<br>5 = Driver commanded PWM is 0, and voltage measured low (should be high). Either open circuit, or driver pin short to ground.<br>7 = Driver undercurrent - Monitored current is below undercurrent threshold. | Disable all motions except lowering |

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

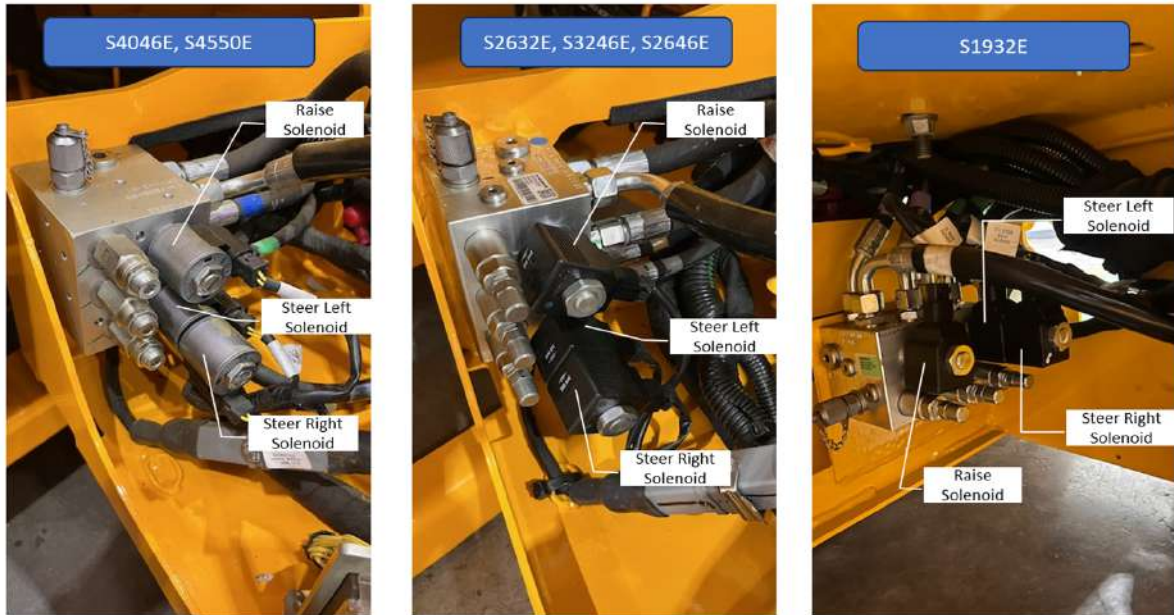
### **Possible Causes :**

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 Backout

### **Troubleshooting Steps :**

1. Swap the C6\_MH connector with C10\_MH(steer left solenoid connector). Key cycle the machine , check if the fault code has changed , then try replacing the Main control valve.
2. If the fault codes do not change , then follow the below steps:
  - Check continuity between Wire 6000U (Pin 2) of Lift Up solenoid C6\_MH and Pin 3 of Controller 35 Pin connector CN1\_MH.
  - If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.
  - 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.
  - If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection.

### **Location :**



### 4.2.14 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)<br>OR<br>If measured solenoid drive current is less than open current) for a configurable delay time (default is 0.7s) | Disable drive F/R |

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

### 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 Backout

### **Troubleshooting Steps :**

1. Swap the C8\_MH connector with C10\_MH(steer left solenoid connector). Key cycle the machine , check if the fault code has changed , then try replacing the Main control valve.

2. If the fault codes do not change , then follow the below steps:

- 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)

- 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)

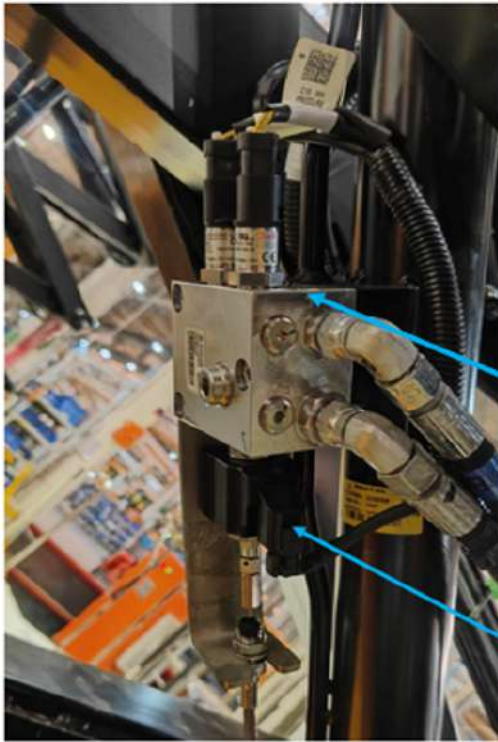
- If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection. otherwise continue to next step.

- 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)

- 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)

- If no continuity, check the mating connectors, wiring Harness for any loose or damaged connection.

### **Location :**



Lift control valve

Lowering Solenoid

4.2.15 5F

| Fault Code | Fault Detail                                   | Description  | Fault Action                                 |
|------------|--|--|--|
| 5F         | Wika PCU Fault/Hardware Fault<br>User_22 Fault | If difference between the throttle channels from the PCU is greater than 3x then this fault is set.<br><br>Type 0: PCU button 1 HW fault (Lift/Lower mode)<br>Type 1: PCU button 2 HW fault (Traction mode)<br>Type 2: PCU button 3 HW fault (Horn)<br>Type 3: PCU button 4 HW fault (Speed mode)<br>Type 4: PCU steer left or right button HW fault<br>Type 5: PCU enable trigger button HW fault | Shutdown Vehicle<br><br>Shutdown Coil Supply |

|  |  |   |  |
|--|--|---|--|
|  |  | All of these are reported by the PCU and HW faults. |  |
|--|--|---|--|

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

**Possible Causes :**

1. Faulty Hardware
2. Faulty CAN Wiring
3. Random buttons pressed on joystick before startup

**Troubleshooting Steps :**

1. If any button on the joystick is selected at random, key cycle the machine.
2. If the fault still persists, check the CAN resistance as explained in CAN Test Tab. If resistance is as per specification continue to next step.
3. Try replacing the Joystick with a new one.
4. If problem still persists, try wiggling the wire bunch near door hinge area and check for any possible loose connection or damage to Harness.
5. If problem still persists, replace Main Harness.

**Related / Similar Faults :**

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|    |  |  |  |
|----|--|--|--|
| 52 | Wika PCU PDO Timeout Fault<br>User_2_Fault | If the cyclic PDO isn't received within 100ms. The potential cause could be:<br>CAN wiring issue<br>Incorrect baud rate or node ID set in the PCU<br>CAN hardware issue on node<br>CAN node not in CAN NMT operational state | Shutdown Vehicle<br>Shutdown Coil Supply |
|----|--|--|--|

## 4.2.16 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<br>Shutdown Interlock<br>Shut down Pump |

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

### 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 Backout

**Troubleshooting Steps :**

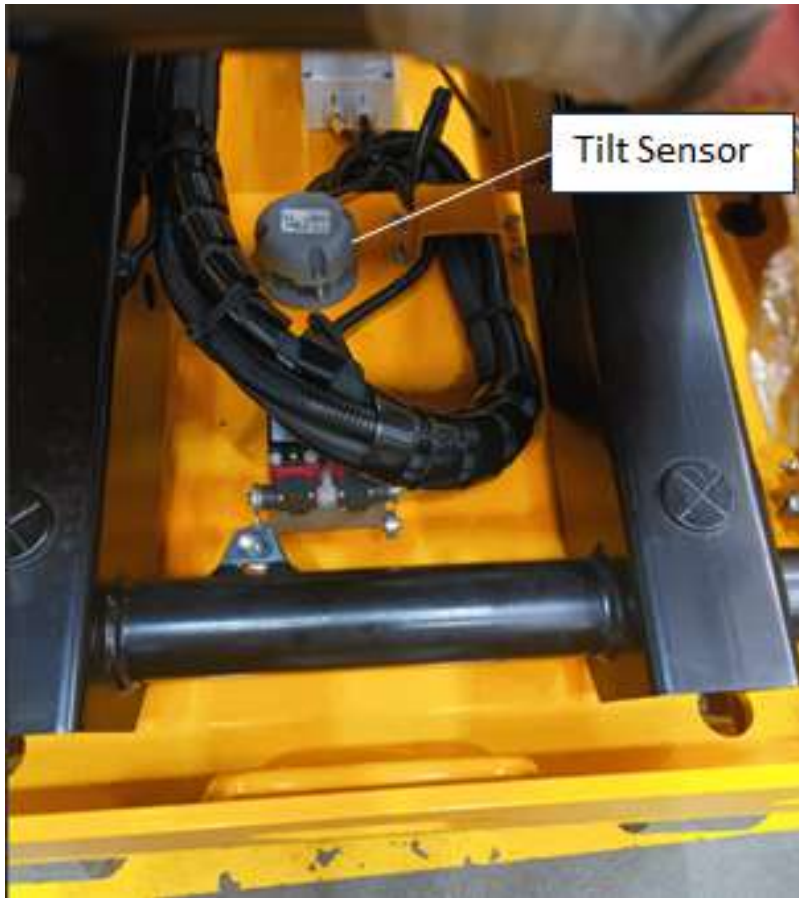
1. If the machine is at or above down limit - Check if machine Pitch angle ( Along the length of machine) is not exceeding 3.0 Degrees and Roll angle ( Along the width of machine) is not exceeding 1.5 degrees. If yes, place the machine on flat ground within this spec.
2. If ground angle is within specification or machine is below down limit and fault is appearing - try re-calibrating the Tilt sensor. ( refer procedure below). If problem persists, 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.

**Related / Similar Faults :**

| <b>Fault Code</b> | <b>Fault Detail</b>                     | <b>Description</b>  | <b>Fault Action</b> |
|-------------------|---|---|---------------------|
| 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<br>Coil Supply |
|--|--|--|-------------------------|

**Location :**



**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 currency supplied |
| OFF          | Tilt outside range                      |
| Blink ( 1-7) | Internal fault                          |

4.2.17 56

| Fault Code | Fault Detail         | Description   | Fault Action  |
|------------|----------------------|---|---|
| 56         | Pothole Switch Fault | <p>Type 0: If the pothole series switch state is on &amp; LH pothole switch is off &amp; RH pothole input switch is on &amp; platform is elevated above the lower limit switches.</p> <p>Type 1: If the pothole series switch state is on &amp; LH pothole switch is on &amp; RH pothole input switch is off &amp; platform is elevated above the lower limit switches.</p> <p>Type 2: If the pothole series switch state is off &amp; LH pothole switch is off &amp; RH pothole input switch is on &amp; platform is elevated above the lower limit switches.</p> <p>Type 3: If the pothole series switch state is off &amp; LH pothole switch is on &amp; RH pothole input switch is off &amp; platform is elevated above the lower limit switches.</p> <p>Type 4: If the pothole series switch state is off &amp; LH pothole switch is on &amp; RH pothole input switch is on &amp; platform is elevated above the lower limit switches.</p> | <p>Disable Lifting with flashing lights and buzzer sound only if the option "Disable_Raise_PH_fault" is set to "Raise Disabled".</p> <p>- Disable Drive/ steer and allow lowering regardless of option "Disable_Raise_PH_fault"</p> |

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

### **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 Backout

### **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. Enter service mode from base and key cycle in chassis mode (Annexure - D), check if switch conditions ( LH, RH, LH-RH Series) are as per table mentioned in Annexure-C or Connect Service Master and check the values using dashboard.
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. 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.
6. 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.

7. 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.

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

**Location :**



| 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 startup.<br>Type 2: If the PCU joystick is in the lift position OR the base upper switch is ON at startup. | Shutdown Throttle<br><br>Shutdown Pump<br><br>Disable all motions |

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

**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 Backout

**Troubleshooting Steps :**

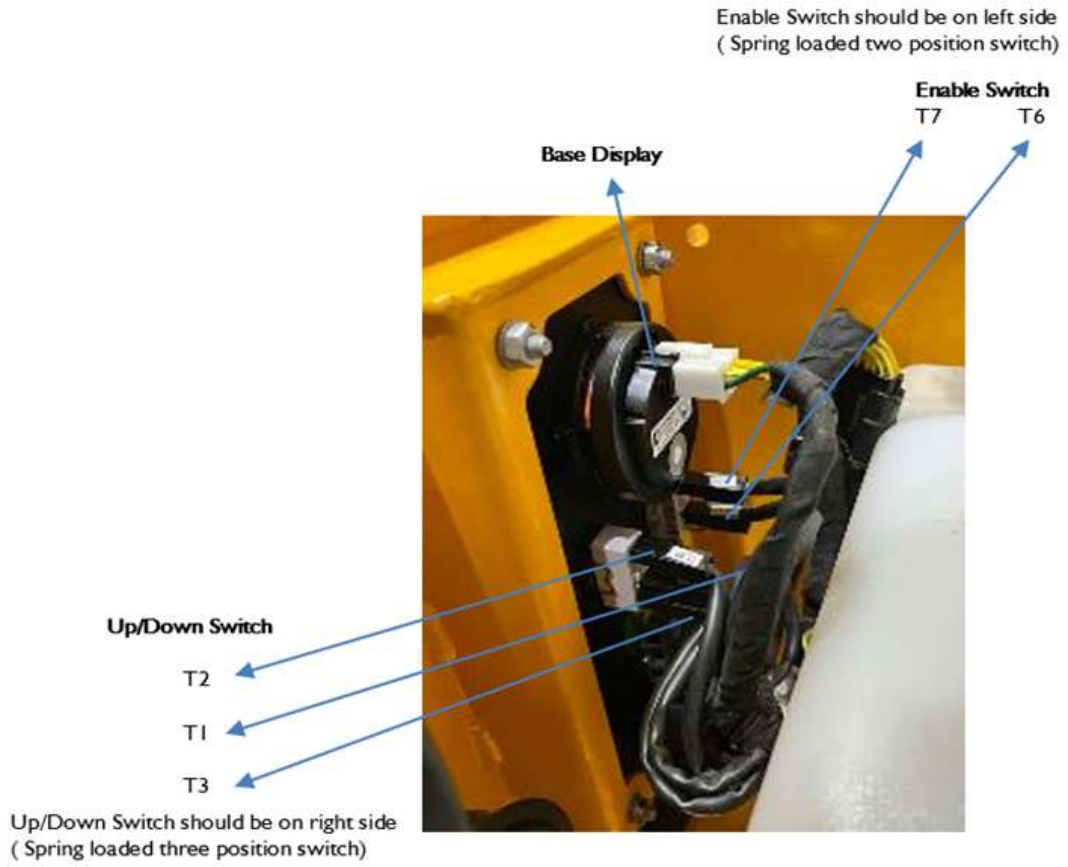
1. Ensure that Joystick or base toggle switches are not pressed at startup. Key cycle the machine to verify. If fault is present continue to next step.
2. Check the base enable and up down toggle switches for any damage or switch stuck or freely rotating. If found damaged, replace the switch or else 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) and 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) and 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                       |
|------------|--|--|------------------------------------|
| 67         | Hydraulic HPD Fault<br><br>User_16_Fault | If Pump HPD fault is active OR lift/lower request is present on startup. | Shutdown Throttle<br>Shutdown Pump |

**Additional Info :**



4.2.19 OL

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|    |   |  |   |
|----|---|--|---|
| OL | Platform Overload Above/Below Set point | <p>If the averaged percentage to max load is &gt;99% this fault will be set. Below are the fault types:</p> <p>Type 0: Static overload checks<br/>                 Type 1: Dynamic lift overload checks<br/>                 Type 2: Dynamic lower overload checks</p> | <p>Shutdown Vehicle<br/>                 Shutdown Coil Supply</p> <p>Disable all motions except lowering below 50% machine height</p> <p>Disable all motions above 50% machine height</p> |
|----|---|--|---|

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

**Possible Causes :**

1. Load on Platform beyond specification
2. Machine Calibration out
3. Angle sensor replacement or adjustment
4. Pressure sensor replacement
5. Temperature difference

**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; perform the following checks:
  - If the angle sensor is adjusted or replaced , ensure calibration is performed again and all the flags are turned on from joystick menu.
  - If the software is re-flashed, check if the angle sensor fully lowered and fully elevated voltage are input correctly.(refer Annexure C).
  - If the pressure sensor is replaced, ensure the calibration is performed again.

- If all the above reasons are negative, re-run the calibration.

**Additional Info :**

- During OL fault condition, if machine above the 50% of machine height, platform will not lower from joystick or base command. Use Service mode or 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.

**4.2.20 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.<br>OR<br>The NC switched input of Lower Limit Switch is OFF below the down limit height for more than 500ms.<br>OR<br>The NC switched input of Lower Limit Switch is ON above the down limit height for more than 500ms.<br>OR<br>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<br>OR<br>If Pothole is open ( Pothole switch 18 & 11 = OFF) and Down Limit Switch state is below | Shutdown Vehicle<br><br>Shutdown Coil Supply |

|  |  |  |  |
|--|--|--|--|
|  |  | Down limit height ( Switch 13 = OFF & Switch 7 = ON) |  |
|--|--|--|--|

- Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>  
[Annexure-D](#)<sup>224</sup>

**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. Enter service mode from base and key cycle in chassis mode, check the Lower Limit Switch & Upper Limit switch positions from stowed and match with table in Annexure-C. with the help of lift/lower toggle.(refer Annexure D for steps).

OR connect the DLA 2.0 and check the values in Service Master(Refer Annexure B for steps)

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 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.

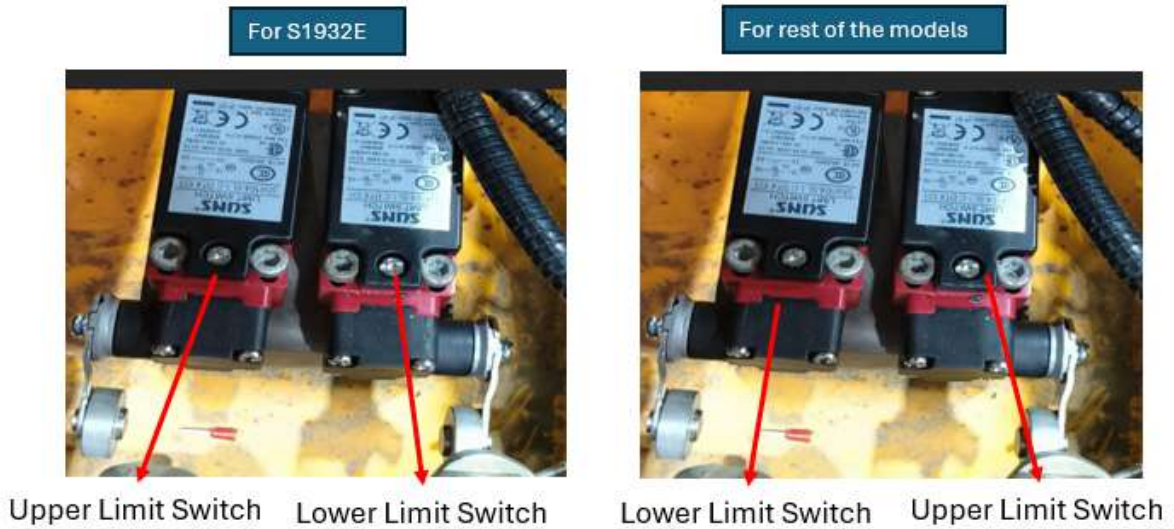
5. Check Pothole switch status at fault height in dashboard as per Annexure-C if not correct refer tab "56" for troubleshooting.

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 angle sensor calibration wrong. try re-calibrating the machine.

**Location :**



### 4.2.21 6D

| Fault Code | Fault Detail      | Description   | Fault Action  |
|------------|-------------------|---|---|
| 6D         | Lift Motion Fault | <p>Type 1: If the platform is stationary (no lift or lower requested) and the angle sensor percent has changed by more than 4% for 10 seconds.</p> <p>Type 2: If Platform is raising &amp; limit switch change over is completed ( Off-On to On-Off) but the angle sensor value is still around fully lowered voltage</p> <p>Type 3: If Platform is raising &amp; angle sensor value is above descent height but the limit switch change over is not completed (Off-On to On-Off)</p> <p>Type 5: If the pump PWM &gt; "Parameter" % and during lift operation- angle sensor percent hasn't increased by defined percentage within defined seconds. ( Refer table below)</p> | <p>Shutdown Vehicle</p> <p>Shutdown Coil Supply</p> |

- [Link : Annexure-A](#) 213  
[Annexure-B](#) 215  
[Annexure-C](#) 221  
[Annexure-D](#) 224

### Possible Causes :

1. Faulty Angle Sensor
2. Mounting Issue
3. Pothole Switch faulty

## **Troubleshooting Steps :**

1. Connect the service master and check the fault type(refer Annexure B).
2. Follow the steps in accordance to specific fault type .
3. Type 1:
  - Adjust the angle sensor mounting to reduce the fluctuations to minimum.
4. Type 2:
  - Lift the machine in service mode and check if the angle sensor value is changing or not.(refer Annexure D)
  - If the value is not changing , then check if there is a damage in angle sensor mounting( bracket/D-bit/spacer)
  - If the damaged part is found , then replace it and if not just adjust the mounting of angle sensor again.
  - Lift the machine again in service mode to check if the angle sensor value is changing
  - If the value is changing, then recalibrate the machine as per standard procedure.
5. Type 3 :
  - Check if the down limit height of the machine is within the specified range
  - Adjust the decent delay height as per the process mentioned below.
6. Type 5:
  - Check if the value in parameter - "fully lowered angle sensor voltage" is matching with the actual angle sensor voltage in fully stowed condition. (refer Annexure C).
  - If the fault still persists, check for damage in D-bit.
  - If fault is still present, adjust the mounting and recalibrate the machine.
7. If fault still persists after troubleshooting for specific types, replace the angle sensor and re-run the calibration.

**Location :**



**Additional Info :**

1. If 6D fault is present , then lower the machine to fully stowed condition and then key cycle to clear the fault condition.

**4.2.22 6A**

| <b>Fault Code</b> | <b>Fault Detail</b>                 | <b>Description</b>                             | <b>Fault Action</b> |
|-------------------|-------------------------------------|--|---------------------|
| 6A                | PCU Steer Left/Right Sequence Fault | If the PCU steer left button is ON at startup. | NA                  |

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>

**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 :**

| <b>Fault Code</b> | <b>Fault Detail</b>                                | <b>Description</b>  | <b>Fault Action</b> |
|-------------------|--|---|---------------------|
| 5C                | PCU Enable Trigger Sequence Fault<br>User_19_Fault | If the PCU enable trigger is ON at startup.   | NA                  |
| 5D                | PCU Passcode Fault<br>User_20_Fault                | Type 0: SDO write failure when requesting to change PCU passcode.<br>Type 1: SDO response failure when requesting to change PCU passcode. | NA                  |

**Additional Info :**

Ensure the PCU software is as per the specific region

**4.2.23 7B**

| <b>Fault Code</b> | <b>Fault Detail</b> | <b>Description</b>  | <b>Fault Action</b>                     |
|-------------------|---------------------|---|---|
| 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% |

**Link :** [Annexure-A](#)<sup>213</sup>  
[Annexure-B](#)<sup>215</sup>  
[Annexure-C](#)<sup>221</sup>

**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.
3. If battery is not able to retain charge and the water level is adequate, then replace the battery.

**Related / Similar Faults :**

| Fault Code | Fault Detail                               | Description   | Fault Action                                 |
|------------|--|---|--|
| 6E         | Battery Low Voltage Fault<br>User_27_Fault | If the BDI percentage lower than the low BDI percentage parameter i.e. 5% for more than 3600ms. | Shutdown Vehicle<br><br>Shutdown Coil Supply |

**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.

4.2.24 28

| <b>Fault Code</b> | <b>Fault Detail</b>                 | <b>Description</b>   | <b>Fault Action</b> |
|-------------------|-------------------------------------|--|---------------------|
| 28                | Motor Temp Hot Cutback - Left Motor | When the temperature of the left motor reaches the hot cutback limit | Warning only        |

**Possible Causes :**

1. Motor winding temperature is at or above the hot cutback limit i.e. 110°C.
2. Machine is working on a harsh duty cycle for a long time.
3. Machine is driving on a gradient for a long time.

**Troubleshooting Steps :**

1. Cool down the machine for 20 - 30 minutes before working again.
2. If the fault persists even after cooling for a long time , try re flashing the software.
3. If the fault still persists , try replacing the motor.

**Related / Similar Faults :**

| <b>Fault Code</b> | <b>Fault Detail</b>                  | <b>Description</b>  | <b>Fault Action</b> |
|-------------------|--------------------------------------|---|---------------------|
| 0A                | Motor Temp Hot Cutback - Right Motor | When the temperature of the Right motor reaches the hot cutback limit | Warning only        |
| 6B                | Motor_Temperature_Shutdown_Fault     | When the temperature of the motor winding reaches 130°C               | Disable all motions |

**Location :**



**Additional Info :**

1. Ensure that the right and left motor identifications are as per [Annexure A](#).<sup>213</sup>
2. This is just a warning fault, motor current will gradually start decreasing which in turn would reduce the driving speed till the winding temperature reaches 130°C which would lead to fault code 6B in which machine will disable all motions.

**4.2.25 29**

| <b>Fault Code</b> | <b>Fault Detail</b>            | <b>Description</b>                                 | <b>Fault Action</b> |
|-------------------|--------------------------------|--|---------------------|
| 29                | Motor Temp Sensor - Left Motor | The temperature sensor of the left motor is faulty | Warning only        |

**Possible Causes :**

1. Motor thermistor connection loose
2. Faulty wiring harness.

## Troubleshooting Steps :

1. Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.
- 2 . If fault code does not change, there is a problem with wiring harness. Follow the below steps :
3. Check if pin 5 on the left motor connector(C62\_MH) and pin 8 of Controller 35 Pin connector CN1\_MH is not backed out.
4. Check continuity between wire 4509 (pin 5) of LH motor connector and pin 8 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
5. Check the circuit for short to battery and short to ground.

## Location :



## Additional Info :

Ensure that the right and left motor identifications are as per [Annexure A](#). <sup>213</sup>

4.2.26 0B

| Fault Code | Fault Detail                    | Description   | Fault Action |
|------------|---------------------------------|---|--------------|
| 0B         | Motor Temp Sensor - Right Motor | The temperature sensor of the right motor is faulty | Warning only |

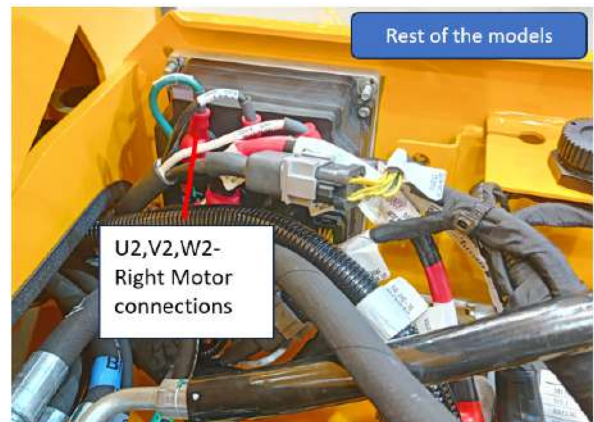
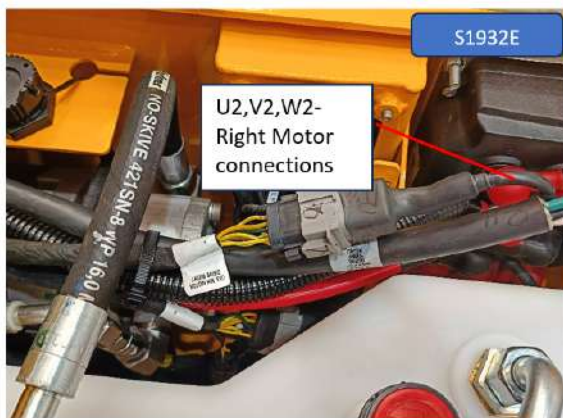
**Possible Causes :**

1. Faulty wiring harness.
2. Motor thermistor connection loose

**Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.
2. If fault code does not change, there is a problem with wiring harness. Follow the below steps :
3. Check if pin 5 on the right motor connector(C63\_MH) and pin 21 of Controller 35 Pin connector CN1\_MH is not backed out.
4. Check continuity between wire 4506 (pin 5) of RH motor connector and pin 21 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
5. Check the circuit for short to battery and short to ground .

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A.](#) 

**4.2.27 32**

| <b>Fault Code</b> | <b>Fault Detail</b>          | <b>Description</b>  | <b>Fault Action</b>   |
|-------------------|------------------------------|---|---|
| 32                | EM Brake Driver - Left Motor | Fault Type(s):<br>1 = Driver current exceeded hardware limits.<br>2 = Driver current exceeded configured over-current limits. | Disable Drive<br>Shutdown throttle<br>Shutdown EM Brake<br>Full Brake |

**Possible Causes :**

1. Open circuit on driver load.
2. Faulty wiring harness
3. Connector pin loose on connector or motor end

**Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.
- 2 . If fault code does not change, there is a problem with wiring harness. Follow the below steps :
  - a) Check if pin 8 on the left motor connector(C62\_MH) and pin 4 of Controller 35 Pin connector CN1\_MH is not backed out.

- b) Check continuity between wire 6012 (pin 8) of LH motor connector and pin 4 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
- c) Check the circuit for short to battery and short to ground .

**Related / Similar Faults :**

| Fault Code | Fault Detail                        | Description | Fault Action      |
|------------|-------------------------------------|-------------|-------------------|
| 0x84       | Motor Braking Impaired - Left Motor |             | Disable drive F/R |

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#) <sup>213</sup>.

4.2.28 A2

| Fault Code | Fault Detail                  | Description   | Fault Action  |
|------------|-------------------------------|---|---|
| A2         | EM Brake Driver - Right Motor | Fault Type(s):<br>1 = Driver current exceeded hardware limits.<br>2 = Driver current exceeded configured over-current limits. | Disable Drive<br>Shutdown throttle<br>Shutdown EM Brake<br>Full Brake |

**Possible Causes :**

1. Open circuit on driver load.
2. Faulty wiring harness
3. Connector pin loose on connector or motor end

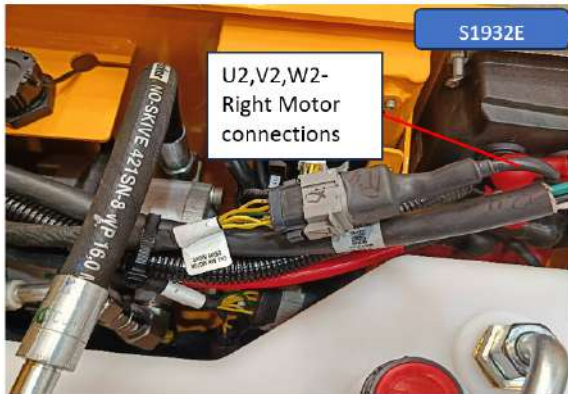
**Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.
- 2 . If fault code does not change, there is a problem with wiring harness. Follow the below steps :
  - i. Check if pin 8 on the Right motor connector(C63\_MH) and pin 5 of Controller 35 Pin connector CN1\_MH is not backed out.
  - ii. Check continuity between wire 6014 (pin 8) of RH motor connector and pin 5 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
  - iii. Check the circuit for short to battery and short to ground

**Related / Similar Faults :**

| Fault Code | Fault Detail                         | Description | Fault Action         |
|------------|--------------------------------------|-------------|----------------------|
| 0x3E       | Motor Braking Impaired - Right Motor |             | Disable drive<br>F/R |

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#)<sup>213</sup>.

4.2.29 36

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|    |                                     |   |   |
|----|-------------------------------------|---|---|
| 36 | Sin Cos Motor Feedback - Left Motor | <b>Fault Type(s):</b><br>1. Controller saw a fast transition to zero speed.<br>2. Encoder supply failed.<br>3. Sine or Cosine input differs from expected.<br>4. Controller saw sensor failure at speed.<br>5. Unrealistic motor acceleration seen.<br>6. Resolver loss of signal.<br>7. Resolver degradation of signal.<br>8. Resolver loss of tracking. | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump Full Brake. |
|----|-------------------------------------|---|---|

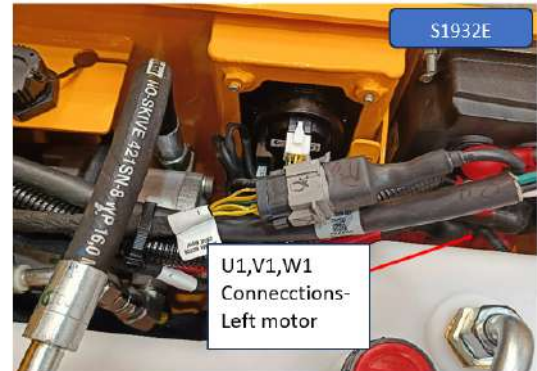
**Possible Causes :**

1. Motor encoder failure.
2. Faulty wiring harness
3. Encoder pin loose on connector or motor end

**Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.
- 2 . If fault code does not change, there is a problem with wiring harness. Follow the below steps :
  1. Check if the pin 2 and 3 of the left motor connector(C62\_MH) and pin 31 and 32 of Controller 35 Pin connector CN1\_MH is not backed out.
  2. Check continuity between wire 4507 (pin 2) of LH motor connector and pin 31 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
  3. Check continuity between wire 4508 (pin 3) of LH motor connector and pin 32 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
  4. Check the circuit for short to battery and short to ground

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#)<sup>213</sup>.

**4.2.30 0D**

| Fault Code | Fault Detail                         | Description  | Fault Action   |
|------------|--------------------------------------|--|--|
| 0D         | Sin Cos Motor Feedback - Right Motor | Fault Type(s):<br>1. Controller saw a fast transition to zero speed.<br>2. Encoder supply failed.<br>3. Sine or Cosine input differs from expected.<br>4. Controller saw sensor failure at speed.<br>5. Unrealistic motor acceleration seen.<br>6. Resolver loss of signal.<br>7. Resolver degradation of signal.<br>8. Resolver loss of tracking. | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |

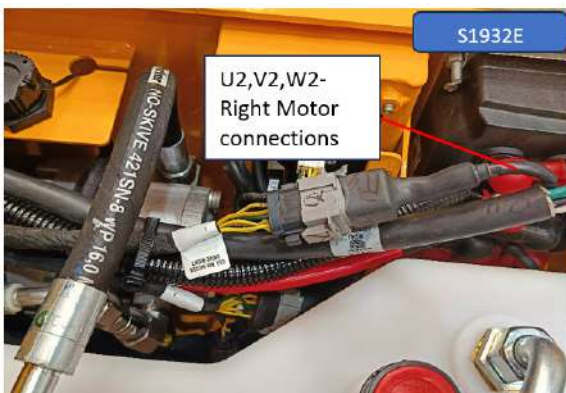
**Possible Causes :**

1. Motor encoder failure.
2. Faulty wiring harness
3. Encoder pin loose on connector or motor end

### **Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.
- 2 . If fault code does not change, there is a problem with wiring harness. Follow the below steps :
  1. Check if the pin 2 and 3 of the right motor connector(C63\_MH) and pin 10 and 11 of Controller 35 Pin connector CN1\_MH is backed out.
  2. Check continuity between wire 4503 (pin 2) of RH motor connector and pin 10 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
  3. Check continuity between wire 4504 (pin 3) of RH motor connector and pin 11 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage
  4. Check the circuit for short to battery and short to ground

### **Location :**



### **Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#).<sup>213</sup>

**4.2.31 37**

| Fault Code | Fault Detail            | Description                       | Fault Action   |
|------------|-------------------------|-----------------------------------|--|
| 37         | Motor Open - Left Motor | Open circuit in motor connections | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |

**Possible Causes :**

1. Motor phase open.
2. Faulty wiring harness

**Troubleshooting Steps :**

1. Check if the connections on U1 , V1, W1 ports are not loose(Lower side).
2. If the fault still persists, Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#).<sup>213</sup>

**4.2.32 0E**

| <b>Fault Code</b> | <b>Fault Detail</b>         | <b>Description</b>                | <b>Fault Action</b>  |
|-------------------|-----------------------------|-----------------------------------|--|
| 0E                | Motor Open -<br>Right Motor | Open circuit in motor connections | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |

**Possible Causes :**

1. Motor phase open.
2. Faulty wiring harness

**Troubleshooting Steps :**

1. Check if the connections on U2 , V2, W2 ports are not loose(Upper side).
2. If the fault still persists, Try swapping the right and left motor connectors. If the fault code shifts to another motor, then there is problem with the motor. Replace the part.

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#) <sup>213</sup>.

4.2.33 38

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|    |                       |                                       |  |
|----|-----------------------|---------------------------------------|--|
| 38 | Main Contactor Welded | Main contactor tips are welded closed | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |
|----|-----------------------|---------------------------------------|--|

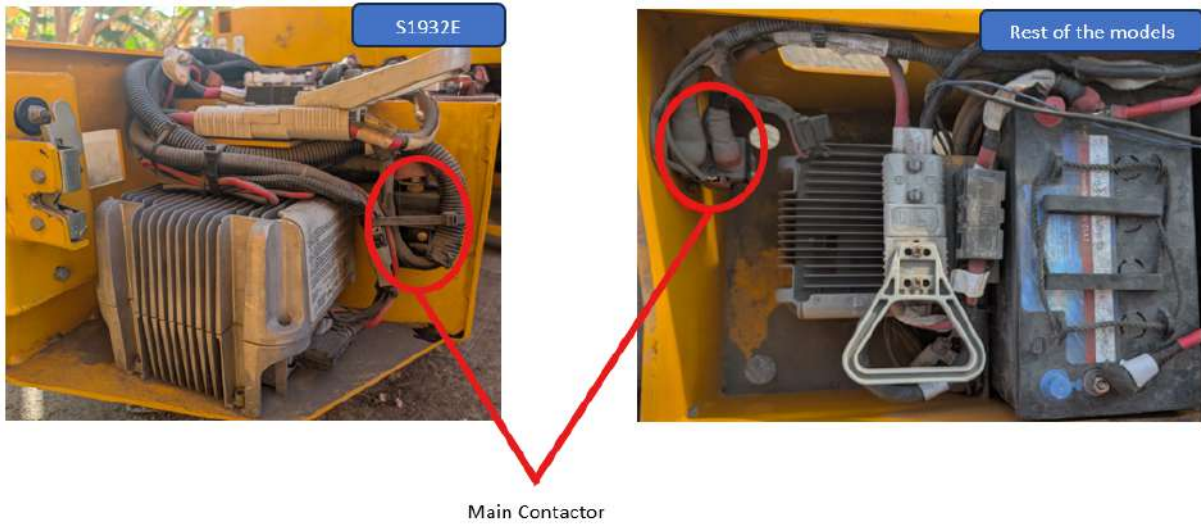
**Possible Causes :**

1. Main contactor tips are welded closed.
2. Motor phase U or V is disconnected or open.

**Troubleshooting Steps :**

1. Ensure the Isolator Switch is disconnected.
2. Remove the cables from the two contacts of the DC contactor and check continuity .
3. If continuity is there, replace the DC contactor.
4. If continuity is not present, connect the cables properly and connect the isolator switch
5. If fault still persists, Check if the motor phases U1, V1, U2 and V2 are connected properly on the controller side.

**Location :**



4.2.34 39

| Fault Code | Fault Detail                 | Description  | Fault Action   |
|------------|------------------------------|--|--|
| 39         | Main Contactor Did Not Close | Type 1: Main did not close when commanded.<br>Type 2: Main disconnected during operation<br>Type 3: Battery disconnected with main enable off. | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |

**Possible Causes :**

Type 1:

1. Main contactor did not close.
2. Main contactor tips are oxidized, burned or not making good contact
3. Blown Mega fuse(200A)

Type 2:

1. Main contactor opened during operation

- 2. Harness Wiring loose
- 3. Faulty Contactor

Type 3:

- 1. Battery not connected to B+ when main enable is off and interlock applied.

### **Troubleshooting Steps :**

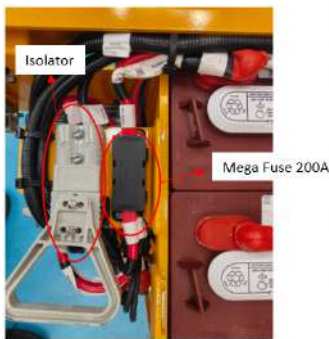
1. Check the voltage on the contactor where cable is connected from mega fuse while machine is idle and during an operation . It should give 24V. If not received , follow below steps:

- Check if the 200A mega fuse is blown.
- Check if the 30A fuse is blown. Location shown below.
- Check if the contacts on the DC contactor have become loose.
- Check if the isolator is connected properly.
- Check if the positive supply battery cable is connected properly.
- Check if the B+ terminal on the main controller is not loose.
- Check the supply contacts are connected properly or not swapped.

2. Check the voltage on the contactor cable going to the controller. During an operation, it should give 24V.

3. If the voltage is not received , replace the main contactor.

### **Location :**



Main Contactor

4.2.35 17

| Fault Code | Fault Detail             | Description  | Fault Action                        |
|------------|--------------------------|--|-------------------------------------|
| 17         | Severe B+ Under voltage  | Fault Type(s):<br>1 = Under voltage cutback (0x343B = 0%) or capacitor voltage below safe limits for 64ms.<br>2 = Commanded voltage could not be achieved due to low capacitor voltage   | Disable all motions<br>Shutdown All |
| 17         | Severe KSI Under voltage | Fault Type(s):<br>1 = Brownout is disabled due to invalid product data configuration.<br>2 = Keyswitch_Voltage below brownout threshold at bootup.<br>3 = Keyswitch_Voltage below low brownout threshold for 5 ms.<br>4 = Keyswitch_Voltage below high brownout threshold for 64 ms. | Disable all motions<br>Shutdown All |

**Possible Causes :**

1. Machine is discharged because of which battery has reached the under voltage cutback limit i.e. 16V.
2. Battery disconnected while driving
3. Blown 200A fuse or main contactor did not close
4. KSI disconnected or Open Circuit while driving.

**Troubleshooting Steps :**

1. Fully charge the machine in equalization mode .

2. Check if all the battery cables are connected properly.
3. Check the water level in batteries.
4. Check if the 200A mega fuse is blown.
5. Check individual battery voltage to identify faulty battery
6. If the individual battery still does not increase after charging in equalization mode and checking the water level. Then , replace the battery
7. Check if the main contactor is faulty. Follow the steps from the fault code 39 tab.
8. If the fault still persists, check if pin 1 of Controller 35 Pin connector CN1\_MH is backed out.
9. Check if the grounding is correct from the ignition relay

**Related / Similar Faults :**

| Fault Code | Fault Detail          | Description  | Fault Action |
|------------|-----------------------|--|--------------|
| 23         | Under voltage Cutback | Battery voltage is at or below under voltage cutback limit | Warning only |

**Location :**



4.2.36 31

| Fault Code | Fault Detail | Description  | Fault Action   |
|------------|--------------|--|--|
| 31         | Main Driver  | Fault Type(s):<br>1 = Driver current exceeded hardware limits.<br>2 = Driver current exceeded configured over-current limits<br>3 = Driver commanded PWM active, using diagnostic pulses. Voltage measured high, should be low. Typically caused by driver failure, or driver pin short to high.<br>4 = Driver commanded PWM active, using diagnostic pulses. Voltage measured low, should be high. Either | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |

|  |  |  |  |
|--|--|--|--|
|  |  | <p>open circuit, or driver pin short to ground.<br/>                     5 = Driver commanded PWM is 0, and voltage measured low (should be high). Either open circuit, or driver pin short to ground.<br/>                     7 = Driver undercurrent - Monitored current is below undercurrent threshold.</p> |  |
|--|--|--|--|

**Possible Causes :**

1. Open or short on Contactor Coil .
2. Dirty connector pins at controller or contactor coil
3. Bad connector crimps or faulty wiring.

**Troubleshooting Steps :**

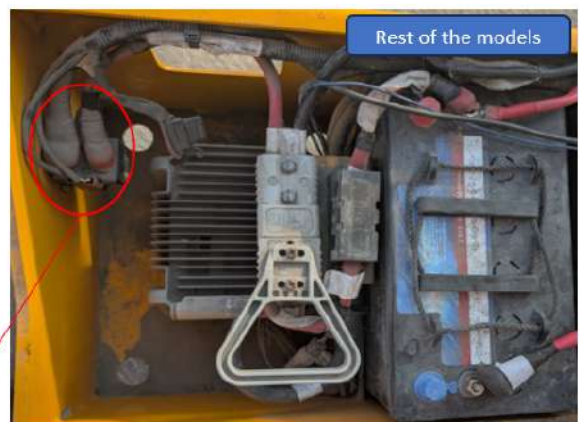
1. Check if the contacts on the DC contactor have become loose.
2. Check if pin 6 of Controller 35 Pin connector CN1\_MH is backed out
3. Follow the steps for "38" fault code .
4. If the fault still persists, follow the steps for "39" fault code

**Related / Similar Faults :**

| Fault Code | Fault Detail          | Description                           | Fault Action   |
|------------|-----------------------|---------------------------------------|--|
| 38         | Main Contactor Welded | Main contactor tips are welded closed | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |

|    |                              |  |  |
|----|------------------------------|--|--|
| 39 | Main Contactor Did Not Close | Type 1: Main did not close when commanded.<br>Type 2: Main disconnected during operation<br>Type 3: Battery disconnected with main enable off. | Disable all motions<br>Shutdown Motor<br>Shutdown Main Contactor<br>Shutdown EM Brake<br>Shutdown Throttle<br>Shutdown Pump<br>Full Brake. |
|----|------------------------------|--|--|

**Location :**



Main Contactor

**4.2.37 E9 (OHL)**

| Fault Code | Fault Detail                     | Description                                | Fault Action                        |
|------------|----------------------------------|--|-------------------------------------|
| E9(OHL)    | At or above Outdoor height limit | Machine reached the limit for Outdoor mode | Disable all motions except lowering |

**Possible Causes :**

1. Machine reached outdoor height limit
2. Dual height limit switch connection open .
3. Dual height switch faulty.

**Troubleshooting Steps :**

1. If operator is indoor and OHL is coming , press the indoor mode button on the dual height box mounted on platform. The machine can go to full height in this case.
2. If the machine is outdoor, lower the machine as the outdoor height limit is reached.
3. Check if the limit switch is properly mounted. Make sure the limit switch is pressed within Outdoor height limit.

**Location :**



**Additional Info :**

- If OHL occurs at outdoor height limit mentioned in manual , then this is not a fault condition. Just a warning to indicate that machine has reached the outdoor height limit. To lift the machine further to full height, indoor mode needs to be selected.

**4.2.38 E0**

| <b>Fault Code</b> | <b>Fault Detail</b>                  | <b>Description</b>          | <b>Fault Action</b>                                  |
|-------------------|--------------------------------------|-----------------------------|--|
| E0                | Foot Switch or Related Wiring Faults | open or short on foot pedal | Disable all motions except lowering in platform mode |

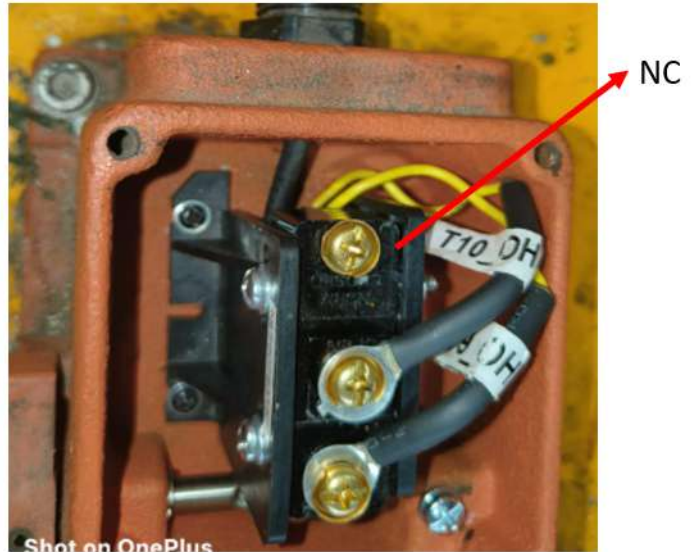
**Possible Causes :**

1. Open circuit on foot pedal switch
2. Short circuit on foot pedal switch
3. Switch pressed during startup

**Troubleshooting Steps :**

1. The foot pedal should not be pressed during or startup. To clear this condition, undress the foot pedal and key cycle the machine.
2. If the fault still persists , follow the below steps:
  - Check if pin 5/20 (wire 4001) of the I/O Expansion ECU is not backed out.
  - Check if the common wire(6000A) in foot switch is connected properly and check if the voltage received is ~12V
  - Remove the wires from foot pedal. Check for continuity between Common Terminal and NO Terminal when the switch is not pressed . If there is continuity, then replace the part.

**Location :**



**Additional Info :**

This fault is only applicable for Korea region.

4.2.39 18

| Fault Code | Fault Detail                                      | Description | Fault Action                        |
|------------|---|-------------|-------------------------------------|
| 18         | Severe B+ Over voltage<br>Severe KSI Over voltage |             | Disable all motions<br>Shutdown All |

**Possible Causes :**

1. Battery disconnected while regen braking
2. Battery-voltage applied to KSI (pin 1) exceeds the Severe Over voltage limit.
3. Machine has reached over voltage cutback limit i.e. 30V

**Troubleshooting Steps :**

1. Key cycle the machine .
2. If the fault still persists, check the battery pack voltage which should be ~ 24V. If it turns out to be >= 30V check if the battery configuration is as per spec.

3. Check the individual battery voltage to identify faulty battery

**Related / Similar Faults :**

| Fault Code | Fault Detail         | Description   | Fault Action |
|------------|----------------------|---|--------------|
| 24         | Over voltage Cutback | Battery voltage is at or above over voltage cutback limit | Warning only |

**4.2.40 25**

| Fault Code | Fault Detail          | Description   | Fault Action      |
|------------|-----------------------|---|-------------------|
| 25         | Ext 5V Supply Failure | Fault Type(s):<br>1 = The 5V supply is outside 5V ± 10%.<br>2 = The current is outside the limits defined by:<br>– Ext_5V_Supply_Min.<br>– Ext_5V_Supply_Max. | Disable 5V supply |

**Possible Causes :**

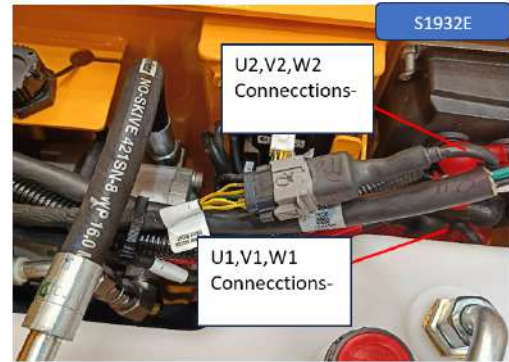
1. Short circuit
2. Open circuit
3. Loose or damaged wiring harness.

**Troubleshooting Steps :**

1. Check if the pin 26 of Controller 35 Pin connector CN1\_MH is not backed out.
2. Check if pin 1 on the left motor connector(C62\_MH) and right motor connector(C63\_MH) are not backed out.
3. Check continuity between wire 4501 (pin 1) of LH motor connector and pin 26 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage .
4. Check continuity between wire 4502 (pin 1) of RH motor connector and pin 26 of Controller 35 Pin connector CN1\_MH, if no continuity check wiring harness for any damage .
5. Check for short to battery and short to ground.

6. If the fault still persists replace the motor

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#).<sup>213</sup>

**4.2.41 E5**

| Fault Code | Fault Detail                                  | Description            | Fault Action                        |
|------------|---|------------------------|-------------------------------------|
| E5         | Dual Zone Push Button or Related Wiring Fault | Dual height Box Wiring | Disable all motions except lowering |

**Possible Causes :**

1. Short circuit
2. Open circuit
3. Loose or damaged wiring harness.

**Troubleshooting Steps :**

1. Check if the push button switches on the dual height box are connected properly. There should be no visible damage in the wiring inside the dual height box.
2. Check if the pin 8 and 9 of the IQAN ECU connector are not backed out .
3. Check if the push button connectors in the dual height box are connected properly.
4. Check if the fuses FB1\_DHLH and FB2\_DHLH are not blown.
5. Check for short to battery and short to ground.
6. If the fault still persists , replace the push buttons.

**Location :**



Push Button

| <b>Fault Code</b> | <b>Fault Detail</b>          | <b>Description</b>   | <b>Fault Action</b> |
|-------------------|------------------------------|--|---------------------|
| 22                | Controller Over temp Cutback | Fault Type(s):<br>1 = Controller heat sink high temperature (affecting AC phases)<br>2 = Controller heat sink high temperature (affecting pump phase)<br>3 = Capacitor bank high temperature<br>4 = AC phase FET high temperature<br>5 = Pump phase FET high temperature<br>6 = Low Frequency single phase high temperature. | Warning Only        |

**Possible Causes :**

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.

**Troubleshooting Steps :**

1. Check if the controller is properly mounted.
2. If the fault still persists , replace the controller.

**4.2.43 E6**

| <b>Fault Code</b> | <b>Fault Detail</b>                                   | <b>Description</b>        | <b>Fault Action</b>                 |
|-------------------|---|---------------------------|-------------------------------------|
| E6                | Dual Zone Height Limit Switch or Related Wiring Fault | Dual height Switch wiring | Disable all motions except lowering |

**Possible Causes :**

1. Short circuit
2. Open circuit

3. Loose or damaged wiring harness.

**Troubleshooting Steps :**

1. Ensure 02 is visible on both platform and base display.
2. Open the limit switch cover . Check for continuity between pin 13(Wire 1300C) and pin 14(wire 4114). There should be continuity present.Ensure that the switch is pressed.
- 3 There should not be any continuity between pin 21(wire 1300D) and pin 22(wire 4115) under OHL height.
4. Check if the pin 24/66 and 25/66 of the IQAN ECU connector are not backed out
5. Check if the fuses FB1\_DHLH and FB2\_DHLH are not blown.
6. Check for short to battery and short to ground.
7. If the fault still persists, replace the dual zone limit switch.

**Location :**



4.2.44 E7

| Fault Code | Fault Detail   | Description  | Fault Action  |
|------------|--|--|---|
| E7         | CAN Data error on received CAN message by Motor controller | If any of the following conditions occurs for received CAN data<br>- Dual Zone option fitted and no CAN message (0xFFB5) related to Dual Zone functionality from MC41 controller (address 0xE4) for 3 consecutive attempts (AP00001533-4.6)<br>- No message regarding input status (0xFF30) is received from CM410 controller (address 0x1E) for 3 consecutive attempts (AP00001533- 4.6)<br>- difference observed in CAN data received in redundancy pair messages - Raise Inhibit_1/2, Drive/Steer Inhibit 1/2 (AP00001533-4.2)<br>- Check sum error (AP00001533- 4.3)<br>- CRC error (AP00001533-4.4)<br>- 0xFFB5 is received from node other than 0xE4 | Below are the reaction from Curtis controller -<br>'-For Dual Zone - when E7 is raised based on 0xFFB5 from MC41 - Prevent Raise / Drive / Steer but lower shall be allowed<br>E7 raised due to CM0410 disconnection:<br>- For Korean functionality- Prevent Raise / Drive but lower shall be allowed<br>- For standard machine without Korea option- no functionality shall be restricted. If brake release was performed before E7 fault, brake shall be re-engaged<br>- Flashing lamp and buzzer sound as per reqd doc |

**Possible Causes :**

1. IQAN /CM410 ECU not flashed properly.
2. Incorrect option setting in VIN setup

**Troubleshooting Steps :**

Refer the CAN test tab for CAN communication test

1. If the machine is dual height, Reflash the IQAN ECU software.

2. If the fault still persists , try replacing the IQAN ECU.
3. If the machine is not dual height, check that the dual height option in VIN setup is selected to "Not Fitted".
4. If the machine is for Korea region , then Reflash the CM0410 software.
5. If the Korea features are not applicable in the machine , then make sure that the options are as per standard machine shown below.
6. If the fault still persists, try replacing the CM410 ECU.
7. Check for short to ground in CAN connection line.

**Related / Similar Faults :**

| Fault Code | Fault Detail                                  | Description   | Fault Action       |
|------------|---|---|--------------------|
| 1          | Invalid Mode - Dual zone system related fault | Once fault 0xE5 or 0xE6 is healed, 0x01 shall be transmitted as a fault code till a valid mode (Indoor/ Outdoor) is selected by an operator | Disable all Motion |

**Location :**

Following options should be selected for a standard machine:  
 Following options should be selected for a Korea machine:

OPTIONAL FEATURES - Manually Selectable Options Based on Vehicle Build

|   |   |
|---|---|
| Dual Zone                               | Elevated Drive                              |
| <input type="text" value="Not Fitted"/> | <input type="text" value="Disable"/>        |
| Joystick Dir                            | Disable Interlock Sequence                  |
| <input type="text" value="Normal"/>     | <input type="text" value="Sequencing En."/> |
| Foot Switch                             | Disable Raise PH Fault                      |
| <input type="text" value="Disable"/>    | <input type="text" value="Raise Disabled"/> |
| Over-rise Prev                          |   |
| <input type="text" value="Disable"/>    |   |

OPTIONAL FEATURES - Manually Selectable Options Based on Vehicle Build

|   |   |
|---|---|
| Dual Zone                                 | Elevated Drive                                |
| <input type="text" value="Not Fitted"/> ▾ | <input type="text" value="Enable"/> ▾         |
| Joystick Dir                              | Disable Interlock Sequence                    |
| <input type="text" value="Invert"/> ▾     | <input type="text" value="Sequencing Dis"/> ▾ |
| Foot Switch                               | Disable Raise PH Fault                        |
| <input type="text" value="Enable"/> ▾     | <input type="text" value="Raise Enabled"/> ▾  |
| Over-rise Prev                            |   |
| <input type="text" value="Cutout All"/> ▾ |   |

### 4.2.45 E8

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|      |  |  |              |
|------|--|--|--------------|
| 0xE8 | Dual_Zone_Fault: Incorrect Dual Zone Configuration | If Dual zone option is selected as "Not Fitted" thru service tool, however CAN messages (0xFFB5) related to Dual Zone functionality are present on the bus from valid MC41 controller (address 0xE4) | Disable lift |
|------|--|--|--------------|

**Possible Causes :**

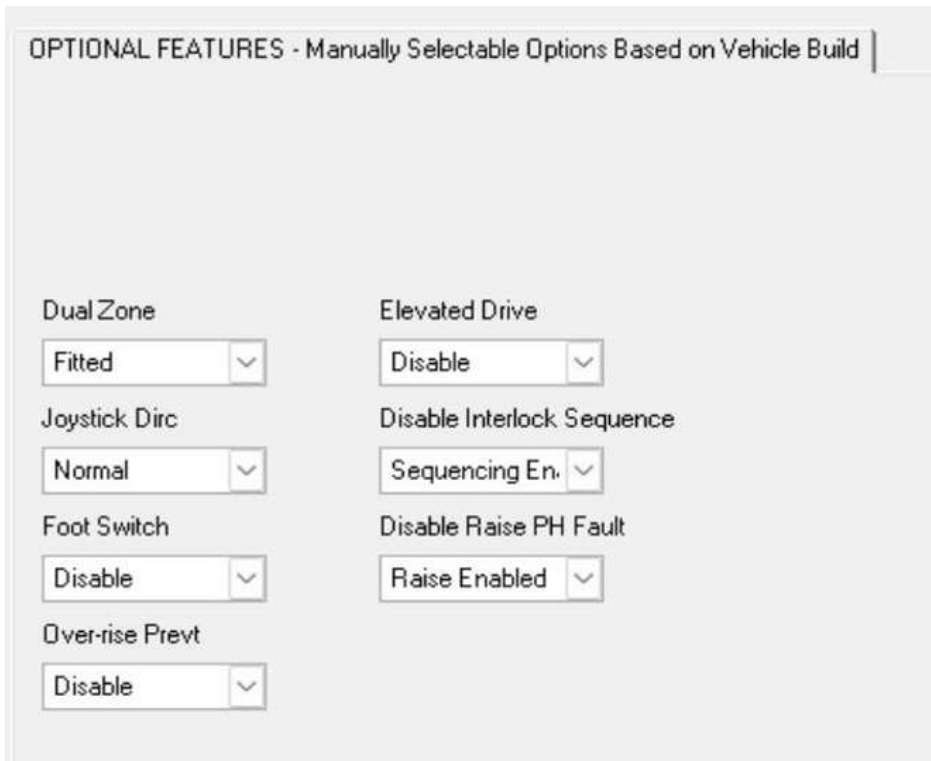
1. Incorrect option selected during VIN setup.

**Troubleshooting Steps :**

1. Connect DLA 2.0 and open the vehicle setup window through the service master .
2. The dual height option should be selected as "fitted".
3. After write the setting ,key cycle the machine.

**Location :**

For the dual height machine following selections should be done:



4.2.46 E1

| Fault Code | Fault Detail  | Description   | Fault Action   |
|------------|---|---|--|
| 0xE1       | Override Detection Limit Switch or Related Wiring Fault | Whenever Over Rise prevention switch state is 2 (OOR) from CM0410 | - Prevent steer, drive & raise if option "Cutout All" is selected,<br>- prevent only raise if "Cutout Lift" is selected, |

**Possible Causes :**

1. Loose connections or damaged wiring harness.
2. Switch failure(Customer scope)

**Troubleshooting Steps :**

1. Check if any of the override switch connections are loose .Disconnect and connect all four again.
2. Check if pin 7 and 15 of 20 is not backed out from CM410 ECU.
3. If the fault still persists, then there is failure in switch which is customer scope.

**Additional Info :**

- This fault is only applicable for Korea region.

4.2.47 E2

| Fault Code | Fault Detail  | Description  | Fault Action                                   |
|------------|---|--|--|
| 0xE2       | Elevated Drive Limit Switch or Related Wiring Fault | Whenever Elevated drive prevention switch state is 2 (OOR) from CM0410 | Prevent steer and drive if option is selected, |

## **Possible Causes :**

1. Loose connections or damaged wiring harness.
2. Faulty Switch

## **Troubleshooting Steps :**

1. Check if the limit connections are not loose.
2. Check if pin 6 of 20 is not backed out from CM410 ECU.
3. Open the limit switch cover. Check if the wire are connected properly and not loose.
4. Press the limit switch manually and check for continuity between pin13(wire 6000C) and pin 14(wire 4003). It should be there.
5. Check if the voltage on the pin 13 and 14 is ~ 12V if the switch is pressed .
6. Release the switch. There should be no continuity between pin 13 and pin 14.
7. If the fault still persists, try replacing the switch.

## **Location :**



**Additional Info :**

- This fault is only applicable for Korea region.

## 4.2.48 E3 (EL)

| Fault Code | Fault Detail                      | Description  | Fault Action                                   |
|------------|-----------------------------------|--|--|
| 0xE3(EL)   | When Elevated condition detected" | Whenever Elevated drive prevention switch state is 0 (Switch released) from CM0410 | Prevent steer and drive if option is selected, |

### **Possible Causes :**

1. Switch mounting problem.
2. Elevated condition detected.

### **Troubleshooting Steps :**

1. IF the elevated drive condition is detected and machine raised above 80mm , drive would be restricted.To resume drive and steer operation , fully lower the machine.
2. If the machine is fully stowed, 'EL' is detected while driving, then :.
  - Turn off the option from joystick and lift the machine to adjust the limit switch mounting so that it is pressed when machine is in stowed condition.
3. If the fault still persists, refer the troubleshooting steps as per "E2" fault code tab.

### **Location :**



**Additional Info :**

- This fault is only applicable for Korea region.

**4.2.49 E4 (UP)**

| Fault Code | Fault Detail                | Description  | Fault Action   |
|------------|-----------------------------|--|--|
| 0xE4(UP)   | Override Condition Detected | Whenever Over Rise prevention switch state is 0 (Over rise detected) from CM0410 | disable all motions except lowering if option is selected, |

**Possible Causes :**

1. Switch wiring problem.
2. Override condition detected

**Troubleshooting Steps :**

1. If the Override switch detects obstacle ,then lower the machine and resume the operation.
2. If the machine is detecting E4(UP) even when there is no obstruction in switch , then:
  - Check if the connectors in override circuit are not loosely connected.
3. If the fault still persists, refer the troubleshooting steps as per "E1" fault code tab.

**Additional Info :**

- This fault is only applicable for Korea region.

**4.2.50 EA**

| Fault Code | Fault Detail                                 | Description   | Fault Action  |
|------------|--|---|---|
| 0xEA       | Brake release switch or Related Wiring Fault | Whenever "Brake_release_command" is 2- (Switch_fault) from CM0410 | No restriction on any existing functions<br>If brake release was performed before EA fault, Brakes shall be re-engaged. |

**Possible Causes :**

1. Break release switch long pressed intentionally.

- 2. Short Circuit
- 3. damaged wiring.

**Troubleshooting Steps :**

- 1. Ensure the brake release switch is pressed only for a limited time and if the brake release function is activated release the switch.
- 2. Check if the continuity over switch contact between pin 1(wire 1000F) and pin2 (wire 6400) when the switch is unpressed. Continuty should not be present.
- 3. If continuity is there , replace the part

**Location :**



## 4.2.51 7D

| Fault Code | Fault Detail              | Description   | Fault Action  |
|------------|---------------------------|---|---|
| 0x7D       | E_STOP_Override_STB_Fault | Whenever controller pin J1-30 detected as HIGH due to Platform e-stop override switch press/ stuck press/ STB in other than "Platform e-stop override" mode | Prevent Raise / Drive / Steer. Only lower allowed from chassis controls operating in Chassis mode |

### **Possible Causes :**

1. Switch stuck
2. Short Circuit
3. Switch pressed in normal mode

### **Troubleshooting Steps :**

1. If the override switch is pressed when both e-stops are released and key is not in neutral position, then 7D fault code will appear. Keycycle the machine to clear the fault.
2. If the fault still persists in normal operation, even if the switch is not pressed manually, check if the switch is stuck.If stuck , then replace the part .

### **Location :**



**4.2.52 12**

| Fault Code | Fault Detail   | Description   | Fault Action       |
|------------|--|---|--------------------|
| 0x12       | Controller Over current (Motor phase current) (Left Motor) | Fault Type(s):<br>1 = Controller Over Current Phase U<br>2 = Controller Over Current Phase W<br>3 = Controller Over Current Phase V<br>4 = Irms > 120 % Current Limit | Disable all motion |

**Possible Causes :**

1. short on left motor phases
2. Controller defective.

**Troubleshooting Steps :**

1. Check for short circuit on phases U1, VI, W1.
2. If short circuit is there , then replace the left motor.
3. If the fault still persists, replace the motor controller.

**4.2.53 02**

**Note:** There are two cases for 02 error code.

1. If the fault code is only available on platform display, then CAN communication error is present. Refer Serial no.2
2. If the fault code is present in both displays, then refer serial no. 1

| S.No. | Fault Code | Fault Detail  | Description   | Fault Action       |
|-------|------------|---|---|--------------------|
| 1     | 0x02       | Controller Over current (Motor phase current) (Right Motor) | Fault Type(s):<br>1 = Controller Over Current Phase U<br>2 = Controller Over Current Phase W<br>3 = Controller Over Current Phase V<br>4 = Irms > 120 % Current Limit | Disable all motion |
| 2     | 0x02       | CAN communication error                                     | Fault in CAN line   | Disable all motion |

**Possible Causes :**

1. Short on right motor phases
2. Controller defective.

**Troubleshooting Steps :**

**For Sr. No.1:**

1. Check for short circuit on phases U2, V2, W2.
2. If short circuit is there , then replace the right motor.
3. If the fault still persists, replace the motor controller.

**For Sr. No. 2:**

1. Follow 'CAN test' tab for troubleshooting

4.2.54 14

| Fault Code | Fault Detail     | Description   | Fault Action       |
|------------|------------------|---|--------------------|
| 0x14       | Precharge Failed | Fault Type(s):<br>1 = Abort<br>2 = Energy Limit Exceeded<br>3 = Time Limit Exceeded | Disable all motion |

**Possible Causes :**

1. An external load on the capacitor bank (B+ connection terminal) that prevents the capacitor bank from charging.
2. Controller defective.

**Troubleshooting Steps :**

1. Check the connections at Curtis controller pin 1 / 35. Ensure no pin back-out
2. Check continuity between wire 1000K connected at Curtis controller connector Pin 1/35 & wire 1000 connected at Ignition relay..
3. Check ignition relay connection (-R2\_MH) as per schematic.
4. Check ignition relay working by switch ON the ignition switch to chassis or platform condition. Check voltage at Curtis controller pin 1/35, it should be approx 24V.
5. Key cycle the machine.

- 6. If fault still persists, re-flash the Curtis controller with respective software file.
- 7. If fault still persists, replace the Curtis controller.

**4.2.55 15**

| <b>Fault Code</b> | <b>Fault Detail</b>                 | <b>Description</b> | <b>Fault Action</b> |
|-------------------|-------------------------------------|--------------------|---------------------|
| 0x15              | Controller Severe Under temperature |                    | Disable all motion  |

**Possible Causes :**

- 1. Controller is operating in an extreme environment below -40°C .
- 2. Controller defective.

**Troubleshooting Steps :**

- 1. Bring the controller in the environment with temperature above -40°C
- 2. If the controller is in the within normal temperature range between -12°C to +60°C and the fault still persists, re-flash the Curtis controller with respective software file.
- 3. If still fault persist, replace the Curtis controller.

**4.2.56 16**

| <b>Fault Code</b> | <b>Fault Detail</b>                | <b>Description</b> | <b>Fault Action</b> |
|-------------------|------------------------------------|--------------------|---------------------|
| 0x16              | Controller Severe Over temperature |                    | Disable all motion  |

**Possible Causes :**

- 1. Controller is operating in an extreme environment above +95°C .
- 2. Controller defective.

**Troubleshooting Steps :**

- 1. Bring the controller in the environment with temperature below +95°C
- 2. If the controller is in the within normal temperature range between -12°C to +60°C and the fault still persists, re-flash the Curtis controller with respective software file.

3. If still fault persist, replace the Curtis controller.

**4.2.57 92**

| Fault Code | Fault Detail                        | Description | Fault Action |
|------------|-------------------------------------|-------------|--------------|
| 0x92       | EM Brake Failed to Set - Left Motor |             | Warning only |

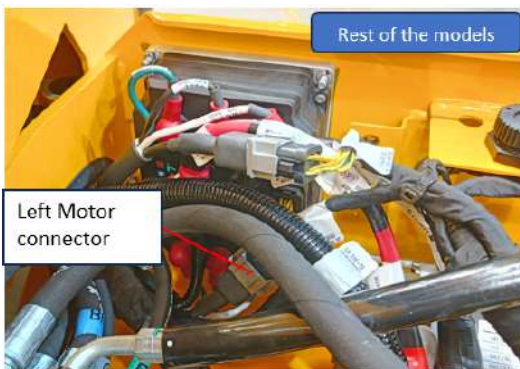
**Possible Causes :**

1. EM Brake failure.
2. Faulty wiring harness

**Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to '43', then there is problem with the motor brake. Replace the motor.
2. If fault code does not change, there is a problem with wiring harness. Follow the below steps :
3. Check if pin 8 on the left motor connector(C62\_MH) and pin 4 of Controller 35 Pin connector CN1\_MH are connected as per schematic.
4. Check the circuit for short to battery and short to ground on the controller pin 4 and pin 8 of the left motor.

**Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#)<sup>213</sup>.

#### 4.2.58 43

| Fault Code | Fault Detail                         | Description | Fault Action |
|------------|--------------------------------------|-------------|--------------|
| 0x43       | EM Brake Failed to Set - Right Motor |             | Warning only |

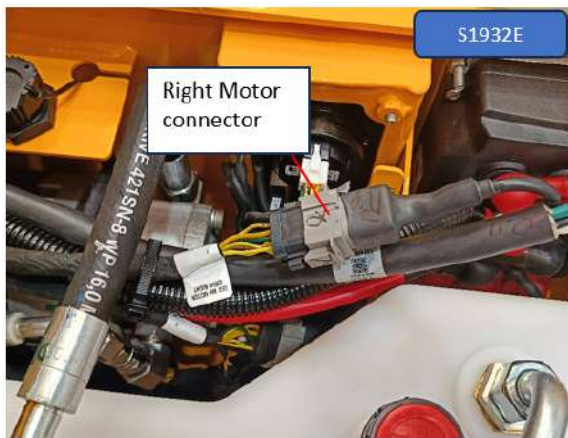
#### **Possible Causes :**

1. EM Brake failure.
2. Faulty wiring harness

#### **Troubleshooting Steps :**

1. Try swapping the right and left motor connectors. If the fault code shifts to '92', then there is problem with the motor. Replace the part.
- 2 . If fault code does not change, there is a problem with wiring harness. Follow the below steps :
3. Check if pin 8 on the right motor connector(C63\_MH) and pin 5 of Controller 35 Pin connector CN1\_MH are connected as per schematic.
4. Check the circuit for short to battery and short to ground on the controller pin 5 and pin 8 of the right motor.

#### **Location :**



**Additional Info :**

Ensure that the right and left motor identifications are as per [Annexure A](#)<sup>213</sup>.

4.2.59 89

| Fault Code | Fault Detail           | Description | Fault Action       |
|------------|------------------------|-------------|--------------------|
| 0x89       | Parameter Out of Range |             | Disable all motion |

**Possible Causes :**

1. Parameter value detected outside of the limits.

**Troubleshooting Steps :**

1. Key cycle the machine to clear the fault.
2. If the fault still persists , Reflash the software.

**Related / Similar Faults :**

| Fault Code | Fault Detail                       | Description | Fault Action       |
|------------|------------------------------------|-------------|--------------------|
| 0x49       | Software Parameter Change/Mismatch |             | Disable all motion |

4.2.60 A9

| Fault Code | Fault Detail | Description | Fault Action       |
|------------|--------------|-------------|--------------------|
| 0xA9       | Coil Supply  |             | Disable all motion |

**Possible Causes :**

1. Short circuit.
2. Faulty wiring harness
3. Pin Short to battery at controller, contactor, coil or motor end

**Troubleshooting Steps :**

1. Check if pin 13 and 6 of 35 pin connector CN1\_MH are not backed out.
2. Check if pin 7 of LH(C62\_MH) and RH(C63\_MH) motor connector are not backed out
3. Switch off the ignition. Check the voltage at DC Contactor coil wire 8300 w.r.t. ground. Voltage should not be available.
4. If ~24 voltage present then suspect that coil supply is short to battery.
5. Check wires 8402, 8401, 8400, 8201, 8100, 4511, 4510. there should not be voltage w.r.t. during ignition off condition. If yes, replace the wiring harness.
6. If the fault still persists, replace the motor controller.

**4.2.61 73**

| Fault Code | Fault Detail                | Description | Fault Action      |
|------------|-----------------------------|-------------|-------------------|
| 0x73       | Stall Detected - Left Motor |             | Disable drive F/R |

**Possible Causes :**

1. Stalled motor
2. Bad crimps or faulty wiring.
3. Motor encoder failure.
4. Problems with power supply for the motor encoder

**Troubleshooting Steps :**

1. Check if the motor is stalled because of the obstacle , move machine away from the obstacle i.e. free path.

2. If the fault still persists, try swapping the right and left motor connectors. If the fault code shifts to '2C', then there is problem with the motor. Replace the part.
3. If fault code does not change, follow the steps for fault code "25".
4. If the fault still persists, Reflash the software.

## 4.2.62 2C

| Fault Code | Fault Detail                 | Description | Fault Action      |
|------------|------------------------------|-------------|-------------------|
| 0x2C       | Stall Detected - Right Motor |             | Disable drive F/R |

### Possible Causes :

1. Stalled motor
2. Bad crimps or faulty wiring.
3. Motor encoder failure.
4. Problems with power supply for the motor encoder

### Troubleshooting Steps :

1. Check if the motor is stalled because of the obstacle , move machine away from the obstacle i.e. free path.
2. If the fault still persists, try swapping the right and left motor connectors. If the fault code shifts to '73', then there is problem with the motor. Replace the part.
3. If fault code does not change, follow the steps for fault code "25".
4. If the fault still persists, Reflash the software.

## 4.2.63 3A & 0F

| Fault Code | Fault Detail                     | Description             | Fault Action      |
|------------|----------------------------------|-------------------------|-------------------|
| 0x3A       | Motor Setup Needed - Left Motor  | Motor setup is required | Disable drive F/R |
| 0x0F       | Motor Setup Needed - Right Motor | Motor setup is required | Disable drive F/R |

### Possible Causes :

- 1. Controller Defective
- 2. Software corrupt

**Troubleshooting Steps :**

- 1. Reflash the software
- 2. Replace the motor controller if the fault still persists.

**Additional Info :**

This is a very rare fault code scenario.

**4.2.64 3B**

| Fault Code | Fault Detail  | Description | Fault Action      |
|------------|---|-------------|-------------------|
| 0x3B       | Misalignment Error - Left Motor<br>Misalignment Error - Right Motor |             | Disable drive F/R |

Link: [Annexure-B](#) <sup>215</sup>

**Possible Causes :**

- 1. Controller Defective
- 2. Software corrupt

**Troubleshooting Steps :**

- 1. Reflash the software
- 2. Refer Annexure B to check if the fault is present in M1 or M2
- 3. Replace the drive motor accordingly.

**Additional Info :**

This is a very rare fault code scenario.

**4.2.65 95**

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|            |              |             |              |

|      |                   |   |              |
|------|-------------------|---|--------------|
| 0x95 | Pump Over current | <b>Fault Type(s): 3</b><br>1 = Pump current-sensor value is close to its supply voltage.<br>2 = Pump current-sensor value is close to the sensor ground.<br>3 = The pump current has exceeded the configured limit. | Disable lift |
|------|-------------------|---|--------------|

**Possible Causes :**

1. Faulty Wiring harness
2. Short to ground
3. Pump motor defective
4. Controller defective

**Troubleshooting Steps :**

1. Check if there is no visible damage in wiring harness or insulation
2. Refer Annexure B to check the fault type.
3. Fault Type 1:
  - Make sure pump motor is not short to supply
  - If the fault still persists, replace the pump motor
4. Fault Type 2:
  - Make sure the pump motor is not short to ground.
  - If the fault still persists, replace the pump motor
5. Fault type 3:
  - Reflash the software .
  - If the fault still persists, replace the motor controller

**Related / Similar Faults :**

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|      |                     |  |              |
|------|---------------------|--|--------------|
| 0xBF | Pump Current Sensor | Fault Type(s):<br>1 = Pump current-sensor value is close to its supply voltage.<br>2 = Pump current-sensor value is close to the sensor ground | Disable lift |
|------|---------------------|--|--------------|

4.2.66 97

| Fault Code | Fault Detail  | Description  | Fault Action       |
|------------|---------------|--|--------------------|
| 0x97       | Pump Hardware | Fault Type(s): 1<br>1 = Duty cycle not updated with the update time frame.<br>2 = Mismatch of the commanded pump duty cycle vs. output | Disable all motion |

**Possible Causes :**

1. Faulty Wiring harness
2. Short to ground
3. Pump motor defective
4. Controller defective

**Troubleshooting Steps :**

1. Check if there is no visible damage in wiring harness or insulation
2. Make sure the pump motor is not short to ground
3. Reflash the software
4. If the fault still persists, replace the pump motor
5. If the fault still persists, replace the motor controller

4.2.67 9A

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|      |                               |   |                    |
|------|-------------------------------|---|--------------------|
| 0x9A | Interlock Braking Supervision | <b>Fault Type(s):</b><br>1 = Motor Speed did not ramp down fast enough to meet configuration(set by Interlock Brake Supervision _Ramp_Delay and Interlock_Brake_Superivision_Ramp_Rate)<br>.<br>2 = Vehicle brought to stop, but then EM brake (if configured) failed to set.<br>3 = Vehicle brought to stop, but then traversed a distance beyond that set by Interlock_Brake_Supervision_Position_Settling_Limit. | Disable all motion |
|------|-------------------------------|---|--------------------|

**Possible Causes :**

1. Software corrupt
2. The vehicle could have a full battery due to which regen is limited and cannot decelerate fast enough.

**Troubleshooting Steps :**

1. Reflash the software
2. Refer [Annexure B](#) <sup>215</sup> to check if other faults are present.

**4.2.68 D6**

| Fault Code | Fault Detail | Description | Fault Action |
|------------|--------------|-------------|--------------|
|------------|--------------|-------------|--------------|

|      |                                 |   |                   |
|------|---------------------------------|---|-------------------|
| 0xD6 | Hazardous Movement - Left Motor | <b>Fault Type(s) / Set Conditions</b><br>1 = The motor speed is in the opposite direction of the speed request and the motor fails to accelerate in the correct direction for a programmed time. In the event of a change to neutral, this hazard will be detected if the motor fails to accelerate toward zero speed for a programmed time.<br>2 = The acceleration is in the opposite direction of the difference between the operator speed request and the motor speed. The speed in the commanded direction is greater than the commanded speed by more than a parameter (Hazardous_Speed) for a programmed time (Hazardous_Throttle_Response_Time). | Disable drive F/R |
|------|---------------------------------|---|-------------------|

**Possible Causes :**

1. Software corrupt

**Troubleshooting Steps :**

1. Reflash the software
2. Refer [Annexure B](#) <sup>[215]</sup> to check if the fault is in M1 or M2.
3. If the fault still persists, replace the respective drive motor

**4.2.69 Battery Charger Fault**

| Fault Code | Possible Causes  | Troubleshooting steps  |
|------------|--|--|
| E01 bAT    | The battery is not connected or the battery voltage is too low | 1. Check Battery connection is correct<br>2. Check Charger connection is correct<br>3. Check if each battery is in ideal condition(Check water Level , Individual voltage) |
| E02 AC     | Abnormal AC power Input(Voltage)                               | 1. Check AC input cord is connected between charger and Ac Outlet.<br>2. Make sure AC plug is tightly inserted into AC outlet  |

|         |  |   |
|---------|--|---|
| E03 Hot | Charger High Temperature Protection                        | 1. Charger shuts down and enters protection mode due to charger/environmental temp being too high. Place the charger in a well ventilated environment<br>2. Disconnect the charger and wait for 15-20 mins before reconnecting for charging |
| 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<br>2. When the battery temperature drops, the charger will restart automatically                |
| E05 Err | Internal 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   |
| E07 Ads | CAN_ID conflict  | Restart the charger or wait for communication to return to normal.  |
| E08 bAt | Software running error                                     | Return it for repair  |
| E09 bAt | No charging curve  | Refresh charge curve.   |
| E10 Err | Relay closing time out                                     | 1. Power on again after 5 minutes of power failure .2. Repeatedly return to repair.   |
| E11 bAt | The voltage can't be charged/The battery section is broken | Power off and recharge/replace battery.   |

4.3 Diagnostic Fault Table

# Diagnostic Fault Table

List of Diagnostic Fault Table

| Sr No. | Description                                      |
|--------|--|
| 1      | <a href="#">General Sensor Fault Table</a>   329 |

4.3.1 General Sensor fault Table (2)

**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).<br>If voltage supply is faulty, disconnect all other sensors in turn until the voltage supply returns.<br>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.<br>Check for signs of corrosion or contamination.<br>Repair/replace as necessary.<br>If no fault is found, proceed to Step 3.   |
| 3    | Sensor failure              | Check the sensor resistance (see relevant help file for values).<br>If sensor is out of specification, replace.<br>If no fault is found, proceed to Step 4   |
| 4    | Wiring fault                | Check the harness continuity, and machine and earth contacts.<br>Repair/replace as necessary.<br>If no fault is found, proceed to Step 5   |
| 5    | ECU fault                   | Disconnect the harness from the ECU and inspect.<br>Check seals are in place, check for signs of corrosion and pin damage.<br>If harness is damaged repair/replace as necessary.<br>If ECU pins are damaged, replace ECU and Reflash, see section on ECU flashing.<br>If no fault is found, raise a Tech web Help desk Call.     |

# Machine Components

## 5 Machine Components

# Machine Components

List of Machine Component

| Number | Component   |
|--------|---|
| 1      | <a href="#">Base Control Panel</a>   333          |
| 2      | <a href="#">Base Control Display</a>   336        |
| 3      | <a href="#">Platform Controller</a>   340         |
| 4      | <a href="#">Motor Controller (Inverter)</a>   345 |
| 5      | <a href="#">Parker I/O Expansion ECU</a>   349    |
| 6      | <a href="#">Ignition/Key Switch</a>   352         |
| 7      | <a href="#">Horn</a>   355                        |
| 8      | <a href="#">E-Stop</a>   357                      |
| 9      | <a href="#">DC Motor</a>   359                    |
| 10     | <a href="#">DC Contactor</a>   361                |
| 11     | <a href="#">Relay</a>   362                       |
| 12     | <a href="#">Base Toggle Switch</a>   365          |
| 13     | <a href="#">Tilt Sensor</a>   368                 |
| 14     | <a href="#">Battery Charger</a>   370             |
| 15     | <a href="#">Battery 6V</a>   373                  |
| 16     | <a href="#">Display Function</a>   377            |
| 17     | <a href="#">Angle Sensor</a>   379                |
| 18     | <a href="#">Joystick</a>   381                    |
| 19     | <a href="#">Pothole Switches</a>   384            |
| 20     | <a href="#">Pressure Sensor</a>   385             |
| 21     | <a href="#">Up &amp; Down Limit Switch</a>   389  |
| 22     | <a href="#">Buzzer</a>   391                      |
| 23     | <a href="#">White Noise Alarm</a>   393           |
| 24     | <a href="#">AC Drive Motor</a>   394              |
| 25     | <a href="#">AC Drive Motor Sensor</a>   397       |
| 26     | <a href="#">Flash Light</a>   400                 |
| 27     | <a href="#">AC Connector</a>   404                |

|    |  |
|----|--|
| 28 | <a href="#">Foot Switch (Korean Region)</a>   406  |
| 29 | <a href="#">Dual Height Box (USA Region)</a>   409 |
| 30 | <a href="#">Livelinek</a>   411                    |
| 31 | <a href="#">Isolator</a>   413                     |
| 32 | <a href="#">Elevated Switch</a>   416              |
| 33 | <a href="#">Override Switch</a>   418              |
| 34 | <a href="#">Perimeter Light (Optional)</a>   431   |

## 5.1 Base Control Panel

|                   |   |
|-------------------|---|
| <b>Component:</b> | <b>Base Control Panel</b>   |
| <b>Function:</b>  | <p>Machine can be operated from Base control panel.<br/>                     Key switch must be set to chassis position to operate the machine from base .<br/>                     To Perform the Platform Up/Down can be done by pressing Base enable switch simultaneously with Platform Up/Down Switch<br/>                     Drive operation can not be done from base, only platform Up/Down can be done from base.</p> |
| <b>Location:</b>  | RH Door   |

**Location  
IMG:**

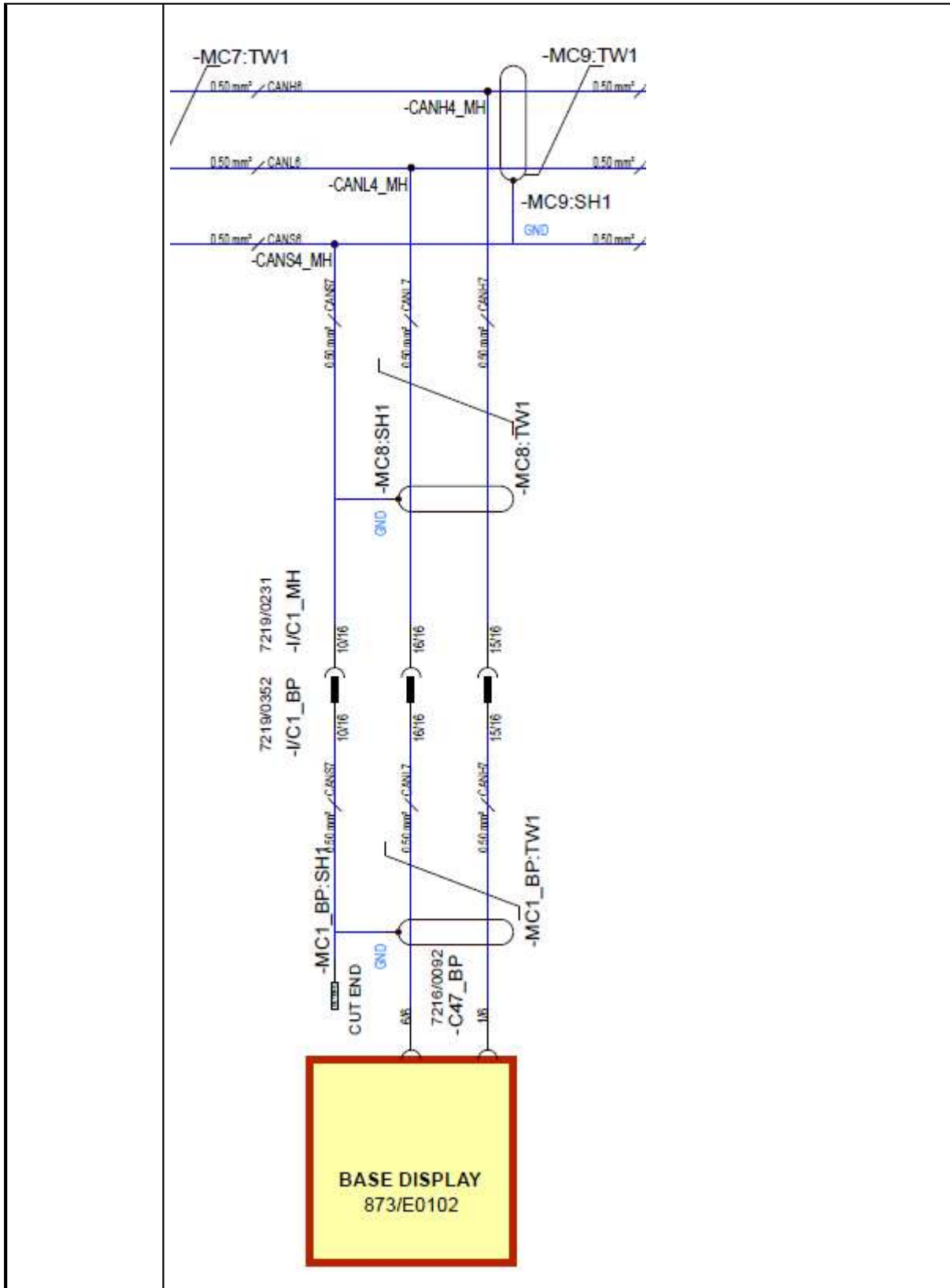


|                                    | <table border="1"> <thead> <tr> <th>Item Number</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Base Display</td> </tr> <tr> <td>2</td> <td>Platform Up/Down Switch</td> </tr> <tr> <td>3</td> <td>Emergency Stop</td> </tr> <tr> <td>4</td> <td>Ignition Switch</td> </tr> <tr> <td>5</td> <td>Base enable Switch</td> </tr> </tbody> </table>   | Item Number | Description | 1       | Base Display | 2     | Platform Up/Down Switch   | 3         | Emergency Stop | 4     | Ignition Switch | 5         | Base enable Switch |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
|------------------------------------|--|-------------|-------------|---------|--------------|-------|---------------------------|-----------|----------------|-------|-----------------|-----------|--------------------|-------|---------------|-----------|-----|--------|--------------|-----------|-----|-------|-------------------------|-----------|-----|-------|-------------------------|-----------|-----|-------|-------------------------|-----------|-----|-------|--------------------------|-----------|-----|--------|-------------------------|-----------|----|--------|------------------------|-----------|----|--------|-------------------------|-----------|----|--------|-------------------------|-----------|----|--------|-------------------------|-----------|----|
| Item Number                        | Description  |             |             |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| 1                                  | Base Display   |             |             |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| 2                                  | Platform Up/Down Switch  |             |             |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| 3                                  | Emergency Stop   |             |             |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| 4                                  | Ignition Switch  |             |             |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| 5                                  | Base enable Switch   |             |             |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| <b>Signal:</b>                     | <table border="1"> <thead> <tr> <th>Terminal</th> <th>Description</th> <th>Part no</th> <th>Wire no</th> </tr> </thead> <tbody> <tr> <td>T5_BP</td> <td>Emergency Stop +ve Output</td> <td>7207/2009</td> <td>P51</td> </tr> <tr> <td>T7_BP</td> <td>ON-MOM Toggle</td> <td>7201/0403</td> <td>P53</td> </tr> <tr> <td>T6_BP</td> <td>ON-MOM Toggle</td> <td>7000/3202</td> <td>P54</td> </tr> <tr> <td>C47_BP</td> <td>Base Display</td> <td>7000/3213</td> <td>P38</td> </tr> <tr> <td>T1_BP</td> <td>Platform Up/Down Switch</td> <td>7000/3202</td> <td>P55</td> </tr> <tr> <td>T2_BP</td> <td>Platform Up/Down Switch</td> <td>7000/3202</td> <td>P56</td> </tr> <tr> <td>T3_BP</td> <td>Platform Up/Down Switch</td> <td>7000/3202</td> <td>P57</td> </tr> <tr> <td>T4_BP</td> <td>Emergency Stop -ve Input</td> <td>7000/3202</td> <td>P52</td> </tr> <tr> <td>C19_BP</td> <td>Ignition Switch In (B1)</td> <td>7207/2015</td> <td>M4</td> </tr> <tr> <td>C20_BP</td> <td>Ignition Switch In (B)</td> <td>7207/2015</td> <td>M4</td> </tr> <tr> <td>C21_BP</td> <td>Ignition Switch Out (3)</td> <td>7207/1102</td> <td>M4</td> </tr> <tr> <td>C22_BP</td> <td>Ignition Switch Out (4)</td> <td>7207/2015</td> <td>M4</td> </tr> <tr> <td>C23_BP</td> <td>Ignition Switch Out (1)</td> <td>7207/2015</td> <td>M4</td> </tr> </tbody> </table> | Terminal    | Description | Part no | Wire no      | T5_BP | Emergency Stop +ve Output | 7207/2009 | P51            | T7_BP | ON-MOM Toggle   | 7201/0403 | P53                | T6_BP | ON-MOM Toggle | 7000/3202 | P54 | C47_BP | Base Display | 7000/3213 | P38 | T1_BP | Platform Up/Down Switch | 7000/3202 | P55 | T2_BP | Platform Up/Down Switch | 7000/3202 | P56 | T3_BP | Platform Up/Down Switch | 7000/3202 | P57 | T4_BP | Emergency Stop -ve Input | 7000/3202 | P52 | C19_BP | Ignition Switch In (B1) | 7207/2015 | M4 | C20_BP | Ignition Switch In (B) | 7207/2015 | M4 | C21_BP | Ignition Switch Out (3) | 7207/1102 | M4 | C22_BP | Ignition Switch Out (4) | 7207/2015 | M4 | C23_BP | Ignition Switch Out (1) | 7207/2015 | M4 |
| Terminal                           | Description  | Part no     | Wire no     |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| T5_BP                              | Emergency Stop +ve Output  | 7207/2009   | P51         |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| T7_BP                              | ON-MOM Toggle  | 7201/0403   | P53         |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| T6_BP                              | ON-MOM Toggle  | 7000/3202   | P54         |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| C47_BP                             | Base Display   | 7000/3213   | P38         |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| T1_BP                              | Platform Up/Down Switch  | 7000/3202   | P55         |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| T2_BP                              | Platform Up/Down Switch  | 7000/3202   | P56         |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| T3_BP                              | Platform Up/Down Switch  | 7000/3202   | P57         |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| T4_BP                              | Emergency Stop -ve Input   | 7000/3202   | P52         |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| C19_BP                             | Ignition Switch In (B1)  | 7207/2015   | M4          |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| C20_BP                             | Ignition Switch In (B)   | 7207/2015   | M4          |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| C21_BP                             | Ignition Switch Out (3)  | 7207/1102   | M4          |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| C22_BP                             | Ignition Switch Out (4)  | 7207/2015   | M4          |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| C23_BP                             | Ignition Switch Out (1)  | 7207/2015   | M4          |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |
| <b>Wires &amp; Connectors IMG:</b> | <p>The diagram illustrates the electrical connection for the Base Display. It starts with a DC power feed splice at terminal -S2_BP. A 50 mm length of wire, identified by part number 7000/3213, connects this splice to a connector labeled -I/C1_BP. This connector is then linked to an MH interconnect connector labeled -I/C1_BP#1. Terminal 8 of the interconnect is specifically marked as 'BLACK 'A''.</p>  |             |             |         |              |       |                           |           |                |       |                 |           |                    |       |               |           |     |        |              |           |     |       |                         |           |     |       |                         |           |     |       |                         |           |     |       |                          |           |     |        |                         |           |    |        |                        |           |    |        |                         |           |    |        |                         |           |    |        |                         |           |    |



|                             |   |
|-----------------------------|---|
|                             | <p>6.Chassis LED's-There shall be 3 separate LED indicators<br/>7.Service &amp; Brake release- When service mode is active<br/>8.Platform e-stop override-While "Platform e-stop Override" Mode is active</p> <p><b>Base Display LED-</b> Following are 3 separate indicator on chassis display</p> <ol style="list-style-type: none"><li>1. Red LED shall be energized (1 sec on/ 1 sec off) if the overload alarm is activated.</li><li>2. Amber LED shall be energized, for any other warning / fault</li><li>3. Green LED shall be energized when power is on at the chassis controller</li></ol> |
| <p><b>Location:</b></p>     | <p>On Base Control Panel</p>  |
| <p><b>Location IMG:</b></p> |    |

| <p><b>Signal:</b></p>                            | <table border="1"> <thead> <tr> <th>Pin</th> <th>Description</th> <th>Connector Number</th> <th>Wire Number</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>CAN HIGH</td> <td>C47_BP</td> <td>CANH7</td> <td>2.5V to 3.75V</td> </tr> <tr> <td>2</td> <td>IGN SUPPLY</td> <td>C47_BP</td> <td>1000J</td> <td>24V</td> </tr> <tr> <td>3</td> <td>GND_BATT</td> <td>C47_BP</td> <td>6000N</td> <td>0V</td> </tr> <tr> <td>6</td> <td>CAN LOW</td> <td>C47_BP</td> <td>CANL7</td> <td>1.25V to 2.5V</td> </tr> </tbody> </table> | Pin              | Description | Connector Number | Wire Number | Voltage | 1 | CAN HIGH | C47_BP | CANH7 | 2.5V to 3.75V | 2 | IGN SUPPLY | C47_BP | 1000J | 24V | 3 | GND_BATT | C47_BP | 6000N | 0V | 6 | CAN LOW | C47_BP | CANL7 | 1.25V to 2.5V |
|--|--|------------------|-------------|------------------|-------------|---------|---|----------|--------|-------|---------------|---|------------|--------|-------|-----|---|----------|--------|-------|----|---|---------|--------|-------|---------------|
| Pin  | Description  | Connector Number | Wire Number | Voltage          |             |         |   |          |        |       |               |   |            |        |       |     |   |          |        |       |    |   |         |        |       |               |
| 1  | CAN HIGH   | C47_BP           | CANH7       | 2.5V to 3.75V    |             |         |   |          |        |       |               |   |            |        |       |     |   |          |        |       |    |   |         |        |       |               |
| 2  | IGN SUPPLY   | C47_BP           | 1000J       | 24V              |             |         |   |          |        |       |               |   |            |        |       |     |   |          |        |       |    |   |         |        |       |               |
| 3  | GND_BATT   | C47_BP           | 6000N       | 0V               |             |         |   |          |        |       |               |   |            |        |       |     |   |          |        |       |    |   |         |        |       |               |
| 6  | CAN LOW  | C47_BP           | CANL7       | 1.25V to 2.5V    |             |         |   |          |        |       |               |   |            |        |       |     |   |          |        |       |    |   |         |        |       |               |
| <p><b>Wires &amp; Connectors IMG:</b></p>        |  |                  |             |                  |             |         |   |          |        |       |               |   |            |        |       |     |   |          |        |       |    |   |         |        |       |               |
| <p><b>Internal Electrical Schematic IMG:</b></p> |  |                  |             |                  |             |         |   |          |        |       |               |   |            |        |       |     |   |          |        |       |    |   |         |        |       |               |



| <b>Testing:</b>             | Please see the Signal   |  |
|-----------------------------|---|--|
| <b>Expected Values:</b>     | Green LED should On when power up the machine ,Both Toggle switch should function |  |
|                             | 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.  |
| <b>Related Fault Codes:</b> | N/A   |  |

## 5.3 Platform Controller

| Component:       | Platform Controller   |
|------------------|---|
| <b>Function:</b> | <p>Operator can operate the machine from platform by platform controller unit. Key switch must be set to platform to operate the machine from platform Outputs controlled by Platform controller based on Motor Controller Command</p> <p>Platform Controller Unit ( PCU) is the main machine operation control unit with following functions.</p> <p>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).</p> <p style="padding-left: 40px;">1.2 Drive mode and Lift mode LED's blink at 0.5 Hz frequency indicating Neutral mode</p> <p style="padding-left: 40px;">1.3 Green LED at top left corner blinks for 2 sec and then becomes solid - indicating machine is ready for operation.</p> <p>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.</p> <p style="padding-left: 40px;">2.2 Pressing the enable button and pushing the joystick drives the machine in forward direction.</p> |

|  |  |
|--|--|
|  | <p>2.3 Pressing the enable button and pulling the joystick drives the machine in reverse direction</p> <p>2.4 By default machine drives in "Tortoise" mode i.e. Machine speed is reduced to 50% of max s</p> <p>2.5 Joystick has two press buttons at the top - one for steer left and one for steer enable</p> <p>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</p> <p>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.</p> <p>3.2 Pressing the enable button and pushing the joystick lowers the platform</p> <p>3.3 Pressing the enable button and pulling the joystick raises the platform</p> <p>4. Display - 4.1 PCU has 2" multi Information LCD display.</p> <p>4.2 Default screen shows battery state of charge in bars &amp; percentage at the top of screen and platform load percentage at the bottom. .</p> <p>4.3 During fault condition - DTC codes are cycled in place of load percentage display.</p> <p>4.4 Pressing the lift &amp; drive button simultaneously and performing a key cycle - opens the menu options</p> <p>5. Buzzer - 5.1 Platform Controller has inbuilt buzzer which sounds during fault conditions ( Overload, Tilt &amp; Pothole)</p> <p>5.2 Buzzer beeps for 1/6 S and then off for 1/6 s during above fault conditions.</p> <p>6. E-Stop - 6.1 PCU has E-Stop button, pressing this button disables all machine operation</p> <p>6.2 Releasing the E-Stop button enable normal operation</p> <p>7.Control Position- This will show show CH (or equivalent icon) to identify the chassis control position is selected when key switch position = chassis</p> <p>8. State of Charge- This will show percentage of battery state of charge</p> <p>9. Error Code- All active error code shall be displayed on platform display. In case of multiple errors, error codes shall be cycled.</p> |
|--|--|

|                             | <p>10. Machine out of Limit- In case machine is operated outside of defined limits relevant warning will be displayed (OL, LL etc.)</p> <p>11. Load Percentage- This will display platform load (gauge &amp; %) during normal operation. In case load sensing system fail, this will stop showing load %</p> <table border="1"> <thead> <tr> <th colspan="2" style="background-color: #ffff00;">PCU Setting &amp; Configuration</th> </tr> </thead> <tbody> <tr> <td style="background-color: #d9e1f2;">Adjust Top Speed</td> <td> <p>There shall be a method to enter into top speed adjustment menu by operating specific buttons on PCU<br/>There shall be a provision to 'Save' or 'Discard' the changed configurations by operating specific buttons</p> <p>There shall be 5 speeds user can adjust</p> <ol style="list-style-type: none"> <li>1. top speed of drive in hare mode (0~100%),</li> <li>2. top speed of drive in tortoise mode (0~100%)</li> <li>3. top speed of drive elevated (0~25%), of maximum theoretical speed and should never exceed 0.8kph</li> <li>4. top speed of lift (0~100%),</li> <li>5. steering speed (0~100%)</li> </ol> </td> </tr> <tr> <td style="background-color: #d9e1f2;">Adjust Machine Options</td> <td> <p>There shall be a method to enter into top speed adjustment menu by operating specific buttons on PCU<br/>There shall be a provision to 'Save' or 'Discard' the changed configurations by operating specific buttons</p> <p>There shall be 5 speeds user can adjust</p> <ol style="list-style-type: none"> <li>1. top speed of drive in hare mode (0~100%),</li> <li>2. top speed of drive in tortoise mode (0~100%),</li> <li>3. top speed of drive elevated (0~25%), of maximum theoretical speed and should never exceed 0.8kph</li> <li>4. top speed of lift (0~100%),</li> <li>5. steering speed (0~100%)</li> </ol> <p>Options 1 and 4 can be disabled for one power cycle only. They shall be enabled automatically after second machine restart.</p> <p>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)</p> <p>Option 3 and 5 can be enabled/disabled permanently (until next setting change)</p> <p>For option 6 above, when user enters this menu brakes shall release electrically.</p> <p>When this mode is selected, there shall be an audible warning and the brake coils shall be energised, allowing the wheels to rotate freely.</p> <p>When the machine is restarted, this mode shall be switched off</p> </td> </tr> <tr> <td style="background-color: #d9e1f2;">Adjust Battery Drain Delay</td> <td> <p>There shall be a method to enter into battery drain adjustment menu by operating specific buttons on PCU<br/>There shall be a provision to 'Save' or 'Discard' the changed configurations by operating specific buttons</p> <p>There shall be a delay user can adjust:</p> <ol style="list-style-type: none"> <li>1. battery drain alarm delay (0~60min)</li> </ol> </td> </tr> <tr> <td style="background-color: #d9e1f2;">Perform Calibration</td> <td> <p>There shall be a method to enter into calibration menu by operating specific buttons on PCU &amp; menu shall have limited access by passcode</p> <p>There shall be 3 calibration user can select to perform-</p> <ol style="list-style-type: none"> <li>1. No Load Calibration</li> <li>2. Full Load Calibration</li> <li>3. Tilt Sensor Calibration (reserved for future)</li> </ol> <p>After Calibration, the display shall show one of the results as below for the respective calibration selected -</p> <ol style="list-style-type: none"> <li>1- No load/Full load/Tilt Sensor calibration complete OR</li> <li>2- Pressure Sensor Failure OR</li> <li>3- Angle Sensor Failure OR</li> <li>4- Tilt OR</li> <li>5- Calibration data has changed</li> </ol> <p>There shall be a provision to return from calibration menu by operating specific buttons</p> </td> </tr> <tr> <td style="background-color: #d9e1f2;">Height Settings</td> <td> <p>There shall be a method to enter into machine mode menu by operating specific buttons on PCU</p> <p>There shall be 2 modes -</p> <ol style="list-style-type: none"> <li>1. Descent delay height/angle</li> <li>2. Down limit height</li> </ol> <p>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</p> <p>To calibrate down limit height, ECU saves the rotary encoder/angle sensor value when the Down limit switch contacts change the voltage</p> <p>There shall be a provision to 'Save' and 'Return' to save the configurations by operating specific buttons</p> </td> </tr> <tr> <td style="background-color: #d9e1f2;">Fault History</td> <td> <p>There shall be a method to enter into fault history menu by operating specific buttons on PCU</p> <p>There shall be provision to view and store last 10 pieces of logs</p> <p>Each log shall be composed with fault code, fault name and trigger time</p> <p>There shall be a provision to clear the fault history by operating specific buttons</p> </td> </tr> </tbody> </table> | PCU Setting & Configuration |  | Adjust Top Speed | <p>There shall be a method to enter into top speed adjustment menu by operating specific buttons on PCU<br/>There shall be a provision to 'Save' or 'Discard' the changed configurations by operating specific buttons</p> <p>There shall be 5 speeds user can adjust</p> <ol style="list-style-type: none"> <li>1. top speed of drive in hare mode (0~100%),</li> <li>2. top speed of drive in tortoise mode (0~100%)</li> <li>3. top speed of drive elevated (0~25%), of maximum theoretical speed and should never exceed 0.8kph</li> <li>4. top speed of lift (0~100%),</li> <li>5. steering speed (0~100%)</li> </ol> | Adjust Machine Options | <p>There shall be a method to enter into top speed adjustment menu by operating specific buttons on PCU<br/>There shall be a provision to 'Save' or 'Discard' the changed configurations by operating specific buttons</p> <p>There shall be 5 speeds user can adjust</p> <ol style="list-style-type: none"> <li>1. top speed of drive in hare mode (0~100%),</li> <li>2. top speed of drive in tortoise mode (0~100%),</li> <li>3. top speed of drive elevated (0~25%), of maximum theoretical speed and should never exceed 0.8kph</li> <li>4. top speed of lift (0~100%),</li> <li>5. steering speed (0~100%)</li> </ol> <p>Options 1 and 4 can be disabled for one power cycle only. They shall be enabled automatically after second machine restart.</p> <p>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)</p> <p>Option 3 and 5 can be enabled/disabled permanently (until next setting change)</p> <p>For option 6 above, when user enters this menu brakes shall release electrically.</p> <p>When this mode is selected, there shall be an audible warning and the brake coils shall be energised, allowing the wheels to rotate freely.</p> <p>When the machine is restarted, this mode shall be switched off</p> | Adjust Battery Drain Delay | <p>There shall be a method to enter into battery drain adjustment menu by operating specific buttons on PCU<br/>There shall be a provision to 'Save' or 'Discard' the changed configurations by operating specific buttons</p> <p>There shall be a delay user can adjust:</p> <ol style="list-style-type: none"> <li>1. battery drain alarm delay (0~60min)</li> </ol> | Perform Calibration | <p>There shall be a method to enter into calibration menu by operating specific buttons on PCU &amp; menu shall have limited access by passcode</p> <p>There shall be 3 calibration user can select to perform-</p> <ol style="list-style-type: none"> <li>1. No Load Calibration</li> <li>2. Full Load Calibration</li> <li>3. Tilt Sensor Calibration (reserved for future)</li> </ol> <p>After Calibration, the display shall show one of the results as below for the respective calibration selected -</p> <ol style="list-style-type: none"> <li>1- No load/Full load/Tilt Sensor calibration complete OR</li> <li>2- Pressure Sensor Failure OR</li> <li>3- Angle Sensor Failure OR</li> <li>4- Tilt OR</li> <li>5- Calibration data has changed</li> </ol> <p>There shall be a provision to return from calibration menu by operating specific buttons</p> | Height Settings | <p>There shall be a method to enter into machine mode menu by operating specific buttons on PCU</p> <p>There shall be 2 modes -</p> <ol style="list-style-type: none"> <li>1. Descent delay height/angle</li> <li>2. Down limit height</li> </ol> <p>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</p> <p>To calibrate down limit height, ECU saves the rotary encoder/angle sensor value when the Down limit switch contacts change the voltage</p> <p>There shall be a provision to 'Save' and 'Return' to save the configurations by operating specific buttons</p> | Fault History | <p>There shall be a method to enter into fault history menu by operating specific buttons on PCU</p> <p>There shall be provision to view and store last 10 pieces of logs</p> <p>Each log shall be composed with fault code, fault name and trigger time</p> <p>There shall be a provision to clear the fault history by operating specific buttons</p> |
|-----------------------------|--|-----------------------------|--|------------------|--|------------------------|---|----------------------------|--|---------------------|--|-----------------|--|---------------|---|
| PCU Setting & Configuration |  |                             |  |                  |  |                        |   |                            |  |                     |  |                 |  |               |   |
| Adjust Top Speed            | <p>There shall be a method to enter into top speed adjustment menu by operating specific buttons on PCU<br/>There shall be a provision to 'Save' or 'Discard' the changed configurations by operating specific buttons</p> <p>There shall be 5 speeds user can adjust</p> <ol style="list-style-type: none"> <li>1. top speed of drive in hare mode (0~100%),</li> <li>2. top speed of drive in tortoise mode (0~100%)</li> <li>3. top speed of drive elevated (0~25%), of maximum theoretical speed and should never exceed 0.8kph</li> <li>4. top speed of lift (0~100%),</li> <li>5. steering speed (0~100%)</li> </ol>   |                             |  |                  |  |                        |   |                            |  |                     |  |                 |  |               |   |
| Adjust Machine Options      | <p>There shall be a method to enter into top speed adjustment menu by operating specific buttons on PCU<br/>There shall be a provision to 'Save' or 'Discard' the changed configurations by operating specific buttons</p> <p>There shall be 5 speeds user can adjust</p> <ol style="list-style-type: none"> <li>1. top speed of drive in hare mode (0~100%),</li> <li>2. top speed of drive in tortoise mode (0~100%),</li> <li>3. top speed of drive elevated (0~25%), of maximum theoretical speed and should never exceed 0.8kph</li> <li>4. top speed of lift (0~100%),</li> <li>5. steering speed (0~100%)</li> </ol> <p>Options 1 and 4 can be disabled for one power cycle only. They shall be enabled automatically after second machine restart.</p> <p>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)</p> <p>Option 3 and 5 can be enabled/disabled permanently (until next setting change)</p> <p>For option 6 above, when user enters this menu brakes shall release electrically.</p> <p>When this mode is selected, there shall be an audible warning and the brake coils shall be energised, allowing the wheels to rotate freely.</p> <p>When the machine is restarted, this mode shall be switched off</p>  |                             |  |                  |  |                        |   |                            |  |                     |  |                 |  |               |   |
| Adjust Battery Drain Delay  | <p>There shall be a method to enter into battery drain adjustment menu by operating specific buttons on PCU<br/>There shall be a provision to 'Save' or 'Discard' the changed configurations by operating specific buttons</p> <p>There shall be a delay user can adjust:</p> <ol style="list-style-type: none"> <li>1. battery drain alarm delay (0~60min)</li> </ol>   |                             |  |                  |  |                        |   |                            |  |                     |  |                 |  |               |   |
| Perform Calibration         | <p>There shall be a method to enter into calibration menu by operating specific buttons on PCU &amp; menu shall have limited access by passcode</p> <p>There shall be 3 calibration user can select to perform-</p> <ol style="list-style-type: none"> <li>1. No Load Calibration</li> <li>2. Full Load Calibration</li> <li>3. Tilt Sensor Calibration (reserved for future)</li> </ol> <p>After Calibration, the display shall show one of the results as below for the respective calibration selected -</p> <ol style="list-style-type: none"> <li>1- No load/Full load/Tilt Sensor calibration complete OR</li> <li>2- Pressure Sensor Failure OR</li> <li>3- Angle Sensor Failure OR</li> <li>4- Tilt OR</li> <li>5- Calibration data has changed</li> </ol> <p>There shall be a provision to return from calibration menu by operating specific buttons</p>   |                             |  |                  |  |                        |   |                            |  |                     |  |                 |  |               |   |
| Height Settings             | <p>There shall be a method to enter into machine mode menu by operating specific buttons on PCU</p> <p>There shall be 2 modes -</p> <ol style="list-style-type: none"> <li>1. Descent delay height/angle</li> <li>2. Down limit height</li> </ol> <p>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</p> <p>To calibrate down limit height, ECU saves the rotary encoder/angle sensor value when the Down limit switch contacts change the voltage</p> <p>There shall be a provision to 'Save' and 'Return' to save the configurations by operating specific buttons</p>   |                             |  |                  |  |                        |   |                            |  |                     |  |                 |  |               |   |
| Fault History               | <p>There shall be a method to enter into fault history menu by operating specific buttons on PCU</p> <p>There shall be provision to view and store last 10 pieces of logs</p> <p>Each log shall be composed with fault code, fault name and trigger time</p> <p>There shall be a provision to clear the fault history by operating specific buttons</p>  |                             |  |                  |  |                        |   |                            |  |                     |  |                 |  |               |   |
| <b>Location:</b>            | On Platform Front RHS  |                             |  |                  |  |                        |   |                            |  |                     |  |                 |  |               |   |

**Location  
IMG:**



| Item Number | Description       |
|-------------|-------------------|
| 1           | Joystick          |
| 2           | Display           |
| 3           | Drive mode button |
| 4           | Horn button       |
| 5           | Tortoise button   |
| 6           | Lift mode button  |
| 7           | E-Stop            |
| 8           | 3 LED Indicators  |
| 9           | Platform buzzer   |

| Signal: | Pin no | Description       | Connector No | Wire no |
|---------|--------|-------------------|--------------|---------|
|         | 1      | GND               | C44_DH       | 6025    |
|         | 2      | CAN HIGH          | C44_DH       | CANH12  |
|         | 3      | E-STOP OUTPUT     | C44_DH       | 1012    |
|         | 4      | INPUT(24V)        | C44_DH       | 1011    |
|         | 5      | CAN LOW           | C44_DH       | CANL12  |
|         | 6      | GND (MAIN GROUND) | C44_DH       | 6025B   |


  

| Wires & Connectors<br>IMG: | Diagram 1                              |  |
|----------------------------|--|--|
|                            | Labels                                 | Dimensions   |
| Diagram 2                  | -C44_DHS<br>7215/0026<br>TO PLATFORM   | -P1_DHS<br>7000/3212<br>-S2_DHS<br>7000/3230 -P3<br>7000/3230 -P4<br>7000/3230 -P5 |
|                            | -C44_DHS#1<br>7215/0026<br>TO PLATFORM | -P2_MH<br>7000/3212<br>-C25_MH<br>-C25_MH#1<br>7215/0026<br>DATALINK CONNECTOR     |

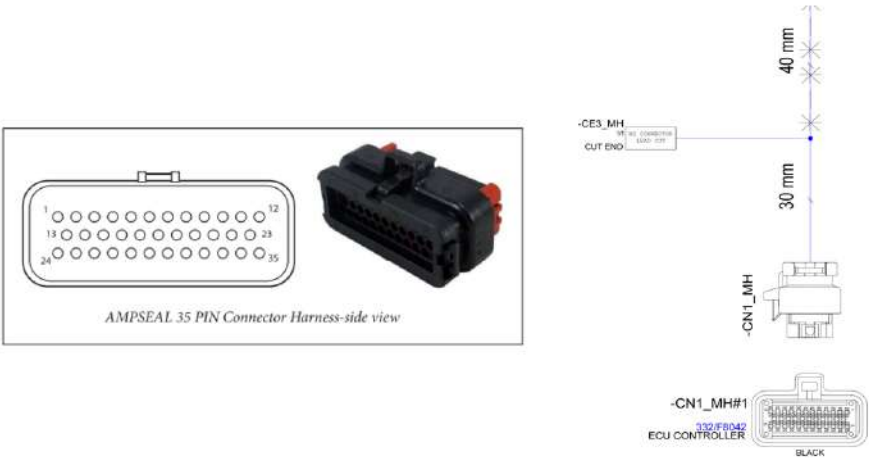
| <p><b>Internal Electrical Schematic IMG:</b></p> |  |            |             |                                   |              |                                   |                            |                                   |                                   |                                   |                    |                                   |                                     |
|--|--|------------|-------------|-----------------------------------|--------------|-----------------------------------|----------------------------|-----------------------------------|-----------------------------------|-----------------------------------|--------------------|-----------------------------------|-------------------------------------|
| <p><b>Testing:</b></p>                           | <p>Check Input Voltage 24 v<br/>Check Ground Connection</p>  |            |             |                                   |              |                                   |                            |                                   |                                   |                                   |                    |                                   |                                     |
| <p><b>Expected Values:</b></p>                   | <p>24 Volt in connector</p>  |            |             |                                   |              |                                   |                            |                                   |                                   |                                   |                    |                                   |                                     |
| <p><b>Related Fault Codes:</b></p>               | <table border="1"> <thead> <tr> <th>Fault Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><a href="#">5F</a><sub>252</sub></td> <td>PCU HW Fault</td> </tr> <tr> <td><a href="#">52</a><sub>252</sub></td> <td>Wika PCU PDO Timeout Fault</td> </tr> <tr> <td><a href="#">5C</a><sub>269</sub></td> <td>PCU Enable Trigger Sequence Fault</td> </tr> <tr> <td><a href="#">5D</a><sub>269</sub></td> <td>PCU Passcode Fault</td> </tr> <tr> <td><a href="#">6A</a><sub>269</sub></td> <td>PCU Steer Right/Left Sequence Fault</td> </tr> </tbody> </table> | Fault Code | Description | <a href="#">5F</a> <sub>252</sub> | PCU HW Fault | <a href="#">52</a> <sub>252</sub> | Wika PCU PDO Timeout Fault | <a href="#">5C</a> <sub>269</sub> | PCU Enable Trigger Sequence Fault | <a href="#">5D</a> <sub>269</sub> | PCU Passcode Fault | <a href="#">6A</a> <sub>269</sub> | PCU Steer Right/Left Sequence Fault |
| Fault Code                                       | Description  |            |             |                                   |              |                                   |                            |                                   |                                   |                                   |                    |                                   |                                     |
| <a href="#">5F</a> <sub>252</sub>                | PCU HW Fault   |            |             |                                   |              |                                   |                            |                                   |                                   |                                   |                    |                                   |                                     |
| <a href="#">52</a> <sub>252</sub>                | Wika PCU PDO Timeout Fault   |            |             |                                   |              |                                   |                            |                                   |                                   |                                   |                    |                                   |                                     |
| <a href="#">5C</a> <sub>269</sub>                | PCU Enable Trigger Sequence Fault  |            |             |                                   |              |                                   |                            |                                   |                                   |                                   |                    |                                   |                                     |
| <a href="#">5D</a> <sub>269</sub>                | PCU Passcode Fault   |            |             |                                   |              |                                   |                            |                                   |                                   |                                   |                    |                                   |                                     |
| <a href="#">6A</a> <sub>269</sub>                | PCU Steer Right/Left Sequence Fault  |            |             |                                   |              |                                   |                            |                                   |                                   |                                   |                    |                                   |                                     |

### 5.4 Motor Controller (Inverter)

|                         |   |
|-------------------------|---|
| <p><b>Component</b></p> | <p><b>Motor Controller (Inverter)</b></p> |
|-------------------------|---|


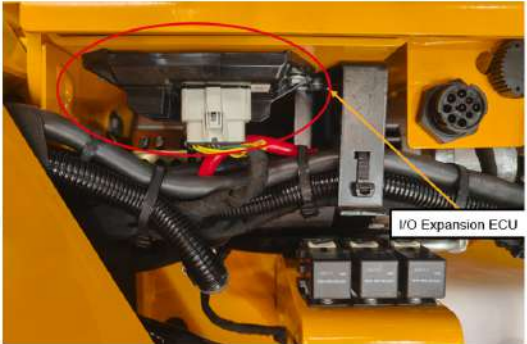
| <b>t:</b>  |   |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
|--|---|----------|----------|-----------|--------------------------------|-----------|--------------------------------|-----------|---------------------|-----------|--------------------|-----------|-------------------|-----------|---------------------|-----------|--------------------|-----------|-------------------|-------------|----------------|
| <b>Function:</b>   | <p>It inverts the DC supply to 3 Phase AC U V W Terminals on the controller feeds 3phase AC supply to wheel motor Right and Left.</p> <p>It also feeds the 24V DC supply to DC pump motor.B- and Pump Terminals feeds DC supply to pump motor.</p> <p>The LV connector is used to feed the signals from joystick and sensors.</p> |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
| <b>Location:</b>   | On Right Door   |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
| <b>Location IMG:</b>   |    |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
| <table border="1"> <thead> <tr> <th>Terminal</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td><b>B+</b></td> <td>Positive Battery to Controller</td> </tr> <tr> <td><b>B-</b></td> <td>Negative Battery to Controller</td> </tr> <tr> <td><b>U1</b></td> <td>Motor Phase U1 (M1)</td> </tr> <tr> <td><b>V1</b></td> <td>Motor Phase V (M1)</td> </tr> <tr> <td><b>W1</b></td> <td>Motor Phase W(M1)</td> </tr> <tr> <td><b>U2</b></td> <td>Motor Phase U1 (M2)</td> </tr> <tr> <td><b>V2</b></td> <td>Motor Phase V (M2)</td> </tr> <tr> <td><b>W2</b></td> <td>Motor Phase W(M2)</td> </tr> <tr> <td><b>Pump</b></td> <td>DC Pump (F2-T)</td> </tr> </tbody> </table> |   | Terminal | Function | <b>B+</b> | Positive Battery to Controller | <b>B-</b> | Negative Battery to Controller | <b>U1</b> | Motor Phase U1 (M1) | <b>V1</b> | Motor Phase V (M1) | <b>W1</b> | Motor Phase W(M1) | <b>U2</b> | Motor Phase U1 (M2) | <b>V2</b> | Motor Phase V (M2) | <b>W2</b> | Motor Phase W(M2) | <b>Pump</b> | DC Pump (F2-T) |
| Terminal   | Function  |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
| <b>B+</b>  | Positive Battery to Controller  |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
| <b>B-</b>  | Negative Battery to Controller  |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
| <b>U1</b>  | Motor Phase U1 (M1)   |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
| <b>V1</b>  | Motor Phase V (M1)  |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
| <b>W1</b>  | Motor Phase W(M1)   |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
| <b>U2</b>  | Motor Phase U1 (M2)   |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
| <b>V2</b>  | Motor Phase V (M2)  |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
| <b>W2</b>  | Motor Phase W(M2)   |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |
| <b>Pump</b>  | DC Pump (F2-T)  |          |          |           |                                |           |                                |           |                     |           |                    |           |                   |           |                     |           |                    |           |                   |             |                |

| <b>Signal:</b>                         | <table border="1"> <thead> <tr> <th rowspan="2">Pin Number</th> <th rowspan="2">Pin Name<br/>Primary Usage</th> <th rowspan="2">Special I/O<br/>(Alternative Usage)<br/>[CIT Motor Node]</th> <th rowspan="2">I/O Type</th> <th colspan="3">Usage Options</th> </tr> <tr> <th>Switch Input</th> <th>Analog Input</th> <th>PWM Driver</th> </tr> </thead> <tbody> <tr><td>1</td><td>KSI</td><td>Input 20 [M1 &amp; M2]</td><td>Virtual</td><td>✓</td><td></td><td></td></tr> <tr><td>2</td><td>M1_Driver 1</td><td>Input (Switch) 21 [M1]</td><td>Driver</td><td>✓</td><td></td><td>✓</td></tr> <tr><td>3</td><td>M2_Driver 4</td><td>Input (Switch) 24 [M2]</td><td>Driver</td><td>✓</td><td></td><td>✓</td></tr> <tr><td>4</td><td>M1_Driver 3</td><td>Input (Switch) 23 [M1]</td><td>Driver</td><td>✓</td><td></td><td>✓</td></tr> <tr><td>5</td><td>M2_Driver 2</td><td>Input (Switch) 22 [M2]</td><td>Driver</td><td>✓</td><td></td><td>✓</td></tr> <tr><td>6</td><td>M1_Driver 5</td><td>Input (Switch) 25 [M1]</td><td>Driver</td><td>✓</td><td></td><td>✓</td></tr> <tr><td>7</td><td>I/O GND</td><td>Sensor Grounds [M1 &amp; M2]</td><td>-</td><td></td><td></td><td></td></tr> <tr><td>8</td><td>M1_Motor Temp</td><td>Input (Switch) 2 [M1]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>9</td><td>Input 5</td><td>Switch 5 [M1 &amp; M2]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>10</td><td>M2_EncA/Sin</td><td>Input (Switch) 3 [M2]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>11</td><td>M2_EncB/Cos</td><td>Input (Switch) 4 [M2]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>12</td><td>M2_EncC</td><td>Input (Switch) 11 [M2]</td><td>Digital</td><td>✓</td><td></td><td></td></tr> <tr><td>13</td><td>Coil Supply</td><td>Input 30 [M1 &amp; M2]</td><td>Virtual</td><td>✓</td><td></td><td></td></tr> <tr><td>14</td><td>Input 13</td><td>Switch 13 [M1 &amp; M2]</td><td>Digital</td><td>✓</td><td></td><td></td></tr> <tr><td>15</td><td>Input 6</td><td>Switch 6 [M1 &amp; M2]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>16</td><td>Input 1</td><td>Switch 1 [M1 &amp; M2]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>17</td><td>Input 15</td><td>Switch 15 [M1 &amp; M2]</td><td>Digital</td><td>✓</td><td></td><td></td></tr> <tr><td>18</td><td>I/O GND</td><td>[M1 &amp; M2]</td><td>-</td><td></td><td></td><td></td></tr> <tr><td>19</td><td>M1_Driver 6</td><td>Input (Switch) 26 [M1]</td><td>Driver</td><td>✓</td><td></td><td>✓</td></tr> <tr><td>20</td><td>M2_Driver 7</td><td>Input (Switch) 27 [M2]</td><td>Driver</td><td>✓</td><td></td><td>✓</td></tr> <tr><td>21</td><td>M2_Motor Temp</td><td>Input (Switch) 2 [M2]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>22</td><td>Input 7</td><td>Switch 7 [M1 &amp; M2]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>23</td><td>CAN1 H</td><td>[M1 &amp; M2]</td><td>-</td><td></td><td></td><td></td></tr> <tr><td>24</td><td>Input 9</td><td>Switch 9 [M1 &amp; M2]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>25</td><td>+12V Ext Supply</td><td>Input 14 [M1 &amp; M2]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>26</td><td>+5V Ext Supply</td><td>Input 31 [M1 &amp; M2]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>27</td><td>Input 18</td><td>Switch 18 [M1 &amp; M2]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> </tbody> </table> |                           |  |          |               |              |            | Pin Number | Pin Name<br>Primary Usage | Special I/O<br>(Alternative Usage)<br>[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 | ✓ | ✓ |  |
|--|--|---------------------------|--|----------|---------------|--------------|------------|------------|---------------------------|--|----------|---------------|--|--|--------------|--------------|------------|----|---------|--------------------|---------|---|---|--|----|--------------|------------------------|---------|---|--|---|----|-------------|------------------------|--------|---|--|---|----|-------------|------------------------|--------|---|---|---|----|-------------|------------------------|--------|---|---|---|----|-------------|------------------------|---------|---|--|---|----|----------|--------------------------|---------|---|--|--|----|---------------|-----------------------|--------|---|---|--|---|---------|--------------------|--------|---|---|--|----|-------------|-----------------------|--------|---|---|--|----|-------------|-----------------------|--------|---|---|--|----|---------|------------------------|---------|---|--|--|----|-------------|--------------------|---------|---|--|--|----|----------|---------------------|---------|---|--|--|----|---------|--------------------|--------|---|---|--|----|---------|--------------------|--------|---|---|--|----|----------|---------------------|---------|---|--|--|----|---------|-----------|---|--|--|--|----|-------------|------------------------|--------|---|--|---|----|-------------|------------------------|--------|---|--|---|----|---------------|-----------------------|--------|---|---|--|----|---------|--------------------|--------|---|---|--|----|--------|-----------|---|--|--|--|----|---------|--------------------|--------|---|---|--|----|-----------------|--------------------|--------|---|---|--|----|----------------|--------------------|--------|---|---|--|----|----------|---------------------|--------|---|---|--|
|  | Pin Number   | Pin Name<br>Primary Usage | Special I/O<br>(Alternative Usage)<br>[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   | ✓             | ✓            |            |            |                           |  |          |               |  |  |              |              |            |    |         |                    |         |   |   |  |    |              |                        |         |   |  |   |    |             |                        |        |   |  |   |    |             |                        |        |   |   |   |    |             |                        |        |   |   |   |    |             |                        |         |   |  |   |    |          |                          |         |   |  |  |    |               |                       |        |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |
|  | <table border="1"> <thead> <tr> <th rowspan="2">Pin Number</th> <th rowspan="2">Pin Name<br/>Primary Usage</th> <th rowspan="2">Special I/O<br/>(Alternative Usage)<br/>[CIT Motor Node]</th> <th rowspan="2">I/O Type</th> <th colspan="3">Usage Options</th> </tr> <tr> <th>Switch Input</th> <th>Analog Input</th> <th>PWM Driver</th> </tr> </thead> <tbody> <tr><td>28</td><td>Input 8</td><td>Switch 8 [M1 &amp; M2]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>29</td><td>PWM Input 10</td><td>Switch 10 [M1 &amp; M2]</td><td>Digital</td><td>✓</td><td></td><td></td></tr> <tr><td>30</td><td>M2_Driver 6</td><td>Input (Switch) 26 [M2]</td><td>Driver</td><td>✓</td><td></td><td>✓</td></tr> <tr><td>31</td><td>M1_EncA/Sin</td><td>Input (Switch) 3 [M1]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>32</td><td>M1_EncB/Cos</td><td>Input (Switch) 4 [M1]</td><td>Analog</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>33</td><td>M1_EncC</td><td>Input (Switch) 11 [M1]</td><td>Digital</td><td>✓</td><td></td><td></td></tr> <tr><td>34</td><td>Input 12</td><td>Switch 12 [M1 &amp; M2]</td><td>Digital</td><td>✓</td><td></td><td></td></tr> <tr><td>35</td><td>CAN1 L</td><td>[M1 &amp; M2]</td><td>-</td><td></td><td></td><td></td></tr> </tbody> </table>  |                           |  |          |               |              |            | Pin Number | Pin Name<br>Primary Usage | Special I/O<br>(Alternative Usage)<br>[CIT Motor Node] | I/O Type | Usage Options |  |  | Switch Input | Analog Input | PWM Driver | 28 | Input 8 | Switch 8 [M1 & M2] | Analog  | ✓ | ✓ |  | 29 | PWM Input 10 | Switch 10 [M1 & M2]    | Digital | ✓ |  |   | 30 | M2_Driver 6 | Input (Switch) 26 [M2] | Driver | ✓ |  | ✓ | 31 | M1_EncA/Sin | Input (Switch) 3 [M1]  | Analog | ✓ | ✓ |   | 32 | M1_EncB/Cos | Input (Switch) 4 [M1]  | Analog | ✓ | ✓ |   | 33 | M1_EncC     | Input (Switch) 11 [M1] | Digital | ✓ |  |   | 34 | Input 12 | Switch 12 [M1 & M2]      | Digital | ✓ |  |  | 35 | CAN1 L        | [M1 & M2]             | -      |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |
|  | Pin Number   | Pin Name<br>Primary Usage | Special I/O<br>(Alternative Usage)<br>[CIT Motor Node] | I/O Type | Usage Options |              |            |            |                           |  |          |               |  |  |              |              |            |    |         |                    |         |   |   |  |    |              |                        |         |   |  |   |    |             |                        |        |   |  |   |    |             |                        |        |   |   |   |    |             |                        |        |   |   |   |    |             |                        |         |   |  |   |    |          |                          |         |   |  |  |    |               |                       |        |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |
|  |  |                           |  |          | Switch Input  | Analog Input | PWM Driver |            |                           |  |          |               |  |  |              |              |            |    |         |                    |         |   |   |  |    |              |                        |         |   |  |   |    |             |                        |        |   |  |   |    |             |                        |        |   |   |   |    |             |                        |        |   |   |   |    |             |                        |         |   |  |   |    |          |                          |         |   |  |  |    |               |                       |        |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |
|  | 28   | Input 8                   | Switch 8 [M1 & M2]                                     | Analog   | ✓             | ✓            |            |            |                           |  |          |               |  |  |              |              |            |    |         |                    |         |   |   |  |    |              |                        |         |   |  |   |    |             |                        |        |   |  |   |    |             |                        |        |   |   |   |    |             |                        |        |   |   |   |    |             |                        |         |   |  |   |    |          |                          |         |   |  |  |    |               |                       |        |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |
|  | 29   | PWM Input 10              | Switch 10 [M1 & M2]                                    | Digital  | ✓             |              |            |            |                           |  |          |               |  |  |              |              |            |    |         |                    |         |   |   |  |    |              |                        |         |   |  |   |    |             |                        |        |   |  |   |    |             |                        |        |   |   |   |    |             |                        |        |   |   |   |    |             |                        |         |   |  |   |    |          |                          |         |   |  |  |    |               |                       |        |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |
| 30                                     | M2_Driver 6  | Input (Switch) 26 [M2]    | Driver   | ✓        |               | ✓            |            |            |                           |  |          |               |  |  |              |              |            |    |         |                    |         |   |   |  |    |              |                        |         |   |  |   |    |             |                        |        |   |  |   |    |             |                        |        |   |   |   |    |             |                        |        |   |   |   |    |             |                        |         |   |  |   |    |          |                          |         |   |  |  |    |               |                       |        |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |
| 31                                     | M1_EncA/Sin  | Input (Switch) 3 [M1]     | Analog   | ✓        | ✓             |              |            |            |                           |  |          |               |  |  |              |              |            |    |         |                    |         |   |   |  |    |              |                        |         |   |  |   |    |             |                        |        |   |  |   |    |             |                        |        |   |   |   |    |             |                        |        |   |   |   |    |             |                        |         |   |  |   |    |          |                          |         |   |  |  |    |               |                       |        |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |
| 32                                     | M1_EncB/Cos  | Input (Switch) 4 [M1]     | Analog   | ✓        | ✓             |              |            |            |                           |  |          |               |  |  |              |              |            |    |         |                    |         |   |   |  |    |              |                        |         |   |  |   |    |             |                        |        |   |  |   |    |             |                        |        |   |   |   |    |             |                        |        |   |   |   |    |             |                        |         |   |  |   |    |          |                          |         |   |  |  |    |               |                       |        |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |
| 33                                     | M1_EncC  | Input (Switch) 11 [M1]    | Digital  | ✓        |               |              |            |            |                           |  |          |               |  |  |              |              |            |    |         |                    |         |   |   |  |    |              |                        |         |   |  |   |    |             |                        |        |   |  |   |    |             |                        |        |   |   |   |    |             |                        |        |   |   |   |    |             |                        |         |   |  |   |    |          |                          |         |   |  |  |    |               |                       |        |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |
| 34                                     | Input 12   | Switch 12 [M1 & M2]       | Digital  | ✓        |               |              |            |            |                           |  |          |               |  |  |              |              |            |    |         |                    |         |   |   |  |    |              |                        |         |   |  |   |    |             |                        |        |   |  |   |    |             |                        |        |   |   |   |    |             |                        |        |   |   |   |    |             |                        |         |   |  |   |    |          |                          |         |   |  |  |    |               |                       |        |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |
| 35                                     | CAN1 L   | [M1 & M2]                 | -  |          |               |              |            |            |                           |  |          |               |  |  |              |              |            |    |         |                    |         |   |   |  |    |              |                        |         |   |  |   |    |             |                        |        |   |  |   |    |             |                        |        |   |   |   |    |             |                        |        |   |   |   |    |             |                        |         |   |  |   |    |          |                          |         |   |  |  |    |               |                       |        |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |
| <b>Wires &amp; Connectors<br/>IMG:</b> | 35Way socket housing-JCB Part No. 332/F8042  |                           |  |          |               |              |            |            |                           |  |          |               |  |  |              |              |            |    |         |                    |         |   |   |  |    |              |                        |         |   |  |   |    |             |                        |        |   |  |   |    |             |                        |        |   |   |   |    |             |                        |        |   |   |   |    |             |                        |         |   |  |   |    |          |                          |         |   |  |  |    |               |                       |        |   |   |  |   |         |                    |        |   |   |  |    |             |                       |        |   |   |  |    |             |                       |        |   |   |  |    |         |                        |         |   |  |  |    |             |                    |         |   |  |  |    |          |                     |         |   |  |  |    |         |                    |        |   |   |  |    |         |                    |        |   |   |  |    |          |                     |         |   |  |  |    |         |           |   |  |  |  |    |             |                        |        |   |  |   |    |             |                        |        |   |  |   |    |               |                       |        |   |   |  |    |         |                    |        |   |   |  |    |        |           |   |  |  |  |    |         |                    |        |   |   |  |    |                 |                    |        |   |   |  |    |                |                    |        |   |   |  |    |          |                     |        |   |   |  |

|  |  <p>AMPSEAL 35 PIN Connector Harness-side view</p> <p>-CES_MH<br/>MOTOR CONTROLLER<br/>CUT END</p> <p>-CN1_MH</p> <p>-CN1_MH#1<br/>ECU CONTROLLER<br/>BLACK</p> <p>40 mm</p> <p>30 mm</p>  |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
|--|--|------------|-------------|-----------------------------------|--|----------------------------------|---|-----------------------------------|--|-----------------------------------|------------------|-----------------------------------|-------------------------------------|-----------------------------------|------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|-------------|-----------------------------------|-------------------|-----------------------------------|--------------------|-----------------------------------|-------------------------------------|
| <p><b>Internal Electrical Schematic IMG:</b></p> | <p>Please Refer Electrical Schematic</p>   |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <p><b>Testing:</b></p>                           | <p>N/A</p>   |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <p><b>Expected Values:</b></p>                   | <p><b>Motor Controller / Inverter</b></p> <p>Battery Voltage 24V DC</p> <p>Current Rating 2 X 200 ARMS (S2-2min)</p> <p>Pump Current Max 280ADC</p> <p>Operating Temp -40 C to +50 C</p> <p>IP rating IP65</p> <p>Power Connections 2x UVW , B+/B-, and Pump</p> <p>I/O Connections 35 Pin AMPseal Connector</p>   |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <p><b>Related Fault Codes:</b></p>               | <table border="1"> <thead> <tr> <th>Fault Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><a href="#">AC</a> <sup>229</sup></td> <td>Fault on other traction Controller / Dual Severe</td> </tr> <tr> <td><a href="#">2</a> <sup>315</sup></td> <td>Controller Over current (Motor phase current) (Right Motor)</td> </tr> <tr> <td><a href="#">12</a> <sup>315</sup></td> <td>Controller Over current (Motor phase current) (Left Motor)</td> </tr> <tr> <td><a href="#">14</a> <sup>317</sup></td> <td>Precharge Failed</td> </tr> <tr> <td><a href="#">15</a> <sup>318</sup></td> <td>Controller Severe Under temperature</td> </tr> <tr> <td><a href="#">16</a> <sup>318</sup></td> <td>Controller Severe Over temperature</td> </tr> <tr> <td><a href="#">22</a> <sup>299</sup></td> <td>Controller Over temperature Cutback</td> </tr> <tr> <td><a href="#">31</a> <sup>291</sup></td> <td>Main Driver</td> </tr> <tr> <td><a href="#">46</a> <sup>229</sup></td> <td>NV Memory Failure</td> </tr> <tr> <td><a href="#">3B</a> <sup>324</sup></td> <td>Misalignment Error</td> </tr> <tr> <td><a href="#">49</a> <sup>315</sup></td> <td>Software Parameter Change /Mismatch</td> </tr> </tbody> </table> | Fault Code | Description | <a href="#">AC</a> <sup>229</sup> | Fault on other traction Controller / Dual Severe | <a href="#">2</a> <sup>315</sup> | Controller Over current (Motor phase current) (Right Motor) | <a href="#">12</a> <sup>315</sup> | Controller Over current (Motor phase current) (Left Motor) | <a href="#">14</a> <sup>317</sup> | Precharge Failed | <a href="#">15</a> <sup>318</sup> | Controller Severe Under temperature | <a href="#">16</a> <sup>318</sup> | Controller Severe Over temperature | <a href="#">22</a> <sup>299</sup> | Controller Over temperature Cutback | <a href="#">31</a> <sup>291</sup> | Main Driver | <a href="#">46</a> <sup>229</sup> | NV Memory Failure | <a href="#">3B</a> <sup>324</sup> | Misalignment Error | <a href="#">49</a> <sup>315</sup> | Software Parameter Change /Mismatch |
| Fault Code                                       | Description  |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <a href="#">AC</a> <sup>229</sup>                | Fault on other traction Controller / Dual Severe   |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <a href="#">2</a> <sup>315</sup>                 | Controller Over current (Motor phase current) (Right Motor)  |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <a href="#">12</a> <sup>315</sup>                | Controller Over current (Motor phase current) (Left Motor)   |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <a href="#">14</a> <sup>317</sup>                | Precharge Failed   |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <a href="#">15</a> <sup>318</sup>                | Controller Severe Under temperature  |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <a href="#">16</a> <sup>318</sup>                | Controller Severe Over temperature   |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <a href="#">22</a> <sup>299</sup>                | Controller Over temperature Cutback  |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <a href="#">31</a> <sup>291</sup>                | Main Driver  |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <a href="#">46</a> <sup>229</sup>                | NV Memory Failure  |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <a href="#">3B</a> <sup>324</sup>                | Misalignment Error   |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |
| <a href="#">49</a> <sup>315</sup>                | Software Parameter Change /Mismatch  |            |             |                                   |  |                                  |   |                                   |  |                                   |                  |                                   |                                     |                                   |                                    |                                   |                                     |                                   |             |                                   |                   |                                   |                    |                                   |                                     |

|                                   |                               |
|-----------------------------------|-------------------------------|
| <a href="#">72</a> <sup>229</sup> | CAN Timeout                   |
| <a href="#">89</a> <sup>321</sup> | Parameter Out of Range        |
| <a href="#">91</a> <sup>229</sup> | Bad Firmware                  |
| <a href="#">95</a> <sup>324</sup> | Pump Over current             |
| <a href="#">97</a> <sup>326</sup> | Pump Hardware                 |
| <a href="#">9A</a> <sup>326</sup> | Interlock Braking Supervision |
| <a href="#">A9</a> <sup>321</sup> | Coil Supply                   |
| <a href="#">BF</a> <sup>324</sup> | Pump Current Sensor           |

## 5.5 Parker I/O Expansion ECU

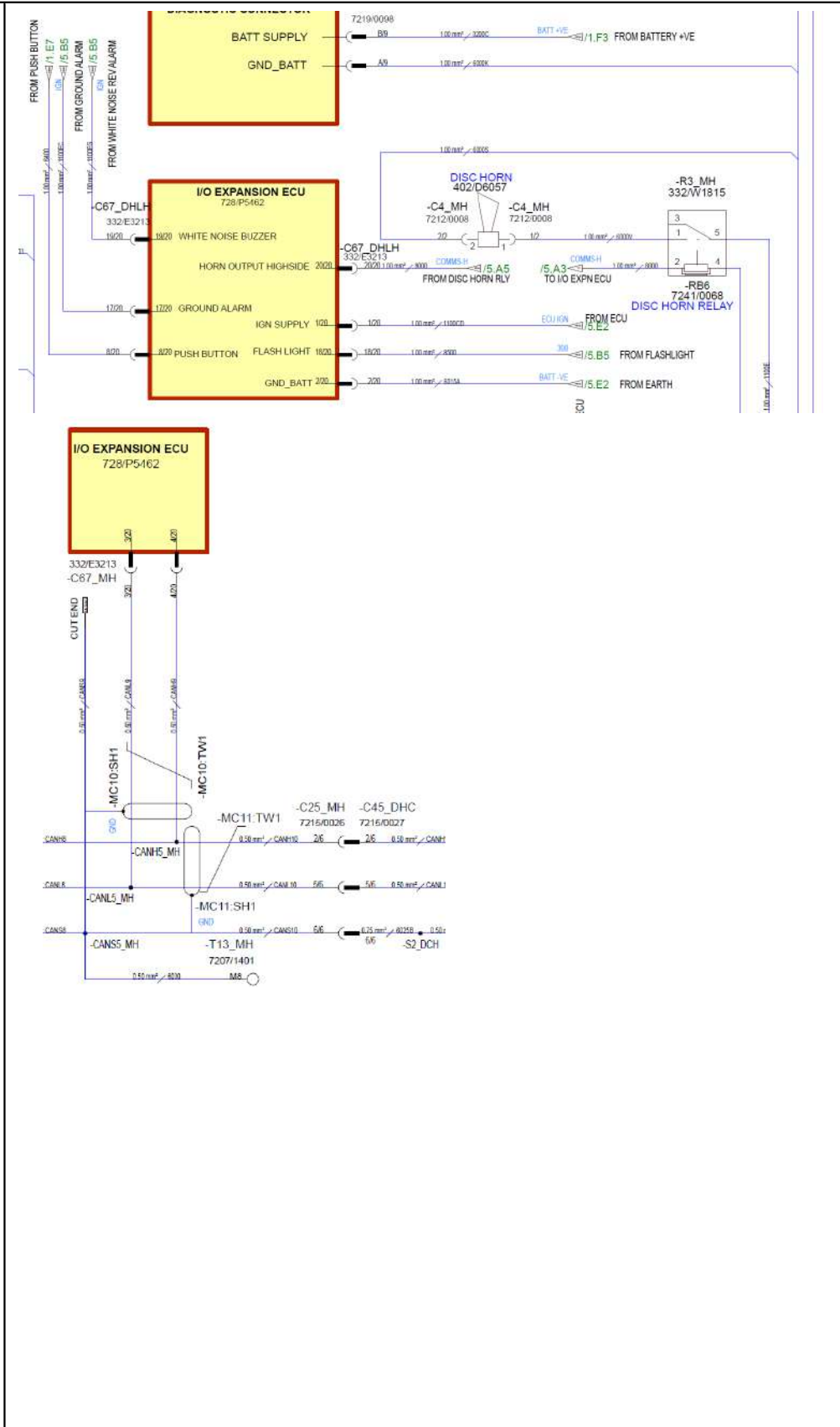
|                      |   |  |
|----------------------|---|--|
| <b>Component:</b>    | <b>Parker I/O Expansion ECU</b>   |  |
| <b>Function:</b>     | <p>This ECU is an additional input out (I/O) expansion ECU which controls flash light , chassis buzzer and horn.</p> <p>This ECU has no separate error codes.All the related error code will be displayed on base and platform display ( Curtis only)</p> |  |
| <b>Location:</b>     | RH Door   |  |
| <b>Location IMG:</b> |    |  |

|                |         |                    |                      |
|----------------|---------|--------------------|----------------------|
| <b>Signal:</b> | 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 |                      |

|                                    |  |
|------------------------------------|--|
| <b>Wires &amp; Connectors IMG:</b> |  |
|------------------------------------|--|


**Internal Electrical Schematic IMG:**



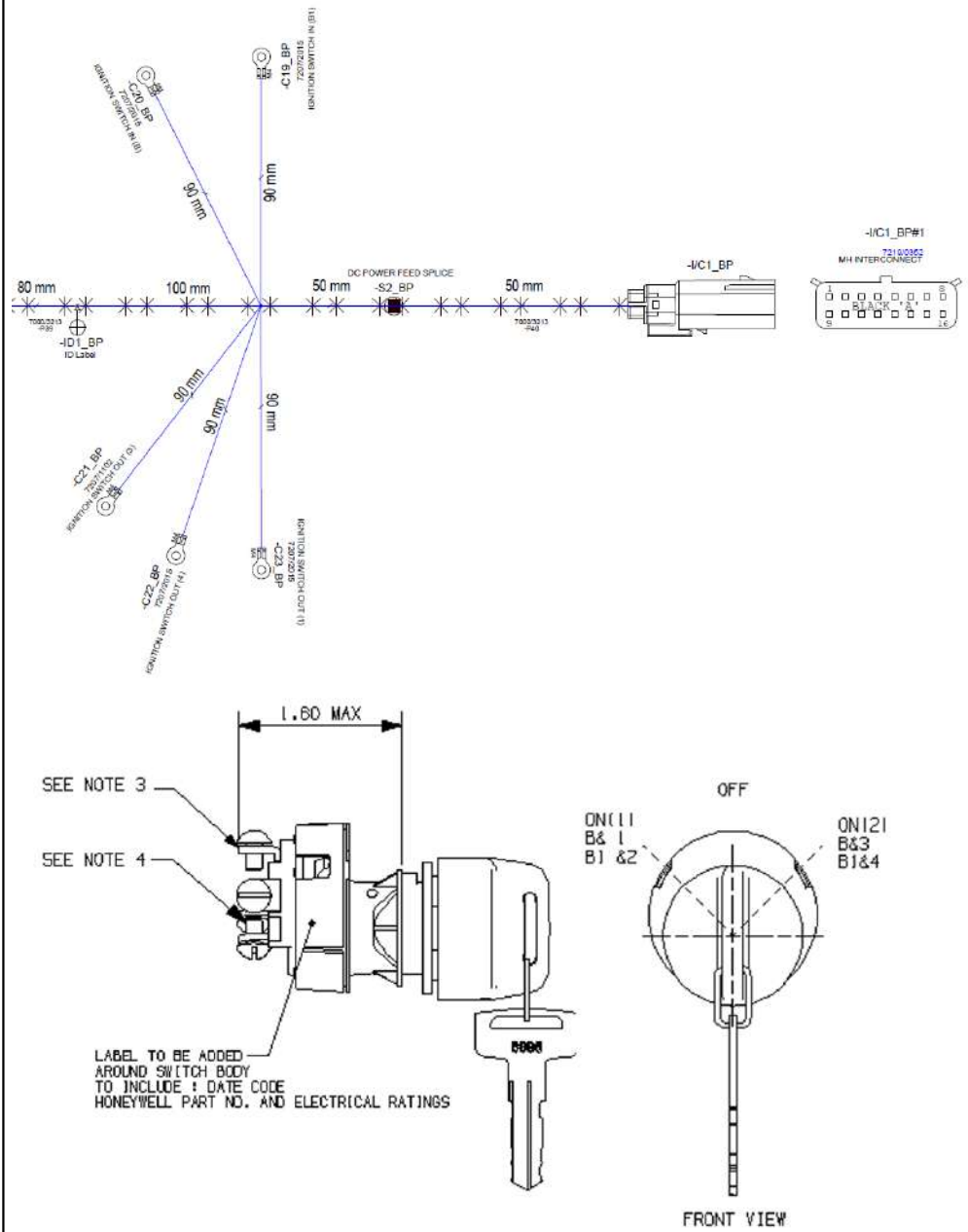
|                             |   |
|-----------------------------|---|
|                             | <p style="text-align: center;">ONLY FOR DUAL HEIGHT</p> |
| <b>Testing:</b>             | N/A   |
| <b>Expected Values:</b>     | N/A   |
| <b>Related Fault Codes:</b> | N/A   |

## 5.6 Ignition/Key Switch

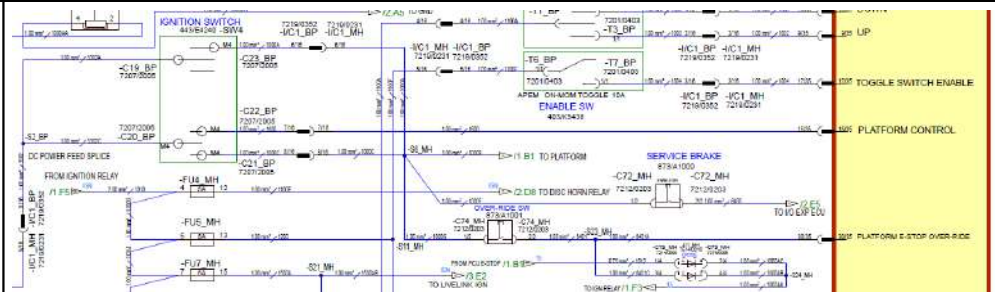
|                   |  |
|-------------------|--|
| <b>Component:</b> | <b>Ignition/Key Switch</b>   |
| <b>Function:</b>  | <p>The ignition turns on and off the main power of the machine. The Ignition/Key Switch supplies power to the Emergency Stop (E-Stop) and selection of Chassis control or Platform control.</p> <p>There are following 3 selectable positions.</p> <ol style="list-style-type: none"> <li>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 button.</li> <li>2.Ignition OFF- When Ignition position is selected, neither control location shall be active. Machine shall be in 'OFF' state with minimal current draw.</li> </ol> |

|                             | <p>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.</p>  |          |         |  |        |             |          |         |   |               |        |     |   |               |        |     |   |                |        |    |
|-----------------------------|--|----------|---------|--|--------|-------------|----------|---------|---|---------------|--------|-----|---|---------------|--------|-----|---|----------------|--------|----|
| <p><b>Location:</b></p>     | <p>The Ignition Switch is located on hydraulic door compartment</p>  |          |         |  |        |             |          |         |   |               |        |     |   |               |        |     |   |                |        |    |
| <p><b>Location IMG:</b></p> |  <p>Ignition Switch</p>   |          |         |  |        |             |          |         |   |               |        |     |   |               |        |     |   |                |        |    |
| <p><b>Signal:</b></p>       | <table border="1"> <thead> <tr> <th>Pin no</th> <th>Description</th> <th>Terminal</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>IGN SWITCH IN</td> <td>C19_BP</td> <td>24V</td> </tr> <tr> <td>2</td> <td>IGN SWITCH IN</td> <td>C22_BP</td> <td>24V</td> </tr> <tr> <td>3</td> <td>IGN SWITCH OUT</td> <td>C23_BP</td> <td>0V</td> </tr> </tbody> </table> |          |         |  | Pin no | Description | Terminal | Voltage | 1 | IGN SWITCH IN | C19_BP | 24V | 2 | IGN SWITCH IN | C22_BP | 24V | 3 | IGN SWITCH OUT | C23_BP | 0V |
| Pin no                      | Description  | Terminal | Voltage |  |        |             |          |         |   |               |        |     |   |               |        |     |   |                |        |    |
| 1                           | IGN SWITCH IN  | C19_BP   | 24V     |  |        |             |          |         |   |               |        |     |   |               |        |     |   |                |        |    |
| 2                           | IGN SWITCH IN  | C22_BP   | 24V     |  |        |             |          |         |   |               |        |     |   |               |        |     |   |                |        |    |
| 3                           | IGN SWITCH OUT   | C23_BP   | 0V      |  |        |             |          |         |   |               |        |     |   |               |        |     |   |                |        |    |

**Wires & Connectors IMG:**



**Internal Electrical Schematic IMG:**

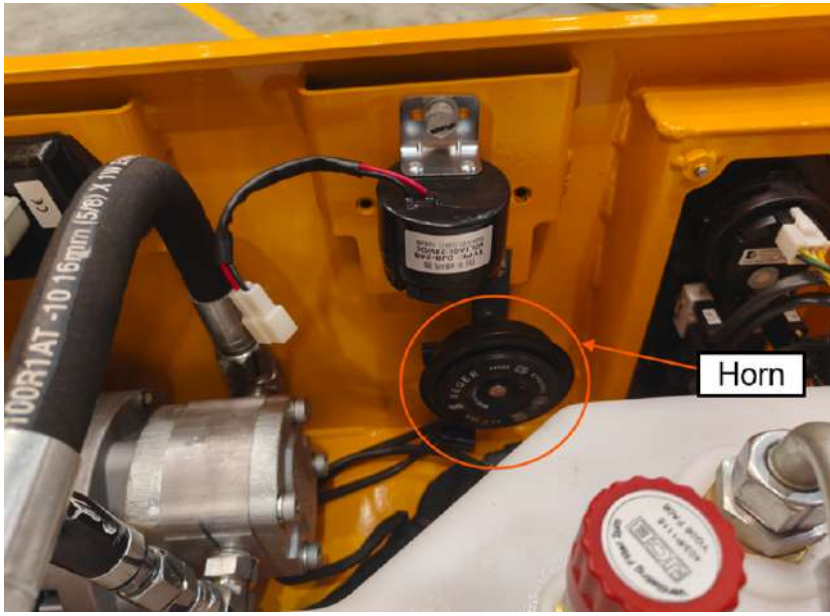


**Testing:**

Check Power supply in Out put cable, if faulty Replace.  
Check Continuity on terminals


|                             |     |
|-----------------------------|-----|
| <b>Expected Values:</b>     | 24V |
| <b>Related Fault Codes:</b> | N/A |

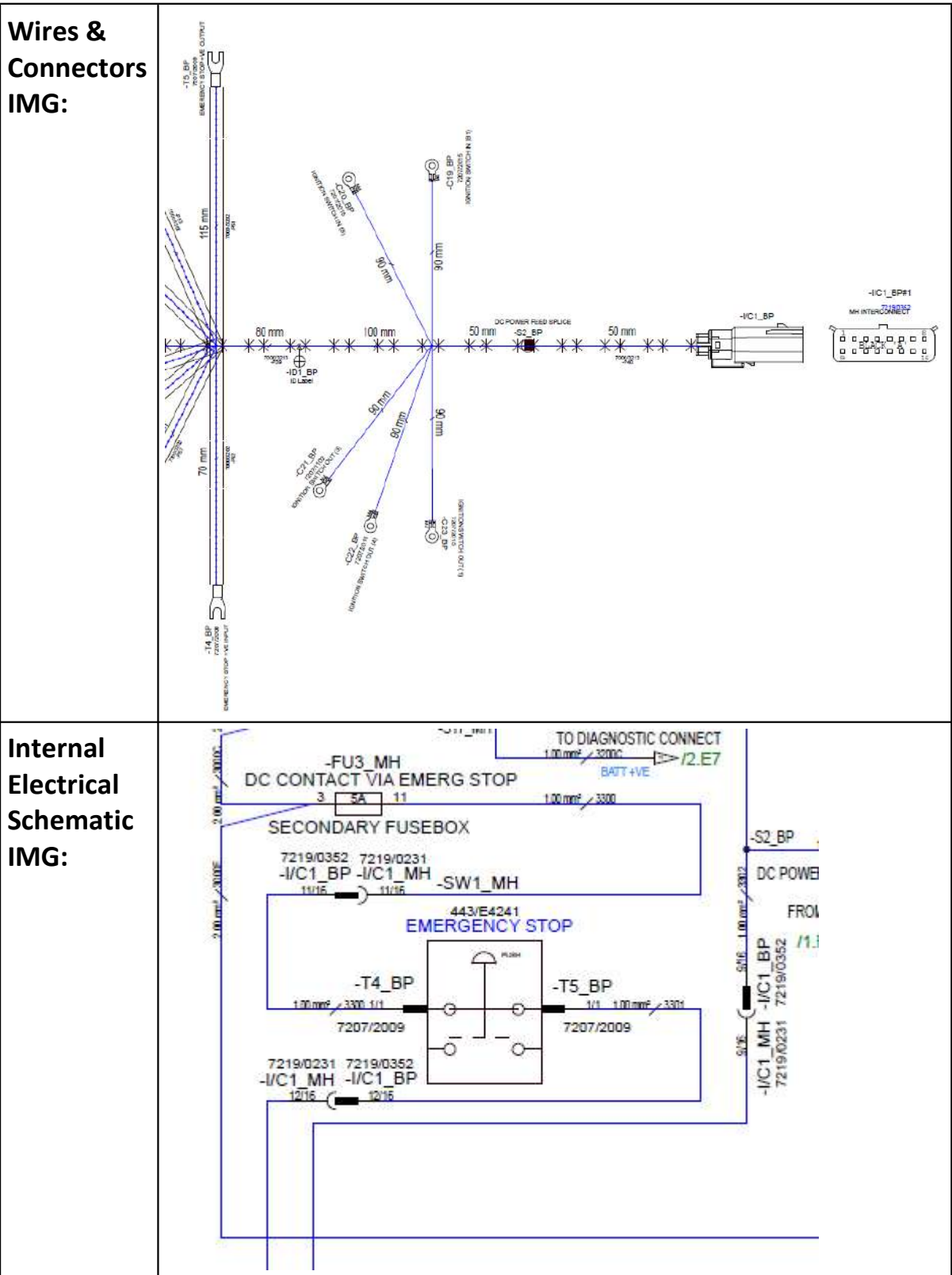
## 5.7 Horn

|                      |  |
|----------------------|--|
| <b>Component:</b>    | <b>Horn</b>  |
| <b>Function:</b>     | <p>The horn is activated at the platform control panel and sounds at the ground as a warning to ground personnel.</p> <p>The Horn output is driven by an I/O expansion module based on commands from Motor Controller</p> <p>An improperly functioning horn will prevent the operator from alerting the ground personnel of hazards or unsafe conditions</p> <p>During calibration, the horn shall be blown 5 times when start raising and lowering, and it shall be blown periodically (once every 5 sec) during lowering the platform.</p> |
| <b>Location:</b>     | Horn is placed on front side of machine underneath chassis   |
| <b>Location IMG:</b> |    |

| <b>Signal:</b>                            | <table border="1"> <thead> <tr> <th>Pin</th> <th>Description</th> <th>Connector Number</th> <th>Wire Number</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>IGN SUPPLY</td> <td>C4_MH</td> <td>1100D</td> <td>24V</td> </tr> <tr> <td>2</td> <td>GND</td> <td>C4_MH</td> <td>6000S</td> <td>0V</td> </tr> </tbody> </table> | Pin              | Description | Connector Number | Wire Number | Voltage | 1 | IGN SUPPLY | C4_MH | 1100D | 24V | 2 | GND | C4_MH | 6000S | 0V |
|---|--|------------------|-------------|------------------|-------------|---------|---|------------|-------|-------|-----|---|-----|-------|-------|----|
| Pin                                       | Description  | Connector Number | Wire Number | Voltage          |             |         |   |            |       |       |     |   |     |       |       |    |
| 1   | IGN SUPPLY   | C4_MH            | 1100D       | 24V              |             |         |   |            |       |       |     |   |     |       |       |    |
| 2   | GND  | C4_MH            | 6000S       | 0V               |             |         |   |            |       |       |     |   |     |       |       |    |
| <b>Wires &amp; Connectors IMG:</b>        |  |                  |             |                  |             |         |   |            |       |       |     |   |     |       |       |    |
| <b>Internal Electrical Schematic IMG:</b> |  |                  |             |                  |             |         |   |            |       |       |     |   |     |       |       |    |
| <b>Testing:</b>                           | Audible sound of Horn will be produced after pressing Horn button  |                  |             |                  |             |         |   |            |       |       |     |   |     |       |       |    |
| <b>Expected Values:</b>                   | 24V  |                  |             |                  |             |         |   |            |       |       |     |   |     |       |       |    |
| <b>Related Fault Codes:</b>               | N/A  |                  |             |                  |             |         |   |            |       |       |     |   |     |       |       |    |


## 5.8 E-Stop

|                      |  |                 |          |         |           |
|----------------------|--|-----------------|----------|---------|-----------|
| <b>Component:</b>    | <b>E-Stop</b>  |                 |          |         |           |
| <b>Function:</b>     | <p>The Key Switch supplies power to the Emergency Stop (E-Stop).<br/>                 The E stop switch immediately switches off the 24v power to the inverters by cutting the Inverter key relay, and opening the Contactor.<br/>                 For all the machine operations E Stop shall be unpressed/released (Pulled out) when Emergency stop is pressed at either control position (e.g. if any signal from an emergency stop indicates pressed position), for time <math>T \geq 0.2s</math>. Prevent all movements within 0.5s.</p> <p><b>Note-</b> Emergency stop button should be used only in emergency condition and should not be used as n "ON-Off" button</p> |                 |          |         |           |
| <b>Location:</b>     | The E-Stop buttons are located on both the chassis and platform controllers and feed into ignition input via key switch  |                 |          |         |           |
| <b>Location IMG:</b> |   |                 |          |         |           |
| <b>Signal:</b>       | Pin no   | Description     | Terminal | Voltage | Wire no   |
|                      | 1  | Battery Charger | T5_BP    | 24V     | 7207/2009 |
|                      | 1  | DC Contactor    | T4_BP    | 24V     | 7207/2009 |

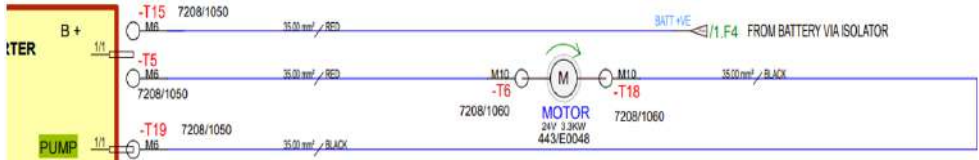


| <b>Testing:</b>                       | Pressing the E-Stop will shut down the machine .No Machine Function should work except E-Stop override .   |  |            |             |                                       |                           |
|---------------------------------------|--|--|------------|-------------|---------------------------------------|---------------------------|
| <b>Expected Values:</b>               | 24V  |  |            |             |                                       |                           |
| <b>Related Fault Codes:</b>           | <table border="1"> <thead> <tr> <th style="background-color: yellow;">Fault Code</th> <th style="background-color: yellow;">Description</th> </tr> </thead> <tbody> <tr> <td><a href="#">7D</a> <small>314</small></td> <td>E_STOP_Override_STB_Fault</td> </tr> </tbody> </table> |  | Fault Code | Description | <a href="#">7D</a> <small>314</small> | E_STOP_Override_STB_Fault |
| Fault Code                            | Description  |  |            |             |                                       |                           |
| <a href="#">7D</a> <small>314</small> | E_STOP_Override_STB_Fault  |  |            |             |                                       |                           |


## 5.9 DC Motor

| <b>Component:</b>    | <b>DC Motor</b>  |       |             |  |          |             |       |             |             |             |     |       |    |             |     |     |
|----------------------|--|-------|-------------|--|----------|-------------|-------|-------------|-------------|-------------|-----|-------|----|-------------|-----|-----|
| <b>Function:</b>     | <p>The Hydraulic pump DC motor installed on this machine is a DC (Direct Current) motor with a series excited permanent magnet.</p> <p>The resistance between the motor enclosure and any of the binding points is infinite or more than 1 mega ohm.</p> <p>The pump motor rotates in an anticlockwise direction (viewed from commutator end).</p> <p>The raise solenoid shall be energized first followed by the hydraulic pump DC motor. This is to avoid sudden build of trapped hydraulic pressure.</p> <p>When the raise operation is halted the hydraulic pump DC motor shall stop first followed by de-activation of the raise solenoid</p> |       |             |  |          |             |       |             |             |             |     |       |    |             |     |     |
| <b>Location:</b>     | It is fitted on hydraulic door compartment   |       |             |  |          |             |       |             |             |             |     |       |    |             |     |     |
| <b>Location IMG:</b> |    |       |             |  |          |             |       |             |             |             |     |       |    |             |     |     |
| <b>Signal:</b>       | <table border="1"> <thead> <tr> <th style="background-color: yellow;">Terminal</th> <th style="background-color: yellow;">Description</th> <th style="background-color: yellow;">Motor</th> <th style="background-color: yellow;">Wire Colour</th> </tr> </thead> <tbody> <tr> <td>Terminal 18</td> <td>Battery -ve</td> <td>M10</td> <td>Black</td> </tr> <tr> <td>T6</td> <td>Battery +ve</td> <td>M10</td> <td>Red</td> </tr> </tbody> </table>   |       |             |  | Terminal | Description | Motor | Wire Colour | Terminal 18 | Battery -ve | M10 | Black | T6 | Battery +ve | M10 | Red |
| Terminal             | Description  | Motor | Wire Colour |  |          |             |       |             |             |             |     |       |    |             |     |     |
| Terminal 18          | Battery -ve  | M10   | Black       |  |          |             |       |             |             |             |     |       |    |             |     |     |
| T6                   | Battery +ve  | M10   | Red         |  |          |             |       |             |             |             |     |       |    |             |     |     |

| <b>Wires &amp; Connectors<br/>IMG:</b>        | N/A   |                    |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |
|---|---|--------------------|--------------|---------------------------------------|-----------------------|---------------------------------------|------------------------------|---------------------------------------|-------------------|---------------------------------------|---------------------|
| <b>Internal Electrical Schematic<br/>IMG:</b> | Schematic No 873/E0155 <table border="1"> <thead> <tr> <th>MODEL</th> <th>DC MOTOR P/N</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>S3246E</td> <td>443/E0048</td> <td>DC MOTOR 3.3KW 24V</td> </tr> <tr> <td>S4046E</td> <td>443/E0048</td> <td>DC MOTOR 3.3KW 24V</td> </tr> </tbody> </table>  | MODEL              | DC MOTOR P/N | DESCRIPTION                           | S3246E                | 443/E0048                             | DC MOTOR 3.3KW 24V           | S4046E                                | 443/E0048         | DC MOTOR 3.3KW 24V                    |                     |
| MODEL   | DC MOTOR P/N  | DESCRIPTION        |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |
| S3246E  | 443/E0048   | DC MOTOR 3.3KW 24V |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |
| S4046E  | 443/E0048   | DC MOTOR 3.3KW 24V |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |
|   | Schematic No 873/E0179 <table border="1"> <thead> <tr> <th>MODEL</th> <th>DC MOTOR P/N</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>S4550E</td> <td>443/E0049</td> <td>DC MOTOR 4.5KW 24V</td> </tr> </tbody> </table>  | MODEL              | DC MOTOR P/N | DESCRIPTION                           | S4550E                | 443/E0049                             | DC MOTOR 4.5KW 24V           |                                       |                   |                                       |                     |
| MODEL   | DC MOTOR P/N  | DESCRIPTION        |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |
| S4550E  | 443/E0049   | DC MOTOR 4.5KW 24V |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |
| <b>Testing:</b>                               | Check 24 Volt on Terminal   |                    |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |
| <b>Expected Values:</b>                       | 24V   |                    |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |
| <b>Related Fault Codes:</b>                   | <table border="1"> <thead> <tr> <th>Fault Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><a href="#">38</a> <small>285</small></td> <td>Main Contactor Welded</td> </tr> <tr> <td><a href="#">39</a> <small>287</small></td> <td>Main Contactor Did Not Close</td> </tr> <tr> <td><a href="#">95</a> <small>324</small></td> <td>Pump Over current</td> </tr> <tr> <td><a href="#">BF</a> <small>324</small></td> <td>Pump Current Sensor</td> </tr> </tbody> </table> | Fault Code         | Description  | <a href="#">38</a> <small>285</small> | Main Contactor Welded | <a href="#">39</a> <small>287</small> | Main Contactor Did Not Close | <a href="#">95</a> <small>324</small> | Pump Over current | <a href="#">BF</a> <small>324</small> | Pump Current Sensor |
| Fault Code                                    | Description   |                    |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |
| <a href="#">38</a> <small>285</small>         | Main Contactor Welded   |                    |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |
| <a href="#">39</a> <small>287</small>         | Main Contactor Did Not Close  |                    |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |
| <a href="#">95</a> <small>324</small>         | Pump Over current   |                    |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |
| <a href="#">BF</a> <small>324</small>         | Pump Current Sensor   |                    |              |                                       |                       |                                       |                              |                                       |                   |                                       |                     |




## 5.10 DC Contactor

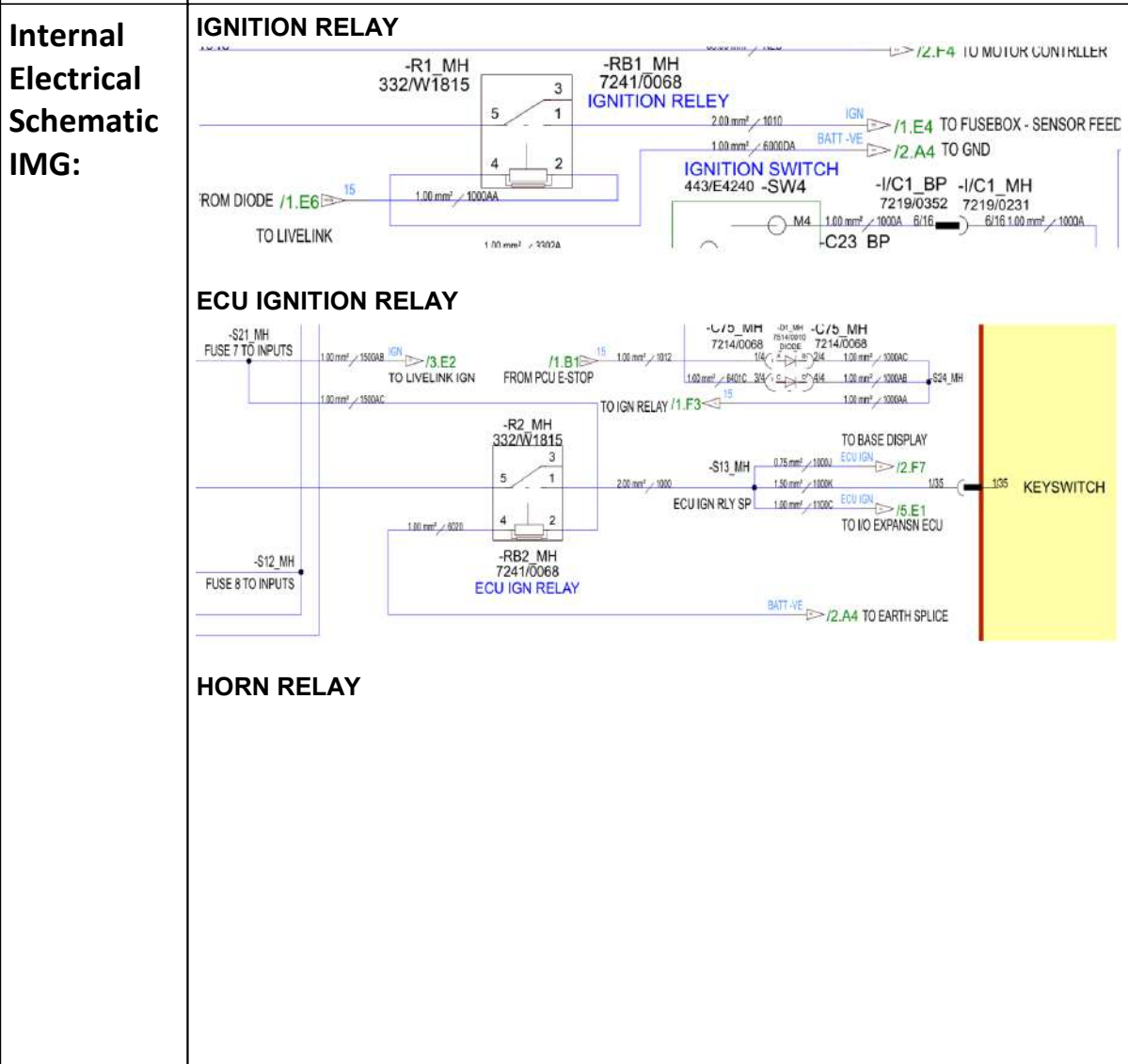
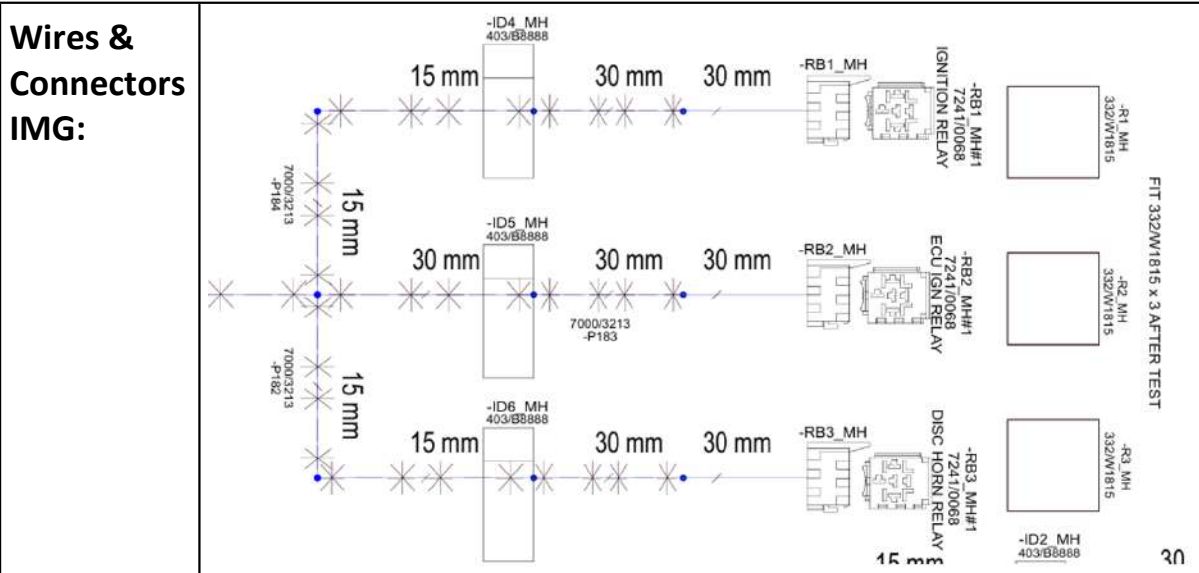
| <b>Component:</b>    | <b>DC Contactor</b>  |           |         |          |             |         |         |     |                  |           |     |    |             |           |     |
|----------------------|--|-----------|---------|----------|-------------|---------|---------|-----|------------------|-----------|-----|----|-------------|-----------|-----|
| <b>Function:</b>     | <p>DC Contactor enables pump motors to be energized as required .It is used to turn power on and off the electric pump.</p> <p>The Contactor is controlled via the Curtis Controller .</p>   |           |         |          |             |         |         |     |                  |           |     |    |             |           |     |
| <b>Location:</b>     | It is fitted on hydraulic door compartment   |           |         |          |             |         |         |     |                  |           |     |    |             |           |     |
| <b>Location IMG:</b> |   |           |         |          |             |         |         |     |                  |           |     |    |             |           |     |
| <b>Signal:</b>       | <p>When Contactor activated</p> <table border="1"> <thead> <tr> <th>Terminal</th> <th>Description</th> <th>Wire No</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>T14</td> <td>Motor Controller</td> <td>7208/1048</td> <td>24V</td> </tr> <tr> <td>T4</td> <td>Battery +ve</td> <td>7208/1048</td> <td>24V</td> </tr> </tbody> </table> |           |         | Terminal | Description | Wire No | Voltage | T14 | Motor Controller | 7208/1048 | 24V | T4 | Battery +ve | 7208/1048 | 24V |
| Terminal             | Description  | Wire No   | Voltage |          |             |         |         |     |                  |           |     |    |             |           |     |
| T14                  | Motor Controller   | 7208/1048 | 24V     |          |             |         |         |     |                  |           |     |    |             |           |     |
| T4                   | Battery +ve  | 7208/1048 | 24V     |          |             |         |         |     |                  |           |     |    |             |           |     |

| <p><b>Wires &amp; Connectors</b><br/><b>IMG:</b></p>        | <table border="1"> <thead> <tr> <th>ITEM</th> <th>PART NUMBER</th> <th>DESCRIPTION</th> <th>QTY</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>401/B4021</td> <td>BATT CABLE 35mm2 RED 100mm</td> <td>1</td> </tr> <tr> <td>2</td> <td>401/B5255</td> <td>BATT CABLE 35mm2 RED 250mm</td> <td>1</td> </tr> <tr> <td>3</td> <td>401/B4007</td> <td>BATT CABLE 35mm2 RED LEN 220mm</td> <td>1</td> </tr> <tr> <td>4</td> <td>401/B3968</td> <td>BATT CABLE 35mm2 RED 220mm</td> <td>2</td> </tr> <tr> <td>5</td> <td>401/B3933</td> <td>BATT CABLE 35mm2 RED 320mm</td> <td>1</td> </tr> <tr> <td>6</td> <td>401/B3998</td> <td>BATT CABLE 35mm2 BLACK 510mm</td> <td>1</td> </tr> <tr> <td>7</td> <td>B73/ED118</td> <td>BATT CABLE 35mm2 RED 2380mm</td> <td>1</td> </tr> <tr> <td>8</td> <td>B73/ED120</td> <td>BATT CABLE 35mm2 BLACK 2700mm</td> <td>1</td> </tr> <tr> <td>9</td> <td>B73/ED114</td> <td>BATT CABLE 35mm2 RED 300mm</td> <td>1</td> </tr> <tr> <td>10</td> <td>B73/ED119</td> <td>BATT CABLE 35mm2 BLACK 300mm</td> <td>1</td> </tr> </tbody> </table> | ITEM                           | PART NUMBER | DESCRIPTION                       | QTY                   | 1                                 | 401/B4021                    | BATT CABLE 35mm2 RED 100mm | 1 | 2 | 401/B5255 | BATT CABLE 35mm2 RED 250mm | 1 | 3 | 401/B4007 | BATT CABLE 35mm2 RED LEN 220mm | 1 | 4 | 401/B3968 | BATT CABLE 35mm2 RED 220mm | 2 | 5 | 401/B3933 | BATT CABLE 35mm2 RED 320mm | 1 | 6 | 401/B3998 | BATT CABLE 35mm2 BLACK 510mm | 1 | 7 | B73/ED118 | BATT CABLE 35mm2 RED 2380mm | 1 | 8 | B73/ED120 | BATT CABLE 35mm2 BLACK 2700mm | 1 | 9 | B73/ED114 | BATT CABLE 35mm2 RED 300mm | 1 | 10 | B73/ED119 | BATT CABLE 35mm2 BLACK 300mm | 1 |
|---|--|--------------------------------|-------------|-----------------------------------|-----------------------|-----------------------------------|------------------------------|----------------------------|---|---|-----------|----------------------------|---|---|-----------|--------------------------------|---|---|-----------|----------------------------|---|---|-----------|----------------------------|---|---|-----------|------------------------------|---|---|-----------|-----------------------------|---|---|-----------|-------------------------------|---|---|-----------|----------------------------|---|----|-----------|------------------------------|---|
| ITEM  | PART NUMBER  | DESCRIPTION                    | QTY         |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| 1   | 401/B4021  | BATT CABLE 35mm2 RED 100mm     | 1           |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| 2   | 401/B5255  | BATT CABLE 35mm2 RED 250mm     | 1           |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| 3   | 401/B4007  | BATT CABLE 35mm2 RED LEN 220mm | 1           |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| 4   | 401/B3968  | BATT CABLE 35mm2 RED 220mm     | 2           |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| 5   | 401/B3933  | BATT CABLE 35mm2 RED 320mm     | 1           |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| 6   | 401/B3998  | BATT CABLE 35mm2 BLACK 510mm   | 1           |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| 7   | B73/ED118  | BATT CABLE 35mm2 RED 2380mm    | 1           |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| 8   | B73/ED120  | BATT CABLE 35mm2 BLACK 2700mm  | 1           |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| 9   | B73/ED114  | BATT CABLE 35mm2 RED 300mm     | 1           |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| 10  | B73/ED119  | BATT CABLE 35mm2 BLACK 300mm   | 1           |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| <p><b>Internal Electrical Schematic</b><br/><b>IMG:</b></p> |  |                                |             |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| <p><b>Testing:</b></p>                                      | <p>Check Continuity on Terminal</p> <p>Check Resistance on Positive and Negative terminal</p>  |                                |             |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| <p><b>Expected Values:</b></p>                              | <p>24V</p>   |                                |             |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| <p><b>Related Fault Codes:</b></p>                          | <table border="1"> <thead> <tr> <th>Fault Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><a href="#">38</a> <sub>285</sub></td> <td>Main Contactor Welded</td> </tr> <tr> <td><a href="#">39</a> <sub>287</sub></td> <td>Main Contactor Did Not Close</td> </tr> </tbody> </table>   | Fault Code                     | Description | <a href="#">38</a> <sub>285</sub> | Main Contactor Welded | <a href="#">39</a> <sub>287</sub> | Main Contactor Did Not Close |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| Fault Code  | Description  |                                |             |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| <a href="#">38</a> <sub>285</sub>                           | Main Contactor Welded  |                                |             |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |
| <a href="#">39</a> <sub>287</sub>                           | Main Contactor Did Not Close   |                                |             |                                   |                       |                                   |                              |                            |   |   |           |                            |   |   |           |                                |   |   |           |                            |   |   |           |                            |   |   |           |                              |   |   |           |                             |   |   |           |                               |   |   |           |                            |   |    |           |                              |   |

5.11 Relay

|                          |              |
|--------------------------|--------------|
| <p><b>Component:</b></p> | <p>Relay</p> |
|--------------------------|--------------|


|                             |   |
|-----------------------------|---|
| <p><b>Function:</b></p>     | <p>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.</p> <p>This allows high current circuit to be controlled by low current switches and ecu. The three relays used in this machine are -</p> <ol style="list-style-type: none"> <li>1 Ignition Relay</li> <li>2. ECU supply Relay</li> <li>3.Horn Relay</li> </ol> |
| <p><b>Location:</b></p>     | <p>All three relays are fitted on RHS door compartment</p>  |
| <p><b>Location IMG:</b></p> |    |
| <p><b>Signal:</b></p>       | <p>24V</p>  |



|                                    |   |
|------------------------------------|---|
|                                    |   |
| <p><b>Testing:</b></p>             | <p>Check Continuity between terminal 3 &amp; 5 and terminal 2 &amp; 4</p> |
| <p><b>Expected Values:</b></p>     | <p>24V</p>  |
| <p><b>Related Fault Codes:</b></p> | <p>N/A</p>  |

### 5.12 Base Toggle Switch

|                          |  |
|--------------------------|--|
| <p><b>Component:</b></p> | <p><b>Base Toggle Switch</b></p>   |
| <p><b>Function:</b></p>  | <p>There are two toggle switched at the base control panel to enable the functions from base .</p> <p><b>1.Base Enable Switch -</b><br/>             Base enable switch is a Toggle Switch of type momentary(On-Off)<br/>             When key switch is set to chassis/base controls, To enable Lift/Lower function from chassis ,Base Enable switch must be pressed and held at the same time as the lift/lower toggle switch .<br/>             Enable switch- Two position<br/>             The Service mode can be initiated by the Base Enable switch as follows-<br/>             In Chassis mode- when Base Enable switch is pressed and held continuously for more than 10 sec without pressing Lift/Lower toggle button, it shall be treated as ‘the request for Service mode after next key-cycle’.<br/>             If the Base Enable switch still kept pressed and held for more than 5 sec even after receiving the indication of successful Service mode recognition by the machine a, then it shall be treated as a false switch press. In this case the earlier recognized Service mode request shall be discarded.</p> <p><b>2.Lift/Lower switch -</b><br/>             Lift/lower switch is a Toggle Switch of type momentary(On-Off-On)</p> |

|                             | <p>Switch shall have 3 positions:</p> <ol style="list-style-type: none"> <li>1. Platform up (momentary)</li> <li>2. No movement select (default)</li> <li>3. Platform down (momentary)</li> </ol> <p>Switch shall be spring loaded to default position.</p> <p>If toggle switch is push and held in the up position platform shall only be raised if key switch is set to chassis controls and base enable switch is also held</p> <p>If toggle switch is push and held in the down position platform shall only be lowered if key switch is set to chassis controls and base enable switch is also held.</p>  |          |             |         |         |       |           |       |     |       |               |      |     |       |              |      |     |          |             |         |         |  |  |  |  |
|-----------------------------|--|----------|-------------|---------|---------|-------|-----------|-------|-----|-------|---------------|------|-----|-------|--------------|------|-----|----------|-------------|---------|---------|--|--|--|--|
| <p><b>Location:</b></p>     | <p>These toggle switches are fitted on RHS door compartment along with ignition &amp; E stop switches</p>  |          |             |         |         |       |           |       |     |       |               |      |     |       |              |      |     |          |             |         |         |  |  |  |  |
| <p><b>Location IMG:</b></p> |   |          |             |         |         |       |           |       |     |       |               |      |     |       |              |      |     |          |             |         |         |  |  |  |  |
| <p><b>Signal:</b></p>       | <p><b>PLATFORM UP/DOWN SWITCH</b></p> <table border="1"> <thead> <tr> <th>Terminal</th> <th>Description</th> <th>Wire No</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>T1_BP</td> <td>IGN Relay</td> <td>1100A</td> <td>24V</td> </tr> <tr> <td>T2_BP</td> <td>Down(Pressed)</td> <td>1001</td> <td>24V</td> </tr> <tr> <td>T3_BP</td> <td>UP (Pressed)</td> <td>1002</td> <td>24V</td> </tr> </tbody> </table> <p><b>ENABLE SWITCH</b></p> <table border="1"> <thead> <tr> <th>Terminal</th> <th>Description</th> <th>Wire No</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | Terminal | Description | Wire No | Voltage | T1_BP | IGN Relay | 1100A | 24V | T2_BP | Down(Pressed) | 1001 | 24V | T3_BP | UP (Pressed) | 1002 | 24V | Terminal | Description | Wire No | Voltage |  |  |  |  |
| Terminal                    | Description  | Wire No  | Voltage     |         |         |       |           |       |     |       |               |      |     |       |              |      |     |          |             |         |         |  |  |  |  |
| T1_BP                       | IGN Relay  | 1100A    | 24V         |         |         |       |           |       |     |       |               |      |     |       |              |      |     |          |             |         |         |  |  |  |  |
| T2_BP                       | Down(Pressed)  | 1001     | 24V         |         |         |       |           |       |     |       |               |      |     |       |              |      |     |          |             |         |         |  |  |  |  |
| T3_BP                       | UP (Pressed)   | 1002     | 24V         |         |         |       |           |       |     |       |               |      |     |       |              |      |     |          |             |         |         |  |  |  |  |
| Terminal                    | Description  | Wire No  | Voltage     |         |         |       |           |       |     |       |               |      |     |       |              |      |     |          |             |         |         |  |  |  |  |
|                             |  |          |             |         |         |       |           |       |     |       |               |      |     |       |              |      |     |          |             |         |         |  |  |  |  |

|   | <table border="1"> <tr> <td>T6_BP</td> <td>IGN Relay</td> <td>1100F</td> <td>24V</td> </tr> <tr> <td>T7_BP</td> <td>Toggle Switch Enable(Pressed)</td> <td>1004</td> <td>24V</td> </tr> </table>  | T6_BP          | IGN Relay | 1100F | 24V | T7_BP | Toggle Switch Enable(Pressed) | 1004 | 24V |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |
|---|---|----------------|-----------|-------|-----|-------|-------------------------------|------|-----|-----|-----|--|----|----------------|---|----|-----|---|-----|--|-----|-----|-----|-----|-----|
| T6_BP                                     | IGN Relay   | 1100F          | 24V       |       |     |       |                               |      |     |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |
| T7_BP                                     | Toggle Switch Enable(Pressed)   | 1004           | 24V       |       |     |       |                               |      |     |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |
| <b>Wires &amp; Connectors IMG:</b>        | <p><b>Base enable toggle switch</b></p> <table border="1"> <thead> <tr> <th>ANGLE OF THROW</th> <th>I</th> <th>II</th> <th>III</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>2-3</td> <td></td> <td>2-1</td> </tr> <tr> <td>28°</td> <td>MOM</td> <td></td> <td>ON</td> </tr> </tbody> </table><br><p><b>Platform Lift/lower toggle switch</b></p> <table border="1"> <thead> <tr> <th>ANGLE OF THROW</th> <th>I</th> <th>II</th> <th>III</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>2-3</td> <td></td> <td>2-1</td> </tr> <tr> <td>28°</td> <td>MOM</td> <td>OFF</td> <td>MOM</td> </tr> </tbody> </table>  | ANGLE OF THROW | I         | II    | III | A     | 2-3                           |      | 2-1 | 28° | MOM |  | ON | ANGLE OF THROW | I | II | III | A | 2-3 |  | 2-1 | 28° | MOM | OFF | MOM |
| ANGLE OF THROW                            | I   | II             | III       |       |     |       |                               |      |     |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |
| A   | 2-3   |                | 2-1       |       |     |       |                               |      |     |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |
| 28°                                       | MOM   |                | ON        |       |     |       |                               |      |     |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |
| ANGLE OF THROW                            | I   | II             | III       |       |     |       |                               |      |     |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |
| A   | 2-3   |                | 2-1       |       |     |       |                               |      |     |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |
| 28°                                       | MOM   | OFF            | MOM       |       |     |       |                               |      |     |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |
| <b>Internal Electrical Schematic IMG:</b> | <p><b>PLATFORM UP/DOWN SWITCH</b><br/>403/K5430</p> <p><b>ENABLE SW</b><br/>403/K5438</p> <p><b>MOTOR CNTRLR &amp; INVERTER</b><br/>873/E0600</p> <p>Terminal connections:<br/>         -I/C1_MH (7219/0231) to -I/C1_BP (7219/0352)<br/>         -I/C1_BP (7219/0352) to -I/C1_MH (7219/0231)<br/>         -I/C1_MH (7219/0231) to -CN1_MH (332/F8042)<br/>         -CN1_MH (332/F8042) to 16/35 DOWN<br/>         -T1_BP (7201/0403) to -T2_BP (7201/0403)<br/>         -T2_BP (7201/0403) to -T3_BP (7201/0403)<br/>         -T3_BP (7201/0403) to 9/35 UP<br/>         -T6_BP (7201/0403) to -T7_BP (7201/0403)<br/>         -T7_BP (7201/0403) to 17/35 TOGGLE SWITCH ENABLE</p> |                |           |       |     |       |                               |      |     |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |
| <b>Testing:</b>                           | Check Power supply on Terminal 1 and 2 or 3 when actuate.   |                |           |       |     |       |                               |      |     |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |
| <b>Expected Values:</b>                   | 24V   |                |           |       |     |       |                               |      |     |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |
| <b>Related Fault</b>                      | N/A   |                |           |       |     |       |                               |      |     |     |     |  |    |                |   |    |     |   |     |  |     |     |     |     |     |

|               |  |
|---------------|--|
| <b>Codes:</b> |  |
|---------------|--|

## 5.13 Tilt Sensor

| <b>Component:</b> | <b>Tilt Sensor</b>  |
|-------------------|---|
| <b>Function:</b>  | <p>Tilt sensor is used to maintain the stability of the machine by determining inclination of chassis when platform is elevated</p> <p>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).</p> <p>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) and all motions disable except lowering.</p> <p>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°</p> <p style="background-color: yellow;"><b>Note :</b> That the tilt sensor is Pre-set to lengthways tilt by the specified angle from the horizontal. Angle: 3°</p> |
| <b>Location:</b>  | It is mounted directly to the chassis.  |

**Location IMG:**

**Signal:**

| Pin   | Description     | Wire No. | Connector | Voltage |
|-------|-----------------|----------|-----------|---------|
| T6_BP | Positive Supply | 4200B    | C26_MH    | 24V     |
| T2_BP | Positive Output | 1200B    | C26_MH    | 24V     |
| T3_BP | Negative Supply | 6200B    | C26_MH    | 24V     |


**Wires & Connectors IMG:**

| <p><b>Internal Electrical Schematic IMG:</b></p> |   |            |             |                                       |                   |                                       |   |
|--|---|------------|-------------|---------------------------------------|-------------------|---------------------------------------|---|
| <p><b>Testing:</b></p>                           | <p>Check 24V input and Output Supply</p>  |            |             |                                       |                   |                                       |   |
| <p><b>Expected Values:</b></p>                   | <p>24V</p>  |            |             |                                       |                   |                                       |   |
| <p><b>Related Fault Codes:</b></p>               | <table border="1"> <thead> <tr> <th>Fault Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><a href="#">LL</a> <small>254</small></td> <td>Inclination Fault</td> </tr> <tr> <td><a href="#">55</a> <small>254</small></td> <td>Machine Tilted Beyond Safe Limits Fault</td> </tr> </tbody> </table> | Fault Code | Description | <a href="#">LL</a> <small>254</small> | Inclination Fault | <a href="#">55</a> <small>254</small> | Machine Tilted Beyond Safe Limits Fault |
| Fault Code                                       | Description   |            |             |                                       |                   |                                       |   |
| <a href="#">LL</a> <small>254</small>            | Inclination Fault   |            |             |                                       |                   |                                       |   |
| <a href="#">55</a> <small>254</small>            | Machine Tilted Beyond Safe Limits Fault   |            |             |                                       |                   |                                       |   |

### 5.14 Battery Charger

|                          |   |
|--------------------------|---|
| <p><b>Component:</b></p> | <p><b>Battery Charger</b></p>   |
| <p><b>Function:</b></p>  | <p>This battery charger is a single-phase charging device operating at a frequency range of 50–60 Hz, designed to deliver a DC output power of 750 watts.</p> |
| <p><b>Location:</b></p>  | <p>The battery charger installed on battery compartment near to batteries</p>   |

**Location**  
**IMG:**



**Signal:**

| Terminal | Description | Wire No | Volt |
|----------|-------------|---------|------|
| T9       | Battery -ve | 78      | 24   |
| T8       | Battery +ve | 77      | 24   |
| Pin no 1 | E-Stop      | 3302    | 24   |
| Pin no 2 | IGN Switch  | 3301    | 24   |

|  |  |
|--|--|
| <p><b>Wires &amp; Connectors IMG:</b></p>        |  |
| <p><b>Internal Electrical Schematic IMG:</b></p> |  |
| <p><b>Testing:</b></p>                           | <p>Turn ON the External Supply from Wall Socket (coming to charger) and check if the batteries are charging or not.</p> <p>During Charging -Check for Charging Symbol on the Base Display.</p> <p>Using Multimeter check the Charger Input Voltage(should be 240v/110v AC)</p> |
| <p><b>Expected Values:</b></p>                   | <p>Output Voltage should be 24v DC</p>   |

|                             |                           |   |   |
|-----------------------------|---------------------------|---|---|
| <b>Related Fault Codes:</b> | <b>Blinking Frequency</b> | <b>Fault Cause</b>  | <b>Solution</b>   |
|                             | E01 bAt                   | The battery is not well connected, or the battery reversely connected or battery damaged. | 1) Check battery connection is correct.<br>2) Check charger connection is correct.<br>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.<br>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   |

## 5.15 Battery 6V

|                   |   |
|-------------------|---|
| <b>Component:</b> | <b>Battery 6V</b>   |
| <b>Function:</b>  | <p>The battery serves as the primary power source for the machine, storing electrical energy and supplying it to various components. It retains charge and ensures uninterrupted operation by powering key systems such as Motor controller, all sensors, Dc motor etc. Total Four (12V/6V) batteries are installed on the machine, depending on the model.</p> <p>Types of Battery used in different machines variant -</p> <p>Flooded Batteries-</p> <p>TROJAN T105, 6V, 225AH<br/>TROJAN T125, 6V, 240AH<br/>TROJAN, T-1275, 12V, 150AH</p> <p>AGM Batteries-</p> <p>VISION 220AH, 6V AGM<br/>VISION 155AH, 12V AGM</p> <p>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.</p> <p>Battery state of charge shall be calculated based on battery voltage and SOC characteristic curves<br/>These SOC characteristic curves shall be configurable in controller through internal parameters</p> |

The SOC shall be displayed in \*bars and % as shown in image below.



**Battery drain alarm-**

If Battery drain alarm is enabled and there is machine inactivity for the 'Battery Drain alarm delay' there shall be an audible warning at the Chassis Buzzer.

**Battery Type**

| Battery Type                           | Specification                      | Part No   | Supplier | Model                     |
|--|------------------------------------|-----------|----------|---------------------------|
| Flooded Batteries<br>Battery 1 x 4 nos | BATTERY, TROJAN T105, 6V, 225AH    | 443/E0142 | Trojan   | S1932EE                   |
|  | BATTERY, TROJAN T125, 6V, 240AH    | 443/E4270 | Trojan   | S3246EE                   |
|  | BATTERY TROJAN, T-1275, 12V, 150AH | 443/E4269 | Trojan   | S4046EE & S4550EE         |
| AGM Batteries<br>Battery 1 x 4 nos     | BATTERY, VISION 220AH, 6V AGM      | 873/E0171 | Vision   | S1932EE, S2632EE, S3246EE |
|  | BATTERY, VISION 155AH, 12V AGM     | 873/E0172 | Vision   | S4046EE & S4550EE         |

**Location:**



Batteries are installed in the Battery Door compartment comprising of 4 batteries to give 24V

**Location IMG:**

**Flooded Battery- TROJAN**



**AGM Battery - VISION**


|  |   |  |
|--|---|--|
|  |  |  |
| <b>Signal:</b>                         | 24V   |  |
| <b>Wires &amp; Connectors<br/>IMG:</b> |   |  |

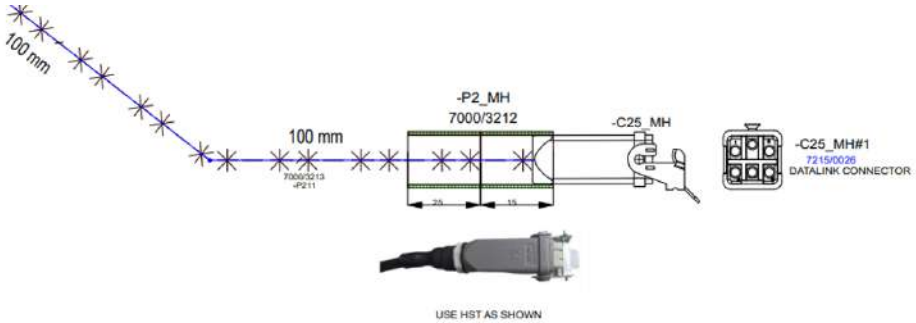
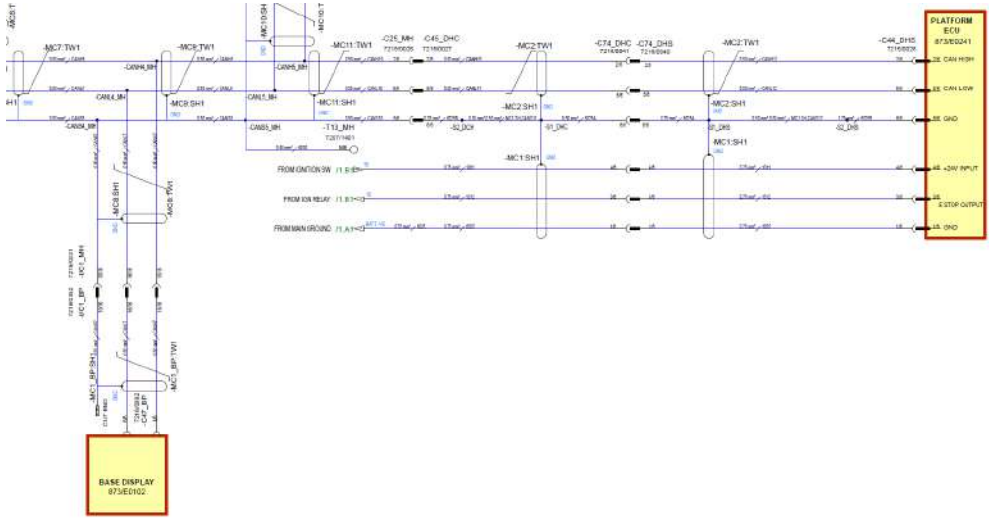


| <b>Testing:</b>                       | <p>Important: Use the multi-meter on the harness connector pins. DO NOT USE the meter on the ECU pins</p> <ol style="list-style-type: none"> <li>1. Battery Discharged-Ensure the battery has sufficient charge to power the machine. Test state of charge using a battery charger/conditioner. Recharge/replace as required.If battery has sufficient charge or fault remains, proceed to step 2.</li> <li>2. Battery connection fault-Check the electrical connectors from the battery for signs of damage/corrosion, clean the terminals and apply a suitable electrically conductive grease to the connections. Repair/replace battery or connectors as necessary. If the fault remains, proceed to Step 3.</li> <li>3. Poor Earth-Check battery earth and machine earth(s) for signs of damage/corrosion, clean the terminals and ensure bolts are tighten to the appropriate torque (see machine service manual for torque value).If the fault remains, proceed to Step 4.\</li> <li>4. Battery charging circuit-Check the battery charge circuit (see engine service manual for alternator diagnosis and repair).Repair/replace as necessary.</li> </ol> |            |             |                                       |                         |                                       |                        |                                       |                       |                                       |                      |                                       |                 |                                       |                           |
|---------------------------------------|---|------------|-------------|---------------------------------------|-------------------------|---------------------------------------|------------------------|---------------------------------------|-----------------------|---------------------------------------|----------------------|---------------------------------------|-----------------|---------------------------------------|---------------------------|
| <b>Expected Values:</b>               | 24V   |            |             |                                       |                         |                                       |                        |                                       |                       |                                       |                      |                                       |                 |                                       |                           |
| <b>Related Fault Codes:</b>           | <table border="1"> <thead> <tr> <th>Fault Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><a href="#">17</a> <small>289</small></td> <td>Severe B+ Under voltage</td> </tr> <tr> <td><a href="#">18</a> <small>296</small></td> <td>Severe B+ Over voltage</td> </tr> <tr> <td><a href="#">23</a> <small>289</small></td> <td>Under voltage Cutback</td> </tr> <tr> <td><a href="#">24</a> <small>296</small></td> <td>Over voltage Cutback</td> </tr> <tr> <td><a href="#">7B</a> <small>270</small></td> <td>Limp Mode Fault</td> </tr> <tr> <td><a href="#">6E</a> <small>270</small></td> <td>Battery Low Voltage Fault</td> </tr> </tbody> </table>  | Fault Code | Description | <a href="#">17</a> <small>289</small> | Severe B+ Under voltage | <a href="#">18</a> <small>296</small> | Severe B+ Over voltage | <a href="#">23</a> <small>289</small> | Under voltage Cutback | <a href="#">24</a> <small>296</small> | Over voltage Cutback | <a href="#">7B</a> <small>270</small> | Limp Mode Fault | <a href="#">6E</a> <small>270</small> | Battery Low Voltage Fault |
| Fault Code                            | Description   |            |             |                                       |                         |                                       |                        |                                       |                       |                                       |                      |                                       |                 |                                       |                           |
| <a href="#">17</a> <small>289</small> | Severe B+ Under voltage   |            |             |                                       |                         |                                       |                        |                                       |                       |                                       |                      |                                       |                 |                                       |                           |
| <a href="#">18</a> <small>296</small> | Severe B+ Over voltage  |            |             |                                       |                         |                                       |                        |                                       |                       |                                       |                      |                                       |                 |                                       |                           |
| <a href="#">23</a> <small>289</small> | Under voltage Cutback   |            |             |                                       |                         |                                       |                        |                                       |                       |                                       |                      |                                       |                 |                                       |                           |
| <a href="#">24</a> <small>296</small> | Over voltage Cutback  |            |             |                                       |                         |                                       |                        |                                       |                       |                                       |                      |                                       |                 |                                       |                           |
| <a href="#">7B</a> <small>270</small> | Limp Mode Fault   |            |             |                                       |                         |                                       |                        |                                       |                       |                                       |                      |                                       |                 |                                       |                           |
| <a href="#">6E</a> <small>270</small> | Battery Low Voltage Fault   |            |             |                                       |                         |                                       |                        |                                       |                       |                                       |                      |                                       |                 |                                       |                           |

## 5.16 Display Function


|                   |  |
|-------------------|--|
| <b>Component:</b> | <b>Display Function</b>  |
| <b>Function:</b>  | <p>The Display shows the operator key information related to the machine, including speed, battery %, warning lamps, fault codes etc.</p> <p>During start-up the platform display shall show the software version for the platform ECU for 3 sec</p> |

|                             | <p>If Lift and Drive buttons are pressed simultaneously during key on cycle, platform display menu shall be accessed</p> <p>Platform display shall show 'CH' (or equivalent icon) to identify the chassis control position is selected when key switch position = chassis</p> <p>If any machine errors are active, relevant error code shall be displayed on platform display.<br/>In case of multiple errors, error codes shall be cycled.</p> <p>If machine is operated outside of defined limits of use for platform load or is tilted beyond defined inclination a clear warning (OL – Overload, LL- Tilt Alarm) shall be displayed on the platform display</p> <p>The Platform display shall show platform load (gauge &amp; %) during normal operation.</p> <p>If any fault on I/O for Load Sensing system, the platform display shall stop showing load percentage in designated placeholder and print “—”. The respective fault code shall be shown in the designated area for fault codes on platform display</p> |          |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
|-----------------------------|--|----------|-------------|----------|------|---|-----|------|----|---|----------|--------|-------|---|---------------|------|-----|---|-------|------|-----|---|---------|--------|-------|---|-----|-------|----|
| <p><b>Location:</b></p>     | <p>Display is mounting on Base control Panel and Platform Control Panel</p>  |          |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| <p><b>Location IMG:</b></p> |   |          |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| <p><b>Signal:</b></p>       | <table border="1"> <thead> <tr> <th>Pin</th> <th>Description</th> <th>Wire No.</th> <th>Volt</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>GND</td> <td>6025</td> <td>0V</td> </tr> <tr> <td>2</td> <td>CAN High</td> <td>CANH12</td> <td>3.5V-</td> </tr> <tr> <td>3</td> <td>E-Stop Output</td> <td>1012</td> <td>24V</td> </tr> <tr> <td>4</td> <td>Input</td> <td>1011</td> <td>24V</td> </tr> <tr> <td>5</td> <td>CAN Low</td> <td>CANL12</td> <td>1.5V-</td> </tr> <tr> <td>6</td> <td>GND</td> <td>6025B</td> <td>0V</td> </tr> </tbody> </table>   | Pin      | Description | Wire No. | Volt | 1 | GND | 6025 | 0V | 2 | CAN High | CANH12 | 3.5V- | 3 | E-Stop Output | 1012 | 24V | 4 | Input | 1011 | 24V | 5 | CAN Low | CANL12 | 1.5V- | 6 | GND | 6025B | 0V |
| Pin                         | Description  | Wire No. | Volt        |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| 1                           | GND  | 6025     | 0V          |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| 2                           | CAN High   | CANH12   | 3.5V-       |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| 3                           | E-Stop Output  | 1012     | 24V         |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| 4                           | Input  | 1011     | 24V         |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| 5                           | CAN Low  | CANL12   | 1.5V-       |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| 6                           | GND  | 6025B    | 0V          |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |

|  |   |
|--|---|
| <p><b>Wires &amp; Connectors<br/>IMG:</b></p>                |   |
| <p><b>Internal<br/>Electrical<br/>Schematic<br/>IMG:</b></p> |  |
| <p><b>Testing:</b></p>                                       | <p>Check Input Supply - 24V</p>   |
| <p><b>Expected Values:</b></p>                               | <p>Input Supply - 24V</p>   |
| <p><b>Related Fault Codes:</b></p>                           | <p>N/A</p>  |

## 5.17 Angle Sensor


|                          |   |
|--------------------------|---|
| <p><b>Component:</b></p> | <p><b>Angle Sensor</b></p>  |
| <p><b>Function:</b></p>  | <p>Angle sensor is used to measure height of the scissor.</p> <p>The shaft of the sensor is coupled with scissor pin, as the scissor pack opens or closes the shaft gets rotated.</p> <p>For every degree rotation a particular digital value is generated.</p> |

|                      | This value is fed to controller and thus.controller determines the position of the scissor.  |          |           |          |  |     |             |          |           |         |   |             |       |        |     |   |     |       |        |    |   |                    |       |        |          |
|----------------------|--|----------|-----------|----------|--|-----|-------------|----------|-----------|---------|---|-------------|-------|--------|-----|---|-----|-------|--------|----|---|--------------------|-------|--------|----------|
| <b>Location:</b>     | On S1932EE machine angle sensor is installed on chassis.<br>Rest of the model have angle sensor mounted on the scissor pack  |          |           |          |  |     |             |          |           |         |   |             |       |        |     |   |     |       |        |    |   |                    |       |        |          |
| <b>Location IMG:</b> | <p><b>S1932EE</b><br/><b>Rest of the model</b></p>    |          |           |          |  |     |             |          |           |         |   |             |       |        |     |   |     |       |        |    |   |                    |       |        |          |
| <b>Signal:</b>       | <table border="1"> <thead> <tr> <th>Pin</th> <th>Description</th> <th>Wire No.</th> <th>Connector</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Battery +ve</td> <td>1200C</td> <td>C33_MH</td> <td>24V</td> </tr> <tr> <td>2</td> <td>GND</td> <td>6200C</td> <td>C33_MH</td> <td>0V</td> </tr> <tr> <td>3</td> <td>Angle Sensor Input</td> <td>4200C</td> <td>C33_MH</td> <td>0.5-4.5V</td> </tr> </tbody> </table> |          |           |          |  | Pin | Description | Wire No. | Connector | Voltage | 1 | Battery +ve | 1200C | C33_MH | 24V | 2 | GND | 6200C | C33_MH | 0V | 3 | Angle Sensor Input | 4200C | C33_MH | 0.5-4.5V |
| Pin                  | Description  | Wire No. | Connector | Voltage  |  |     |             |          |           |         |   |             |       |        |     |   |     |       |        |    |   |                    |       |        |          |
| 1                    | Battery +ve  | 1200C    | C33_MH    | 24V      |  |     |             |          |           |         |   |             |       |        |     |   |     |       |        |    |   |                    |       |        |          |
| 2                    | GND  | 6200C    | C33_MH    | 0V       |  |     |             |          |           |         |   |             |       |        |     |   |     |       |        |    |   |                    |       |        |          |
| 3                    | Angle Sensor Input   | 4200C    | C33_MH    | 0.5-4.5V |  |     |             |          |           |         |   |             |       |        |     |   |     |       |        |    |   |                    |       |        |          |

| <p><b>Wires &amp; Connectors<br/>IMG:</b></p>        |   |            |             |                                   |                    |                                   |                                |                                   |                         |                                   |                   |
|--|---|------------|-------------|-----------------------------------|--------------------|-----------------------------------|--------------------------------|-----------------------------------|-------------------------|-----------------------------------|-------------------|
| <p><b>Internal Electrical Schematic<br/>IMG:</b></p> |   |            |             |                                   |                    |                                   |                                |                                   |                         |                                   |                   |
| <p><b>Testing:</b></p>                               | <p>Check Input Voltage - 24V &amp; Output Voltage - 0.5V-4.5V</p>   |            |             |                                   |                    |                                   |                                |                                   |                         |                                   |                   |
| <p><b>Expected Values:</b></p>                       | <p>Input Voltage - 24V &amp; Output Voltage - 0.5V-4.5V</p>   |            |             |                                   |                    |                                   |                                |                                   |                         |                                   |                   |
| <p><b>Related Fault Codes:</b></p>                   | <table border="1"> <thead> <tr> <th>Fault Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><a href="#">B8</a> <sub>241</sub></td> <td>Angle Sensor Fault</td> </tr> <tr> <td><a href="#">65</a> <sub>241</sub></td> <td>Angle Sensor Calibration Fault</td> </tr> <tr> <td><a href="#">5A</a> <sub>264</sub></td> <td>Down limit Switch Fault</td> </tr> <tr> <td><a href="#">6D</a> <sub>267</sub></td> <td>Lift Motion Fault</td> </tr> </tbody> </table> | Fault Code | Description | <a href="#">B8</a> <sub>241</sub> | Angle Sensor Fault | <a href="#">65</a> <sub>241</sub> | Angle Sensor Calibration Fault | <a href="#">5A</a> <sub>264</sub> | Down limit Switch Fault | <a href="#">6D</a> <sub>267</sub> | Lift Motion Fault |
| Fault Code   | Description   |            |             |                                   |                    |                                   |                                |                                   |                         |                                   |                   |
| <a href="#">B8</a> <sub>241</sub>                    | Angle Sensor Fault  |            |             |                                   |                    |                                   |                                |                                   |                         |                                   |                   |
| <a href="#">65</a> <sub>241</sub>                    | Angle Sensor Calibration Fault  |            |             |                                   |                    |                                   |                                |                                   |                         |                                   |                   |
| <a href="#">5A</a> <sub>264</sub>                    | Down limit Switch Fault   |            |             |                                   |                    |                                   |                                |                                   |                         |                                   |                   |
| <a href="#">6D</a> <sub>267</sub>                    | Lift Motion Fault   |            |             |                                   |                    |                                   |                                |                                   |                         |                                   |                   |

5.18 Joystick

|                          |                 |
|--------------------------|-----------------|
| <p><b>Component:</b></p> | <p>Joystick</p> |
|--------------------------|-----------------|

| <p><b>Function:</b></p>     | <p>There shall be a single axis proportional joystick with Enable button</p> <p>If drive mode selected – Press Enable button and Push forward to drive forward, Press Enable button and pull backwards to drive backwards.<br/>Refer section Function 1 - Drive for drive control</p> <p>If lift mode selected - Press Enable button and Push forward to lower platform, Press Enable button and pull backward to raise platform<br/>Refer section Function3 -Platform Raise for lift control</p> <p>Joystick also has 3 position switch located on top of joystick for steer operation</p> <ol style="list-style-type: none"> <li>1. Steer left (momentary)</li> <li>2. No steer selected (default)</li> <li>3. Steer right (momentary)</li> </ol> |          |       |  |     |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
|-----------------------------|---|----------|-------|--|-----|-------------|----------|------|---|-----|------|----|---|----------|--------|-------|---|---------------|------|-----|---|-------|------|-----|---|---------|--------|-------|---|-----|-------|----|
| <p><b>Location:</b></p>     | <p>Mounted on Platform Control Unit at the platform side rail</p>   |          |       |  |     |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| <p><b>Location IMG:</b></p> |   |          |       |  |     |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| <p><b>Signal:</b></p>       | <table border="1"> <thead> <tr> <th>Pin</th> <th>Description</th> <th>Wire No.</th> <th>Volt</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>GND</td> <td>6025</td> <td>0V</td> </tr> <tr> <td>2</td> <td>CAN High</td> <td>CANH12</td> <td>3.5V-</td> </tr> <tr> <td>3</td> <td>E-Stop Output</td> <td>1012</td> <td>24V</td> </tr> <tr> <td>4</td> <td>Input</td> <td>1011</td> <td>24V</td> </tr> <tr> <td>5</td> <td>CAN Low</td> <td>CANL12</td> <td>1.5V-</td> </tr> <tr> <td>6</td> <td>GND</td> <td>6025B</td> <td>0V</td> </tr> </tbody> </table>   |          |       |  | Pin | Description | Wire No. | Volt | 1 | GND | 6025 | 0V | 2 | CAN High | CANH12 | 3.5V- | 3 | E-Stop Output | 1012 | 24V | 4 | Input | 1011 | 24V | 5 | CAN Low | CANL12 | 1.5V- | 6 | GND | 6025B | 0V |
| Pin                         | Description   | Wire No. | Volt  |  |     |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| 1                           | GND   | 6025     | 0V    |  |     |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| 2                           | CAN High  | CANH12   | 3.5V- |  |     |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| 3                           | E-Stop Output   | 1012     | 24V   |  |     |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| 4                           | Input   | 1011     | 24V   |  |     |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| 5                           | CAN Low   | CANL12   | 1.5V- |  |     |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |
| 6                           | GND   | 6025B    | 0V    |  |     |             |          |      |   |     |      |    |   |          |        |       |   |               |      |     |   |       |      |     |   |         |        |       |   |     |       |    |

**Wires & Connectors IMG:**

**Internal Electrical Schematic IMG:**

**Testing:**

Check Input Supply - 24V

**Expected Values:**

Input Supply - 24V


**Related Fault Codes:**

| Fault Code                            | Description                         |
|---------------------------------------|-------------------------------------|
| <a href="#">5F</a> <small>252</small> | PCU HW Fault                        |
| <a href="#">52</a> <small>252</small> | Wika PCU PDO Timeout Fault          |
| <a href="#">5C</a> <small>269</small> | PCU Enable Trigger Sequence Fault   |
| <a href="#">5D</a> <small>269</small> | PCU Passcode Fault                  |
| <a href="#">6A</a> <small>269</small> | PCU Steer Right/Left Sequence Fault |

Scissor EDRV Helpfile

© 2026 Ravi Dagne

## 5.19 Pothole Switches


| <b>Component:</b>    | <b>Pothole Switches</b>  |
|----------------------|--|
| <b>Function:</b>     | <p>The pothole protection system helps to prevent the machine from tipping over when one wheel drives off a depression, such as a pothole.</p> <p>A typical pothole protection system consists of a protection plate, actuator and supporting linkages.</p> <p>There are two pothole switches on each side of the chassis connected in series -</p> <ol style="list-style-type: none"> <li>1.Pothole Switch LH</li> <li>2.Pothole Switch RH</li> </ol> <p>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.</p> <p>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. Raise function will get disable .</p> <p>There shall be option user can adjust:</p> <ol style="list-style-type: none"> <li>1.Pothole Protection Alarm (enable or disable)</li> </ol> |
| <b>Location:</b>     | Mounted on both sides of Chassis plate   |
| <b>Location IMG:</b> |   |

| <b>Signal:</b>                            | <b>Pin No</b>   | <b>Description</b>      | <b>Wire No</b> | <b>Volt</b>                 |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
|---|---|-------------------------|----------------|-----------------------------|-----|----------|----------------|---|--|----|---|--|----|---|--|----|---|--|
|   | 1   | LH Pothole Input        | 4200F          | 24V - Platfo<br>0V - Platfo |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
|   | 2   | LH/RH Pothole Series    | 4030F          | 24V - Platfo<br>0V - Platfo |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
|   | 3   | Platform Up/Down Switch | 1300F          | 24                          |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
|   | 4   | Enable Switch           | 1200F          | 24                          |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
| <b>Wires &amp; Connectors IMG:</b>        |   |                         |                |                             |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
|   | <table border="1"> <thead> <tr> <th>PIN</th> <th>WIRED TO</th> <th>TERMINAL BLOCK</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td>14</td> </tr> <tr> <td>2</td> <td></td> <td>22</td> </tr> <tr> <td>3</td> <td></td> <td>21</td> </tr> <tr> <td>4</td> <td></td> <td>13</td> </tr> </tbody> </table> |                         |                |                             | PIN | WIRED TO | TERMINAL BLOCK | 1 |  | 14 | 2 |  | 22 | 3 |  | 21 | 4 |  |
| PIN                                       | WIRED TO  | TERMINAL BLOCK          |                |                             |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
| 1   |   | 14                      |                |                             |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
| 2   |   | 22                      |                |                             |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
| 3   |   | 21                      |                |                             |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
| 4   |   | 13                      |                |                             |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
| <b>Internal Electrical Schematic IMG:</b> |   |                         |                |                             |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
| <b>Testing:</b>                           | Check Continuity in Contact Block Terminal  |                         |                |                             |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
| <b>Expected Values:</b>                   | 24V   |                         |                |                             |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
| <b>Related Fault Codes:</b>               | <b>Fault Code</b>   | <b>Description</b>      |                |                             |     |          |                |   |  |    |   |  |    |   |  |    |   |  |
|   | <a href="#">56</a>   257  | Pothole Switch Fault    |                |                             |     |          |                |   |  |    |   |  |    |   |  |    |   |  |

## 5.20 Pressure Sensor

|                  |                 |
|------------------|-----------------|
| <b>Component</b> | Pressure Sensor |
|------------------|-----------------|

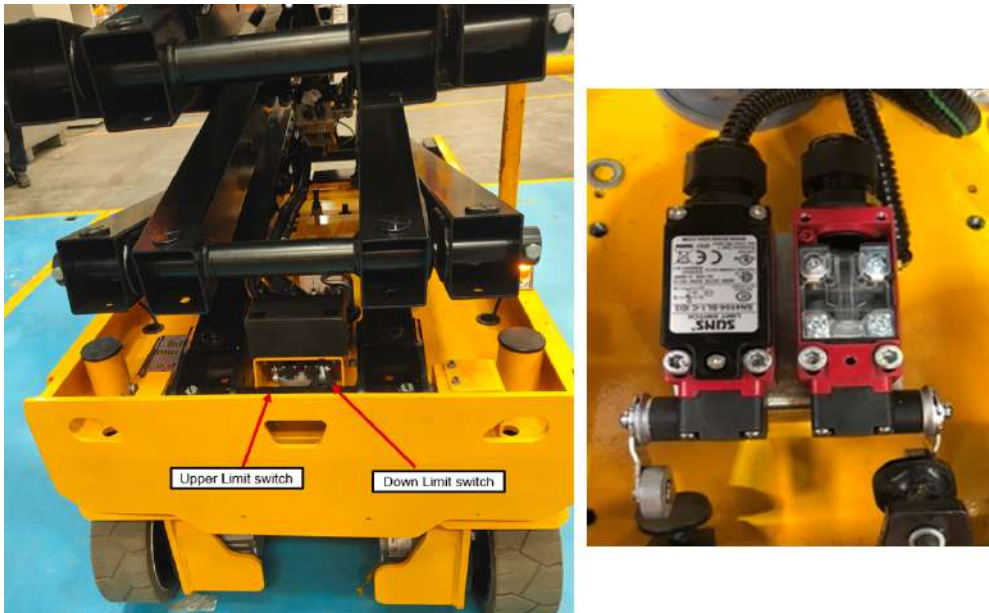
|                  |   |
|------------------|---|
| <b>t:</b>        |   |
| <b>Function:</b> | <p>The Pressure sensor are being used in Load Sensing system of the machine. There are Two Pressure sensor mounted on hydraulic lift cylinder. Pressure in cylinder is proportional to load in platform and scissor pack position.</p> <p>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.</p> <p>When the platform weight goes beyond 95% of the rated load of the machine an audible warning message is given by controller controller.</p> |
| <b>Location:</b> | Mounted on the Lift Ram Valve block.  |

| <p><b>Location</b><br/><b>IMG:</b></p> |    |         |             |         |    |   |              |       |  |   |           |       |  |   |                       |       |  |
|--|---|---------|-------------|---------|----|---|--------------|-------|--|---|-----------|-------|--|---|-----------------------|-------|--|
| <p><b>Signal:</b></p>                  | <p><b>Pressure Sensor 1</b></p> <table border="1"> <thead> <tr> <th>Pin No</th> <th>Description</th> <th>Wire No</th> <th>Vc</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Earth Splice</td> <td>6000B</td> <td></td> </tr> <tr> <td>2</td> <td>IGN Relay</td> <td>1200G</td> <td></td> </tr> <tr> <td>4</td> <td>Pressure Sensor Input</td> <td>4200G</td> <td></td> </tr> </tbody> </table> | Pin No  | Description | Wire No | Vc | 1 | Earth Splice | 6000B |  | 2 | IGN Relay | 1200G |  | 4 | Pressure Sensor Input | 4200G |  |
| Pin No                                 | Description   | Wire No | Vc          |         |    |   |              |       |  |   |           |       |  |   |                       |       |  |
| 1                                      | Earth Splice  | 6000B   |             |         |    |   |              |       |  |   |           |       |  |   |                       |       |  |
| 2                                      | IGN Relay   | 1200G   |             |         |    |   |              |       |  |   |           |       |  |   |                       |       |  |
| 4                                      | Pressure Sensor Input   | 4200G   |             |         |    |   |              |       |  |   |           |       |  |   |                       |       |  |

|                                    |                               | Pressure Sensor 2   |                       |         |    |           |          |   |         |   |         |   |          |   |        |
|------------------------------------|-------------------------------|---|-----------------------|---------|----|-----------|----------|---|---------|---|---------|---|----------|---|--------|
|                                    |                               | Pin No  | Description           | Wire No | Vc |           |          |   |         |   |         |   |          |   |        |
|                                    |                               | 1   | Earth Splice          | 6000A   |    |           |          |   |         |   |         |   |          |   |        |
|                                    |                               | 2   | IGN Relay             | 1300C   |    |           |          |   |         |   |         |   |          |   |        |
|                                    |                               | 4   | Pressure Sensor Input | 4300C   |    |           |          |   |         |   |         |   |          |   |        |
| Wires & Connectors IMG:            |                               |   |                       |         |    |           |          |   |         |   |         |   |          |   |        |
|                                    |                               |   |                       |         |    |           |          |   |         |   |         |   |          |   |        |
|                                    |                               | <table border="1"> <thead> <tr> <th>PLUG PINS</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-COMMON</td> </tr> <tr> <td>2</td> <td>+SUPPLY</td> </tr> <tr> <td>3</td> <td>NOT USED</td> </tr> <tr> <td>4</td> <td>OUTPUT</td> </tr> </tbody> </table> |                       |         |    | PLUG PINS | FUNCTION | 1 | -COMMON | 2 | +SUPPLY | 3 | NOT USED | 4 | OUTPUT |
| PLUG PINS                          | FUNCTION                      |   |                       |         |    |           |          |   |         |   |         |   |          |   |        |
| 1                                  | -COMMON                       |   |                       |         |    |           |          |   |         |   |         |   |          |   |        |
| 2                                  | +SUPPLY                       |   |                       |         |    |           |          |   |         |   |         |   |          |   |        |
| 3                                  | NOT USED                      |   |                       |         |    |           |          |   |         |   |         |   |          |   |        |
| 4                                  | OUTPUT                        |   |                       |         |    |           |          |   |         |   |         |   |          |   |        |
| Internal Electrical Schematic IMG: |                               |   |                       |         |    |           |          |   |         |   |         |   |          |   |        |
| Testing:                           | Check Input and Output Supply |   |                       |         |    |           |          |   |         |   |         |   |          |   |        |

|                             |                                   |                                    |
|-----------------------------|-----------------------------------|------------------------------------|
| <b>Expected Values:</b>     | 24V                               |                                    |
| <b>Related Fault Codes:</b> | <b>Fault Code</b>                 | <b>Description</b>                 |
|                             | <a href="#">54</a> <sup>234</sup> | Pressure Sensors Correlation Fault |
|                             | <a href="#">7A</a> <sup>237</sup> | Percentage_To_Max_Difference_Fault |
|                             | <a href="#">B9</a> <sup>234</sup> | Pressure Sensor 1 Fault            |
|                             | <a href="#">BB</a> <sup>237</sup> | Pressure Sensor 2 Fault            |


## 5.21 Up & Down Limit Switch

|                      |   |
|----------------------|---|
| <b>Component:</b>    | <b>Up &amp; Down Limit Switch</b>   |
| <b>Function:</b>     | <p>The Up and 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.</p> <p>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 safety features like Pothole, Alarm, etc.</p> <p>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</p> |
| <b>Location:</b>     | Mounted on the chassis  |
| <b>Location IMG:</b> |   |

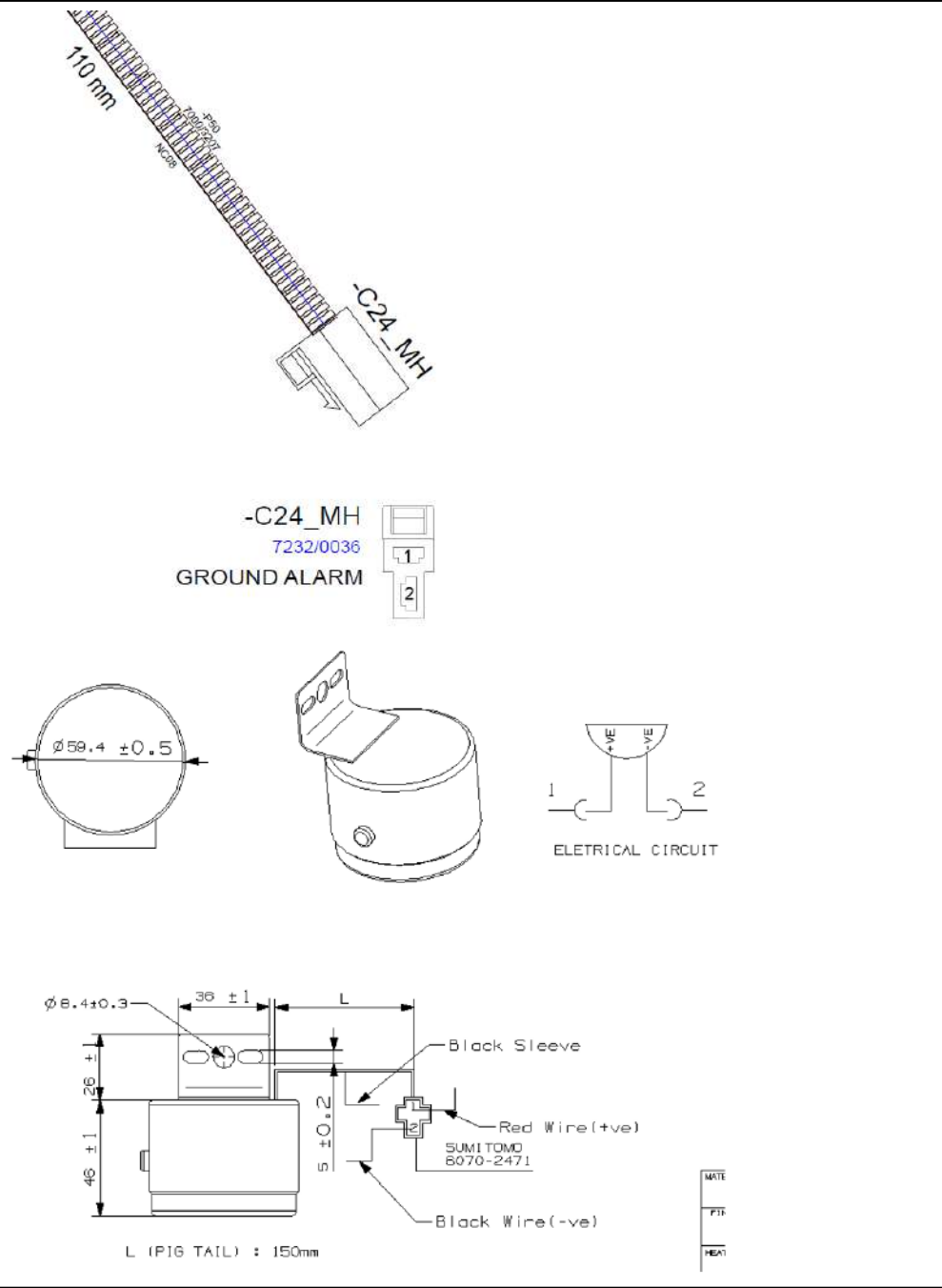
| <b>Signal:</b>                            | Lower Limit Switch   |         |                            |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
|---|--|---------|----------------------------|---------|---------|----|-----------|-------|-----|----|----------------------------|-------|----------------------------|----|--------------------|-------|-----|----|----------------------------|-------|
|   | <table border="1"> <thead> <tr> <th>Pin No</th> <th>Description</th> <th>Wire No</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>24</td> <td>IGN Relay</td> <td>1200A</td> <td>24V</td> </tr> <tr> <td>23</td> <td>LOWER LIMIT SWITCH INPUT 1</td> <td>4200A</td> <td>24V When Switch is Pressed</td> </tr> <tr> <td>16</td> <td>IGN Relay</td> <td>1300A</td> <td>24V</td> </tr> <tr> <td>15</td> <td>LOWER LIMIT SWITCH INPUT 2</td> <td>4300A</td> <td>0V When Switch is Pressed</td> </tr> </tbody> </table> | Pin No  | Description                | Wire No | Voltage | 24 | IGN Relay | 1200A | 24V | 23 | LOWER LIMIT SWITCH INPUT 1 | 4200A | 24V When Switch is Pressed | 16 | IGN Relay          | 1300A | 24V | 15 | LOWER LIMIT SWITCH INPUT 2 | 4300A |
| Pin No                                    | Description  | Wire No | Voltage                    |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| 24  | IGN Relay  | 1200A   | 24V                        |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| 23  | LOWER LIMIT SWITCH INPUT 1   | 4200A   | 24V When Switch is Pressed |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| 16  | IGN Relay  | 1300A   | 24V                        |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| 15  | LOWER LIMIT SWITCH INPUT 2   | 4300A   | 0V When Switch is Pressed  |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| <b>Wires &amp; Connectors IMG:</b>        | Upper Limit Switch   |         |                            |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
|   | <table border="1"> <thead> <tr> <th>Pin No</th> <th>Description</th> <th>Wire No</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>24</td> <td>Not Used</td> <td></td> <td></td> </tr> <tr> <td>23</td> <td>Not Used</td> <td></td> <td></td> </tr> <tr> <td>16</td> <td>UPPER LIMIT SWITCH</td> <td>4300E</td> <td>24V</td> </tr> <tr> <td>15</td> <td>IGN Relay</td> <td>1300E</td> <td>24V When Switch is Pressed</td> </tr> </tbody> </table>  | Pin No  | Description                | Wire No | Voltage | 24 | Not Used  |       |     | 23 | Not Used                   |       |                            | 16 | UPPER LIMIT SWITCH | 4300E | 24V | 15 | IGN Relay                  | 1300E |
| Pin No                                    | Description  | Wire No | Voltage                    |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| 24  | Not Used   |         |                            |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| 23  | Not Used   |         |                            |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| 16  | UPPER LIMIT SWITCH   | 4300E   | 24V                        |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| 15  | IGN Relay  | 1300E   | 24V When Switch is Pressed |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| <b>Wires &amp; Connectors IMG:</b>        |  |         |                            |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| <b>Internal Electrical Schematic IMG:</b> |  |         |                            |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| <b>Testing:</b>                           | Check Power Supply and Continuity in Contact Block Terminal  |         |                            |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |
| <b>Expected Values:</b>                   | 24V  |         |                            |         |         |    |           |       |     |    |                            |       |                            |    |                    |       |     |    |                            |       |

|                             |                          |                         |
|-----------------------------|--------------------------|-------------------------|
| <b>Related Fault Codes:</b> | <b>Fault Code</b>        | <b>Description</b>      |
|                             | <a href="#">5A</a>   264 | Down limit Switch Fault |

## 5.22 Buzzer

| <b>Component:</b>    | <b>Buzzer</b>  |         |             |         |           |         |   |     |        |        |     |   |     |       |        |    |  |  |  |  |
|----------------------|--|---------|-------------|---------|-----------|---------|---|-----|--------|--------|-----|---|-----|-------|--------|----|--|--|--|--|
| <b>Function:</b>     | The function of a buzzer on a machine is to emit an audible alarm or warning sound to alert the operator or nearby personnel of a potential hazard or issue while the machine is in operation.   |         |             |         |           |         |   |     |        |        |     |   |     |       |        |    |  |  |  |  |
| <b>Location:</b>     | It is fitted on hydraulic tank door compartment  |         |             |         |           |         |   |     |        |        |     |   |     |       |        |    |  |  |  |  |
| <b>Location IMG:</b> |   |         |             |         |           |         |   |     |        |        |     |   |     |       |        |    |  |  |  |  |
| <b>Signal:</b>       | <table border="1"> <thead> <tr> <th>Pin No</th> <th>Description</th> <th>Wire No</th> <th>Connector</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>IGN</td> <td>1100EC</td> <td>C24_MH</td> <td>24V</td> </tr> <tr> <td>2</td> <td>GND</td> <td>4400A</td> <td>C24_MH</td> <td>0V</td> </tr> </tbody> </table> | Pin No  | Description | Wire No | Connector | Voltage | 1 | IGN | 1100EC | C24_MH | 24V | 2 | GND | 4400A | C24_MH | 0V |  |  |  |  |
| Pin No               | Description  | Wire No | Connector   | Voltage |           |         |   |     |        |        |     |   |     |       |        |    |  |  |  |  |
| 1                    | IGN  | 1100EC  | C24_MH      | 24V     |           |         |   |     |        |        |     |   |     |       |        |    |  |  |  |  |
| 2                    | GND  | 4400A   | C24_MH      | 0V      |           |         |   |     |        |        |     |   |     |       |        |    |  |  |  |  |

**Wires & Connectors  
IMG:**



|  |   |
|--|---|
| <p><b>Internal Electrical Schematic IMG:</b></p> |   |
| <p><b>Testing:</b></p>                           | <p>Check Power Supply in connector terminal</p> |
| <p><b>Expected Values:</b></p>                   | <p>24V</p>                                      |
| <p><b>Related Fault Codes:</b></p>               | <p>N/A</p>                                      |


## 5.23 White Noise Alarm

| <p><b>Component:</b></p>    | <p><b>White Noise Alarm</b></p>   |         |         |        |             |         |         |   |                   |        |     |   |     |       |    |
|-----------------------------|---|---------|---------|--------|-------------|---------|---------|---|-------------------|--------|-----|---|-----|-------|----|
| <p><b>Function:</b></p>     | <p>White Noise alarm is an ambient alarm<br/>It is an optional feature ,doesn't come in Standard Machine.</p>   |         |         |        |             |         |         |   |                   |        |     |   |     |       |    |
| <p><b>Location:</b></p>     |   |         |         |        |             |         |         |   |                   |        |     |   |     |       |    |
| <p><b>Location IMG:</b></p> |   |         |         |        |             |         |         |   |                   |        |     |   |     |       |    |
| <p><b>Signal:</b></p>       | <table border="1"> <thead> <tr> <th>Pin No</th> <th>Description</th> <th>Wire No</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>I/O Expansion ECU</td> <td>1100EG</td> <td>24V</td> </tr> <tr> <td>2</td> <td>GND</td> <td>4400C</td> <td>0V</td> </tr> </tbody> </table> |         |         | Pin No | Description | Wire No | Voltage | 1 | I/O Expansion ECU | 1100EG | 24V | 2 | GND | 4400C | 0V |
| Pin No                      | Description   | Wire No | Voltage |        |             |         |         |   |                   |        |     |   |     |       |    |
| 1                           | I/O Expansion ECU   | 1100EG  | 24V     |        |             |         |         |   |                   |        |     |   |     |       |    |
| 2                           | GND   | 4400C   | 0V      |        |             |         |         |   |                   |        |     |   |     |       |    |

|   |   |
|---|---|
| <p><b>Wires &amp; Connectors</b><br/><b>IMG:</b></p>        |   |
| <p><b>Internal Electrical Schematic</b><br/><b>IMG:</b></p> |   |
| <p><b>Testing:</b></p>                                      | <p>Check Power Supply in connector terminal</p> |
| <p><b>Expected Values:</b></p>                              | <p>24V</p>                                      |
| <p><b>Related Fault Codes:</b></p>                          | <p>N/A</p>                                      |

5.24 AC Drive Motor

|                          |                       |
|--------------------------|-----------------------|
| <p><b>Component:</b></p> | <p>AC Drive Motor</p> |
|--------------------------|-----------------------|

|                          |   |
|--------------------------|---|
| <b>Function:</b>         | The Traction Motor or AC motor generates the driving effort of the machine<br>It is a Three-phase AC motor control by AC voltage .<br>There are two AC drive motor -<br>1.AC Motor Drive Right<br>2.AC Motor Drive Left |
| <b>Location:</b>         | Front side of machine on wheel yoke   |
| <b>Location<br/>IMG:</b> |    |

**Signal:**

### PIN-OUT FOR ENCODER TEMP SENSOR, BRAKE

| 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          |

**Wires & Connectors  
IMG:**

DEUTSCH DT04-08PA  
SEE TABLE FOR PIN-OUT DETAILS  
VIEWED FROM ARROW SIDE

TERMINALS FOR M6 STUDS  
U (GREEN)  
V (BLACK)  
W (WHITE)

8 AWG  
PHASE WIRES

DT04-08PA

| 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          |

**NOTE:** PAINT PER FAIRFIELD  
PAINT SPEC. FFTHPB-06  
COLOR: BLACK

ALL DIMENSIONS ARE PRE-PAINT SIZES  
IP67 PER IEC 60529

**Internal  
Electrical  
Schematic  
IMG:**

STEER RIGHT SOLENOID LS OUTPUT  
DC CONTACTOR COIL LS  
PHASE U  
PHASE V  
PHASE W  
M1 Motor Temp  
M2 Enc 100mA  
M1 Enc 100mA

FOR MOTOR PIN REFER SHEET 15

ENCODER +5V  
SIGNAL A (SIN)  
SIGNAL B (COS)  
GROUND/SHIELD  
TEMPERATURE +5V  
BRAKE +24V  
BRAKE GROUND


**Testing:**

Please refer electrical schematic

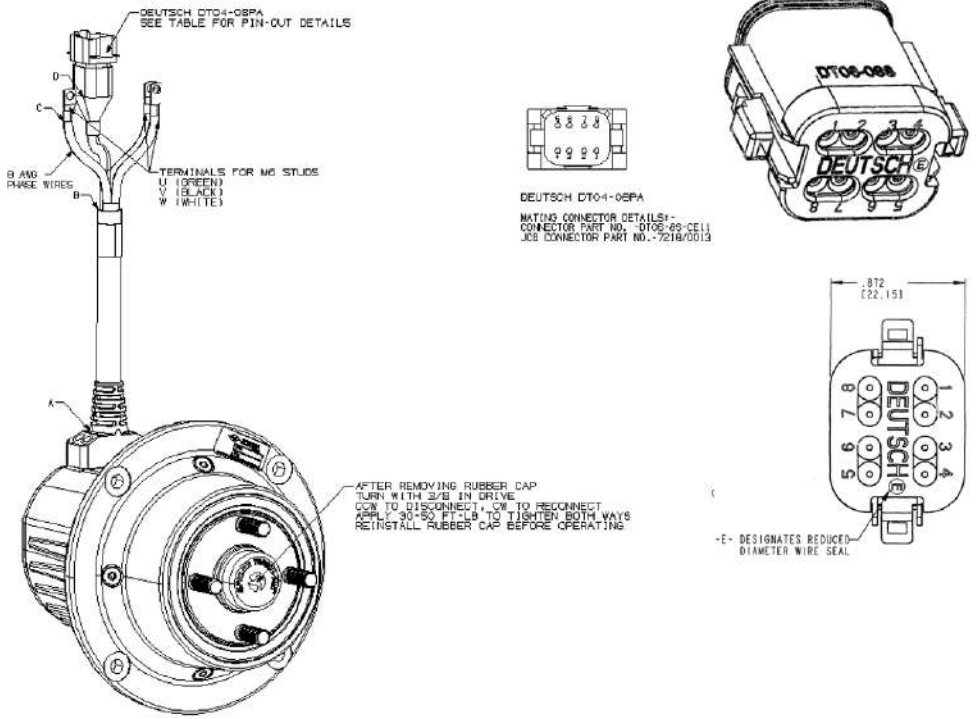
|                                       |                                       |   |
|---------------------------------------|---------------------------------------|---|
| <b>Expected Values:</b>               | 24V                                   |   |
| <b>Related Fault Codes:</b>           | <b>Fault Code</b>                     | <b>Description</b>  |
|                                       | <a href="#">12</a> <small>315</small> | Controller Over current (Motor phase current) (Left Motor)  |
|                                       | <a href="#">2</a> <small>315</small>  | Controller Over current (Motor phase current) (Right Motor) |
|                                       | <a href="#">28</a> <small>272</small> | Motor Temp Hot Cutback - Left Motor                         |
|                                       | <a href="#">0A</a> <small>272</small> | Motor Temp Hot Cutback - Right Motor                        |
|                                       | <a href="#">29</a> <small>273</small> | Motor Temp Sensor - Left Motor                              |
|                                       | <a href="#">0B</a> <small>274</small> | Motor Temp Sensor - Right Motor                             |
|                                       | <a href="#">32</a> <small>276</small> | EM Brake Driver - Left Motor                                |
|                                       | <a href="#">A2</a> <small>278</small> | EM Brake Driver - Right Motor                               |
|                                       | <a href="#">36</a> <small>279</small> | Sin Cos Motor Feedback - Left Motor                         |
|                                       | <a href="#">0D</a> <small>281</small> | Sin Cos Motor Feedback - Right Motor                        |
|                                       | <a href="#">37</a> <small>283</small> | Motor Open - Left Motor                                     |
|                                       | <a href="#">0E</a> <small>284</small> | Motor Open - Right Motor                                    |
|                                       | <a href="#">3A</a> <small>323</small> | Motor Setup Needed - Left Motor                             |
|                                       | <a href="#">0F</a> <small>323</small> | Motor Setup Needed - Right Motor                            |
|                                       | <a href="#">6B</a> <small>272</small> | Motor_Temperature_Shutdown_Fault                            |
|                                       | <a href="#">84</a> <small>276</small> | Motor Braking Impaired - Left Motor                         |
|                                       | <a href="#">3E</a> <small>278</small> | Motor Braking Impaired - Right Motor                        |
| <a href="#">92</a> <small>319</small> | EM Brake Failed to Set - Left Motor   |   |
| <a href="#">43</a> <small>320</small> | EM Brake Failed to Set - Right Motor  |   |

## 5.25 AC Drive Motor Sensor

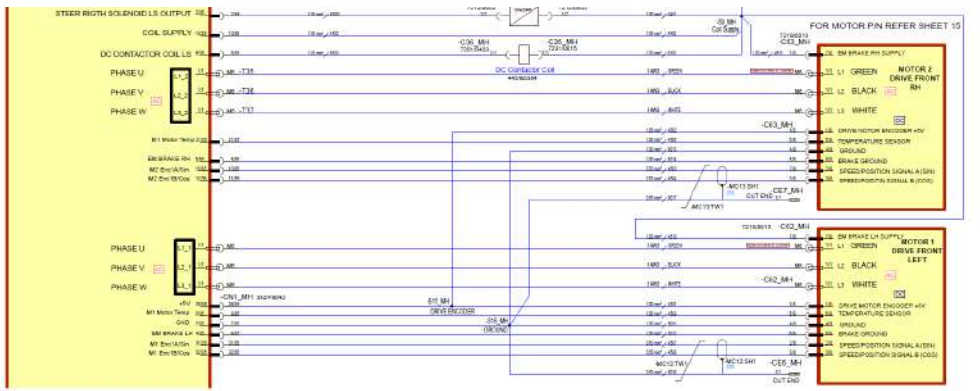
|                   |   |
|-------------------|---|
| <b>Component:</b> | <b>AC Drive Motor Sensor</b>  |
| <b>Function:</b>  | <p><b>Temperature Sensor</b> - Temperature Sensors can monitor the temperature of the motor, helping to prevent overheating and potential damage.</p> <p><b>Speed Sensor</b>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

| <p><b>Location</b><br/><b>IMG:</b></p>                      |   |            |  |   |  |  |             |                       |            |             |           |   |                |   |                |   |        |  |        |   |                  |   |               |   |            |   |              |   |
|---|---|------------|--|---|--|--|-------------|-----------------------|------------|-------------|-----------|---|----------------|---|----------------|---|--------|--|--------|---|------------------|---|---------------|---|------------|---|--------------|---|
| <p><b>Signal:</b></p>                                       | <table border="1"> <thead> <tr> <th colspan="3">CONNECTING INSTRUCTIONS FOR ENCODER, TEMP SENSOR, AND BRAKE</th> </tr> <tr> <th>DESCRIPTION</th> <th>CONNECTOR PART NUMBER</th> <th>PIN NUMBER</th> </tr> </thead> <tbody> <tr> <td>ENCODER +5V</td> <td rowspan="10">DT04-08PA</td> <td>1</td> </tr> <tr> <td>SIGNAL A (SIN)</td> <td>2</td> </tr> <tr> <td>SIGNAL B (COS)</td> <td>3</td> </tr> <tr> <td>GROUND</td> <td></td> </tr> <tr> <td>SHIELD</td> <td>4</td> </tr> <tr> <td>TEMPERATURE + 5V</td> <td>5</td> </tr> <tr> <td>NOT CONNECTED</td> <td>6</td> </tr> <tr> <td>BRAKE +24V</td> <td>7</td> </tr> <tr> <td>BRAKE GROUND</td> <td>8</td> </tr> </tbody> </table> |            |  | 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 |  | SHIELD | 4 | TEMPERATURE + 5V | 5 | NOT CONNECTED | 6 | BRAKE +24V | 7 | BRAKE GROUND | 8 |
| 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  |   |            |  |   |  |  |             |                       |            |             |           |   |                |   |                |   |        |  |        |   |                  |   |               |   |            |   |              |   |
| SHIELD  |   | 4          |  |   |  |  |             |                       |            |             |           |   |                |   |                |   |        |  |        |   |                  |   |               |   |            |   |              |   |
| TEMPERATURE + 5V  |   | 5          |  |   |  |  |             |                       |            |             |           |   |                |   |                |   |        |  |        |   |                  |   |               |   |            |   |              |   |
| NOT CONNECTED   |   | 6          |  |   |  |  |             |                       |            |             |           |   |                |   |                |   |        |  |        |   |                  |   |               |   |            |   |              |   |
| BRAKE +24V  |   | 7          |  |   |  |  |             |                       |            |             |           |   |                |   |                |   |        |  |        |   |                  |   |               |   |            |   |              |   |
| BRAKE GROUND  |   | 8          |  |   |  |  |             |                       |            |             |           |   |                |   |                |   |        |  |        |   |                  |   |               |   |            |   |              |   |

**Wires & Connectors IMG:**



**Internal Electrical Schematic IMG:**



**Testing:**

Please refer electrical schematic

**Expected Values:**

N/A


**Related Fault Codes:**

| Fault Code                            | Description   |
|---------------------------------------|---|
| <a href="#">12</a> <small>315</small> | Controller Over current (Motor phase current) (Left Motor)  |
| <a href="#">2</a> <small>315</small>  | Controller Over current (Motor phase current) (Right Motor) |
| <a href="#">28</a> <small>272</small> | Motor Temp Hot Cutback - Left Motor                         |
| <a href="#">0A</a> <small>272</small> | Motor Temp Hot Cutback - Right Motor                        |
| <a href="#">29</a> <small>273</small> | Motor Temp Sensor - Left Motor                              |
| <a href="#">0B</a> <small>274</small> | Motor Temp Sensor - Right Motor                             |
| <a href="#">32</a> <small>276</small> | EM Brake Driver - Left Motor                                |

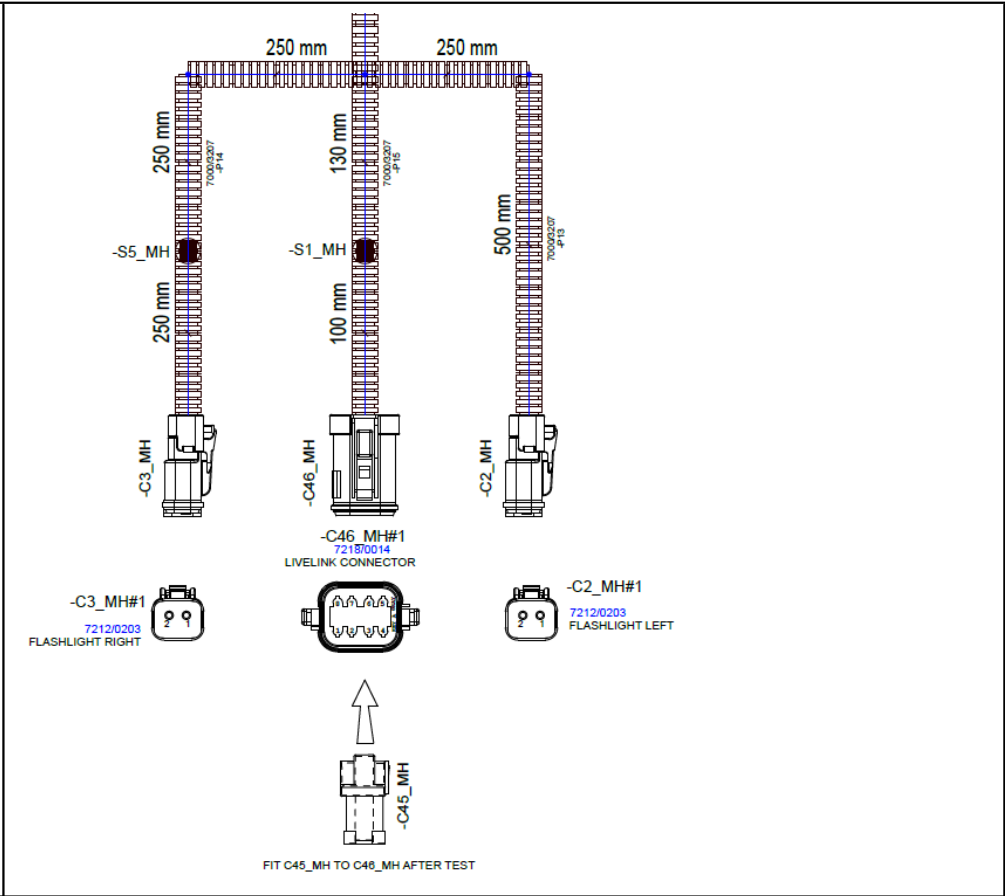
|                                       |                                      |
|---------------------------------------|--------------------------------------|
| <a href="#">A2</a> <small>278</small> | EM Brake Driver - Right Motor        |
| <a href="#">36</a> <small>279</small> | Sin Cos Motor Feedback - Left Motor  |
| <a href="#">0D</a> <small>281</small> | Sin Cos Motor Feedback - Right Motor |
| <a href="#">37</a> <small>283</small> | Motor Open - Left Motor              |
| <a href="#">0E</a> <small>284</small> | Motor Open - Right Motor             |
| <a href="#">3A</a> <small>323</small> | Motor Setup Needed - Left Motor      |
| <a href="#">0F</a> <small>323</small> | Motor Setup Needed - Right Motor     |
| <a href="#">6B</a> <small>272</small> | Motor_Temperature_Shutdown_Fault     |
| <a href="#">84</a> <small>276</small> | Motor Braking Impaired - Left Motor  |
| <a href="#">3E</a> <small>278</small> | Motor Braking Impaired - Right Motor |
| <a href="#">92</a> <small>319</small> | EM Brake Failed to Set - Left Motor  |
| <a href="#">43</a> <small>320</small> | EM Brake Failed to Set - Right Motor |

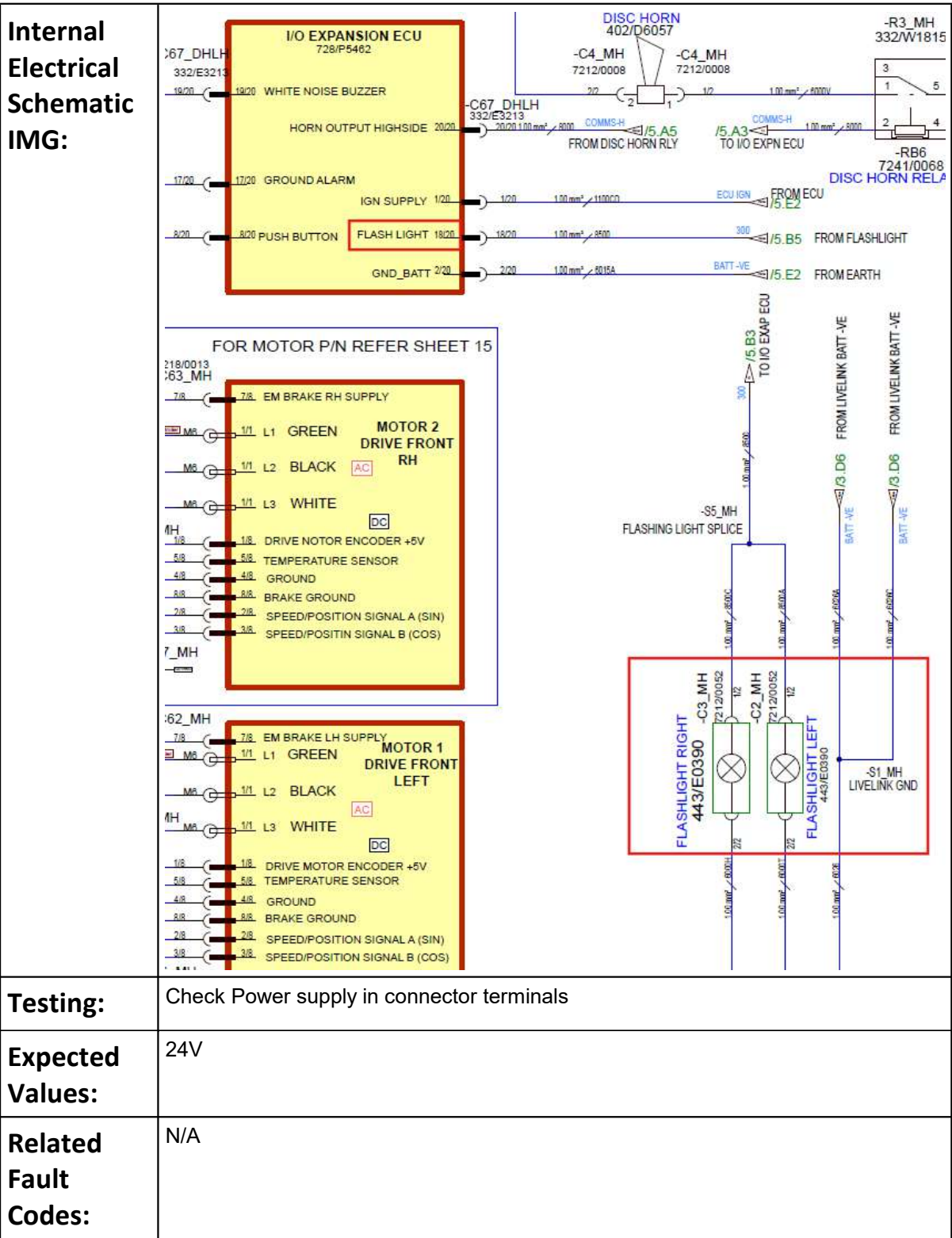
## 5.26 Flash Light

|                   |  |
|-------------------|--|
| <b>Component:</b> |  |
| <b>Function:</b>  | <p>Flashing lights are driven by an IO expansion module on basis of command from motor controller<br/>                 There are two flashlights ,Flashlight Right &amp; Flashlight Left on chassis of the machine .</p> <p>Frequency of Flashlight on below cases-</p> <p>1.NO active fault &amp; Idle Flashing lights is disabled</p> <p>If the machine is powered ON and Idle Flashing lights is disabled and NO active fault.<br/>                 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)</p> <p>2.NO active fault &amp; Idle Flashing lights is enabled</p> <p>machine is powered on AND Idle Flashing lights is enabled AND NO active fault<br/>                 Then The flashing lights shall flash at 1 Hz (1/2s on and 1/2s off and repeat) all the times</p> <p>Note- In case of fault the Flashing lights shall flash at 2 Hz (1/4s on and 1/4s off)</p> <p>In case of fault OR Service Mode OR “Platform e-stop Override” mode is Active, the Flashing lights shall flash at 2 Hz (1/4s on and 1/4s off) except in following fault condition_</p> <p>1. If Pothole guard fault (0x56) is active AND option “Disable Raise PH Fault” is set to “Raise Enabled”.</p> |

| <b>Location:</b>     | Two Flash light are fitted on both side of chassis L plate   |         |             |         |         |   |                   |       |     |   |              |       |    |        |             |         |         |   |                   |       |     |   |              |       |    |
|----------------------|--|---------|-------------|---------|---------|---|-------------------|-------|-----|---|--------------|-------|----|--------|-------------|---------|---------|---|-------------------|-------|-----|---|--------------|-------|----|
| <b>Location IMG:</b> |    |         |             |         |         |   |                   |       |     |   |              |       |    |        |             |         |         |   |                   |       |     |   |              |       |    |
| <b>Signal:</b>       | <p><b>Flashlight Right</b></p> <table border="1"> <thead> <tr> <th>Pin No</th> <th>Description</th> <th>Wire No</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>I/O Expansion ECU</td> <td>8500C</td> <td>24V</td> </tr> <tr> <td>2</td> <td>Earth Splice</td> <td>6000H</td> <td>0V</td> </tr> </tbody> </table> <p><b>Flashlight Left</b></p> <table border="1"> <thead> <tr> <th>Pin No</th> <th>Description</th> <th>Wire No</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>I/O Expansion ECU</td> <td>8500A</td> <td>24V</td> </tr> <tr> <td>2</td> <td>Earth Splice</td> <td>6000T</td> <td>0V</td> </tr> </tbody> </table> | Pin No  | Description | Wire No | Voltage | 1 | I/O Expansion ECU | 8500C | 24V | 2 | Earth Splice | 6000H | 0V | Pin No | Description | Wire No | Voltage | 1 | I/O Expansion ECU | 8500A | 24V | 2 | Earth Splice | 6000T | 0V |
| Pin No               | Description  | Wire No | Voltage     |         |         |   |                   |       |     |   |              |       |    |        |             |         |         |   |                   |       |     |   |              |       |    |
| 1                    | I/O Expansion ECU  | 8500C   | 24V         |         |         |   |                   |       |     |   |              |       |    |        |             |         |         |   |                   |       |     |   |              |       |    |
| 2                    | Earth Splice   | 6000H   | 0V          |         |         |   |                   |       |     |   |              |       |    |        |             |         |         |   |                   |       |     |   |              |       |    |
| Pin No               | Description  | Wire No | Voltage     |         |         |   |                   |       |     |   |              |       |    |        |             |         |         |   |                   |       |     |   |              |       |    |
| 1                    | I/O Expansion ECU  | 8500A   | 24V         |         |         |   |                   |       |     |   |              |       |    |        |             |         |         |   |                   |       |     |   |              |       |    |
| 2                    | Earth Splice   | 6000T   | 0V          |         |         |   |                   |       |     |   |              |       |    |        |             |         |         |   |                   |       |     |   |              |       |    |

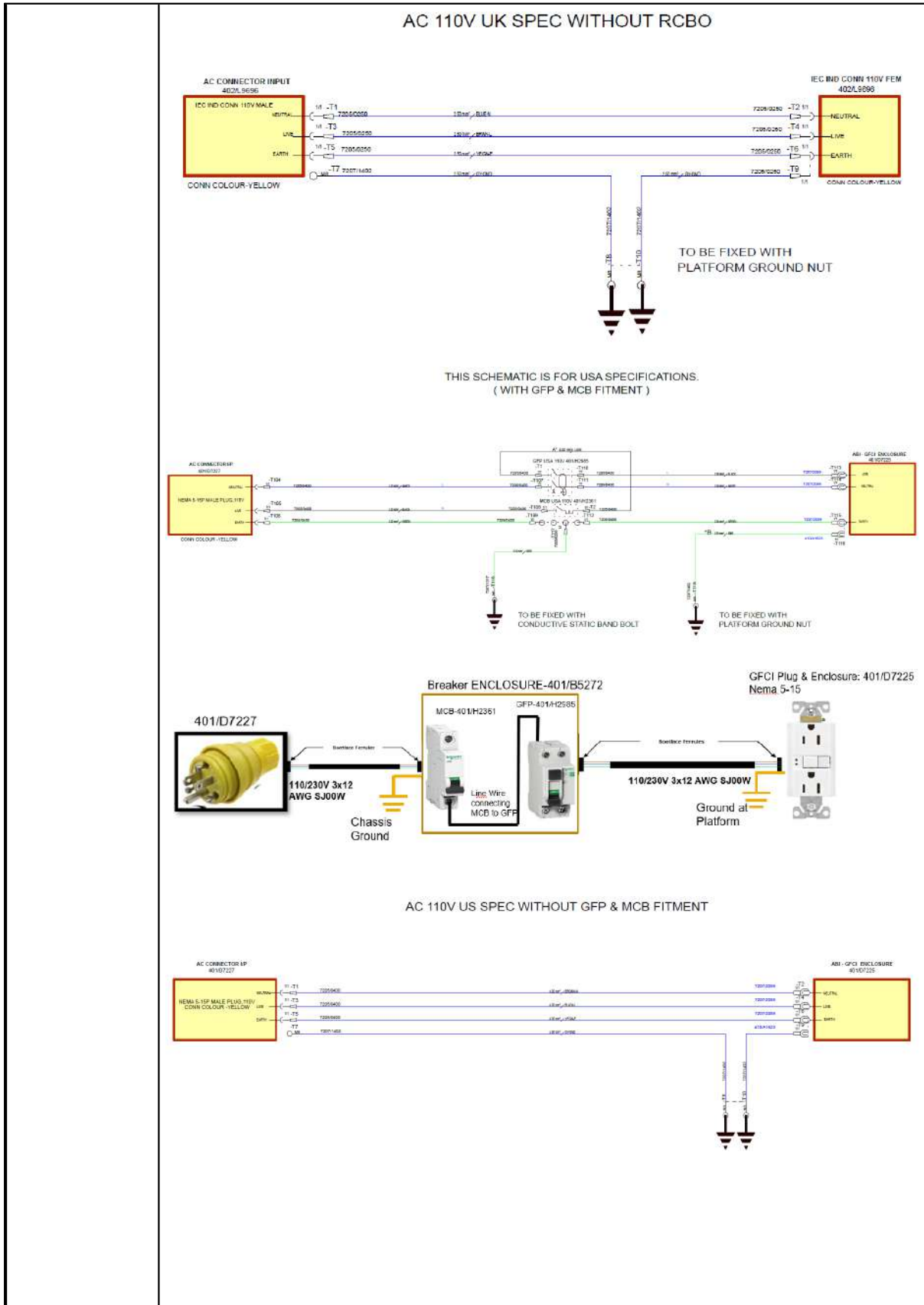
**Wires & Connectors  
IMG:**





## 5.27 AC Connector


|   |   |
|---|---|
| <b>Component:</b>                         | <b>AC Connector</b>   |
| <b>Function:</b>                          | There is single phase AC supply on the machine platform that can be used for any purpose and ac connector is fitted on chassis which can be connected to external power supply to platform. |
| <b>Location:</b>                          | One connector Available on Platform Front RHS and Second Connector Available on Chassis Rear side near step ladder  |
| <b>Location IMG:</b>                      |   |
| <b>Signal:</b>                            | As per region specification - 230V - Europe<br>110V - UK<br>110V - USA  |
| <b>Wires &amp; Connectors IMG:</b>        |   |
| <b>Internal Electrical Schematic IMG:</b> | <div style="text-align: center;"> <p><b>AC 230V EUROPE SPECIFICATION</b></p> <p><b>AC 110V UK SPECIFICATION</b></p> </div>  |



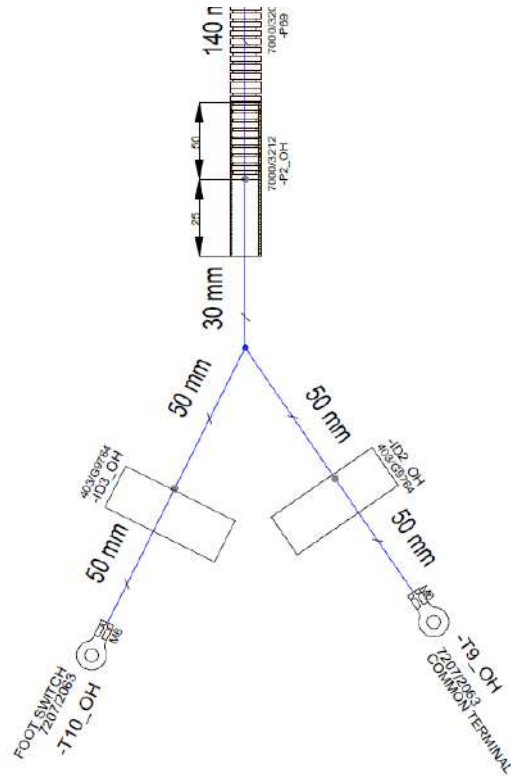
|                                    |  |
|------------------------------------|--|
|                                    | <p style="text-align: center;">AC 230V SCHUKO SPEC</p> |
| <p><b>Testing:</b></p>             | <p>Check Power Supply at both end connector</p>        |
| <p><b>Expected Values:</b></p>     | <p>230V - Europe<br/>110V - UK<br/>110V - USA</p>      |
| <p><b>Related Fault Codes:</b></p> | <p>N/A</p>   |

## 5.28 Foot Switch (Korean Region)

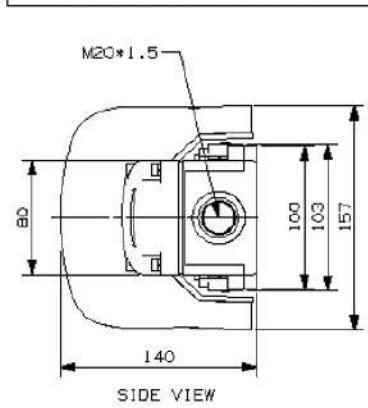
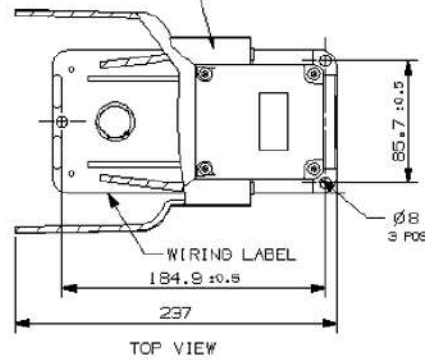
|                          |  |
|--------------------------|--|
| <p><b>Component:</b></p> | <p><b>Foot Switch</b></p>  |
| <p><b>Function:</b></p>  | <p>Foot Pedal Switch enables to drive and platform up/down function from platform . Foot Pedal Switch is connected to CM410 controller .Further logical processing shall be done by Motor controller based on the status of the physical switch inputs sent by CM410 controller.</p> |
| <p><b>Location:</b></p>  | <p>On Platform Floor RHS</p>   |

| <p><b>Location</b><br/><b>IMG:</b></p> |    |         |                  |  |          |             |         |         |        |             |      |     |       |            |       |                  |
|--|--|---------|------------------|--|----------|-------------|---------|---------|--------|-------------|------|-----|-------|------------|-------|------------------|
| <p><b>Signal:</b></p>                  | <table border="1"> <thead> <tr> <th>Terminal</th> <th>Description</th> <th>Wire No</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>T10_OH</td> <td>Foot Switch</td> <td>4001</td> <td>24V</td> </tr> <tr> <td>T9_OH</td> <td>PWM Output</td> <td>6000A</td> <td>0-24V PWM Output</td> </tr> </tbody> </table> |         |                  |  | Terminal | Description | Wire No | Voltage | T10_OH | Foot Switch | 4001 | 24V | T9_OH | PWM Output | 6000A | 0-24V PWM Output |
| Terminal                               | Description  | Wire No | Voltage          |  |          |             |         |         |        |             |      |     |       |            |       |                  |
| T10_OH                                 | Foot Switch  | 4001    | 24V              |  |          |             |         |         |        |             |      |     |       |            |       |                  |
| T9_OH                                  | PWM Output   | 6000A   | 0-24V PWM Output |  |          |             |         |         |        |             |      |     |       |            |       |                  |

**Wires & Connectors  
IMG:**



PROTECTIVE COVER, PEDAL CAST ALUMINUM, BASE CAST IRON ALL COLORS BLACK

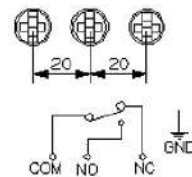


80° C

500V DC  
25mA

IR 1MIN BETWEEN CURRENT CARRYING PARTS  
IR 1MIN BETWEEN NON-CURRENT CARRYING PARTS

WIRING DIAGRAM



SUPPLIER NAME : SUNS  
SUPPLIER NUMBER : FS-5G-20-C-1DB  
EMC CRITICAL : NO

| <b>Internal Electrical Schematic IMG:</b> |  |            |             |                        |                                      |
|---|--|------------|-------------|------------------------|--------------------------------------|
| <b>Testing:</b>                           | Check Power supply and Continuity in foot switch terminals   |            |             |                        |                                      |
| <b>Expected Values:</b>                   | 24V  |            |             |                        |                                      |
| <b>Related Fault Codes:</b>               | <table border="1"> <thead> <tr> <th>Fault Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td> <a href="#">E0</a> 295                             </td> <td>                                 Foot Switch or Related Wiring Faults                             </td> </tr> </tbody> </table> | Fault Code | Description | <a href="#">E0</a> 295 | Foot Switch or Related Wiring Faults |
| Fault Code                                | Description  |            |             |                        |                                      |
| <a href="#">E0</a> 295                    | Foot Switch or Related Wiring Faults   |            |             |                        |                                      |

## 5.29 Dual Height Box (USA Region)

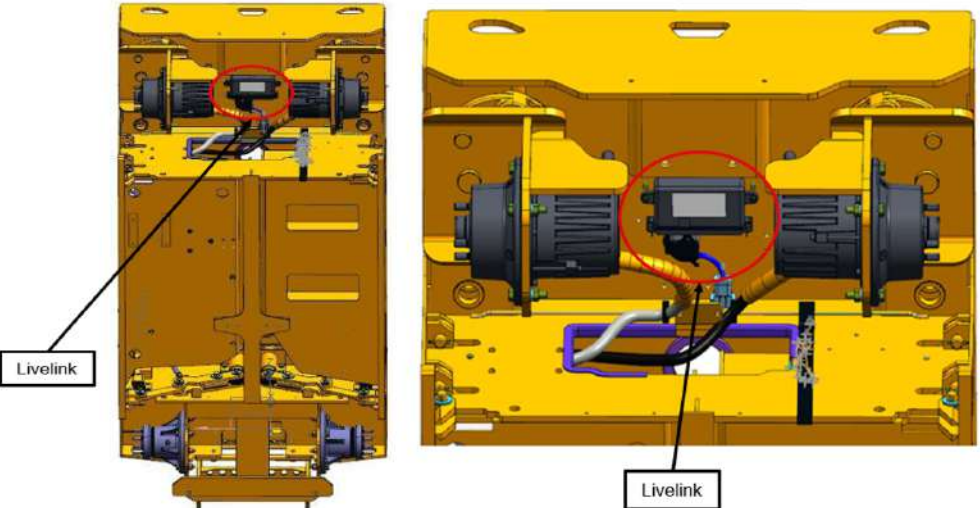
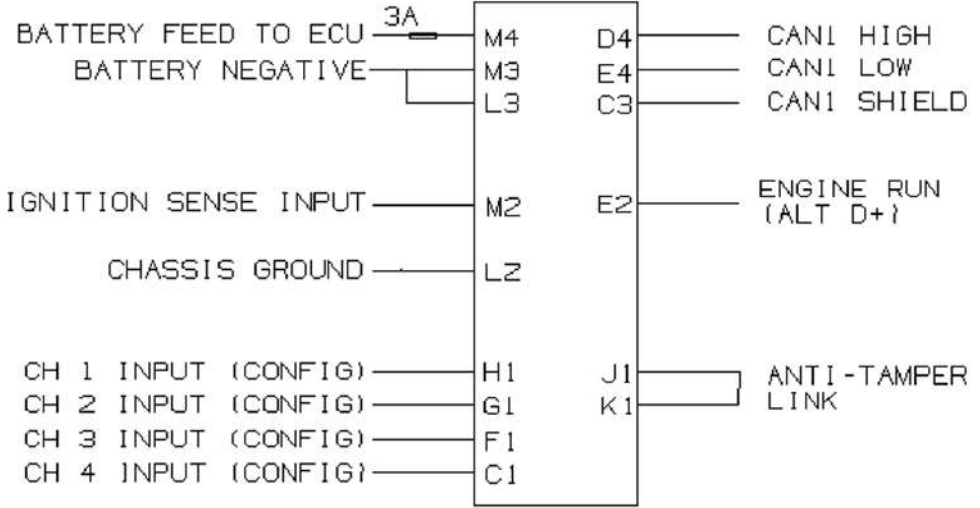
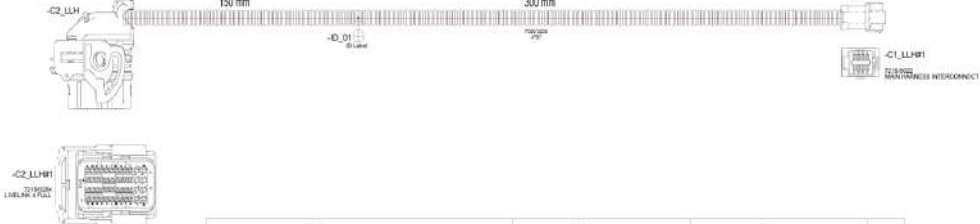
|                      |   |
|----------------------|---|
| <b>Component:</b>    | <b>Dual Height Box (USA Region)</b>   |
| <b>Function:</b>     | <p>Dual zone functionality restricts the machine raise or drive/steer operation outside the safe operating height where the effect of wind can affect the stability of the machine. The machine operations are unaffected and allowed to the maximum extend during Indoor mode where the effect of wind is negligible. However, when the machine needs to be operated in Outdoor conditions, Raise and/or drive/steer operations are restricted.</p> <p>This function is in is an extension to the Dual Zone functionality in MC41 controller</p> |
| <b>Location:</b>     | On Platform Front RHS   |
| <b>Location IMG:</b> |   |



| <p><b>Internal Electrical Schematic IMG:</b></p> |   |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |
|--|---|------------|-------------|---------------------------------------|---|---------------------------------------|---|---------------------------------------|-----------------------------------|---------------------------------------|-----------------------------|---------------------------------------|---|---------------------------------------|---|---------------------------------------|--|---------------------------------------|--|---|--|
| <p><b>Testing:</b></p>                           | <p>Check Power Supply and Continuity on switch terminals</p>  |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |
| <p><b>Expected Values:</b></p>                   | <p>24V</p>  |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |
| <p><b>Related Fault Codes:</b></p>               | <table border="1"> <thead> <tr> <th>Fault Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><a href="#">E1</a> <small>307</small></td> <td>Override Detection Limit Switch or Related Wiring Fault</td> </tr> <tr> <td><a href="#">E2</a> <small>307</small></td> <td>Elevated Drive Limit Switch or Related Wiring Fault</td> </tr> <tr> <td><a href="#">E3</a> <small>310</small></td> <td>Elevated Conditions Detected - EL</td> </tr> <tr> <td><a href="#">E4</a> <small>311</small></td> <td>Override Condition Detected</td> </tr> <tr> <td><a href="#">E5</a> <small>298</small></td> <td>Dual Zone Push Button or Related Wiring Fault</td> </tr> <tr> <td><a href="#">E6</a> <small>300</small></td> <td>Dual Zone Height Limit Switch or Related Wiring Fault</td> </tr> <tr> <td><a href="#">E7</a> <small>301</small></td> <td>Dual_Zone_Fault: CAN Data error from CM410</td> </tr> <tr> <td><a href="#">E8</a> <small>305</small></td> <td>Dual_Zone_Fault: Incorrect Dual Zone Configuration</td> </tr> <tr> <td><a href="#">E9 (OHL)</a> <small>293</small></td> <td>At or about Outdoor Height Limit - OHL</td> </tr> </tbody> </table> | Fault Code | Description | <a href="#">E1</a> <small>307</small> | Override Detection Limit Switch or Related Wiring Fault | <a href="#">E2</a> <small>307</small> | Elevated Drive Limit Switch or Related Wiring Fault | <a href="#">E3</a> <small>310</small> | Elevated Conditions Detected - EL | <a href="#">E4</a> <small>311</small> | Override Condition Detected | <a href="#">E5</a> <small>298</small> | Dual Zone Push Button or Related Wiring Fault | <a href="#">E6</a> <small>300</small> | Dual Zone Height Limit Switch or Related Wiring Fault | <a href="#">E7</a> <small>301</small> | Dual_Zone_Fault: CAN Data error from CM410 | <a href="#">E8</a> <small>305</small> | Dual_Zone_Fault: Incorrect Dual Zone Configuration | <a href="#">E9 (OHL)</a> <small>293</small> | At or about Outdoor Height Limit - OHL |
| Fault Code                                       | Description   |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |
| <a href="#">E1</a> <small>307</small>            | Override Detection Limit Switch or Related Wiring Fault   |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |
| <a href="#">E2</a> <small>307</small>            | Elevated Drive Limit Switch or Related Wiring Fault   |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |
| <a href="#">E3</a> <small>310</small>            | Elevated Conditions Detected - EL   |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |
| <a href="#">E4</a> <small>311</small>            | Override Condition Detected   |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |
| <a href="#">E5</a> <small>298</small>            | Dual Zone Push Button or Related Wiring Fault   |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |
| <a href="#">E6</a> <small>300</small>            | Dual Zone Height Limit Switch or Related Wiring Fault   |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |
| <a href="#">E7</a> <small>301</small>            | Dual_Zone_Fault: CAN Data error from CM410  |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |
| <a href="#">E8</a> <small>305</small>            | Dual_Zone_Fault: Incorrect Dual Zone Configuration  |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |
| <a href="#">E9 (OHL)</a> <small>293</small>      | At or about Outdoor Height Limit - OHL  |            |             |                                       |   |                                       |   |                                       |                                   |                                       |                             |                                       |   |                                       |   |                                       |  |                                       |  |   |  |

## 5.30 Livelink

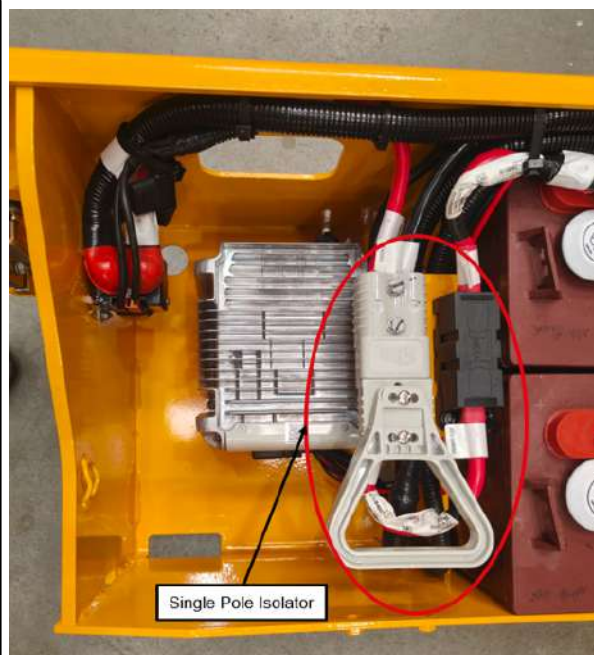
|                          |   |
|--------------------------|---|
| <p><b>Component:</b></p> | <p><b>Livelink</b></p>  |
| <p><b>Function:</b></p>  | <p>The Livelink unit shall have the machine VIN programmed into it using the standard JCB ServiceMaster tool on Production or through the JCB Access setup tool<br/>The machine variant shall be determined using character 5,6 &amp; 7 of VIN.</p> |
| <p><b>Location:</b></p>  | <p>Under the Chassis front side</p>   |

|   |   |
|---|---|
| <p><b>Location<br/>IMG:</b></p>                   |   |
| <p><b>Signal:</b></p>                             | <p style="text-align: center;">SIMPLIFIED CIRCUIT DIAGRAM</p>  <p>BATTERY FEED TO ECU — 3A — M4 — D4 — CAN1 HIGH<br/>         BATTERY NEGATIVE — M3 — E4 — CAN1 LOW<br/>         — L3 — C3 — CAN1 SHIELD</p> <p>IGNITION SENSE INPUT — M2 — E2 — ENGINE RUN (ALT D+)<br/>         CHASSIS GROUND — L2</p> <p>CH 1 INPUT (CONFIG) — H1 — J1 — ANTI-TAMPER LINK<br/>         CH 2 INPUT (CONFIG) — G1 — K1 —<br/>         CH 3 INPUT (CONFIG) — F1 —<br/>         CH 4 INPUT (CONFIG) — C1 —</p> |
| <p><b>Wires &amp;<br/>Connectors<br/>IMG:</b></p> |   |

|  |   |
|--|---|
| <p><b>Internal Electrical Schematic IMG:</b></p> | <p>The diagram is a detailed electrical schematic. It shows a power supply section with components labeled C2_11H and C2_11LH. There are connections to a battery (BATTERY NEG) and various ground points (TO EARTH SPICE). The schematic includes various electrical symbols, wires, and labels such as 'FROM CANBUS', 'TO CANBUS', and 'TO EARTH SPICE'. A central box labeled 'EQUIP' contains several terminals and components.</p> |
| <p><b>Testing:</b></p>                           | <p>Check Power Supply</p>   |
| <p><b>Expected Values:</b></p>                   | <p>24V</p>  |
| <p><b>Related Fault Codes:</b></p>               | <p>N/A</p>  |

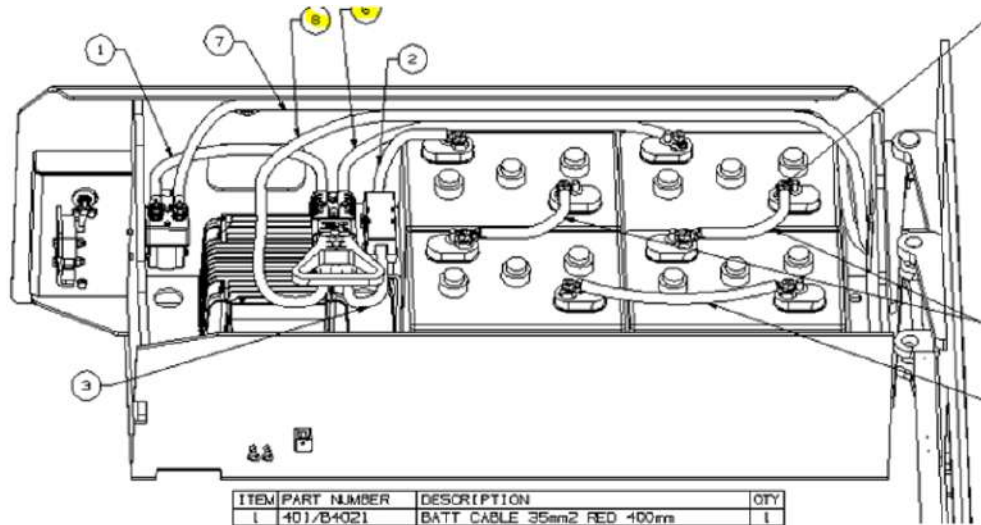
## 5.31 Isolator

|                             |   |
|-----------------------------|---|
| <p><b>Component:</b></p>    | <p><b>Isolator</b></p>  |
| <p><b>Function:</b></p>     | <p>An Isolator Switch is a safety device used to disconnect the battery from the electrical system of a machine or vehicle. Its primary function is to completely isolate the battery during maintenance or servicing activities, preventing accidental electrical contact, short circuits, or energy discharge. This ensures the safety of personnel and protects sensitive electrical components from damage.</p> |
| <p><b>Location:</b></p>     | <p>LH door</p>  |
| <p><b>Location IMG:</b></p> | <p><b>Rest of World<br/>Australia Region</b></p>  |



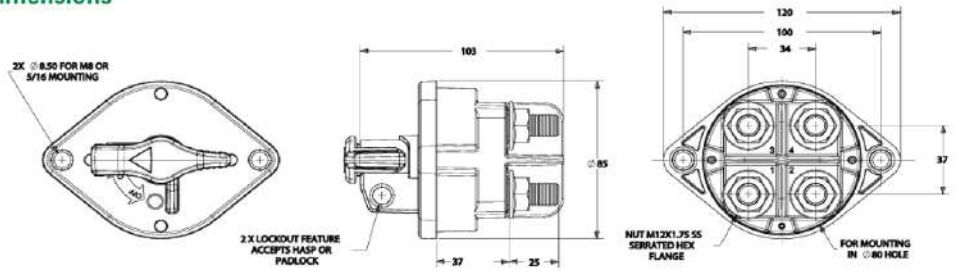
| <b>Signal:</b> | Pin No | Description    | Terminal No | Wire No | Voltage |
|----------------|--------|----------------|-------------|---------|---------|
|                | 1      | Primary Fuse   | T10         | RED     | 24V     |
|                | 2      | DC Contactor   | T3          | RED     | 24V     |
|                | 3      | Battery GND    | T22         | BLACK   | 0V      |
|                | 4      | Controller -ve | T23         | BLACK   | 0V      |

**Wires & Connectors  
IMG:**

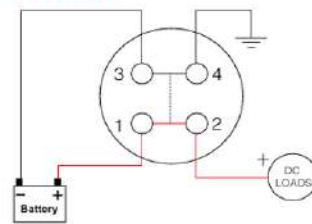


| ITEM | PART NUMBER | DESCRIPTION                                | QTY |
|------|-------------|--|-----|
| 1    | 401/B4021   | BATT CABLE 35mm <sup>2</sup> RED 400mm     | 1   |
| 2    | 401/B5265   | BATT CABLE 35mm <sup>2</sup> RED 290mm     | 1   |
| 3    | 401/B4007   | BATT CABLE 35mm <sup>2</sup> RED LEN 220mm | 1   |
| 4    | 401/B3968   | BATT CABLE 35mm <sup>2</sup> RED 220mm     | 2   |
| 5    | 401/B3933   | BATT CABLE 35mm <sup>2</sup> RED 320mm     | 1   |
| 6    | 401/B3998   | BATT CABLE 35mm <sup>2</sup> BLACK 510mm   | 1   |
| 7    | B73/ED119   | BATT CABLE 35mm <sup>2</sup> RED 2950mm    | 1   |
| 8    | B73/ED120   | BATT CABLE 35mm <sup>2</sup> BLACK 2700mm  | 1   |
| 9    | B73/ED114   | BATT CABLE 35mm <sup>2</sup> RED 300mm     | 1   |
| 10   | B73/ED113   | BATT CABLE 35mm <sup>2</sup> BLACK 300mm   | 1   |

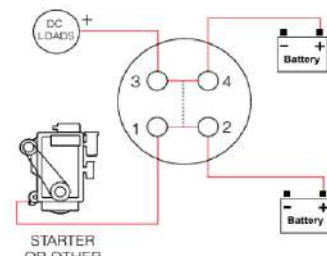
**Dimensions**



**Configurations**



**Master Battery Disconnect Dual Pole**  
Switching One Battery, Positive and Negative  
(shown in ON state)



**Master Battery Disconnect Dual Pole**  
Switching Two Batteries  
(shown in ON state)

**Internal  
Electrical  
Schematic  
IMG:**

**Rest of World**



**Australia Region**

|                             |  |
|-----------------------------|--|
|                             | <p><b>ISOLATOR OPTION AUS ONLY</b></p> |
| <b>Testing:</b>             | Check Continuity on Terminal           |
| <b>Expected Values:</b>     | 24V                                    |
| <b>Related Fault Codes:</b> | N/A                                    |

**5.32 Elevated Switch**

|                      |   |                    |                    |                |                         |
|----------------------|---|--------------------|--------------------|----------------|-------------------------|
| <b>Component:</b>    | <b>Elevated Switch</b>  |                    |                    |                |                         |
| <b>Function:</b>     | During the drive operation, ON DETECTION OF Elevated height- any further drive operation shall be disabled. |                    |                    |                |                         |
| <b>Location:</b>     | On Scissor Pack Lower Arm   |                    |                    |                |                         |
| <b>Location IMG:</b> |   |                    |                    |                |                         |
| <b>Signal:</b>       | <b>Pin No</b>   | <b>Description</b> | <b>Terminal No</b> | <b>Wire No</b> | <b>Voltage</b>          |
|                      | 1   | Elevated Switch    | C3_OL              | 4003           | 24V When Switch Pressed |
|                      | 4   | PWM Output         | C3_OL              | 6000C          | 24V When Switch Pressed |

**Wires &  
Connectors  
IMG:**



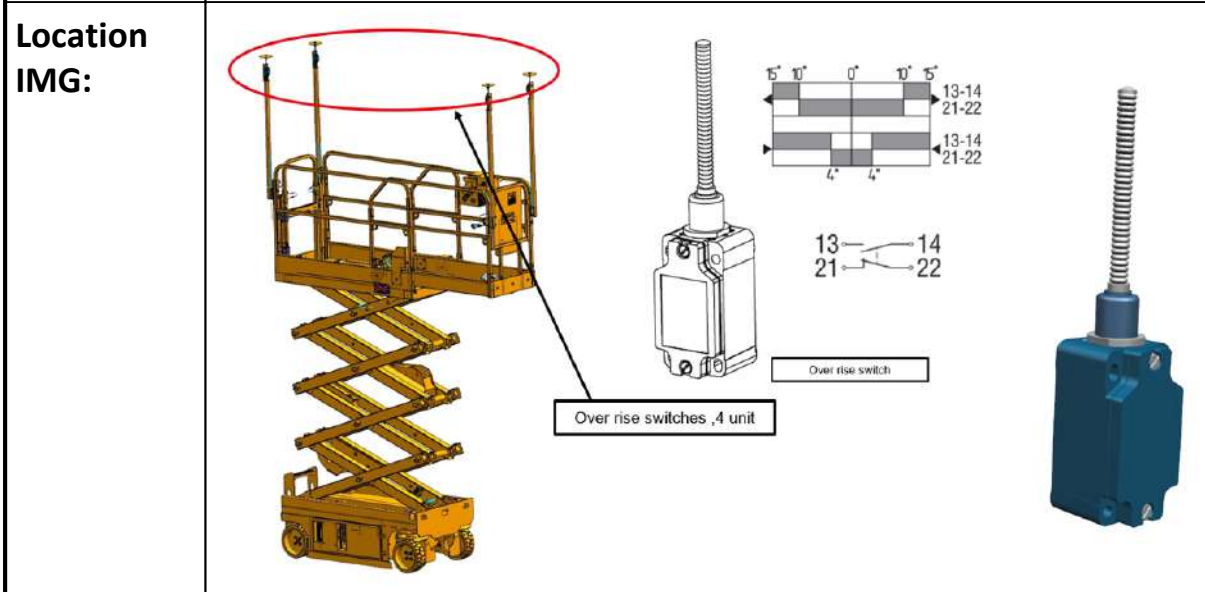


If the “Over Rise Prevention” option is disabled, or the signal value is not 0, the message “UP” shall not be displayed, and steering operations shall continue as normal.

All physical inputs from the Over Rise Prevention switches shall be connected to the CM410 controller.

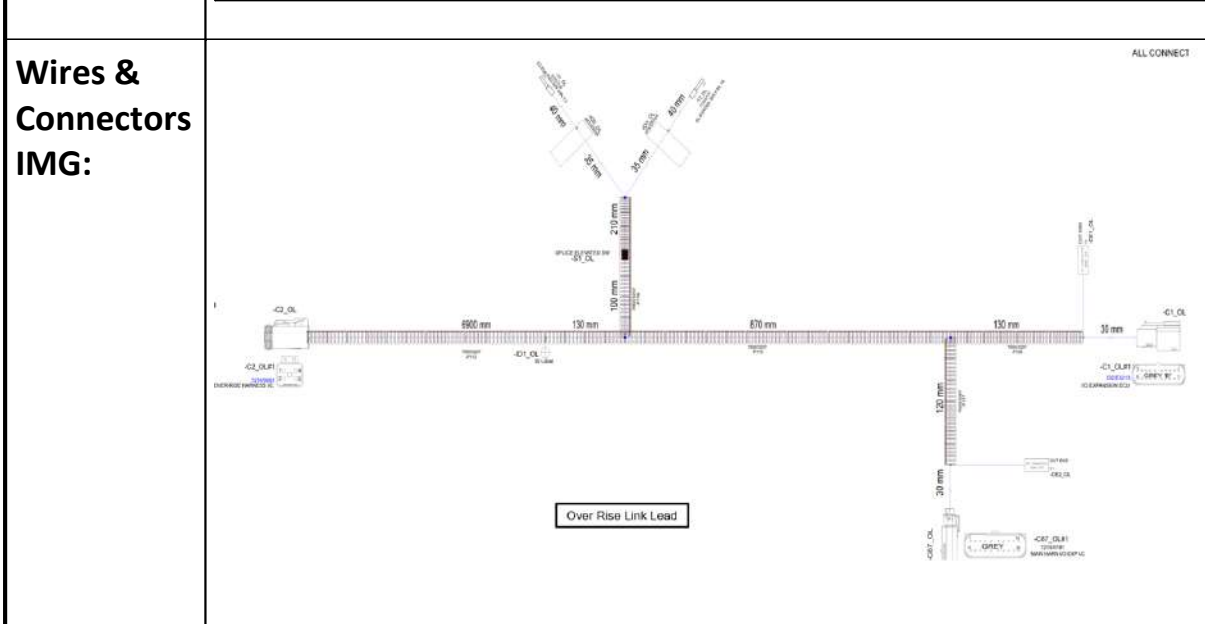
The Motor Controller shall perform the logical processing based on the status of these physical inputs, as communicated by the CM410

**Location:** On top of Platform




**Signal:**

| Pin No | Description | Contactor No | Wire No | Voltage |
|--------|-------------|--------------|---------|---------|
| 1      | PWM Output  | C1_OH        | 6000C   | 12V     |



| <p><b>Internal Electrical Schematic IMG:</b></p> |  |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |
|--|--|------------|-------------|--------------------------|---|--------------------------|---|--------------------------|-----------------------------------|--------------------------|-----------------------------|--------------------------|---|--------------------------|---|--------------------------|--|--------------------------|--|--------------------------------|--|
| <p><b>Testing:</b></p>                           | <p>Check Continuity in Contact Block Terminal</p>  |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |
| <p><b>Expected Values:</b></p>                   | <p>12V</p>   |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |
| <p><b>Related Fault Codes:</b></p>               | <table border="1"> <thead> <tr> <th>Fault Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><a href="#">E1</a>   307  </td> <td>Override Detection Limit Switch or Related Wiring Fault</td> </tr> <tr> <td><a href="#">E2</a>   307  </td> <td>Elevated Drive Limit Switch or Related Wiring Fault</td> </tr> <tr> <td><a href="#">E3</a>   310  </td> <td>Elevated Conditions Detected - EL</td> </tr> <tr> <td><a href="#">E4</a>   311  </td> <td>Override Condition Detected</td> </tr> <tr> <td><a href="#">E5</a>   298  </td> <td>Dual Zone Push Button or Related Wiring Fault</td> </tr> <tr> <td><a href="#">E6</a>   300  </td> <td>Dual Zone Height Limit Switch or Related Wiring Fault</td> </tr> <tr> <td><a href="#">E7</a>   301  </td> <td>Dual_Zone_Fault: CAN Data error from CM410</td> </tr> <tr> <td><a href="#">E8</a>   305  </td> <td>Dual_Zone_Fault: Incorrect Dual Zone Configuration</td> </tr> <tr> <td><a href="#">E9 (OHL)</a>   293  </td> <td>At or about Outdoor Height Limit - OHL</td> </tr> </tbody> </table> | Fault Code | Description | <a href="#">E1</a>   307 | Override Detection Limit Switch or Related Wiring Fault | <a href="#">E2</a>   307 | Elevated Drive Limit Switch or Related Wiring Fault | <a href="#">E3</a>   310 | Elevated Conditions Detected - EL | <a href="#">E4</a>   311 | Override Condition Detected | <a href="#">E5</a>   298 | Dual Zone Push Button or Related Wiring Fault | <a href="#">E6</a>   300 | Dual Zone Height Limit Switch or Related Wiring Fault | <a href="#">E7</a>   301 | Dual_Zone_Fault: CAN Data error from CM410 | <a href="#">E8</a>   305 | Dual_Zone_Fault: Incorrect Dual Zone Configuration | <a href="#">E9 (OHL)</a>   293 | At or about Outdoor Height Limit - OHL |
| Fault Code                                       | Description  |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |
| <a href="#">E1</a>   307                         | Override Detection Limit Switch or Related Wiring Fault  |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |
| <a href="#">E2</a>   307                         | Elevated Drive Limit Switch or Related Wiring Fault  |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |
| <a href="#">E3</a>   310                         | Elevated Conditions Detected - EL  |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |
| <a href="#">E4</a>   311                         | Override Condition Detected  |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |
| <a href="#">E5</a>   298                         | Dual Zone Push Button or Related Wiring Fault  |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |
| <a href="#">E6</a>   300                         | Dual Zone Height Limit Switch or Related Wiring Fault  |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |
| <a href="#">E7</a>   301                         | Dual_Zone_Fault: CAN Data error from CM410   |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |
| <a href="#">E8</a>   305                         | Dual_Zone_Fault: Incorrect Dual Zone Configuration   |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |
| <a href="#">E9 (OHL)</a>   293                   | At or about Outdoor Height Limit - OHL   |            |             |                          |   |                          |   |                          |                                   |                          |                             |                          |   |                          |   |                          |  |                          |  |                                |  |

## 5.34 Brake Release Switch


| <b>Component:</b>    | <b>Brake Release Switch</b>  |              |         |         |  |        |             |              |         |         |   |            |        |       |     |   |                   |        |      |     |
|----------------------|--|--------------|---------|---------|--|--------|-------------|--------------|---------|---------|---|------------|--------|-------|-----|---|-------------------|--------|------|-----|
| <b>Function:</b>     | <p>Brake Release switch allows the operator to electrically release the AC Drive motor brake during service operations(during live fault codes) particularly useful when the machine is unable to drive.</p> <p>Once service brake release enabled, the operator can push or pull the machine manually for positioning or towing during maintenance.</p> |              |         |         |  |        |             |              |         |         |   |            |        |       |     |   |                   |        |      |     |
| <b>Location:</b>     | located inside the RH Door (Hydraulic ) compartment.   |              |         |         |  |        |             |              |         |         |   |            |        |       |     |   |                   |        |      |     |
| <b>Location IMG:</b> |    |              |         |         |  |        |             |              |         |         |   |            |        |       |     |   |                   |        |      |     |
| <b>Signal:</b>       | <table border="1"> <thead> <tr> <th>Pin No</th> <th>Description</th> <th>Connector No</th> <th>Wire No</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>IGN Switch</td> <td>C72_MH</td> <td>1000F</td> <td>24V</td> </tr> <tr> <td>2</td> <td>I/O Expansion ECU</td> <td>C72_MH</td> <td>6400</td> <td>24V</td> </tr> </tbody> </table>  |              |         |         |  | Pin No | Description | Connector No | Wire No | Voltage | 1 | IGN Switch | C72_MH | 1000F | 24V | 2 | I/O Expansion ECU | C72_MH | 6400 | 24V |
| Pin No               | Description  | Connector No | Wire No | Voltage |  |        |             |              |         |         |   |            |        |       |     |   |                   |        |      |     |
| 1                    | IGN Switch   | C72_MH       | 1000F   | 24V     |  |        |             |              |         |         |   |            |        |       |     |   |                   |        |      |     |
| 2                    | I/O Expansion ECU  | C72_MH       | 6400    | 24V     |  |        |             |              |         |         |   |            |        |       |     |   |                   |        |      |     |



| <p><b>Testing:</b></p>             | <p>Check power supply 24 V and continuity on switch terminal</p>  |            |             |                                   |  |
|------------------------------------|---|------------|-------------|-----------------------------------|--|
| <p><b>Expected Values:</b></p>     | <p>24V</p>  |            |             |                                   |  |
| <p><b>Related Fault Codes:</b></p> | <table border="1"> <thead> <tr> <th>Fault Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><a href="#">EA</a> <sub>312</sub></td> <td>Brake release switch or Related Wiring Fault</td> </tr> </tbody> </table> | Fault Code | Description | <a href="#">EA</a> <sub>312</sub> | Brake release switch or Related Wiring Fault |
| Fault Code                         | Description   |            |             |                                   |  |
| <a href="#">EA</a> <sub>312</sub>  | Brake release switch or Related Wiring Fault  |            |             |                                   |  |

### 5.35 Override Switch

|                          |   |
|--------------------------|---|
| <p><b>Component:</b></p> | <p><b>Override Switch</b></p>   |
| <p><b>Function:</b></p>  | <p>Override switch enable safe base control of the machine to lower the platform when the platform E-stop is pressed and unreachable for reset, by temporarily allowing a limited override from the chassis (base) controls. E-stop Override switch is a momentary push button.</p> |
| <p><b>Location:</b></p>  | <p>located on the Base Control Panel.</p>   |

| <p><b>Location</b><br/><b>IMG:</b></p> |   |              |             |              |         |     |   |            |        |       |   |   |                          |        |       |   |
|--|---|--------------|-------------|--------------|---------|-----|---|------------|--------|-------|---|---|--------------------------|--------|-------|---|
| <p><b>Signal:</b></p>                  | <table border="1"> <thead> <tr> <th>Pin No</th> <th>Description</th> <th>Connector No</th> <th>Wire No</th> <th>Vol</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>IGN Switch</td> <td>C74_MH</td> <td>1000F</td> <td>2</td> </tr> <tr> <td>2</td> <td>Platform E-Stop Override</td> <td>C74_MH</td> <td>6401A</td> <td>2</td> </tr> </tbody> </table> | Pin No       | Description | Connector No | Wire No | Vol | 1 | IGN Switch | C74_MH | 1000F | 2 | 2 | Platform E-Stop Override | C74_MH | 6401A | 2 |
| Pin No                                 | Description   | Connector No | Wire No     | Vol          |         |     |   |            |        |       |   |   |                          |        |       |   |
| 1                                      | IGN Switch  | C74_MH       | 1000F       | 2            |         |     |   |            |        |       |   |   |                          |        |       |   |
| 2                                      | Platform E-Stop Override  | C74_MH       | 6401A       | 2            |         |     |   |            |        |       |   |   |                          |        |       |   |

|  |   |
|--|---|
| <p><b>Wires &amp; Connectors IMG:</b></p>        | <p>The diagram shows a physical wiring layout. At the top is a component labeled 'FIT C76_MH AFTER TEST'. Below it is a connector labeled '-C74_MH'. To the right is a switch labeled '-C74_MH#1' with part number '7212/0203' and 'OVER-RIDE SW'. Below that is another connector labeled '-I/C1_MH#1' with part number '7219/0231' and 'BP INTERCONNECT'. Below that is a component labeled '-I/C1_MH'. A horizontal wire runs from this component through several connectors: '7000/0213 -P12', '150 mm', '7000/0213 -P12', '120 mm', '7000/0213 -P12', '30 mm', '-S6_MH', '7000/0213 -P13', '30 mm', '-S7_MH', '30 mm'. A vertical wire branches off downwards from the horizontal wire, with dimensions '60 mm' and '20 mm'. This vertical wire connects to a component labeled 'CUT END' and '-CE1_MH'. A note 'Tape to this Branch' points to the junction. A '30 mm' dimension is also shown between the '-I/C1_MH' component and the first connector.</p>  |
| <p><b>Internal Electrical Schematic IMG:</b></p> | <p>The schematic diagram shows the electrical circuit. Key components include: 'IGNITION SWITCH 443E4240-SW1', 'C23_BP 7207/2005', 'C22_BP 7207/2005', 'C21_BP 7207/2005', 'FU4_MH 4 SA 12', 'FUS_MH 5 SA 13', 'FU7_MH 7 SA 15', 'S11_MH', 'S5_MH', 'S21_MH', 'S22_MH', 'S23_MH', 'S24_MH', 'S25_MH', 'S26_MH', 'S27_MH', 'S28_MH', 'S29_MH', 'S30_MH', 'S31_MH', 'S32_MH', 'S33_MH', 'S34_MH', 'S35_MH', 'S36_MH', 'S37_MH', 'S38_MH', 'S39_MH', 'S40_MH', 'S41_MH', 'S42_MH', 'S43_MH', 'S44_MH', 'S45_MH', 'S46_MH', 'S47_MH', 'S48_MH', 'S49_MH', 'S50_MH', 'S51_MH', 'S52_MH', 'S53_MH', 'S54_MH', 'S55_MH', 'S56_MH', 'S57_MH', 'S58_MH', 'S59_MH', 'S60_MH', 'S61_MH', 'S62_MH', 'S63_MH', 'S64_MH', 'S65_MH', 'S66_MH', 'S67_MH', 'S68_MH', 'S69_MH', 'S70_MH', 'S71_MH', 'S72_MH', 'S73_MH', 'S74_MH', 'S75_MH', 'S76_MH', 'S77_MH', 'S78_MH', 'S79_MH', 'S80_MH', 'S81_MH', 'S82_MH', 'S83_MH', 'S84_MH', 'S85_MH', 'S86_MH', 'S87_MH', 'S88_MH', 'S89_MH', 'S90_MH', 'S91_MH', 'S92_MH', 'S93_MH', 'S94_MH', 'S95_MH', 'S96_MH', 'S97_MH', 'S98_MH', 'S99_MH', 'S100_MH'. The diagram also shows various relays and switches, including 'SERVICE BRAKE 873A1000', 'APEM ON-MOV TOGGLE 10A ENABLE SW 403X5436', and 'OVER-RIDE SW 823A1001'. The schematic is color-coded with blue and yellow lines.</p> |
| <p><b>Testing:</b></p>                           | <p>Check power supply 24 V and continuity on switch terminal</p>  |
| <p><b>Expected Values:</b></p>                   | <p>24V</p>  |

|                             |                   |                           |
|-----------------------------|-------------------|---------------------------|
| <b>Related Fault Codes:</b> | <b>Fault Code</b> | <b>Description</b>        |
|                             | 7D <sup>314</sup> | E_STOP_Override_STB_Fault |

## 5.36 MC41 Controller

| <b>Component:</b>    | <b>MC41 Controller</b>   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
|----------------------|--|-----|------|------|---------|------|---------|------|----|------|--------|------|----|------|----|------|---------|------|------|------|------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|---------|-------|---------|-------|----|-------|--------|-------|----|-------|----|--|-----|------|-------|----------|-------|------|-------|------|-------|------|-------|-------|-------|-------|-------|-------|-------|------|-------|------|-------|------|-------|----|-------|----|-------|----------|-------|------|-------|-------|-------|-------|-------|--------|-------|--------|-------|------|-------|------|-------|------|-------|------|--|-----|------|-------|---------|-------|---------|-------|---------|-------|---------|-------|----|-------|----|-------|---------|-------|------|-------|-------|-------|-------|-------|--------|-------|--------|-------|------|-------|------|-------|------|-------|------|-------|---------|-------|---------|-------|---------|-------|---------|-------|------|-------|------|
| <b>Function:</b>     | MC41 Controller ECU is an I/O expansion ECU that extends Dual Zone functionality by controlling raise and drive/steer operations beyond the safe operating height. All related faults are displayed through the base and platform controllers (Curtis only).   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| <b>Location:</b>     | Under the chassis  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| <b>Location IMG:</b> |  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| <b>Signal:</b>       | <table border="1"> <thead> <tr> <th>Pin</th> <th>Name</th> </tr> </thead> <tbody> <tr><td>C1:1</td><td>CAN_L_A</td></tr> <tr><td>C1:2</td><td>CAN_L_B</td></tr> <tr><td>C1:3</td><td>NC</td></tr> <tr><td>C1:4</td><td>ADDR_L</td></tr> <tr><td>C1:5</td><td>NC</td></tr> <tr><td>C1:6</td><td>NC</td></tr> <tr><td>C1:7</td><td>VREF+_A</td></tr> <tr><td>C1:8</td><td>IN_1</td></tr> <tr><td>C1:9</td><td>IN_2</td></tr> <tr><td>C1:10</td><td>IN_3</td></tr> <tr><td>C1:11</td><td>IN_33</td></tr> <tr><td>C1:12</td><td>IN_34</td></tr> <tr><td>C1:13</td><td>IN_35</td></tr> <tr><td>C1:14</td><td>OUT_1</td></tr> <tr><td>C1:15</td><td>OUT_2</td></tr> <tr><td>C1:16</td><td>BB_1</td></tr> <tr><td>C1:17</td><td>CAN_H_A</td></tr> <tr><td>C1:18</td><td>CAN_H_B</td></tr> <tr><td>C1:19</td><td>NC</td></tr> <tr><td>C1:20</td><td>ADDR_H</td></tr> <tr><td>C1:21</td><td>NC</td></tr> <tr><td>C1:22</td><td>NC</td></tr> </tbody> </table> | Pin | Name | C1:1 | CAN_L_A | C1:2 | CAN_L_B | C1:3 | NC | C1:4 | ADDR_L | C1:5 | NC | C1:6 | NC | C1:7 | VREF+_A | C1:8 | IN_1 | C1:9 | IN_2 | C1:10 | IN_3 | C1:11 | IN_33 | C1:12 | IN_34 | C1:13 | IN_35 | C1:14 | OUT_1 | C1:15 | OUT_2 | C1:16 | BB_1 | C1:17 | CAN_H_A | C1:18 | CAN_H_B | C1:19 | NC | C1:20 | ADDR_H | C1:21 | NC | C1:22 | NC | <table border="1"> <thead> <tr> <th>Pin</th> <th>Name</th> </tr> </thead> <tbody> <tr><td>C1:23</td><td>VREF-GND</td></tr> <tr><td>C1:24</td><td>IN_4</td></tr> <tr><td>C1:25</td><td>IN_5</td></tr> <tr><td>C1:26</td><td>IN_6</td></tr> <tr><td>C1:27</td><td>IN_36</td></tr> <tr><td>C1:28</td><td>IN_37</td></tr> <tr><td>C1:29</td><td>IN_38</td></tr> <tr><td>C1:30</td><td>BB_2</td></tr> <tr><td>C1:31</td><td>BB_3</td></tr> <tr><td>C1:32</td><td>BB_4</td></tr> <tr><td>C1:33</td><td>NC</td></tr> <tr><td>C1:34</td><td>NC</td></tr> <tr><td>C1:35</td><td>VREF-GND</td></tr> <tr><td>C1:36</td><td>IN_7</td></tr> <tr><td>C1:37</td><td>IN_29</td></tr> <tr><td>C1:38</td><td>IN_27</td></tr> <tr><td>C1:39</td><td>OUT_11</td></tr> <tr><td>C1:40</td><td>OUT_13</td></tr> <tr><td>C1:41</td><td>BB_1</td></tr> <tr><td>C1:42</td><td>BB_2</td></tr> <tr><td>C1:43</td><td>BB_3</td></tr> <tr><td>C1:44</td><td>BB_4</td></tr> </tbody> </table> | Pin | Name | C1:23 | VREF-GND | C1:24 | IN_4 | C1:25 | IN_5 | C1:26 | IN_6 | C1:27 | IN_36 | C1:28 | IN_37 | C1:29 | IN_38 | C1:30 | BB_2 | C1:31 | BB_3 | C1:32 | BB_4 | C1:33 | NC | C1:34 | NC | C1:35 | VREF-GND | C1:36 | IN_7 | C1:37 | IN_29 | C1:38 | IN_27 | C1:39 | OUT_11 | C1:40 | OUT_13 | C1:41 | BB_1 | C1:42 | BB_2 | C1:43 | BB_3 | C1:44 | BB_4 | <table border="1"> <thead> <tr> <th>Pin</th> <th>Name</th> </tr> </thead> <tbody> <tr><td>C1:45</td><td>OUT_31a</td></tr> <tr><td>C1:46</td><td>OUT_32a</td></tr> <tr><td>C1:47</td><td>OUT_33a</td></tr> <tr><td>C1:48</td><td>OUT_34a</td></tr> <tr><td>C1:49</td><td>NC</td></tr> <tr><td>C1:50</td><td>NC</td></tr> <tr><td>C1:51</td><td>VREF+_B</td></tr> <tr><td>C1:52</td><td>IN_8</td></tr> <tr><td>C1:53</td><td>IN_30</td></tr> <tr><td>C1:54</td><td>IN_28</td></tr> <tr><td>C1:55</td><td>OUT_12</td></tr> <tr><td>C1:56</td><td>OUT_14</td></tr> <tr><td>C1:57</td><td>BB_1</td></tr> <tr><td>C1:58</td><td>BB_2</td></tr> <tr><td>C1:59</td><td>BB_3</td></tr> <tr><td>C1:60</td><td>BB_4</td></tr> <tr><td>C1:61</td><td>OUT_31b</td></tr> <tr><td>C1:62</td><td>OUT_32b</td></tr> <tr><td>C1:63</td><td>OUT_33b</td></tr> <tr><td>C1:64</td><td>OUT_34b</td></tr> <tr><td>C1:65</td><td>+BAT</td></tr> <tr><td>C1:66</td><td>-BAT</td></tr> </tbody> </table> | Pin | Name | C1:45 | OUT_31a | C1:46 | OUT_32a | C1:47 | OUT_33a | C1:48 | OUT_34a | C1:49 | NC | C1:50 | NC | C1:51 | VREF+_B | C1:52 | IN_8 | C1:53 | IN_30 | C1:54 | IN_28 | C1:55 | OUT_12 | C1:56 | OUT_14 | C1:57 | BB_1 | C1:58 | BB_2 | C1:59 | BB_3 | C1:60 | BB_4 | C1:61 | OUT_31b | C1:62 | OUT_32b | C1:63 | OUT_33b | C1:64 | OUT_34b | C1:65 | +BAT | C1:66 | -BAT |
| Pin                  | Name   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:1                 | CAN_L_A  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:2                 | CAN_L_B  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:3                 | NC   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:4                 | ADDR_L   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:5                 | NC   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:6                 | NC   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:7                 | VREF+_A  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:8                 | IN_1   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:9                 | IN_2   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:10                | IN_3   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:11                | IN_33  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:12                | IN_34  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:13                | IN_35  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:14                | OUT_1  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:15                | OUT_2  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:16                | BB_1   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:17                | CAN_H_A  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:18                | CAN_H_B  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:19                | NC   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:20                | ADDR_H   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:21                | NC   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:22                | NC   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| Pin                  | Name   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:23                | VREF-GND   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:24                | IN_4   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:25                | IN_5   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:26                | IN_6   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:27                | IN_36  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:28                | IN_37  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:29                | IN_38  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:30                | BB_2   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:31                | BB_3   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:32                | BB_4   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:33                | NC   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:34                | NC   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:35                | VREF-GND   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:36                | IN_7   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:37                | IN_29  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:38                | IN_27  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:39                | OUT_11   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:40                | OUT_13   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:41                | BB_1   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:42                | BB_2   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:43                | BB_3   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:44                | BB_4   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| Pin                  | Name   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:45                | OUT_31a  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:46                | OUT_32a  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:47                | OUT_33a  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:48                | OUT_34a  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:49                | NC   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:50                | NC   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:51                | VREF+_B  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:52                | IN_8   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:53                | IN_30  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:54                | IN_28  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:55                | OUT_12   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:56                | OUT_14   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:57                | BB_1   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:58                | BB_2   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:59                | BB_3   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:60                | BB_4   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:61                | OUT_31b  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:62                | OUT_32b  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:63                | OUT_33b  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:64                | OUT_34b  |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:65                | +BAT   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |
| C1:66                | -BAT   |     |      |      |         |      |         |      |    |      |        |      |    |      |    |      |         |      |      |      |      |       |      |       |       |       |       |       |       |       |       |       |       |       |      |       |         |       |         |       |    |       |        |       |    |       |    |  |     |      |       |          |       |      |       |      |       |      |       |       |       |       |       |       |       |      |       |      |       |      |       |    |       |    |       |          |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |  |     |      |       |         |       |         |       |         |       |         |       |    |       |    |       |         |       |      |       |       |       |       |       |        |       |        |       |      |       |      |       |      |       |      |       |         |       |         |       |         |       |         |       |      |       |      |

| <p><b>Wires &amp; Connectors IMG:</b></p>        |   |            |             |    |   |    |   |    |                                   |
|--|---|------------|-------------|----|---|----|---|----|-----------------------------------|
| <p><b>Internal Electrical Schematic IMG:</b></p> | <p>APPLICABLE FOR DUAL ZONE SYSTEM</p>  |            |             |    |   |    |   |    |                                   |
| <p><b>Testing:</b></p>                           | <p>Check Input Voltage 24V</p>  |            |             |    |   |    |   |    |                                   |
| <p><b>Expected Values:</b></p>                   | <p>24V</p>  |            |             |    |   |    |   |    |                                   |
| <p><b>Related Fault Codes:</b></p>               | <table border="1"> <thead> <tr> <th>Fault Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>E1</td> <td>Override Detection Limit Switch or Related Wiring Fault</td> </tr> <tr> <td>E2</td> <td>Elevated Drive Limit Switch or Related Wiring Fault</td> </tr> <tr> <td>E3</td> <td>Elevated Conditions Detected - EL</td> </tr> </tbody> </table> | Fault Code | Description | E1 | Override Detection Limit Switch or Related Wiring Fault | E2 | Elevated Drive Limit Switch or Related Wiring Fault | E3 | Elevated Conditions Detected - EL |
| Fault Code                                       | Description   |            |             |    |   |    |   |    |                                   |
| E1   | Override Detection Limit Switch or Related Wiring Fault   |            |             |    |   |    |   |    |                                   |
| E2   | Elevated Drive Limit Switch or Related Wiring Fault   |            |             |    |   |    |   |    |                                   |
| E3   | Elevated Conditions Detected - EL   |            |             |    |   |    |   |    |                                   |

|         |   |
|---------|---|
| E4      | Override Condition Detected                           |
| E5      | Dual Zone Push Button or Related Wiring Fault         |
| E6      | Dual Zone Height Limit Switch or Related Wiring Fault |
| E7      | Dual_Zone_Fault: CAN Data error from CM410            |
| E8      | Dual_Zone_Fault: Incorrect Dual Zone Configuration    |
| E9(OHL) | At or about Outdoor Height Limit - OHL                |

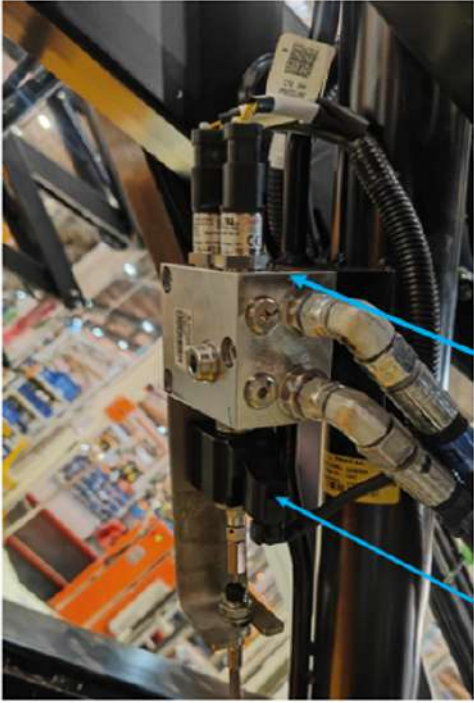
## 5.37 Main Control Valve

|                      |   |                    |                     |                |
|----------------------|---|--------------------|---------------------|----------------|
| <b>Component:</b>    | <b>Main Control Valve</b>   |                    |                     |                |
| <b>Function:</b>     | <p>The main control valve allows the flow of the hydraulics for Platform Lift Up/Down and Steer Left/Right Function through Solenoid coil respectively.</p> <p>A. <b>Raise Solenoid:</b> Controls the lifting cylinder to raise the platform.</p> <p>B. <b>Steer Solenoid:</b> Directs oil to the LH and RH steering cylinders to steer the machine.</p> <p>The solenoid valve on the MCV is electrically operated. When the DC contactor energizes it, the solenoid shifts the MCV spool, directing hydraulic flow as required and simultaneously signaling the motor control system to coordinate movement.</p> |                    |                     |                |
| <b>Location:</b>     | For S1932EE under the Chassis and For rest of model in Hydraulic Tray   |                    |                     |                |
| <b>Location IMG:</b> |   |                    |                     |                |
| <b>Signal:</b>       | <b>Pin</b>  | <b>Description</b> | <b>Connector No</b> | <b>Wire No</b> |

|  | <table border="1"> <tr> <td>1</td> <td>Coil Supply</td> <td>C6_MH</td> <td>8100</td> <td></td> </tr> <tr> <td>2</td> <td>Raise Solenoid LS</td> <td>C6_MH</td> <td>6000U</td> <td></td> </tr> </table>  | 1            | Coil Supply | C6_MH        | 8100    |   | 2 | Raise Solenoid LS | C6_MH  | 6000U |  |   |                                |        |       |  |
|--|---|--------------|-------------|--------------|---------|---|---|-------------------|--------|-------|--|---|--------------------------------|--------|-------|--|
| 1  | Coil Supply   | C6_MH        | 8100        |              |         |   |   |                   |        |       |  |   |                                |        |       |  |
| 2  | Raise Solenoid LS   | C6_MH        | 6000U       |              |         |   |   |                   |        |       |  |   |                                |        |       |  |
|  | <table border="1"> <thead> <tr> <th>Pin</th> <th>Description</th> <th>Connector No</th> <th>Wire No</th> <th>V</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Coil Supply</td> <td>C10_MH</td> <td>8400</td> <td></td> </tr> <tr> <td>2</td> <td>Steer Left Solenoid LS Output</td> <td>C10_MH</td> <td>6000M</td> <td></td> </tr> </tbody> </table>   | Pin          | Description | Connector No | Wire No | V | 1 | Coil Supply       | C10_MH | 8400  |  | 2 | Steer Left Solenoid LS Output  | C10_MH | 6000M |  |
| Pin  | Description   | Connector No | Wire No     | V            |         |   |   |                   |        |       |  |   |                                |        |       |  |
| 1  | Coil Supply   | C10_MH       | 8400        |              |         |   |   |                   |        |       |  |   |                                |        |       |  |
| 2  | Steer Left Solenoid LS Output   | C10_MH       | 6000M       |              |         |   |   |                   |        |       |  |   |                                |        |       |  |
|  | <table border="1"> <thead> <tr> <th>Pin</th> <th>Description</th> <th>Connector No</th> <th>Wire No</th> <th>V</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Coil Supply</td> <td>C11_MH</td> <td>8401</td> <td></td> </tr> <tr> <td>2</td> <td>Steer Right Solenoid LS Output</td> <td>C11_MH</td> <td>6000L</td> <td></td> </tr> </tbody> </table>  | Pin          | Description | Connector No | Wire No | V | 1 | Coil Supply       | C11_MH | 8401  |  | 2 | Steer Right Solenoid LS Output | C11_MH | 6000L |  |
| Pin  | Description   | Connector No | Wire No     | V            |         |   |   |                   |        |       |  |   |                                |        |       |  |
| 1  | Coil Supply   | C11_MH       | 8401        |              |         |   |   |                   |        |       |  |   |                                |        |       |  |
| 2  | Steer Right Solenoid LS Output  | C11_MH       | 6000L       |              |         |   |   |                   |        |       |  |   |                                |        |       |  |
| <p><b>Wires &amp; Connectors IMG:</b></p>        | <p>The diagram shows three solenoid assemblies. The Steer Right Solenoid (top left) is connected to connector -C11_MH (part 7212/0203) and has a 30mm wire to ID7_MH (part 403B868). The Steer Left Solenoid (top middle) is connected to connector -C10_MH (part 7212/0203) and has a 30mm wire to ID8_MH (part 403B868). The Raise Solenoid (top right) is connected to connector -C6_MH (part 7212/0203) and has a 30mm wire to ID9_MH (part 403B868). All three assemblies are connected to a common bus at the bottom via wires of length 30mm, 70mm, and 50mm, with part numbers 7000/3202 and 7000/3202-PA7.</p>   |              |             |              |         |   |   |                   |        |       |  |   |                                |        |       |  |
| <p><b>Internal Electrical Schematic IMG:</b></p> | <p>The schematic diagram shows the internal electrical connections. On the left, a yellow-shaded area lists the following terminals: RAISE SOLENOID LS (312), LOWER SOLENOID LS OUTPUT (302), STEER LEFT SOLENOID LS OUTPUT (310), STEER RIGHT SOLENOID LS OUTPUT (315), COIL SUPPLY (130), and PHASE U (11). On the right, the schematic shows the RAISE and LOWER solenoid outputs connected to a DC CONTACTOR COIL (4830304). The STEER LEFT and STEER RIGHT outputs are connected to the COIL SUPPLY. The COIL SUPPLY is connected to the DC CONTACTOR COIL. The PHASE U terminal is connected to the DC CONTACTOR COIL. The schematic also shows various other components like solenoid spools, coils, and connectors.</p> |              |             |              |         |   |   |                   |        |       |  |   |                                |        |       |  |
| <p><b>Testing:</b></p>                           | <p>Check Input Voltage 24V</p>  |              |             |              |         |   |   |                   |        |       |  |   |                                |        |       |  |

|                             |                                       |                       |
|-----------------------------|---------------------------------------|-----------------------|
| <b>Expected Values:</b>     | 24V                                   |                       |
| <b>Related Fault Codes:</b> | <b>Fault Code</b>                     | <b>Description</b>    |
|                             | <a href="#">A1</a> <small>244</small> | Steer right Fault     |
|                             | <a href="#">A6</a> <small>246</small> | Steer Left Coil Fault |
|                             | <a href="#">A4</a> <small>248</small> | Lift Up solenoid      |
|                             | <a href="#">A9</a> <small>321</small> | Coil Supply           |

## 5.38 Lowering Valve

| <b>Component:</b>    | Lowering Valve   |              |             |              |         |   |   |             |       |      |  |   |                          |       |       |  |  |  |  |
|----------------------|--|--------------|-------------|--------------|---------|---|---|-------------|-------|------|--|---|--------------------------|-------|-------|--|--|--|--|
| <b>Function:</b>     | Lower Solenoid: Mounted on the scissor pack/arm. When electrically energized, it opens the lift control valve, allowing the lowering cylinder to lower the platform.   |              |             |              |         |   |   |             |       |      |  |   |                          |       |       |  |  |  |  |
| <b>Location:</b>     | On Lift Ram  |              |             |              |         |   |   |             |       |      |  |   |                          |       |       |  |  |  |  |
| <b>Location IMG:</b> |    |              |             |              |         |   |   |             |       |      |  |   |                          |       |       |  |  |  |  |
| <b>Signal:</b>       | <table border="1"> <thead> <tr> <th>Pin</th> <th>Description</th> <th>Connector No</th> <th>Wire No</th> <th>V</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Coil Supply</td> <td>C8_MH</td> <td>8201</td> <td></td> </tr> <tr> <td>2</td> <td>Lower Solenoid LS Output</td> <td>C8_MH</td> <td>6000P</td> <td></td> </tr> </tbody> </table> | Pin          | Description | Connector No | Wire No | V | 1 | Coil Supply | C8_MH | 8201 |  | 2 | Lower Solenoid LS Output | C8_MH | 6000P |  |  |  |  |
| Pin                  | Description  | Connector No | Wire No     | V            |         |   |   |             |       |      |  |   |                          |       |       |  |  |  |  |
| 1                    | Coil Supply  | C8_MH        | 8201        |              |         |   |   |             |       |      |  |   |                          |       |       |  |  |  |  |
| 2                    | Lower Solenoid LS Output   | C8_MH        | 6000P       |              |         |   |   |             |       |      |  |   |                          |       |       |  |  |  |  |

| <p><b>Wires &amp; Connectors IMG:</b></p>        |   |            |             |                           |                      |
|--|---|------------|-------------|---------------------------|----------------------|
| <p><b>Internal Electrical Schematic IMG:</b></p> |   |            |             |                           |                      |
| <p><b>Testing:</b></p>                           | <p>Check Input Voltage 24V</p>  |            |             |                           |                      |
| <p><b>Expected Values:</b></p>                   | <p>24V</p>  |            |             |                           |                      |
| <p><b>Related Fault Codes:</b></p>               | <table border="1"> <thead> <tr> <th style="background-color: yellow;">Fault Code</th> <th style="background-color: yellow;">Description</th> </tr> </thead> <tbody> <tr> <td><a href="#">A7</a>   2501</td> <td>Lift Down Coil Fault</td> </tr> </tbody> </table> | Fault Code | Description | <a href="#">A7</a>   2501 | Lift Down Coil Fault |
| Fault Code                                       | Description   |            |             |                           |                      |
| <a href="#">A7</a>   2501                        | Lift Down Coil Fault  |            |             |                           |                      |

## 5.39 Perimeter Light (Optional)

|                          |   |
|--------------------------|---|
| <p><b>Component:</b></p> | <p>Perimeter Light</p>  |
| <p><b>Function:</b></p>  | <p>The perimeter light is installed around the machine to define a safe operating zone, protecting it from potential hazards and clearly marking the area as restricted for unauthorized personnel.</p> |
| <p><b>Location:</b></p>  | <p>On the Chassis</p>   |

| <p><b>Location<br/>IMG:</b></p>                              |  |              |             |              |         |         |   |     |       |       |    |   |           |       |     |     |
|--|--|--------------|-------------|--------------|---------|---------|---|-----|-------|-------|----|---|-----------|-------|-----|-----|
| <p><b>Signal:</b></p>  | <table border="1"> <thead> <tr> <th>Pin No</th> <th>Description</th> <th>Connector No</th> <th>Wire No</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>GND</td> <td>C3_PH</td> <td>BLACK</td> <td>0V</td> </tr> <tr> <td>4</td> <td>IGN (+ve)</td> <td>C3_PH</td> <td>RED</td> <td>24V</td> </tr> </tbody> </table> | Pin No       | Description | Connector No | Wire No | Voltage | 1 | GND | C3_PH | BLACK | 0V | 4 | IGN (+ve) | C3_PH | RED | 24V |
| Pin No   | Description  | Connector No | Wire No     | Voltage      |         |         |   |     |       |       |    |   |           |       |     |     |
| 1  | GND  | C3_PH        | BLACK       | 0V           |         |         |   |     |       |       |    |   |           |       |     |     |
| 4  | IGN (+ve)  | C3_PH        | RED         | 24V          |         |         |   |     |       |       |    |   |           |       |     |     |
| <p><b>Wires &amp;<br/>Connectors<br/>IMG:</b></p>            |  |              |             |              |         |         |   |     |       |       |    |   |           |       |     |     |
| <p><b>Internal<br/>Electrical<br/>Schematic<br/>IMG:</b></p> |  |              |             |              |         |         |   |     |       |       |    |   |           |       |     |     |
| <p><b>Testing:</b></p>                                       |  |              |             |              |         |         |   |     |       |       |    |   |           |       |     |     |
| <p><b>Expected<br/>Values:</b></p>                           | <p>24V</p>   |              |             |              |         |         |   |     |       |       |    |   |           |       |     |     |

|                                     |     |
|-------------------------------------|-----|
| <b>Related<br/>Fault<br/>Codes:</b> | N/A |
|-------------------------------------|-----|

This page is intentionally left blank.  
Remove this text from the manual  
template if you want it completely blank.

# Machine Calibration

## 6 Machine Calibration

# Machine Calibration

List of Machine Calibration

| Number | Component  |
|--------|--|
| 1      | <a href="#">Calibration Sequence</a>   436         |
| 2      | <a href="#">Calibration Platform Control</a>   438 |
| 3      | <a href="#">Standard Calibration</a>   443         |
| 4      | <a href="#">Field Calibration</a>   448            |
| 5      | <a href="#">Rapid Calibration</a>   453            |
| 6      | <a href="#">Tilt Sensor Calibration</a>   457      |

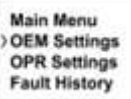
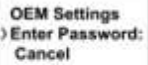
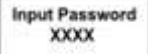
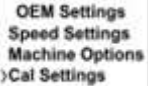
## 6.1 Calibration Sequence

| 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<br>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           | <a href="#">Setting of lower limit switch in ECU (Electronic Control Unit) as per procedure given below.</a>   |
| 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. |
|----|---------------------|---|

## 6.2 Platform Control Menu Options

| 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  | > Height Mode<br>Service Mode<br>Cancel                              | 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  |               | Speed Settings<br>> Fast 100.0%<br>Slow 50.0%<br>Elevated 17.2%      | 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          | > Lift Speed 51%<br>Steer Speed 25%<br>Cancel                        | 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 |               | Machine Options<br>> PH Alarm On<br>Descent Del Off<br>Load Sense On | 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 | Machine Options<br>> Miscellaneous                                   | 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 |                                       | Miscellaneous<br>>Jstk Dir    INV<br>Foot Sw    Off<br>Ovr Prvt   Off | Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.   |
|               | Joystick<br>Direction <sup>(2)</sup>  | Miscellaneous<br>Jstk Dir    INV<br>>Foot Sw    On<br>Ovr Prvt   Off  | 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 <sup>(2)</sup>            | Miscellaneous<br>Jstk Dir    INV<br>Foot Sw    Off<br>>Ovr Prvt   On  | 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.   |
|               | Override<br>Prevention <sup>(2)</sup> | >Cutout    LFT<br>Elyt Drv   Off<br>Dual Hght   Off<br>Cancel         | This is only applicable to machines fitted with an override prevention system.  |
|               | Cutout <sup>(2)</sup>                 | Cutout    LFT<br>>Elyt Drv   On<br>Dual Hght   Off<br>Cancel          | If override prevention is activated and LFT is appearing on the display, the machine lift will be disabled until the override condition is cleared. If override prevention is activated and ALL is appearing on the display, the machine lift and drive will be disabled until the override condition is cleared. |
|               | Elevated<br>Drive <sup>(2)</sup>      | Cutout    LFT<br>Elyt Drv   Off<br>>Dual Hght   On<br>Cancel          | 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 <sup>(3)</sup>            |   | This option is only available for machines fitted with the dual height feature.   |
|               | Cancel <sup>(2, 3)</sup>              |   | Select to exit the miscellaneous settings menu.   |
|               | Calibration<br>settings               |   | Cal Settings<br>>Cal Settings<br>Cal Status<br>Cancel   |
| 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 |              | <pre> Cal Settings &gt;Enable      Off Angle Sensor Off NL Static    Off                     </pre> | Use the lift mode button to move up and horn button to move down the menu, and drive mode button for enter.   |
|                      | Enable       | <pre> &gt;FL Static    Off NL Dynamic   Off FL Dynamic   Off Cancel                     </pre>      | 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   |              | <pre> Cal Status &gt;AS Complete Y NL Static    Y FL Static    Y                     </pre>         | 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    | <pre> &gt;NL Dynamic   Y FL Dynamic   Y PS Failure   N AS Failure   N                     </pre>    | 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   | <pre> Data Change  N &gt; Cancel                     </pre>   | 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  |                          | <pre> Height Mode &gt;DD Height 1.16m DL Height 0.50m Cancel                     </pre>     | 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                   | <pre> Service Mode &gt;Enable Off                     </pre>                                | 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 |                          | <pre> OPR Settings &gt;Batt Alarm On Batt Del 5min Brake Rel Off                     </pre> | 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            | <pre> Idle Light On Motion Al On &gt;Field Cal Cancel                     </pre>            | 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            | <pre> SW Ver:00.00.26                     </pre>  | 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 <sup>(1)</sup> |   | 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.   |              |  |   |

## 6.3 Standard Calibration

### Standard Calibration -

When the load sensing system (angle sensor or pressure sensor) is repaired or reworked, **Standard Calibration** is performed to restore full machine functionality. This ensures the system is accurately calibrated to the rated load.

### Pre Checks -

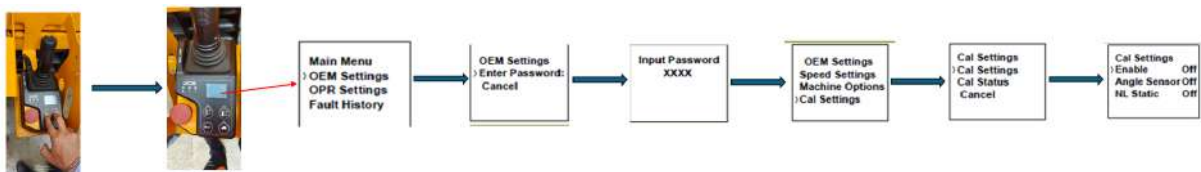
Make sure to connect the joystick to the data link interconnect inside the RH door.

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. Machine lift/lower operation from PCU will not work until machine is fully calibrated. Use base controls for lifting and lowering operations.
3. Lower the platform to the stowed position.
4. Make sure that there is no load on the platform.
5. Make sure that the both (base and PCU) emergency switches are in the ON position.
6. Machine should be fully charged.
7. Make sure the key is in platform control.
8. Make sure to follow the full calibration process

## Angle Sensor Calibration -

1. Press the lift and travel button together on the PCU while switching ON the E-Stop of the Joystick.
2. Select 'OEM settings' and press enter. Enter the password. The drive mode button is used as enter.
3. Move the platform raise/lower toggle switch to find 'Cal settings' function. Press the enter button.
4. Scroll down and select 'Angle sensor', and press enter.
5. Select ON by pressing the left/right button for the angle sensor calibration and press enter. Wait for the green light to blink once.
6. Scroll up to enable and change the status to ON, and press enter. Wait for the green light to blink once.
7. The calibration will start automatically and platform will move up and down once.
8. Once the calibration is done, perform the key cycle to save the calibration.
9. If the calibration result shows errors, check error code and diagnose the respective error and do the calibration process again.



## 1. No Load Static Calibration -

1. Press the lift and travel button together on the PCU while switching ON the E-Stop of the Joystick.
2. Select 'OEM settings' and press enter. Enter the password. The drive mode button is used as enter.

3. Move the platform raise/lower toggle switch to find 'Cal settings' function. Press the enter button.
4. Scroll down and select 'NL Static', and press enter.
5. Select ON by pressing the left/right button for the no load static calibration and press enter. Wait for the green light to blink once
6. Scroll up to enable and change the status to ON, and press enter. Wait for the green light to blink once
7. The calibration will start automatically. Platform will raise and lower twice (once in S4550E), while stopping 25 times each cycle to save data
8. Once the calibration is done, perform the key cycle to save the calibration
9. If the calibration result shows errors, check error code and diagnose the respective error and do the calibration process again.

## 2. No Load Dynamic Calibration -

1. Press the lift and travel button together on the PCU while switching ON the E-Stop of the Joystick.
2. Select 'OEM settings' and press enter. Enter the password. The drive mode button is used as enter.
3. Move the platform raise/lower toggle switch to find 'Cal settings' function. Press the enter button.
4. Scroll down and select 'NL Dynamic', and press enter.
5. Select ON by pressing the left/right button for the no load Dynamic calibration and press enter. Wait for the green light to blink once
6. Scroll up to enable and change the status to ON, and press enter. Wait for the green light to blink once
7. The calibration will start automatically. Platform will move up and down 2 times (once in S4550E), continuously.
8. Once the calibration is done, perform the key cycle to save the calibration
9. If the calibration result shows errors, check error code and diagnose the respective error and do the calibration process again.

## Pre Checks -

1. Make sure that the platform is loaded to the 102% of rated load on the platform.

| <b>Machine Model</b> | <b>102% Load (Without Joystick)</b> |
|----------------------|-------------------------------------|
| S1932E EDRV          | 235kg                               |
| S2632E EDRV          | 255kg                               |
| S2646E EDRV          | 459kg                               |
| S3246E EDRV          | 326kg                               |
| S4046E EDRV          | 326kg                               |
| S4550E EDRV          | 235kg                               |

### 3. Full Load Static Calibration -

1. Press the lift and travel button together on the PCU while switching ON the E-Stop of the Joystick.
2. Select 'OEM settings' and press enter. Enter the password. The drive mode button is used as enter.
3. Move the platform raise/lower toggle switch to find 'Cal settings' function. Press the enter button.
4. Scroll down and select 'FL static', press enter.
5. Select ON by pressing the left/right button for the Full Load Static calibration and press enter. Wait for the green light to blink once.
6. Scroll up to enable and change the status to ON, and press enter. Wait for the green light to blink once.
7. The calibration will start automatically. Platform will raise and lower twice (once in S4550E), while stopping 25 times each cycle to save data.
8. Once the calibration is done, perform the key cycle to save the calibration.
9. If the calibration result shows errors, check error code and diagnose the respective error and do the calibration process again.

### 4. Full Load Dynamic Calibration -

1. Press the lift and travel button together on the PCU while switching ON the E-Stop of the Joystick.
2. Select 'OEM settings' and press enter. Enter the password. The drive mode button is used as enter.
3. Move the platform raise/lower toggle switch to find 'Cal settings' function. Press the enter button.
4. Scroll down and select 'FL dynamic', press enter.

5. Select ON by pressing the left/right button for the Full Load Dynamic calibration and press enter.Wait for the green light to blink once
6. Scroll up to enable and change the status to ON, and press enter.Wait for the green light to blink once
- 7.The calibration will start automatically. Platform will raise and lower 2 times(once in S4550E), continuously.
- 8.Once the calibration is done, perform the key cycle to save the calibration
- 9.If the calibration result shows errors, check error code and diagnose the respective error and do the calibration process again.

## Post Checks - Overload Check:

1. Take the machine to suitable testing area.
2. Raise and lower the platform twice.
3. Lower the platform to the stowed position.
4. Add 105% rated load on the platform as per below table

| Machine Model | 105% Rated Load |
|---------------|-----------------|
| S1932E EDRV   | 242kg           |
| S2632E EDRV   | 263kg           |
| S2646E EDRV   | 473kg           |
| S3246E EDRV   | 336kg           |
| S4046E EDRV   | 336kg           |
| S4550E EDRV   | 241kg           |

5. Raise the platform.Make sure that the platform should not raise to more than 50% of full height before the overload alarm sounds.
6. When the overload alarm occurs 'OL' error is displayed on the LCD
7. Restart the machine. Wait for some duration. Make sure that the 'OL' alarm sound again activates.

## False Overload Check:

- 1.Add 95% rated load on the platform as per below table:

| <b>Machine Model</b> | <b>95% Rated Load</b> |
|----------------------|-----------------------|
| S1932E EDRV          | 218kg                 |
| S2632E EDRV          | 237kg                 |
| S2646E EDRV          | 427kg                 |
| S3246E EDRV          | 304kg                 |
| S4046E EDRV          | 304kg                 |
| S4550E EDRV          | 218kg                 |

2. Fully raise and lower the platform. Make sure that no overload alarm sounds during the test.
3. Raise and lower the platform to full working height for 5 cycles with 95% load in the platform.
4. If the overload alarm sounds, contact the nearest JCB service engineer.

## 6.4 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.

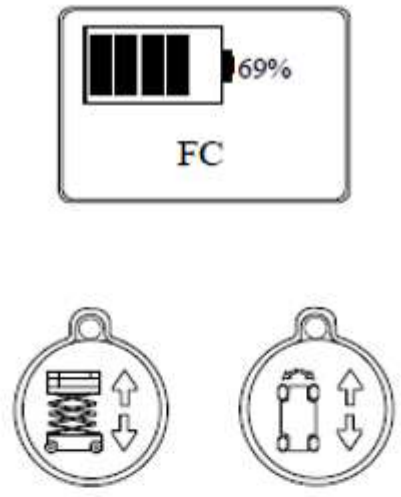
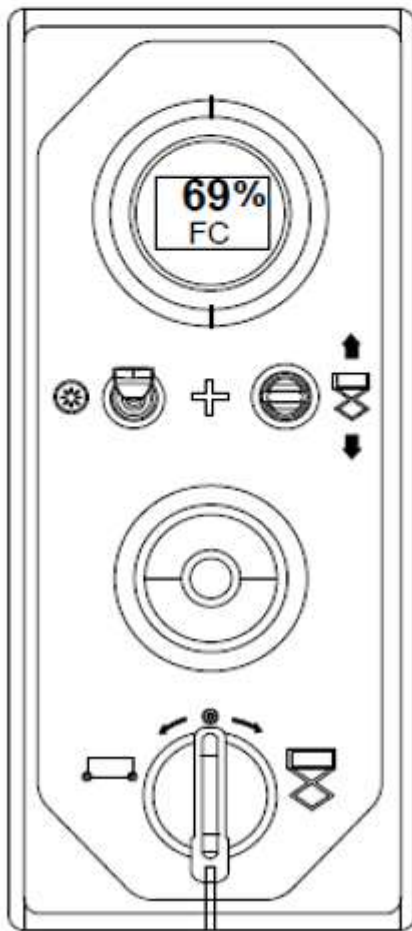


Figure 63.



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.

## **Pre Checks -**

Make sure to connect the joystick to the datalink interconnect inside the RH door.

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

3. 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. Machine should be fully charged.

9. Make sure the key is in platform control.

## **Angle Sensor Calibration -**

1. Press the lift and travel button together on the PCU while switching ON the E-Stop of the Joystick.

2. The PCU display will display 'Menu'.

3. Select 'OPR settings' and press enter.

4. Move the platform raise/lower toggle switch to select 'Field cal' function. Press the enter button.

5. Scroll down and select 'Angle sensor', and press enter. Wait for the green light to blink once.

6. Scroll up to enable and change the status to ON, and press enter. Wait for the green light to blink.

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

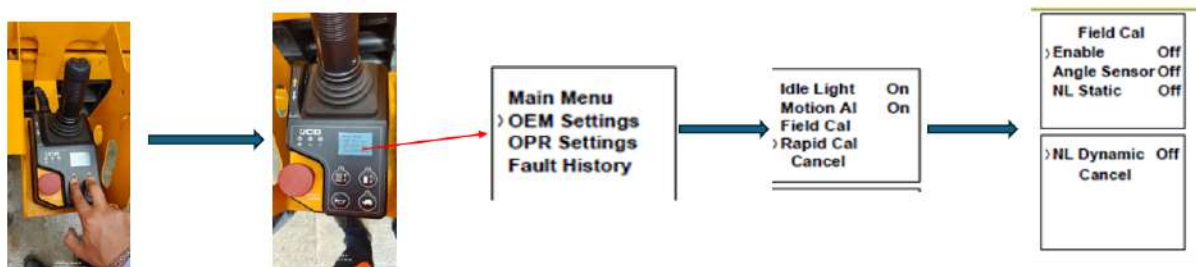
8. Once the calibration is complete, the base display will show 'FC AS OK'. Perform a key cycle to save the calibration

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

9.1 Check the error code

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

9.3 Perform the calibration process again.



## 1. No Load Static Calibration -

1. Press the lift and travel button together on the PCU while switching ON the E-Stop of the Joystick.
2. The PCU display will display 'Menu'.
3. Select 'OPR settings' and press enter.
4. Move the platform raise/lower toggle switch to select 'Field cal' function. Press the enter button.
5. Scroll down and select 'NL Static', and press enter. Wait for the green light to blink once.
6. Scroll up to enable and change the status to ON, and press enter. Wait for the green light to blink.
7. The calibration will start automatically. The platform will raise and lower once, and then stop periodically to capture calibration data.
8. Once the calibration is complete, the base display will show 'FC NL OK'. Perform a key cycle to save the calibration.
9. If the calibration result shows 'FC NL NOK' error, do the steps that follow:
  - 9.1 Check the error code
  - 9.2 Inspect the condition of the corresponding sensors to ensure correct operation.
  - 9.3 Perform the calibration process again.

## 2. No Load Dynamic Calibration -

1. Press the lift and travel button together on the PCU while switching ON the E-Stop of the Joystick.
2. The PCU display will display 'Menu'.
3. Select 'OPR settings' and press enter.
4. Move the platform raise/lower toggle switch to select 'Field cal' function. Press the enter button.
5. Scroll down and select 'NL Dynamic', and press enter. Wait for the green light to blink once.

6. Scroll up to enable and change the status to ON, and press enter. Wait for the green light to blink.
7. The calibration will start automatically. The platform will raise and lower once continuously.
8. Once the calibration is complete, the base display will show 'FC NL OK'. Perform a key cycle to save the calibration
9. If the calibration result shows 'FC NL NOK' error, do the steps that follow:
  - 9.1 Check the error code
  - 9.2 Inspect the condition of the corresponding sensors to ensure correct operation.
  - 9.3 Perform the calibration process again.

### **Post Checks -**

1. Take the machine to suitable testing area.
2. Raise and lower the platform twice to full height ensure FC is displayed on the base and platform display while performing lift and lower operations.

## **6.5 Rapid Calibration**

### **Rapid Calibration -**

- Machine software must be version A115 or above and joystick firmware version 00.00.29 or above to perform rapid calibration
- When the load sensing system of a machine (angle sensor/pressure sensor) is repaired/reworked, rapid 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 65%-75% 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 suitable weights and ceiling height not sufficient to lift the machine to full height, rapid calibration can be performed

| <b>Model</b> | <b>Minimum Ceiling Height Required</b> |
|--------------|--|
| S1932E EDRV  | 3.5m                                   |
| S2632E EDRV  | 4.5m                                   |
| S2646E EDRV  | 4.5m                                   |
| S3246E EDRV  | 4.5m                                   |
| S4046E EDRV  | 4.5m                                   |
| S4550E EDRV  | 5m                                     |

·To indicate the machine is running on rapid calibration, the platform and base display will show 'RC'.

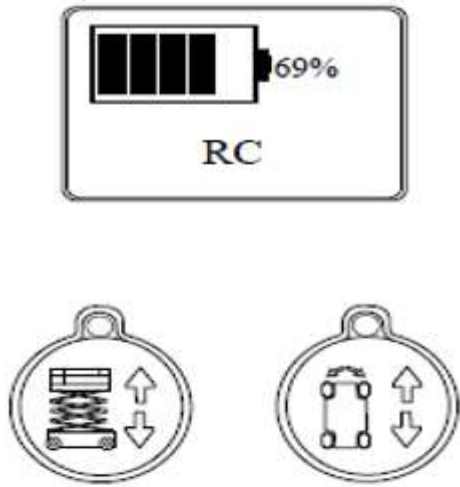
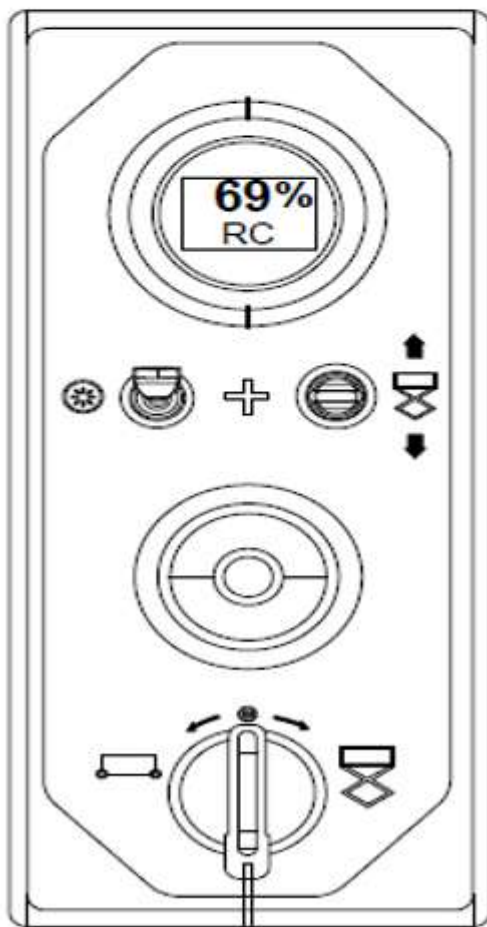


Figure 65.



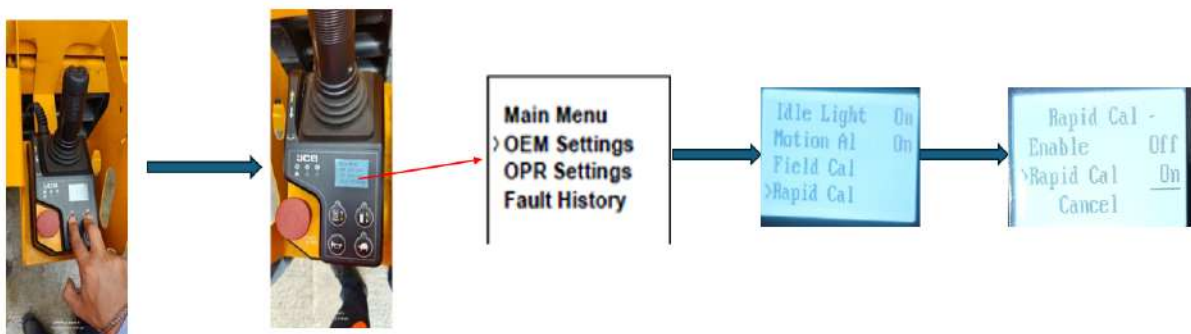
A standard calibration will restore the 100% load capacity, and 'RC' indication will no longer be visible on the platform or base control panel display.

## Pre Checks - .

1. Take the machine to a suitable testing area.
2. Lower the platform to the stowed position.
3. Make sure that there is no load on the platform.
4. Make sure that the both (base and PCU) emergency switches are in the ON position.

## Calibration -

1. Press the lift and travel button together on the PCU while switching ON the E-Stop of the Joystick.
2. The PCU display will display 'Menu'.
3. Select 'OPR settings' and press enter.
4. Move the platform raise/lower toggle switch to select 'Rapid cal' function. Press the enter button.
5. Scroll down and select 'Rapid Cal', and press enter. Wait for the green light to blink once.
6. Scroll up to enable and change the status to ON, and press enter. Wait for the green light to blink.
7. The calibration will start automatically and platform will move up to some height and down once.
8. Once the calibration is complete, the base display will show 'RC OK'. Perform a key cycle to save the calibration
9. If the calibration result shows 'RC NOK' error, do the steps that follow:
  - 9.1 Check the error code
  - 9.2 Inspect the condition of the corresponding sensors to ensure correct operation.
  - 9.3 Perform the calibration process again.



## Post Checks -

1. Take the machine to suitable testing area.
2. Raise and lower the platform twice to full height ensure FC is displayed on the base and platform display while performing lift and lower operations.

## 6.6 Tilt Sensor Calibration

| 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:  $3.1^{\circ}$ .
- 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.

**Notes - This Calibration is only required when the part is replaced**

This page is intentionally left blank.  
Remove this text from the manual  
template if you want it completely blank.

# Service Master Tool

## 7 Service Master Tool

# Service Master Tool

List of Service Master Tool

| Number | Component  |
|--------|--|
| 1      | <a href="#">Install Software - Service Master</a> <small>462</small> |
| 2      | <a href="#">Using JCB Service Master</a> <small>464</small>          |
| 3      | <a href="#">Using DLA (Data Link Adapter)</a> <small>465</small>     |
| 4      | <a href="#">Flashloader Tool</a> <small>470</small>                  |

### 7.1 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

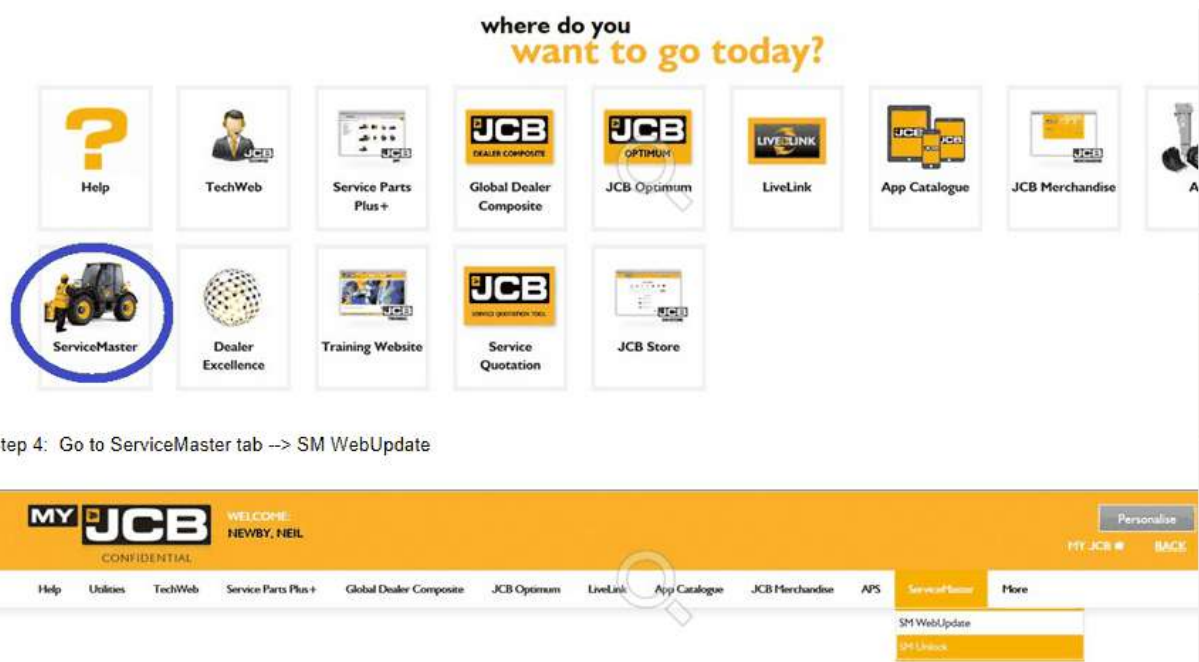
Follow the below steps to install the software

Step 1: Visit the [JCB Dealer Business Portal](#)

Step 2: Enter your User and password details to login

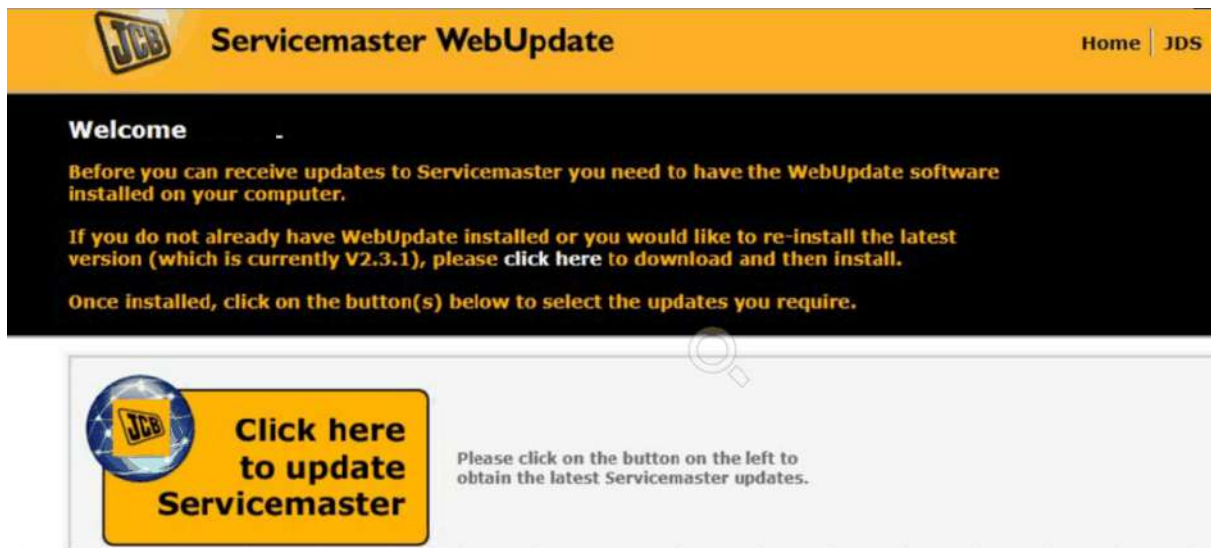


Step 3: Click on 'Service Master' icon



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)



## 7.2 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 ECUs with new software, sending information to the ECU over the Can Bus.

## 7.3 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 ECUs 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.

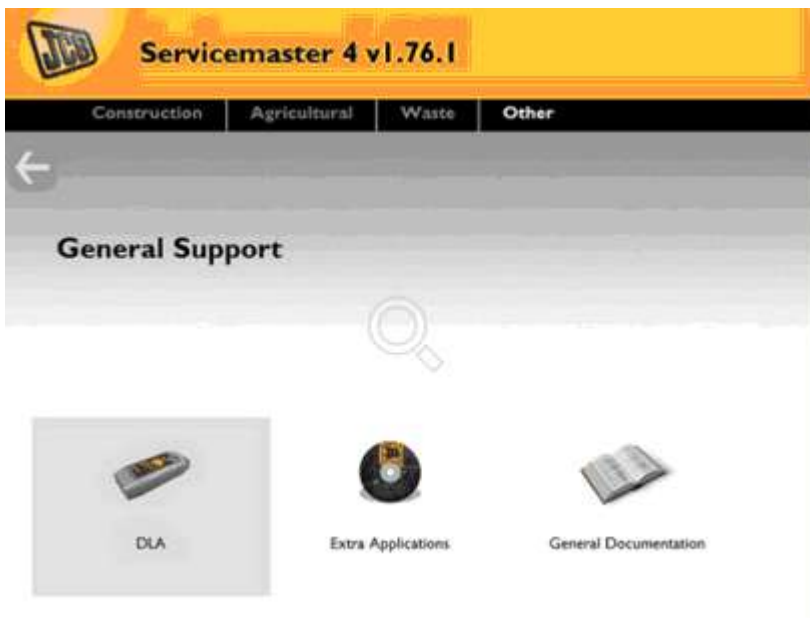
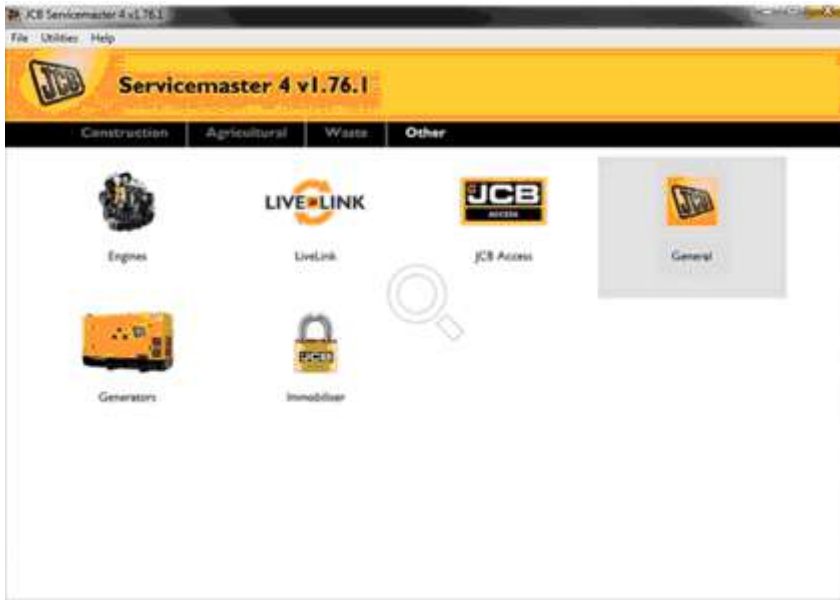
#### Installation Procedure - DLA Drives

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





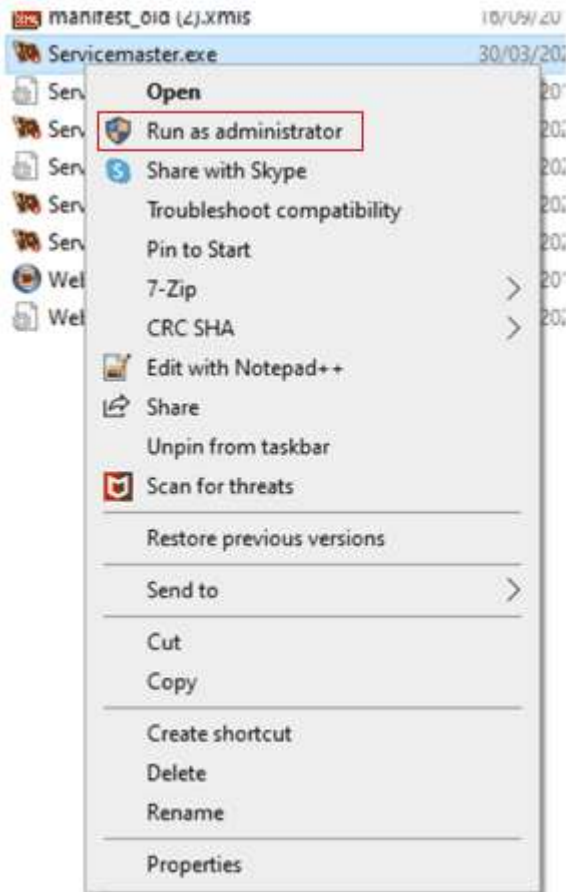
- Click on DLA driver and guides icon.



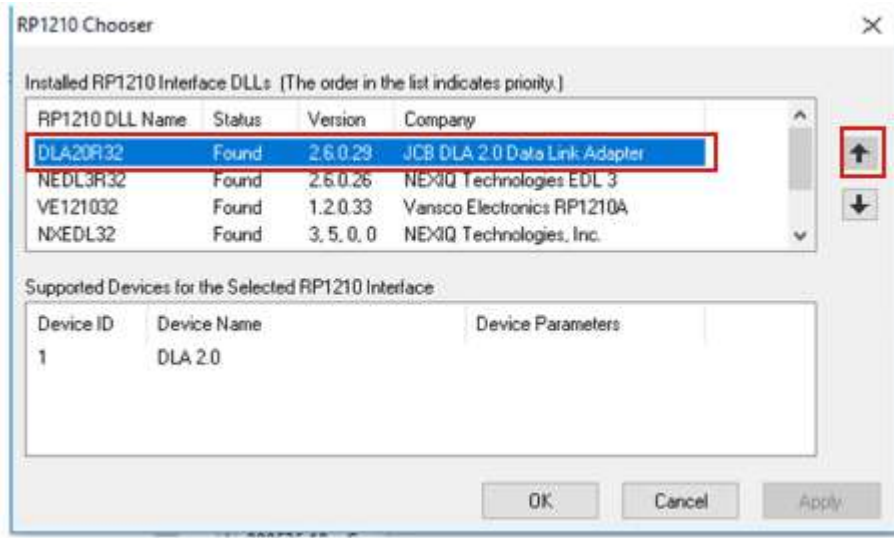
- Based upon the driver you want to install. Select the appropriate version of DLA. Select V1.10 USB DLA. Obey the window instructions to complete the DLA driver software installation Select DLA 2.0 Drivers [v2.6.0.29]. Refer attach image Figure



**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.



# DLA 2.0

## Install & Setup Guide

March 2021

## 7.4 Flashloader Tool

### Flash loader Tool

[Overview](#)

[Flashloader](#)

[Flashing The ECU](#)

[Communication Faults](#)

#### Overview

The Service Master Flashloader program is used to load software into the Electronic Control Units (ECUs) 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.

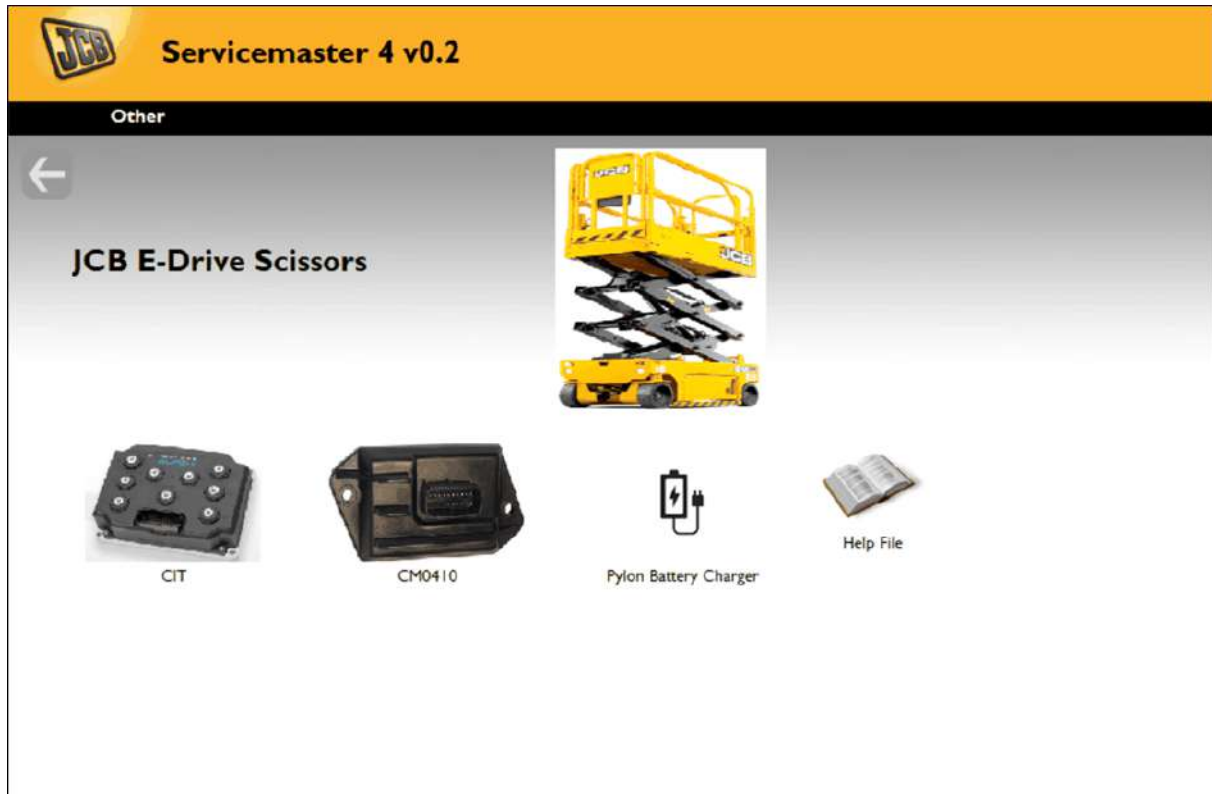
#### Step -

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



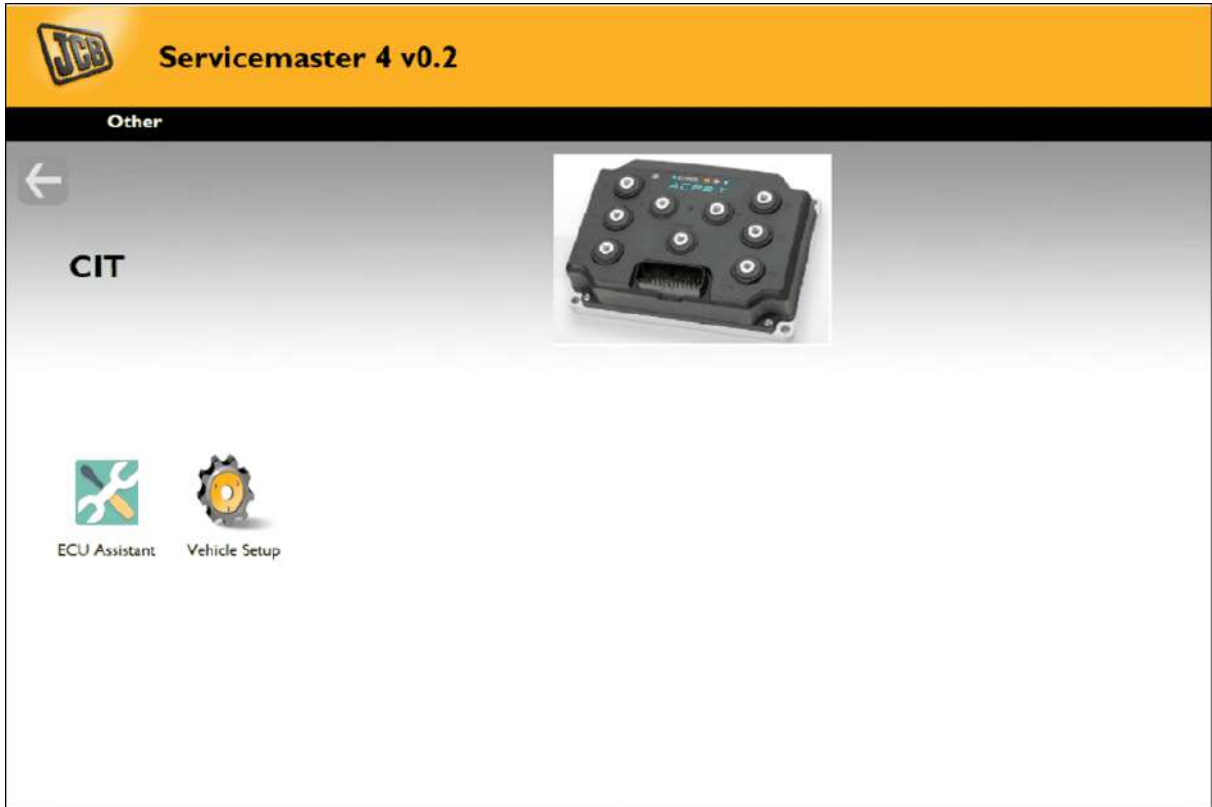
**Step -**

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



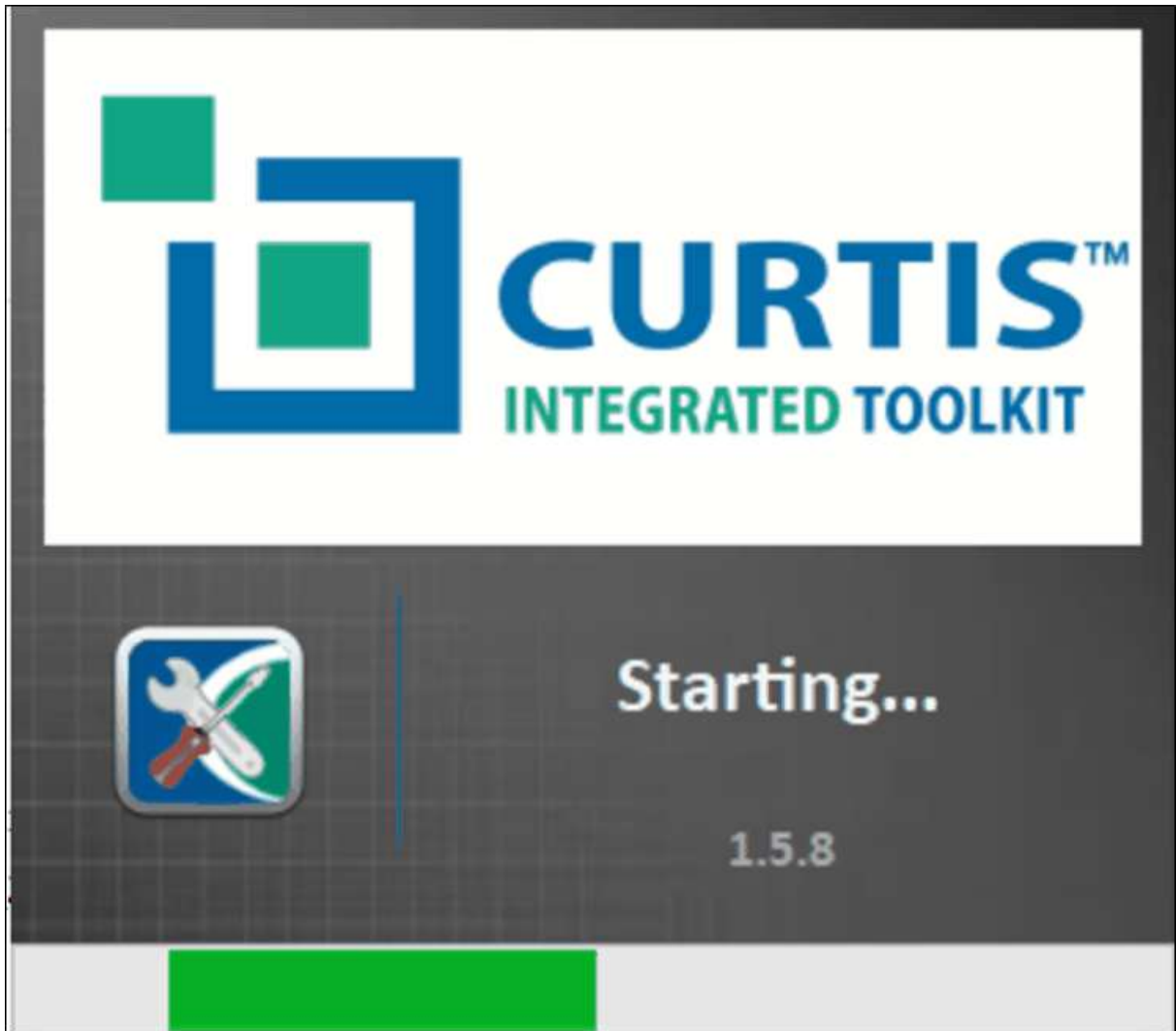
**Step -**

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

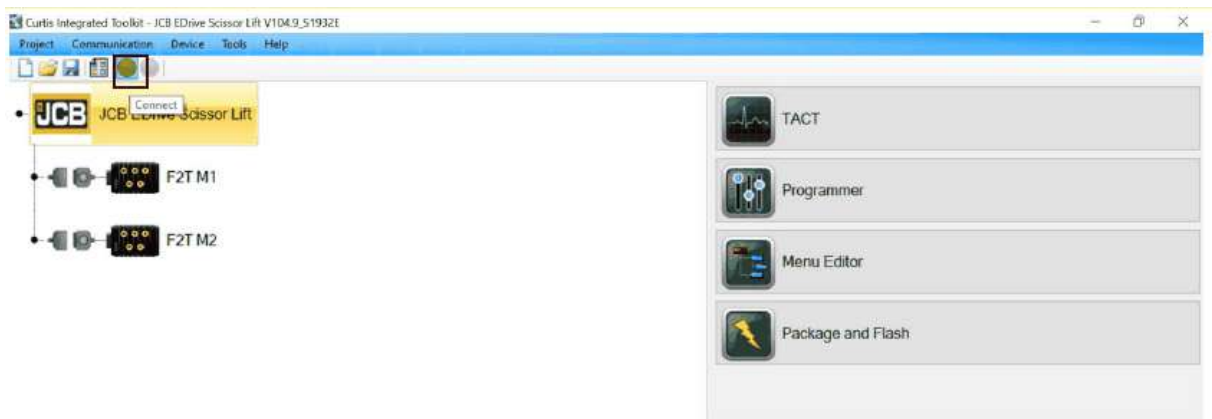


**Step -**

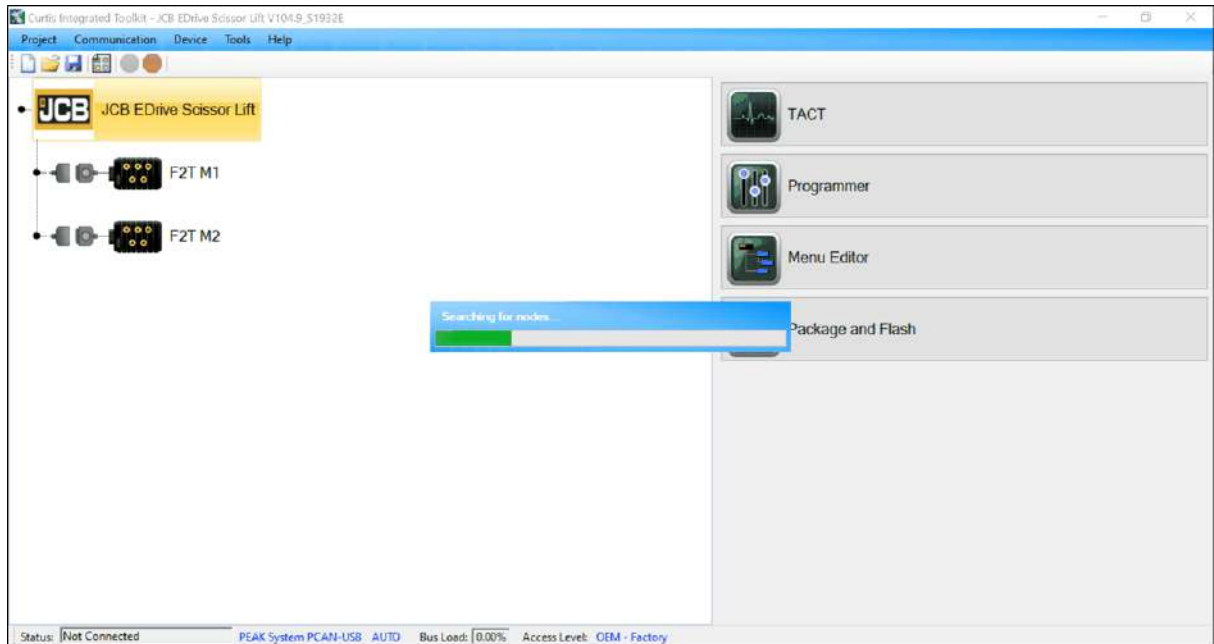
- Wait for Curtis Integrated tool to open.



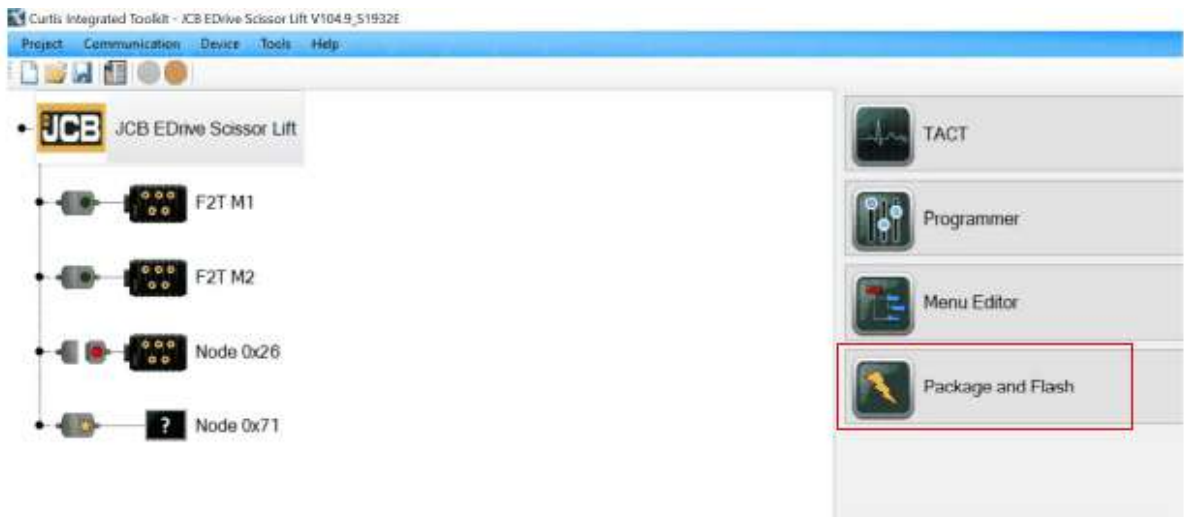
- Click on green button to connect.



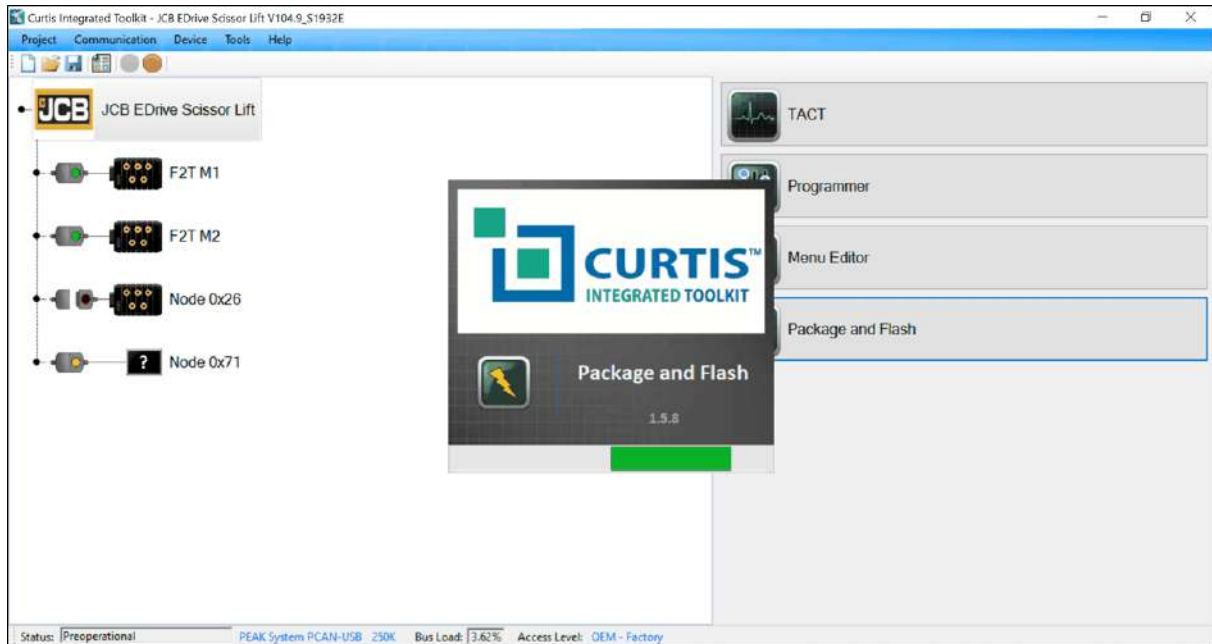
- Wait for CIT to connect



- Once online, click on package and flash.



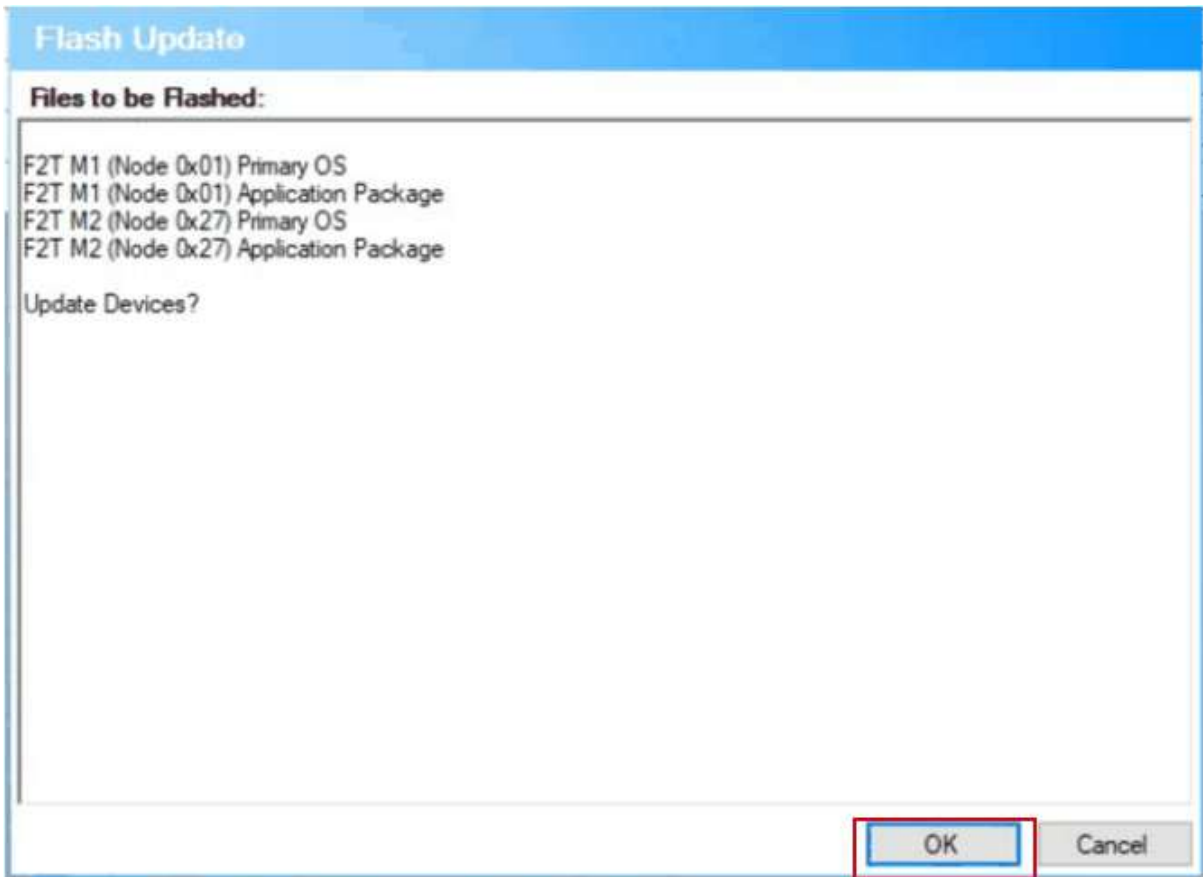
- Wait for package and flash to open



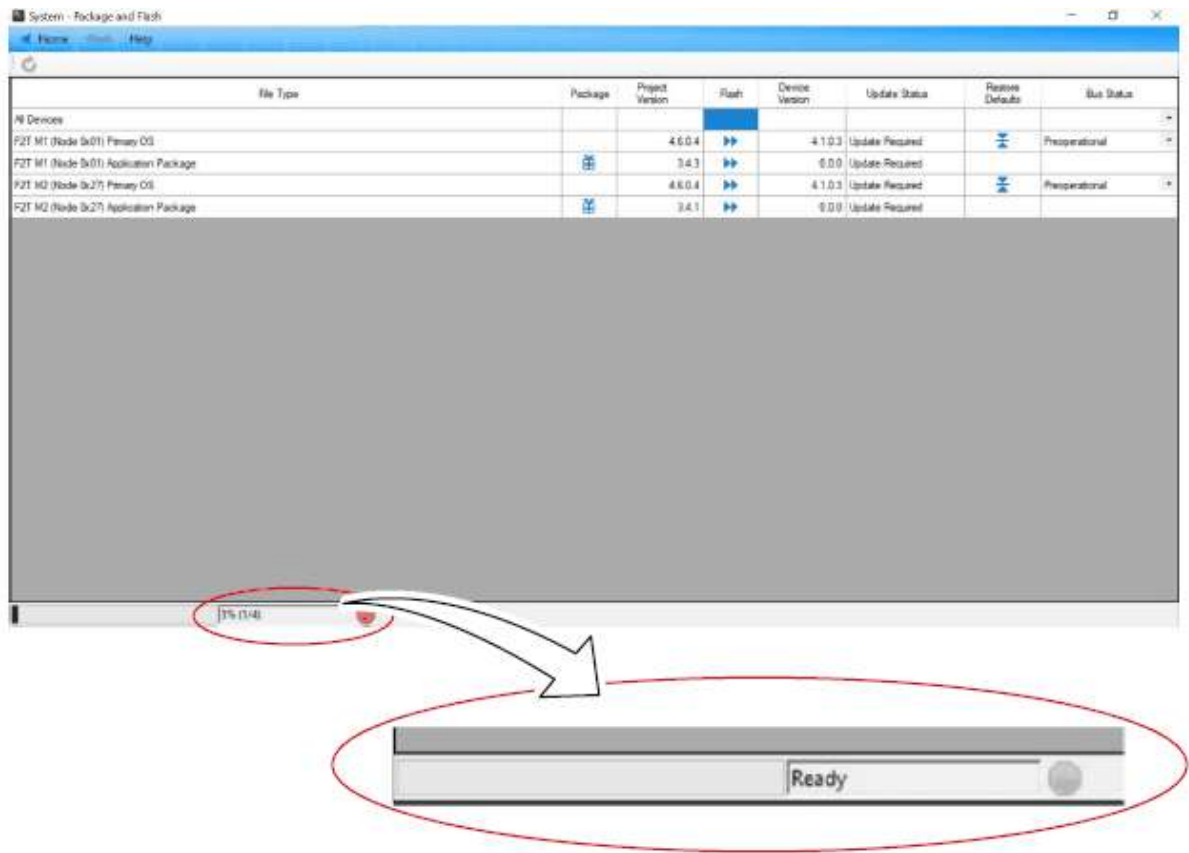
- Click on blue arrow at the top.

| File Type                              | Package | Project Version | Flash | Device Version | Update Status   | Restore Defaults | Bus Status     |
|--|---------|-----------------|-------|----------------|-----------------|------------------|----------------|
| <b>All Devices</b>                     |         |                 |       |                |                 |                  |                |
| F2T M1 (Node 0x01) Primary OS          |         | 4.6.0.4         | ▶▶    | 4.1.0.3        | Update Required | ⚙                | Preoperational |
| F2T M1 (Node 0x01) Application Package | ⊞       | 3.4.3           | ▶▶    | 0.0.0          | Update Required |                  |                |
| F2T M2 (Node 0x27) Primary OS          |         | 4.6.0.4         | ▶▶    | 4.1.0.3        | Update Required | ⚙                | Preoperational |
| F2T M2 (Node 0x27) Application Package | ⊞       | 3.4.1           | ▶▶    | 0.0.0          | Update Required |                  |                |

- Click OK.



- Wait for software to flash. Once 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 ECUs
- There is a supply fault to the ECUs. fuse fault/ Primary fuse fault / wiring fault
- The Diagnostic socket is not connected to the CAN-Bus.
- There are no ECUs disconnected from the CAN-Bus.
- There is a CAN-Bus fault Refer to 4000 Help Pages (CAN-Bus Tests)

This page is intentionally left blank.  
Remove this text from the manual  
template if you want it completely blank.

# Software Flashing

8 Software Flashing

# Software Flashing

List of Software Flashing

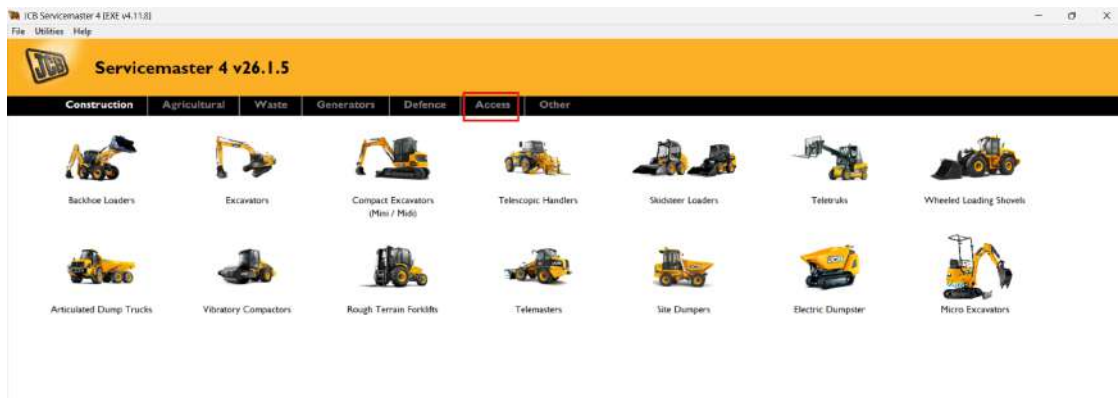
| Number | Component   |
|--------|---|
| 1      | <a href="#">CIT Installation &amp; Application Software Flashing</a>   482                |
| 2      | <a href="#">IQAN Tool Installation &amp; Dual Height Software Flashing</a>   499          |
| 3      | <a href="#">Parker Extension Unit(CM0410) Software Flashing</a>   509                     |
| 4      | <a href="#">Peak Tool Driver Installation &amp; WIKA Joystick Software Flashing</a>   515 |

## 8.1 CIT Installation & Application Software Flashing

### Curtis Integrated Tool

#### A. Procedure to Install the CIT (Curtis Integrated Tool):

1. Click on "Servicemaster.exe" and go to Other. JCB Access icon should be there.



2. Go inside "JCB Access" and click on "JCB Scissors".



3. Go inside JCB Scissors and click on "JCB E-Drive Scissors".



4. Below icons should appear.



- Click on "CIT". Below icons should be appear.



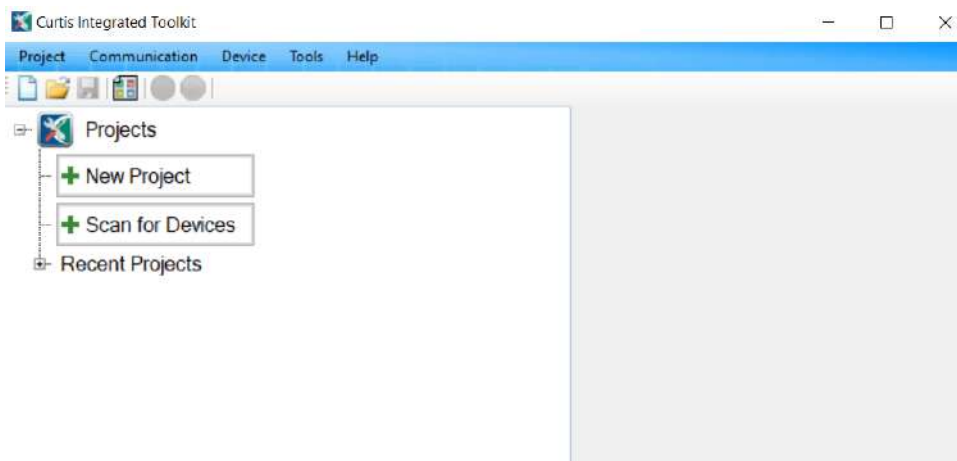
- Click on "ECU Assistant Installer" to install CIT tool - **This needs to be done with Admin right. Admin right is required once to install.**
- Follow Pop up instructions.

## **B. Procedure to Flash Motor Controller Software:**

- After installation, use "ECU Assistant Launchpad" for flashing / diagnostic etc.
- Connect DLA 2.0 to Machine 9-Pole Diagnostic Connector and reach to below window in SM (See above installation procedure)

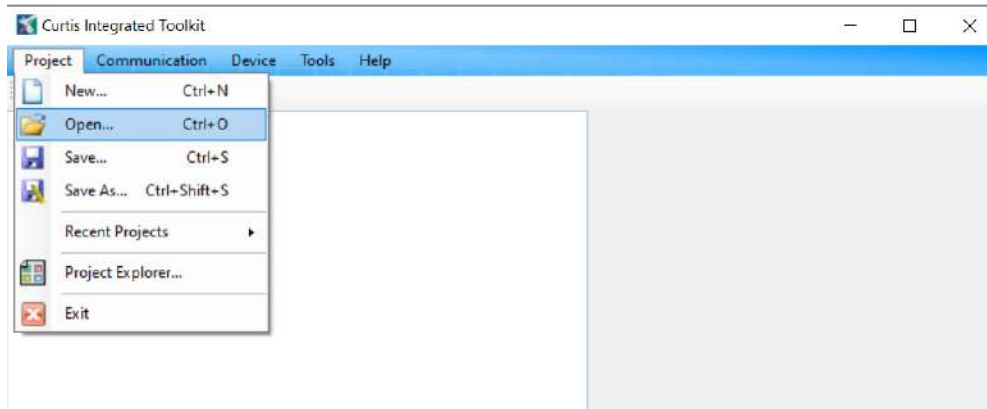


- By clicking ECU Assistant Launchpad--> below CIT Launchpad should be opened. This is used to connect to CAN bus, manage project and launch CIT application.

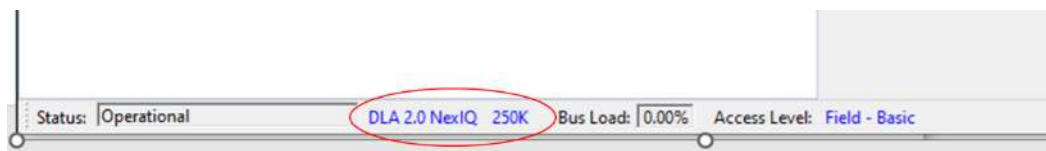


- Click on "Open..." from Project Menu and Select the Machine Specific ". cprj" file from below location (**Based on the Region for which Machine is Build, for e.g. Korea/Australia/Rest of the World**).

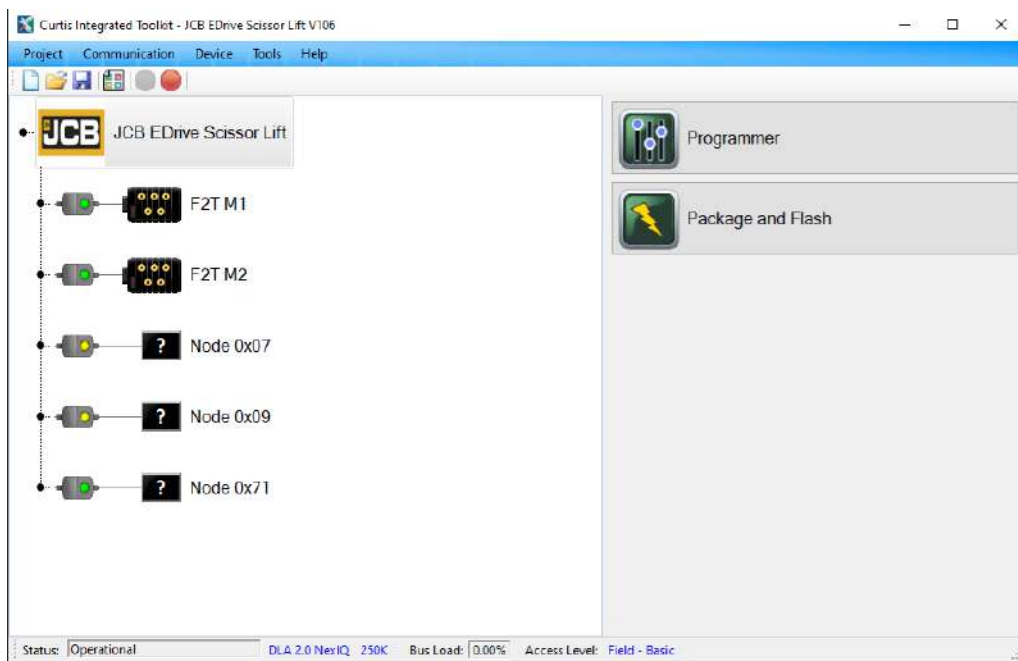
**C:\JCB\_Servicemaster\_2\Machine SW\Access\Scissors\EDrive\ Motor Controller and Joystick PCU software.**



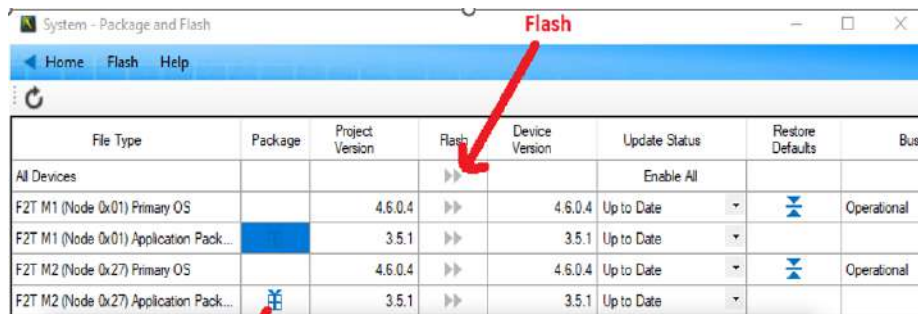
5. Select DLA 2.0 NexIQ and 250 kbps from bottom Menu bar



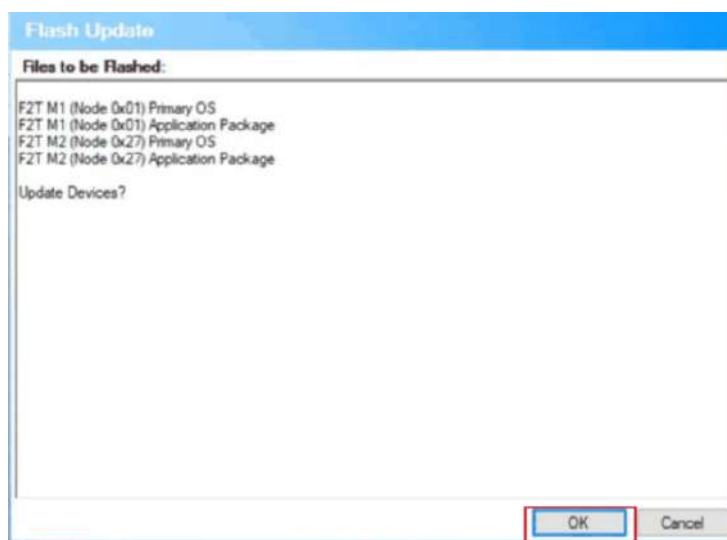
6. Go to “Communication” Option in top Menu bar and press “connect F2” or Green circle button. After successful connection, below screen (similar screen) should appear.



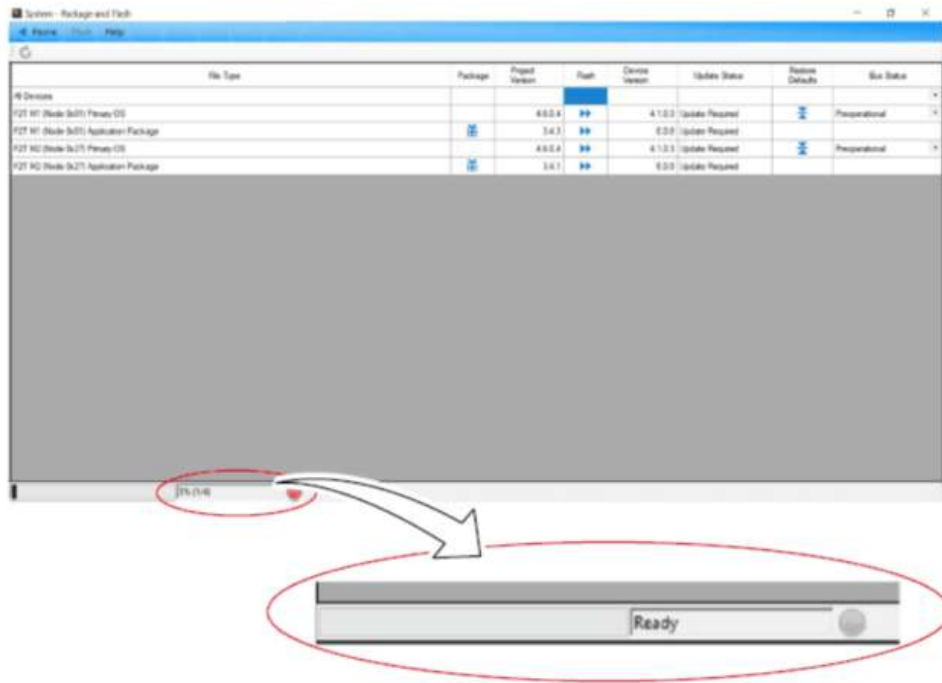
7. Click on “Package and Flash” Option on Right hand Side of the launch window. Below Screen should Open and will show all device software version detail w.r.t. project software version.



8. Click “All Devices” flash button >> to flash all the ECUs. Press OK



9. Wait for Software to flash till Bottom Bar show “Ready”. Bottom Menu Bar will show the Progress. Once it shows “Ready”, Key Cycle and disconnect the DLA.



### C. Procedure to Setup Machine (ONLY REQUIRES AFTER SOFTWARE FLASH- Requires JDS unlock to write VIN):

1. After Software Flashing, use “Vehicle Setup” tool to set up the Machine Variant (EU or USA) and Enable/Disable Optional Feature for Specific Region.
2. Connect DLA 2.0 to Machine 9-Pole Diagnostic Connector and reach to below window in SM (See above installation procedure)



ECU Assistant  
Installer

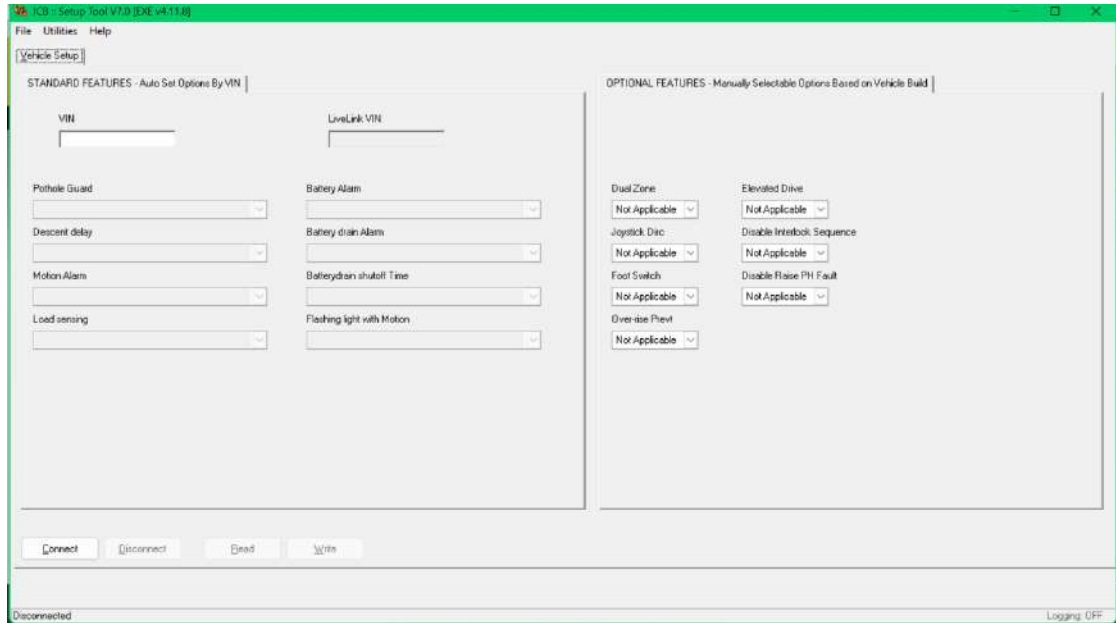


ECU Assistant  
Launchpad

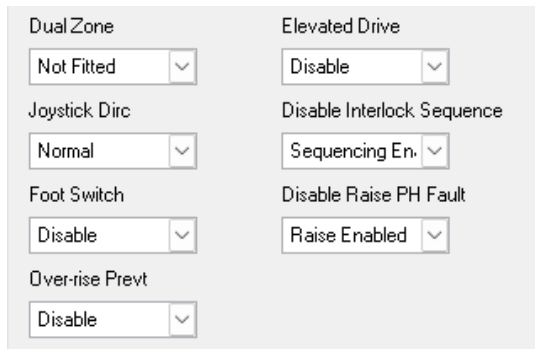


Vehicle Setup

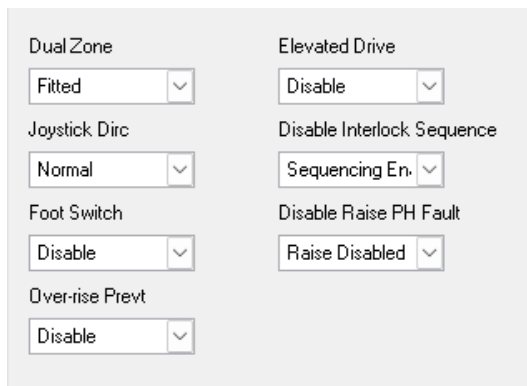
3. Click on “Vehicle Setup” Option to set the Machine Variant. Below Screen will appear if Motor Controller and LiveLink units are connected and LiveLink is already Setup properly then VIN Number will appear. **(If LiveLink is not setup or not connected or ECU is Blank then VIN need to be written manually in Left side “VIN” box. It will need unlocking using JDS portal - Unlocking using JDS Portal is described separately at the last, Refer Section-E).**



#### 4. Default Setting of Optional Features once SW A116 is Flashed.



#### 5. Optional Feature Setting for USA Region-To be changed manually



**For USA Region-** Use Dual Zone Option. Separate ECU along with harness is available on Machine to enable this feature. If we try to enable this feature on other region machine

without the required hardware (ECU+Harness) then required diagnostic code will be generated, thereby informing the operator to select either “Not Fitted” or “Not Applicable” Option for Dual Zone feature.

6. Optional Feature Setting for Korea Region-**To be changed manually**

|                |                            |
|----------------|----------------------------|
| Dual Zone      | Elevated Drive             |
| Not Fitted     | Enable                     |
| Joystick Dir   | Disable Interlock Sequence |
| Invert         | Sequencing Dis             |
| Foot Switch    | Disable Raise PH Fault     |
| Enable         | Raise Enabled              |
| Over-rise Prev |                            |
| Cutout All     |                            |

**For Korean Region** – Use Joystick Dir, Foot Switch, Over-rise Prev, Elevated Drive, Disable Interlock Sequence and Disable Raise PH Fault options to set the required feature.

7. Optional Feature Setting for Rest of the World- **To be changed manually**

|                |                            |
|----------------|----------------------------|
| Dual Zone      | Elevated Drive             |
| Not Fitted     | Disable                    |
| Joystick Dir   | Disable Interlock Sequence |
| Normal         | Sequencing En.             |
| Foot Switch    | Disable Raise PH Fault     |
| Disable        | Raise Disabled             |
| Over-rise Prev |                            |
| Disable        |                            |

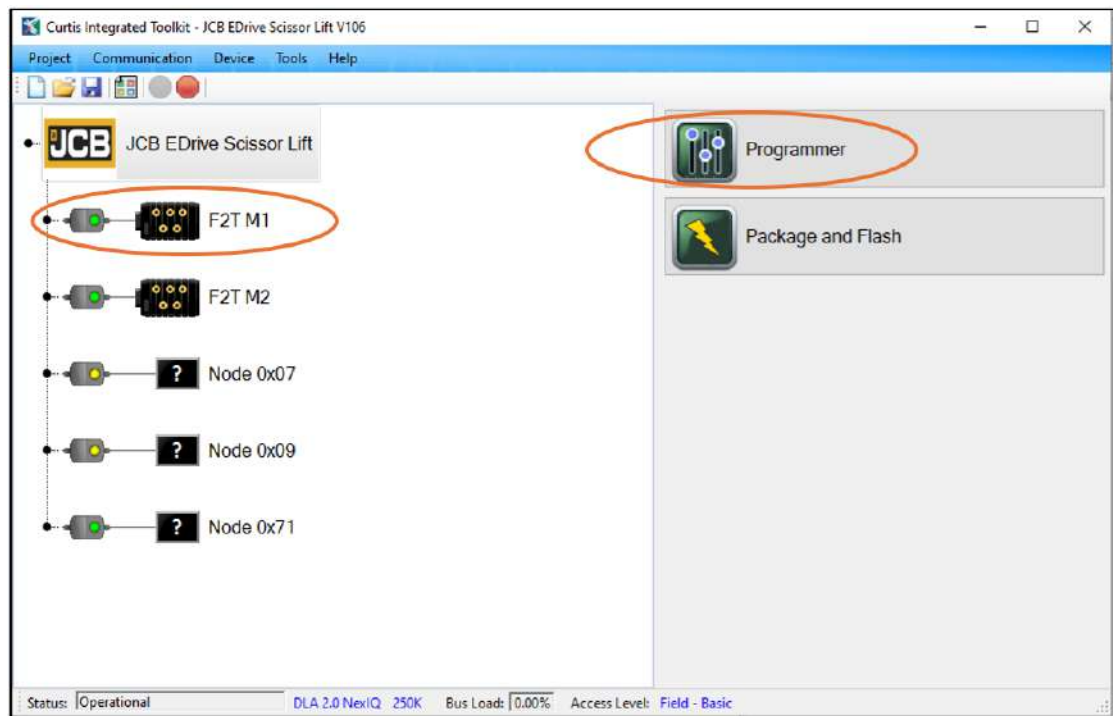
8. After writing the Correct VIN and selecting the Optional Features, click “Write” button to write the configuration into controller.

9. Follow the Pop up for proper Power recycle.

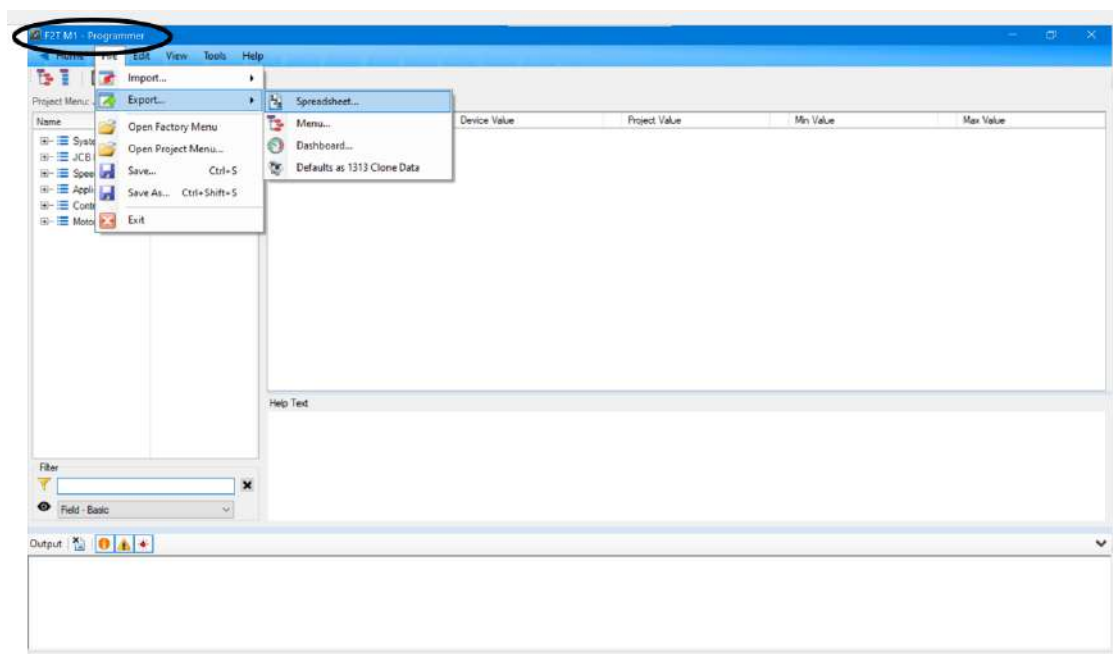
**D. Procedure to Export Machine Parameters:**

1. Follow steps 1- 6 from section” **B. Procedure to flash Motor Controller Software**” to connect DLA to the motor controller and open required machine software project.

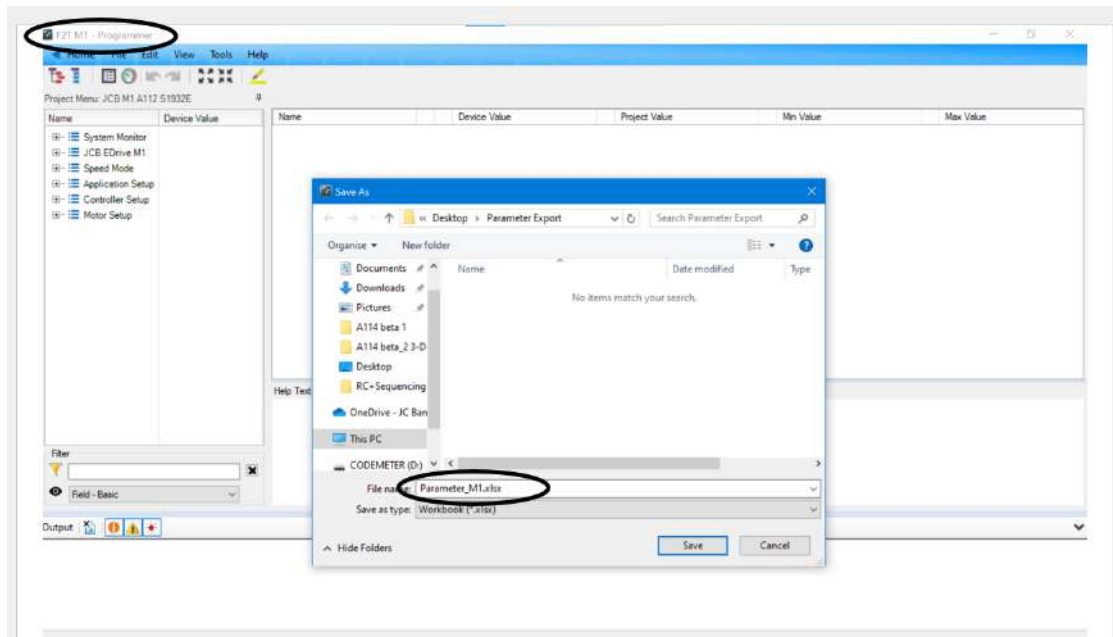
2. Select “F2T M1” as shown below and click on “Programmer” Option on Right hand Side of the launch window.



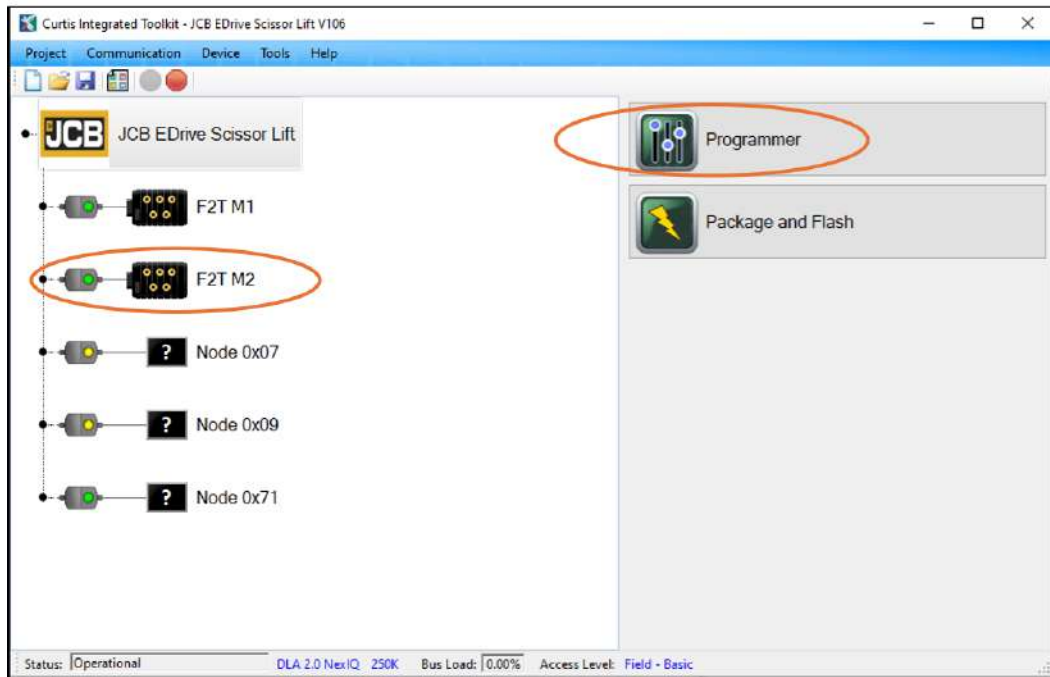
3. F2T M1 Programmer window will open as shown below. Select File-> Export-> Spreadsheet.



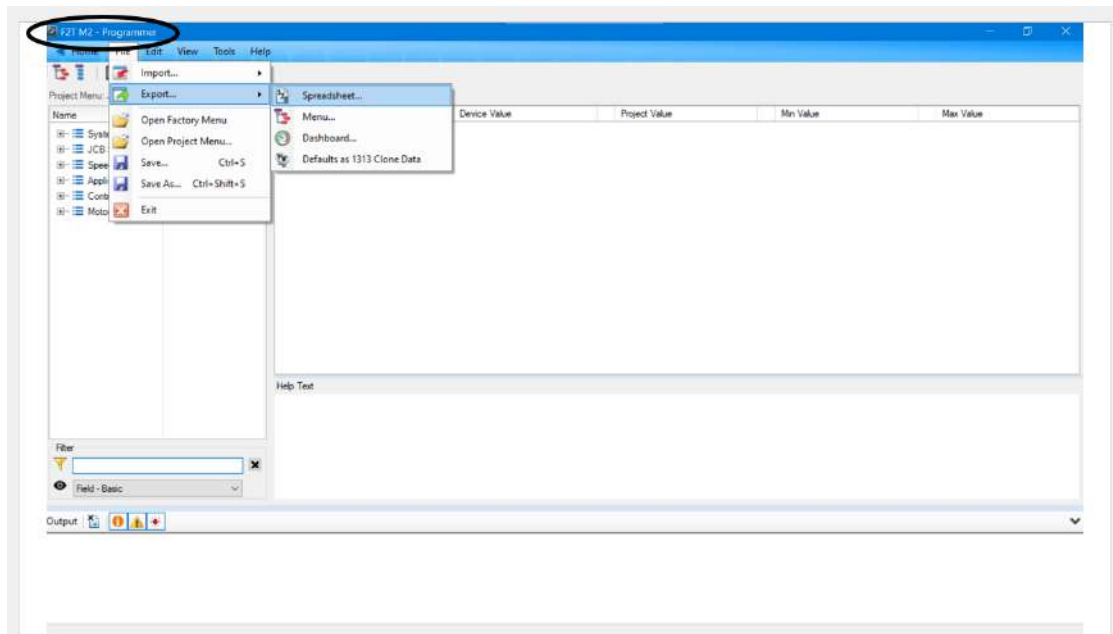
4. Save the file with appropriate name at required location.



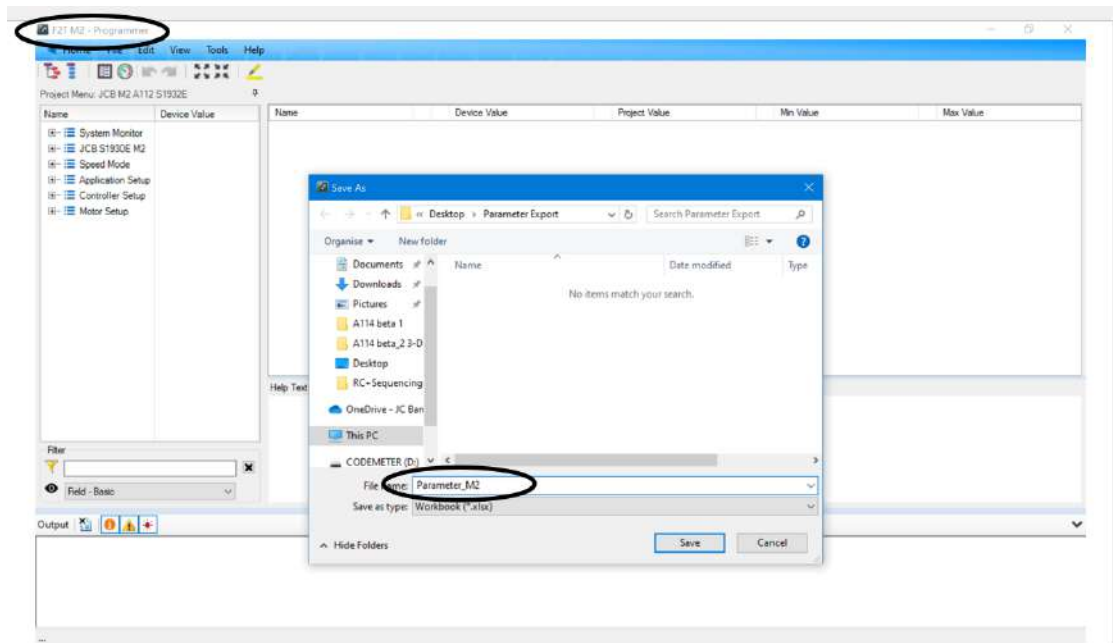
5. After reading the parameters- an excel file will open indicating the parameters of M1 are exported successfully. (This opened Excel file can be closed).
6. Now select “F2T M2” as shown below and click on “Programmer” Option on Right hand Side of the launch window.



7. M2 Programmer window will open as shown below. Select File-> Export-> Spreadsheet.

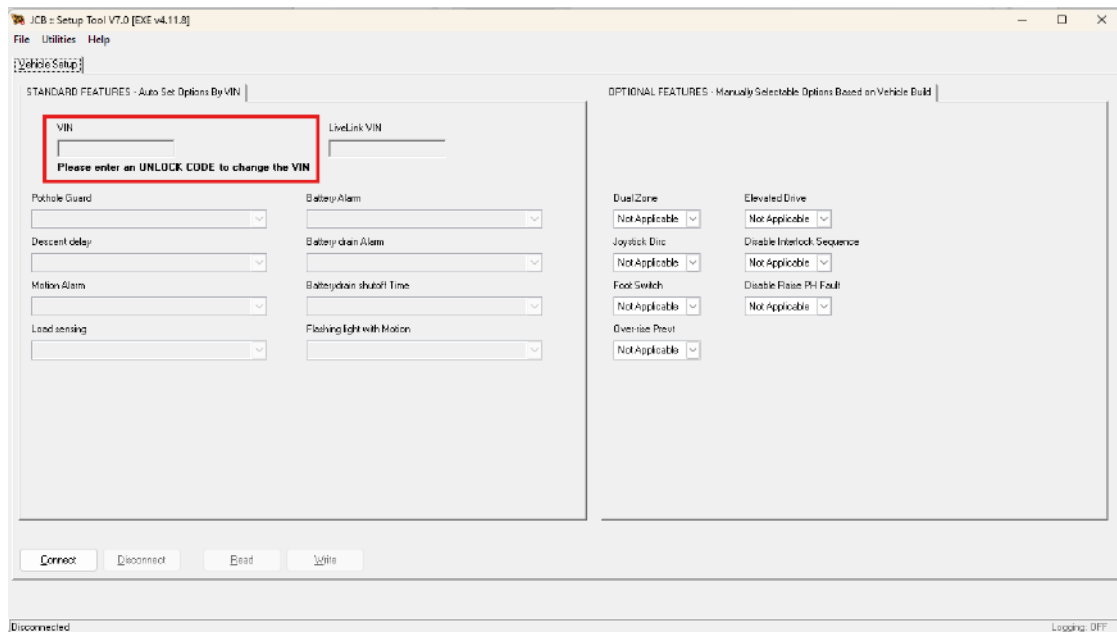


8. Save the file with appropriate name (different than M1) at required location.

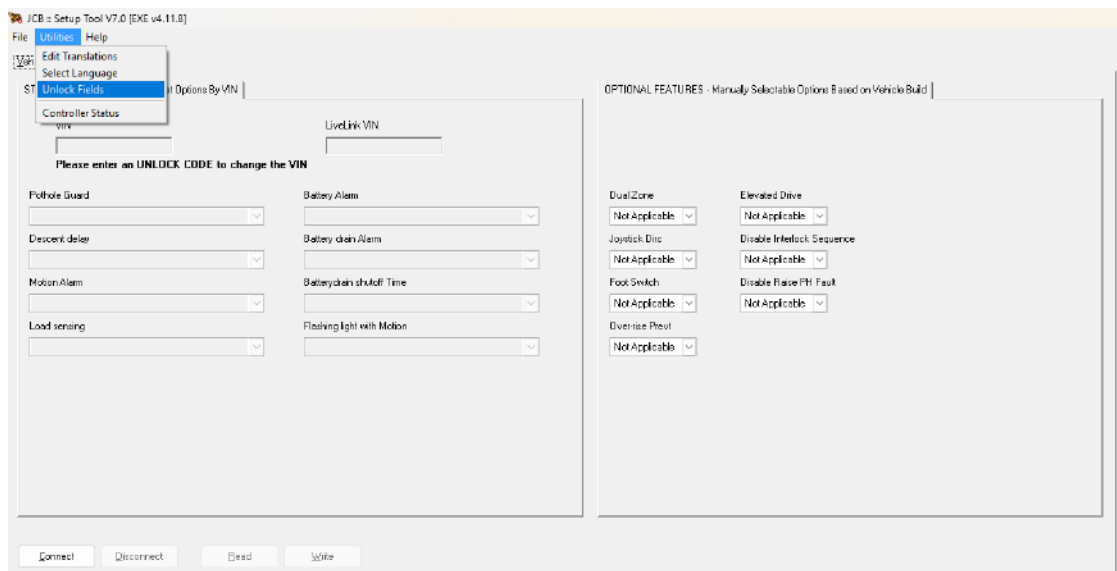


9. After reading the parameters- an excel file will open indicating the parameters of M2 are exported successfully. (This opened Excel file can be closed).

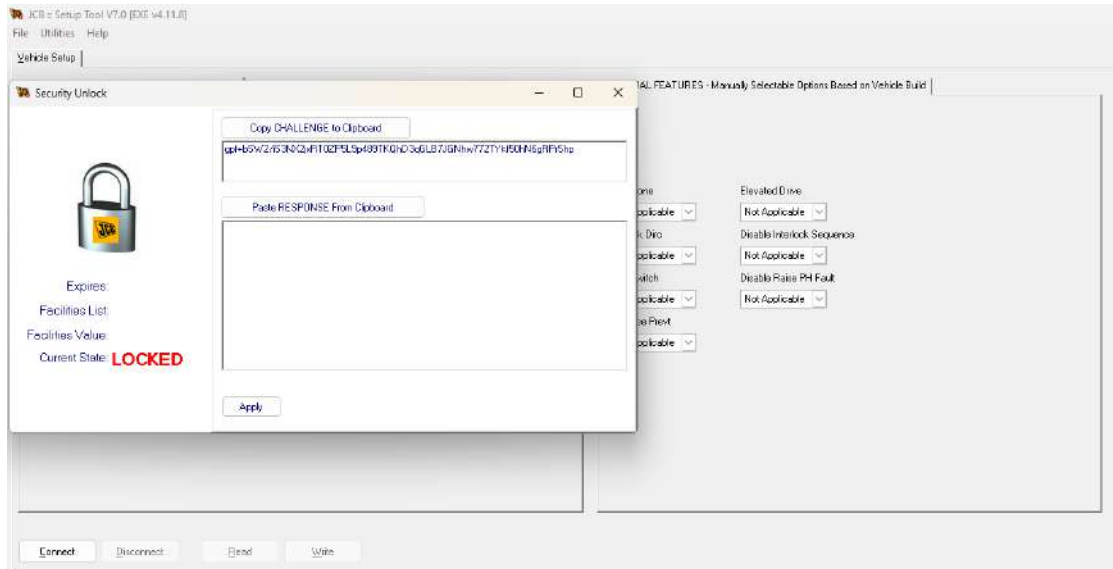
## **E. Procedure to UNLOCK VIN Option via JDS Login:**



1. Click on “Utilities” at the top of the header bar and select the “Unlock Fields” Option.



2. Following Window will Open. Copy the CHALLENGE Key.



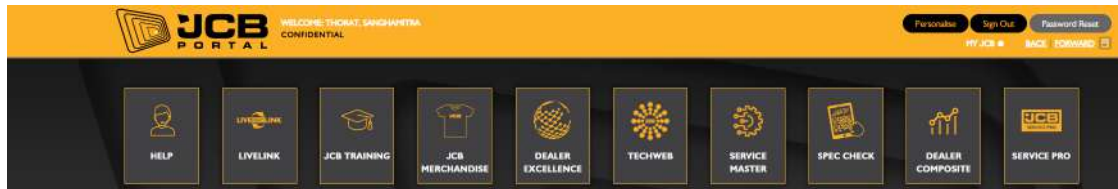
3. Click on the below JDS Login Link and thereafter Enter the Email ID & Password. Click on the “Log on” Option.

[business.jcb.com/logon\\_jcb/jcb/html/logon.html?samlContext=eu1\\_260587649550\\_b7ec162d-60e3-4201-9cc5-55b316ef1eee](https://business.jcb.com/logon_jcb/jcb/html/logon.html?samlContext=eu1_260587649550_b7ec162d-60e3-4201-9cc5-55b316ef1eee)

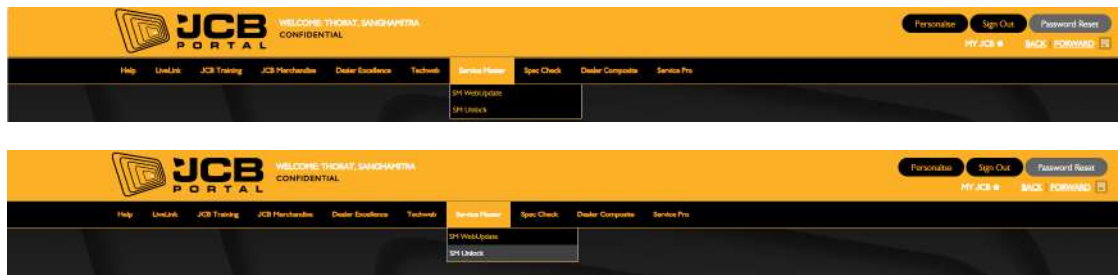




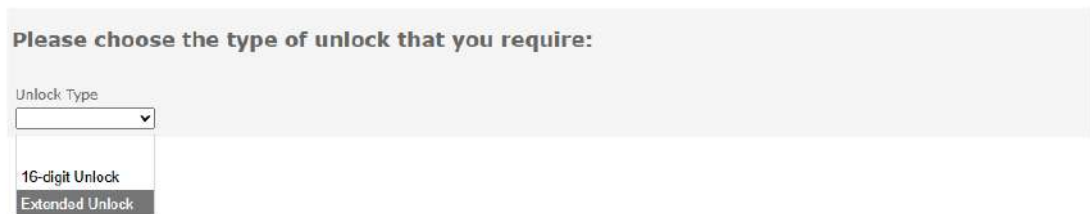
4. Select the “SERVICE MASTER” Option.



5. Within the Service Master Option, click on “SM UNLOCK”.



6. Following Window will Open. Select the Extended Unlock Option.



Please choose the type of unlock that you require:

Unlock Type  
 Extended Unlock ▾  
 16-digit Unlock  
 Extended Unlock


10. Below Window will Open. Paste the Challenge Key which was copied in Step-2, in the Challenge Key Text Box and press the Submit button.

**Extended Unlock**

Challenge Value 

SUBMIT

**Extended Unlock**

Challenge Value 

gpf+bSW2/iS3NX2jxRT0ZP5L9p489TKQhD3qGLB7J  
 GNhw772TYkf50hN6gRPrShp

SUBMIT

11. After Pressing the Submit button in previous step, below window will open. Here, we need to enable the VIN Edit option and mention the reason why this unlock code is required and the extended expiry date (e.g. 1 day, 1 week, 1 month, 3 months, 6 months, 12 months & 24 months etc- Expiry Date to be selected as per the need). Finally, Click on SUBMIT button.

**Extended Unlock**

Challenge Value [Access-eDriveScissor]  
 gpf+bSW2/iS3NX2jxRT0ZP5L9p489TKQhD3qGLB7JGNhw772TYkf50hN6gRPrShp

VIN Edit

Reason Required:  
 Add VIN Number of Upcoming Machines

Extended Expiry Date:  
 12 months ▾

SUBMIT

Extended Expiry Date:

1 day ▼

None

1 day

1 week

1 month

3 months

6 months

12 months

24 months

12. After Pressing the Submit button in previous step, below window will open. Copy the Response Value (Alpha-Numeric Code) and paste it in the Response window of Step-2 and press the Apply button.

**Extended Unlock**

Challenge Value [Access-eDriveScissor]  
gpf+b5W2/iS3NX2jxRT0ZP5L9p489TKQhD3qGLB7JGNhw772TYkf50hN6gRPrShp

VIN Edit

Reason Required:

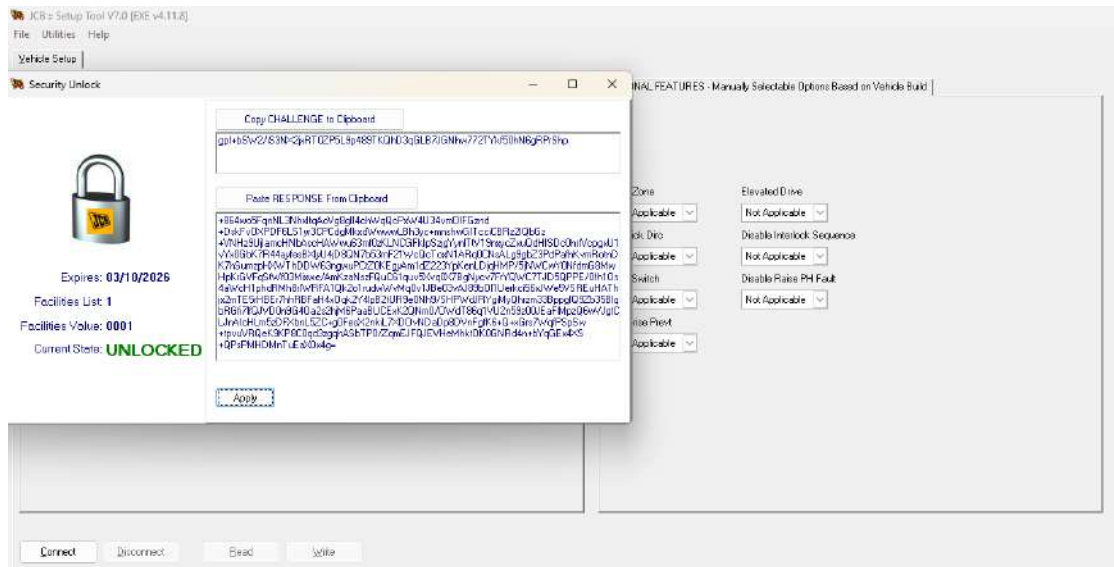
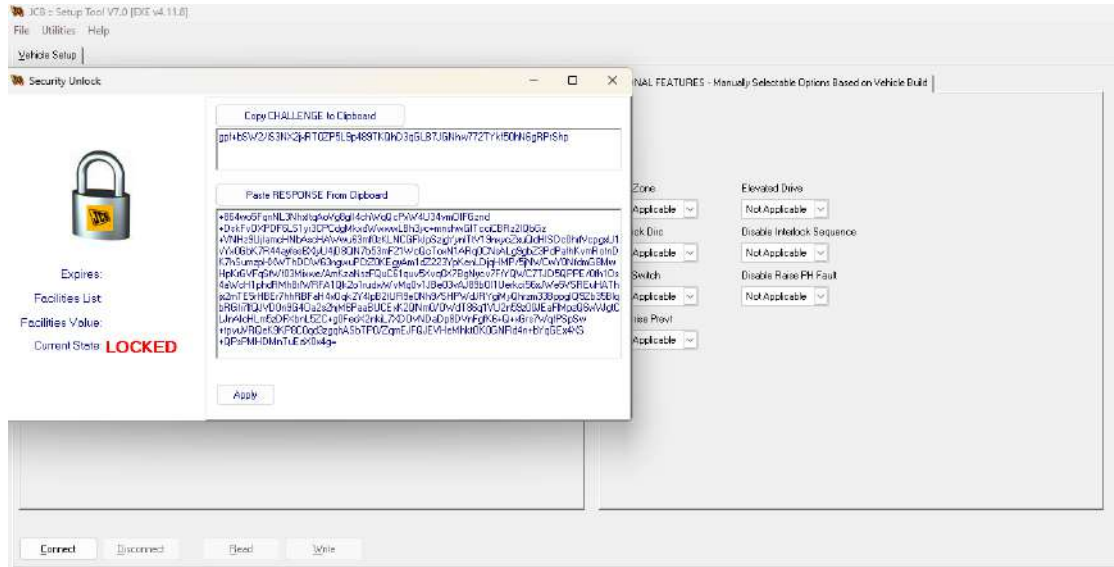
Add VIN Number of Upcoming Machines

Extended Expiry Date:  
**12 months**

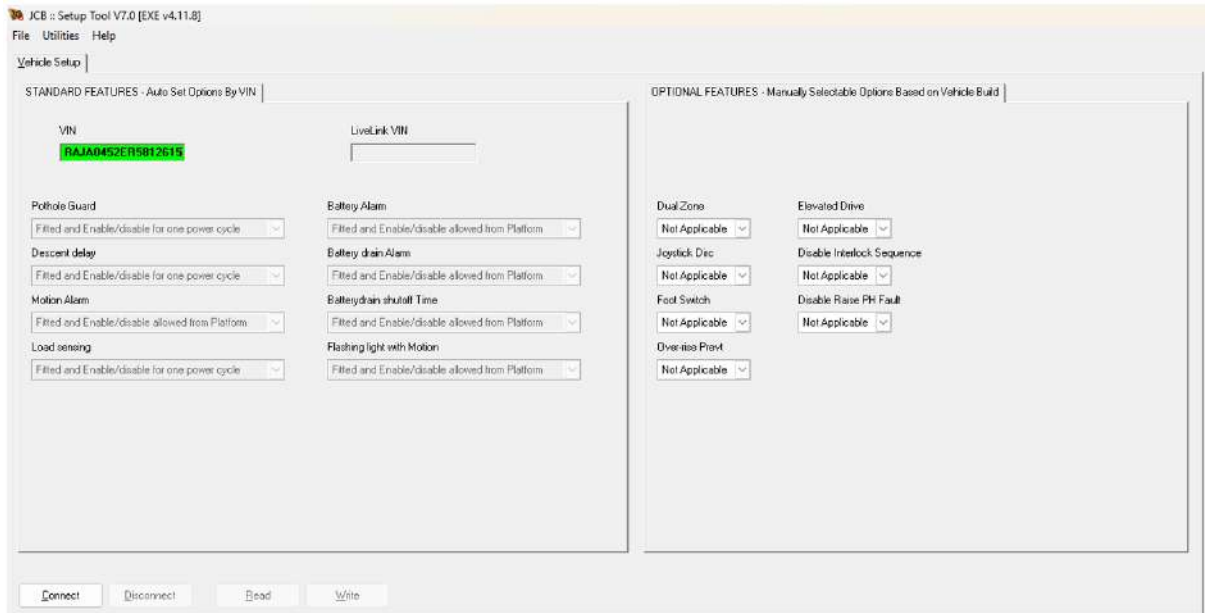
Response Value

```
rZdM07KKK27nRLQZYN2/cVfseIIndc4oFoJA4foyl0FKLtem5ogwrF/nHEr+ZwBS9Y1HFcdt4UHw1VENV
Qk8QyQFSWmiaHTIj1RuMwNM1SqDhbyb5t9Dm7KBgfsCpK1tu/u8h1LjQn/+HAn4f1/sE01sIX0paJS1
sFfip00t9swEpmo4cK2LQffYdJ1hyWxpVizhyHKXYK1FYeZaKhL4bhdg+96XMLPELP/axjbs1qo3AMmu
sUFbyC2fuUzM6X6q25ypHMADcM5F5I12/aNoxKXW2Tzm7SF6bVR0u8h/gfXBa7cQ+luIw+/SMZ/9mcex
1bcZMwb27AIPX1VQfo6rdL8cu0KkYw18gtjM2eJVFvaHOLs00z25VferXs7jUBXYmPkWd5aJkfPubAnt
```

START AGAIN



13. Go to the Vehicle Setup Tool again, now we can write the VIN Number.

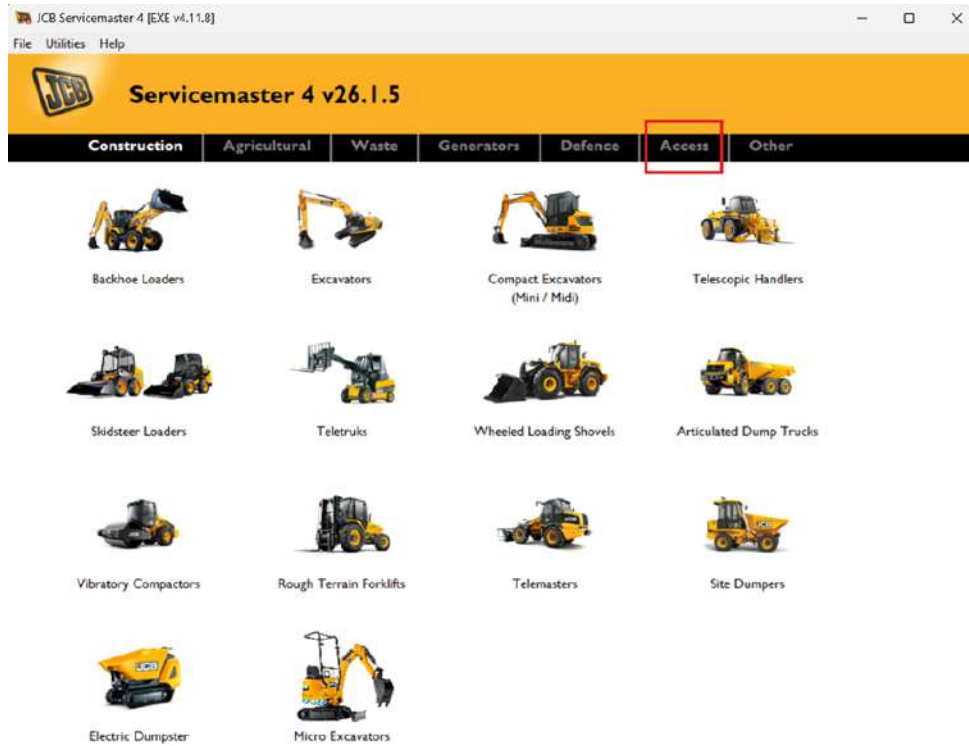


## 8.2 IQAN Tool Installation & Dual Height Software Flashing

### IQAN Flashloader Tool

#### A. Procedure to Install the IQAN Flashloader Tool:

1. Click on “Servicemaster.exe” and go to Other. JCB Access icon should be there.



2. Go inside “JCB Access” and click on “JCB Scissors”.



3. Go inside JCB Scissors and click on “JCB E-Drive Scissors”.



4. Below icons should appear.



5. Click on "IQAN MC41(Optional)". Below icons should be appear.



6. Click on "IQAN Flashloader" Option, Below Window will Open.

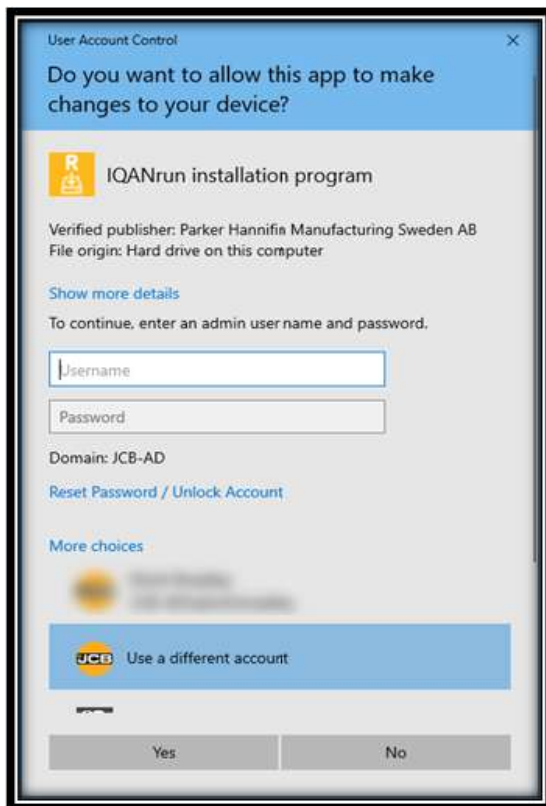


7. Click on “IQAN Flashloader Setup” Option, Below Window will Open.



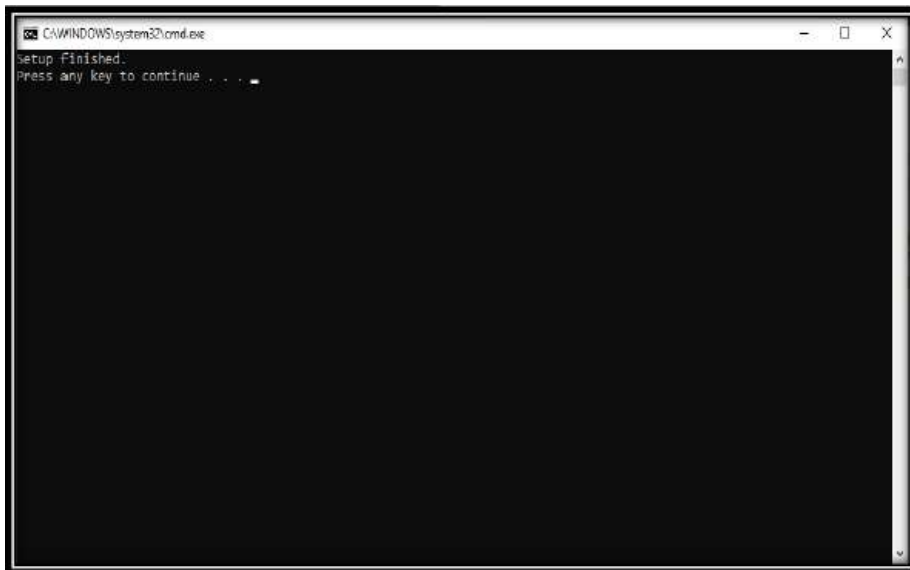
8. Select “IQAN Run Installer” Option, Below Window will Open. System shall ask user to enter admin login credentials, Contact the relevant Service/IT support to proceed ahead with the installation.

Note: Admin rights will also be required to install the “IQAN Run Installer”.



9. Once the installation is complete, System shall show the below pop-up screen.

Press any key to close this pop-up and continue.

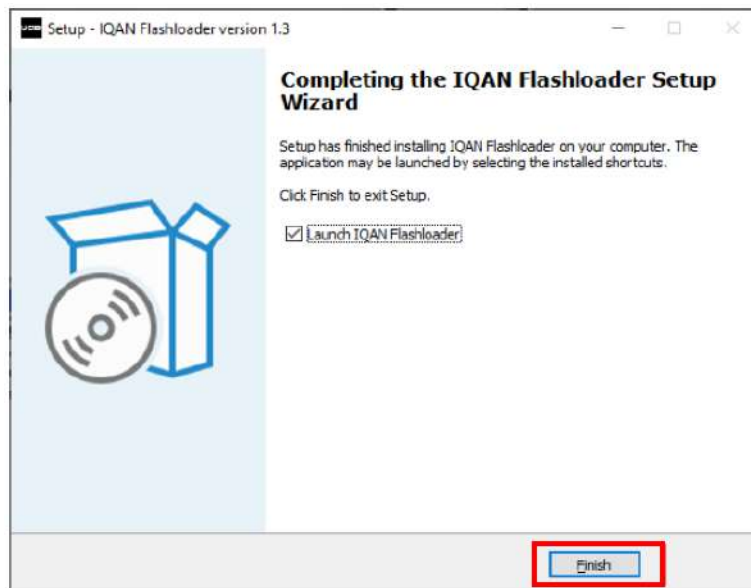


10. Next Select the "IQAN Flashloader Installer" Option (from Step-7), Below Window will Open. System shall ask user to enter admin login credentials, Contact the relevant Service/IT support to proceed ahead with the installation.

Note: Admin rights will also be required to install the "IQAN Flashloader Installer".



11. Once the installation is complete, System shall show the below pop-up screen. Click "Finish", this completes the IQAN Flashloader installations.



## **B. Procedure to Flash Dual Height ECU Software using IQAN Flashloader Tool:**

1. Close Service Master and re-open, navigate back to the Flash loaders page to open “IQAN Flashloader” page. As, the Flashloader installations are complete now, the IQAN Flashloader appears with its icon as shown in the image below.



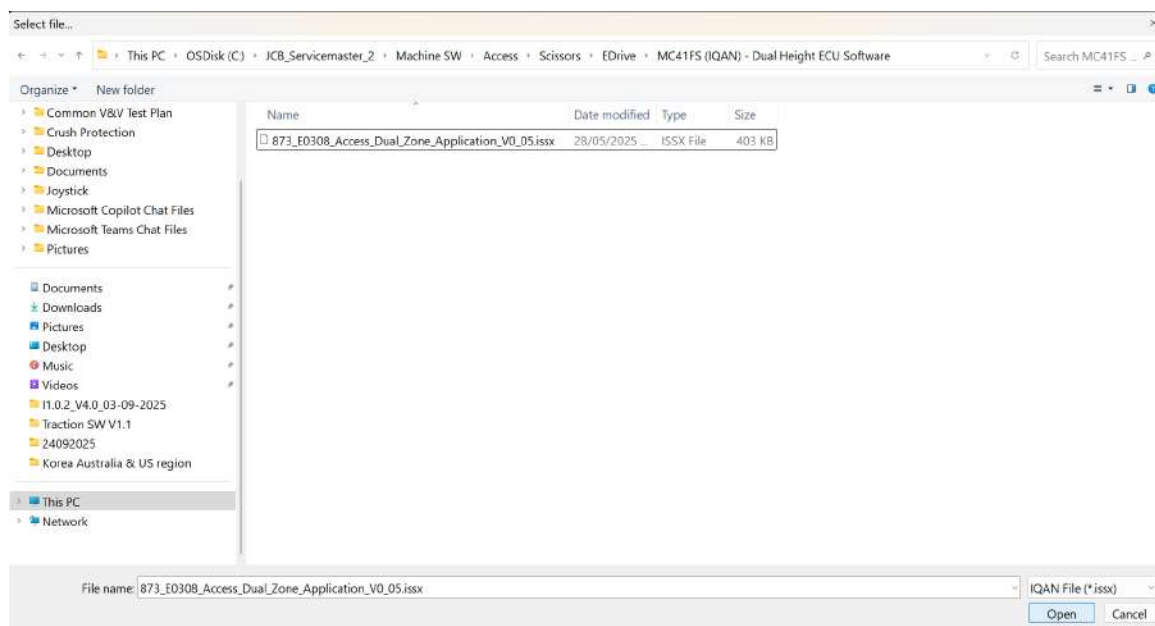
2. Select IQAN Flashloader, below window will open



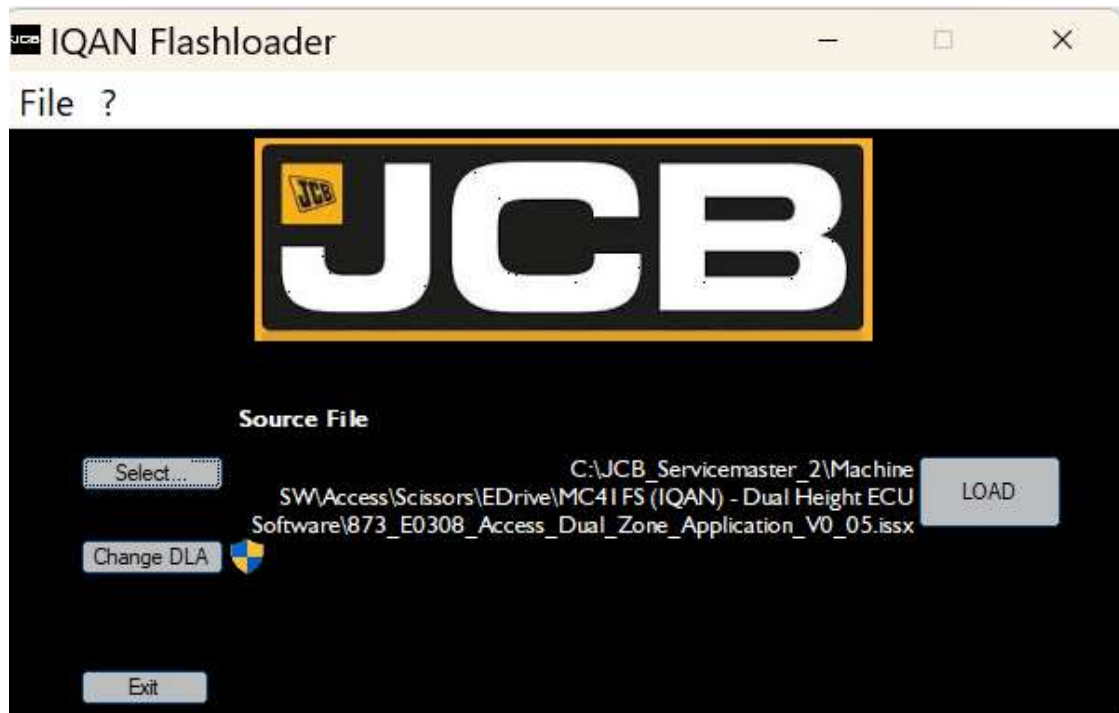
3. Click "Select" and browse to the appropriate software file from below location

***C:\JCB\_Servicemaster\_2\Machine SW\Access\Scissors\EDrive\MC41FS (IQAN) - Dual Height ECU Software***

Below "873\_E0308\_Access\_Dual\_Zone\_Application\_V0\_05. issx" is an example to show the procedure. Once the required file is selected click on Open Option at the bottom right side.



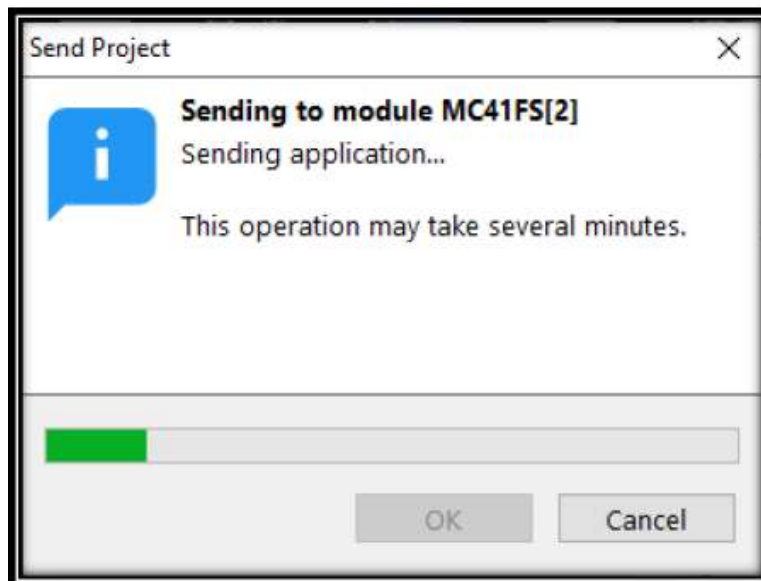
4. In continuation to previous step, once we click on Open Option. Below window will pop-up.



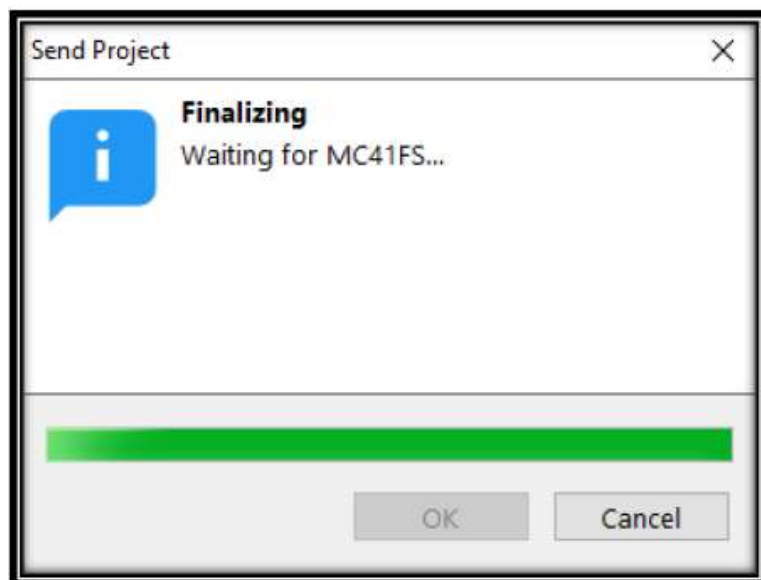
5. Connect appropriate DLA hardware to the machine, Use the Change DLA button to change between DLA type 1.0 and 2.0.

Note: Admin right is required for this.

6. Click 'Load'. This shall start the process of flashing the ECU.
7. While the flashing is in progress, system shall display the progress bar pop-up as seen in the image below.



8. On Successful flashing, system shall display the message as seen in the image below.



This pop-up closes automatically once the flashing is done successfully.

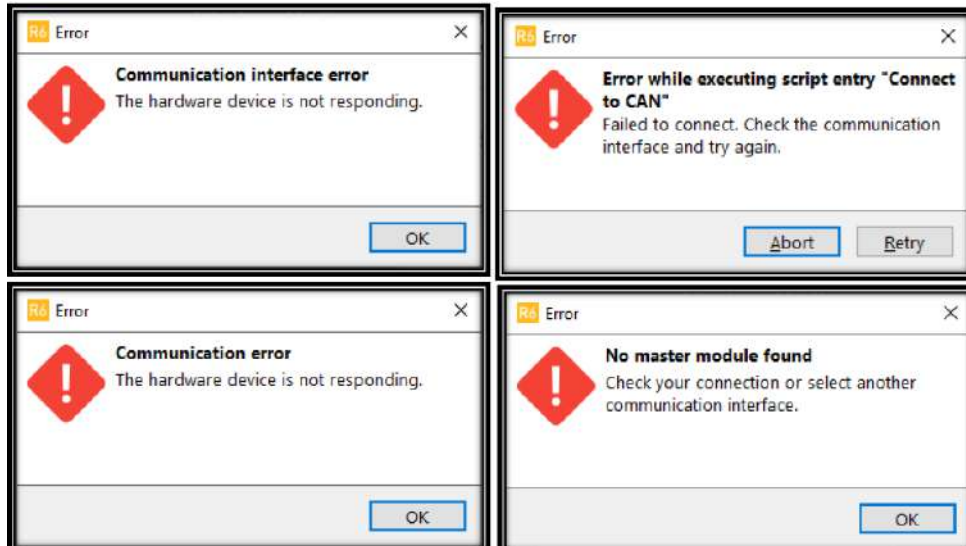
9. Before Initiating the Flashing, make sure there are no errors as shown below.

**DLA connection error(s)**

- A combination of these errors would pop-up if there is problem with DLA-USB connection.
- Make sure to insert appropriate DLA interface in USB port properly and select the appropriate DLA in the tool.

**CAN wiring connection error**

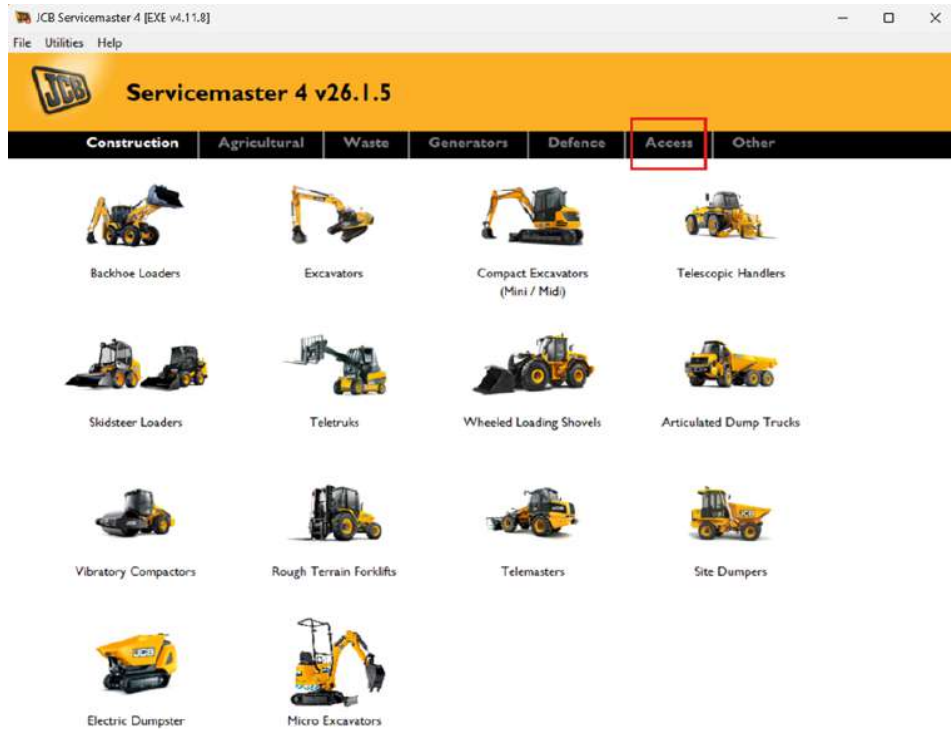
- This error would pop-up if the CAN connections are wrong. Verify the CAN connections to machine and rectify them if there is problem.



### 8.3 Parker Extension Unit(CM0410) Software Flashing

## Parker Extension Unit (CM0410) Flashing

1. Click on "Servicemaster.exe" and go to Other. JCB Access icon should be there.



2. Go inside “JCB Access” and click on “JCB Scissors”.



3. Go inside JCB Scissors and click on “JCB E-Drive Scissors”.



4. Below icons should appear.

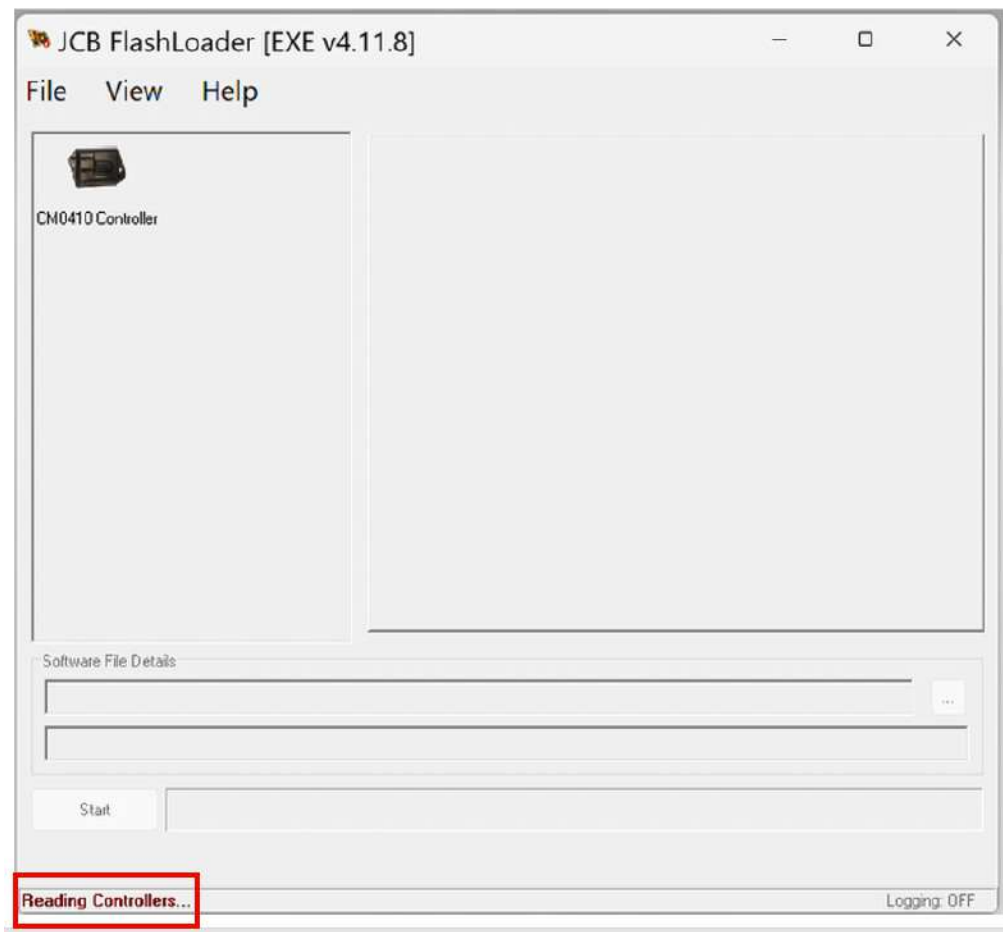


5. Click on "CM0410" Option. Below icons should appear.

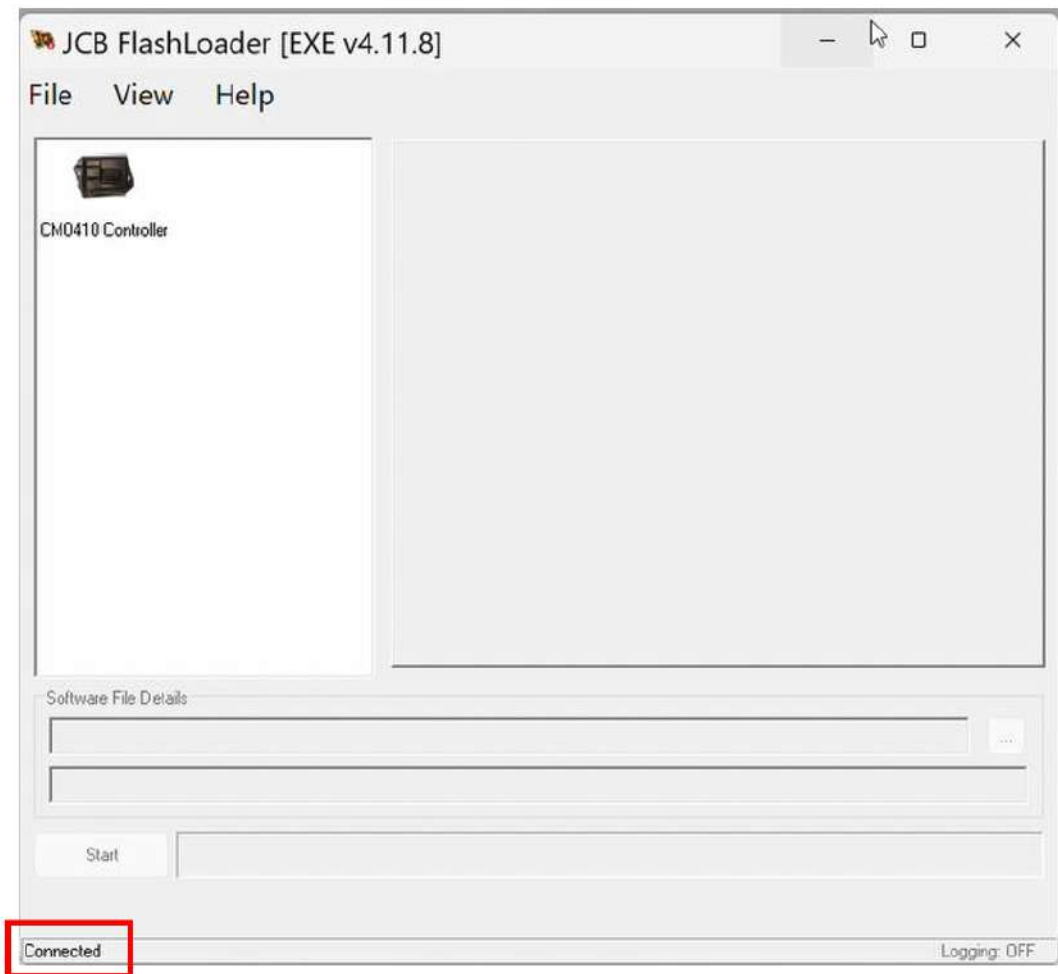


6. Click on "Flashloader" Tool.

7. Following Window will Open. Controller can only be selected once the Reading is completed.



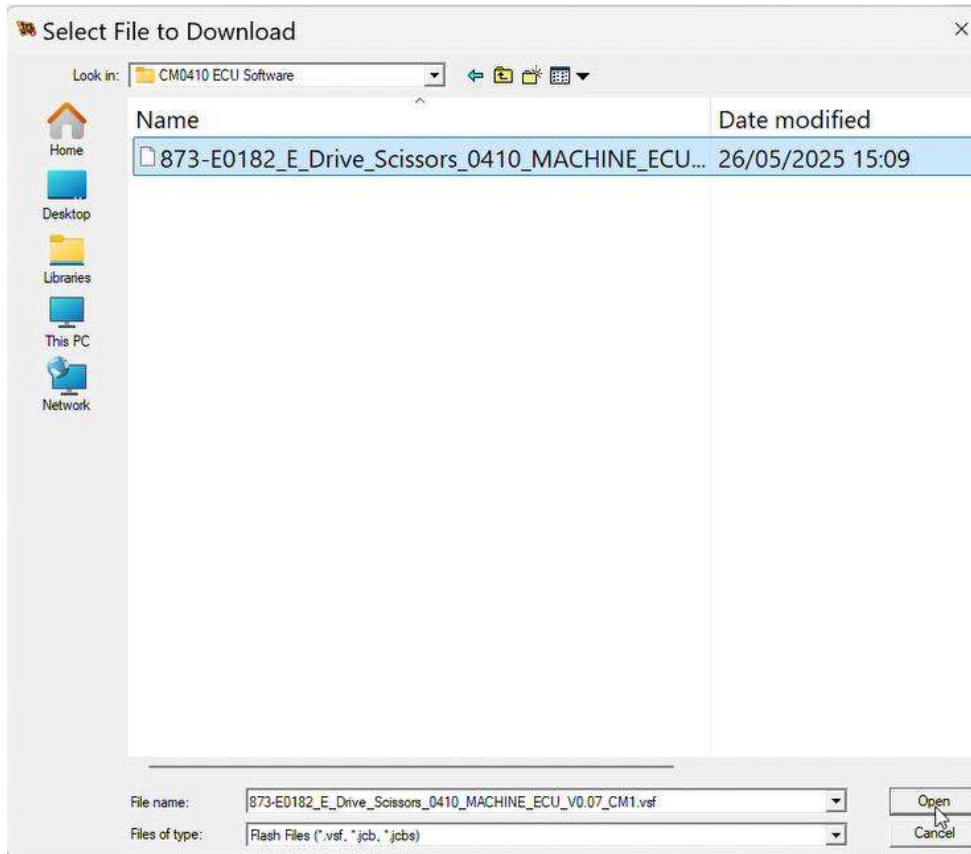
8. Once the Reading of Controllers is completed, "Connected" Message comes at the Bottom of the Screen, Now Select the required controller in which software is required to be flashed. In our case Click on "CM0410 Controller" Option.



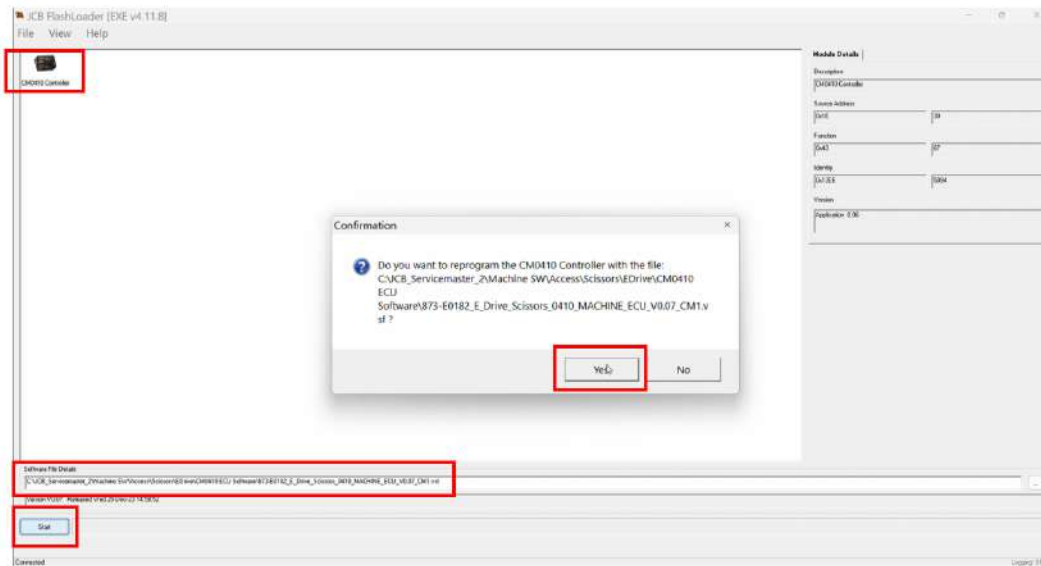
9. Next, Browse the required Software file which needs to be flashed by clicking on the 3 Dots.



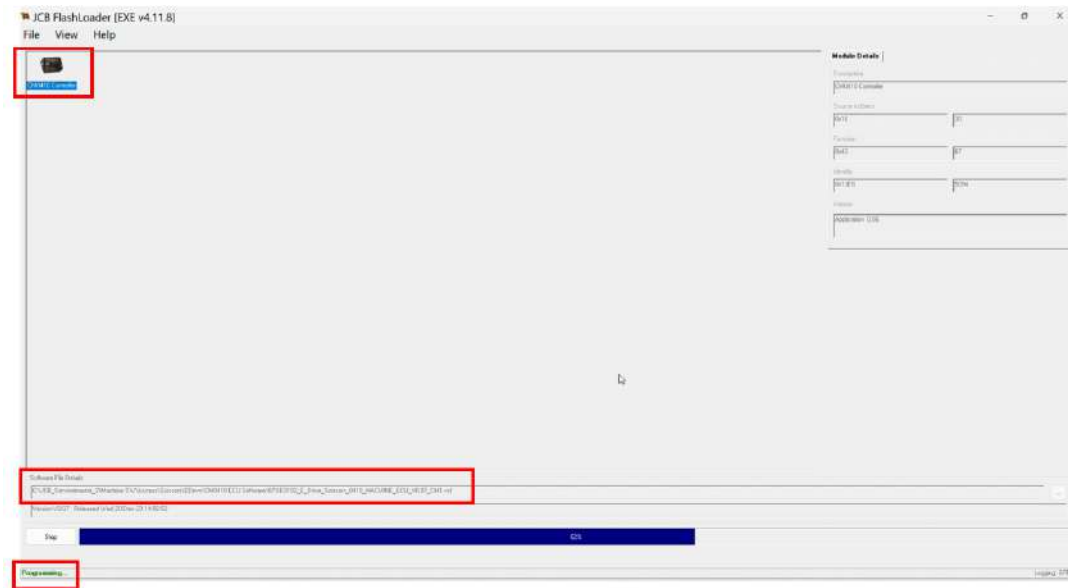
***C:\JCB\_Servicemaster\_2\Machine SW\Access\Scissors\EDrive\CM0410 ECU Software***



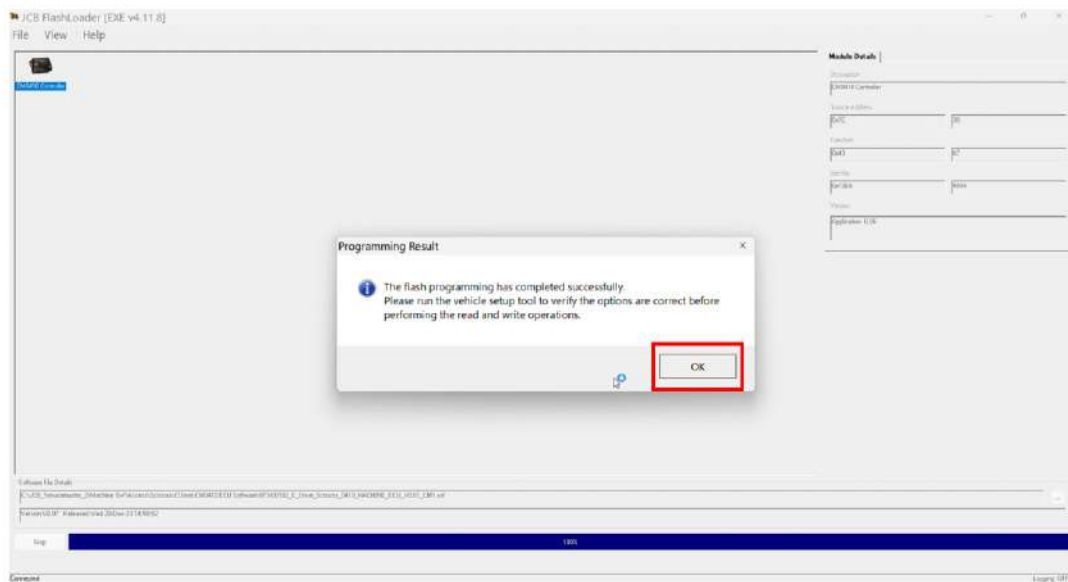
10. After Selecting the Required Software file which needs to be flashed, Click on Start Button. Below Confirmation Window Will Open. Click on “Yes” Option.



11. Software Flashing will Start; at 1<sup>st</sup> the existing file will be erased and thereafter the new file will be flashed.



12. Once Software Flashing is successfully completed, One Pop Up Window Will Open. Click on Ok Option & close the Flashloader Tool Window.

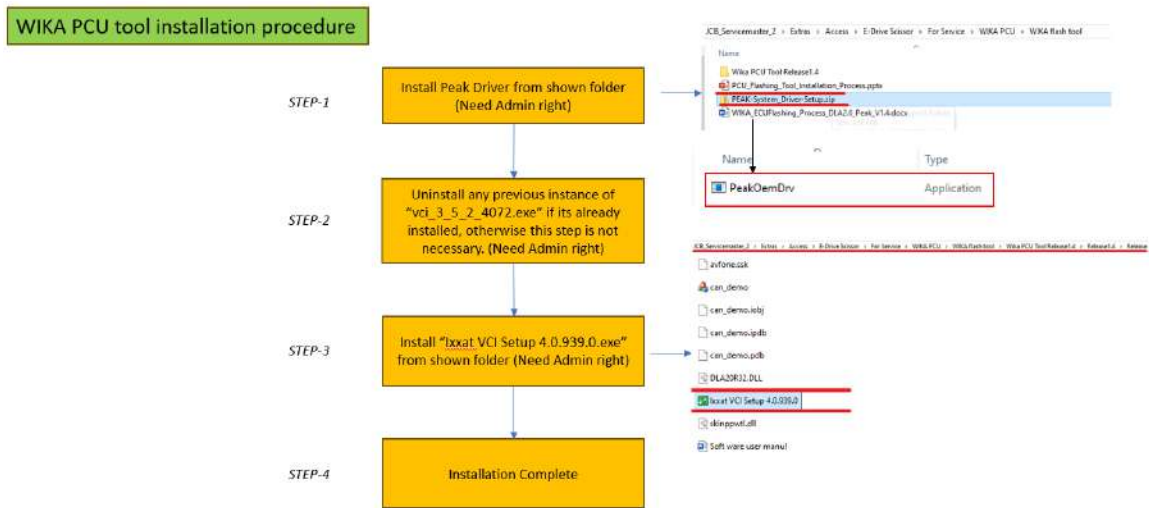


## 8.4 Peak Tool Driver Installation & WIKA Joystick Software Flashing

## Wika ECU Flashing Procedure using DLA/PCAN

**\*\* Please note – This tool was developed as Engineering developmental tool as WIKA PCU comes with pre-flashed software and does not require flashing at End of line or in Field. This tool must only be used in case of Emergency by authorized person. \*\*\*\***

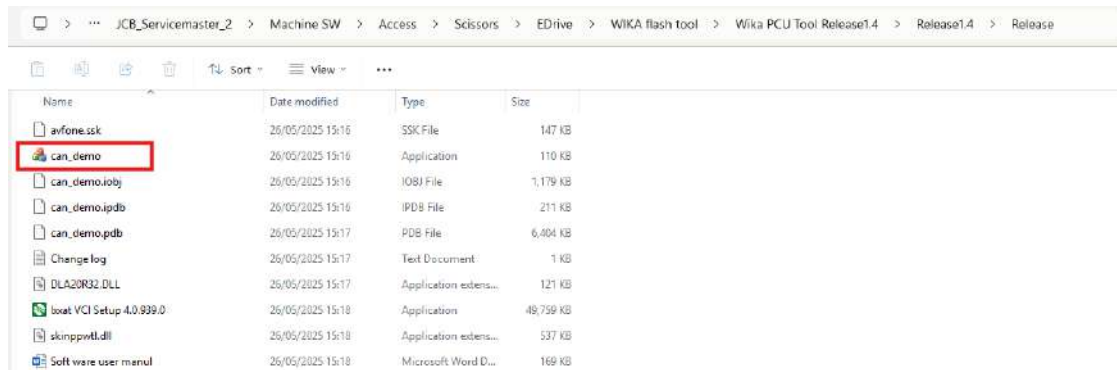
1. Prior to Flashing the Joystick ECU, we need to have the below software's/drivers installed in the laptop.



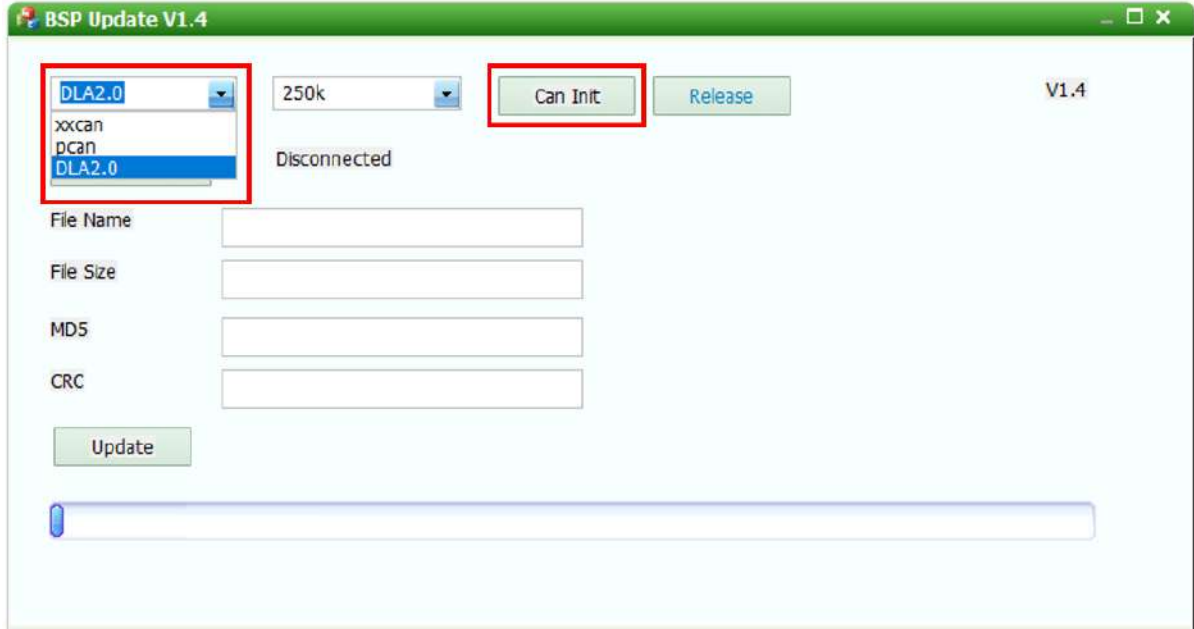
2. Turn OFF Power Supply.
3. Remove all other ECU's Except Wika Joystick ECU from CAN network.
4. Turn ON Power Supply.
5. Connect the laptop and controller through DLA2.0 or PEAK tool.
6. Set WIKA PCU Into Boot loader mode (Turn OFF Ignition, Press & Hold Horn & Tortoise Button. Turn ON Ignition, Release the Horn & Tortoise Button). Below screen shall appear in boot mode.



- Open CAN Demo Application on laptop from Below Location.  
**C:\JCB\_Servicemaster\_2\Machine SW\Access\Scissors\EDrive\WIKI flash tool\Wika PCU Tool Release1.4\Release1.4\Release**



- Select DLA2.0 or **pcan** and Click on Can Init.



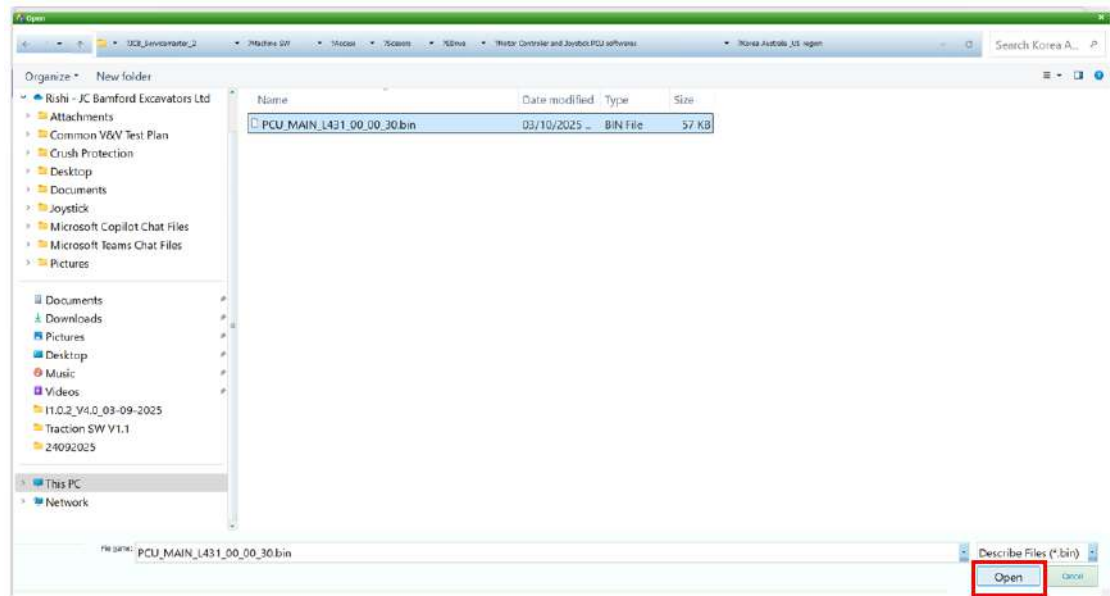
9. Click On Open File Option & Select the required xxx.bin software file from below location (Based on the Region for which Machine is Build, for e.g. Korea/Australia/Rest of the World).

***C:\JCB\_Servicemaster\_2\Machine SW\Access\Scissors\EDrive\Motor Controller and Joystick PCU software\FOR Korea & Australia Region.***

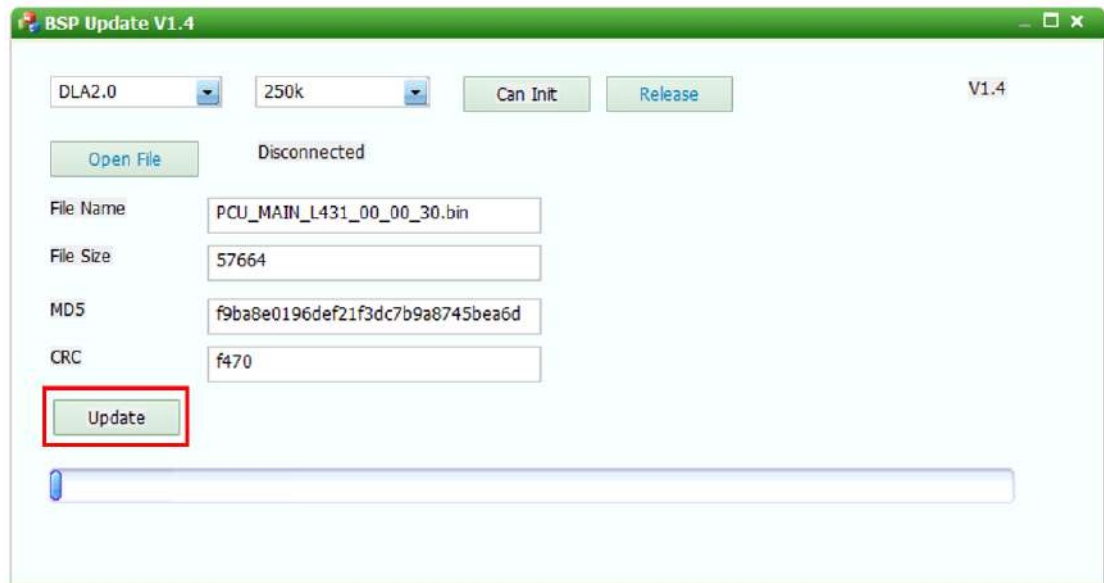
Or

***C:\JCB\_Servicemaster\_2\Machine SW\Access\Scissors\EDrive\Motor Controller and Joystick PCU software\FOR Rest of the World (Other than Korea & Australia).***

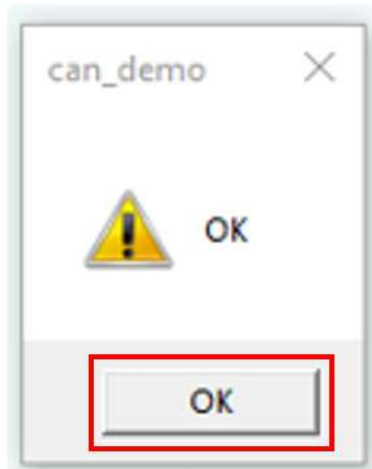
Below "PCU\_MAIN\_L431\_00\_00\_30.bin" is an example to show the procedure. Once the required file is selected click on Open Option at the bottom right side.



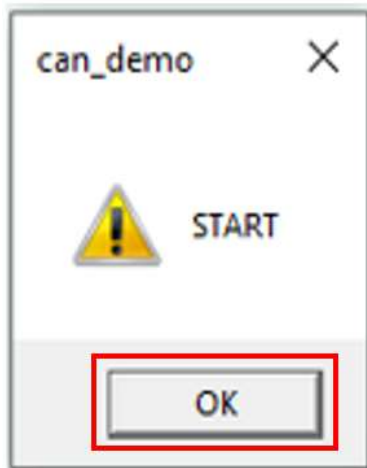
10. Following Window will Open, Click on Update Option.



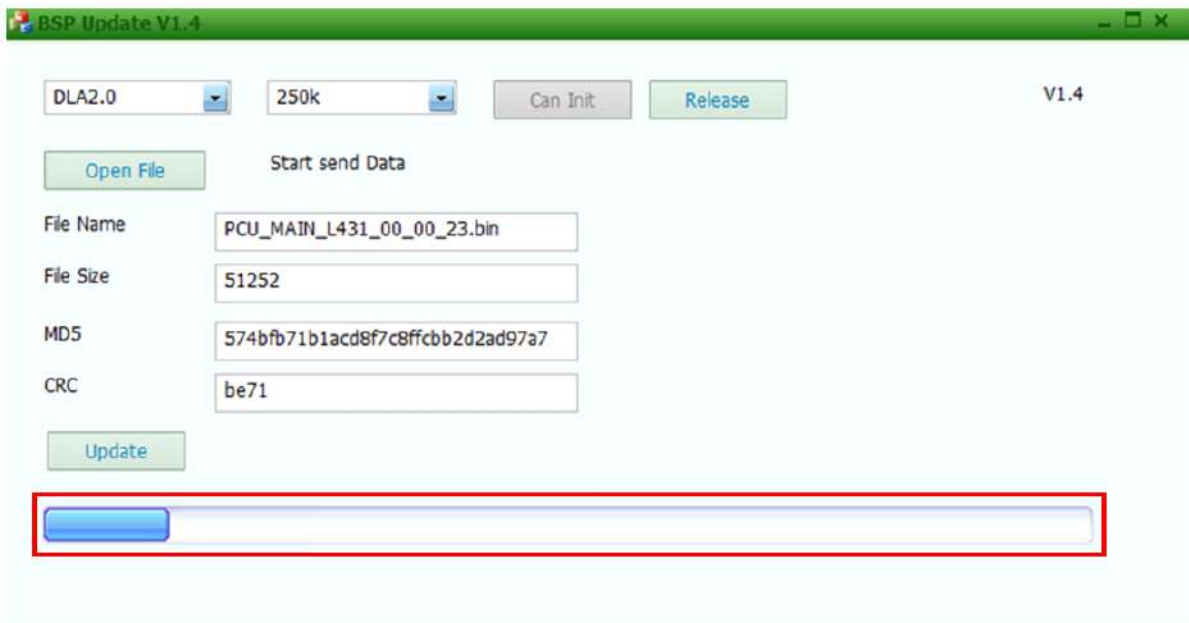
11. Below Pop Up will appear, Click on OK Option.



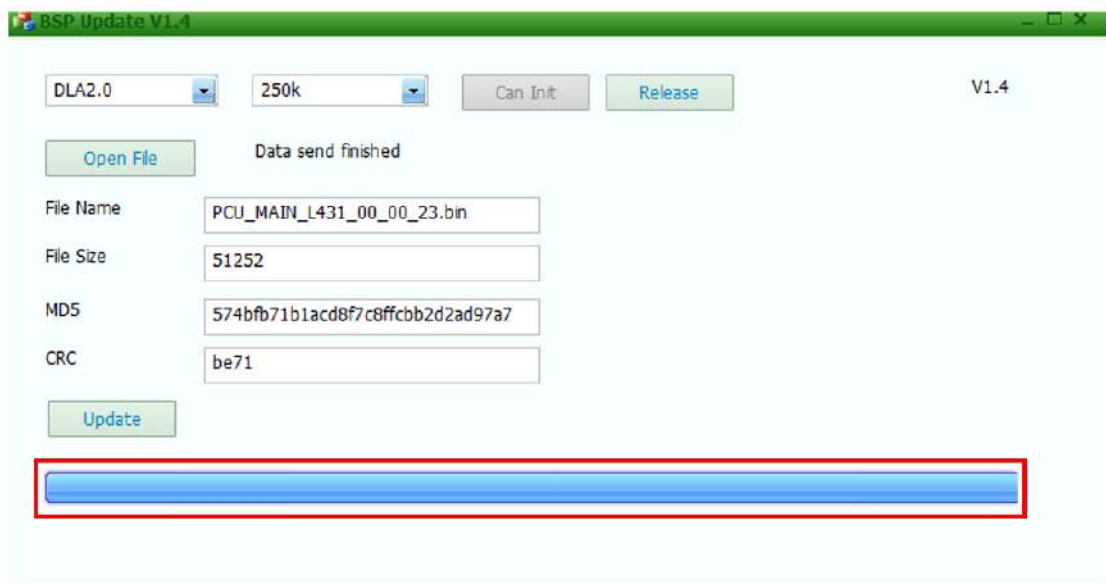
12. In Continuation to previous step, below pop up will appear, Click on OK Option.



13. After Clicking the OK Option in previous step, the Update will still start.



14. Once Update is finished, Check Platform ECU display after ignition power cycle for version number.





# **Service Operation Procedure**

## 9 Service Operation Procedure

# Service Operation Procedure

List of Service Operation Procedure

| Number | Component   |
|--------|---|
| 1      | <a href="#">Hydraulic Oil Change</a>   524                      |
| 2      | <a href="#">Battery Charger Curves</a>   525                    |
| 3      | <a href="#">Down Limit Switch Setting and Calibration</a>   527 |
| 4      | <a href="#">Up Limit Switch Setting and Calibration</a>   528   |
| 5      | <a href="#">Decent Delay Height Setting</a>   530               |

### 9.1 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.
- Dont 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.



## 9.2 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

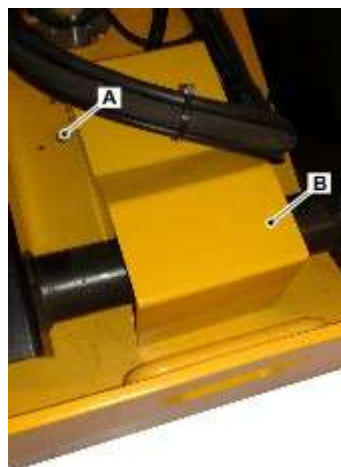
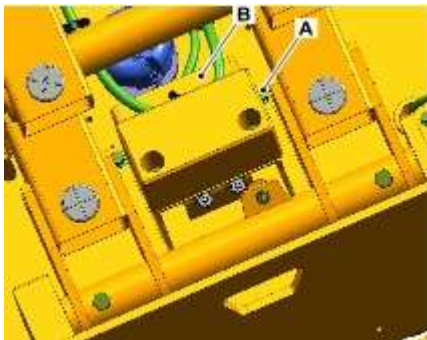
| Model/ Option | Charger Profile | Batteries             |
|---------------|-----------------|-----------------------|
| S1932EDRV     | 161             | Vision - EVGC-220A-AM |
| S2632EDRV     | 161             | Vision - EVGC-220A-AM |
| S2646EDRV     | 161             | Vision - EVGC-220A-AM |
| S3246EDRV     | 161             | Vision - EVGC-220A-AM |
| S4046EDRV     | 161             | Vision - EV12-155A-AM |
| S4550EDRV     | 161             | Vision - EV12-155A-AM |

## 9.3 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

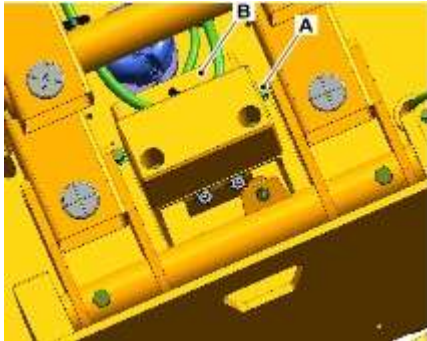
| Machine Model | Down Limit Height <sup>(1)</sup> |
|---------------|----------------------------------|
| S1932E EDRV   | 1.6 1.8m                         |
| S2632E EDRV   | 2.2 2.4m                         |
| S2646E EDRV   | 2.2 2.4m                         |
| S3246E EDRV   | 2.4 2.6m                         |
| 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.*

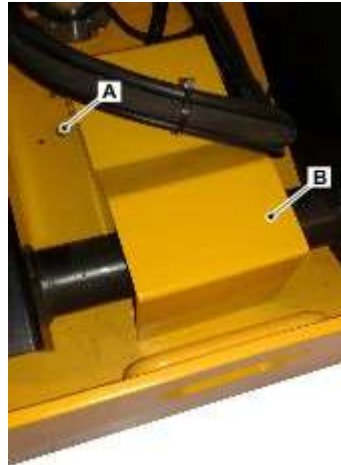
## 9.4 Up Limit Switch Setting and Calibration

### 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 <sup>(1)</sup> |
|---------------|-----------------------------------|
| 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.

## 9.5 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              |