MITT-ILC WECANX2.0

Large Wrecker Integrated

Lighting Control System

Installation, Operation, and Troubleshooting

MITT-ILC WECANX2.0

Course Summary:

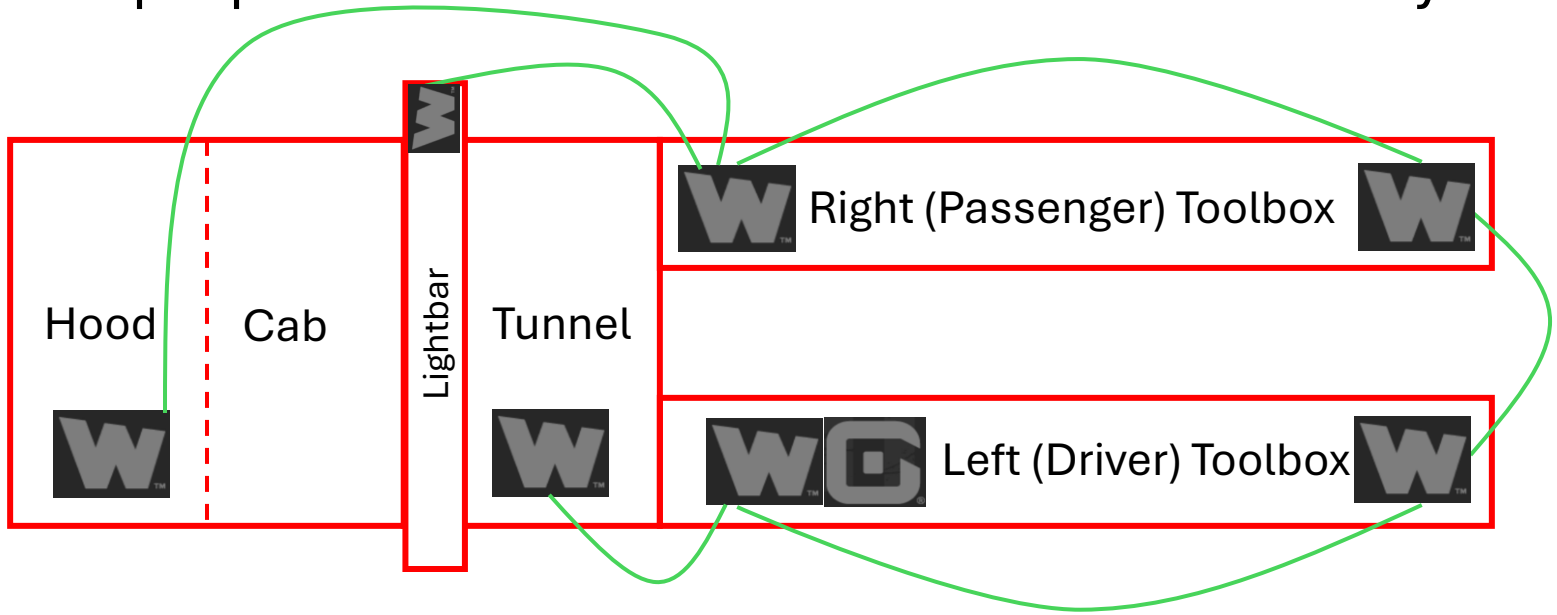
1) Overview (Paul)
2) Chassis Preparation (Jason)
3) Toolboxes (Jason)
4) Power (Jason/Paul)
5) Additional Lights (Paul)
6) Lightbar – WECANX-(Whelen)
7) Generic Lights/Lightbar-(Whelen)
8) Software Configuration-(Whelen)
9) Operation-(Whelen)
10) Diagnostics & Troubleshooting – (Whelen/Paul)
11) Crimps, Crimping and Crimping Tools (Paul/Whelen/Jason)

Overview – Key Changes

- **Centralized J-box eliminated**
- **Increased connectorization** (every lighting drops comes with mating connector)
- **Increased modularity** (distributed system)
- **Increased Control** (Zone control)
- **Increased Customization** (233 I/O points individually adjustable via software)
- **Simpler Troubleshooting** (CAN & Power)
- **Better Documentation** (50020525 system drawing)
- **Reduced Install Time** (pre-programmed lighting/location specific drops)
- **Tail lighting independent** Tail lights are now independent from the Lighting system

Overview - WECANX

Centralized Junction box eliminated, Now consists of up to 6 localized output panels connected via Power and WECANX only.



= Whelen Output module(s)

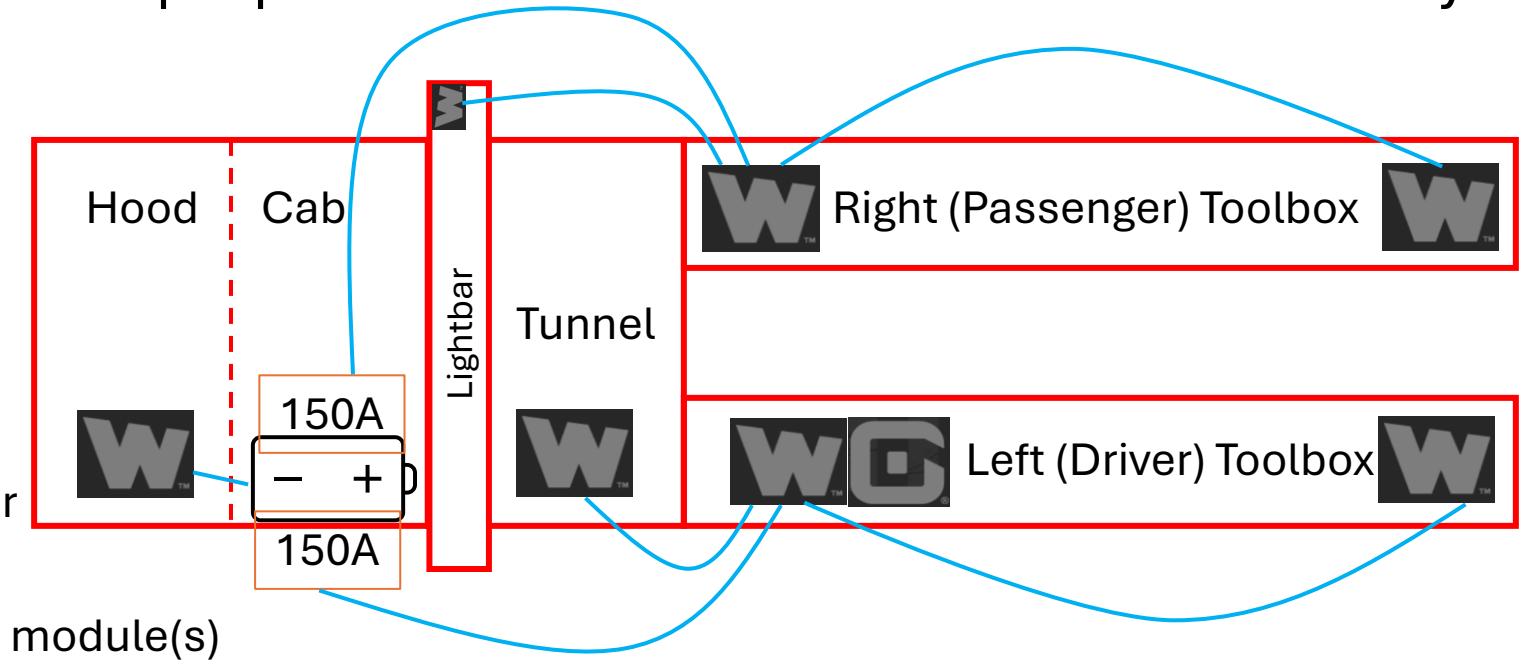
= Whelen Core-R “Brain”

= WECANX Network

<u>Six Local Output Zones totaling</u>
QTY. 160 (2.5 amp outputs)
QTY. 9 (15 amp outputs)
QTY. 16 (Millennium light outputs)
ALL Pre-programmed

Overview – POWER & GND

Centralized Junction box eliminated, Now consists of up to 6 localized output panels connected via Power and WECANX only.



150A = Circuit Breaker

= Whelen Output module(s)

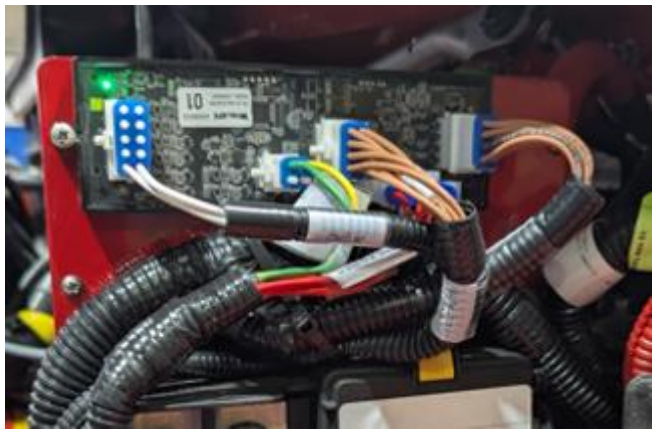
= Whelen Core-R “Brain”

= Power & GND

<u>Six Local Output Zones totaling</u>
QTY. 160 (2.5 amp outputs)
QTY. 9 (15 amp outputs)
QTY. 16 (Millennium light outputs)
ALL Pre-programmed

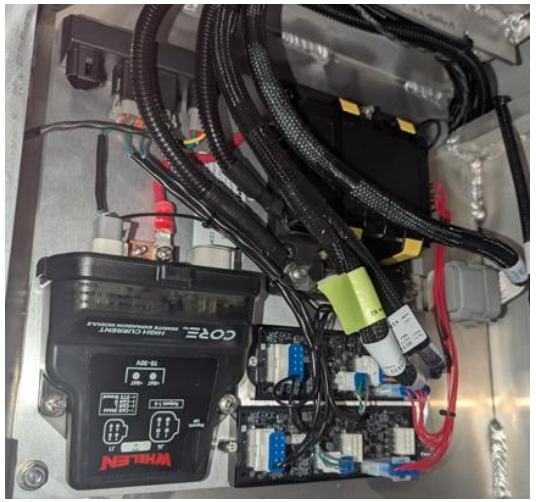
Overview - PANELS

HOOD

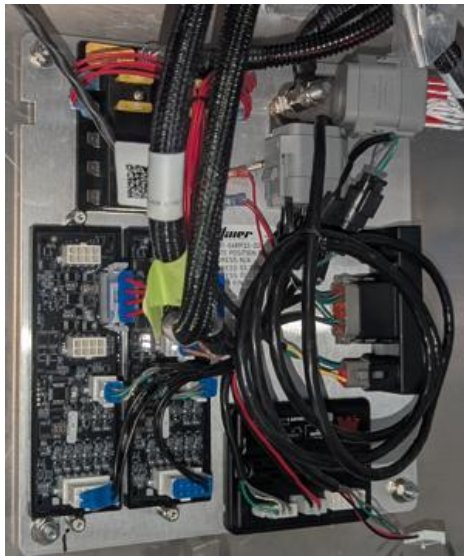


TUNNEL

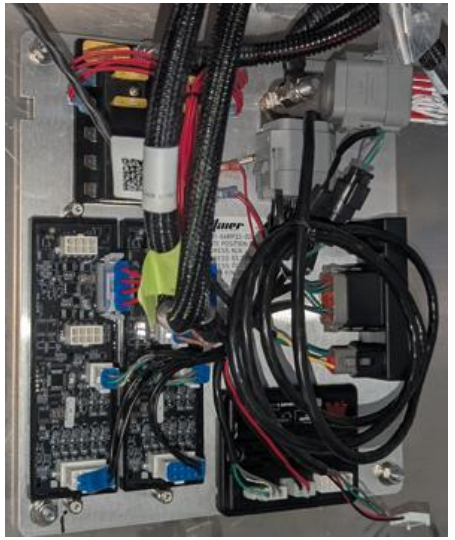
FRONT RIGHT TOOLBOX



REAR RIGHT TOOLBOX



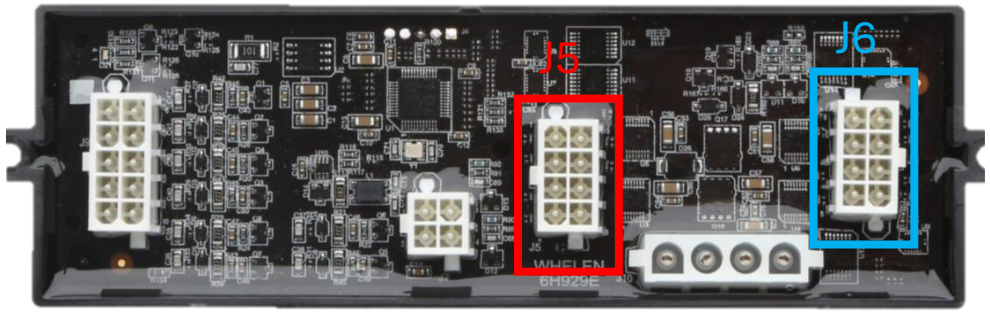
FRONT LEFT TOOLBOX



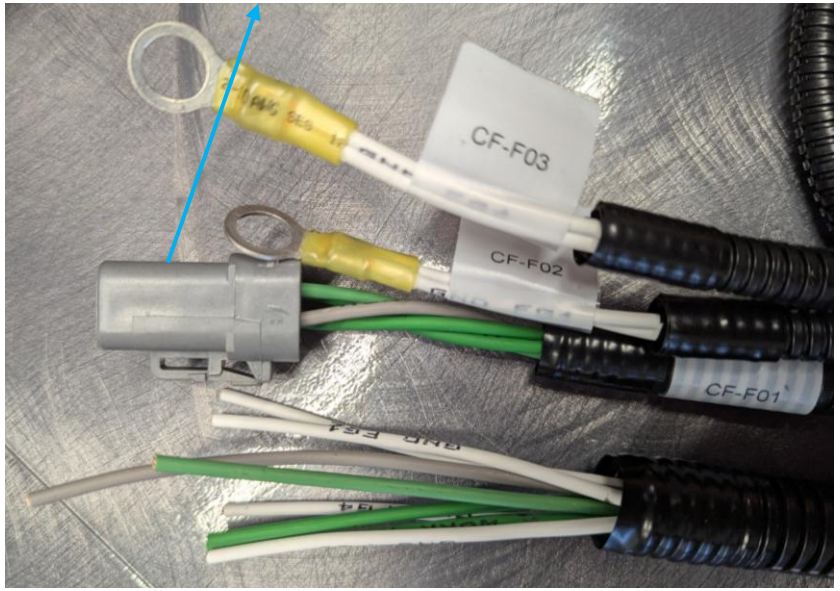
REAR LEFT TOOLBOX

Overview - OUTPUTS

CEM16

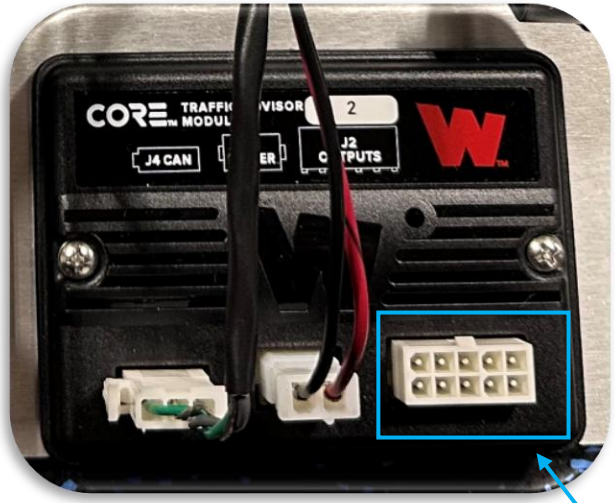


HIGH CURRENT (HC4)

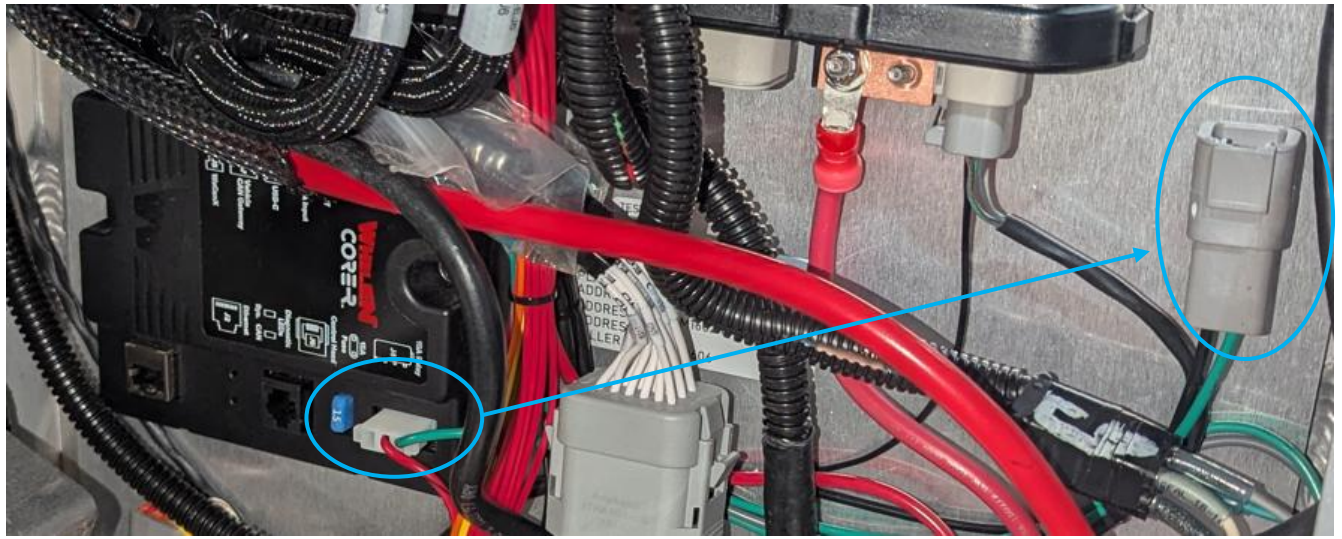


Overview - OUTPUTS

CTA



CORE-R

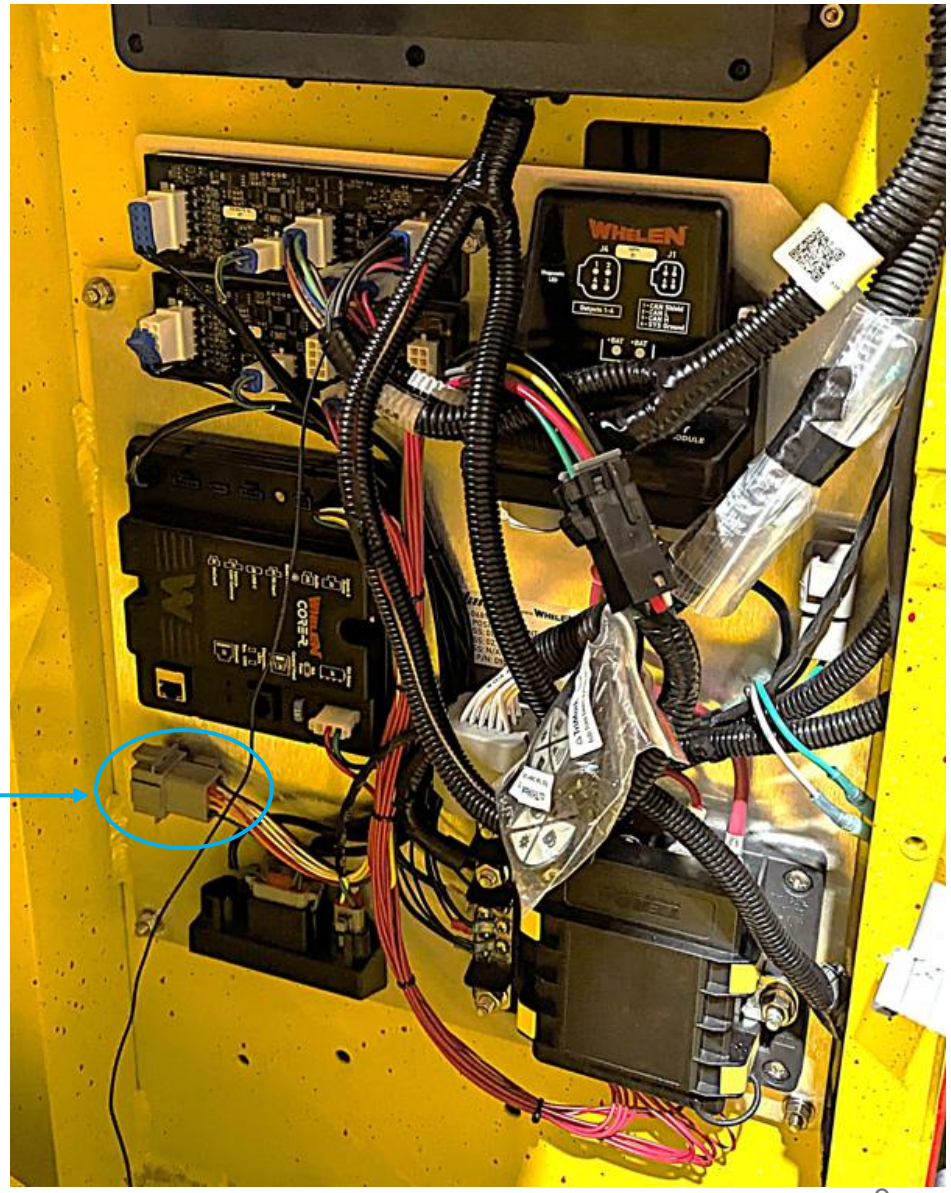


Overview - INPUTS

CORE R INPUTS*

CONNECTOR	PINOUT	Plug Position	Label	Wire Color
N/A	N/A	J3-1	Battery	Red (+)
DT06-08SA	1	J3-2	Left Turn	Wht/Brn (+)
DT06-08SA	2	J3-3	Right Turn	Wht/Red (+)
DT06-08SA	3	J3-4	Brake	Wht/Org (+)
DT06-08SA	4	J3-5	Marker	Brn (+)
N/A	N/A	J3-6	Ground	Blk
DT06-08SA	5	J3-7	Ignition	Red/Wht (+)
DT06-08SA	6	J3-8	Reverse	Org (+)
DT06-08SA	7	J3-9	LOCK/UNLOCK	Yel (+)
DT06-08SA	8	J3-10	E-Stop	Grn (+)

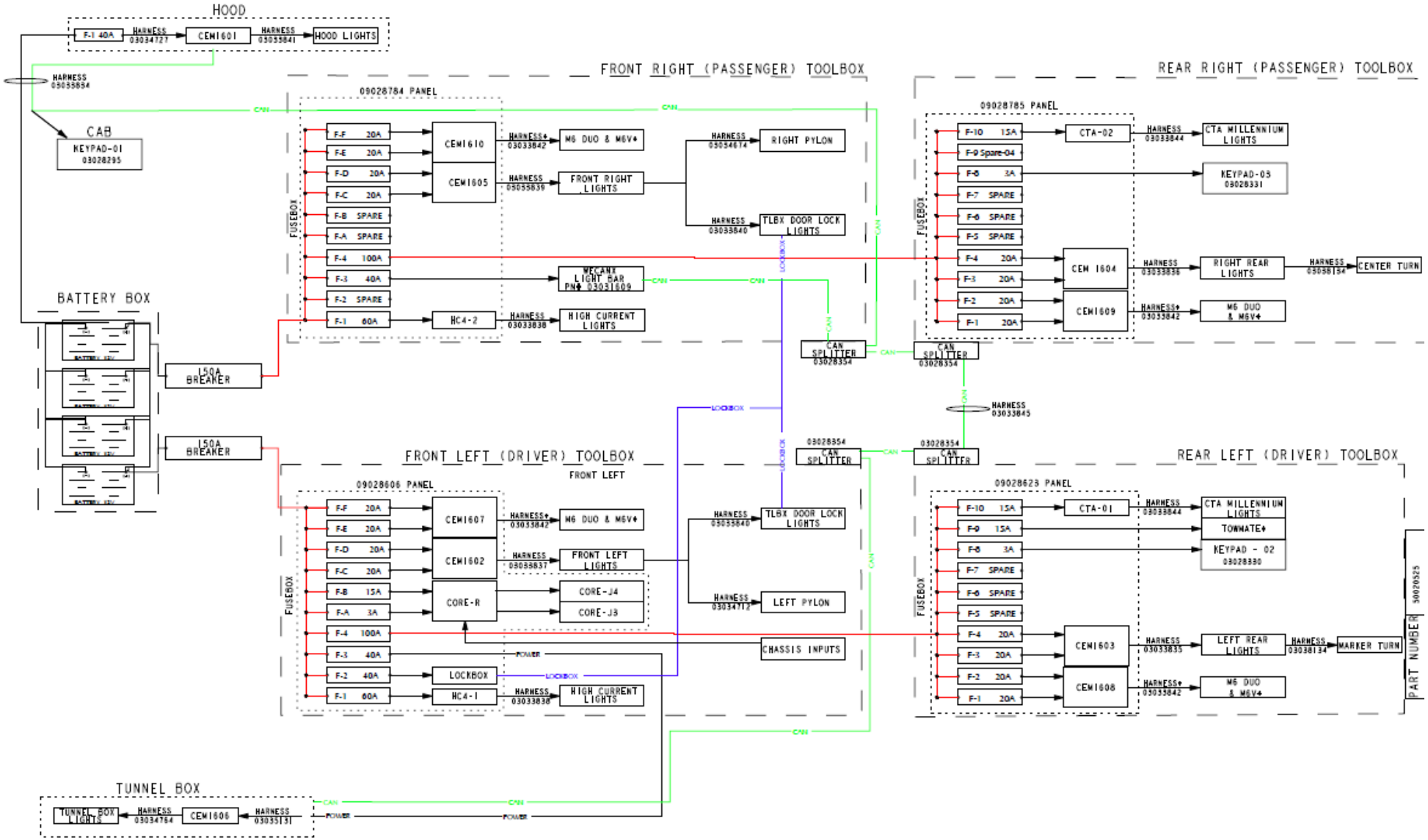
CHASSIS INPUTS
TO CORE-R
DT06-08SA (mating connector)



*LOCK/UNLOCK IS PREWIRED AND
NEED NOT BE INTERFACED TO
*RESISTORS MAY NEED TO BE ADDED
TO CHASSIS INPUTS TURNS AND BRAKES
NOTABLY FOR FREIGHTLINER AND INTERNATIONAL

Overview

Review System Drawing 50020525

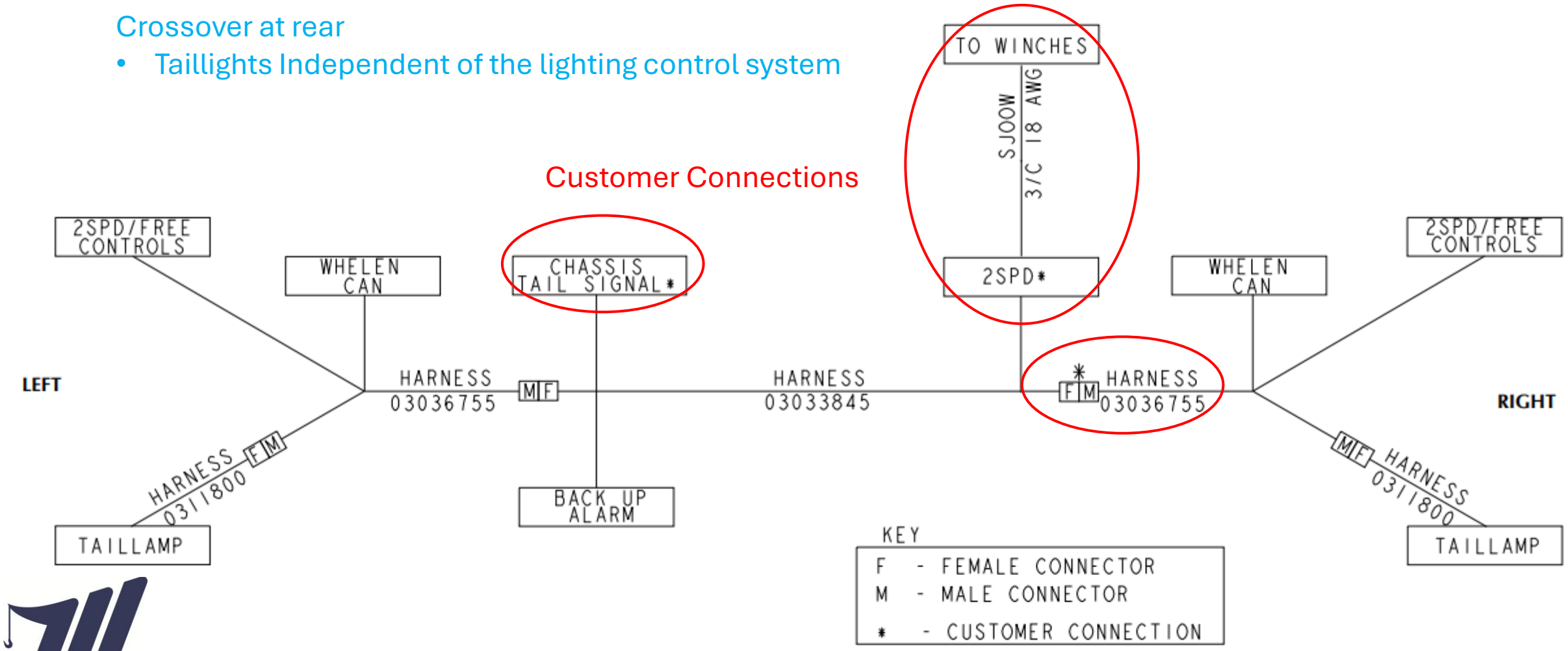


Overview

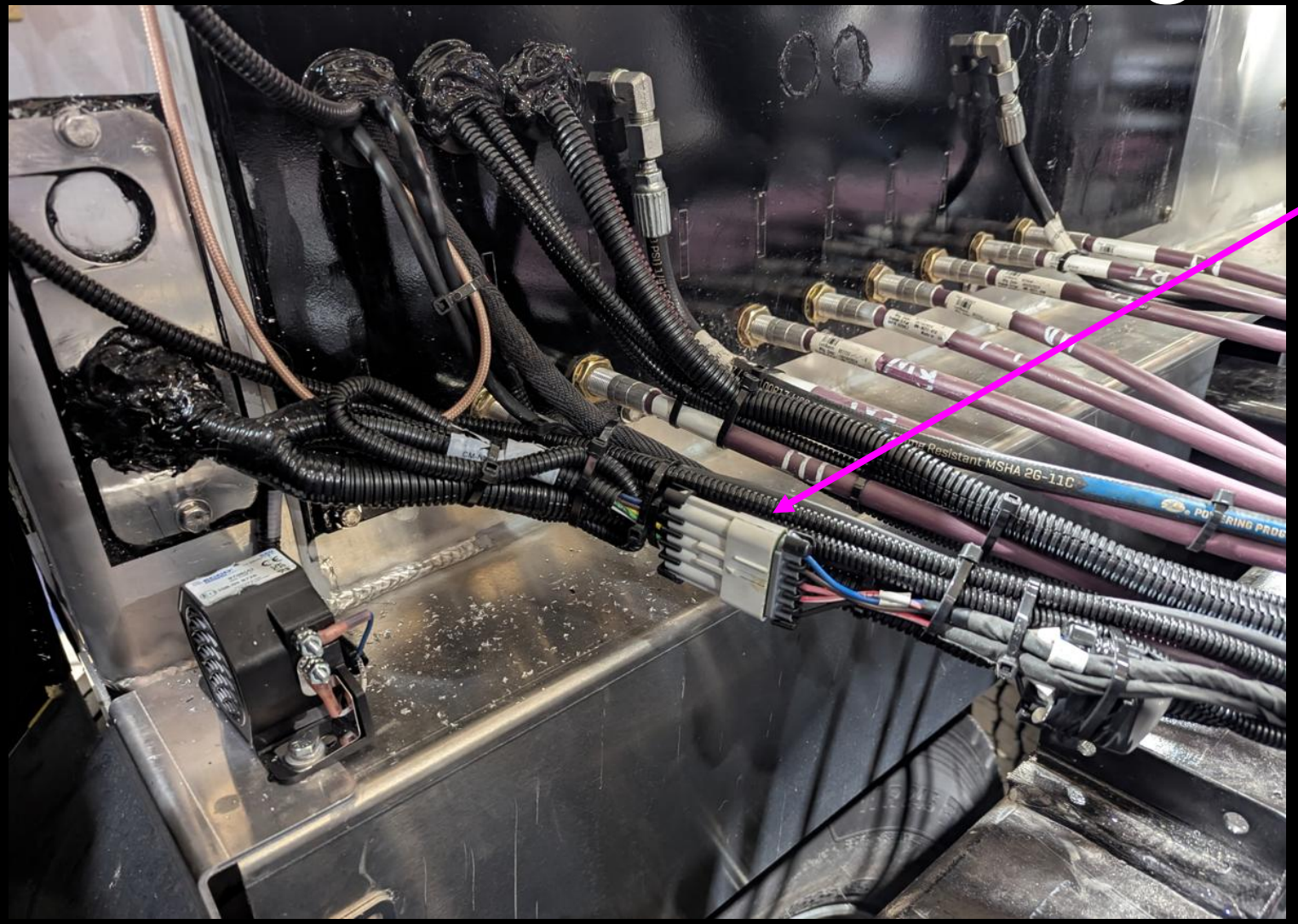
System Drawing 50020525

Crossover at rear

- Taillights Independent of the lighting control system



End of Chassis Tail Lights connection



Factory taillights chassis connection

Chassis specific adapters

- 03033843 MITT-ILC TAILIGHT ADAPTER2 (Paccar 6-way metripack)
- 03038116 MITT-ILC ADPT INTERNATIONAL (APEX adapter for International/Freightliner)

Taillight Variations

State 3 for International, Freightliner and others:

- 2 – Marker/Brake/Turn lights
- 2 – Reverse light

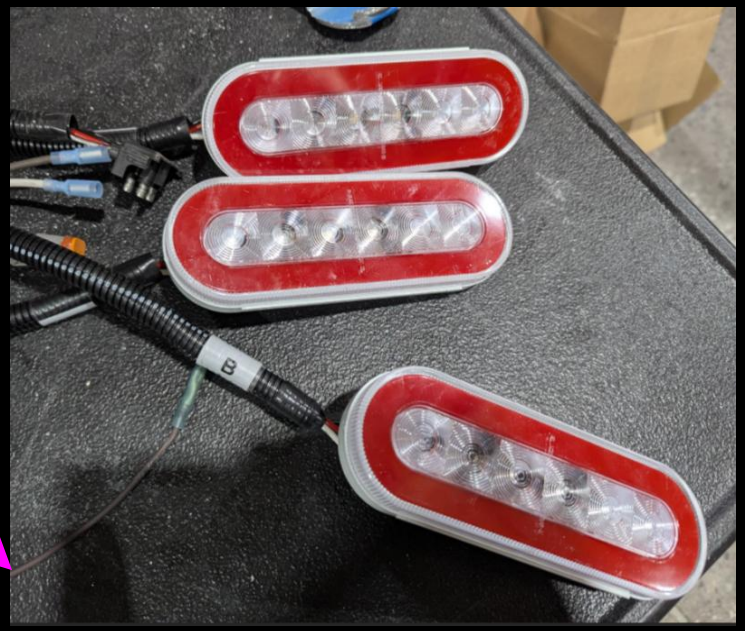
State 2 for PACCAR chassis, Petes, Kenworths and others:

- 3 – Marker/Brake/Turn lights
- 1 – Reverse light

Taillight harness modification

Harness 0311800 – State 2

The PL-3 light connector at “B” is modified by connecting the not connected black wire to marker in the tail light harness.



Connect to marker in the tail harness

Upon the single wire modification, all 3 lights will be stop/turn and marker

- The taillights are now isolated from the wrecker lighting control system to provide redundancy.
- The taillights connector on all chassis is a 5-way metripack connector with combined stop and turn

Miller Industries

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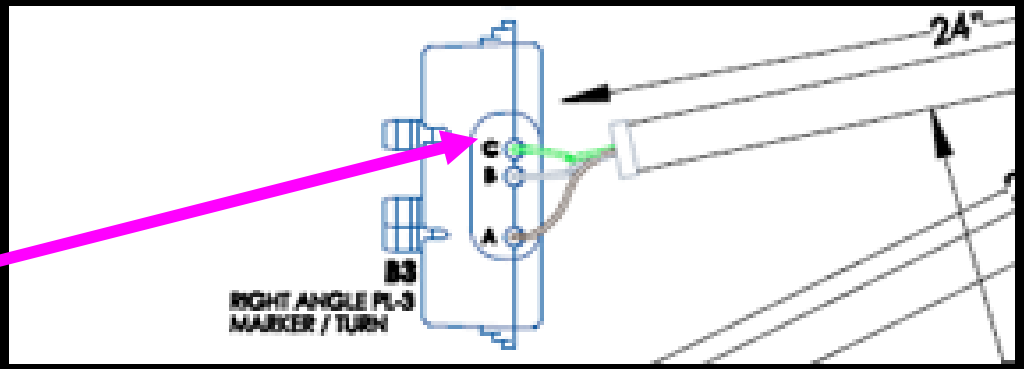
Taillight harness modification

(low marker current version, 2 reverse, 2 marker brake turn)

Harness 0311800 – State 3

The PL-3 light connector at “B” is modified by connecting the not connected black wire to reverse in the tail light harness.

Connect to reverse in the tail harness



Upon the single wire modification, all 2 lights will be stop/turn and marker and 2 will be reverse.

- The taillights are now isolated from the wrecker lighting control system to provide redundancy.
- The taillights connector on all chassis is a 5-way metripack connector with combined stop and turn

Miller INDUSTRIES

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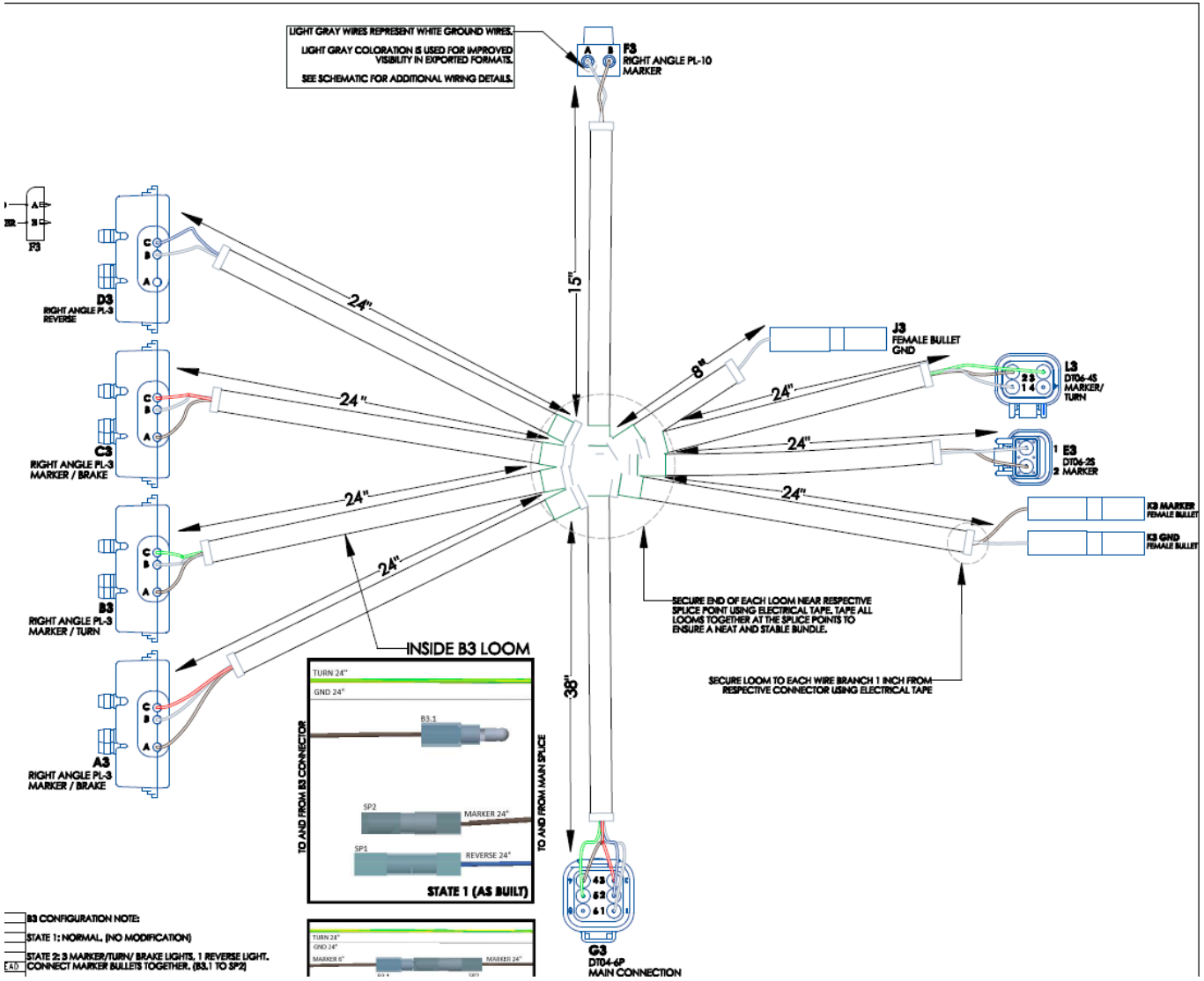
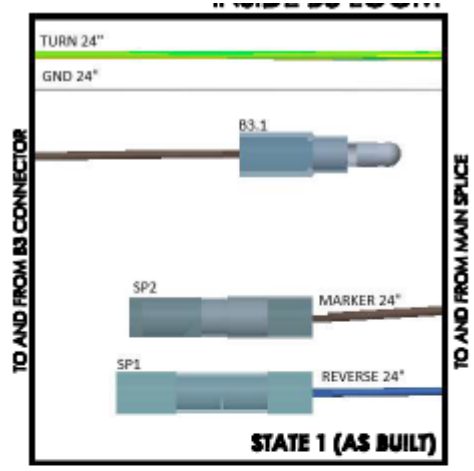
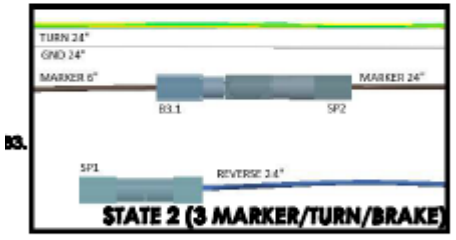
Taillight harness modification - Coming Soon

Harness 0311800 Rev 3







CHASSIS PREPARATION

- Qty 2 (150amp circuit breakers, one for each toolbox)*
- 4 gauge power and ground wires (pair for each toolbox)*
- Chassis inputs cable from chassis J-box*

*Distributor installation required

CHASSIS PREPARATION

- Chassis inputs cable from chassis J-box*

*Distributor installation required

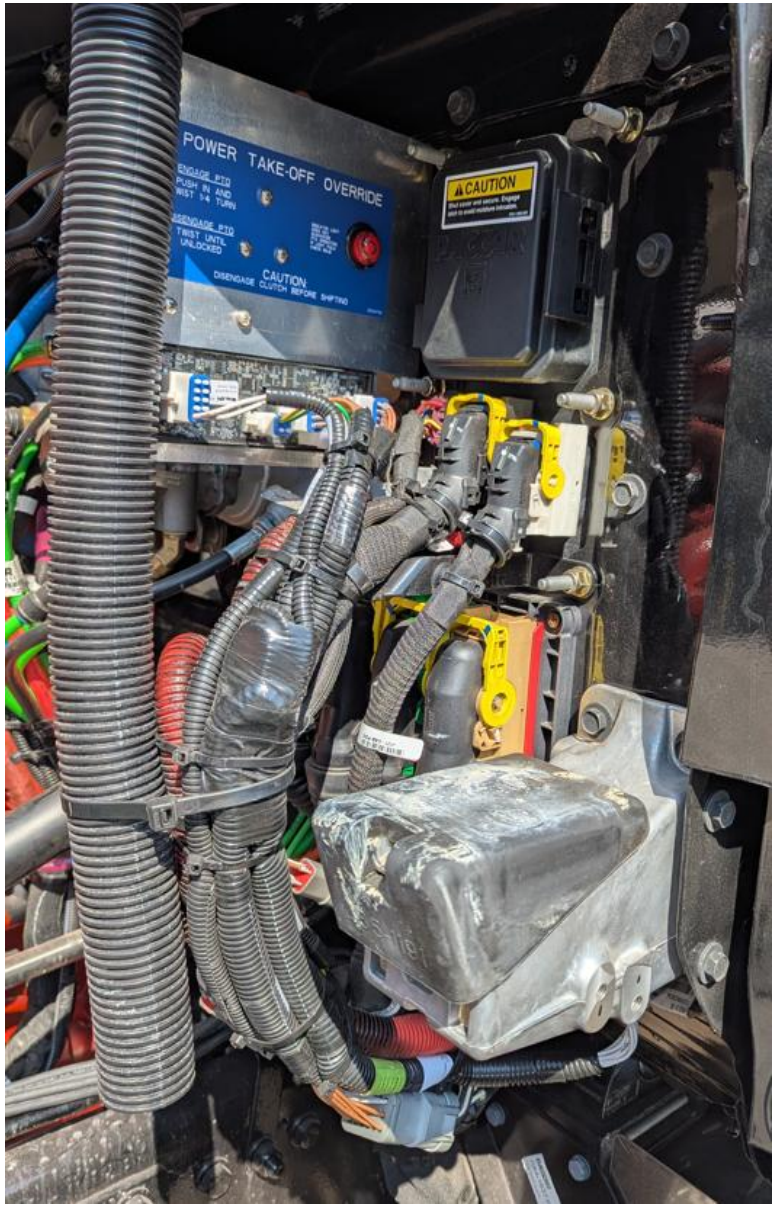
CHASSIS PREPARATION

- Qty 2 (150amp circuit breakers, one for each toolbox)*

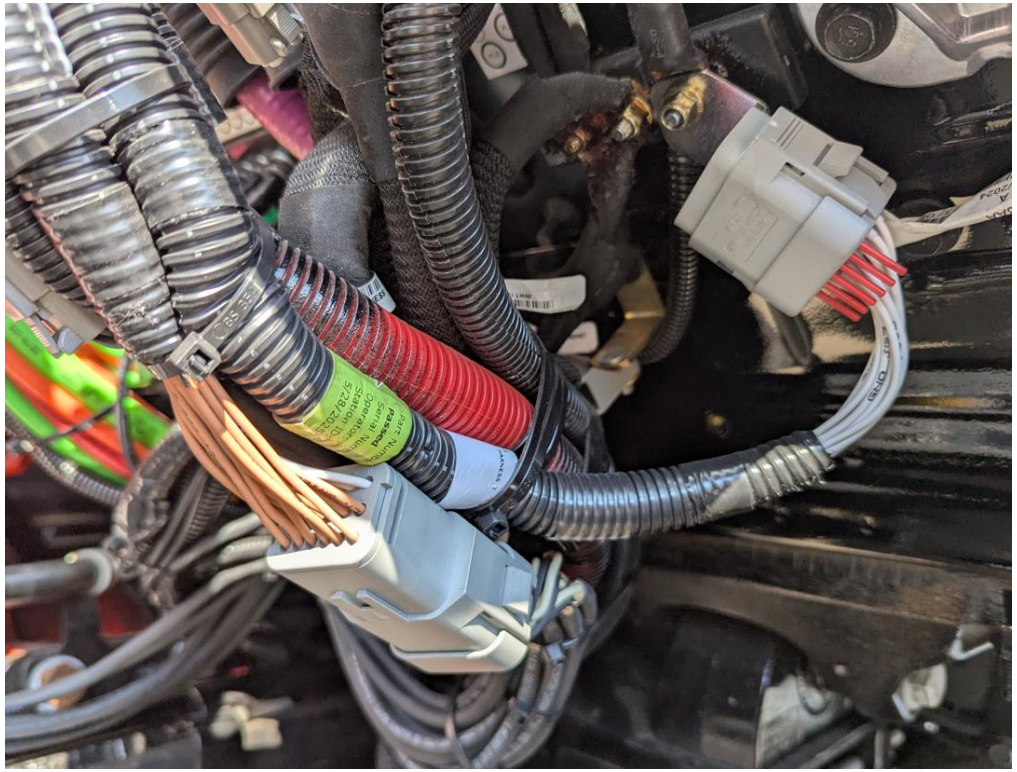
*Distributor installation required

CHASSIS PREPARATION – Manual Transmission

- Hood CEM16-01*



- Gnd buss connection*



*Distributor installation required

CHASSIS PREPARATION – Auto Transmission

- Hood CEM16-01*

- Gnd buss connection*

*Distributor installation required

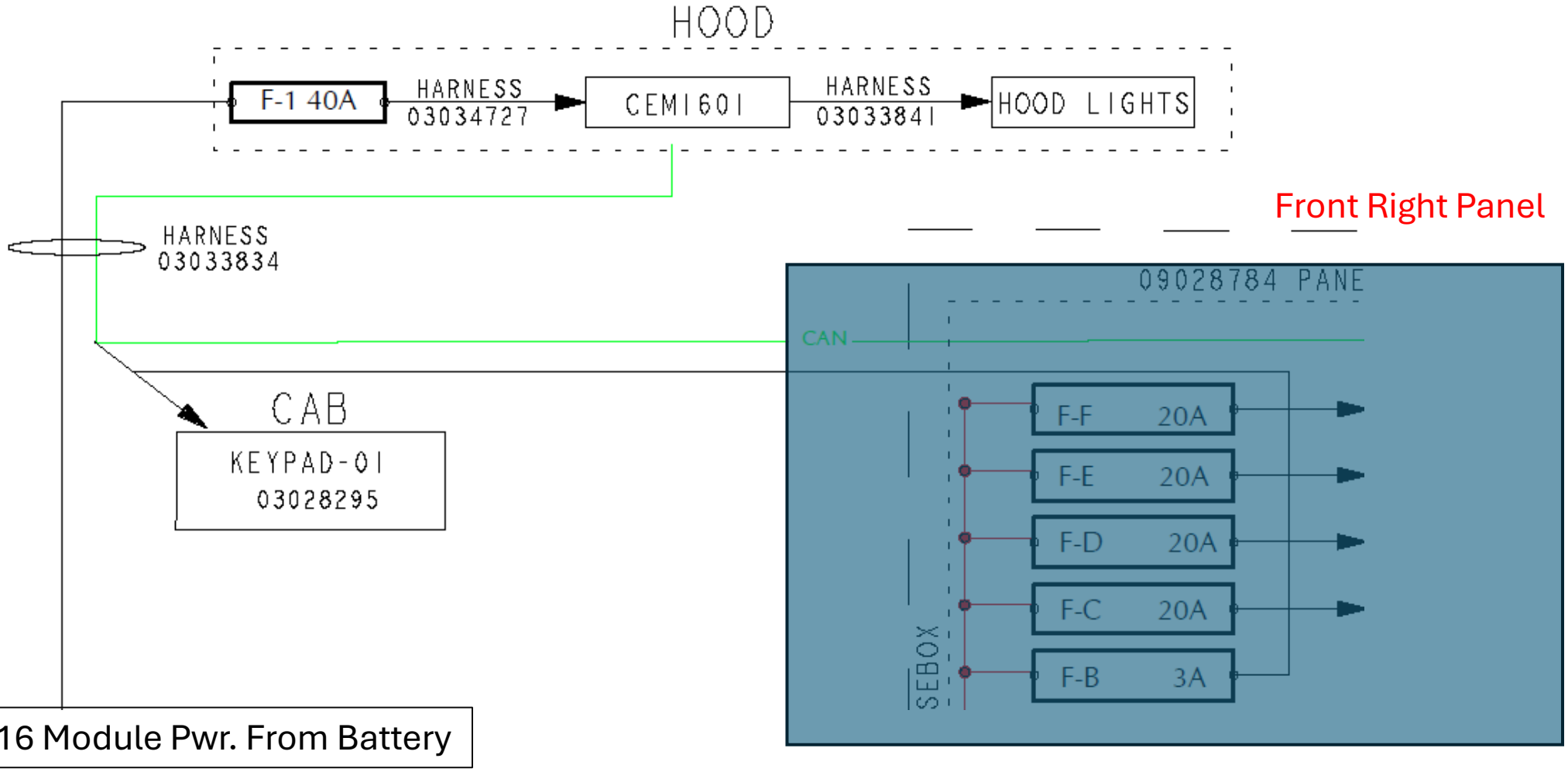
CHASSIS PREPARATION – Auto Transmission

- Hood CEM16-01*
- Gnd buss connection*

*Distributor installation required

CHASSIS PREPARATION

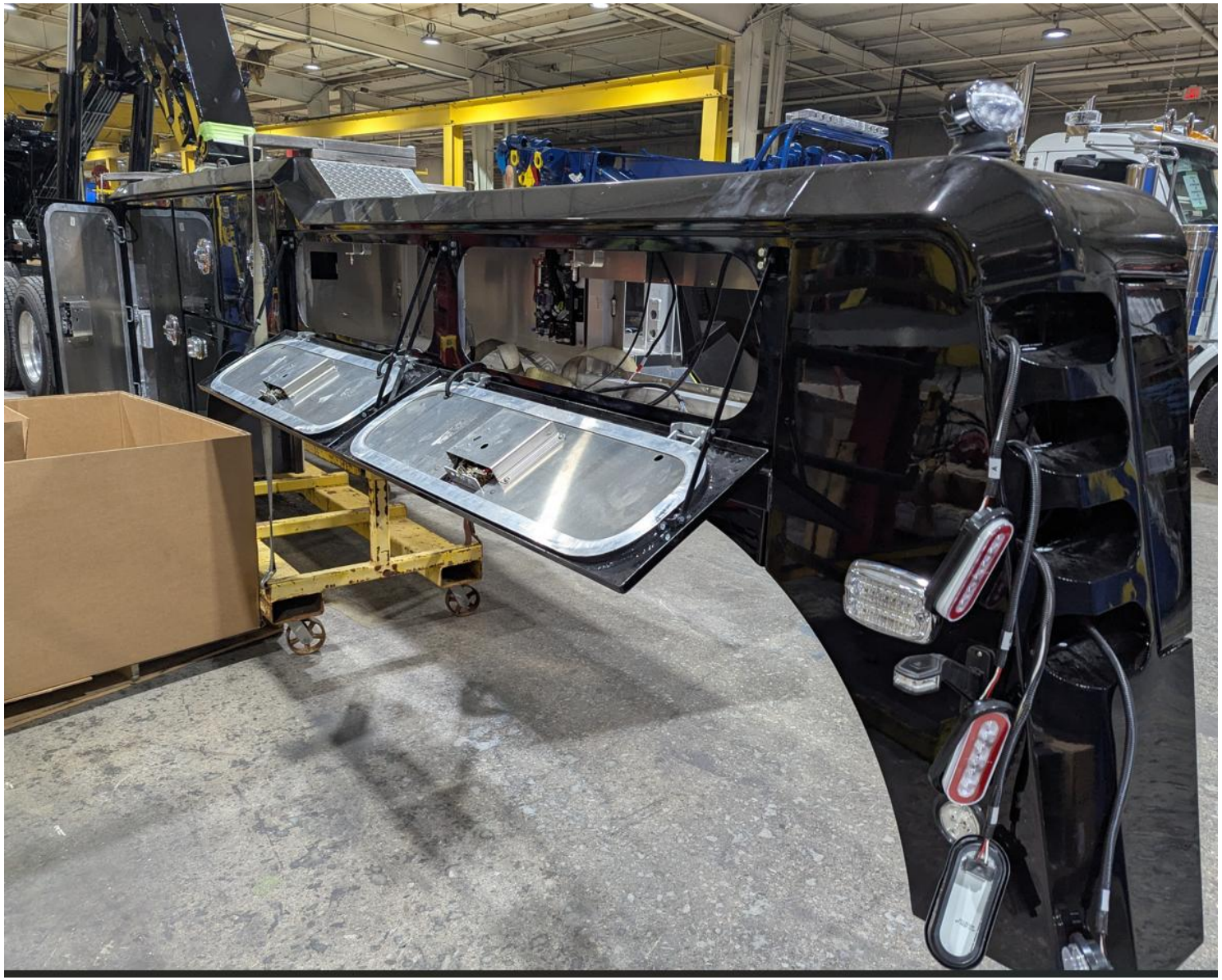
Hood/Cab Harness/Keypad Installation



*Distributor installation required

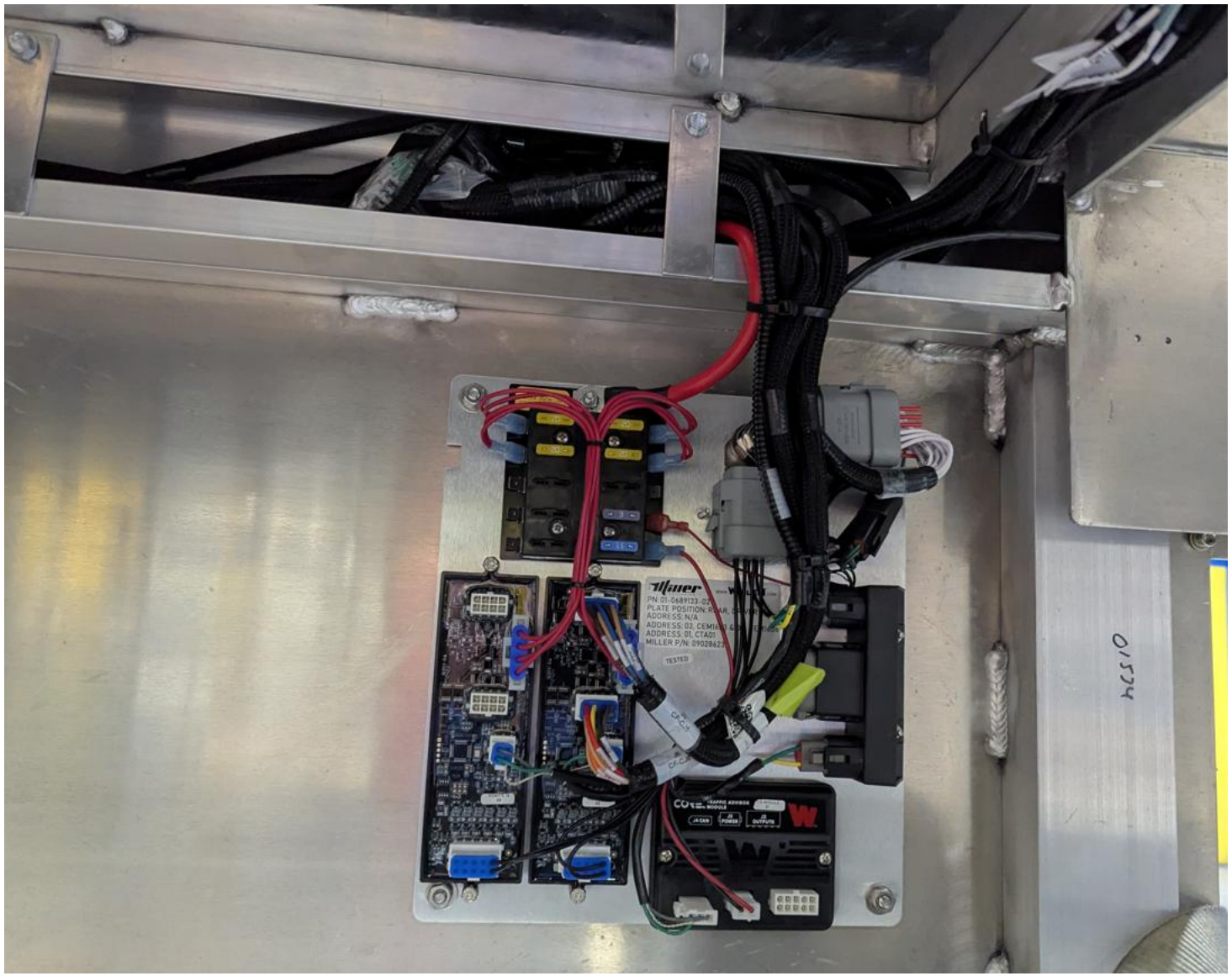
Toolboxes

Come with the panels Installed and harnessing routed



Toolboxes

Come with the panels Installed and harnessing routed



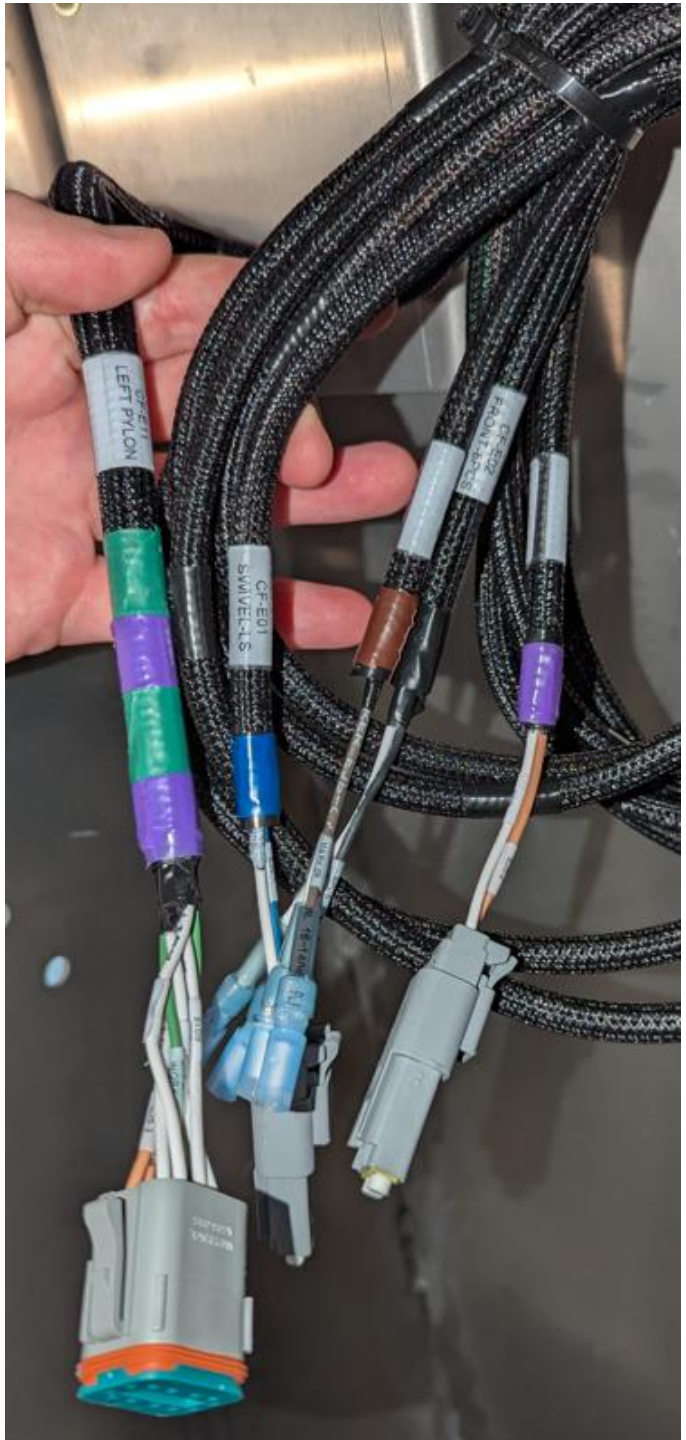
Toolboxes

- Crossover harness:
- Connects WECANX network from left toolbox to right toolbox at rear.
- Bridges the tail light signals from each toolbox to the chassis Connection.
- Brake and turn are spliced together as the chassis signals are combined.
- 2Spd and Free spool control station crossover.

*Distributor installation required

Toolboxes

Color coded lighting drops with preinstalled mating connectors

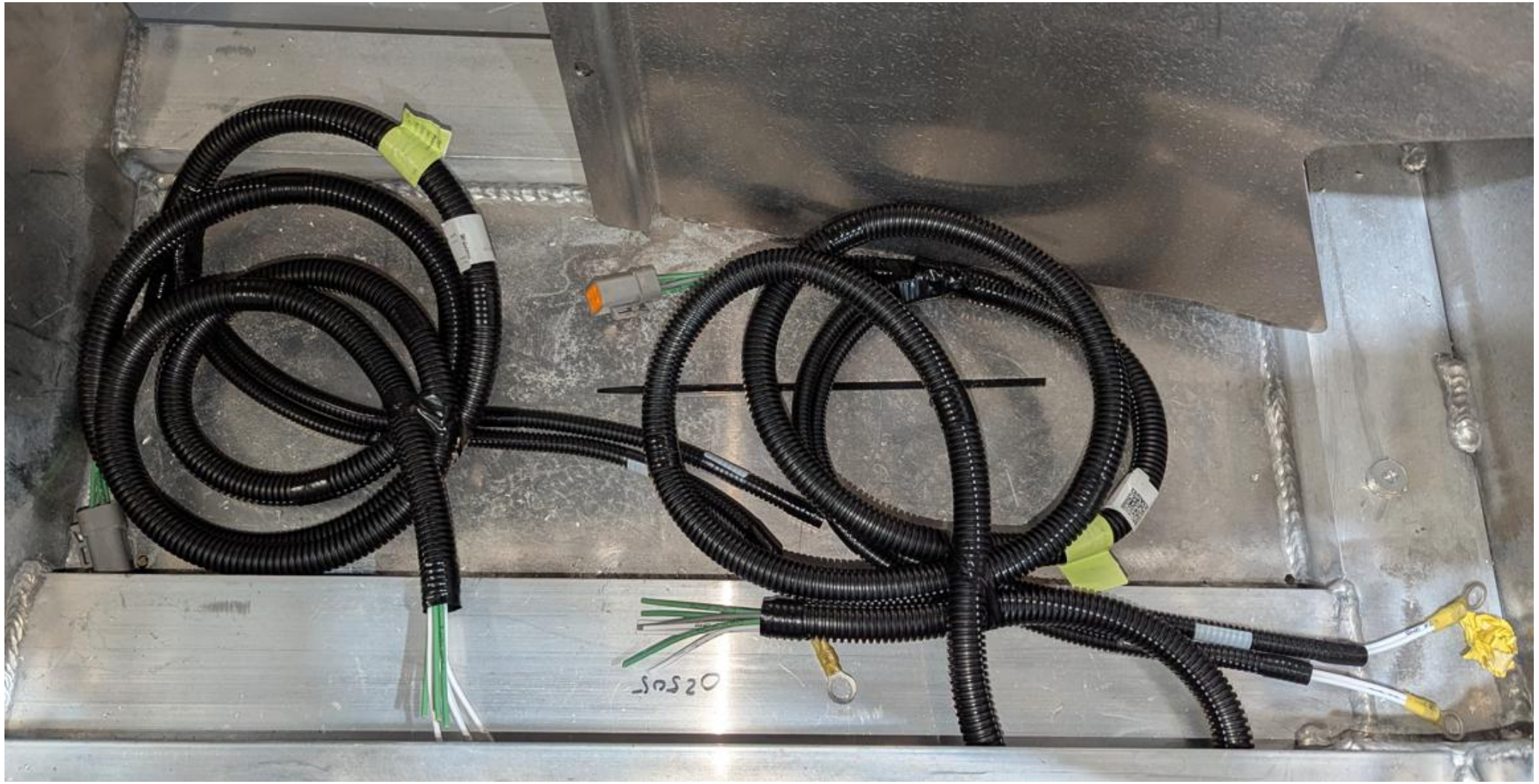


Toolboxes

Color coded lighting drops with preinstalled mating connectors

Toolboxes

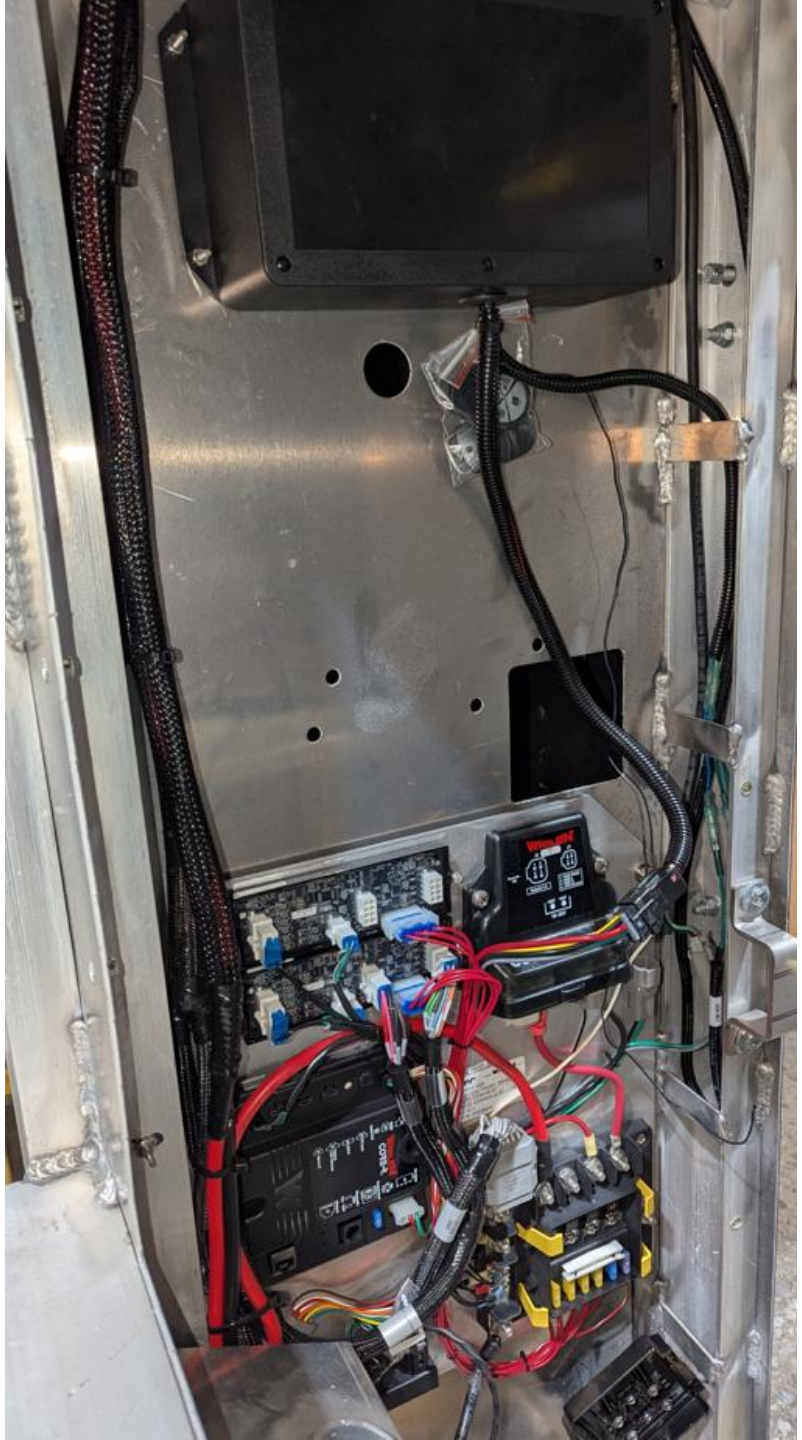
High Current model, HC4, harnessing ships loose with every truck.



Installation optional depending on lights specified (High Current, 15A max per wire)

Toolboxes

Front Right and Left Panels



Toolboxes – Front Left Panel

Toolbox Lockbox

Controls PWR Output 15A

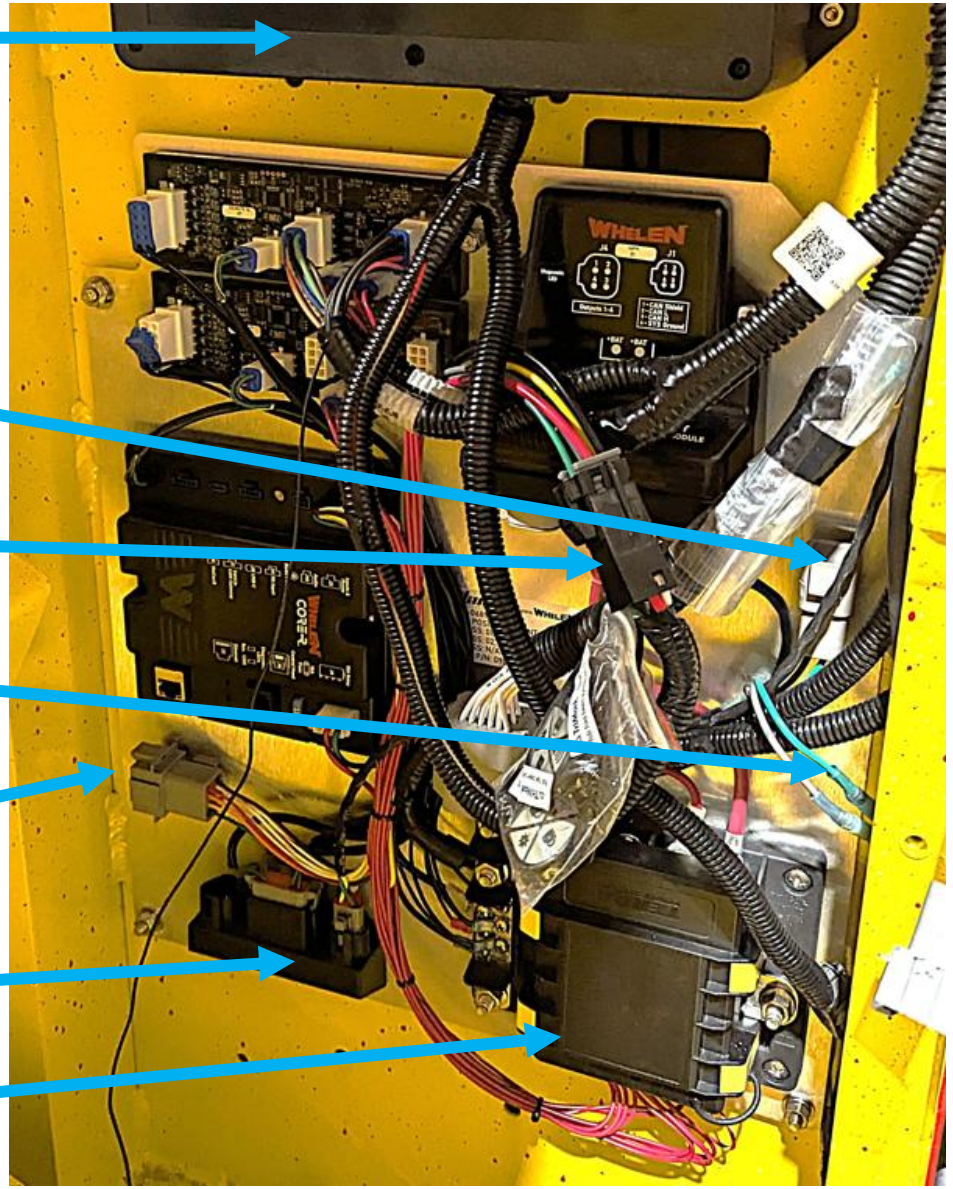
Lockbox power connection

Lock/Unlock outputs*

Front Left Panel Chassis inputs*

CAN splice connector

Fuse Box

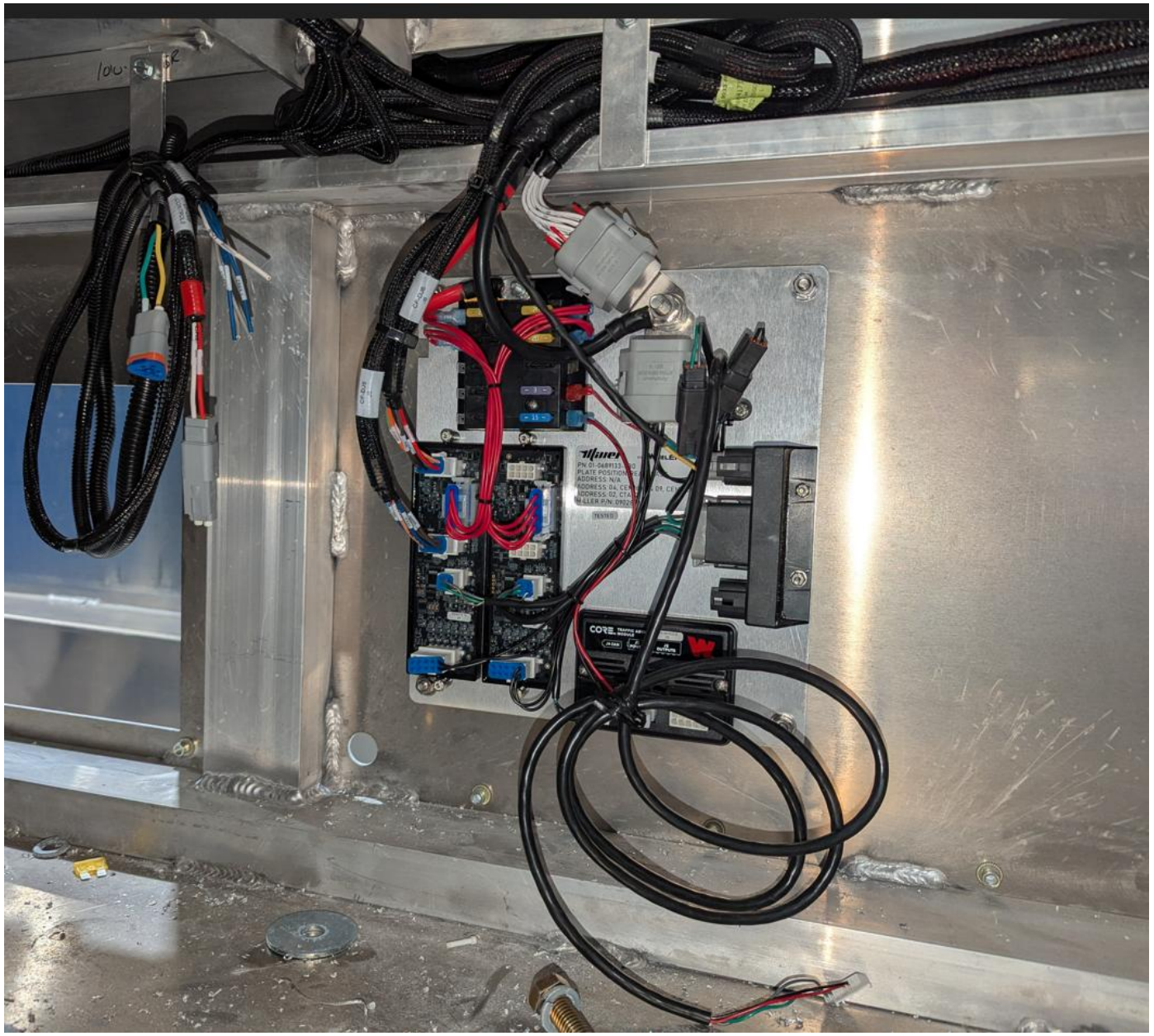


*Distributor installation required

Toolboxes

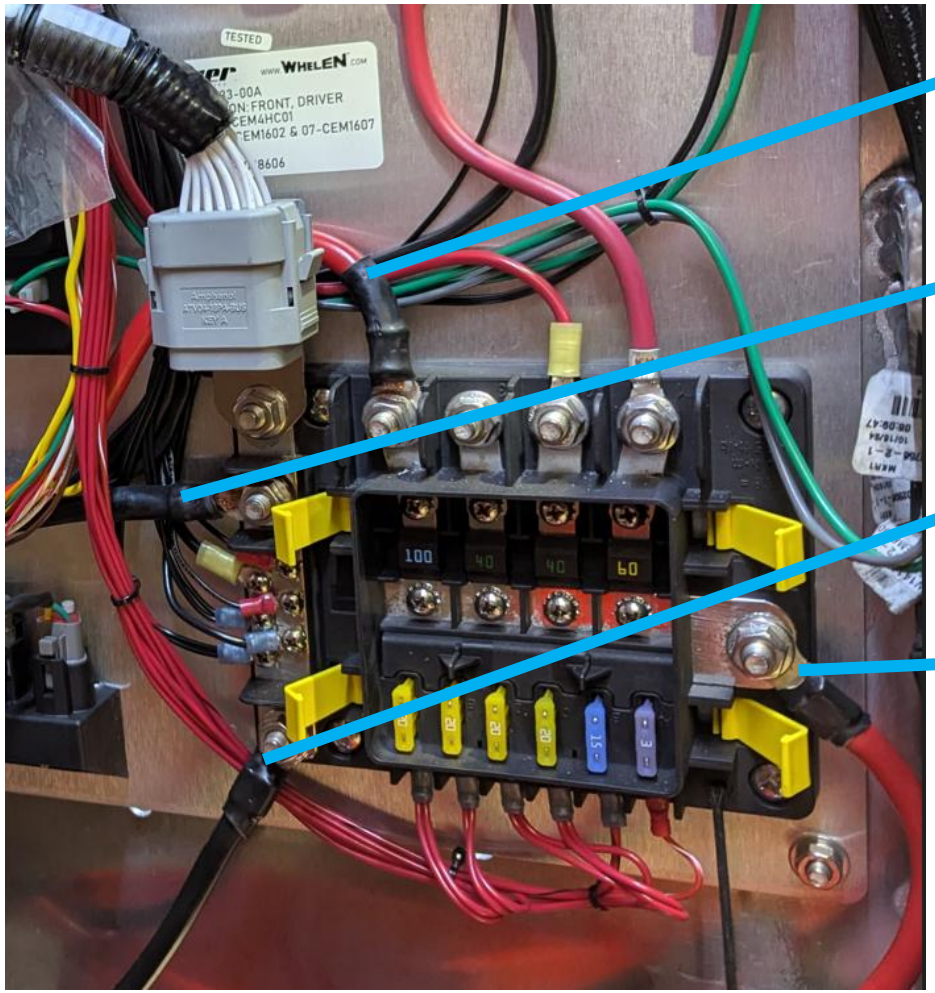
Rear Panel

FUSE#	Fuse Rating	Description
1	20	CEM16
2	20	CEM16
3	20	CEM16
4	20	CEM16
5	-	Spare-01
6	-	Spare-02
7	-	Spare-03
8	3	Keypad
9	15	Towmate*
10	15	CTA



Power – Left front Panel

FUSE#	Fuse Rating	Description
1	60	HCM
2	40	Lock Box
3	40	Tunnel Box
4	100	Rear Left Panel
A	3	Core
B	15	Core J4
C	20	CEM1602
D	20	CEM1602
E	20	CEM1607
F	20	CEM1607



Power cable to the rear left panel

-Ground cable to the rear left panel

-Ground cable to battery negative terminal*

+Power cable to 150amp breaker at battery positive terminal*

*Distributor installation required

Power – Right front Panel

FUSE#	Fuse Rating	Description
1	60	HC4-2
2	-	Spare-1
3	40	Lightbar
4	100	Rear Right Panel
A	-	Spare-2
B	-	Spare-3
C	20	CEM1605
D	20	CEM1605
E	20	CEM1610
F	20	CEM1610

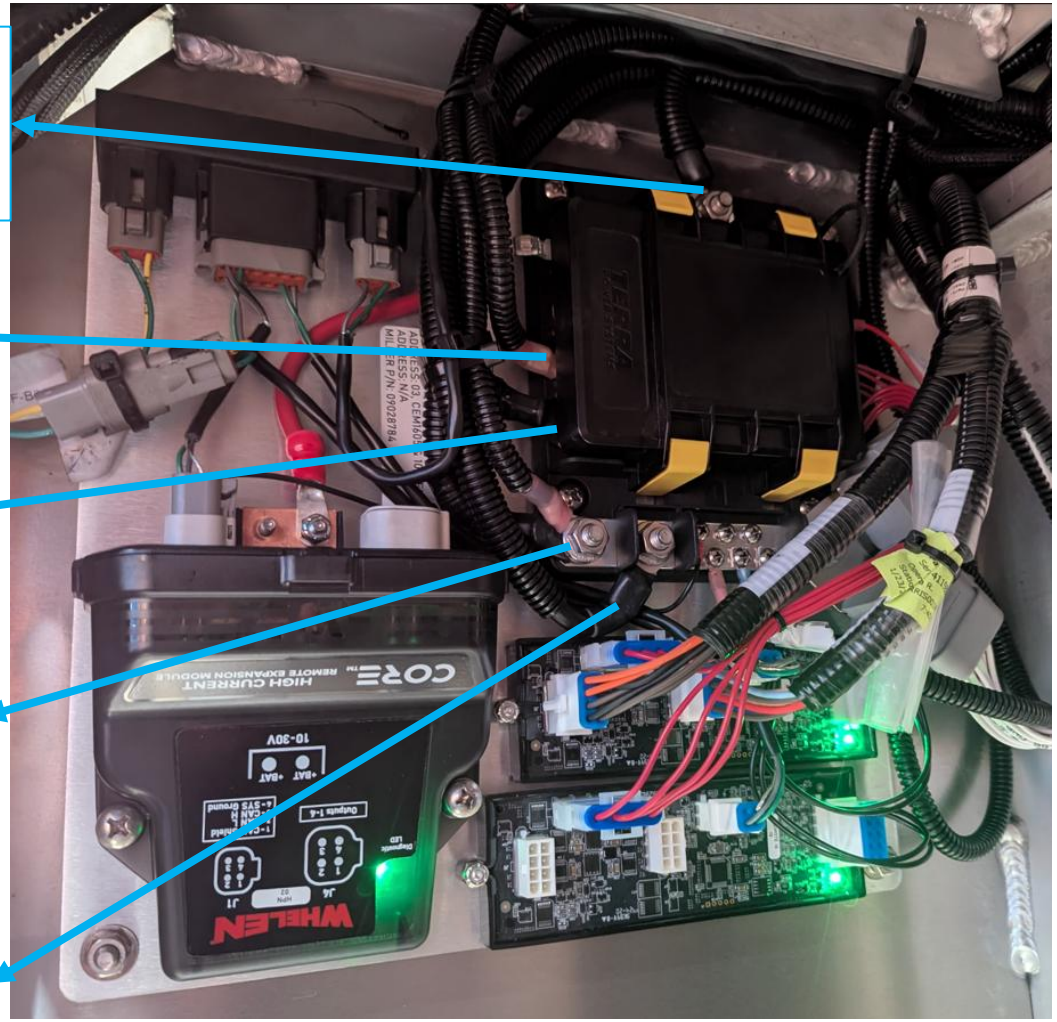
Power cable straight to 150amp breaker at battery positive terminal*

+ Power cable to the Lightbar*

+ Power cable to the rear right panel

Ground cable to the rear rear panel

- Ground cable straight to battery negative terminal*



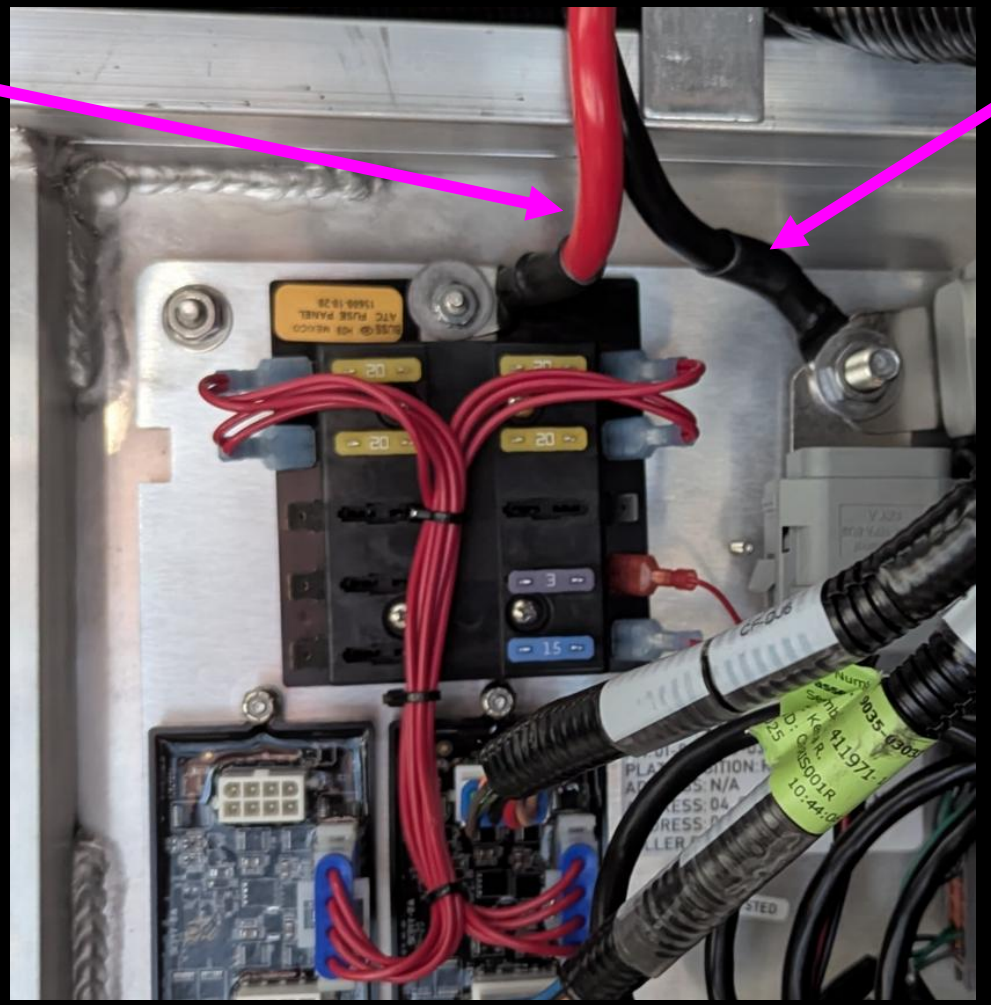
*Distributor installation required

Drivers (left) Rear Panel System POWER

+Power, from front left panel

-Ground, from front left panel

(Loom repositioned to show detail)



Fuse Box

FUSE#	Fuse Rating	Description
1	20	CEM16
2	20	CEM16
3	20	CEM16
4	20	CEM16
5	-	Spare-01
6	-	Spare-02
7	-	Spare-03
8	3	Keypad
9	15	Towmate*
10	15	CTA

Miller Industries

WHELEN

Pylon Wiring

The Pylon Harnessing is divided into 2 separate branches entering the pylon from both the left and right toolboxes

The right front toolbox powers the lightbar in addition to the following signals out of an 8 pin Deutsch connector:

G	J5-3	CF--GII	1	SIDE BEACN	M6-FR-1 pylon
G	J5-4	CF--GII	2	SIDE BEACN	M6-FR-2 pylon
G	J5-5	CF--GII	3	MARKER	Pylon Marker Light (Non-flashing)
G	J5-6	CF--GII	4	BRAKE	Pylon Brake Light

The left front toolbox provides the following signals out of the 8 pin Deutsch connector:

E	J5-3	CF-EII	1	SIDE BEACN	M6-FL-1 pylon
E	J5-4	CF-EII	2	SIDE BEACN	M6-FL-2 pylon
E	J5-5	CF-EII	3	UPPER WORK	Pylon Work Light-L
E	J5-6	CF-EII	4	UPPER WORK	Pylon Work Light-R

Toolbox Side

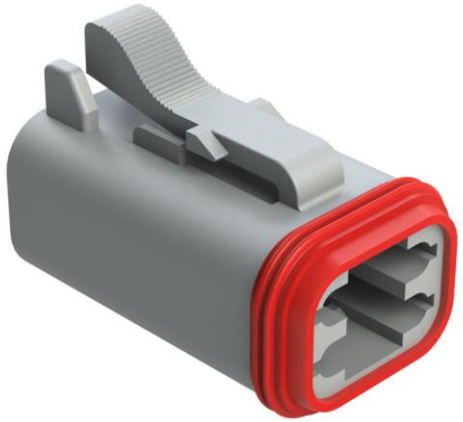
Pylon Side

*Distributor installation required

U/L Work Lights

Harness 03033839 – Front Right Panel

Connect U/L Lights connector, CF-G09 to the underlift work lights on the boom/underlift.
Each U/L work light has its own power and ground connection, no splicing is necessary.



*Distributor installation required

PTO Connector

Harness 03033837 – Front Left Panel

Connect PTO connector, CF-E09 to the PTO solenoid, if equipped, in the engine compartment .

*Distributor installation required

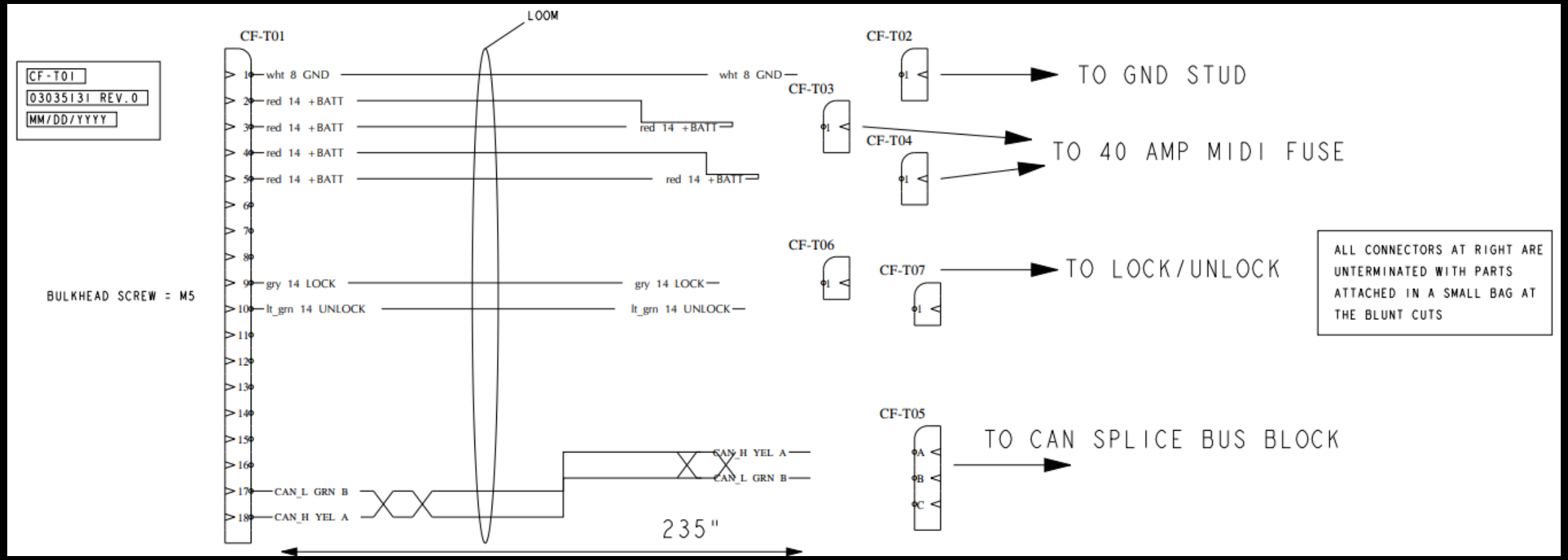
Tunnel Box Power Distribution

Handles body lighting in the tunnel box only.

- Door Handle Lights
- Compartment Lighting
- Marker lights
- Warning Lights
- Upper Work Lighting Circuits LH & RH Side
- Ground Lighting

*Distributor installation required

Tunnel Box Power Distribution



Tunnel box Harness 03035131 connects the front left panel.

- Power/GND
- CAN
- Lock/Unlock

*Distributor installation required

Miller Industries

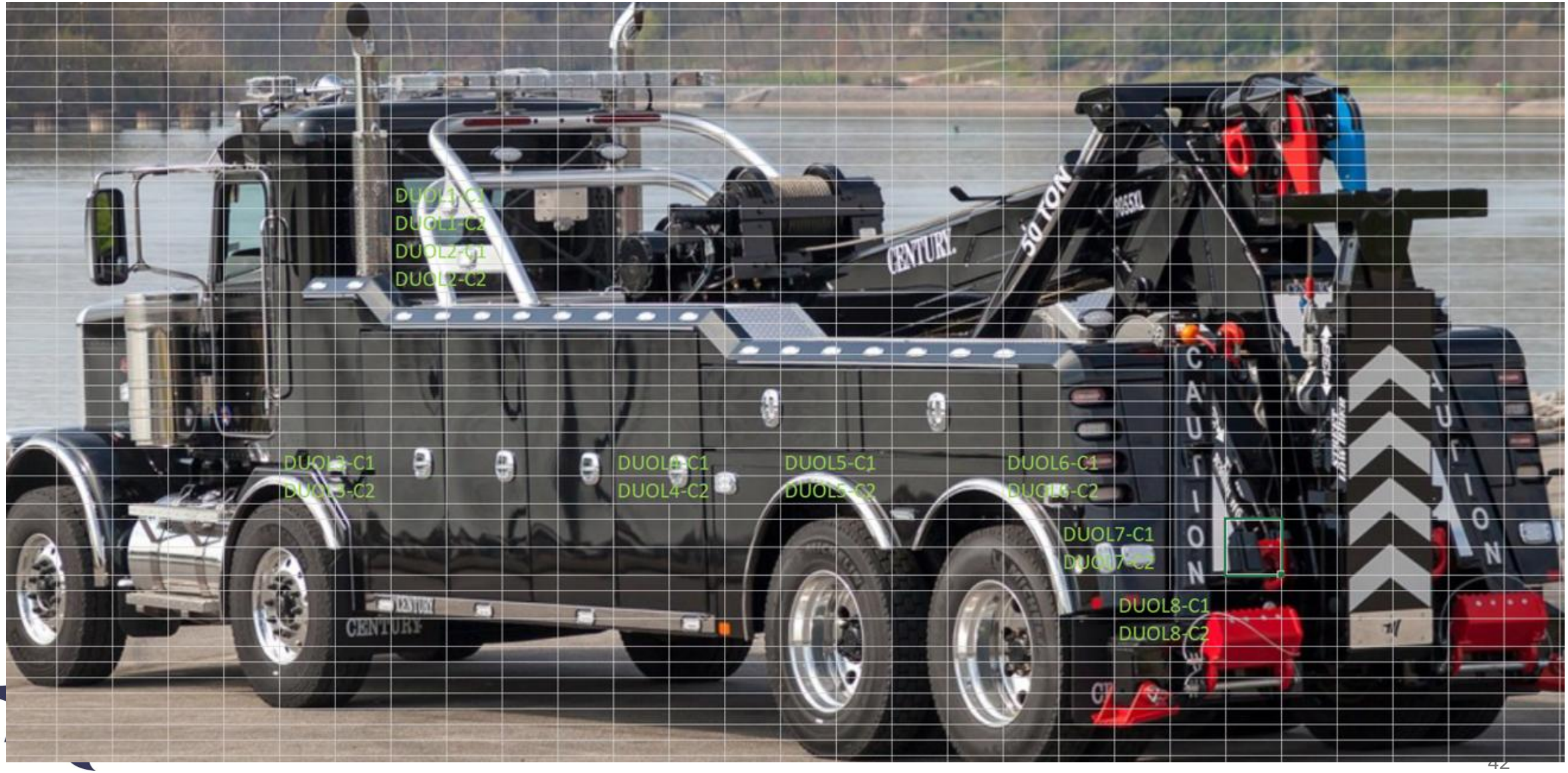
WHELEN

Adding Additional lights

Find a spare drop in accordance with the type of light desired

Adding Additional lights

Find a spare drop in accordance with the type of light desired



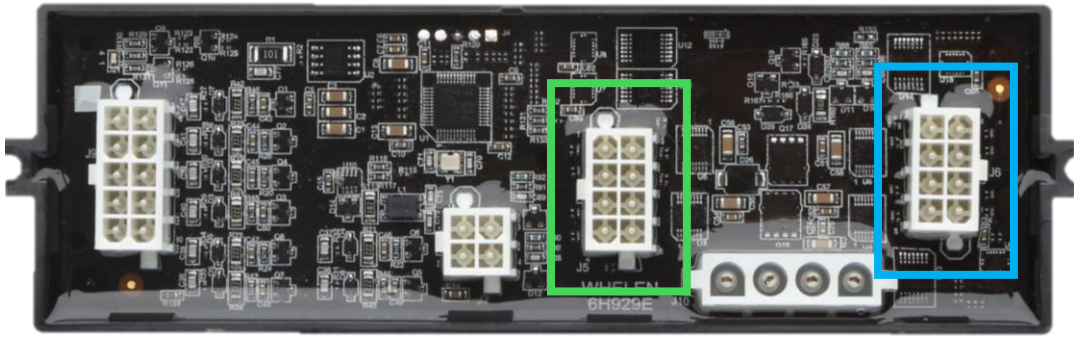
Adding Additional Lights

Find a spare drop in accordance with the type of light desired

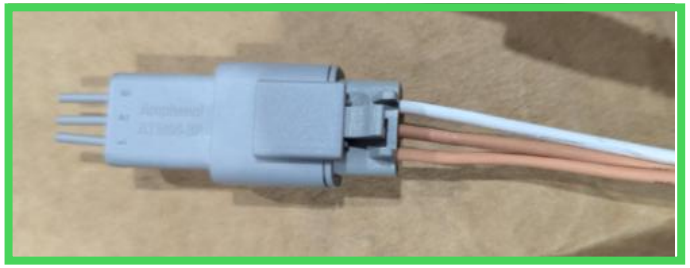
Adding Additional Lights – DUO & V

Adding additional M6 OR M6V type lights with harness 03033842, MITT-ILC 2nd CEM16 M6 DUO&V

	2nd	Harness 03033842		
CEM16	CEM1607, 8, 9, 10	HeadUnit	CONNECTOR	PIN
J5-1	DUO1F-C1	SIDE BEACN	CF-K01	1
J5-2	DUO1F-C2	SIDE BEACN	CF-K01	2
J5-3	DUO2-C1	SIDE BEACN	CF-K03	1
J5-4	DUO2-C2	SIDE BEACN	CF-K03	2
J5-5	DUO3-C1	SIDE BEACN	CF-K05	1
J5-6	DUO3-C2	SIDE BEACN	CF-K05	2
J5-7	DUO4R-C1	SIDE BEACN	CF-K07	1
J5-8	DUO4R-C2	SIDE BEACN	CF-K07	2
J6-1	M6V1F-M6	SIDE BEACN	CF-K01	1
J6-2	M6V1F-DK	DRVR DOCK	CF-K01	2
J6-3	M6V2-M6	SIDE BEACN	CF-K03	1
J6-4	M6V2-DK	DRVR DOCK	CF-K03	2
J6-5	M6V3-M6	SIDE BEACN	CF-K05	1
J6-6	M6V3-DK	DRVR DOCK	CF-K05	2
J6-7	M6V4R-M6	SIDE BEACN	CF-K07	1
J6-8	M6V4R-DK	DRVR DOCK	CF-K07	2

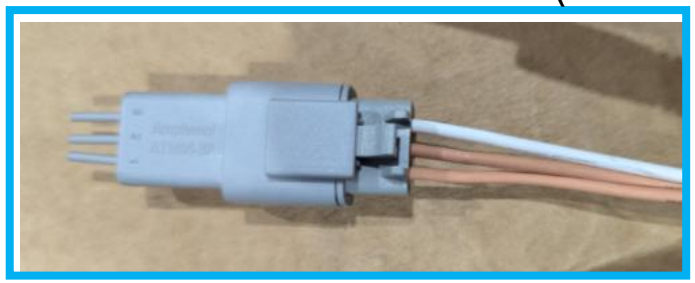


harness 03033842 (4 connections)



Programmed for M6 and M6 DUO Lighting. When plugged into J5

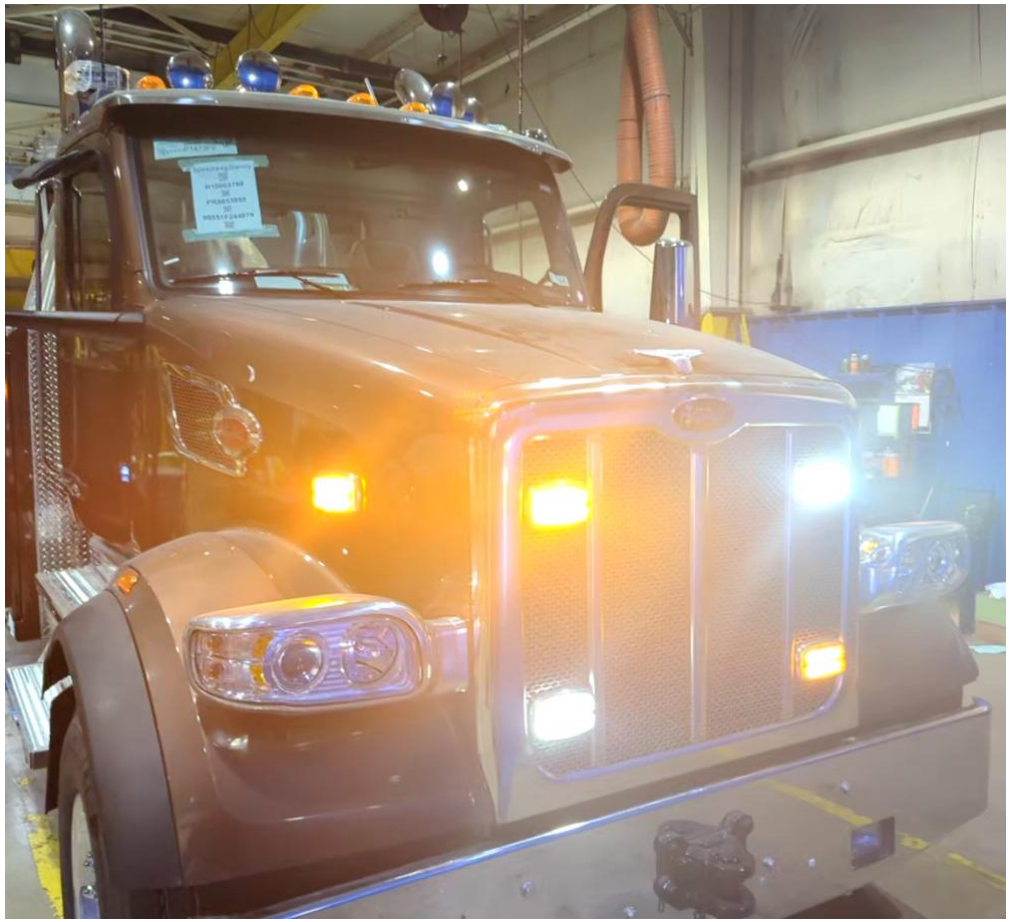
harness 03033842 (4 connections)

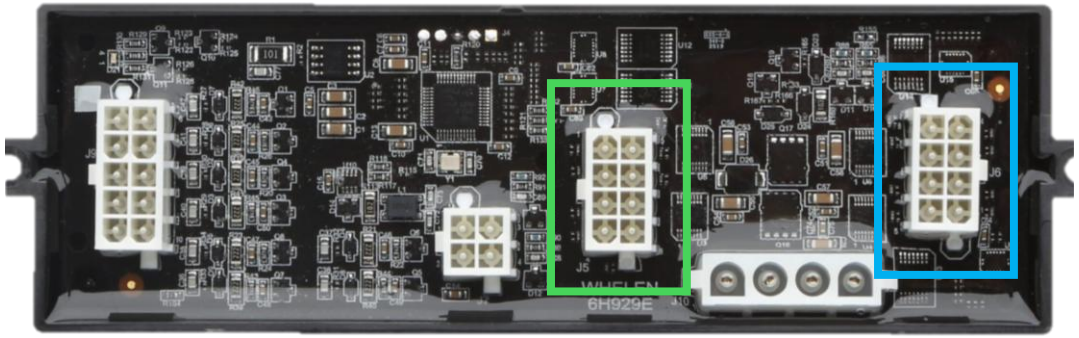


Programmed for M6V Lighting. When plugged into J6

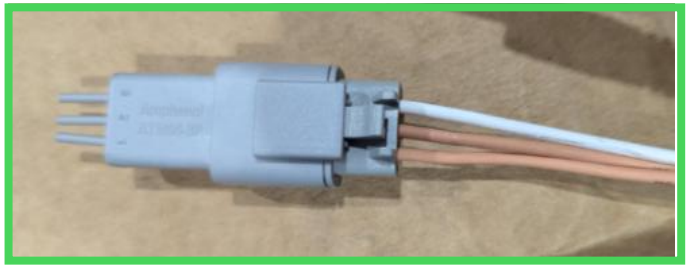
Adding Additional Lights – DUO & V

Example Of M6 Duo Lighting



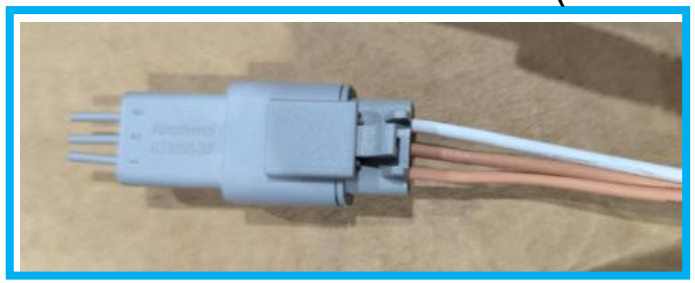


harness 03033842 (4 connections)



Programmed for M6 and M6 DUO Lighting. When plugged into J5

harness 03033842 (4 connections)



Programmed for M6V Lighting. When plugged into J6

Lightbar – WECANX (03031609)

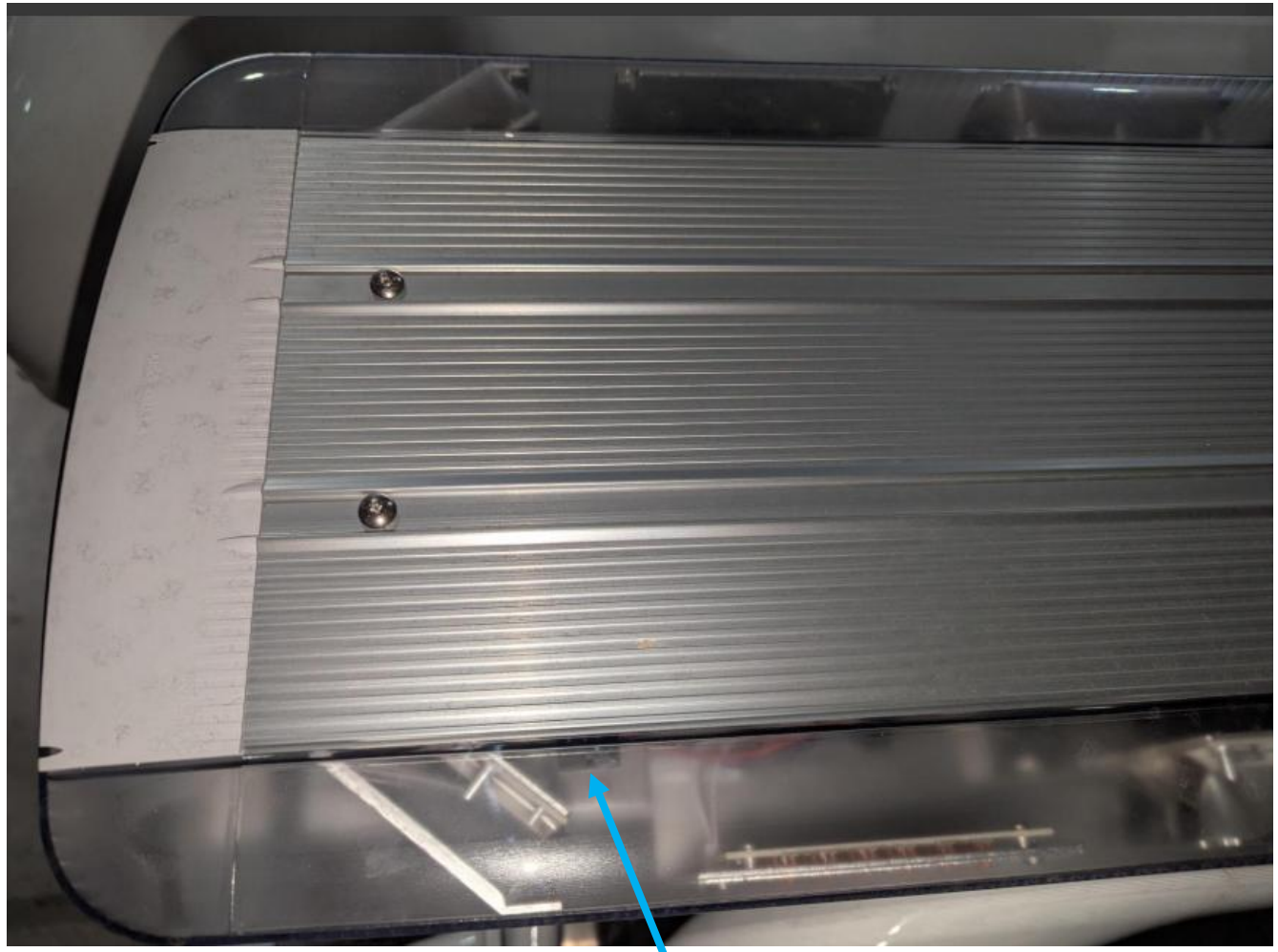
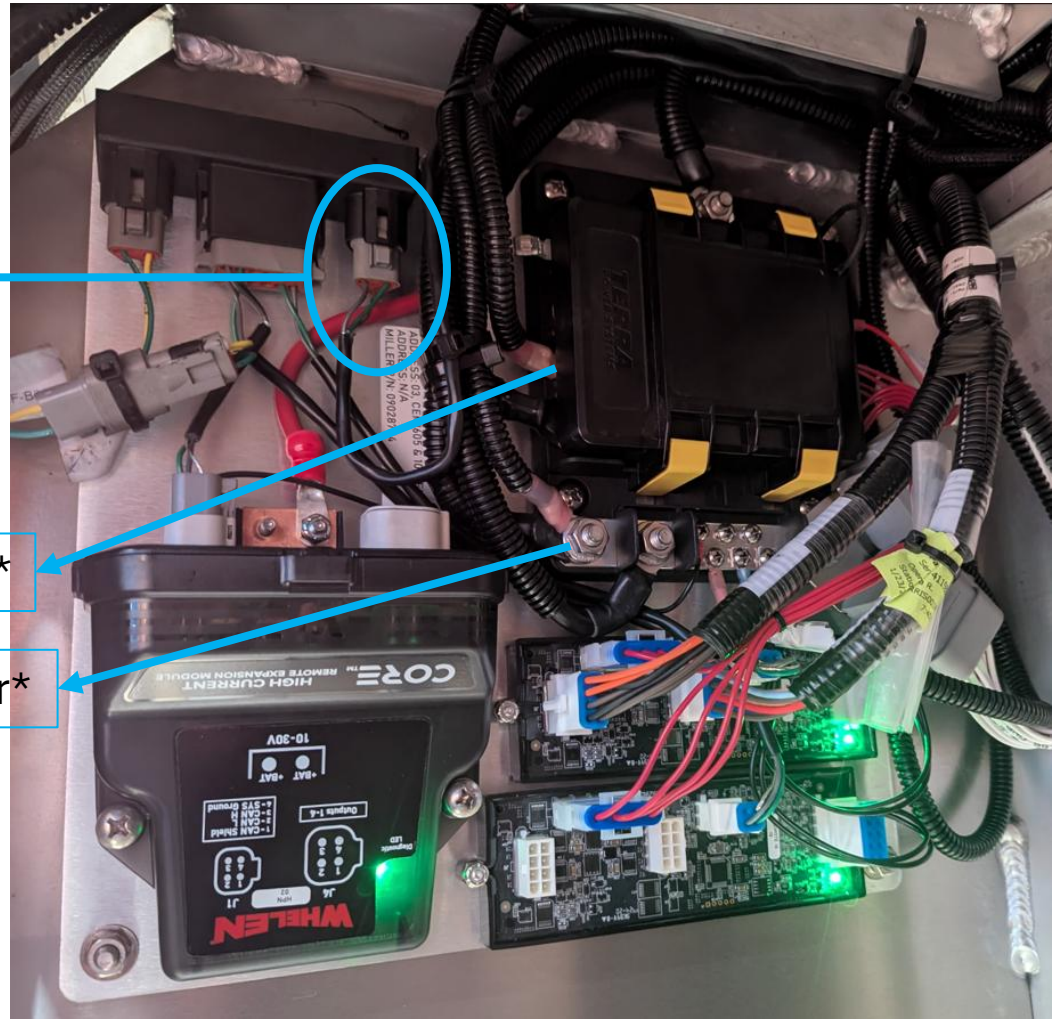


photo cell

*Distributor installation required

Lightbar – WECANX (03031609)

Right front Panel



Lightbar WECANX (MLR472X)*
CONNECTOR :DT06-3S-C015
(included in kit **03034852)**
CAN-H = GREEN, PIN- A
CAN-L=GREY, PIN- B

+ Power cable to the lightbar*

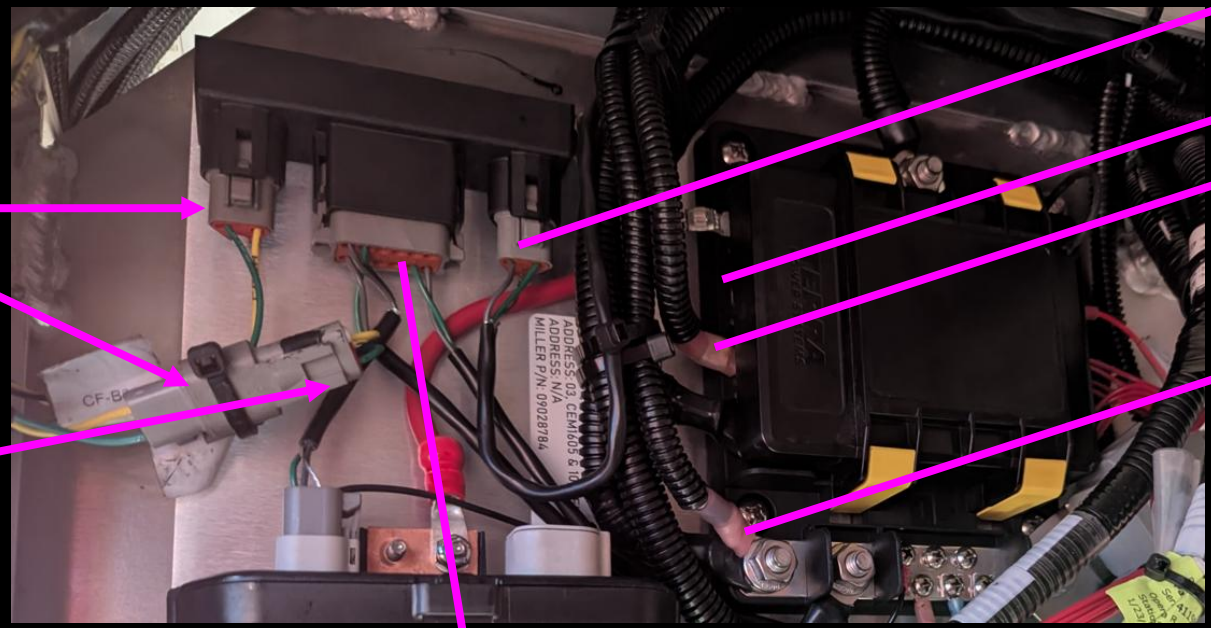
- Ground cable to the lightbar*

Molex 19164-0083 Perma-Seal Ring Terminal,
8 Ga., 5/16" Stud, Heat Shrink Insulated**

*Distributor installation required
**not included in kit

Connecting one or more lightbars

- The system is designed to work with WECANX lightbars for simplicity
- Power supplied by the panel mounted fuse block
- WECANX supplied by the panel mounted CAN splice block



WECANX to hood/Cab

WECANX to Right rear

Lightbar WECANX

+Lightbar1 Power

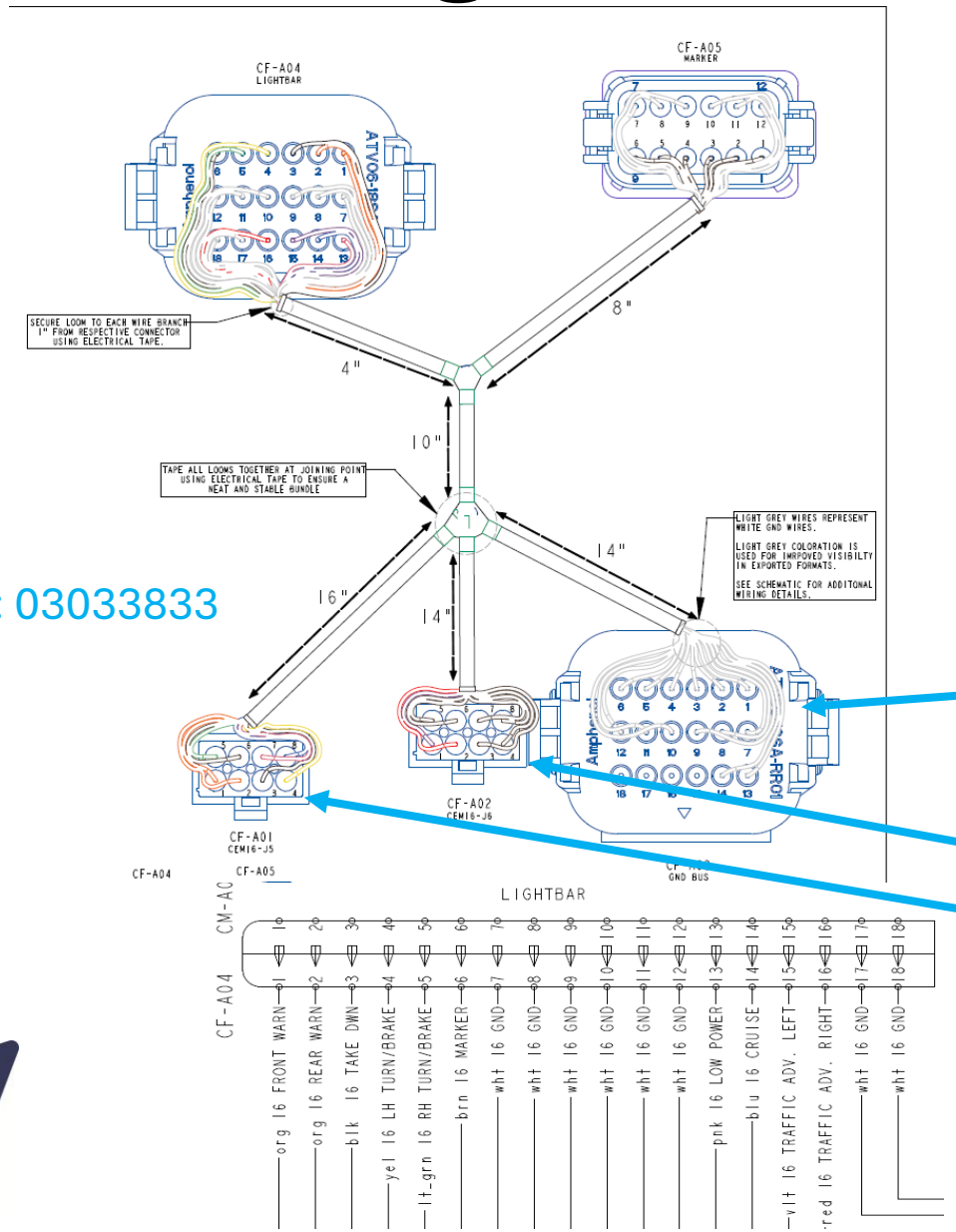
+Lightbar2 Power

-Lightbar GND

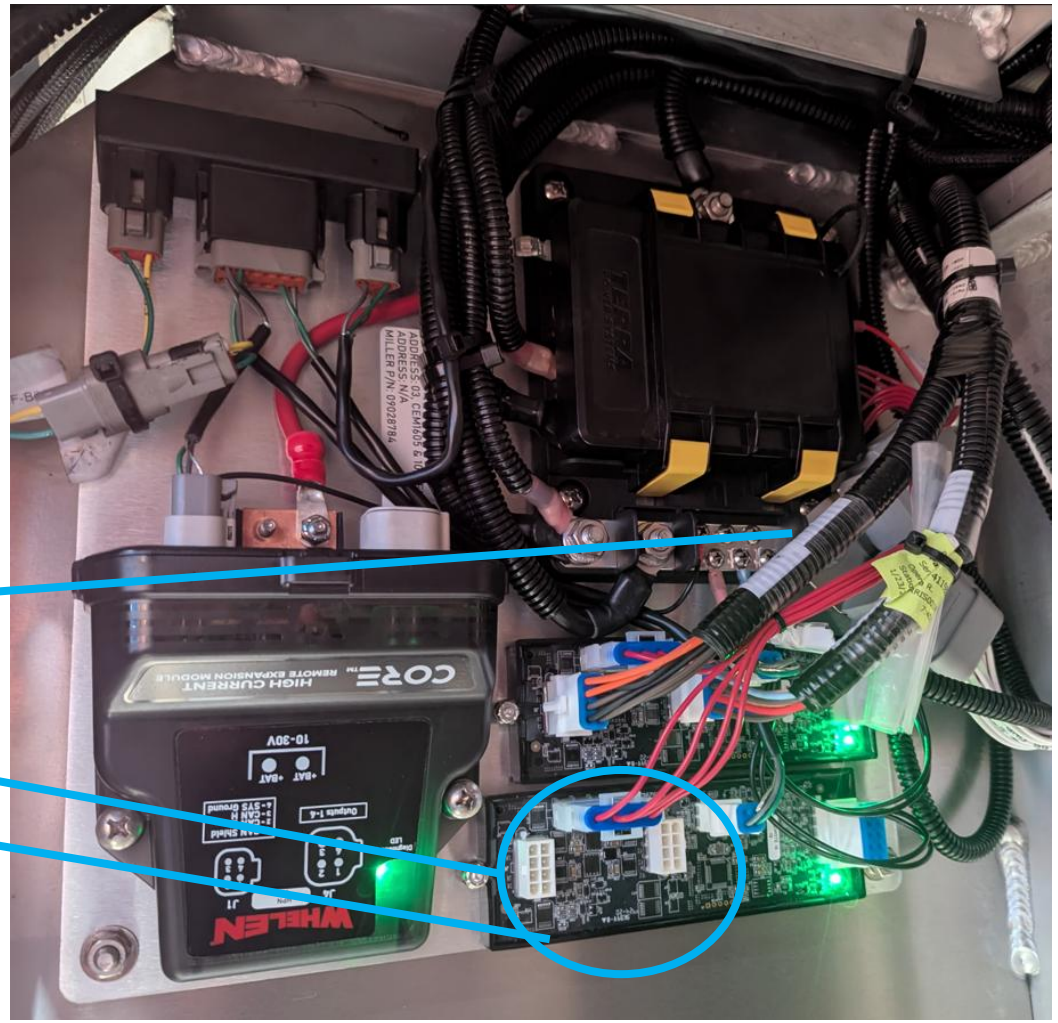
Additional WECANX connections possible
Front right panel

Lightbar – Generic HW

Harness: 03033833



Right front Panel



*Distributor installation required

Software

- The software is fully configured to enable all outputs to function as outlined in the Harnessing termination tables
- Additionally the installer/customer has the option of “hard” enabling or disabling 8 features by grounding specific CEM16 module input wires as outlined in the configuration section.

- Latest software configuration file located here: https://www.millerind.com/display-controller

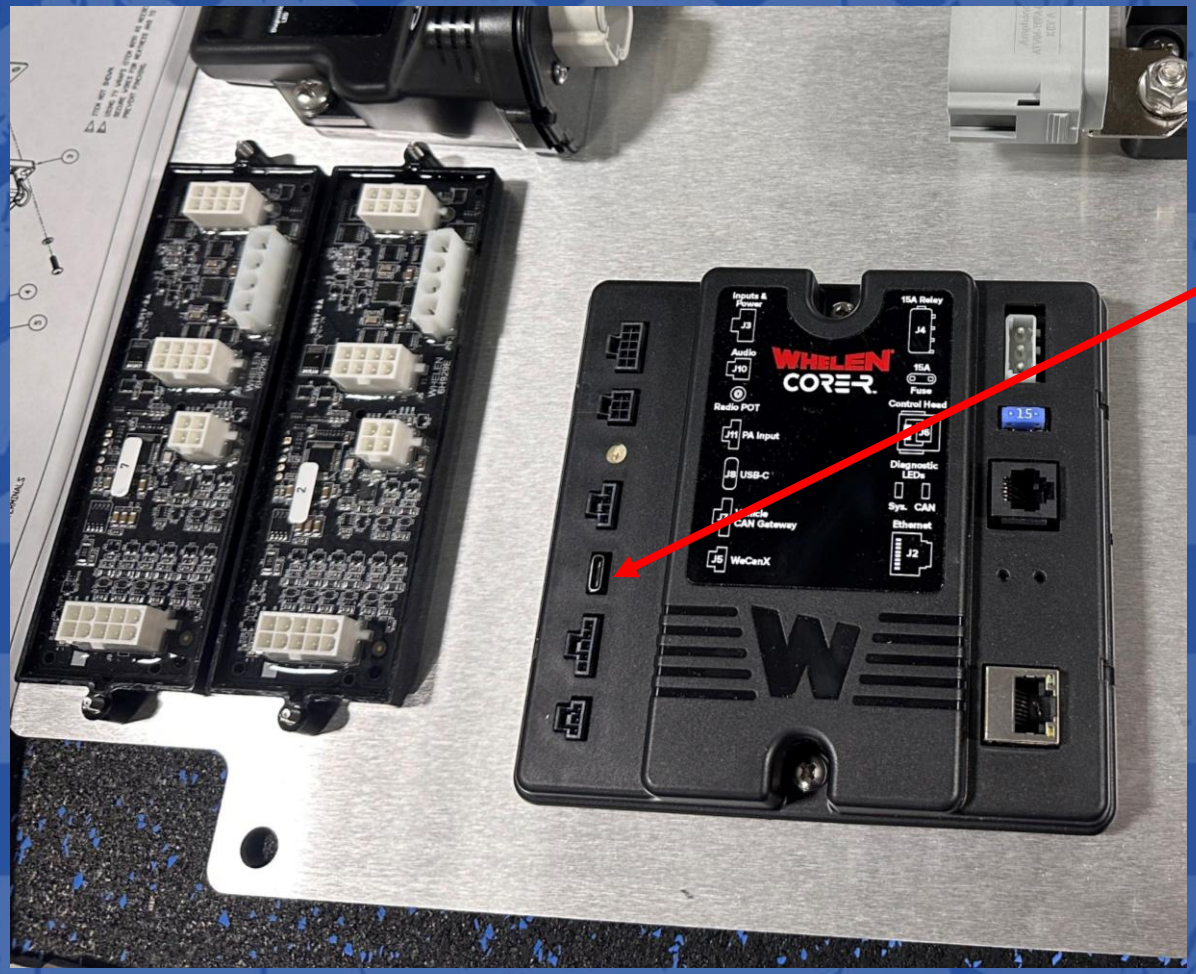
MITT-ILC WECANX 2_0

MITT-ILC GENERIC V2.pdf	Jul 24, 2025
MITT-ILC GENERIC V2.wln	Jul 24, 2025
MITT-ILC WECANX2.0 50020525.pdf	Jan 21, 2025
MITT-ILC WECANX2.0 Core-R configuration release notes.pdf	Jul 24, 2025
MITT-ILC WECANX2.0 Miller Distributed Electrical_Final_Draft .pptx	Apr 7, 2025
MITT-ILC WECANX2.0 V46.wln	Jul 24, 2025
MITT-ILC WECANX2.0.pptx	Apr 25, 2025

Software

The software is defined as the .wln file type and is sent to the machine by the Whelen Command application available as a free download here: https://www.whelen.com/whelen-command

Working with Command



To connect to the truck's electrical system, you must connect to the Core-R unit with a USB-C cable.

Important note about USB cables. Make sure you are using a good quality USB-C to USB-A cable. Some cables are charge only and will not work to transfer configuration files. Also, USB-C to USB-C does not work on all computers.

Example USB-A to USB-C cable:
Eaton/Tripp Lite U038-006-GY-MAX

Whelen Engineering Company, Inc.
Whelen Industries

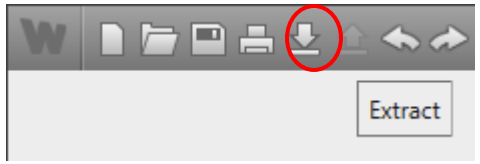
Software

Connecting a PC to the Core-R module:

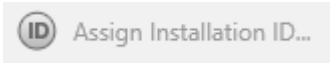
1. Interface to the Core-R to PC via USB-C cable.
    1. *Example USB-A to USB-C cable:*
       Eaton/Tripp Lite U038-006-GY-MAX
2. Open Whelen Command application.
3. Update firmware if available.

Extracting the .wln config file from Core-R module:

1. Open the Whelen Command Application.
2. Click the extract arrow to download the program.
3. The program is now extracted.



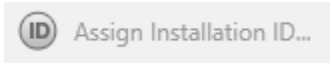
Software

Assign address IDs : 

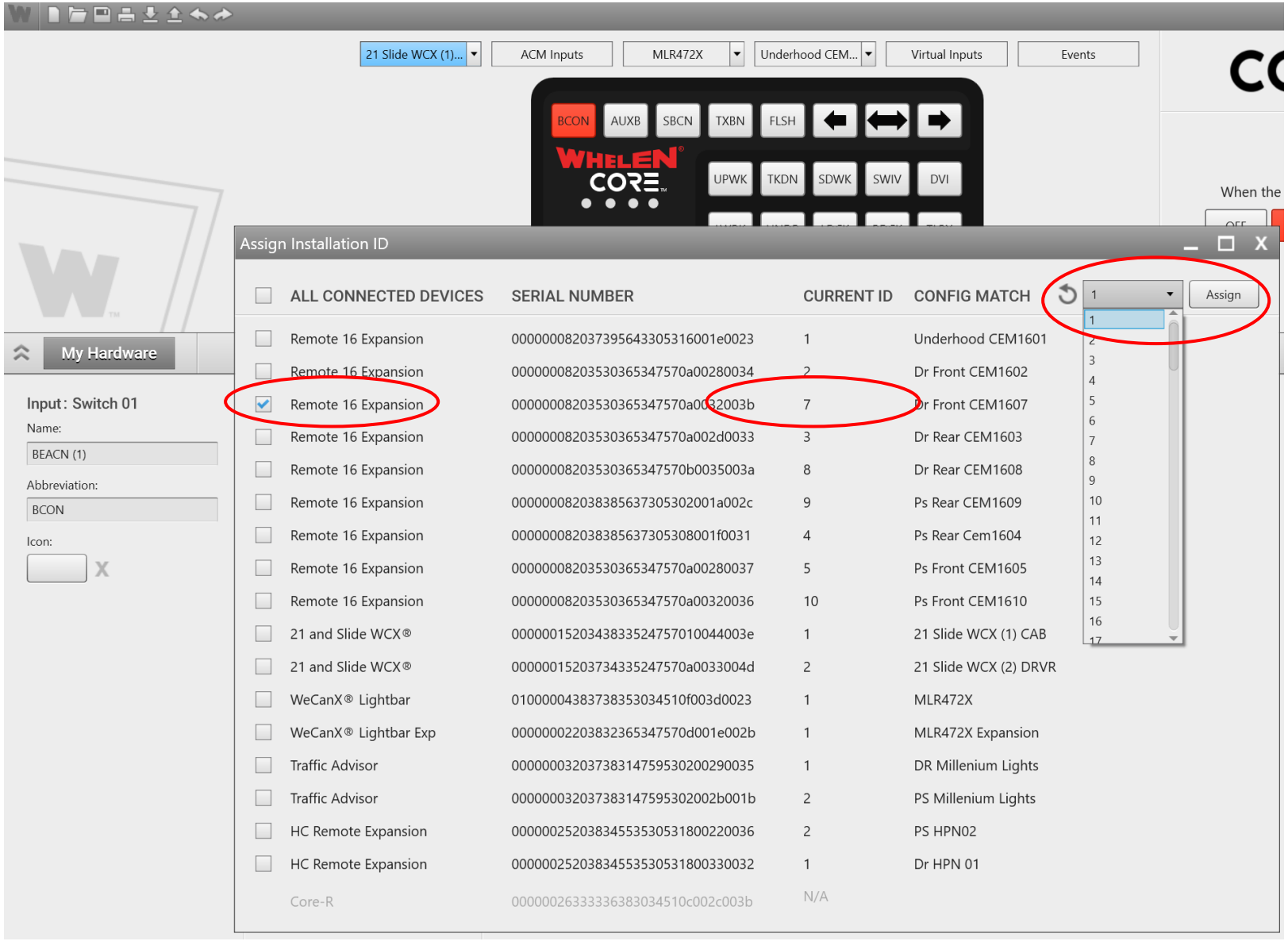
- Every module has a series specific unique numerical ID.
  - For example the keypad (noted as 21 and slide WCX) has a CAB location ID#1; left toolbox ID#2 and right toolbox ID#3 while a Remote 16 expansion (CEM16 module) is ID 1-10; so on and so forth.
- Having a duplicate # in the same module series will cause unpredictable behavior for both of those modules, such as one works while the other does not and vice versa.
- Also if a module has no ID it can cause issues as well.

Software

Assign address IDs :



Lightbars only need
To be addressed if
There are more than 1

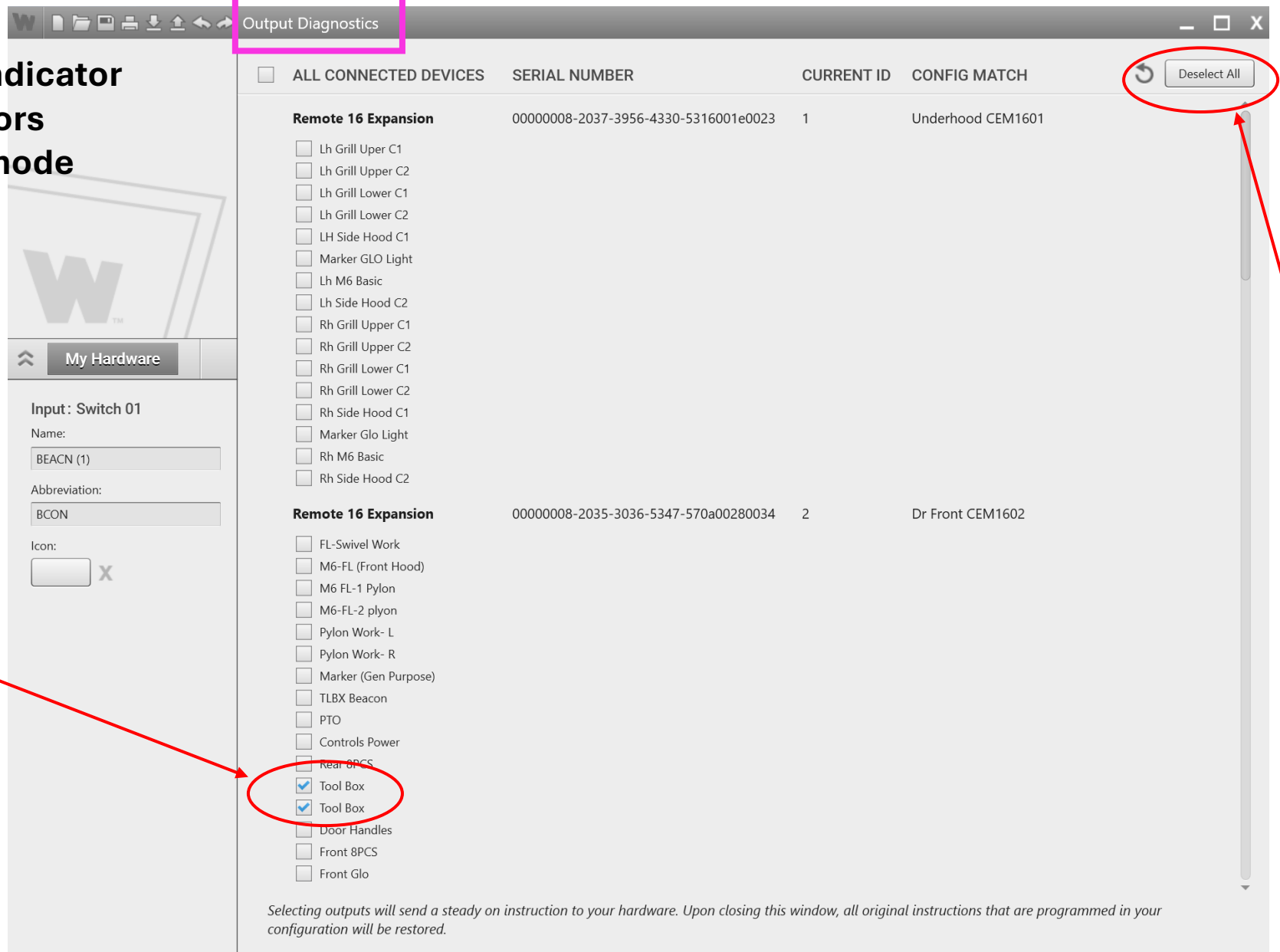


Software

Output Diagnostics

CEM16 & headunit indicator lights flashes all colors when in diagnostic mode

Selected outputs turn on instantly.



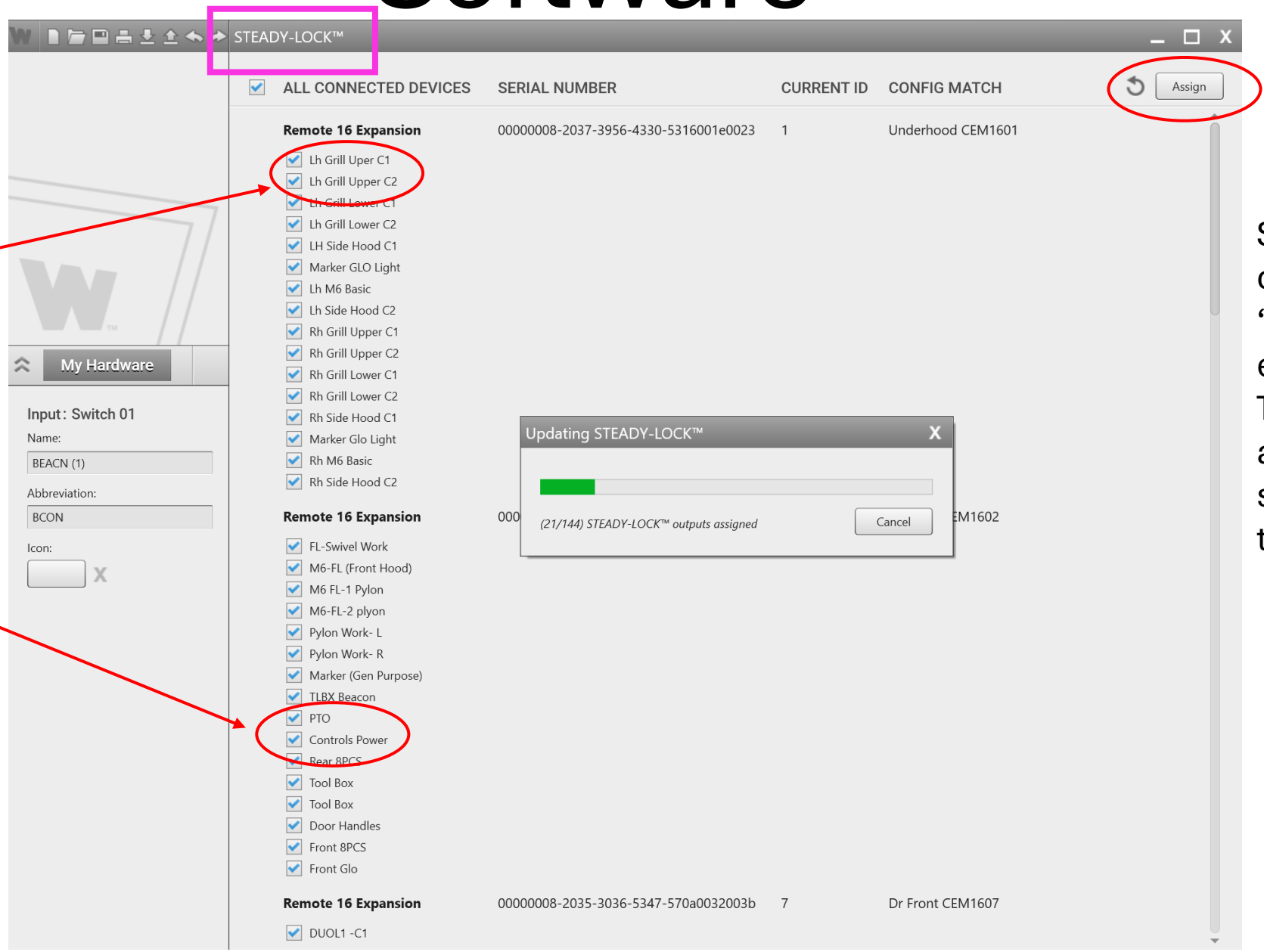
Note: Once diagnostics are complete deselect all and close the window

Software

Steady Lock (for M6 lights)

Selected outputs turn on for a few seconds then off cycling through each Selection once.

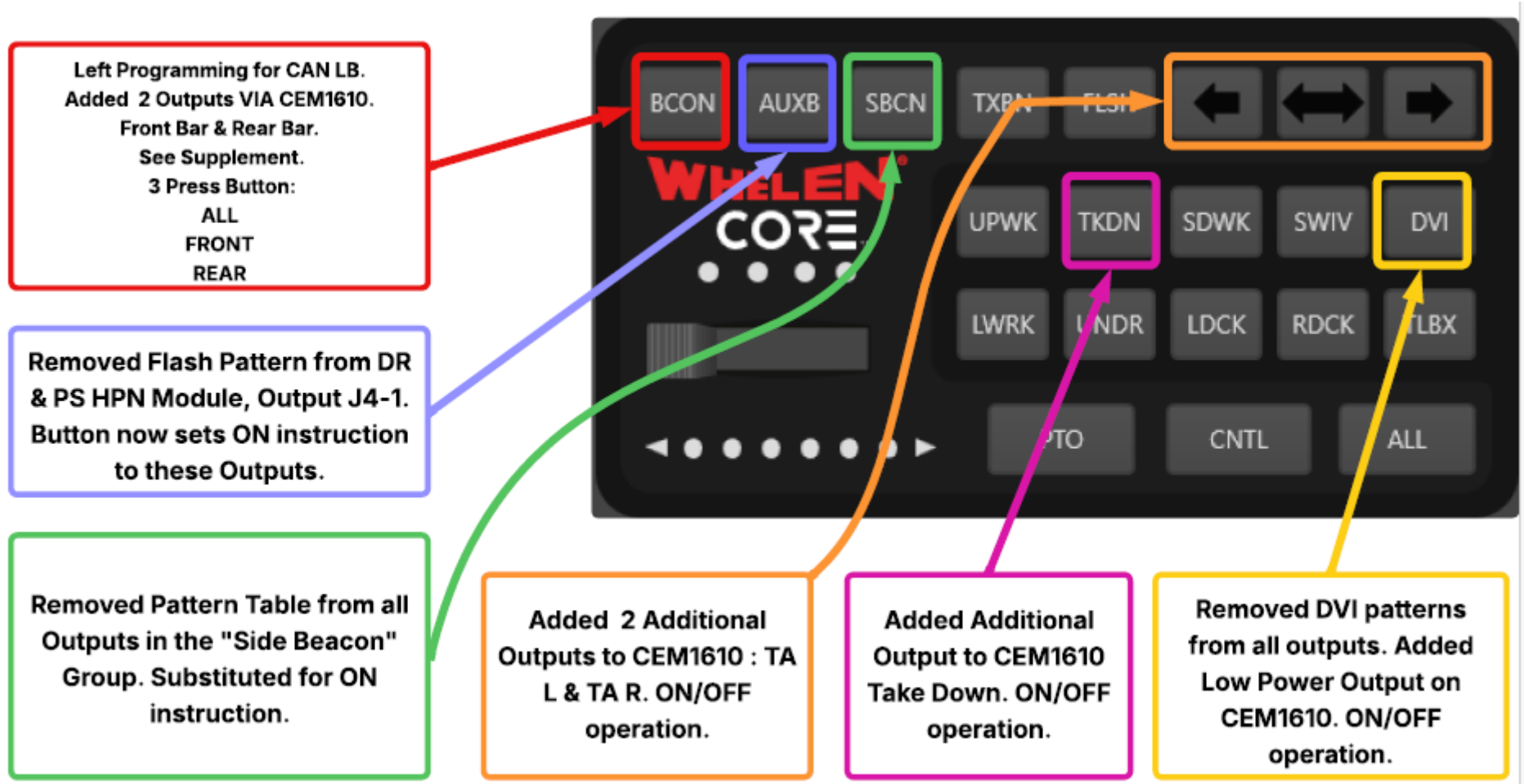
Be sure to deselect PTO and Controls Pwr. before assigning Steady Lock.



Steady lock configures the “Steady Lock” enabled light
To “steady burn” allowing the system to flash the light directly.

Software Configuration – Generic

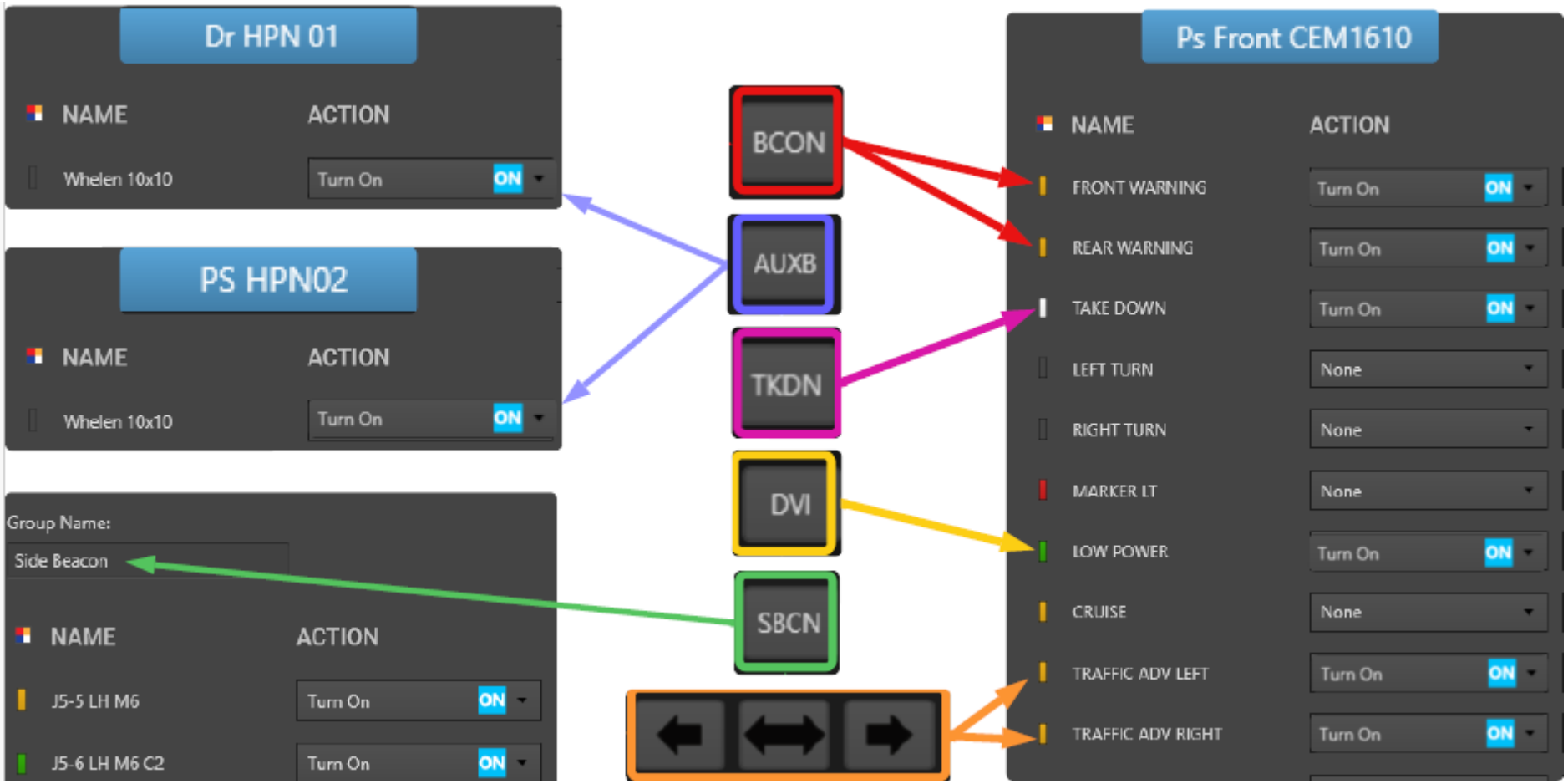
File: MITT-ILC GENERIC V2.wln*



*File version subject to change

Software Configuration – Generic

File: MITT-ILC GENERIC V2.wln*



*File version subject to change

Configuration
GND ENABLE SUMMARY

Lightbar Cruise Enable – Pin J9-1 CEM1602. Enables a feature where the corner modules of the lightbars are illuminated in low intensity when the truck's Marker Light Input (j3-5) is ON. Since this is not legal in all 50 States, this is simply an option and not a standard feature.

Manual Transmission Enable – Pin J9-2 CEM1602. Disables PTO engagement from anywhere BUT the cab mounted keypad. PTO can still be dis-engaged Anywhere.

Cab Keypad Backlight Dim – Pin J9-3 CEM1602. Dims the keypad backlighting to the lowest setting on JUST the cab mounted keypad.

Courtesy Light Enable (Walk Away Lights) - Pin J9-4 CEM1602. Enables a feature that turns on door handle lights and ground lights (if equipped) when the ignition switch is turned off to help operators see the ground when they exit the vehicle.

Rear Work Light Enable – Pin J9-2 CEM1607. When truck is placed in reverse gear, lower work lights and rear swivel lights will turn on to supplement reverse lighting.

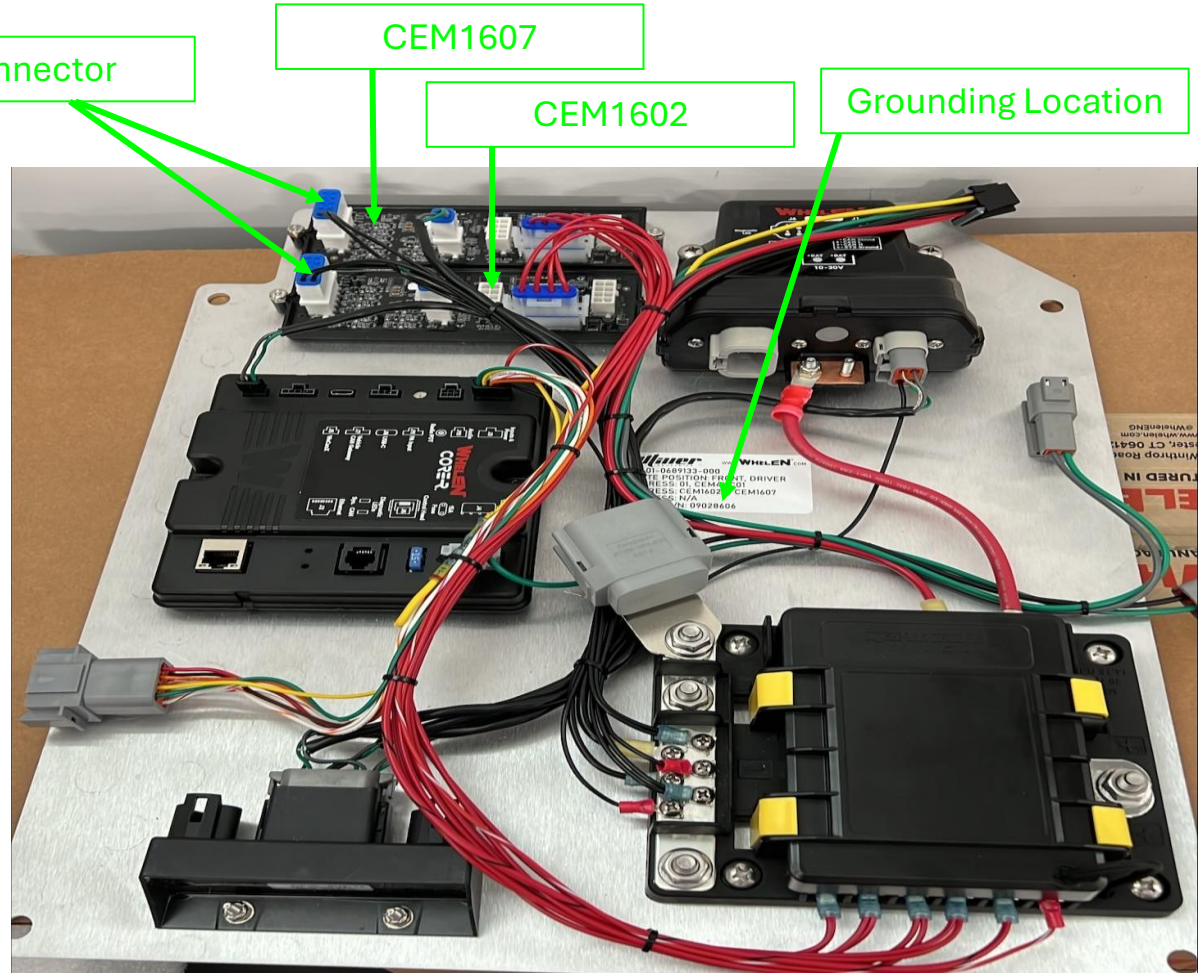
Millennium Lights Disable – Pin J9-3 CEM1607. Disables Millennium lights from flashing to keep vehicle in compliance with states that do not allow for such.

Automatic DVI enable at Night – Pin J9-4 CEM1607. In this mode, if the lightbar photocell sees night for more than 4 seconds, it will automatically turn on the DVI button. Then, anytime a flashing light is turned on (Beacon, Side Beacon, Aux Beacon etc) it will be automatically in night mode (DVI patterns).

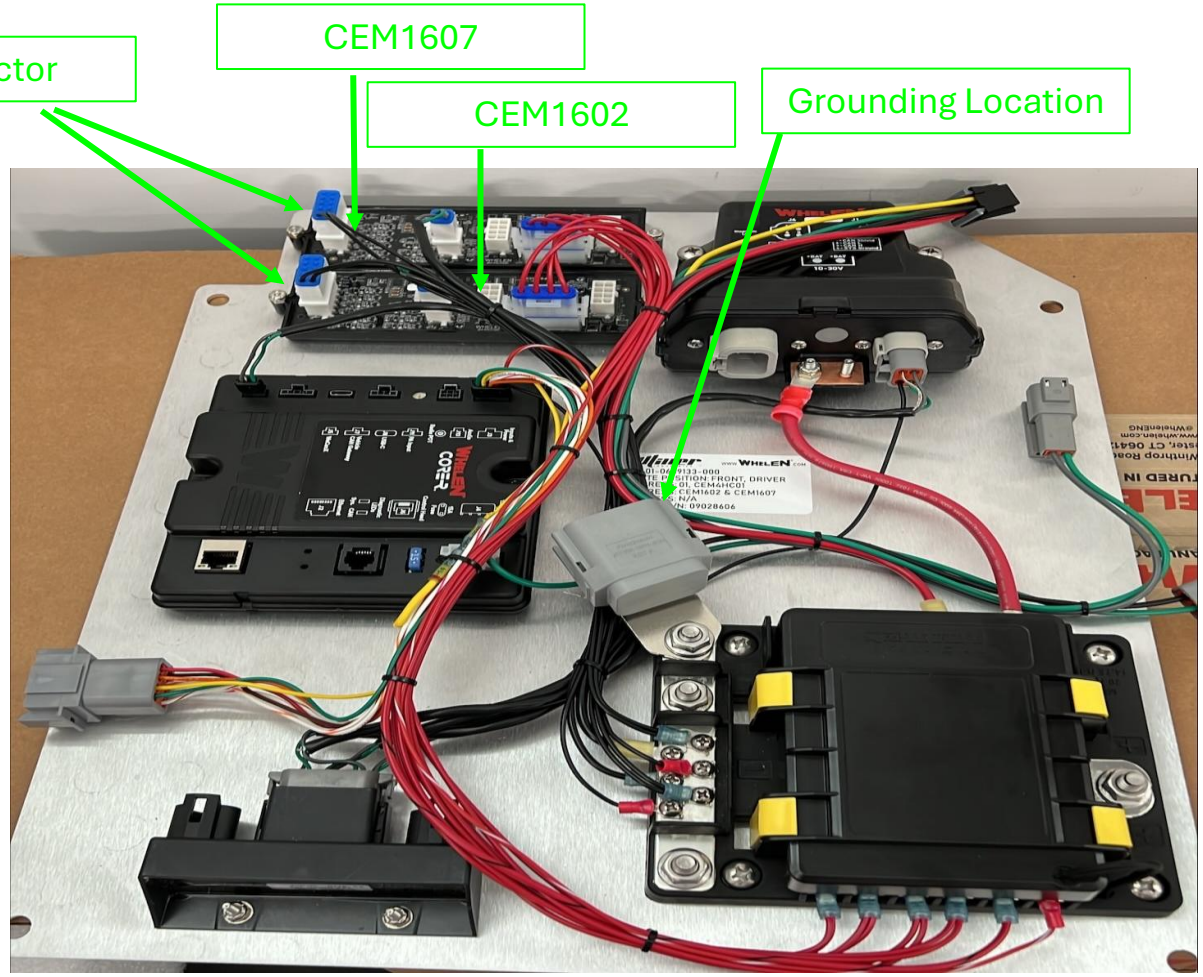
Configuration

The following slides show a couple options that can be accessed through ground activation of specific inputs on the various .wln configuration files.

By permanently grounding inputs on CEM1602 & 1607 (J9 connector) there are a host of program modifications available. None of these require modifying the configuration file.



Configuration



J9 Connector and terminals Part#s

CIRCUIT ID	QTY.	MILLER PART #	MANUFACTURER	MANUFACTURER PART #	PRIMARY DESCRIPTION
J9 GND	1	03028515	TE	794781-1	CONN MINI UMNL 10F
J9 GND	1	03034335	TE	1-794772-0	SEAL, INTERFACE 10 POS
J9 GND	1	03034336	TE	1-1586359-0	SEAL, GANG 10 POS
J9 GND	2	03034155	TE	794407-1	MINI UNML SCKT 20-16 AWG SN
J9 GND	8	03034334	TE	174670-1	SPLG SEALING PLUG

Manual Transmission Mode

Manual Transmission Mode:

Restricts PTO engagement to ***ONLY*** the cab mounted keypad. Dis-engagement is allowed from any keypad location.

This is a mode accessible by grounding pin #2 on the J9 (input connector) of the CEM1602 Module. This is the remote expansion module closest to the center of the main plate.

Recommended grounding for this is to strip and crimp a female Deutsch terminal into the wire and insert into the 18 cavity ground buss attached to the fuse box.

Applying **permanent ground** to this pin will place the program into Manual Transmission Mode.

Allliner INDUSTRIES

WHELEN

Lightbar Cruise Enable

Cruise Light Enable:

In this mode, the corner modules of the lightbar (MLR472X) will illuminate in low intensity “Cruise” mode anytime the chassis input for “Marker Lights” is turned ON.

Since this option is not legal in all 50 states, this mode is not enabled by default. However, it can be turned on at time of build or anytime thereafter.

This is a mode accessible by grounding pin #1 on the J9 (input connector) of the CEM1602 module. This is the remote expansion module closest to the center of the main plate. Applying **permanent ground** to this pin will place the program into Cruise Enable Mode.

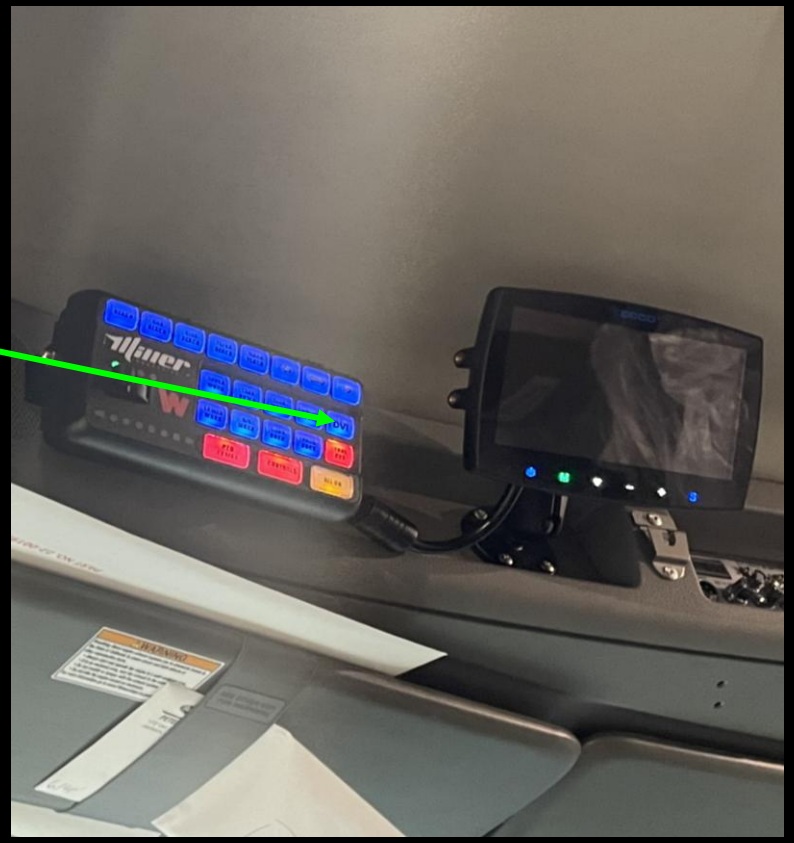
Cab Keypad Backlighting Dim

Cab Keypad DIM:

In this mode, the CAB mounted, overhead 21 Button Keypad backlighting will be dimmed to the LOWEST (2.5%) intensity. Some operators feel the blue is too harsh on the eyes at night. This is a quick fix option to addressing that concern. All other keypads will remain at the factory default setting.

A temporary (resets with ignition cycle) is to **Press and hold** the DVI button (2 seconds) you will see the backlighting diminish.

A permanent solution is done by grounding pin #3 on the J9 (input connector) of the CEM1602 Module. This is the remote expansion module closest to the center of the main plate. Applying **permanent ground** to this pin will place the program into Permanent Keypad DIM.



Allner INDUSTRIES

WHELEN

Courtesy Light Enable

Courtesy Light Enable:

This is a creature comfort setting. In this mode, anytime the ignition switch is moved from “RUN-> OFF” the ground lighting circuit (if equipped) will turn on for 30 seconds.

This will provide area lighting around the cab of the truck to keep drivers safe when exiting the vehicle. After 30 seconds, the lamps will extinguish, and the system will sleep after 1 hour.

This mode is accessed by grounding pin #4 on the J9 (input connector) of the CEM1602 module. This is the remote expansion module closest to the center of the main plate. Applying **permanent ground** to this pin will enable this feature.

Rear Work w/ Reverse Enable

Supplemental Reverse Lighting:

In this mode, anytime vehicle is placed into reverse, the following circuits will energize:

CEM1603 & CEM1604:

J6-3 Lower Work

J6-4 Swivel Work

This will provide additional area lighting off the rear of the truck to keep drivers safe when traveling in reverse.

This mode is accessed by grounding pin #2 on the J9 (input connector) of the CEM1607 module. This is the remote expansion module ***furthest*** from the center of the main plate. Applying **permanent ground** to this pin will enable this feature.

Miller Industries

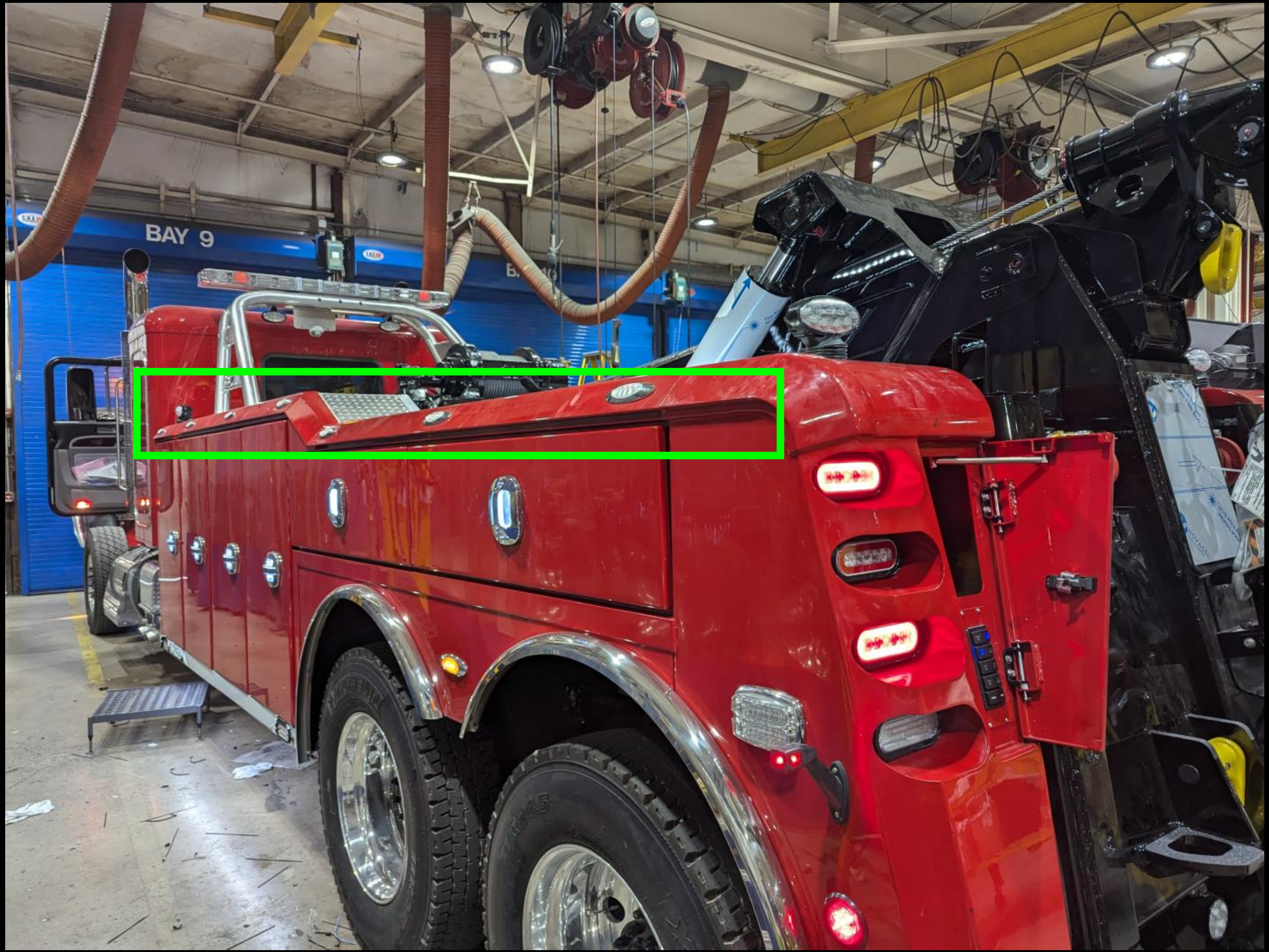
WHELEN

Millennium Lights Disable

Millennium Lights Disable:

As a standard feature of the new electrical system, Millennium lights have many flash modes, some of which act as a side mounted traffic advisor. However, this is not legal in all states and the new system has been provisioned to lock out this operation if necessary.

This mode is accessed by grounding pin #3 on the J9 (input connector) of the CEM1607 module. This is the remote expansion module *furthest* from the center of the main plate. Applying **permanent ground** to this pin will disable any flash modes associated with the Millennium lights.



Miller INDUSTRIES

WHELEN

Automatic DVI at Night/Low Light

Automatic DVI:

In this mode, if the lightbar photocell sees night for more than 4 seconds, it will automatically turn on the DVI button. Then, anytime a flashing light is turned on (Beacon, Side Beacon, Aux Beacon etc) it will be automatically in night mode (DVI patterns). Operators can override this and return to daytime flash patterns by simply turning the DVI button off. Night mode will also be cancelled if the lightbar sees daylight for more than 4 seconds, it will revert back to daytime programming, all automatically. The headunit DVI button will illuminate RED when the photosensor sees low light/darkness thus enabling this feature.

This mode is accessed by grounding PIN #4 on the J9 (input connector) of the CEM1607 module. This is the remote expansion module *furthest* from the center of the main plate. Applying **permanent ground** to this pin will enable this feature.

DVI™ patterns gradually increase and decrease warning light intensity, which better conveys visual information to approaching motorists at night.

Configuration

Chassis Variation - Drivers (left) Front Panel System Inputs

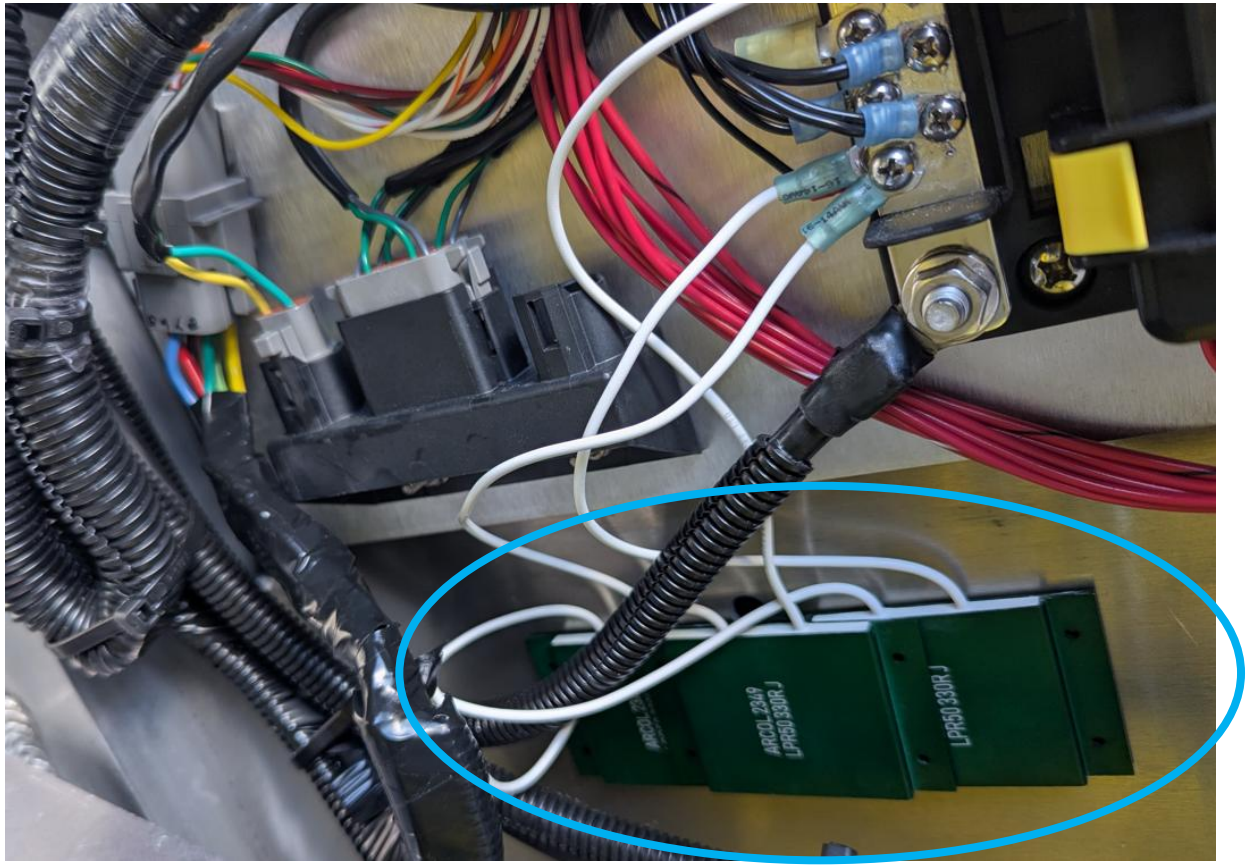
- Chassis, such as Freightliner and International, have a load detection voltage.
- This low voltage (~2.7VDC) can trigger marker/turns/brake/reverse inputs into the Core-R full on.
- Solution is to install a resistor (~330Ω) on these inputs to ground

Configuration

Chassis Variation - Drivers (left) Front Panel System Inputs

Example of 330 ohm resistors installed:

03032386, RESISTOR,330 OHM



Operation

- Same keypad and operation of the first generation Whelen system
- With additional features added

Control Head Functions

BCON- Lightbar Enable. 3 position button.

a. Press 1- Rear of Light Bar.
b. Press 2- Front of Light Bar.
c. Press 3- All Bar.

AUXB- Auxiliary Beacon Enable. (Cab Roof Warning)

SBCN- Side Beacon Enable.

a. Turns on all side firing warning lights. (Hood and Body)

TXBN- Toolbox Flashing Beacon/Flashing Warning Light.

FLSH- Flashing Marker Lights Enable.

Left Arrow- Left Traffic Director.

a. Press 1- Bar Only.
b. Press2 -Bar + Millenium Lts*.

Center Out Arrow- Center Out Traffic Director.

a. Press 1- Bar Only.
b. Press2 -Bar + Millenium Lts.*

Right Arrow- Right Traffic Director.

a. Press 1- Bar Only.
b. Press2 -Bar + Millenium Lts.*

* = New

Miller Industries

Control Head Functions

UPWK- Pylon Work Lights

TKDN- Lightbar Mounted Forward Facing Scene Lights

a. Press 1- Steady
b. Press and Hold (2 Sec. – Flashing TD's)*

SDWK- Side Firing Razor Lights

SWIV- Swivel Lights

DVI- Enable Dynamic Variable Intensity. Nighttime Specific Flash Pattern

a. Press and Hold- Temporary Dim Cab Mounted Keypad for 1 Ignition Cycle*

* = New

Allmer INDUSTRIES

WHELEN

Control Head Functions

LWRK- Lower Work Lights Enable.

UNDR- Under Lift Work Lights Enable.

LDCK- Left (Drivers Side) Dock Lights Enable.

RDCK- Right (Passenger Side) Dock Lights Enable.

TLBX-Tool Box Compartment Lighting Enable.

Control Head Functions

PTO- Engage PTO. ***PRESS AND HOLD***

CNTL- Controls Enable. Press to Enable Wireless Operation.

ALL- Turns on the following;

a. BCON – SET TO ALL ON.
b. FLSH
c. UPWK
d. TKDN
e. SDWK
f. SWIV
g. LWRK
h. UNDR
i. LDCK
j. RDCK
k. TLBX

Slide Switch – Explained

a. Pos 1: BCON,AUXB,SBCN,TBXN = ON
b. Pos 2: UPWK,TKDN,SDWK,SWIV = ON
c. Pos 3: LWRK,UNDR,LDCK,RDCL,TLBX = ON

Miller INDUSTRIES

WHELEN

Operation
Low Battery Indication

Even if core turns off a function, the user can still override this and turn the function back on with load management active.

The keypad indicates low battery by phasing the top and bottom row of lights on and off as shown in the slide video.

Low battery Indication occurs at 11.9 VDC and recovers above 11.9 VDC.

PTO and Controls PWR. are not affected until the battery/charging system reaches a critically low condition.

Miller INDUSTRIES

WHELEN

Control Head Functions

Emergency Stop Switch

Emergency STOP Active: The Core-R monitors the hydraulic controller Wireless Remote Emergency Stop Switch.

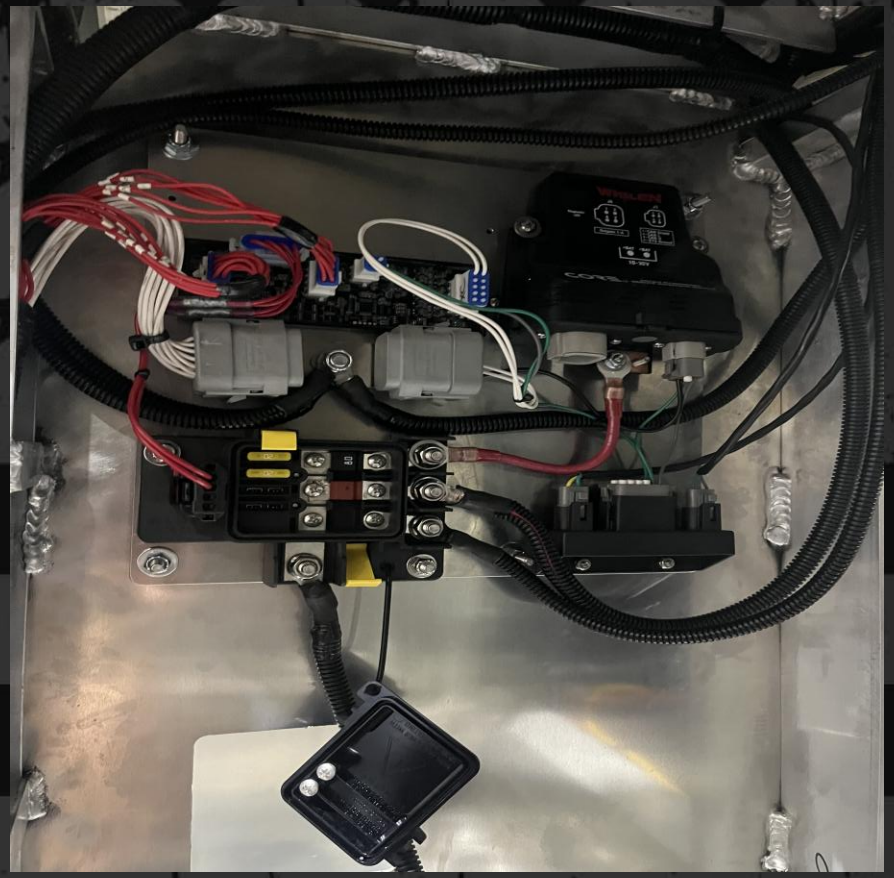
If the system detects the button is pushed, the system will *automatically* disengage the PTO on the truck. In addition, the controls will flash the PTO button and the 3 red lights above the slide switch. This will happen continuously until the E-Stop button is reset.

The PTO **WILL NOT** re-engage until the E-STOP button (on the remote control) is reset. Once the button is reset, press and hold the PTO Switch to resume work.

Miller Industries

WHELEN

Operation - Hardware Protection Features



Devices are fused according to the load. Most CEM16s are fused total @ 40A divided equally on parallel inputs fused at 20A/each.

Individual lightheads are not fused. Instead, they are current monitored by the output devices (CEM4/16) and *current limited* if faults or overloads are detected.

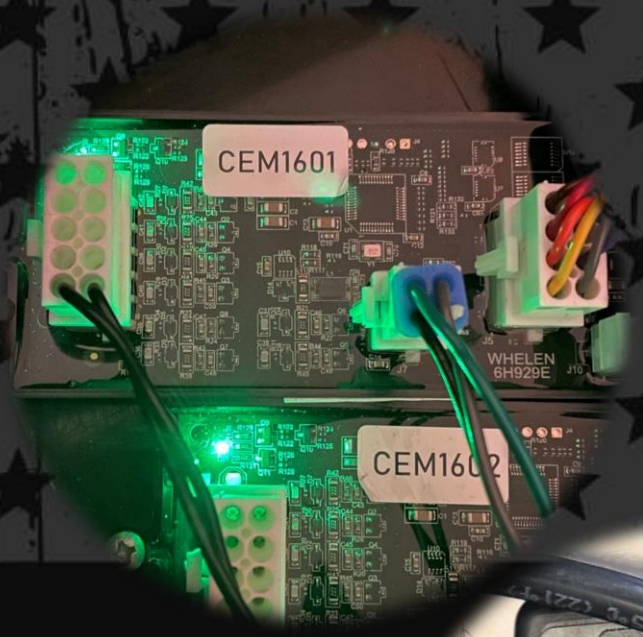
Front Plates are fed from dedicated 150A circuit breakers. Rear plates are fed from front plates with 100A fuses.

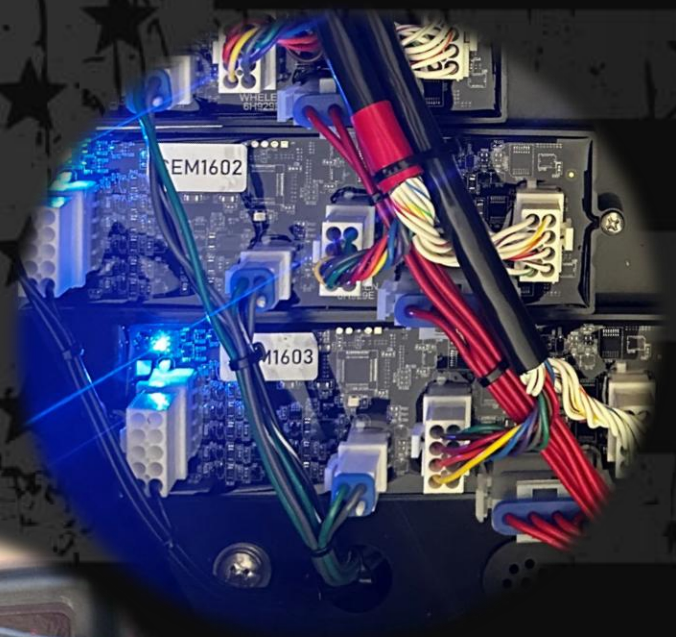
Whelen Engineering Company, Inc.

Operation- Shut down delay

- Shut down delay = 1hr. after ignition power loss.
- All functionality is active, keypad backlight is off.

Diagnostic Indicators CEM16 CEM4HC





Remote expansion modules are all equipped with diagnostic indicators.

MITT-ILC configuration files are default with these turned on.

During normal system operation, when no network errors are detected, the system will display steady green indicators on all connected hardware.

The following slides show what various other light behaviors mean.

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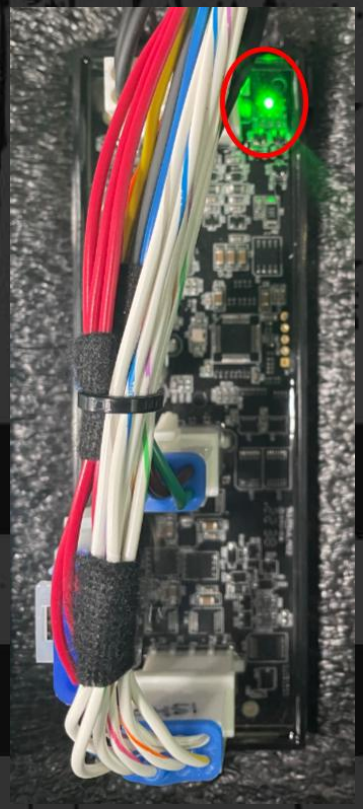
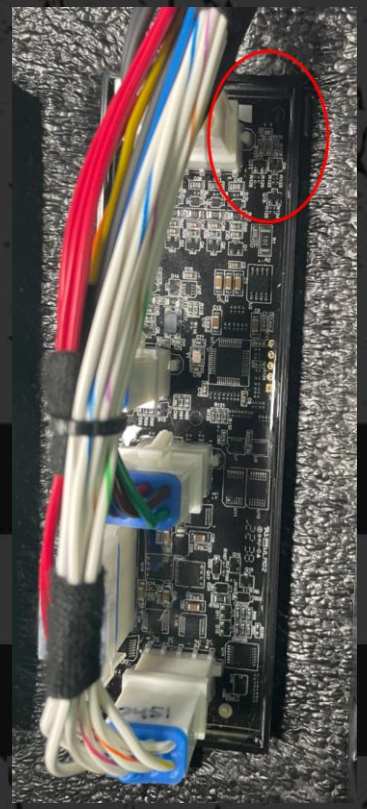
System Status Lights
Diagnostic Indicators on CEM16 / 4HC and CTA





Diagnostic Indicator Color	System Status	Detail
Green	Unit is Operational	Unit is communicating with Core-R.
Blue Flash	1HZ Flash Rate: Bootload in Process. 2.5HZ The Bootload can not detect an Application.	Firmware update being delivered from C399R. Pending firmware upgrade.
Red Flash	Fault Diagnostics are Active.	Output fault diagnostics is active. **Only should work with PC connected to core.

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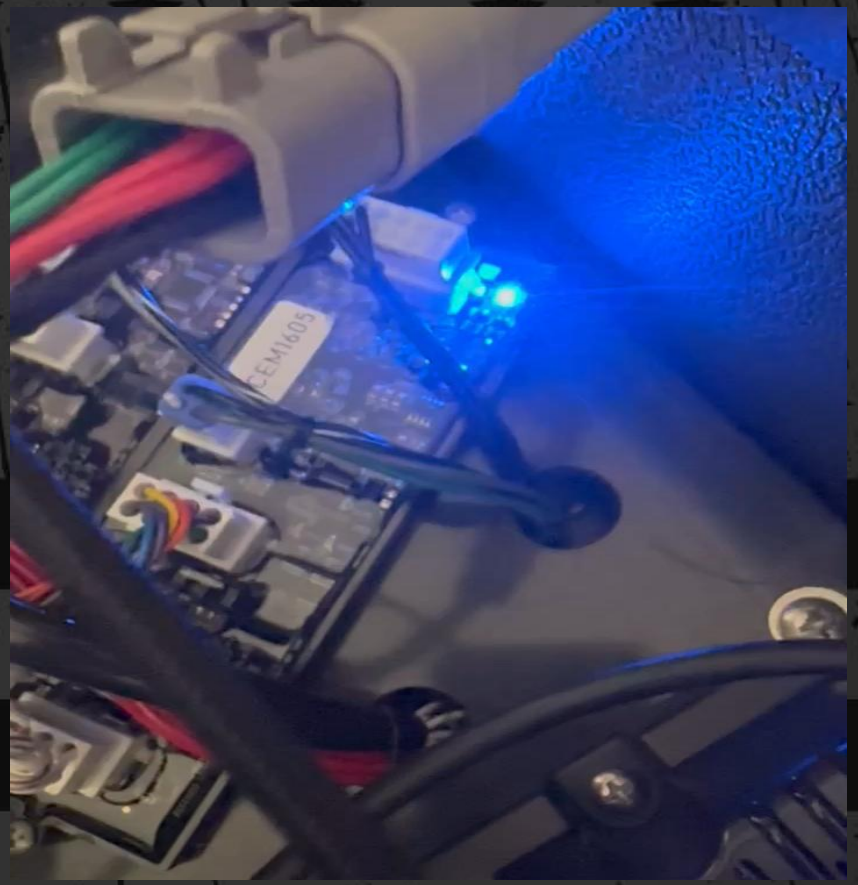
WHELEN

3. Diagnostic Indicators CEM16 CEM4HC



BLUE- Processing firmware update. Quick flash indicates that device is actively receiving firmware data. DO NOT TURN OFF POWER.

Slow flash indicates the device is waiting for firmware.

Allen INDUSTRIES

WHELEN

3. Diagnostic Indicators CEM16 CEM4HC

This is an example of what can happen if power is interrupted *during a firmware update*, the red diagnostic indicator is blinking. The device will be unresponsive to system commands.

You will need to power cycle the system and try the firmware update again.

** The blinking red LED is also indicative of Output Diagnostics being used on the network. Once the diagnostic session is closed, the LED should revert to green.

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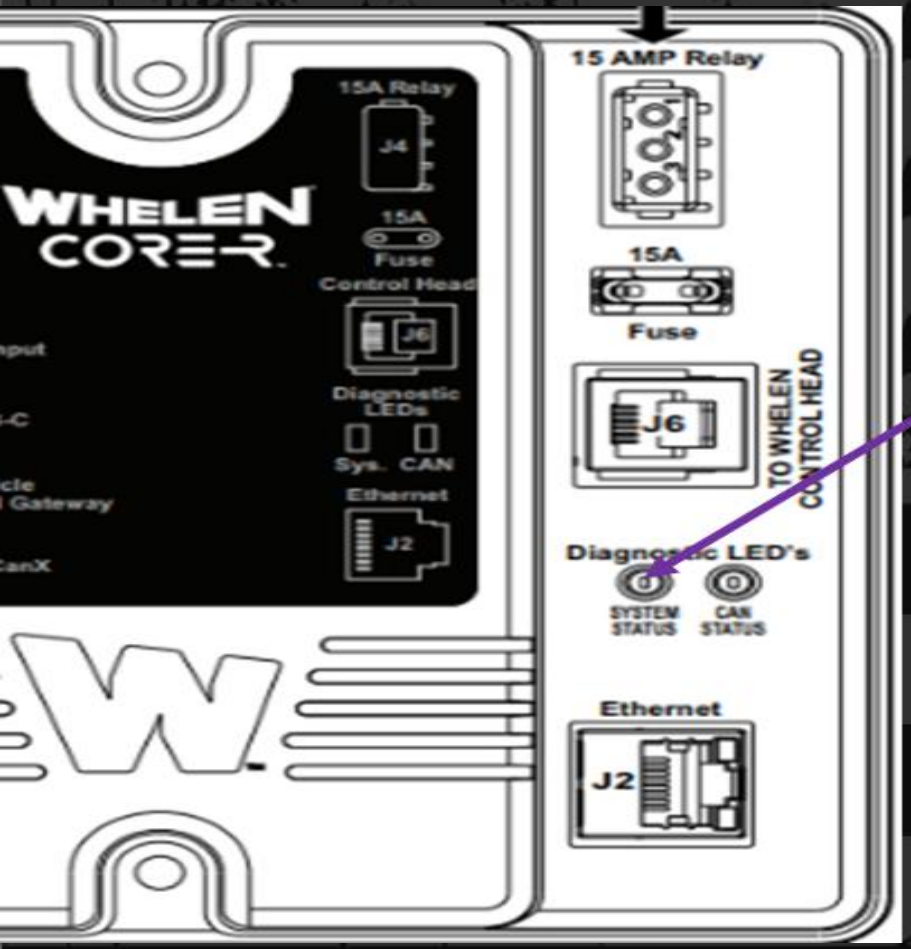
3. System Status Lights
Core- R Diagnostic Indicators

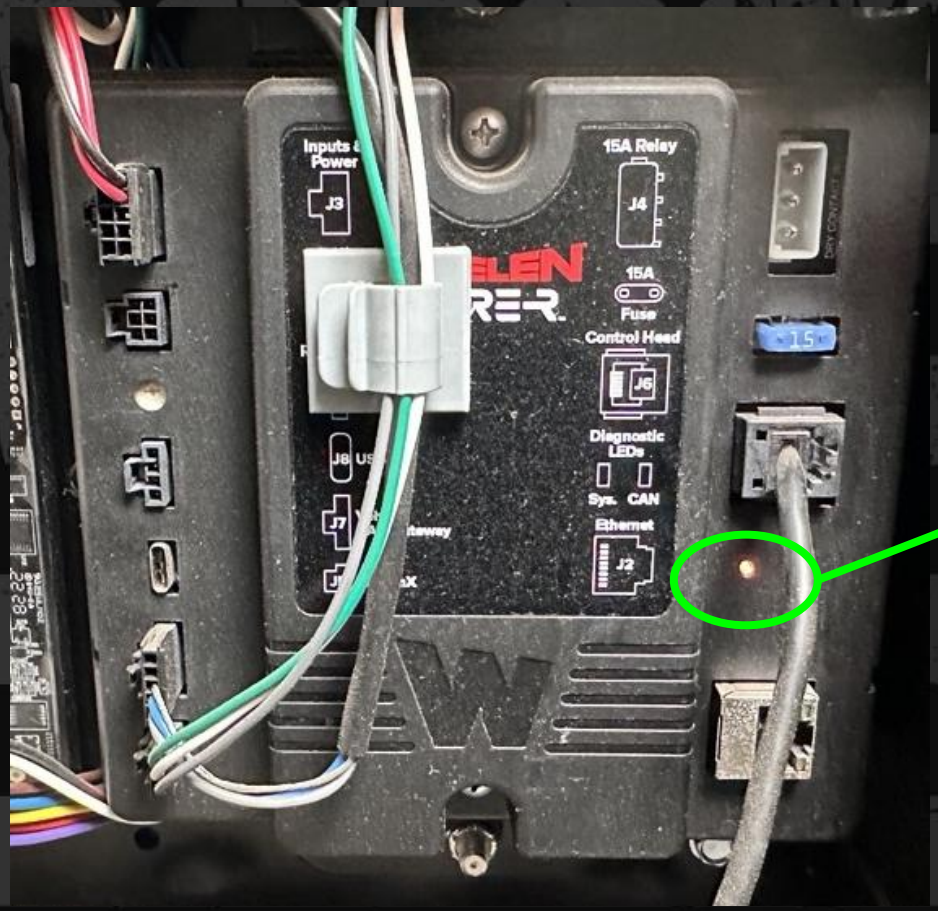


Indicator Color	System Status	Detail
RED	Memory Error	Unable to access flash memory.
ORANGE	File Error	No Configuration .
WHITE	Working	Processing and distributing new config to WeCanX devices.
CYAN	Missing Node	The configuration has more hardware than what is connected to the bus.
GREEN	System Active	Communicating with connected devices.
BLUE	Processing inputs to the system.	System Communications active.

Allner INDUSTRIES

WHELEN

3. Using the System Status Lights Core- R Diagnostic Indicators



Example: Core suite is unresponsive, control head makes noise, but nothing happens. Checking the diagnostic indicators on Core, we see it is orange. Compare this to the guide:

ORANGE	File Error	No Configuration

Solution: re-load the latest program to the Core-R

Allner INDUSTRIES

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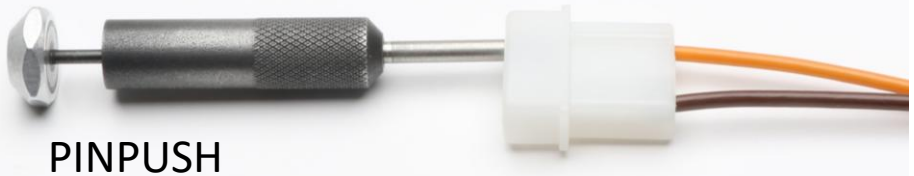
Diagnostics & Troubleshooting

1. Observe expansion module indicator lights; green = good
2. Verify power and CAN connections
   - Check for loose or missing connections
3. Verify termination integrity
   - Ensure terminals are fully seated.
   - De-pin connector and inspect crimps.
4. Verify modules are addressed correctly via Whelen Command.
5. Reflash the program and update firmware.

Whelen Connector De-Pinning Tools

AMP Pin Connectors



PINPUSH
Tyco 1-305183-1

Mini-UMNL Connectors

TYCO 189727-1

AMP Socket Connectors

SOCKPUSH
Tyco 1-305183-2

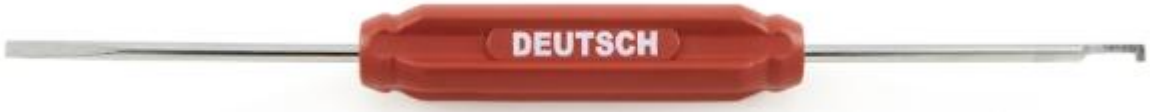
Universal Mate-N-Lok Connectors

1804030-1

WHELEN

Deutsch Connector Tools

- Deutsch DT-RT1 flathead screwdriver with wedge lock removal feature



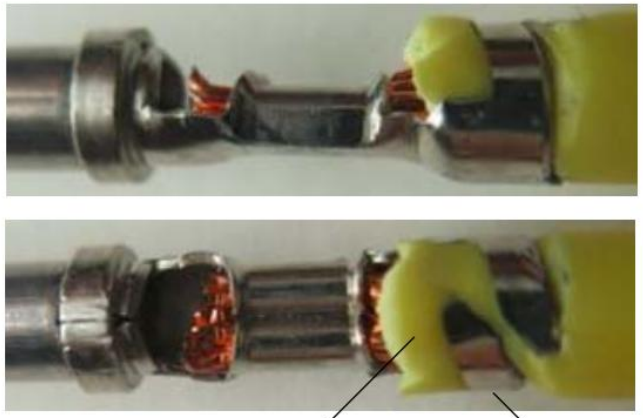
- Deutsch 0411-336-1605 size 16 HDP series 16-20ga contact removal tool.
- Deutsch 0411-291-1405 size 16 HDP series 14-16ga contact removal tool.
- Deutsch 0411-337-1205 size 12 HDP series contact removal tool.

- ATT-12-00 Hand crimper for Deutsch size 12 stamped and formed contacts (12/14 ga)
- ATT-12-01 Hand crimper for Deutsch size 12 stamped and formed contacts (10/12 ga)
- ATT-16-00 Hand crimper for Deutsch size 16 stamped and formed contacts (14/16 ga)
- ATT-20-00 Hand crimper for Deutsch size 20 stamped and formed contacts (16/20 ga)

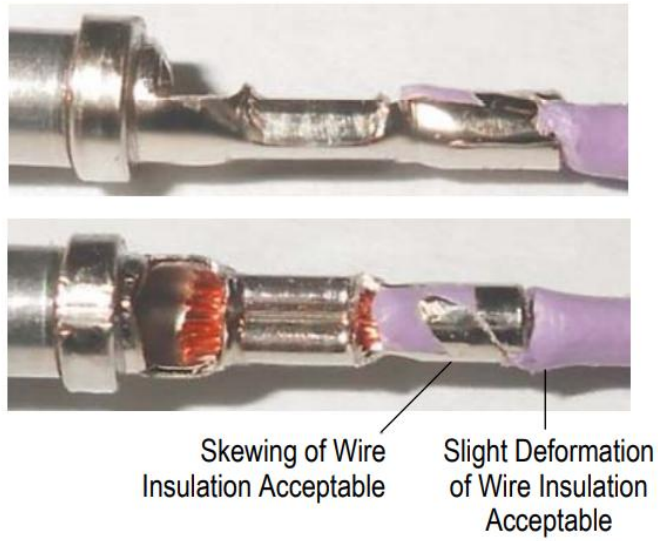
- HDT-48-00 Hand crimper for Deutsch size 12/16/20 solid contacts (12-20 ga)

Stamped and Formed Crimping

Wire Size 14 AWG SXL (SAE J1128) Shown



Wire Size 0.50 mm² Thin (ISO 6722) Shown



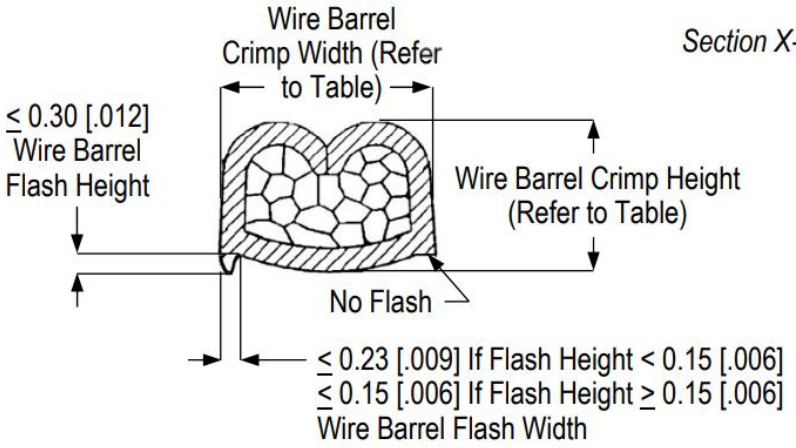
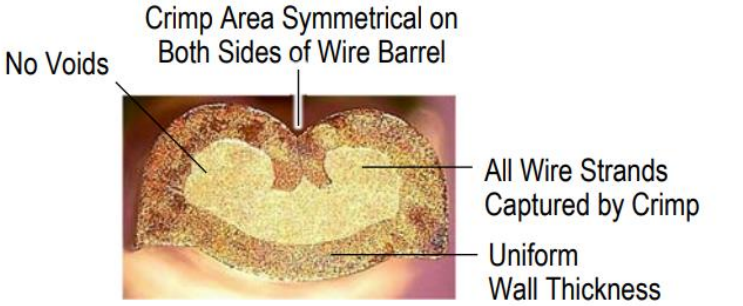


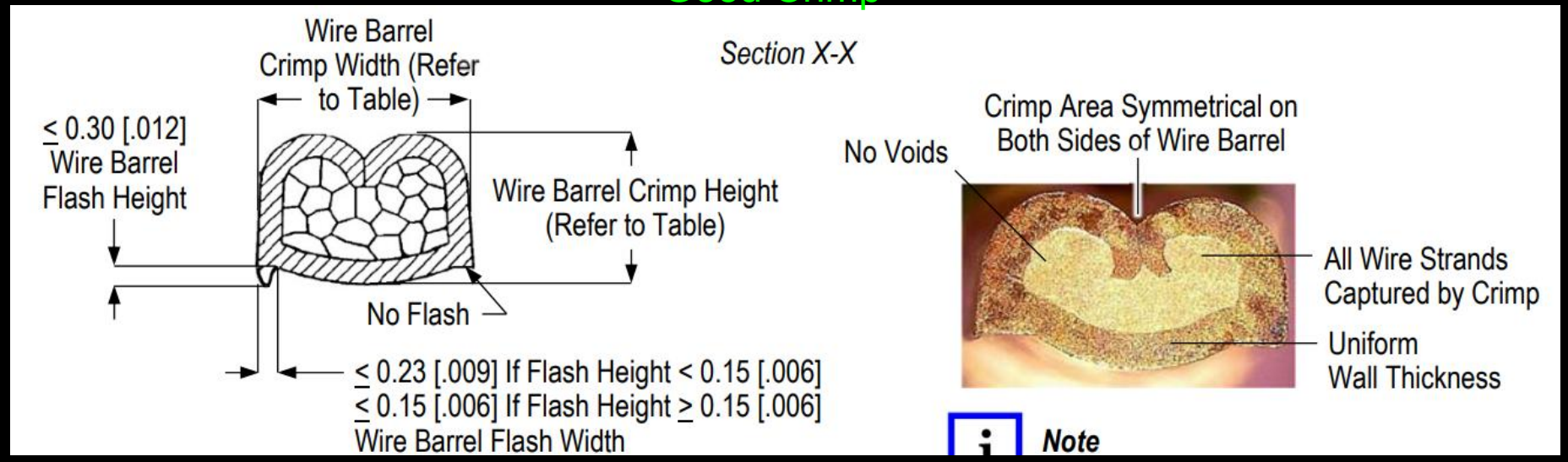
Figure 3 (Cont'd)



Note
1. See Appendix A for Cross Section Examples

Stamped and Formed Crimping

Good Crimp

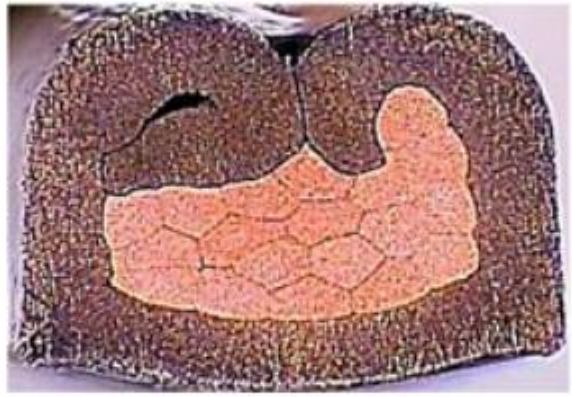


Stamped and formed Crimping

Bad Crimp

Unacceptable Wire Barrel Crimp

Uneven Crimp and Wall Thickness and Flash on Both Sides

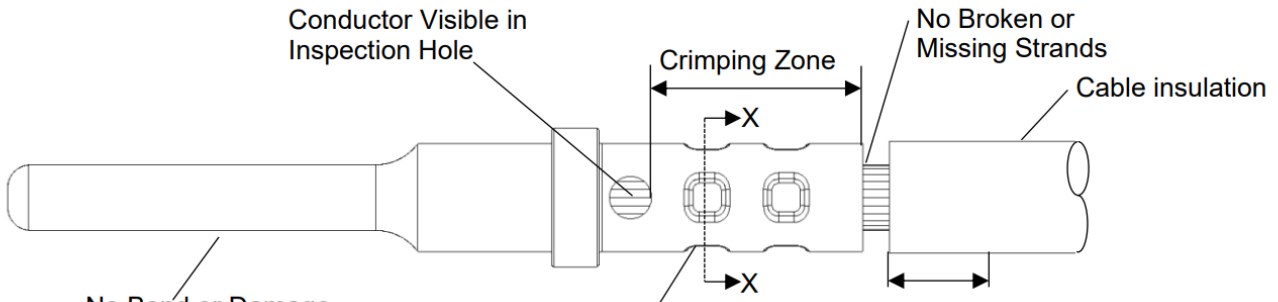


Uneven Crimp and Wall Thickness

Crimp Too Loose and Void on Both Sides

Solid terminal crimping

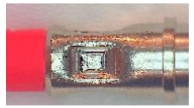
CRIMP REQUIREMENTS



Note

1) *Size 4, 8 have 4 crimp indents*
2) *Size 12-20 have 8 crimp indents*

Size 4
4 AWG SGX

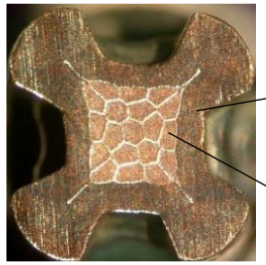


Size 8
8 AWG GXL

Size12
12 AWG GXL

Size16
16 AWG GXL

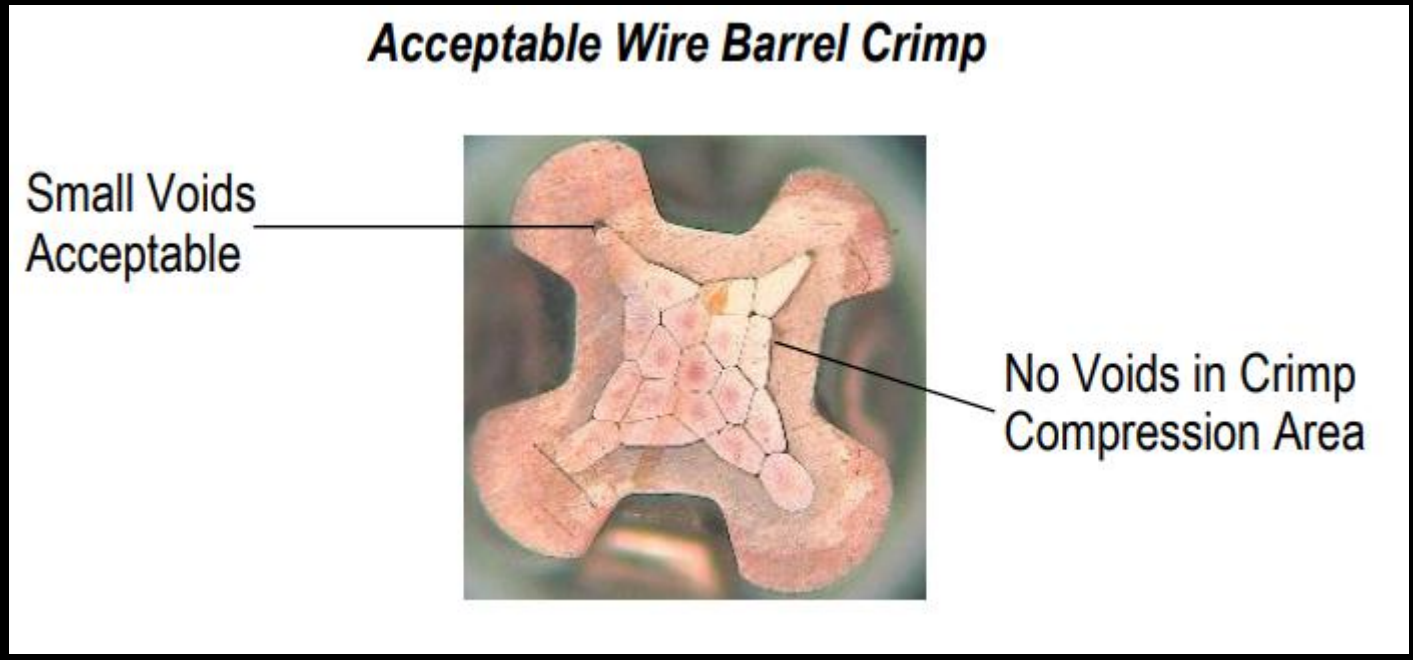
Size20
20 AWG GXL



Section X-X

Solid terminal crimping

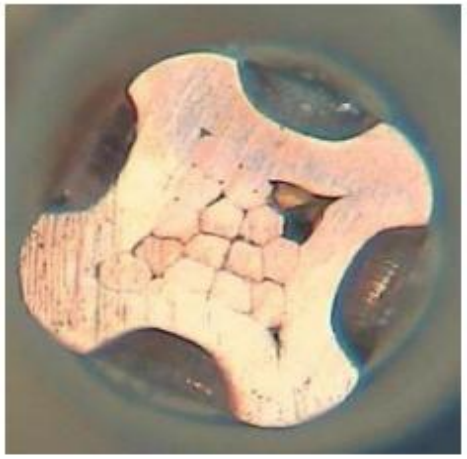
Good Crimp



Solid terminal crimping

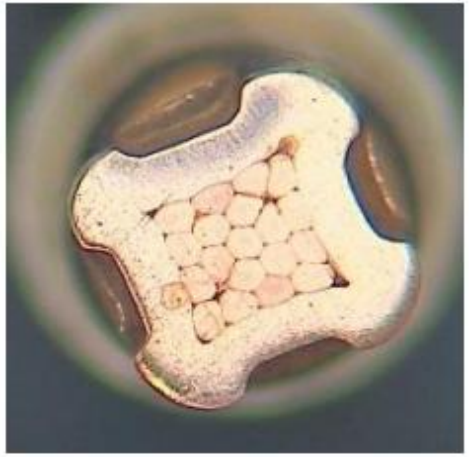
Bad Crimp

Unacceptable Wire Barrel Crimp



Crimp Too Loose and
Voids in the Crimp

Uneven Crimp and
Wall Thickness



Crimp Too Loose and
Void on Within Crimp

Deutsch Connectors and Crimping, Web links

DEUTSCH Solid Contact Manual

DEUTSCH Stamped and Formed Contact Manual

Lug/Ring terminal crimping

Good Crimp

- *Eyelet neck is not punctured*
- *No "fins" from over crimping*
- *Uniform depression of the lug*
- *Use adhesive lined heat shrink tube for a trouble-free electrical connection.*

- Additional suggestions:

Regarding crimpers – Because eyelets have different wall thicknesses, start with the larger crimp die to determine if a smaller crimp die is needed as crimp die labels can be inaccurate as the die maker makes an assumption on one eyelet thickness while many thicknesses are available.

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Lug/Ring terminal crimping

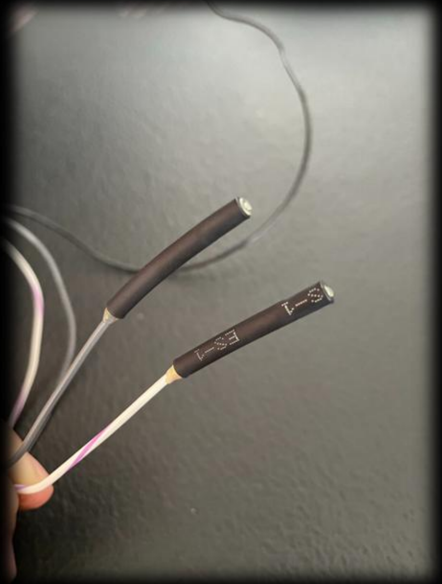
Bad Crimp

10.4.1.1 OVER CRIMPED

Over crimping can cut the copper wire strands of the cable reducing ampacity and increases the risks of over-heating. This can ultimately lead to poor performance and premature failures.

Capping Wires On A Whelen® Lighthead

When using a Whelen lighthead with Core®, you do not need to use the Grey (Sync) wire nor the White/Violet (Scan-Lock®) wire. Ensure that both wires are capped off with a waterproof cap (adhesive lined shrink tube) or connector. Failure to do so will void the warranty and will result in water wicking.



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Water Wicking

Water wicking happens when unused wires are not properly capped at time of installation. Wires such as: sync, pattern selection & low power.

Prevention: Use heat shrink caps to cap unused wires to prevent water wicking.

Digi-Key Part # ESC30K-ND

Tech Tip: Body mounted warning and scene lights that **do not have un-used wires properly capped** will void the warranty.

Whelen Engineering Co., Inc.

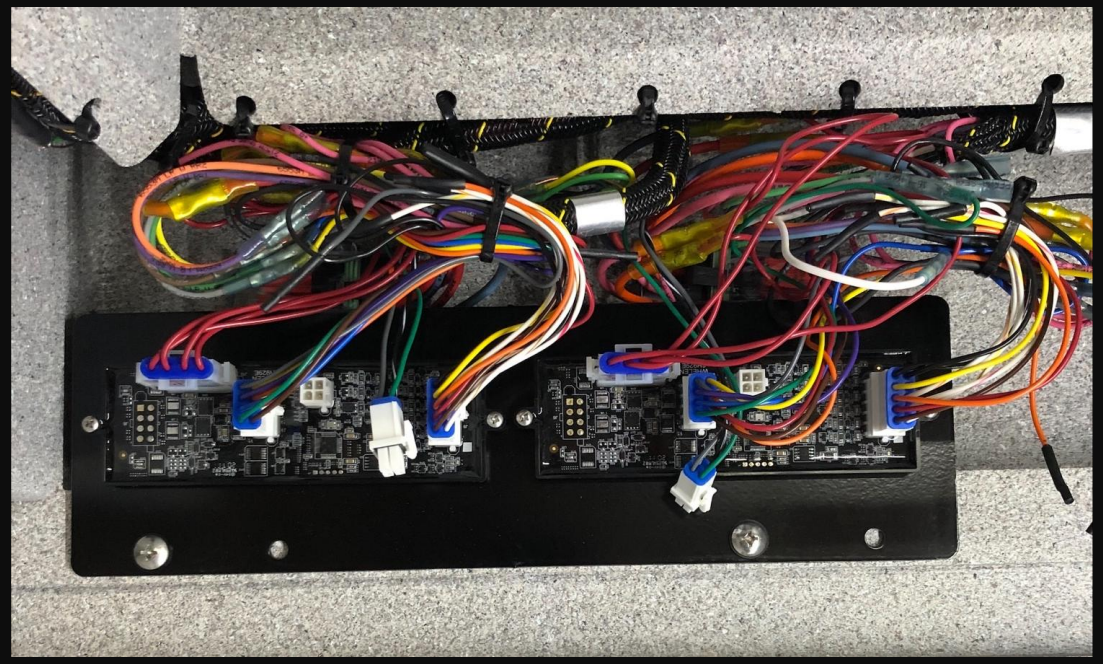
Service Loop

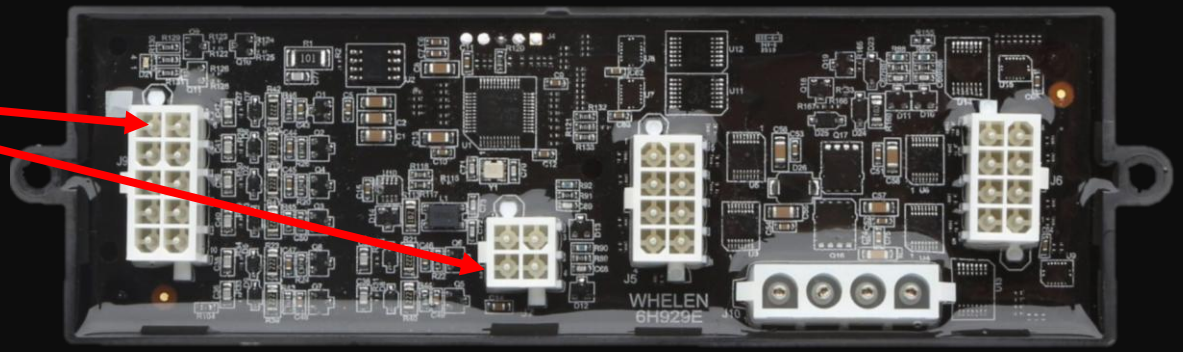
- Leave a manageable amount of wire slack for a serviceability.
- Don’t pull wires tight as this will cause strain on wire, terminals, and connectors.

Proper wire routing is essential to the electrical system’s long-term reliability.

Mini-Universal Mate-N-Loc Connectors Protecting Circuit Integrity

Whelen uses Mini Universal Mate-N-Lok connectors on a lot of our products.





Liked for its small footprint, this connector can be susceptible to terminal disengagement when the harness is under tension.

Cable management is always difficult on large harnesses- however care should be taken to not place excessive tension loads on pigtail harness connections. It *can* and *will* damage the pin terminals, causing numerous issues with lighting loads connected.

Miller INDUSTRIES

WHELEN

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603-324-4148

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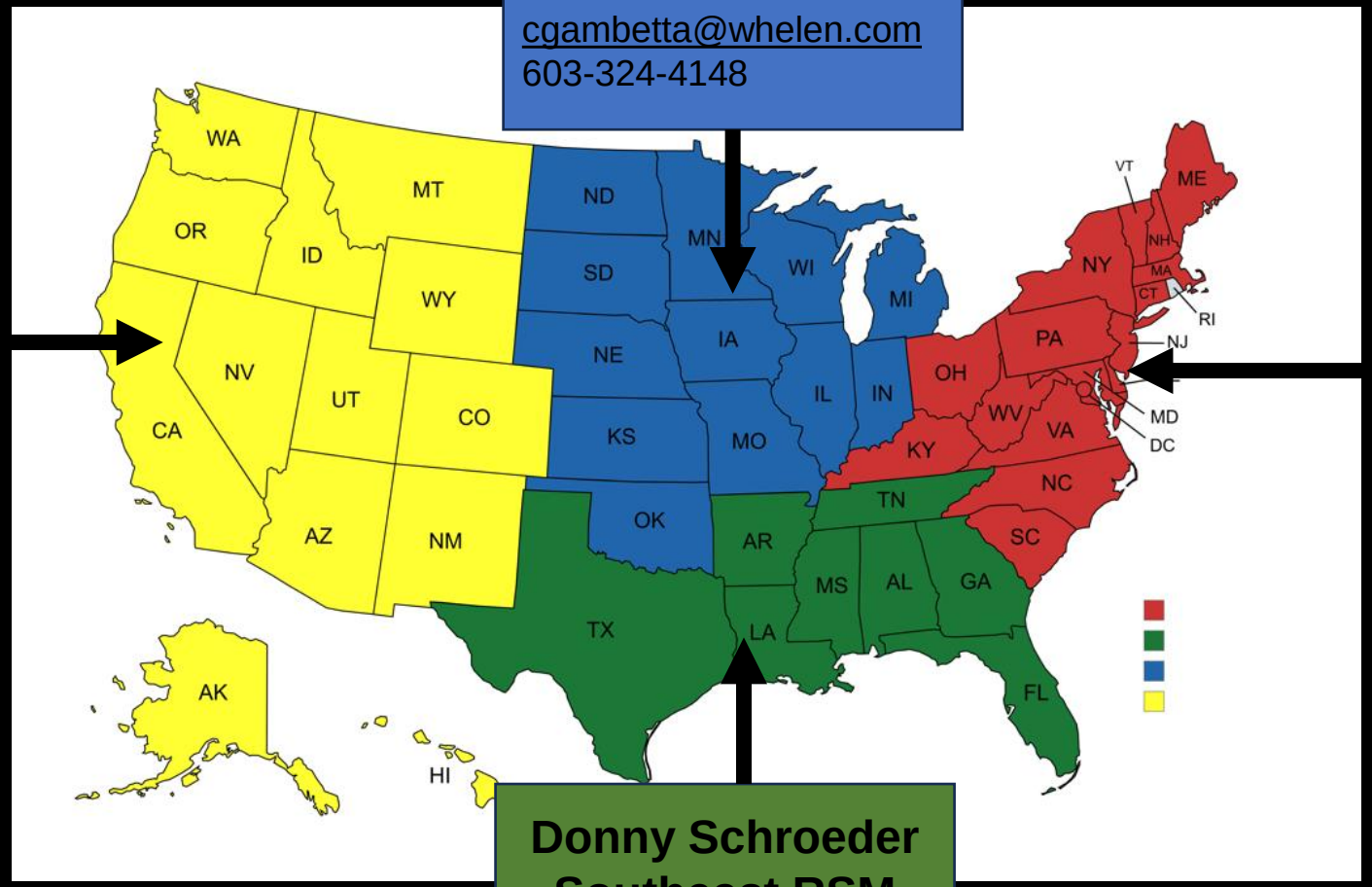

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Resource summary

https://www.whelen.com/whelen-command

https://www.millerind.com/display-controller/

THANK YOU FOR YOUR BUSINESS

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