TORCROBOTICS

RemoteTask™
Remote Control System

Parts and Installation Manual

Version 2.0

405 Partnership Drive, Blacksburg VA 24060 Ph: 1-800-530-9285 Fx: 540-443-3667 www.torc.ai

REMOTETASK™

Parts and Installation Manual

V2.0

Assignment of Liability

WARNING: DO NOT OPERATE UNTIL USER MANUAL IS REVIEWED AND UNDERSTOOD. PRODUCT USE IS SUBJECT TO STRICT TERMS AND CONDITIONS. SEE TERMS AND CONDITIONS DOCUMENT FOR ADDITIONAL USE RESTRICTIONS. OPERATING PRODUCT IN VIOLATION OF USER RESTRICTIONS COULD RESULT IN PRODUCT MALFUNCTION, PROPERTY DAMAGE, AND PERSONAL INJURY INCLUDING DEATH.

NOTICE: USER ASSUMES ALL RISKS ASSOCIATED WITH POSSESSION OR USE OF PRODUCT AND RELATED SYSTEMS. USER AGREES TO INDEMNIFY, DEFEND AND HOLD HARMLESS TORC ROBOTICS, Inc. (“TORC®”) FROM ANY DAMAGES ARISING OUT OF POSSESSION OR USE OF PRODUCT AND RELATED SYSTEMS. TORC IS NOT LIABLE FOR ANY DAMAGES OF ANY KIND.

NOTICE: SEE TERMS AND CONDITIONS FOR ALL TERMS APPLICABLE TO USE OF THE PRODUCT OR RELATED SOFTWARE.

Copyright © 2018 TORC Robotics, Inc. All Rights Reserved. All information contained in this manual is believed to be accurate at the time of printing; however, TORC Robotics, Inc. reserves the right to make modifications to the specifications and operation of this product without obligation to notify any person or entity of such revision.

TORC® and SafeStop® are registered trademarks of TORC Robotics, Inc.

Foreword

This manual provides safety information and installation instructions for the RemoteTask Remote Control System for CAT D® series Skid Steer Loaders, Multi-Terrain Loaders, and Compact Track loaders.

Some photographs or illustrations in this publication show details or attachments that can be different from your machine. Guards and covers might have been removed for illustrative purposes.

Compatible Machines

Skid Steer Loaders: 236D, 242D, 246D, 262D, 272D2, 272D2 XHP

Multi-Terrain Loaders: 257D, 277D, 287D, 297D2, 297D2 XHP

Compact Track Loaders: 259D, 279D, 289D, 299D2, 299D2 XHP

NOTE: A separate RemoteTask Alpha system, RTA01, is available for the following additional machines:

Skid Steer Loaders: 226D, 232D

Compact Track Loaders: 239D, 249D

Table of Contents

1 Safety Information

1.1 Important Safety Information

Failure to observe the outlined safety measures regarding operation, maintenance, and repair is the most common cause of accidents that involve product operation. It is important to heed all safety precautions and warnings provided in this manual and on the product.

Do not perform any procedure in the Parts and Installation manual until you have read understand the instructions and warnings in the manual. Use only proper tools and observe all precautions that pertain to the use of these tools. Failure to follow these procedures can result in personal injury.

The list of procedures and hazards identified by WARNING and NOTICE labels is not all inclusive. TORC cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive.

Ensure that the product will not be damaged or made unsafe by the operation, installation, maintenance, or repair procedures used.

The following symbols are used throughout the manual to indicate a particularly hazardous condition:

⚠ WARNING

The warning label is used when a hazardous condition could result in serious injury or loss of life.

⚠ CAUTION

A caution label identifies a hazard or procedure that could result in damage to the product or loss related to equipment malfunction.

⚠ NOTICE

A notice label indicates information that may not be applicable regarding system safety, but needs to be known for best system performance.

1.2 Safety Messages

Remote control installation requires safety precautions to prevent potential hazards such as injury, loss of life, or damage to the machine or other property. Be sure to also review the safety messages in the CAT Operation and Maintenance Manual.

TORC cannot anticipate every possible circumstance that might involve a potential hazard; therefore, the warnings in this publication and on the product are not all inclusive. The operator must be alert to potential hazards and ensure that any operating technique used is safe.

⚠ WARNING

All Caterpillar safety and service procedures and precautions should be followed during product installation or servicing. In the event of a conflict of direction, Caterpillar procedures override any procedures found in this manual.

⚠ WARNING

Do Not Modify or Disassemble RemoteTask components or wiring. Modifications could result in a shock hazard, product damage, or unexpected operation. Opening, modifying, or repairing the RemoteTask will void any applicable warranty and could prevent the device from operating properly. Contact a CAT dealer if repairs or modifications are required.

⚠ WARNING

Ensure machine is a safe state for installation or servicing. Park the in a stable location, engage the parking brake, remove the key, and disconnect the machine battery. Lock the lift arm safety brace and the cab support lever before performing any under cab installation steps.

⚠ WARNING

Do not operate the machine unless you have read and understand the instructions and warnings in the Operation and Maintenance manual. Most accidents that involve product operation are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. The operator should have the necessary training, skills, and tools in order to perform operation and safety functions properly.

⚠ WARNING

The operator is responsible for safely operating the remote machine. Ensure the remote operation area is clearly marked and personnel do not enter the area during remote operation. Verify site personnel are aware the system will be operating remotely. Maintain line-of-sight with the machine at all times during remote operation.

⚠ WARNING

Do not approach the machine if the Active Indicator (amber beacon) is flashing. Verify with the operator that it is safe to approach the machine.

⚠ CAUTION

Do Not Operate With Suspected Failures. If you suspect there is damage to the RemoteTask™, contact a CAT dealer to have it inspected before further use.

⚠ CAUTION

Do not secure wire harnesses to flexible hydraulic hoses. Technicians servicing these hoses will not secure the RemoteTask wire harness to replacement hoses. Hoses move during normal operation and create wear points which may damage the wiring harness.

⚠ CAUTION

Replacing the protection cage requires access to the interior of the controller unit. Perform this replacement in a clean and dry location to prevent damage to the sensitive electronics inside the unit.

⚠ NOTICE

Some of the pictures in this manual were taken with some prototype components. The appearance of these components will differ slightly from the production components.

2 RemoteTask Remote Control System Parts

2.1 RT01 RemoteTask Parts List

Parts included in the RT01-MI RemoteTask Machine Interface Assembly		
Quantity	**Part Number**	**Description**
1	RT01-MI-MIM	Machine Interface Module
1	RT01-MI-MIH	Machine Interface Harness
1	RT01-MI-MEI	Machine ECM Interface
1	RT01-MI-UCM	Under Cab Mounting Assembly
1	RT01-MI-UCH	Under Cab Harness
1	RT01-MI-REI	Remote Enable Interface
1	RT01-MI-UIH	User Interface Harness
1	RT01-MI-AMB	Active Indicator (Amber Beacon)
1	RT01-MI-GRN	Communication Link Indicator (Green Beacon)

Parts included in the RT01-RC RemoteTask Controller		
Quantity	**Part Number**	**Description**
1	RT01-RC-RCU	Remote Control Unit
1	RT01-RC-PC	Protection Cage
1	RT01-RC-SH	Shoulder Harness
1	RT01-RC-BAT	Controller Batteries (set of 4 batteries)
1	RT01-RC-BC	Controller Battery Charger

Documentation Included in the RT01-DOC RemoteTask Remote Control System		
Quantity	**Part Number**	**Description**
1	RT01-DOC-OMM	Operation and Maintenance Manual
1	RT01-DOC-PIM	Parts and Installation Manual

Options included in the RT01-OPT RemoteTask Parts		
Quantity	**Part Number**	**Description**
1	RT01-OPT-PRG	Firmware Update/Programming Toolkit
1	RT01-OPT-ISO	Remote Control ISO Warning Label

3 Machine Installation Parts and Tools Overview

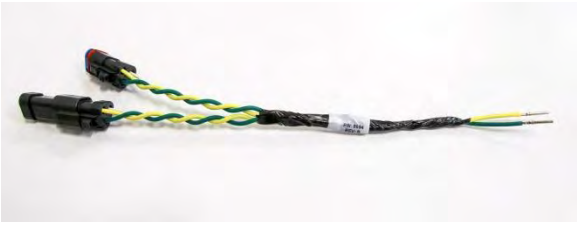
3.1 Required Tools

Description	Quantity
24mm Combination Wrench	2
16mm Combination Wrench	1
Socket Wrench and 6” Extension Bar	1
Needle Nose Pliers	1
Allen Wrench	1
Flat head screwdriver	1
Flush cut pliers	1
13mm Socket	1
10mm Socket	1
4mm Hex bit	1
T25 TORX Driver	1
T30 TORX Driver	1
825 Silicone Compound	1

3.2 Machine Interface Assembly Parts Overview

	**Machine Interface Module (MIM)** RT01-MI-MIM The Machine Interface Module is comprised of the on-machine RemoteTask ECM and power distribution fuses and relays. This device wirelessly communicates with the RemoteTask Controller. The part number and serial number remain visible after installation toward the rear side of the machine cab.

	**Machine Interface Harness (MIH)** RT01-MI-MIH The Machine Interface Harness connects the Under Cab Harness to the machine.

	**Machine ECM Interface (MEI)** RT01-MI-MEI The bare pins on the Machine ECM Interface are inserted into an existing ECM connector. This part provides access to CAN B on the machine ECM.

Under Cab Harness (UCH)
RT01-MI-UCH
The Under Cab Harness connects the Machine Interface Module to the Machine Interface Harness and User Interface Harness. It is the primary connection to machine 12V power for the RemoteTask system.

Remote Enable Interface (REI)
RT01-MI-REI
The Remote Enable Interface is mounted to the rear of the machine over the right taillight. It provides the necessary controls and indicators for the RemoteTask system, including an Emergency Stop button, LED indicators, and a key switch to enter/exit remote-control and pairing modes.

User Interface Harness (UIH)
RT01-MI-UIH
The User Interface Harness connects the Remote Enable Interface to the Under Cab Harness. The harness also runs up the rear of the cab providing connection points to the indicator beacons and a communications antenna.

	**Communication Link Indicator (Green Beacon)** RT01-MI-GRN The external Communication Link Indicator (green beacon) indicates when the Machine Interface Module is communicating with the RemoteTask Controller.

	**Active Indicator (Amber Beacon)** RT01-MI-AMB The external Active Indicator (amber beacon) indicates that the machine is in a state where motion is possible (parking brake is not applied or the hydraulic lockout is disengaged).

4 Pre-Installation

⚠ WARNING

All Caterpillar safety and service procedures and precautions should be followed during product installation or servicing. In the event of a conflict of direction, Caterpillar procedures override any procedures found in this manual.

⚠ WARNING

Ensure machine is a safe state for installation or servicing. Park the in a stable location, engage the parking brake, remove the key, and disconnect the machine battery. Lock the lift arm safety brace and the cab support lever before performing any under cab installation steps.

4.1 Prepare the Machine

1. **Check Machine Firmware.** Machine ECM firmware must be installed with production release number 503-7999-00 or later before installing the RemoteTask system.

2. **Park the Machine.** Park the machine on a smooth, level surface. Engage the parking brake.

3. **Raise Lift Arms.** Raise the lift arms to allow room to engage the lift arm safety brace.

4. **Engage the lift arm safety brace.** Reference the applicable CAT Operation and Maintenance manual for detailed instructions on engaging the lift arm safety brace.

5. **Turn off the engine.** Turn off the machine engine with the in-cab key switch. Remove the key and exit the cab.

6. **Lift the Cab.** Use the two 24mm wrenches to remove the two front bolts which secure the cab. Reference the applicable CAT Operation and Maintenance manual for detailed instructions on lifting the cab.

7. **Disconnect the Battery.** Remove the negative battery cable at the battery.

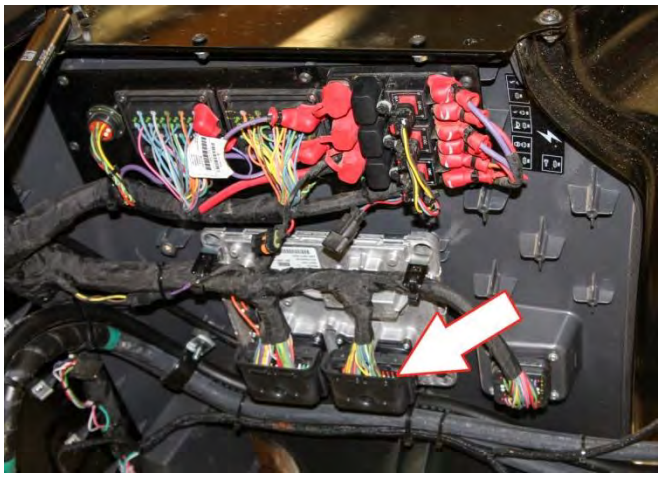
5 Installing the Machine Interface Assembly

5.1 Installing the Machine ECM Interface (MEI)

1. **REMOVE UNDER-CAB ECM CONNECTOR**

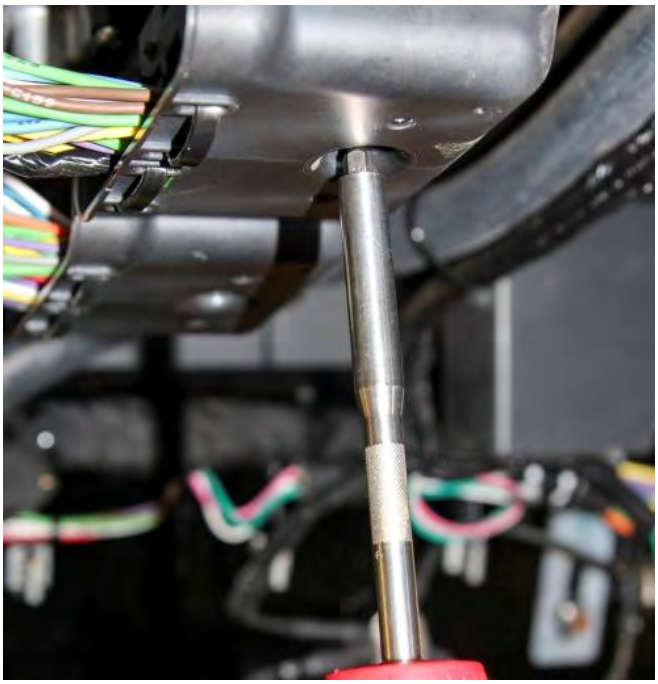
   A. Locate the two center ECM connectors on the rear of the cab. The MEI will will be added to the ECM connector closest to the bottom of the cab.

NOTE: The left-side metal cover on the cab has been removed for clarity. Cover may be removed for easier access to under-cab components.



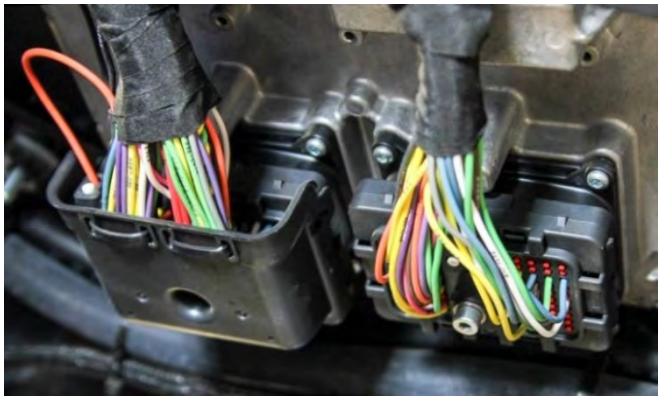
   B. Locate the connector shell closest to the bottom of the cab.

   C. Use the 4mm hex driver to remove the screw securing the connector.



D. Cut the existing zip ties securing the connector cover.

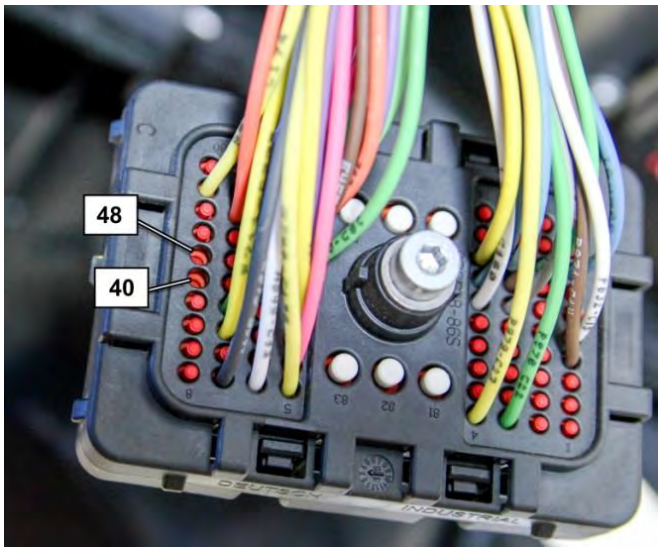
E. Remove the connector cover.



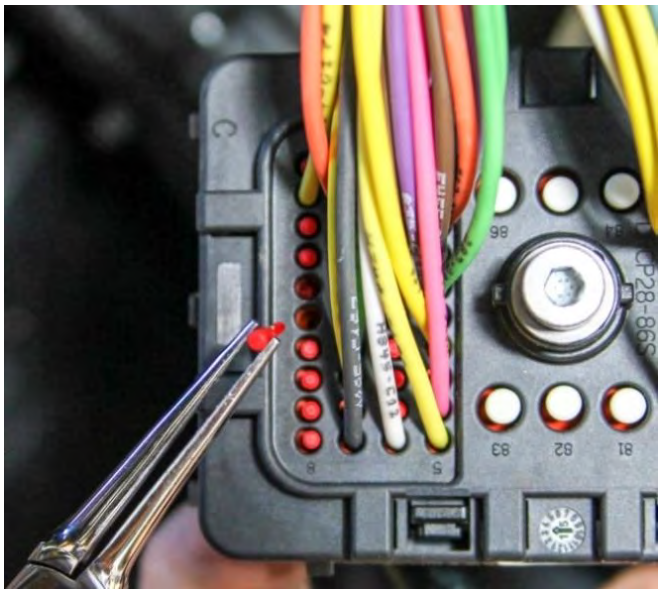
F. Pull the connector downward to unplug it from the machine.

2. INSTALLING THE MEI

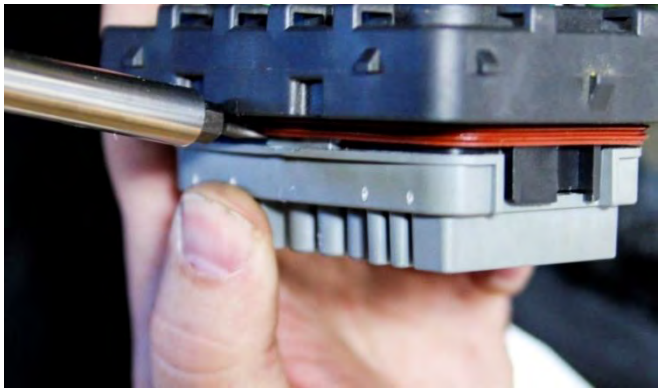
A. Locate cavity plugs 40 and 48 in the housing.



B. Using needle nose pliers, remove the cavity plugs from positions 40 and 48. Discard the cavity plugs.



C. Insert a flathead screwdriver between the terminal retainer and gently pry to unlock. There are 2 clips which need to be released. Do not fully remove the retainer.



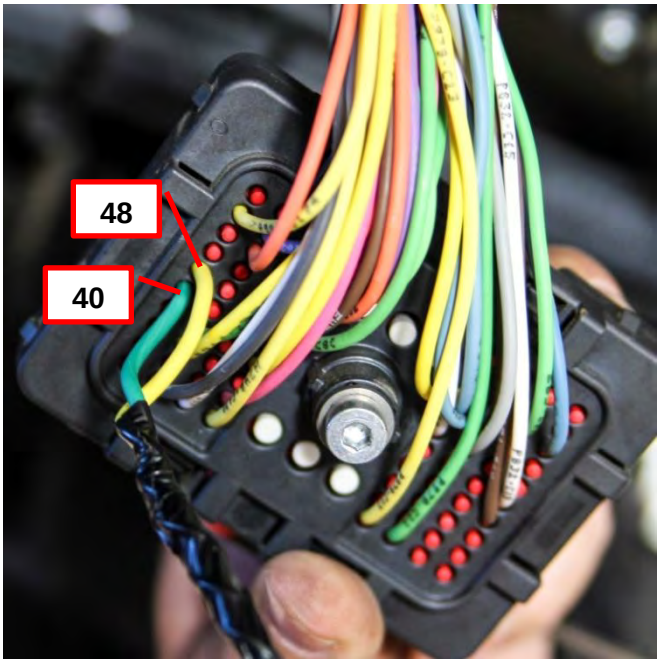
NOTE: If the retainer is removed, reinstall it after installing the MEI by carefully aligning it with the pins and pressing it into place. Take caution not to bend pins during reinstallation.

D. Locate the un-terminated green and yellow wires on the MEI.

E. Insert the green MEI wire into pin 40.

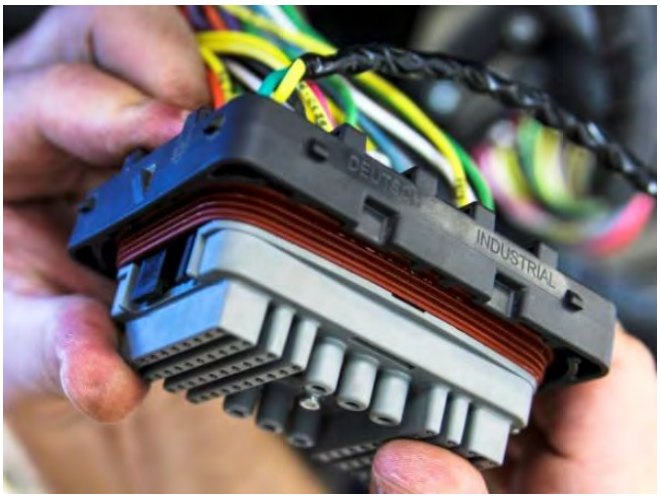
F. Insert the yellow MEI wire into pin 48.

G. Press wires firmly until they lock into the connector. An audible click will indicate that the wire is secured



H. Once the MEI wires are secured, lock the retainer by gripping the top and bottom of the retainer and pressing it closed. Ensure both clips are fully seated.

I. Route the MEI along the existing CAT wires.

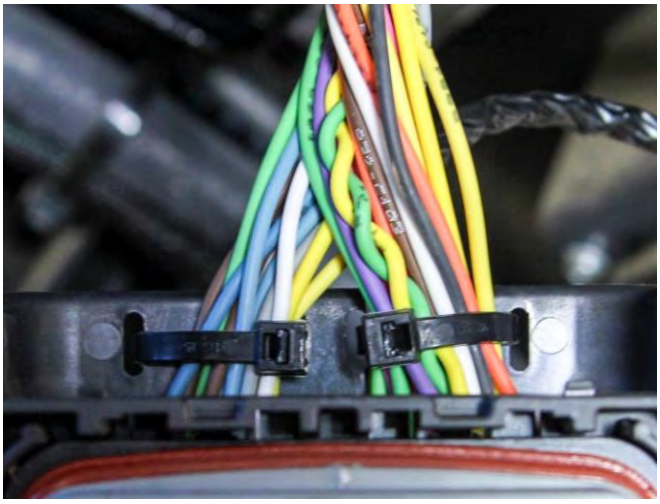


3. REINSTALLING THE CONNECTOR

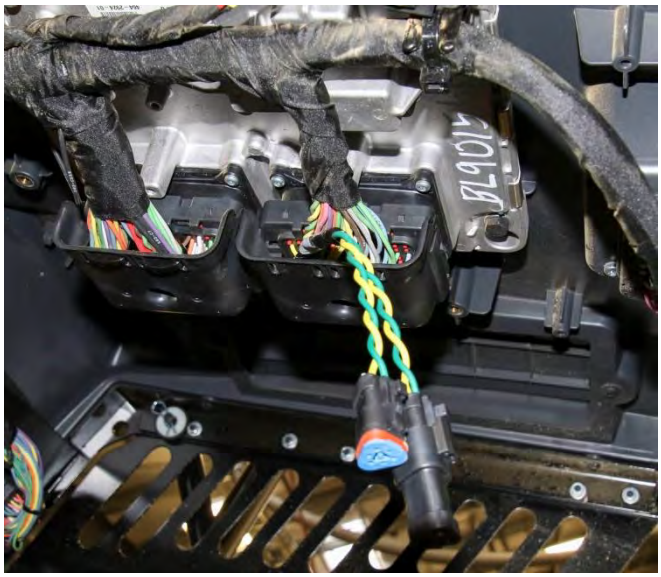
A. Insert two zip ties into the holes in the connector cover.

B. Verify the MEI runs parallell with the other wires connected to the retainer. Reattach the cover to the connector.

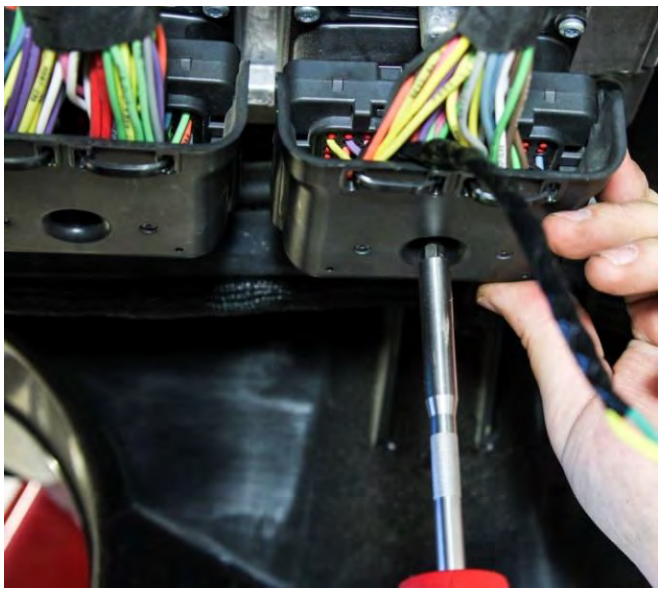
C. Close and tighten the zip ties around the connector wire bundles and MEI as shown. Clip off excess zip tie ends.



D. Plug the connector back in.

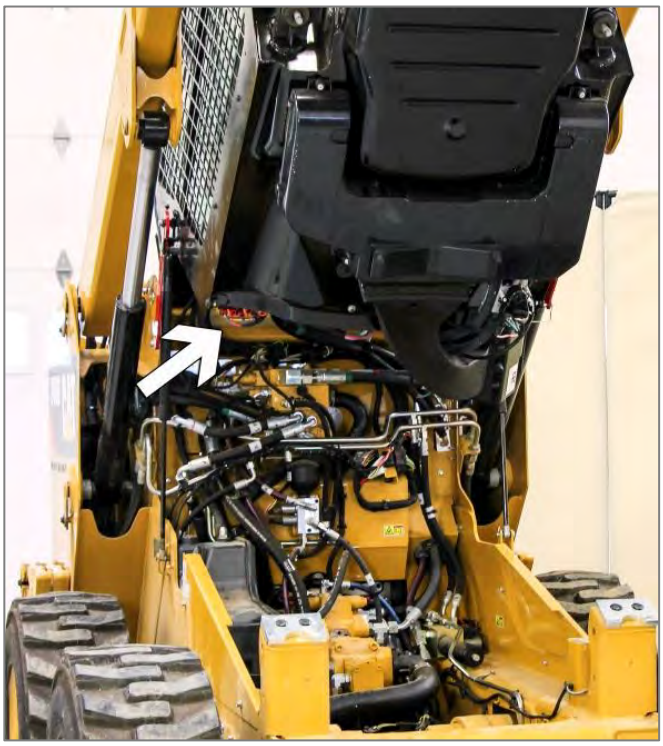


E. Use the 4mm hex driver to secure the connector.



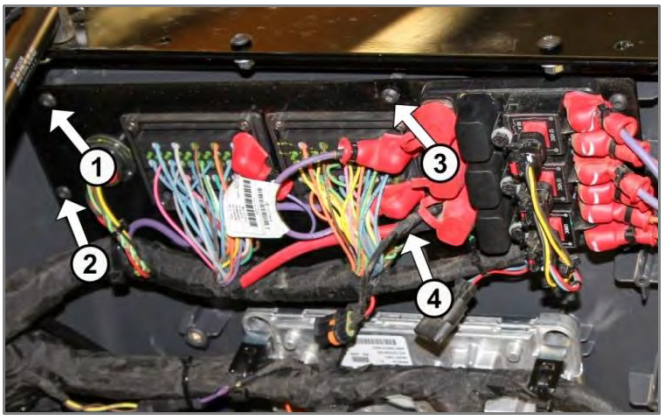
5.2 Installing the Machine Interface Module (MIM)

The Machine Interface Module attaches to the back of the cab, on the right side.



1. Prepare the mounting screws.

A. Locate the four indicated screws on the right side of the cab.



B. Use the T25 TORX driver to loosen the top screws (1, 2).

C. Loosen the lower right screw (3)

D. Completely remove the lower left screw (4).

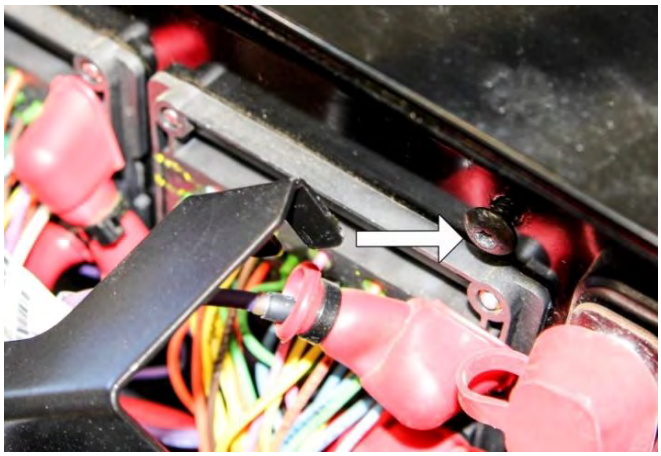
2. Attach the Machine Interface Module (MIM).

A. Locate the four mounting points on the MIM.

B. Align the mounting slots with the cab screws illustrated in step 1. Use the numbers indicated in the illustration to match each screw with its respective receptacle.

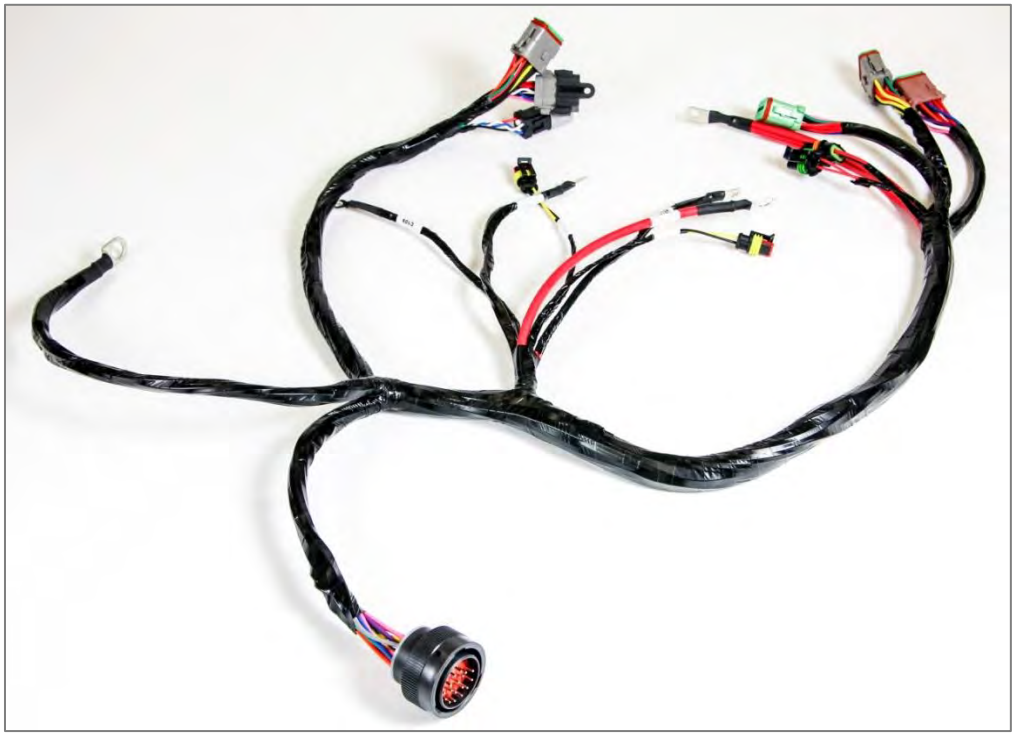
NOTE: The MIM will come installed with a protective Deutsch plug (not shown). Do not remove the plug during installation.

C. Insert the MIM mounting openings onto the loosened screws.



D. Use the T25 TORX driver to tighten all four screws. **Ensure that no existing wires are pinched by the MIM.**

5.3 Installing the Under Cab Harness (UCH)



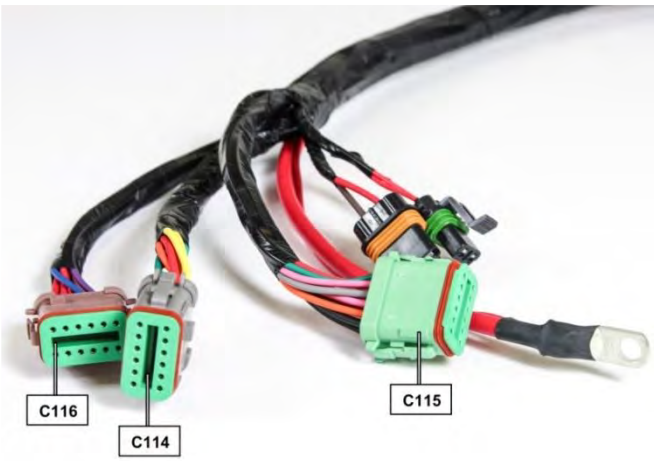
⚠ CAUTION

Do not secure wire harnesses to flexible hydraulic hoses. Technicians servicing these hoses will not secure the RemoteTask wire harness to replacement hoses. Hoses move during normal operation and create wear points which may damage the wiring harness.

5.3.1 Attach the Under Cab Harness to the Machine Interface Module

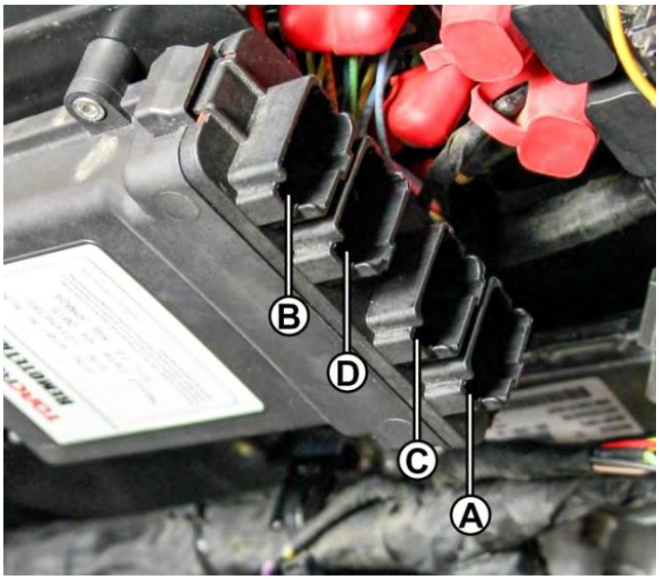
1. Connecting C114, C115 and C116.

A. Locate the Deutsch connectors C114 (gray), C115 (green), and C116 (brown) on the Under Cab Harness.

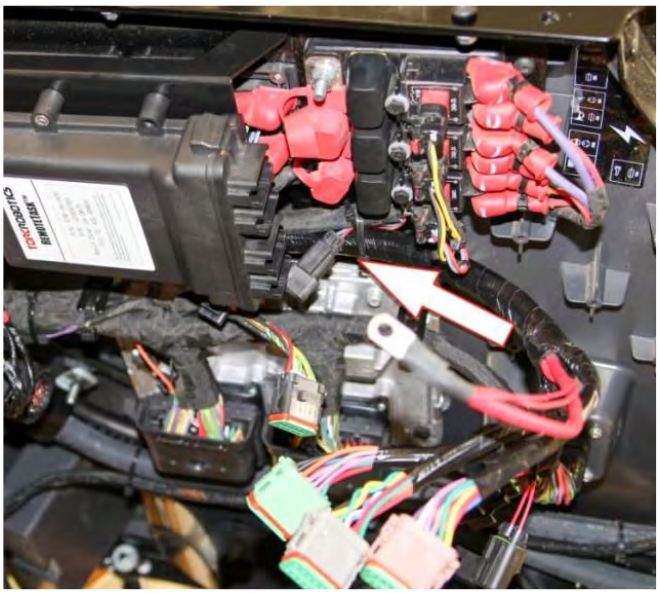


B. Apply a thin layer of Dielectric Silicone Compound to connectors C114, C115, and C116.

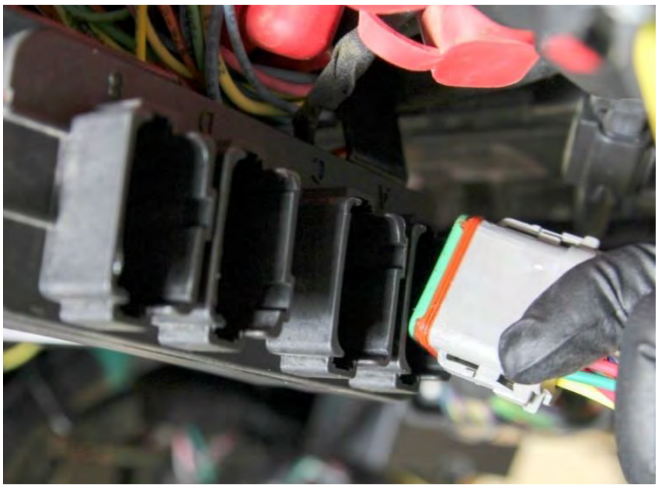
C. Locate the male Machine Interface Module Deutsch connector ports. The ports are labeled below each port as indicated. Ports are not labeled in alphabetical order.



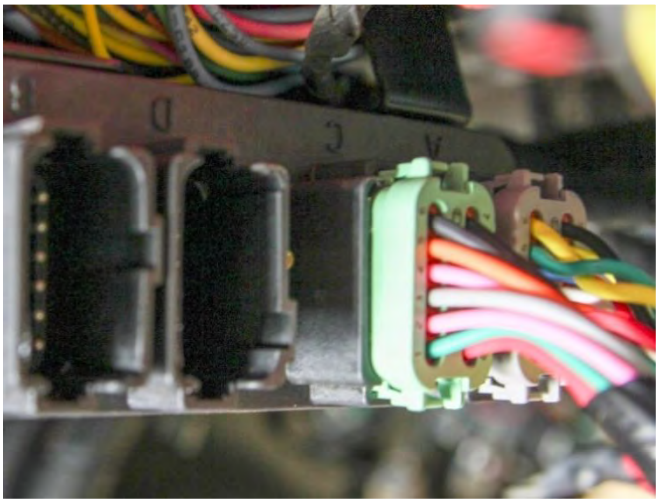
D. Feed the harness along the left side of the MIM. Position the connectors C114, C115, and C116 so they can mate with the male MIM Deutsch connector ports.



E. Plug Connector C114 (gray) into MIM port A.

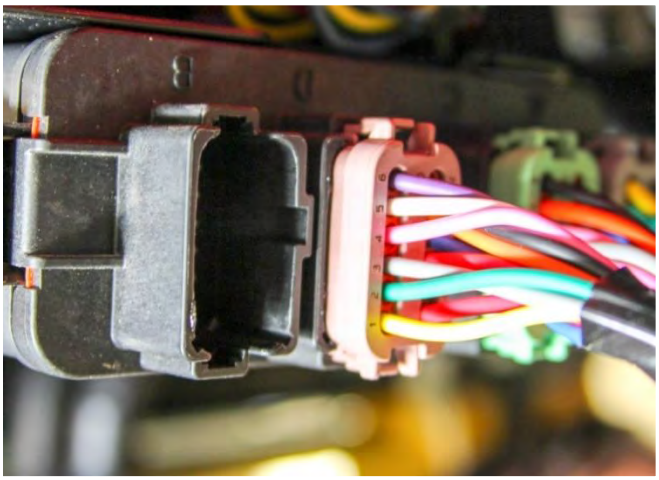


F. Plug Connector C115 (green) into MIM port C.



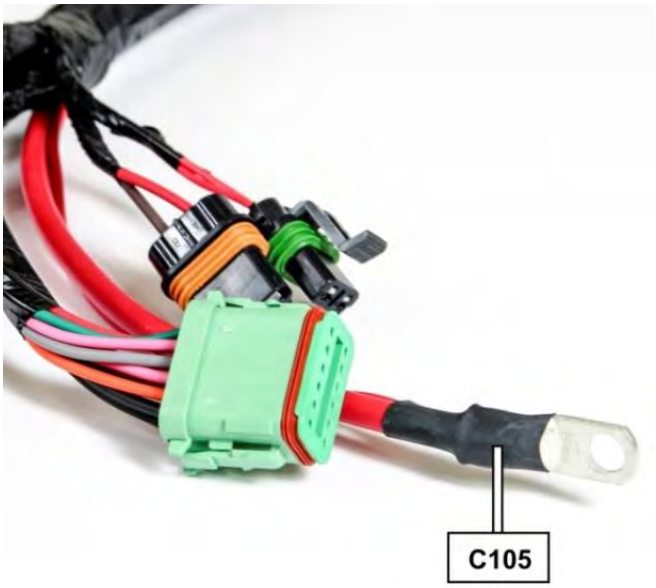
G. Plug Connector C116 (brown) into MIM port D.

NOTE: MIM port B is not used and will come installed with a protective plug. Ensure open plugs are always sealed to protect from dust and moisture.



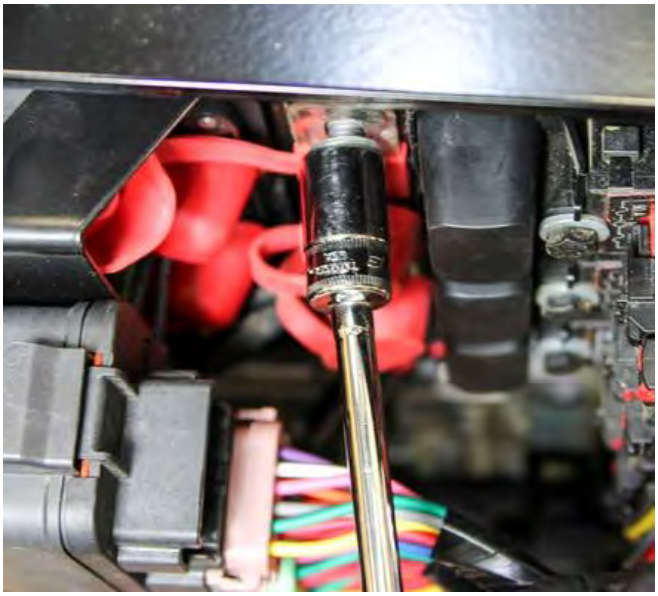
2. Connecting C105.

A. Locate connector C105 on the UCH.



B. Locate the right bolt below the Machine Interface Module and remove the boot.

C. Use the 13mm socket to remove the existing nut and washer from the bolt.



D. Feed the power cable behind the MIM Deutsch connector cabling.

E. Install the ring terminal onto the power stud.

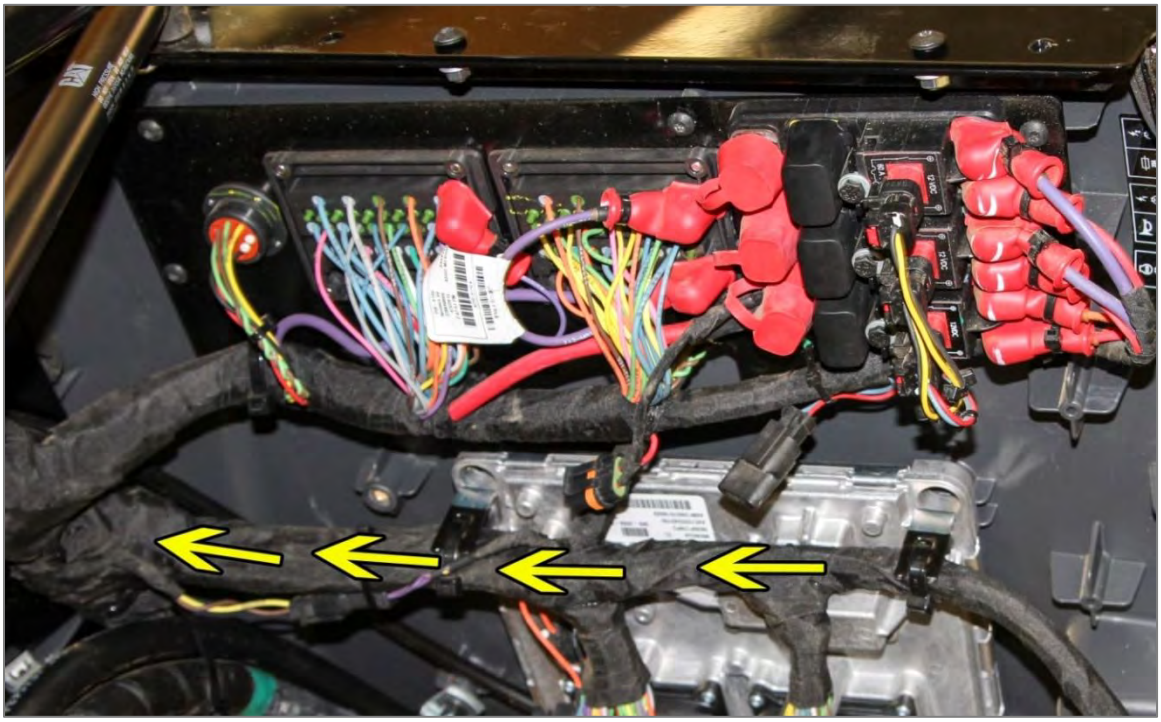
F. Use the 13mm socket to secure the ring terminal with the existing washer and nut.

3. Route the Under Cab Harness (UCH) beside the Machine Interface Module (MIH).

A. Feed the UCH toward the top of the cab.

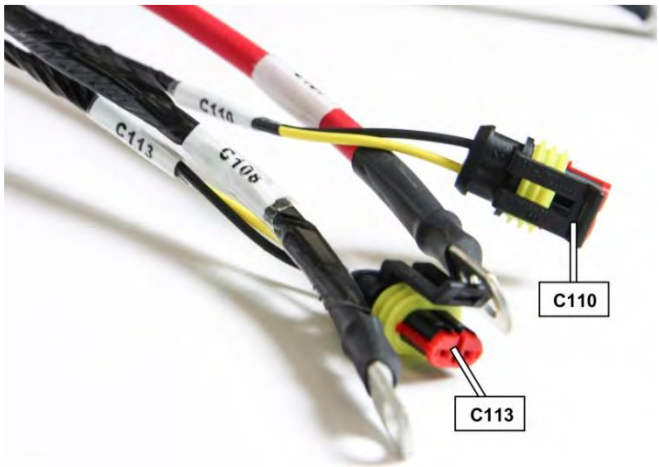
B. Use zip ties to loosely secure the section of harness along the existing CAT harness beside the Machine Interface Module.

Machine Interface Module has been removed from the illustration for clarity.



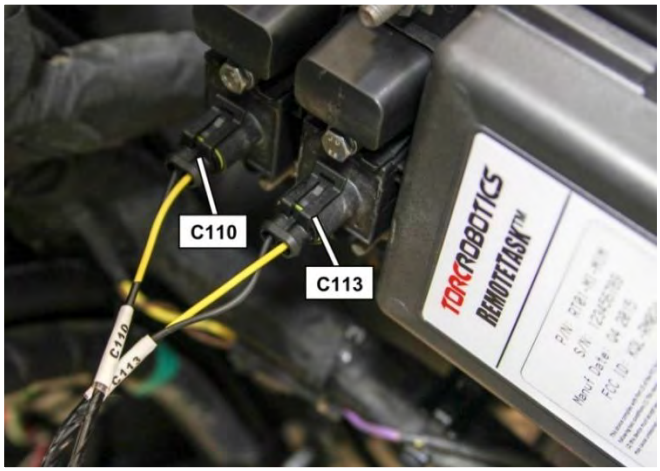
4. Connect C110 and C113.

A. Locate connectors C113 and C110 on the UCH.



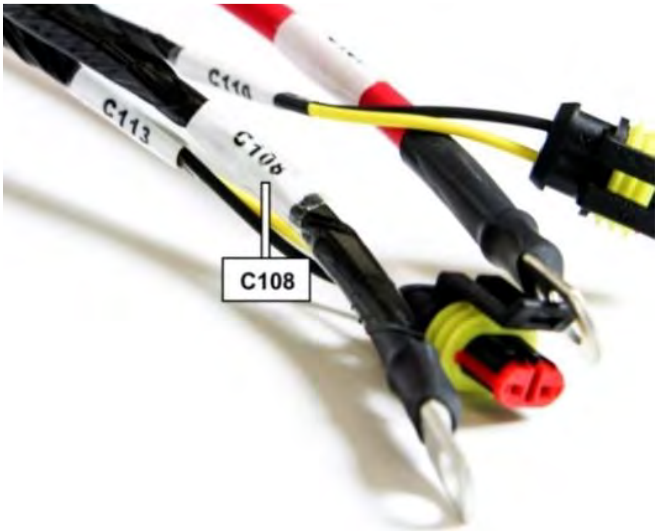
B. Insert C110 into the top connector on the front of the Machine Interface Module.

C. Insert C113 into the bottom connector on the front of the Machine Interface Module.



5. Connect C108, C109, and C112.

A. Locate connectors C108, C109, and C112 on the Under Cab Harness.

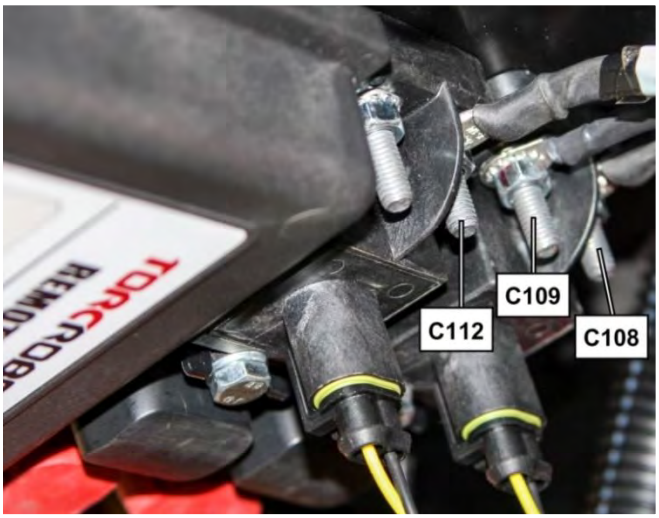


B. Locate the four studs on the upper left side of the MIM.

C. Use the 10mm socket to unscrew the nuts from the **top three** studs.

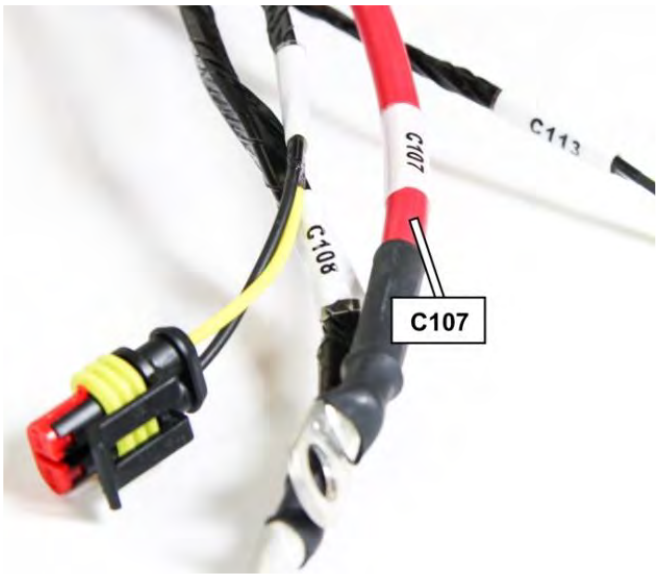
D. Attach the connector ring terminals to the studs in this order from the top: C108, C109, C112.

E. Use the existing nuts to secure the connectors to the studs. Attach provided boots over the studs.



6. Connect C107.

A. Locate connector C107 on the UCH.



B. Locate the top stud above the right side of the MIM. Remove the boot.

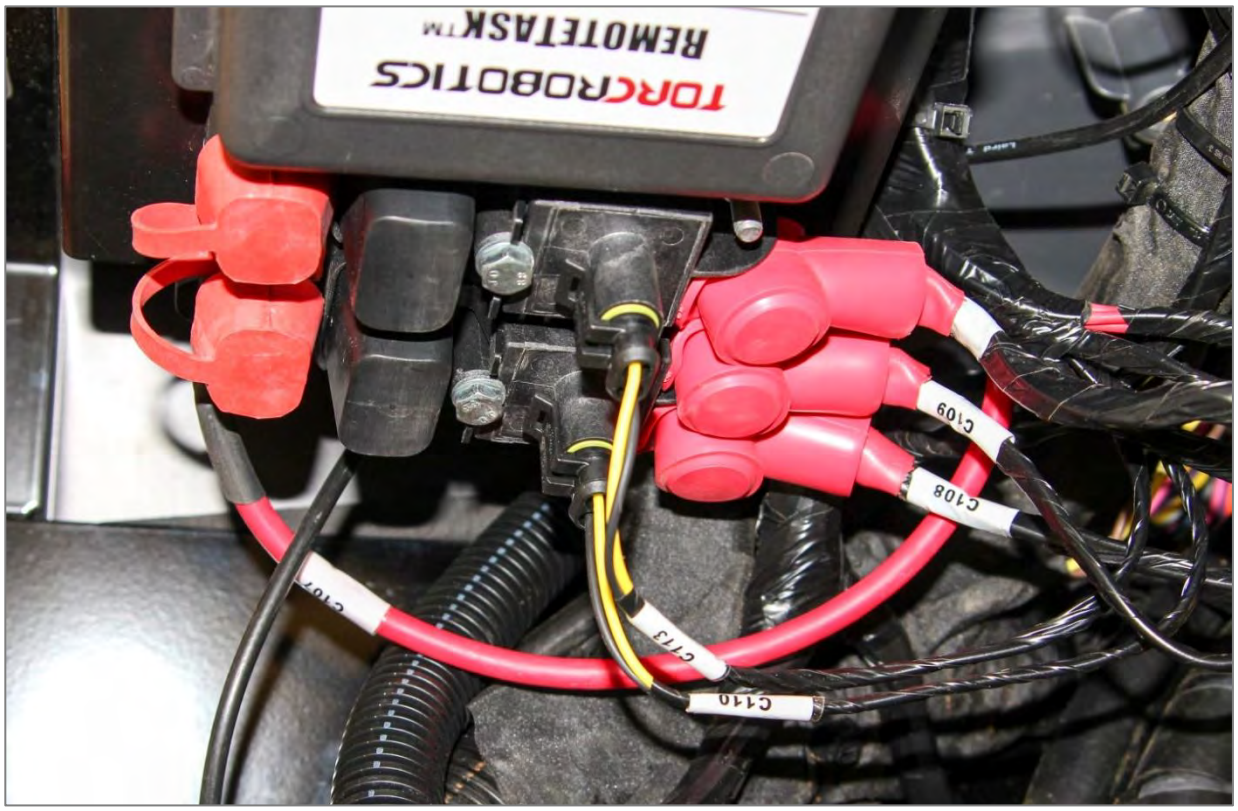
C. Use the 13mm socket to unscrew the nut from top stud.

D. Attach C107 to the stud.

E. Reinstall the nut to secure C107 to the bolt.

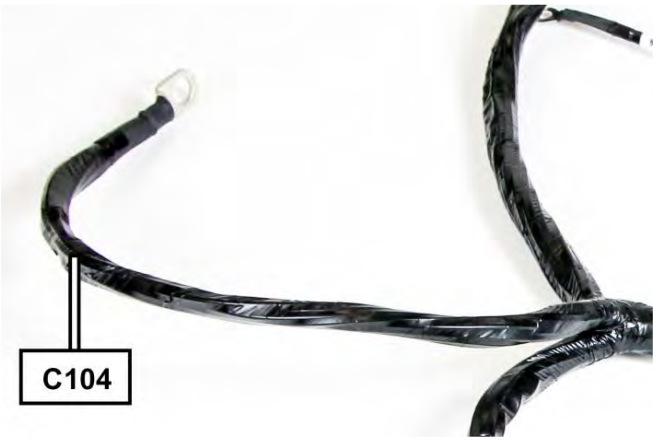
F. Reinstall the boot over the stud.

7. Verify that the connectors and bolts in steps 4-6 are secured.



8. Attach C104.

A. Locate C104 on the Under Cab Harness.



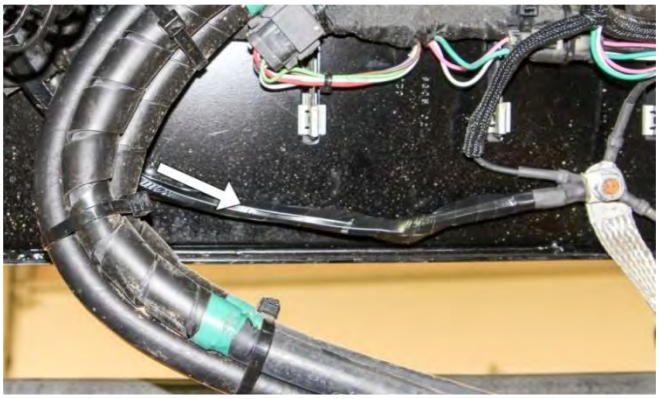
B. Locate the existing ground point on the back of the cab.

C. Use the 16mm wrench to remove the nut on the ground point.

D. Feed C104 along the back of the cab, behind existing CAT harness.

E. Use the 16mm wrench and existing nut to secure C104 on the ground point.

F. Ensure that the C104 connector runs parallel with the back edge of the cab. Use a zip tie to secure it in place behind the existing harness.



9. **Secure the Under Cab Harness.** Tighten all zip ties and clip zip tie ends to secure the harness. Some Under Cab Harness connectors remain unconnected after this step. These connectors will be installed in the following sections.

5.4 Installing the Machine Interface Harness (MIH)

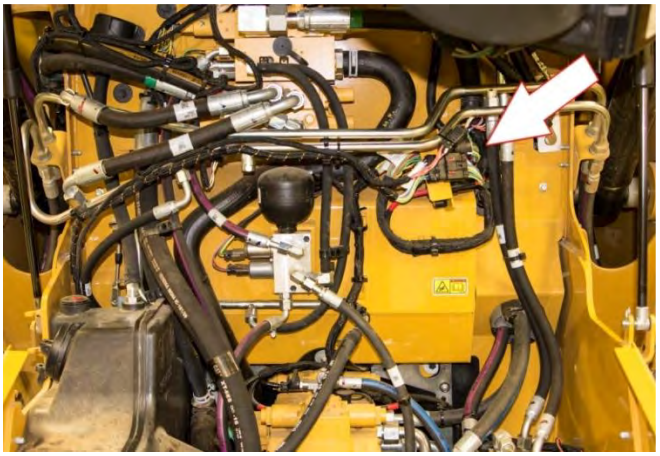
⚠ CAUTION

Do not secure wire harnesses to flexible hydraulic hoses. Technicians servicing these hoses will not secure the RemoteTask wire harness to replacement hoses. Hoses move during normal operation and create wear points which may damage the wiring harness.

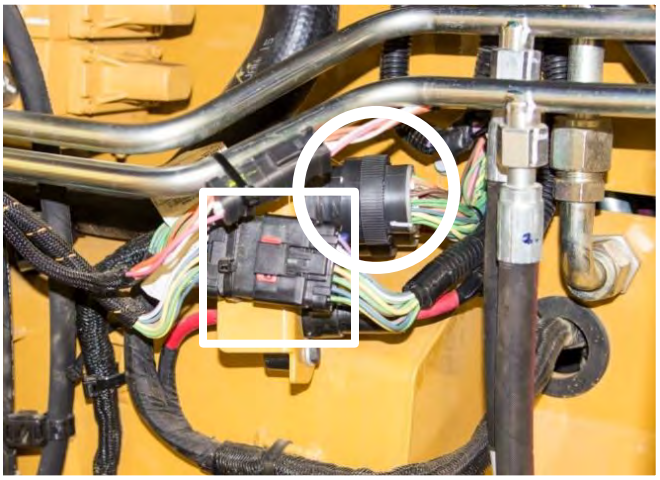
5.4.1 Interfacing with the Machine Connectors

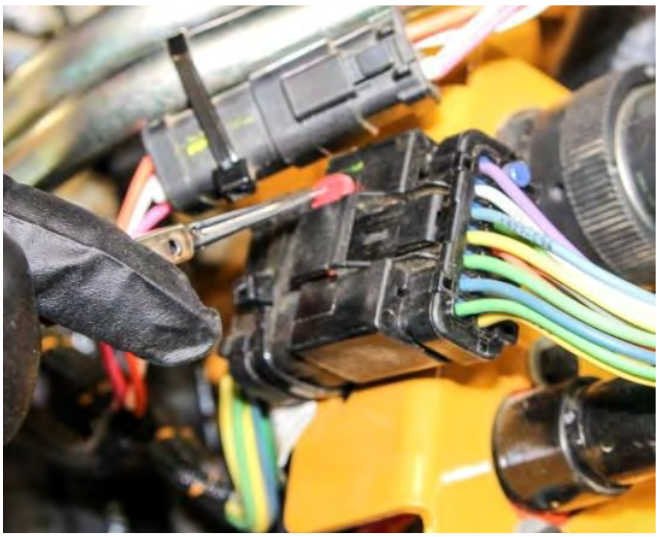
1. **Unplug the CAT connectors.**

   A. Locate the machine connectors secured to the left side of the bulkhead.



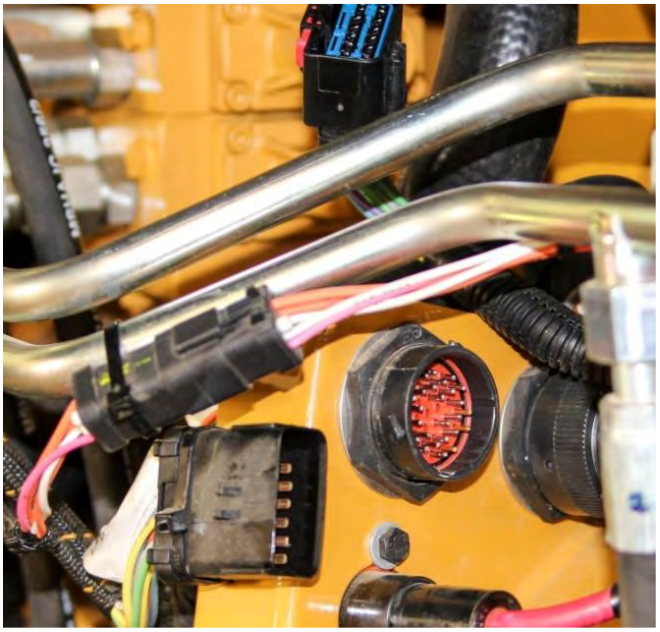
B. Use needle nose pliers to pull the red tab up to unlock the rectangular connector.





C. Unplug the rectangular connector.

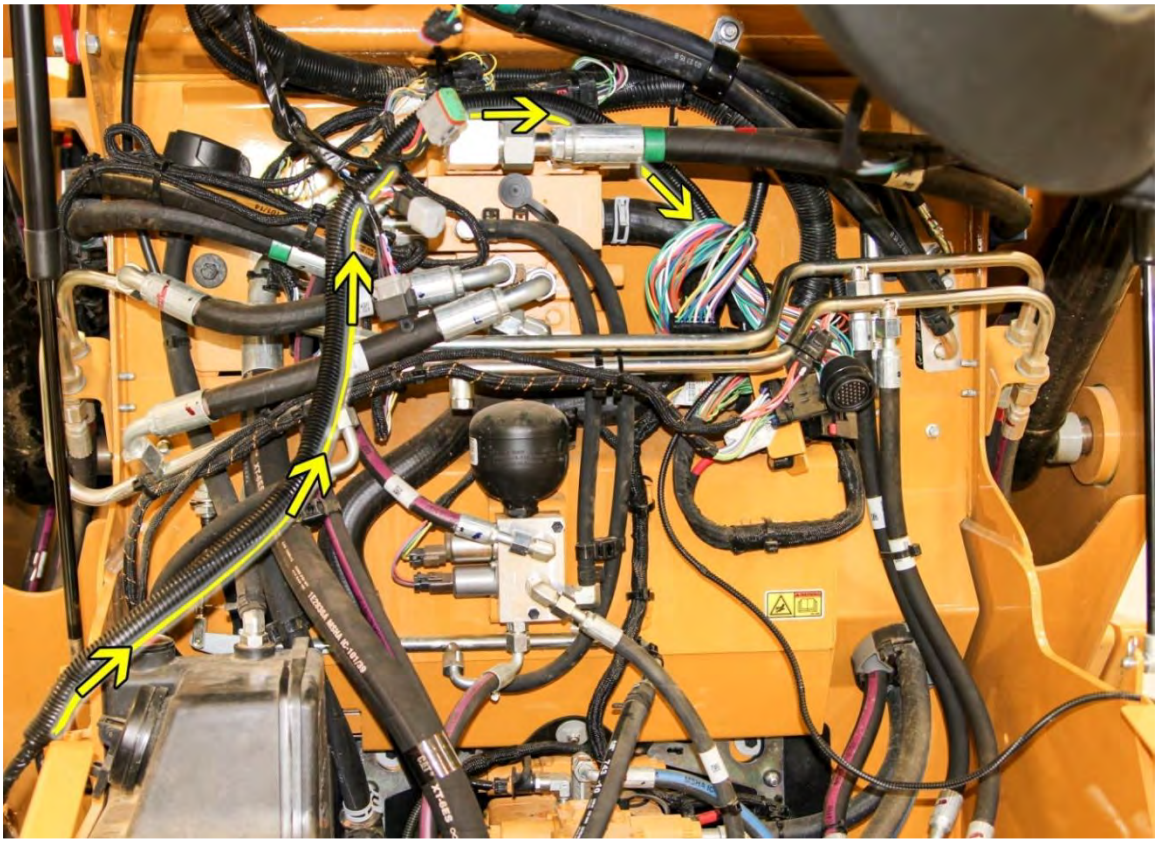
D. Unplug the circular connector.



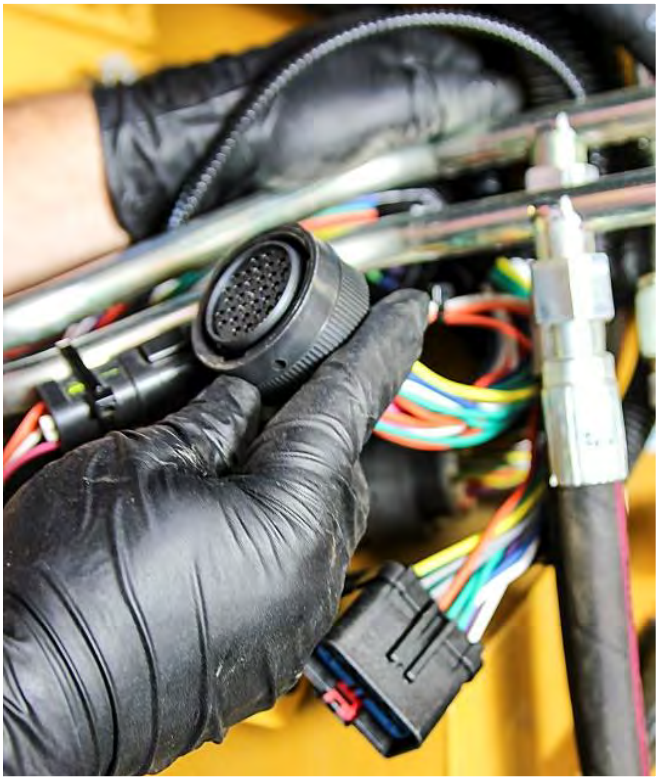
2. Connect the Machine Interface Harness (MIH).

A. Locate the female rectangular and circular connectors on the MIH.

B. Route the MIH behind the bulkhead components as shown. Rest the MIH rectangular and circular connectors next to the machine connectors unplugged in the previous step.



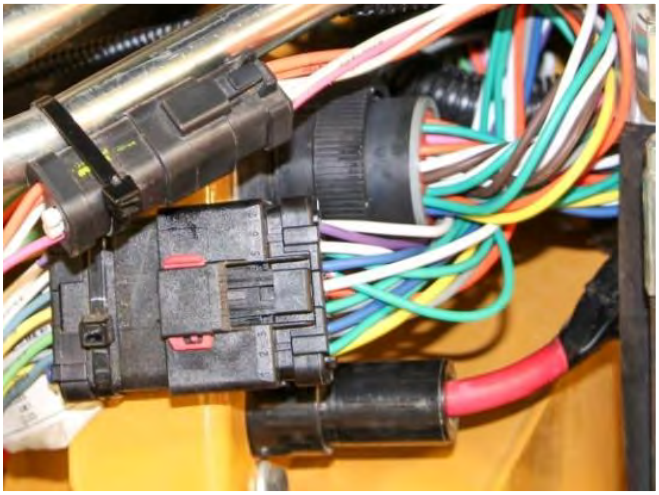
C. Feed the connectors behind the machine components as shown.



D. Connect the circular female MIH connector to the circular male bulkhead connector.

E. Connect the rectangular female MIH connector to the rectangular male bulkhead connector.

F. Use the needle-nose pliers to reengage the red retainer on the rectangular connector.

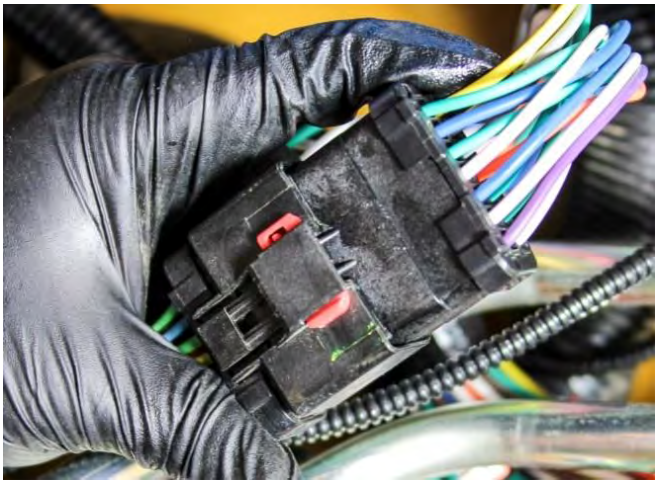


3. Connect the Machine Connectors.

A. Locate the male rectangular and circular connectors on the Machine Interface Harness (MIH).

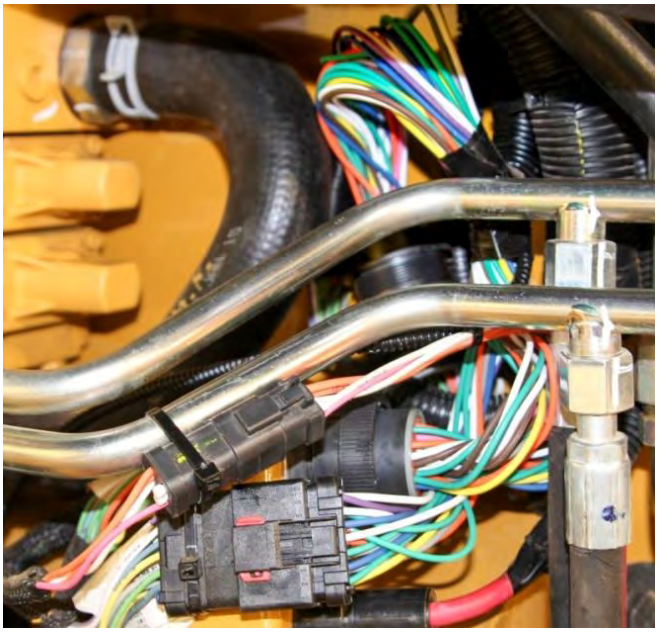
B. Plug the MIH circular connector into the circular female connector that was previously mated to the bulkhead connector.

C. Plug the MIH rectangular connector into the rectangular female connector that was previously mated to the bulkhead connector. Engage the red retainer.



D. Use zip ties to secure the connectors to the existing harness.

E. Ensure that the connector cables are neatly secured behind the existing cab components, and cables are not pinched or strained at attachment points

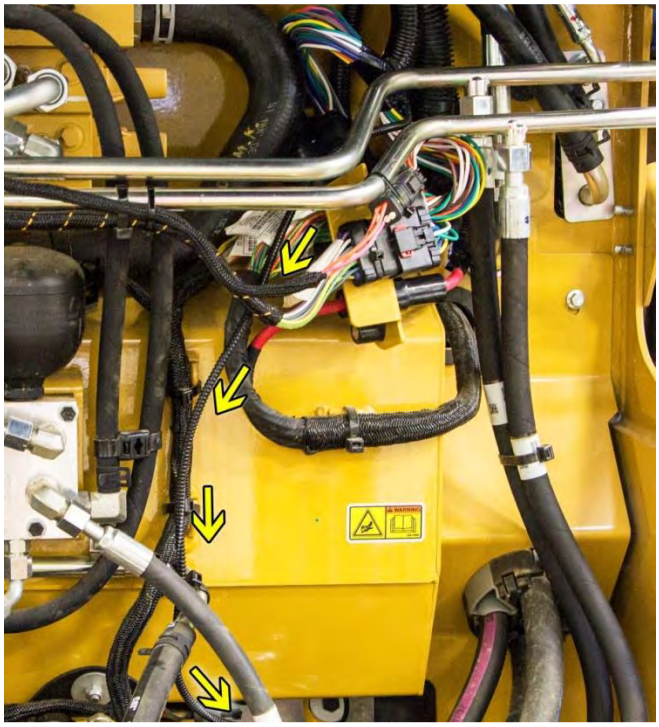


5.4.2 Connect the Horn

1. Route the Horn Connectors.

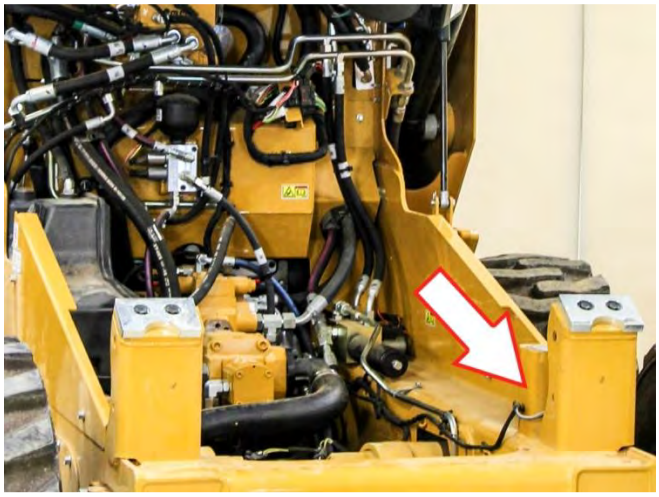
A. Locate connectors C505 and C504 on the Machine Interface Harness.

B. Feed the cable underneath existing machine components and along the existing chassis horn cable.



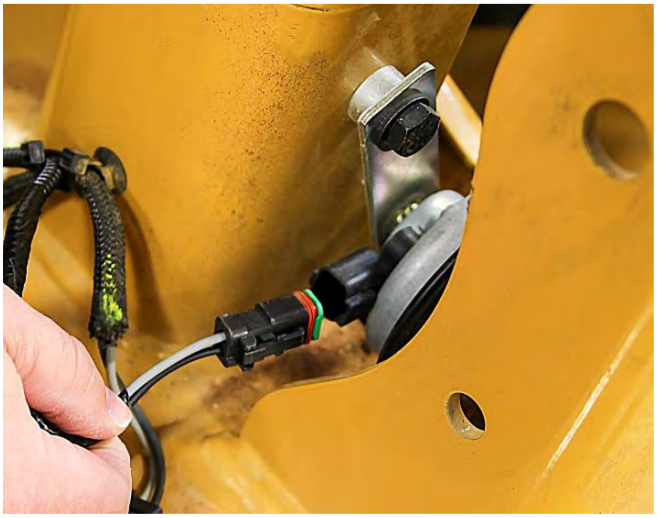
C. Locate the under-cab horn connectors on the front left side of the machine.

D. Route the harness to the machine horn connector.



2. Attach the Machine Interface Harness horn connectors.

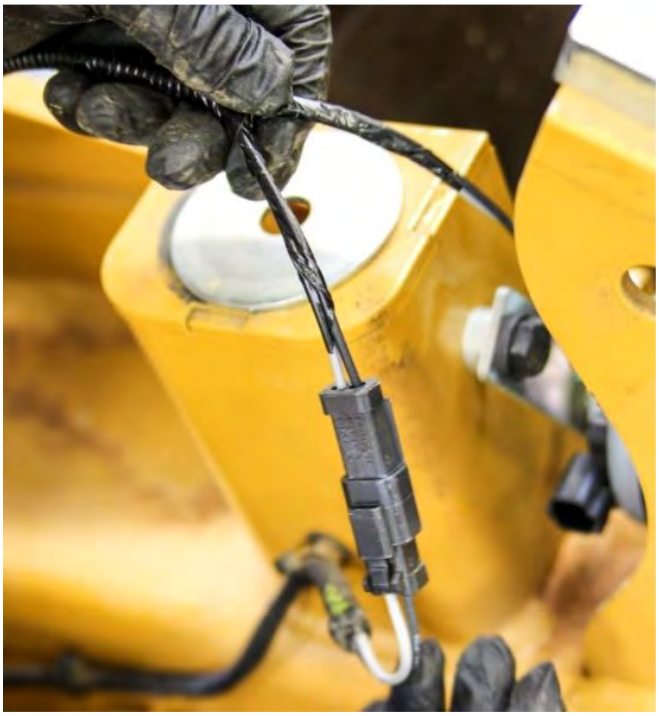
A. Unplug the existing female horn connector from the machine.



B. Plug the existing female horn connector into the male MIH connector.

C. Place the female MIH harness over the existing harness.

D. Plug the female MIH horn connector into the machine male connector.



E. Feed the wiring along the existing horn harness and secure them to each other with zip ties.

⚠ CAUTION

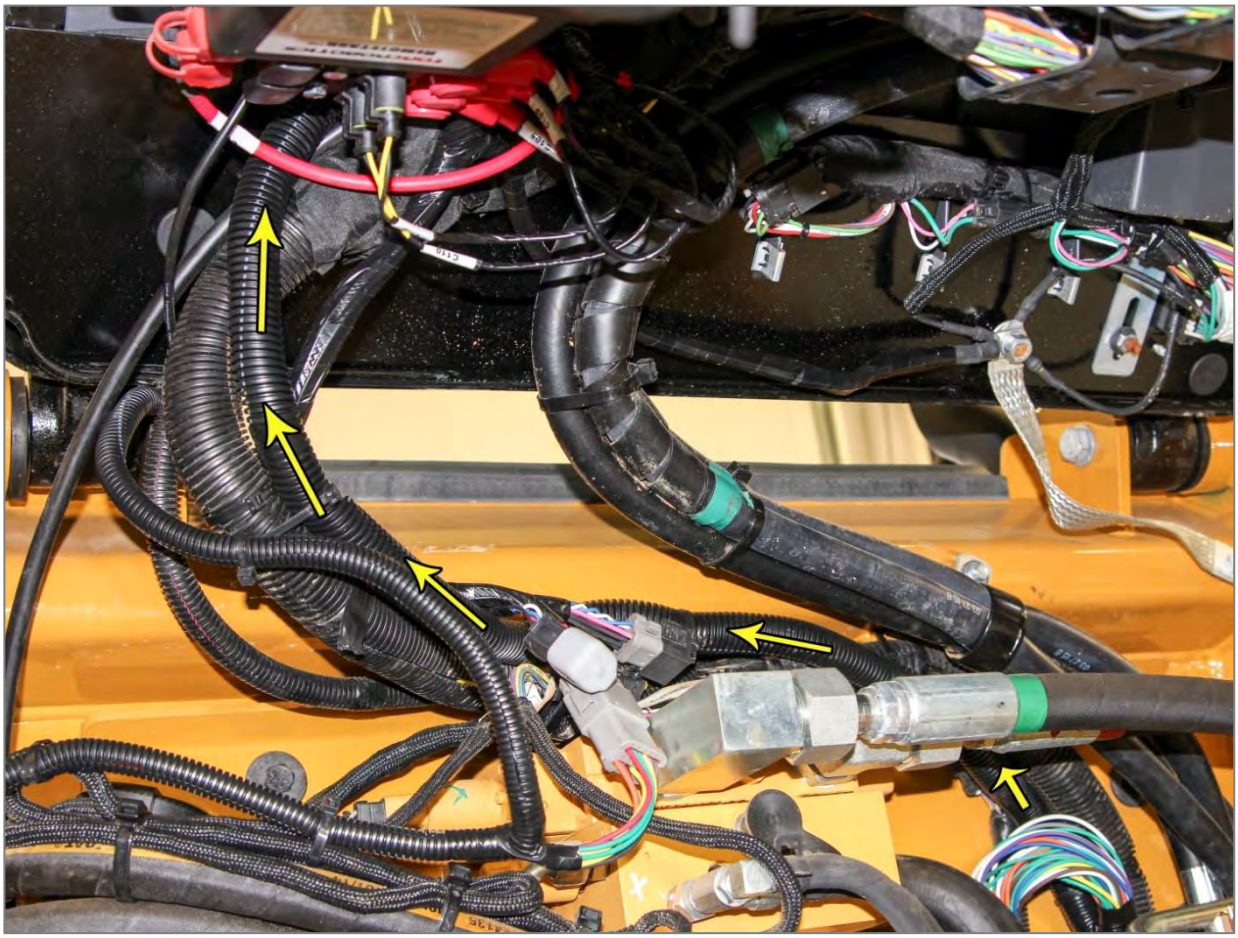
Do not secure wire harnesses to flexible hydraulic hoses. Technicians servicing these hoses will not secure the RemoteTask wire harness to replacement hoses. Hoses move during normal operation and create wear points which may damage the wiring harness.

5.4.3 Connect the Machine Interface Harness to the Under Cab Harness

1. **Route the Machine Interface Harness (MIH).**

   A. Feed the unconnected end of the MIH along the machine harness as shown. Feed the connectors beside the MIM and over the top of all existing harneses.

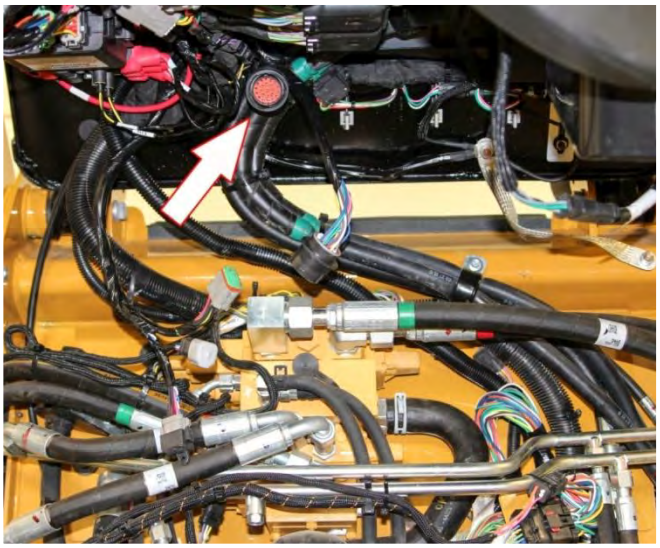
   B. Loosely attach zip ties to keep the MIH in place.



2. Connect C501 to the Under Cab Harness.

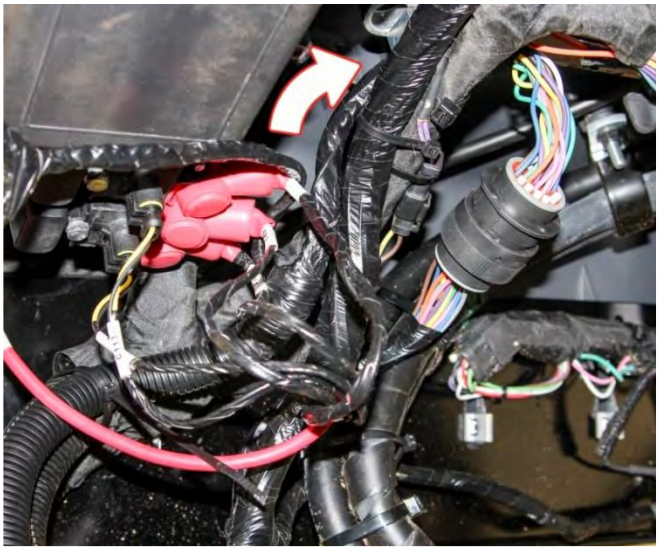
A. Locate the remaining circular female connector C501 on the Machine Interface Harness.

B. Locate the circular male connector C101 on the Under Cab Harness.



C. Verify that the MIH circular connector is routed behind the existing machine harness.

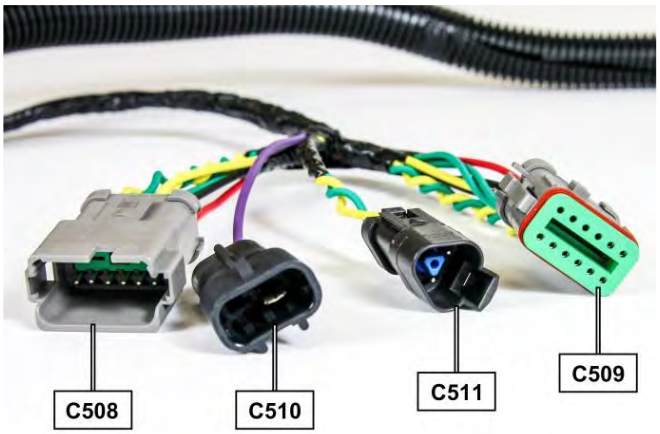
D. Connect the MIH circular connector C501 with the UCH circular connector C101.



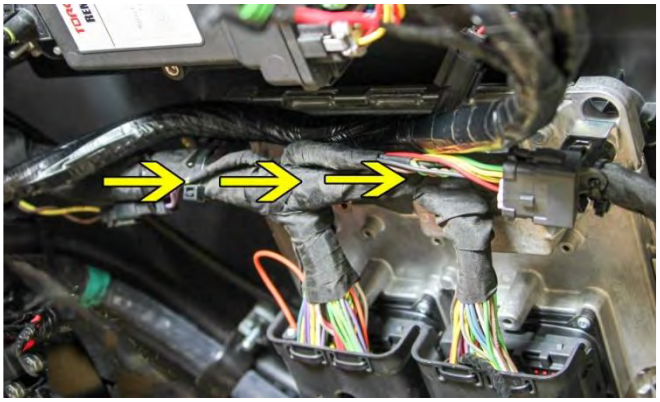
E. Tuck the mated circular connectors behind the existing harness. Zip tie to secure.

3. Connect C508, C510, C511, and C509.

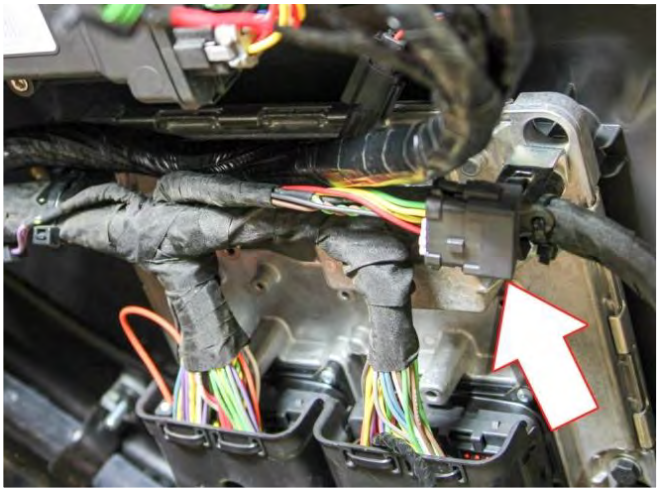
A. Locate connectors C508, C510, C511, and C509 on the Machine Interface Harness (shown in order from left to right in illustration).



B. Feed connectors C508, C510, C511, and C509 along the existing harness near the two large machine ECM connectors.

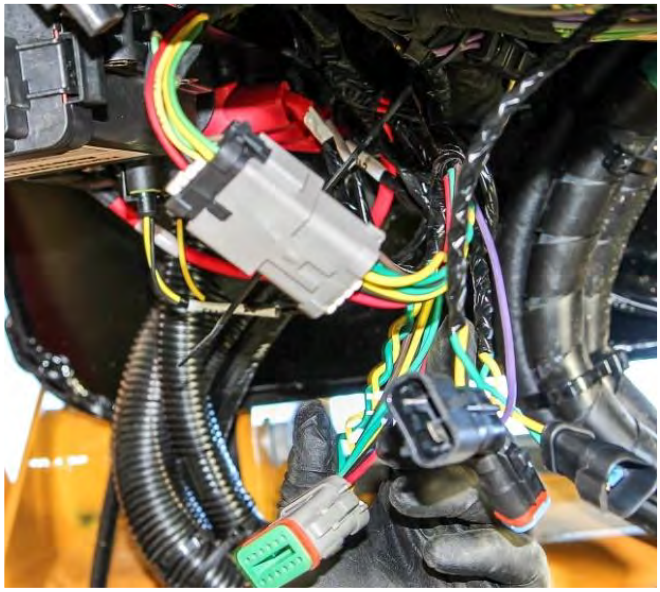


C. Locate the existing CAT Deutsch connector attached to the harness. If product link is installed, this connector will be connected to the product link module.



D. Remove existing CAT Deutsch connector from cover or CAT Product Link module.

E. Plug the existing CAT Deutsch connector into Machine Interface Harness connector C508.

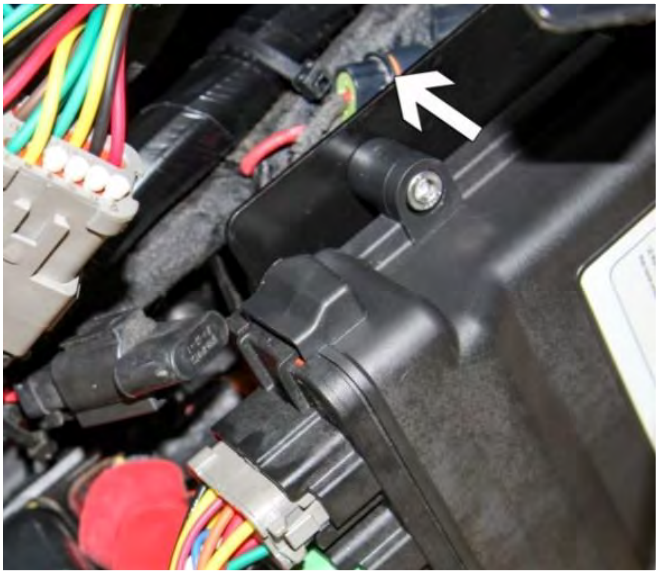


F. Attach Machine Interface Harness Deutsch connector C509 to the existing Deutsch connector cover (or Product Link Module if equipped).

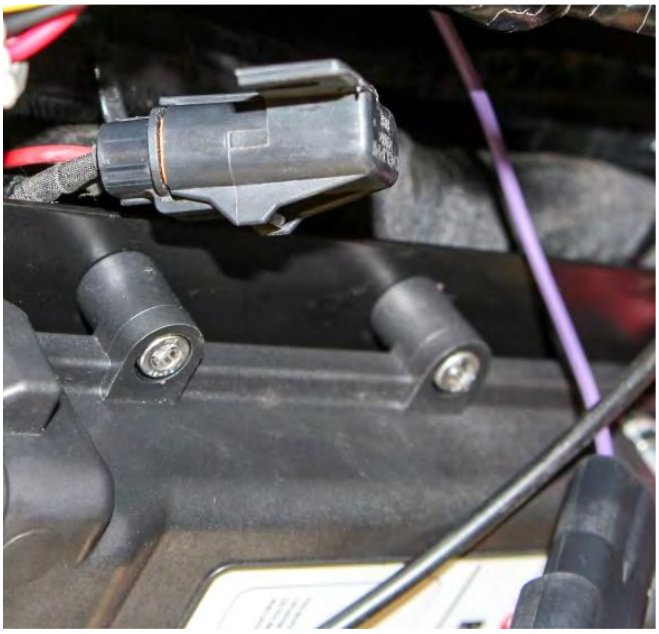
G. Locate the Machine ECM Interface (MEI) previously installed in the lower ECM connector.

H. Plug the female MEI connector into the male MIH connector C511.

I. Locate the existing CAT Delphi PA66 connector behind the Machine Interface Module, on the left side.



J. Use the flush cut pliers to clip the existing zip tie to gain access to the connector.



K. Remove the connector cover to expose the 15 amp fuse.

L. Remove the 15 amp fuse from the existing connector.

M. Plug the existing connector into Machine Interface Harness connector C510.

N. Locate the Under Cab Harness connector C106.

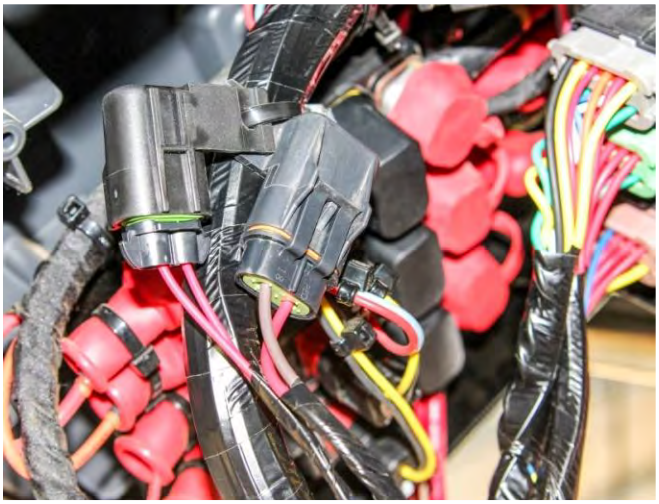
O. Insert the 15 amp fuse into the UCH connector C106.

P. Attach the Cat connector cover to C106.

Q. Use zip ties to secure connectors to the existing harness.

R. Insert zip ties into the provided holes on the covers of connectors C106 and C111.

S. Use zip ties to secure connectors to the Under Cab Harness.



4. **Secure the harness.** Ensure the Machine Interface Harness connectors are routed neatly. Tighten all zip ties to secure the MIH. Clip zip tie ends.

5.5 Installing the User Interface Harness (UIH)

5.5.1 Connect the Under-Cab Components

1. **Connect the User Interface Harness to the Under Cab Harness**

   A. Locate male connector C201 on the User Interface Harness (UIH).

B. Plug the male connector C201into the female connector C102.

2. Connect the antenna cord (C118) to the Machine Interface Module.

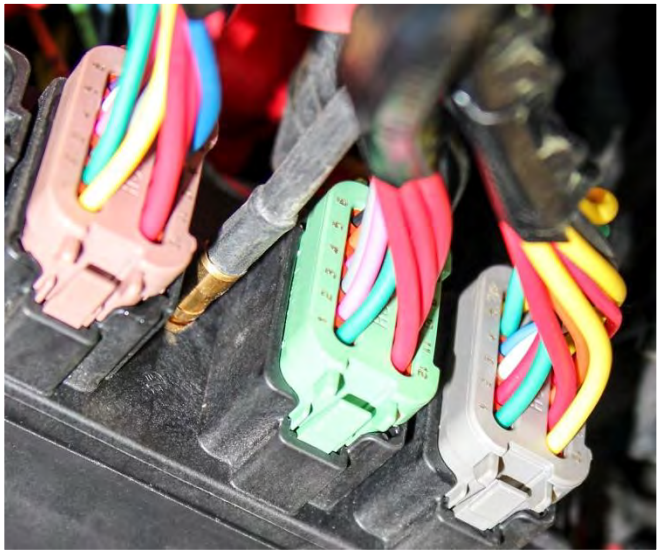
A. Locate the antenna connector (C118) on the UIH.

B. Feed the antenna connector along the top of the under cab, along the existing machine harness on the back of the cab toward the MIM.

C. Locate the female coaxial connector on the bottom of the MIM between connectors C and D.

D. Plug the antenna connector into the MIM.

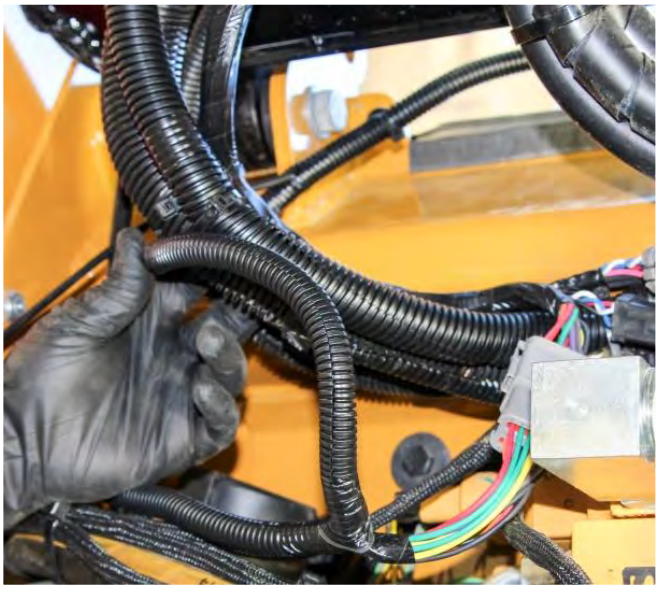
E. Use zip ties to secure the antenna cable in place.



3. Route the antenna.

A. Feed the antenna through the opening between the cab and the machine bulkhead.

B. Feed the section of the cable that contains magnetic attachments through the opening so that the antenna and all magnetic attachments are resting on the back of the machine. Only feed the antenna and cord with magnetic attachments to the back of the cab. All other connectors will remain under the cab.



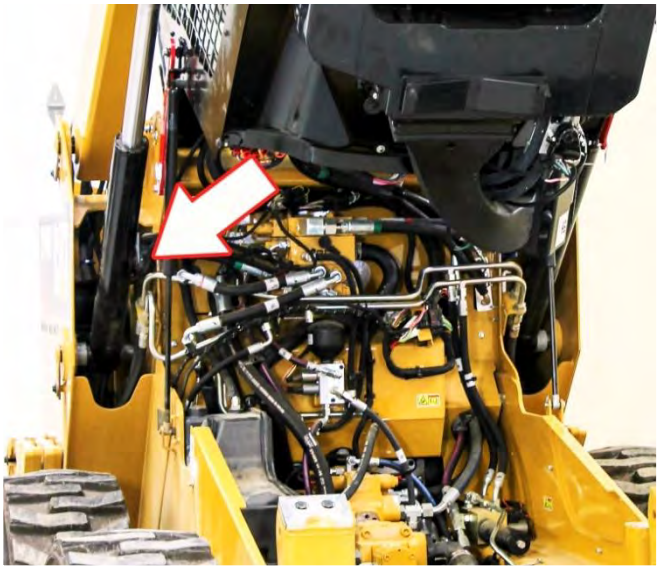
C. Use zip ties to secure the antenna cable and C201 harness to the existing machine harness.

NOTE: The capped UIH connectors are used for firmware upgrades and maintenance, and will remain unconnected during this installation. Use zip ties to secure these connnectors so that they are accessable for future use.

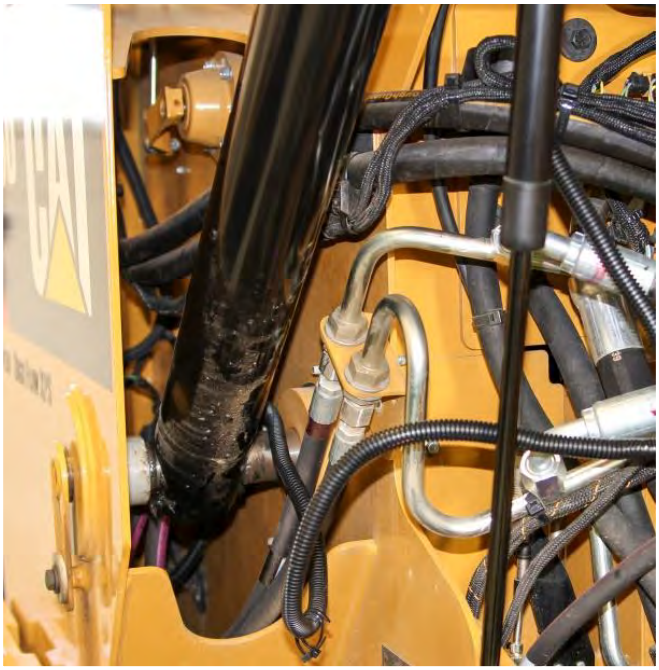
4. Route Connector C202

A. Locate connector C202 on the User Interface Harness.

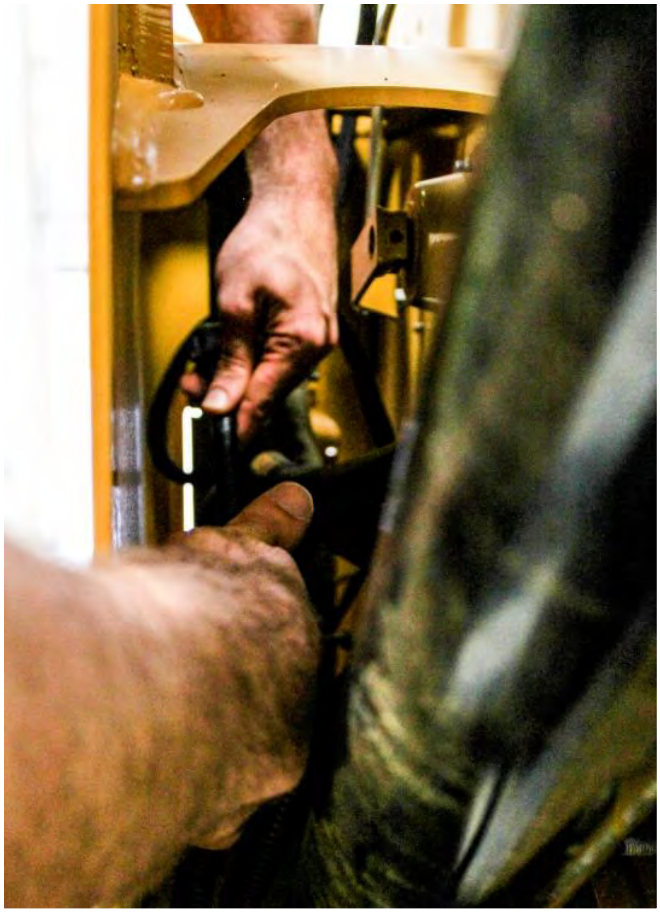
B. Proceed to the outer right side of the machine to route C202.



C. Feed connector C202 through the right side of the machine, along the existing electrical lighting harness running to the rear right tail light.



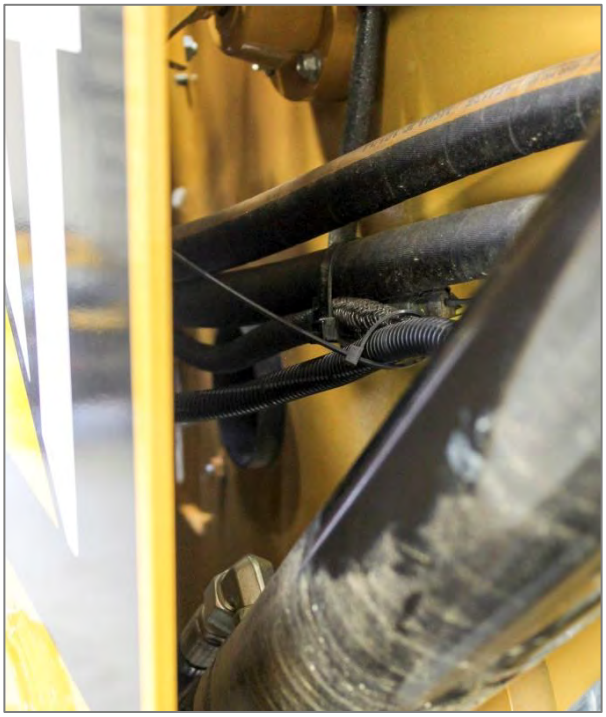
D. Feed the cable toward the rear of the machine.

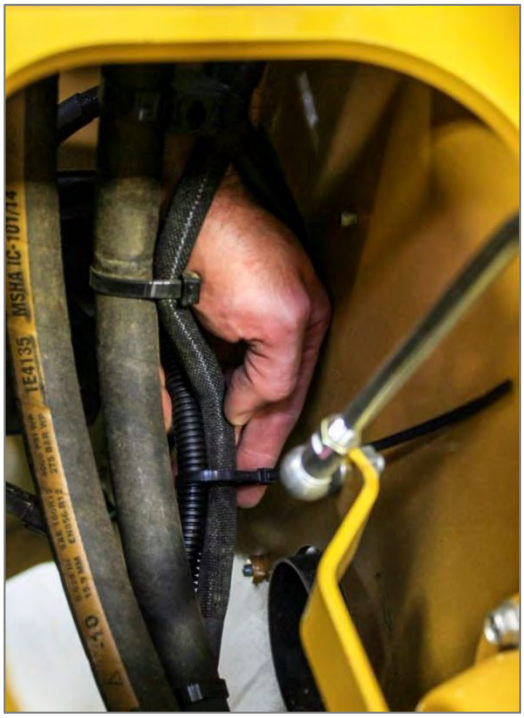


E. Use zip ties to loosely secure the connector cable to the rear electrical lighting harness. Allow enough slack in the cable for the cab to lift and lower without stressing the cable. The connector will be connected to the Remote Enable Interface in the section: “Installing the Remote Enable Interface (REI)”

⚠ CAUTION

Do not secure wire harnesses to flexible hydraulic hoses. Technicians servicing these hoses will not secure the RemoteTask wire harness to replacement hoses. Hoses move during normal operation and create wear points which may damage the wiring harness.





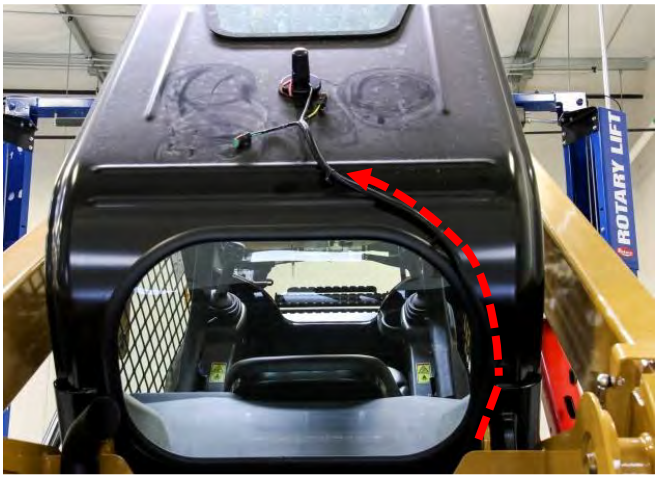
5.5.2 Installing the External Antenna and Indicator Beacons

1. Route the Antenna.

A. Proceed to the back of the machine.

B. Locate the antenna and harness with magnetic attachment points.

C. Feed the antenna cord along the right side of the rear cab window. Affix the magnetic attachments to the cab to secure the cord in place.



2. Install the Indicator Beacons.

A. Locate connectors C203 and C204 on either side of the antenna.

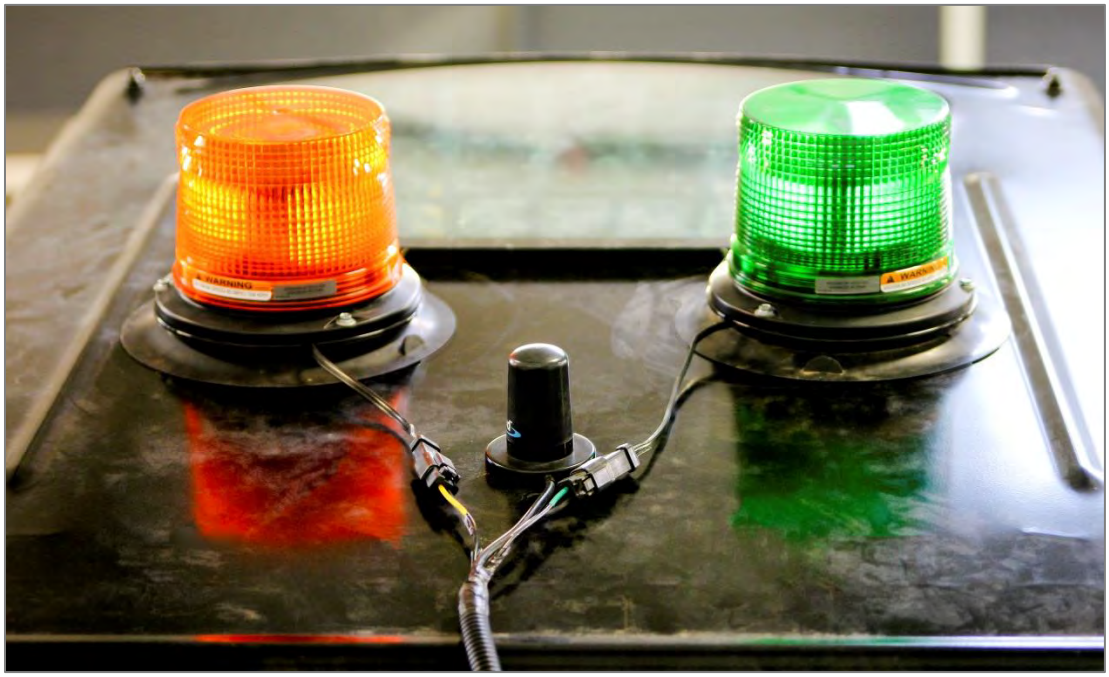
B. Place the amber beacon (RT01-MI-AMB) on the left side of the cab roof.

C. Plug User Interface Harness connector C203 (black and yellow wires) into the amber beacon connector.

D. Place the green beacon (RT01-MI-GRN) on the right side of the cab roof.

E. Plug User Interface Harness connector C204 (black and green wires) into the green beacon connector.

3. Verify that the antenna and beacons are resting level on the cab roof, to ensure the magnetic mounts remain secure.



5.6 Installing the Remote Enable Interface (REI)

1. **Prepare the machine.**

   A. Locate the four screws directly above and below the right rear lights on the machine.

   B. Use the T30 TORX driver to loosen the four screws.

2. Attach the User Interface Harness (UIH) connector.

A. Locate UIH Deutsch connector C202 that was routed through to the right side of the machine in Step 4 of section 5.5.1.

B. Push back the panel to create space for the UIH Deutsch connector to pass beside the lighting assembly to the outside of the machine.

C. Feed the UIH Deutsch connector through the opening to the left of the rear lights. Pull the harness through to allow enough length to reach the REI.

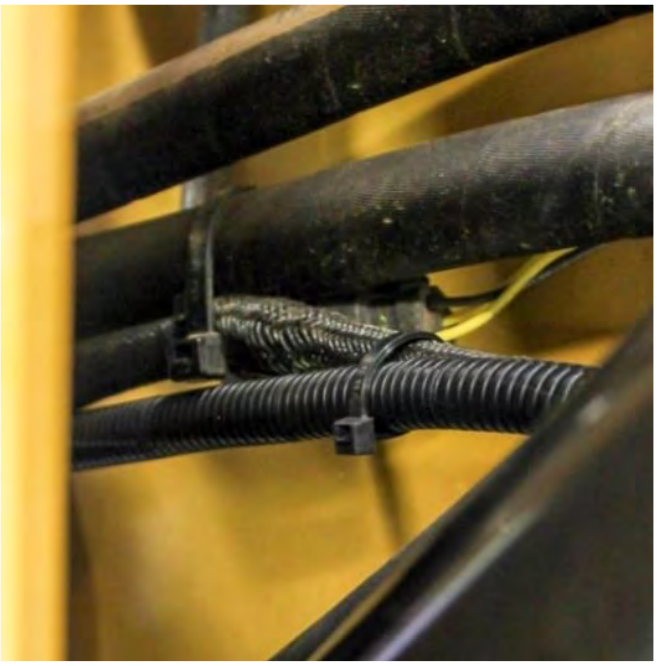
3. Install the Remote Enable Interface (REI).

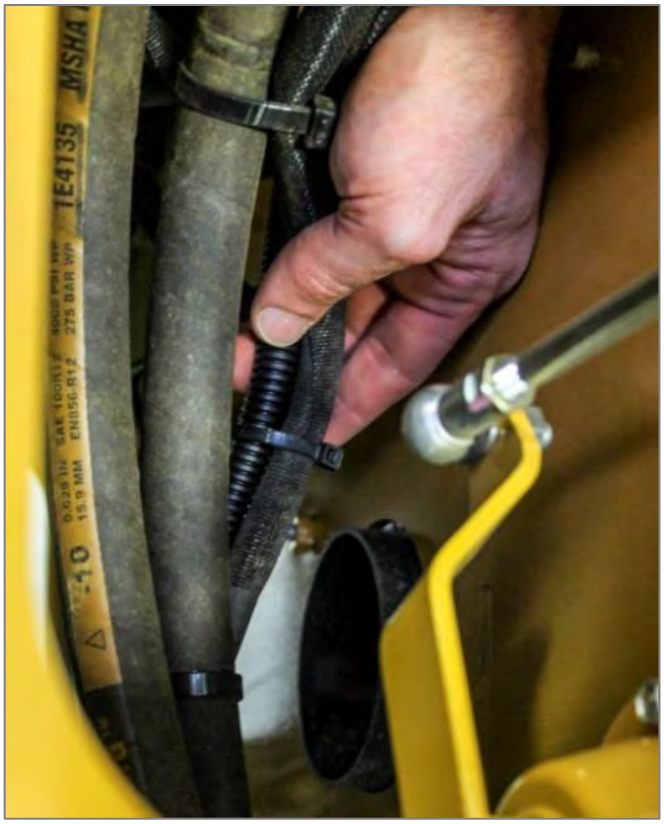
A. Slide the REI down onto the two loosened screws above the right rear light.

B. Plug the UIH Deutsch connector into the connector port underneath the REI.

C. Use the T30 TORX driver to tighten the four screws above and below the left rear light.

D. Proceed to the right side of the machine. Tighten the zip ties along the previously routed harness to secure it in place. Clip zip tie ends.




-10
0.625 IN
15.9 MM
SAE 100R1
EN856-R12
4000 PSI WP
275 BAR WP
1E4135
MSHA

6 Post Installation

After the RemoteTask installation is complete, return the machine to an operational state.

1. **Reconnect the Battery**
   A. Reattach the negative battery cable at the battery.

2. **Lower the Implement Arm**
   A. Enter the cab and turn on the machine.
   B. Have a helper remove the retaining pin from the lift arm brace.
   C. Have the helper swing the lift arm brace into its storage position and secure the brace in the storage position with the retaining pin.
   D. Completely lower the implement arm.
   E. Exit the cab.

6.1 Attaching the Remote Enabled Machine Label

The Remote Enabled Machine warning label is used to alert personnel that the machine has remote control capabilities. A magnetic label is provided with the RemoteTask™ system. This label should be present and legible on every machine installed with RemoteTask.

1. **Prepare the machine surface.** Carefully clean and dry the surface of the implement arm.

2. **Prepare the magnet.** Clean the reverse side of the magnetic material with water, then wipe with a soft cloth and let dry.

3. **Apply the magnet.** Apply the magnet to the front of the implement arm, so it is visible to the operator prior to entering the machine cab.

6.2 Post Installation Testing

The purpose of this section is to validate the system after installation. This document should be used along with the RemoteTask™ Operation and Maintenance Manual. The Operation and Maintenance Manual provides more details about the operation, controls, and feedback provided by system.

⚠ WARNING

Do not operate the machine unless you have read and understand the instructions and warnings in the Operation and Maintenance manual. Most accidents that involve product operation are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. The operator should have the necessary training, skills, and tools in order to perform operation and safety functions properly.

⚠ WARNING

The operator is responsible for safely operating the remote machine. Ensure the remote operation area is clearly marked and personnel do not enter the area during remote operation. Verify site personnel are aware the system will be operating remotely. Maintain line-of-sight with the machine at all times during remote operation.

⚠ WARNING

Do not approach the machine if the Active Indicator (amber beacon) is flashing. Verify with the operator that it is safe to approach the machine.

6.2.1 Test In-Cab Machine Controls

A. Turn on the machine using the CAT key inside the cab.
B. Verify that manual operation of the machine has not been affected by the installation of RemoteTask. Check that the driving controls and implement controls operate normally.
C. Ensure that no new diagnostic codes have been set.
D. Remove attached implements and proceed to test remote operation of the machine.

6.2.2 Test Remote Operation of the Machine

A. Follow the instructions in the RemoteTask Operation and Maintenance Manual section “Transition Machine from Manual to Remote Operation” and “RemoteTask Controller Startup” for initiating remote control of the machine.
B. Upon turning the Remote Enable Interface to the ON position, ensure the green “Ready” indicator on the REI illuminates and blinks slowly.
C. Upon Remote Controller Startup, verify the following:
    - The Remote Control Unit indicator lights illuminate and cycle through applicable red, green, and amber color illuminations (see the Operation and Maintenance Manual section “Operator Feedback” for details on LED indicators.
    - After powering on the Remote Control Unit, ensure that the green Communication Link Indicator beacon on top of the cab begins to blink.

6.2.3 Test the Emergency Stop Function

A. Use the Remote Control Unit key switch to start the machine’s engine. Verify that the machine engine starts and system indicators match the previous machine settings.
B. Proceed to the Remote Enable Interface.
C. Press the Emergency Stop button on the REI. Verify that the Emergency Stop control disables the engine and that the machine is in an OFF state.
D. Release the Emergency Stop button on the REI by twisting it clockwise until release.
E. Restart the engine with the Remote Control Unit.
F. Press the Emergency Stop button on the Remote Control Unit.
G. Verify that the Emergency Stop button disables the engine and the machine is in an OFF state. Release the Emergency Stop button and power cycle the controller.

6.2.4 Test Remote Controls

For information on operating the Remote Control Unit controls, see the Operation and Maintenance Manual sections “Operator Controls,” “Joystick Controls,” and “Control Knobs.”

A. Use the Remote Control Unit key switch to start the machine’s engine. Verify that the machine engine starts and system indicators match the previous machine settings.
B. Press the horn button on the RemoteTask Control Unit. Verify that the machine horn sounds.
C. Release the parking brake and hydraulic lockout. Verify that the amber Active Indicator beacon on top of the cab begins to blink.
D. Adjust the engine speed by rotating the engine speed dial. Verify that the machine’s engine speed changes in accordance with the control.
E. If the machine is equipped with an electronic tool coupler, test the remote functionality of the coupler by engaging and disengaging the coupler pins.
F. If the machine is equipped with auxiliary electrical connections, test each while the parking brake is engaged. Measure the voltage at the AUX electrical connector.

7 Remote Controller Replacement Parts

7.1 Replacing the Protection Cage

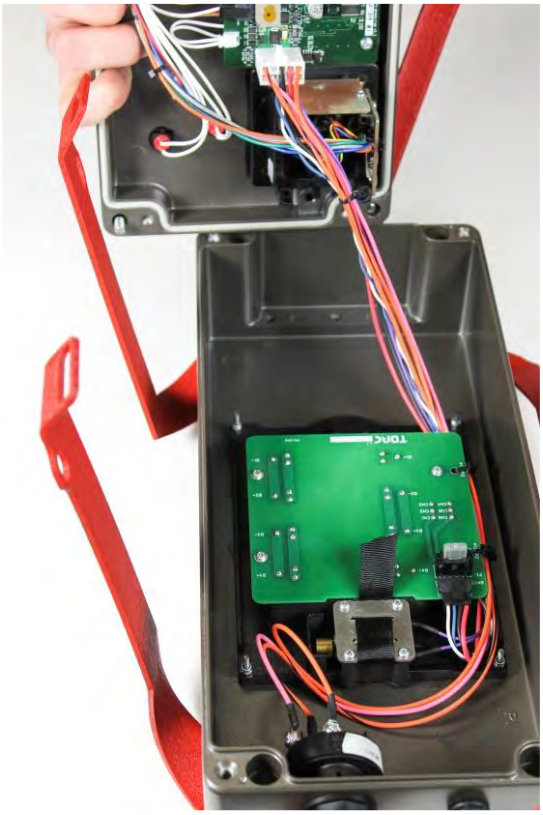
⚠ CAUTION

Replacing the protection cage requires access to the interior of the controller unit. Perform this replacement in a clean and dry location to prevent damage to the sensitive electronics inside the unit.

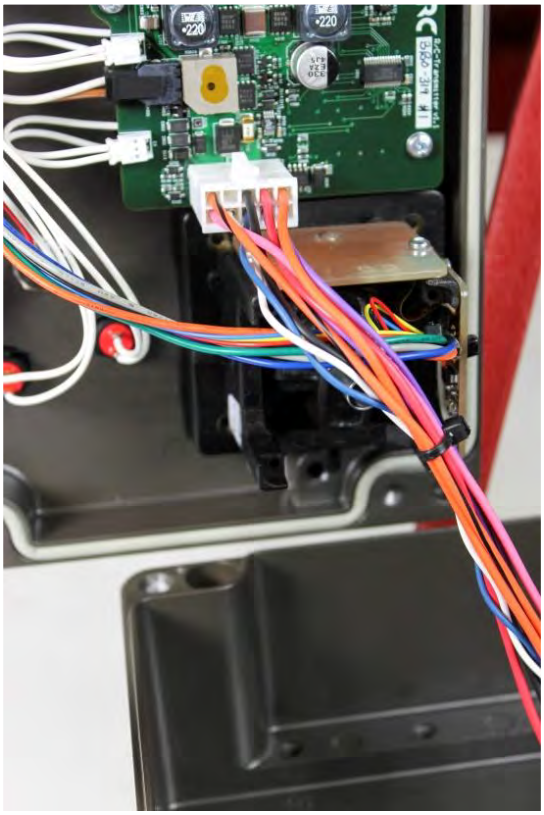
1. **Remove existing protection cage.**

   A. Using a #3 Phillips screwdriver, unscrew the top four screws on the Remote Control Unit lid to gain access to the mounting screws.

B. Lift the lid of the Remote Control Unit enclosure.



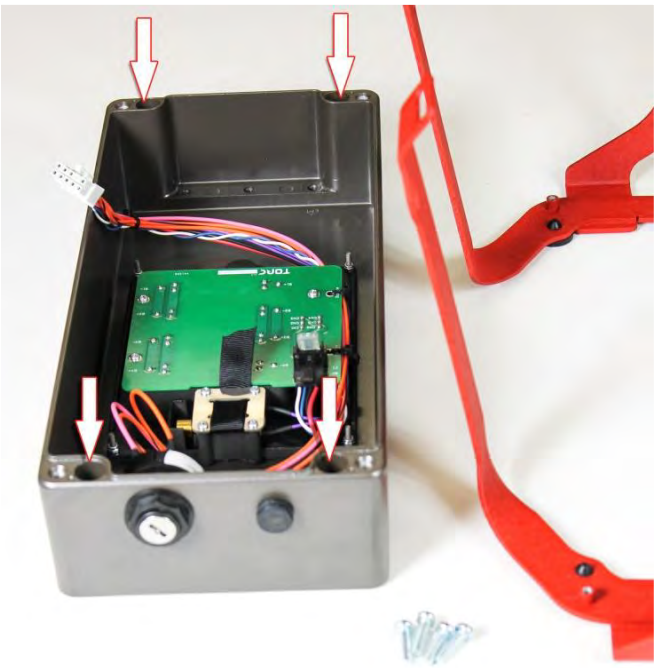
C. Disconnect the white connector from the PCB connector on the lid of the Remote Control Unit enclosure.



D. Using a #2 Phillips screwdriver remove the (4) screws from the Remote Control Unit mounting holes.

E. Remove the Remote Control Unit from the original protection cage.

F. Align the Remote Control unit with the replacement protection cage as shown.

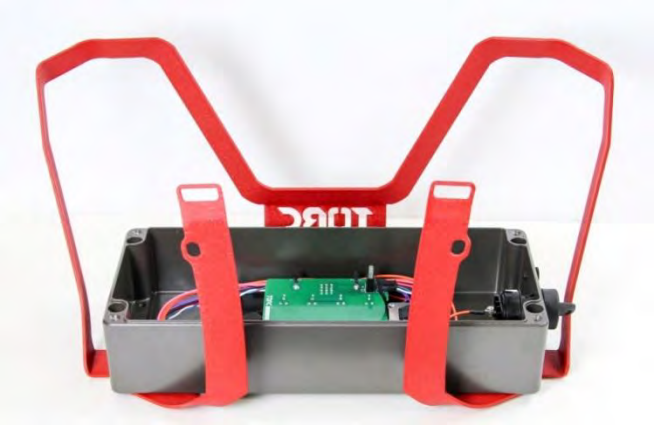


2. Install the Replacement Protection Cage.

A. Lower the Remote Control Unit onto the protection cage, aligning the female threaded standoffs with the bottom enclosure holes.

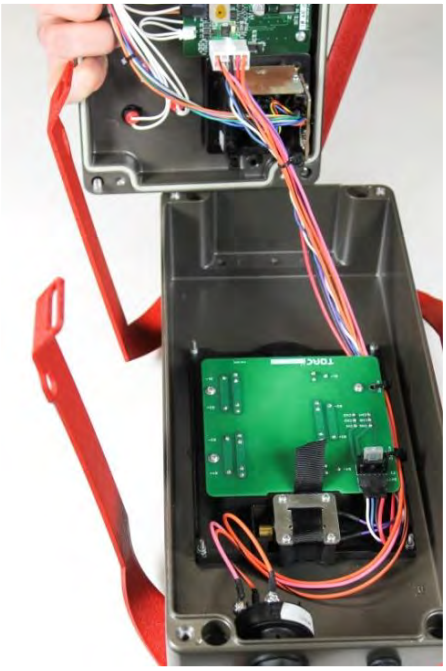
B. Apply Loctite 222 to the mounting screws and insert the screws into the Remote Control Unit mounting holes.

C. Tighten screws to secure the protection cage.



D. Reconnect the white connector to the Remote Control Unit lid. Be careful not to touch or damage the PCB while plugging in the connector.

E. Place the lid on enclosure making sure not to pinch the wiring. Secure the lid screws.



7.2 Installing the Operator Shoulder Harness

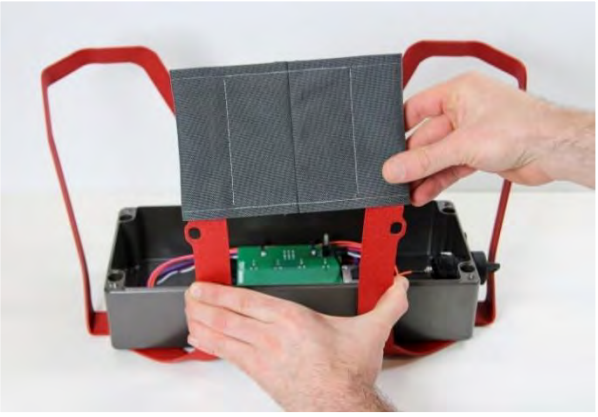
⚠ NOTICE

Some of the pictures in this manual were taken with some prototype components. The appearance of these components will differ slightly from the production components.

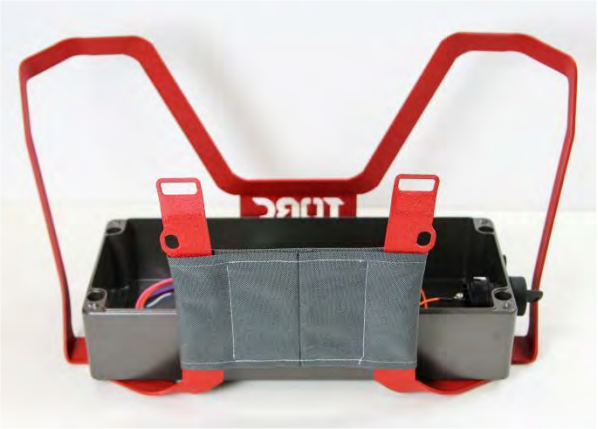
The controller lid should remain attached during installation of the operator shoulder harness.

1. **Attach the Belly Pad to the Protection Cage.**

A. Squeeze the back metal arms of the protection cage inward to insert them into the provided belly pad pockets.



B. Slide belly pad down metal arms until the top hem rests below the shoulder pad attachment holes.



2. Attach the Shoulder Harness to the Protection Cage.

A. Feed webbing straps through provided holes in the back of the protection cage.

B. Fold the straps over and feed the straps through the plastic tri-bar locks.

C. Feed the straps back through the tri-bar locks.

D. Clip the two rear straps to the mounting holes on the back of the protection cage.

8 FCC Compliance

This equipment has been approved for mobile applications where the equipment should be used at distances greater than 20cm from the human body (with the exception of hands, wrists, feet, and ankles). Operation at distances less than 20 cm is strictly prohibited. This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation. FCC ID: KQL– RM024

9 Limited Warranty

TORC Robotics, Inc. (herein referred to as TORC) guarantees that the product(s) you have purchased from TORC are free from defects in materials or workmanship for a period of one year from the original date of purchase. Within this period TORC will, at its sole discretion, repair or replace any components which fail under normal use. This warranty does not cover failures due to abuse, misuse, accident, or unauthorized alterations or repairs. There are no other warranties, expressed or implied, which extend beyond the description contained herein including the implied warranty of merchantability and fitness for a particular purpose. TORC expressly excludes all other warranties TORC's liability is limited to the cost of repair or replacement of the product. Such remedy shall be the sole and exclusive remedy for any breach of warranty. TORC shall not be liable for: 1. Damage to other property caused by any defects in the product, damages based upon inconvenience, loss of use of the product, loss of time, loss of profits, loss of business opportunity, loss of goodwill, interference with business relationships, or other commercial loss, even if advised of the possibility of such damages. 2. Any indirect or other damages, whether incidental, consequential, or otherwise. 3. Any claim against the customer by any other party