TORCROBOTCS

REMOTETASKTM Remote Control System



Parts and Installation Manual

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RemoteTaskTM Alpha

Parts and Installation Manual

V1.1

1 General Information

1.1 Assignment of Liability

WARNING: DO NOT OPERATE UNTIL PARTS AND INSTALLATION 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.

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1.2 Foreword

This manual provides safety information and installation instructions for the RemoteTask Remote Control System for CAT Alpha series SSL and CTL machines.

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.

1.3 Compatible Machines

Skid Steer Loaders: 226D, 232D

Compact Track Loaders: 239D, 249D



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2 Safety Information

2.1 General 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:

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

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

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



2.2 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.

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.

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.

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.

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.

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.



\Lambda 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.

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.

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.

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.

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.

3 RemoteTask Alpha Parts and Tools

3.1 RTA01 RemoteTask Parts List

Parts included in the RTA01-MI RemoteTask Machine Interface Assembly			
Quantity	Part Number	Description	
1	RTA01-MI-MIM	Machine Interface Module, Mounting Bracket and Hardware	
1	RTA01-MI-MIH	Machine Interface Harness	
1	RTA01-MI-MEI	Machine ECM Interface	
1	RTA01-MI-UCH	Under Cab Harness	
1	RTA01-MI-REI	Remote Enable Interface	
1	RTA01-MI-UIH	User Interface Harness	
1	RTA01-MI-AMB	Active Indicator (Amber Beacon)	
1	RTA01-MI-GRN	Communication Link Indicator (Green Beacon)	
1	RTA01-MI-PRM	Power Relay Module Assembly	

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 RTA01-DOC RemoteTask Remote Control System				
Quantity Part Number Description				
1	RT01-DOC-OMM	Operation and Maintenance Manual		
1	RTA01-DOC-PIM	Parts and Installation Manual		

Templates Included			
Quantity Part Number Description			
1	D05142	MIM Install Location Template	
1	D05143	REI Install Location Template	

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		Remote Control ISO Warning Label		

3.2 Machine Interface Assembly Parts Overview

	Machine Interface Module (MIM)
TORCROBOTICS	RTA01-MI-MIM
	The Machine Interface Module is comprised of the on-machine RemoteTask ECM and mounting plate. This device wirelessly communicates with the RemoteTask controller. The part number and serial number remain visible after installation; it is mounted to the bottom of the cab. MIM shown attached to included mounting bracket and hardware.
	Machine Interface Harness (MIH)
	RTA01-MI-MIH
	TPN: 10115
-	The Machine Interface Harness connects the Under Cab Harness to the machine.
	Machine ECM Interface (MEI)
	RTA01-MI-MEI
	TPN: 8694
	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)
	RTA01-MI-UCH
9	TPN: 10114
Contraction of the second seco	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.
R	



	Remote Enable Interface (REI)
	RTA01-MI-REI
	The Remote Enable Interface is mounted on the engine cover on the rear of the machine. 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)
	RTA01-MI-UIH
	TPN: 10113
	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
	The external Communication Link Indicator (green beacon) indicates when the Machine Interface Module is communicating with the RemoteTask Controller.
	Active Indicator (Amber Beacon)
Contraction and Contraction	RTA01-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).
	Power Relay Module Assembly
	RTA01-MI-PRM
	The Power Relay Module Assembly is comprised of power relays to distribute power from the RemoteTask system to machine functions, as well as fuses for the RT system. It is mounted on the rear of the cab.

3.3 Required Tools

Description	Quantity
10mm Socket	1
13mm Socket	1
16mm Socket	1
18mm Wrench	1
24mm Wrench	2
4mm Hex Driver	1
3mm Drill Bit	1
5mm Drill Bit	1
6.5mm Drill Bit	1
6" Extension Bar	1
9" Extension Bar	1
Allen Wrench	1
Deburring Tool	1
Drill	1
Flat head screwdriver	1
Flush cut pliers	1
Flush cut pliers	1
M6 – 1.0 Tap Tool	1
Needle Nose Pliers	1
Scissors	1
Socket Wrench	1
Spring Punch	1
T25 TORX Driver	1
T30 TORX Driver	1
T50 TORX Driver	1
Utility Knife	1

3.4 Required Materials

Description	Description	
8" Zip Ties	As Required	
11" Zip Ties	As Required	
Threadlocker	Loctite 242	
Cutting Oil	1 bottle	
Silicone Compound	825 Silicone Compound	
Painter's Tape	Optional	



3.5 Required CAT Parts and Hardware

The Machine Interface Module (MIM) is designed to be mounted to the machine air conditioner plate. If the machine is not equipped with an air conditioner, additional Caterpillar parts must be purchased to supply the mounting surface for the MIM. Refer to the following tables for parts and additional tools required to complete installation.

CAT Part	CAT PN	Quantity
Plate AS	418-5870	1
Screw – Truss Head (M12X1.75X25-MM)	345-7725	1
Nut (M12X1.75-THD)	8T-4244	1
Washer (13.5X40X3-MM THK)	8T-4821	2
Washer (7X19X2-MM THK)	9X-2038	2
Screw – Truss Head (M6X1X25-MM)	3E-8020	2

4 Pre-Installation

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.

Ensure machine is a safe state for installation or servicing. Park the machine 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 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.

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5 Installing the Machine Interface Assembly

5.1 Installing the Machine ECM Interface (MEI)

5.1.1 General Information

The MEI (TPN:10572) is installed to the ECM connector closest to the bottom of the cab.



Required Tools and Materials

Tools	Quantity
Needle Nose Pliers	1
Flat head screwdriver	1
Flush cut pliers	1
4mm Hex Driver	1

Materials	Description
8" Zip Ties	As Required



5.1.2 Installation Instructions

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.

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5.2 Installing the Machine Interface Module (MIM)

5.2.1 General Information

The Machine Interface Module (RTA01-MI-MIM) is installed on the CAT Air Conditioning plate underneath the cab area

The plate which mounts the HVAC duct must be installed in order to complete RemoteTask MIM installation.



Required Tools and Materials

Tools	Quantity
Utility Knife	1
Scissors	1
Spring Punch	1
Drill	1
5mm Drill Bit	1
6" Extension Bar	1
Deburring Tool	1
M6 – 1.0 Tap Tool	1
T30 TORX Driver	1

Materials	Description
MIM Install Location Template	D05142
Loctite/Threadlocker	1 bottle
Cutting Oil	1 bottle
Painter's Tape	Optional



5.2.2 Machine Requirements

The Machine Interface Module (MIM) is designed to be mounted to the machine air conditioner plate. If the machine is not equipped with an air conditioner, additional Caterpillar parts must be purchased to supply the mounting surface for the MIM. Refer to the following tables for parts and additional tools required to complete installation.

Required Caterpillar Parts

CAT Part	CAT PN	Quantity
Plate AS	418-5870	1
Screw – Truss Head (M12X1.75X25-MM)	345-7725	1
Nut (M12X1.75-THD)	8T-4244	1
Washer (13.5X40X3-MM THK)	8T-4821	2
Washer (7X19X2-MM THK)	9X-2038	2
Screw – Truss Head (M6X1X25-MM)	3E-8020	2

Required Additional Tools

Tools	Notes
18mm Wrench	-
Ratchet	-
9" Extension for Ratchet	-
T50 TORX Socket	
T30 TORX Socket	-

5.2.3 Installation Instructions

1. MODIFYING THE CAT AC PLATE

- A. At the back of this manual, locate and remove the *MIM Install Locating Template* (D05142).
- B. Use scissors to cut template along indicated lines (see template). Cut a hole in template where directed.
- C. Align template as shown.

NOTE: Consult template for details on cutting areas.

D. Use spring punch to mark the mark at the 4 areas indicated on the template.

NOTE: Painter's tape can be used to secure the template to the plate to prevent the template from moving during modification.







- E. Apply cutting oil to the marked areas.
- F. Use 5mm drill bit to drill the 4 holes.



G. Deburr all holes.



H. Apply cutting oil to the holes and use an M6x1.0 tap to thread all holes.





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2. INSTALLING THE MIM

- A. Align the 4 holes on the MIM mounting plate with the 4 holes previously drilled in the panel.
- B. Ensure the MIM is oriented as shown with the connectors pointing to the near end of the plate.



- C. Locate the 4 screws and 4 washers included with the MIM assembly.
- D. Apply a small amount of Loctite to each screw.



E. Use a T30 TORX Driver to install the screws and washers in the previously drilled holes, securing the MIM to the panel.

NOTE: Attach screws loosely until all 4 screws are installed.



F. Tighten screws to 10.5Nm (7.7 ftlbs).



3. INSTALLING THE MODIFIED AIR CONDITIONING PLATE

- A. Locate required CAT hardware listed in section 5.2.2
- B. Lower the cab. Reference the applicable Cat Operation and Maintenance manual for detailed instructions on lowering the cab.
- C. Enter the cab.
- D. Locate the circular rubber plug to the left of the cab seat.
- E. Remove the rubber plug.





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F. Install washer (8T-4821) on the M12 bolt and place the bolt in the opening, with the head of the bolt inside the cab.

G. Lift the cab and secure.

NOTE: Ensure the bolt and washer stay in place as the cab is being lifted.

H. Locate the 2 air conditioning plate mounting studs on the bottom of the cab.





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- I. Locate the modified air conditioning plate.
- J. Orient the plate openings over the holes and mount the left side of the plate onto the previously installed bolt as shown.

K. Install washer (9X-2038) onto an M6 screw and install into the air conditioner plate mounting hole.



L. Use T30 TORX driver to install both screws.





M. Install washer (9X-2038) and M12 nut onto the bolt previously installed in the cab. N. Feed T50 TORX Driver and extension through the side of the cab to tighten the bolt.

- O. Use T50 TORX Driver and 18mm wrench to tighten bolt and secure it in place
- 0 60
- P. Ensure all bolts are tightened.



5.3 Installing the Remote Enable Interface (REI)

5.3.1 General Information

The REI (RTA01-MI-REI) is mounted on the engine cover on the rear of the machine.



Required Tools and Materials

Tools	Quantity
Utility Knife	1
Scissors	1
Spring Punch	1
Drill	1
3mm Drill Bit	1
6.5mm Drill Bit	1
Deburring Tool	1
M6x1.0 Thread Tap	1
Ratchet	1
6" Extension	1
10mm Socket	1

Materials	Description
REI Install Location Template	D05143
Threadlocker	Loctite 242
Cutting Oil	1bottle
Painter's Tape	Optional

5.3.2 Installation Instructions

- 1. MODIFYING THE ENGINE ACCESS COVER
 - A. Locate the mounting area for the REI, on the stationary portion of the right rear engine cover.

- B. At the back of this manual, locate and remove the *REI Install Locating Template* (D05143). Use scissors to cut template along indicated lines (see template for directions).
- C. Align template over the existing plate as shown.

NOTE: Ensure template is aligned with indicated left tab and top edge of the machine cover.

D. Use spring punch to mark the 4 hole locations indicated on the template.









- E. Apply cutting oil to drill areas.
- F. Drill 6.5mm holes at each of the 4 marked positions, starting with 3mm pilot holes.
- G. Deburr the holes as necessary.

NOTE: Place shop towels under the engine cover to contain cutting oil and drill debris.



2. INSTALLING THE REI

- A. Locate the 4 hex screws and washers included with the REI assembly.
- B. Assemble the screws and washers before applying Loctite.



C. Feed the screw through the bottom of the engine cover into the previously drilled hole as shown.

- D. Use 10mm socket to install all screws securing the REI to the machine.
- E. Tighten screws to 10.5Nm (7.7 ftlbs).



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5.4 Installing the Power Relay Module (PRM)

5.4.1 General Information

The PRM (RTA01-MI-PRM) is installed on the back of the cab, on the right side.



Required Tools and Materials

Tools	Quantity
T25 TORX Driver	1

5.4.2 Installation Instructions

1. INSTALLING THE MODULE

A. Proceed to the indicated area on the right rear side of the cab.





- B. Locate the 3 indicated OEM screws.
- C. Use the T25 TORX driver to loosen the screws, allowing enough room to slide the PRM bracket onto the screws.

NOTE: Do not over tighten screws. These screws are threaded into plastic which will easily strip out.



- D. Insert the PRM mounting plate onto the screws as shown.
- E. Tighten screws to secure.

NOTE: Do not over tighten. These screws are threaded into plastic which will easily strip out.



5.5 Installing the Machine Interface Harness (MIH)

5.5.1 General Information

The MIH (TPN: 10115) routes from the chassis firewall to the center rear of the cab.



Required Tools and Materials

Tools	Quantity
Flush Cut Pliers	1

8" Zin Ties As Required	



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



5.5.2 Installation Instructions

1. INTERFACING WITH MACHINE CONNECTORS

A. Locate the indicated OEM Deutsch circular connector closest to the chassis body.



B. Disconnect the OEM connector.



D. Plug circular MIH connector C503 into the previously disconnected OEM receptacle.



E. Connect the circular MIH connector C502 to the previously disconnected OEM plug.

- F. Locate the indicated 14-position Delphi connectors on the right side of the machine.
- G. Unlock the red retainer on the connectors and disconnect.

MACHINE INTERFACE HARNESS INSTALLATION







- H. Install the MIH Delphi connector C507 to the female OEM Delphi connector.
- I. Reengage the red retainer.





J. Connect MIH connector C506 to the male OEM Delphi connector.

K. Reengage the red retainer on the connectors.

wires are not pinched or strained.

M. Secure wires with zip ties.







and associated and the terminal process of the



2. INSTALLING CAB CONNECTORS

- A. Route the unconnected sections of the MIH along the existing harness toward the back of the cab as shown.
- B. Use zip ties to loosely secure.

C. Route MIH connector C501 to the branch in the harness at the top-rear of the cab.

NOTE: Connector C501 will remain disconnected until section 5.6.

- D. Route connectors C508, C509, C510, and C511 toward the bottom of the cab, along the existing harnesses near the 2 large machine ECM connectors.
- E. Use zip ties to loosely support harness while routing.



View from under the cab

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F. Locate the existing OEM Deutsch connector attached to the harness.

NOTE: If product link is installed, this connector will be connected to the product link module.

G. Remove existing OEM Deutsch connector from the cover or CAT Product Link module.



- H. Locate Machine Interface Harness (MIH) Deutsch connector C509
- I. Install C509 into the existing Deutsch connector cover (or Product Link Module if equipped).

J. Install the existing OEM Deutsch connector into female MIH connector C508.

K. Secure connectors to existing harness with zip ties.

Interface (MEI) connector (P/N

5.1.



MACHINE INTERFACE HARNESS INSTALLATION

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- M. Plug the MEI connector into the MIH connector C511.
- N. Use zip ties to secure connectors to the existing harness.



O. Locate the existing OEM 2-position Delphi connector to the left of the power relays.



- P. Cut the existing zip tie securing the connector cover.
- Q. Remove the connector cover to expose the 15 amp fuse (blue).





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

NOTE: Save the 15 amp fuse and OEM connector cover for installation into the Under Cab Harness in section 5.6.

- S. Locate Machine Interface Harness (MIH) connector C510.
- T. Connect the 2-position OEM connector to MIH connector C510.



U. Secure the connector to the harness with a zip tie.



3. SECURING THE HARNESS

- A. Ensure the Machine Interface Harness connectors are routed neatly and no wires are strained or pinched.
- B. Tighten all zip ties.
- C. Cut all zip tie ends.



5.6 Installing the Under Cab Harness (UCH)

5.6.1 General Information

The UCH (TPN: 10114) routes from the MIM in the front of the cab to the top rear of the cab.



Required Tools and Materials

Description	Quantity
Ratchet	1
6" Extension	1
10mm Socket	1
13mm Socket	1
16mm Socket	1
Flush cut pliers	1

Materials	Description
8" Zip Ties	As Required

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

5.6.2 Installation Instructions

1. CONNECTING THE UNDER CAB HARNESS TO THE MIM

- A. Locate Under Cab Harness connectors C104 and C101.
- B. Route both connectors along the OEM harness and secure loosely with zip ties at the base of the cab as shown.



- C. Locate UCH connectors C114, C115, and C116.
- D. Route these connectors along the OEM harness toward the MIM. Loosely zip tie to provide strain relief during installation

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View from under the cab

- E. Route connectors to the bottom right side of the cab toward the MIM as shown.
- F. Install connector C115 into MIM connector C





- G. Install connector C114 into connector C.
- H. Install connector C116 into connector D.

NOTE: MIM connector B is not used and arrives with a preinstalled plug. Ensure open plugs are always sealed to protect from dust and moisture.

I. Secure harness with zip ties as necessary.

2. CONNECTING THE UCH TO THE MIH

- A. Route UCH connectors C102, C103, and C117 along the OEM harness toward the rear right of the machine as shown
- B. Secure with zip ties.

NOTE: C102 will remain disconnected until Section 5.7 Installing the User Interface Harness

- C. Locate female Machine Interface Harness connector C501 previously routed to the back of the cab.
- D. Locate male Under Cab Harness connector C101.



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- E. Route MIH connector C501 behind OEM cab harness.
- F. Connect the MIH connector C501 with the UCH circular connector C101.

- G. Tuck the mated circular connectors behind the OEM harness.
- H. Secure with zip ties.



- I. Locate indicated the OEM ground stud on the back of the cab.
- J. Use 16mm socket to remove the nut on the ground point.



K. Locate Under Cab Harness connector C104 (ring terminal).

- L. Route C104 along the back of the cab, behind the OEM harness.
- M. Use the 16mm wrench and existing nut to secure C104 on the ground point.

NOTE: Ensure C104 is oriented so that the wiring does not get damaged when the cab is lowered.

N. Use zip ties to secure wing in place behind the OEM harness.





3. CONNECTING UCH TO THE FUSE DISTRIBUTION MODULE

- A. Locate UCH connector C107 (ring terminal).
- B. Ensure C107 is routed near the previously installed Power Relay Module.

C. Remove the boot covering the outside bolt on the Power Relay Module.



View from under the cab

- D. Use a 13mm socket to remove the existing nut and washer from the stud.
- E. Install the ring terminal onto the power stud.
- F. Use a 13mm socket to secure the ring terminal with the existing washer and nut.
- G. Replace the boot.



View from under the cab

H. Locate Under Cab Harness connectors C108, C109, and C112 (red booted ring terminals).

- I. Locate the 4 studs on the front of the Fuse Distribution Module.
- J. Use the 10mm socket to unscrew the nuts from the 3 **inside** studs.



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- K. Remove the boots from the terminals to gain access to the UCH connectors.
- L. Attach the connector ring terminals to the studs in the following order from inside to outside:

C1	80
C1	09
C1	12

M. Use the existing nuts to secure the connectors to the studs.







View from under the cab

N. Secure the provided boots over the studs.



O. Locate UCH connectors C110 and C113.

P. Insert connector C110 into the inside connector on the Power Relay Module

Q. Insert connector C113 into the outside connector on the Power Relay Module.



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4. CONNECTING CAT FUSE

A. Locate Under Cab Harness connector C106



- B. Locate 15 amp fuse and connector cover previously removed from the CAT connector in section 5.5.
- C. Insert the 15 amp fuse into C106



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- D. Attach CAT connector cover to C106
- E. Attach the connector with a zip tie to the harness.



F. Secure UCH connector C111 to existing harness with zip ties.





5. CONNECTING C105

A. Locate Under Cab Harness connector C105 (ring terminal).



- B. Route C105 toward the OEM power bus bar.
- C. Remove the boot covering the outside stud.



View from under the cab



- D. Use 13mm socket to remove existing nut and washer from the outside stud
- E. Use the existing nuts to secure connector C105 to the stud.



View from under the cab

F. Replace boot over the stud.





6. SECURING THE HARNESS

- A. Locate 2 edge clip zip ties, provided with the installation kit.
- B. Use edge clip zip ties to secure the Under Cab Harness near MIM connectors to the AC plate and cab edge.



- C. Ensure all of the UCH connectors are routed neatly and no wires are strained or pinched.
- D. Tighten all zip ties.
- E. Clip all zip tie ends.



View from under the cab

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5.7 Installing the User Interface Harness (UIH)

5.7.1 General Information

The User Interface Harness (TPN: 10113) routes from the MIM at the bottom of the cab to the external components installed on the back and roof of the machine.



UIH routing inside the cab



UIH routing outside the cab



Required Tools and Materials

Tools	Quantity
Flush cut pliers	1
Flathead screwdriver	1
Materials	Description
8" Zip Ties	As Required

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

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5.7.2 Installation Instructions

1. INSTALLING ROOF COMPONENTS

- A. Locate the UIH antenna base and connectors C203 and C204.
- B. Locate the antenna.



C. Place the antenna on the UIH base and turn it clockwise until it fits tightly on the base.



- D. Proceed to the back of the machine.
- E. Place the antenna on the center of the cab roof, approximately 1ft from the rear edge.
- F. Route the antenna cable along the right side of the rear cab window. Affix the magnetic attachments to the cab to secure the cable in place.





- G. Locate connectors C203 and C204 on either side of the antenna.
- H. Place the amber beacon (RTA01-MI-AMB) on the right side of the cab roof.
- I. Plug UIH connector C203 (black and yellow wires) into the amber beacon connector.
- J. Place the green beacon (RTA01-MI-GRN) on the left side of the cab roof.
- K. Plug UIH connector C204 (black and green wires) into the green beacon connector.





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





2. INSTALLING UNDER-CAB COMPONENTS

- A. Locate the antenna coaxial connector C 205.
- B. Use zip ties to loosely secure the antenna cable at the base of the existing harnesses at the chassis.
- C. Route the antenna connector cable along the Under Cab Harness, toward the MIM previously installed on the cab.

- D. Install connector C205 into the female coaxial connector between connectors C and D on the MIM.
- E. Secure the cable to the UCH to provide strain relief.





F. Use zip ties to loosely secure the cable along the UCH.



View from under cab

- G. Route the remaining unconnected harness C201, C102, C103, and C117 behind existing harnesses in the bulkhead area.
- H. Route UIH connector C202 under all existing harnesses and hoses, toward the outside right of the machine





- I. Locate User Interface Harness connector C201
- J. Locate Under Cab Harness connector C102.

K. Connect UIH connector C201 to the UCH connector C102.

NOTE: The remaining (capped) UIH connectors C103 and C117 are used for firmware upgrades and maintenance, they will remain disconnected. Use zip ties to secure these connectors so they are accessible for future use.





3. CONNECTING THE REI

A. Locate the hole in the right side of the firewall.





B. Route connector C202 through the opening, toward the rear of the machine.



C. Ensure no wires are pinched or strained. Zip tie as necessary.

- D. Open the radiator access cover at the back of the machine.
- E. Route connector C202 toward the REI.



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F. Test fit the connector by plugging it into the connector on the back of the REI. Position the harness along the side wall of the compartment as shown. Ensure the wires are not strained.

NOTE: Adjust the harness under the cab until the harness has enough slack to reach the REI without tension.

G. Use a zip tie to secure the harness as shown.





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- H. Disconnect C202 from the REI.
- I. Route C202 out of the side opening of the radiator cover. Close the cover.



- J. Reconnect C202 to the REI.
- K. Ensure wire harness is not pinched or strained.

NOTE: Connector C202 must be disconnected from the REI to allow the radiator access cover to open freely.



4. SECURING THE HARNESS

- A. Verify that all harnesses are neatly routed and wires are not pinched or strained.
- B. Secure zip ties and clip all zip tie ends.





- C. Slowly lower the cab. Reference applicable CAT Operation and Maintenance manual for detailed instructions on lowering the cab.
- D. Inspect the area between the cab and the chassis to ensure no wires or components are at risk for damage.
- E. Secure the cab.





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.

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.

\Lambda 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.

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.

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7 Installing Replacement Parts

7.1 Replacing the Protection Cage



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.



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- 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

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. Attaching 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.



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- 2. Attaching 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.





7.3 Replacing the MIM Mounting Bracket

This section provides instructions for replacing the MIM Mounting Bracket and Hardware (RTA01-MIM-MIMB)

1. Installing replacement MIM Mounting Bracket

- A. Use a T25 TORX driver to remove the 4 screws securing the MIM receiver enclosure to the bracket.
- B. Remove the MIM enclosure from the original bracket.

C. Place the MIM enclosure in position on the replacement mounting bracket.





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- D. Apply Loctite 242 to each of the 4 screws.
- E. Use a T25 TORX driver to install the 4 screws.

F. Tighten screws and torque to 25 inlbs (2.8 Nm).





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8 Notices

8.1 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

8.2 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



9 Templates

The following pages contain the templates referenced in sections 5.2 Installing the Machine Interface Module (MIM), and 5.3 Installing the Remote Enable Interface (REI). Remove these templates from the manual and use them as directed in the above sections.





