

KENWORTH T680 - MIRRORS

SERVICE MANUAL





FOREWORD

Read this manual carefully before operating.

For the most recent version of this manual visit: www.lang-mekra.com.

If you have any questions, contact technical support at:

- Telephone: 1-888-MEKRA 4U / Fax: (803) 337 5265
- E-mail: quality@lang-mekra.com

NOTE: If you have trouble with any portion of this service manual, please call our service line at 803-337-5264 and ask for customer service. Our hours of operation are 9:00 am – 4:00 pm EST, Monday – Friday.

These Products may be the subject of Pending U.S. Patent Applications or may be covered by, but not limited to, one or more of the following U.S. Patents or patent applications:

8544151 B2, US 20130043362 A1, US 20130092812 A1, 61/769,838

**Kenworth T680
MIRRORS SERVICE MANUAL**

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TABLE OF CONTENTS

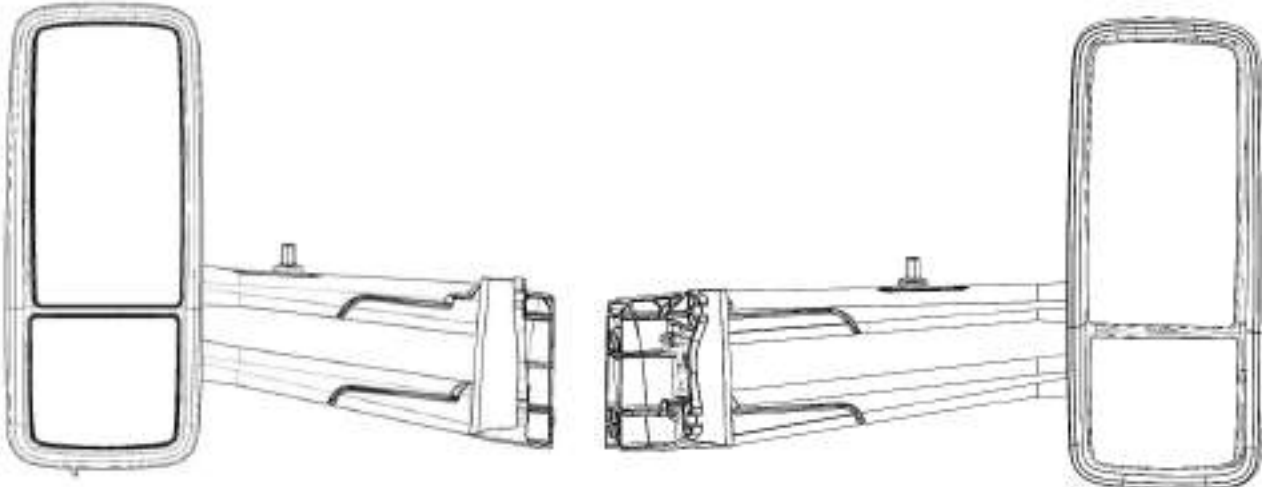
1. Mirror system	4
2. Carrier glass assembly	5
2.1. Convex mirror glass	5
2.2. Main mirror glass	6
3. Housing removal and replacement	8
4. Actuator	9
5. Bezel replacement	10
6. Electrical component replacement	10
6.1. Control cable replacement	11
6.2. OAT sensor replacement	12
6.3. Wires routing	14
6.3.1. OAT wires	14
6.3.2. Heaters wires	15
6.3.3. Actuator wires	16
6.4. Electrical connector	17
6.4.1. Wire pin layout	17
6.4.2. Removal of wire terminals	18
6.4.3. Connector installation	19
7. Heaters troubleshooting	20
7.1. Analysis	20
7.2. Voltage at heater terminals	21
7.3. Heater foil checking	21
7.4. Truck connector checking	21
8. Remote troubleshooting	22
8.1. Analysis	22
8.2. Actuator voltage checking	23
8.3. Actuator checking	23
8.4. Truck connector checking	23
9. PDC List	24
9.1. Left Hand PDC	25
9.2. Right Hand PDC	26
10. Warranty Coverage	27



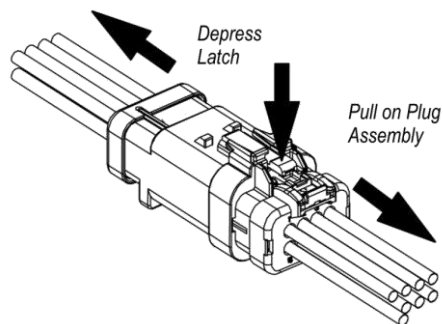
1. MIRROR SYSTEM

Precautions: When removing and installing the mirror system from/to the truck's door, make sure the mirror is properly supported to avoid damage to the mirror system, truck and personal injury.

Removal:



1. With the mirror system in its nominal position, remove the four bolts that secure the mirror system to the truck.
2. Carefully disconnect the truck's connector from the old/damaged mirror system.



Installation:

1. Before inserting the truck's connector into the replacement mirror connector, inspect the truck's connector for any damage (defects, corrosion, etc...). If truck connector appears to be okay, then insert the truck's connector into the mirror system's connector; if not then refer to the truck service manual for replacement.
2. Place the new mirror system against the truck's and secure it to the panel by fastening the four bolts to the specified torque value as specified in the truck service manual.

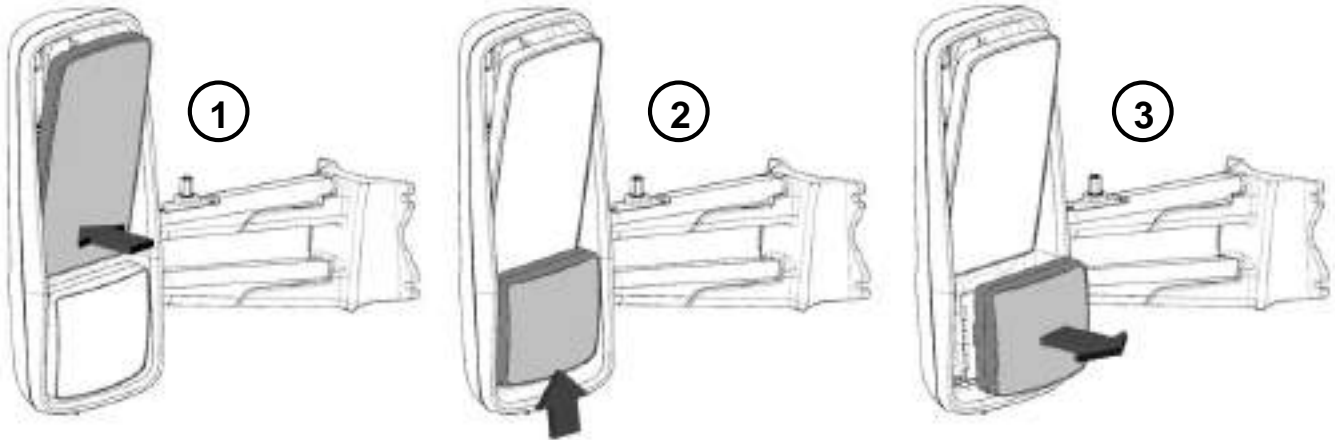


2. CARRIER GLASS ASSEMBLY



Warning: Wear protective gloves and safety glasses especially when replacing broken glass

2.1. CONVEX MIRROR GLASS



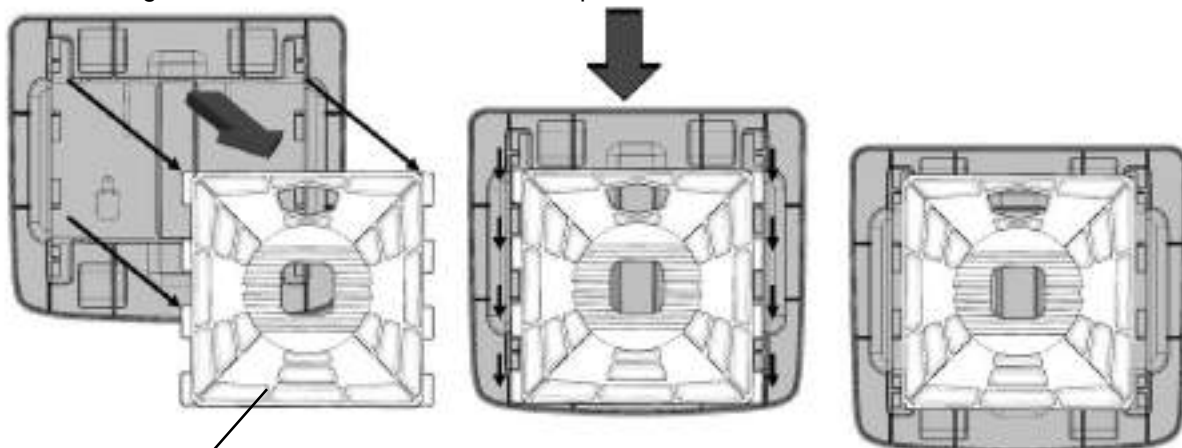
Removal:

1. Push the main mirror glass inward at the bottom. (The actuator clutch will allow this manual adjustment of a motorized mirror.) This will provide enough clearance in order to lift up on the convex mirror to disengage the tabs from the manual socket plate.
2. With the flat mirror pushed inward, push up on the convex mirror approximately 1/2" to disengage the tabs on the convex carrier plate from the manual socket plate.
3. The convex mirror can now be removed from the mirror housing.
4. Disconnect the heating element wires from the heater foil terminals by pulling firmly on the wire connectors to completely free the convex mirror from the mirror assembly.

Installation: Install the replacement convex carrier assembly in the reverse operation of it being removed.

5. Inspect the condition of the heating element wires (corrosion, exposed wire, etc...) before inserting the connectors onto the heater foil terminals. If they are in good condition, then insert the connectors.

Note: The manual socket plate is fixed to the bezel. The illustrations shown below demonstrate how to carefully remove the glass carrier from the manual socket plate.

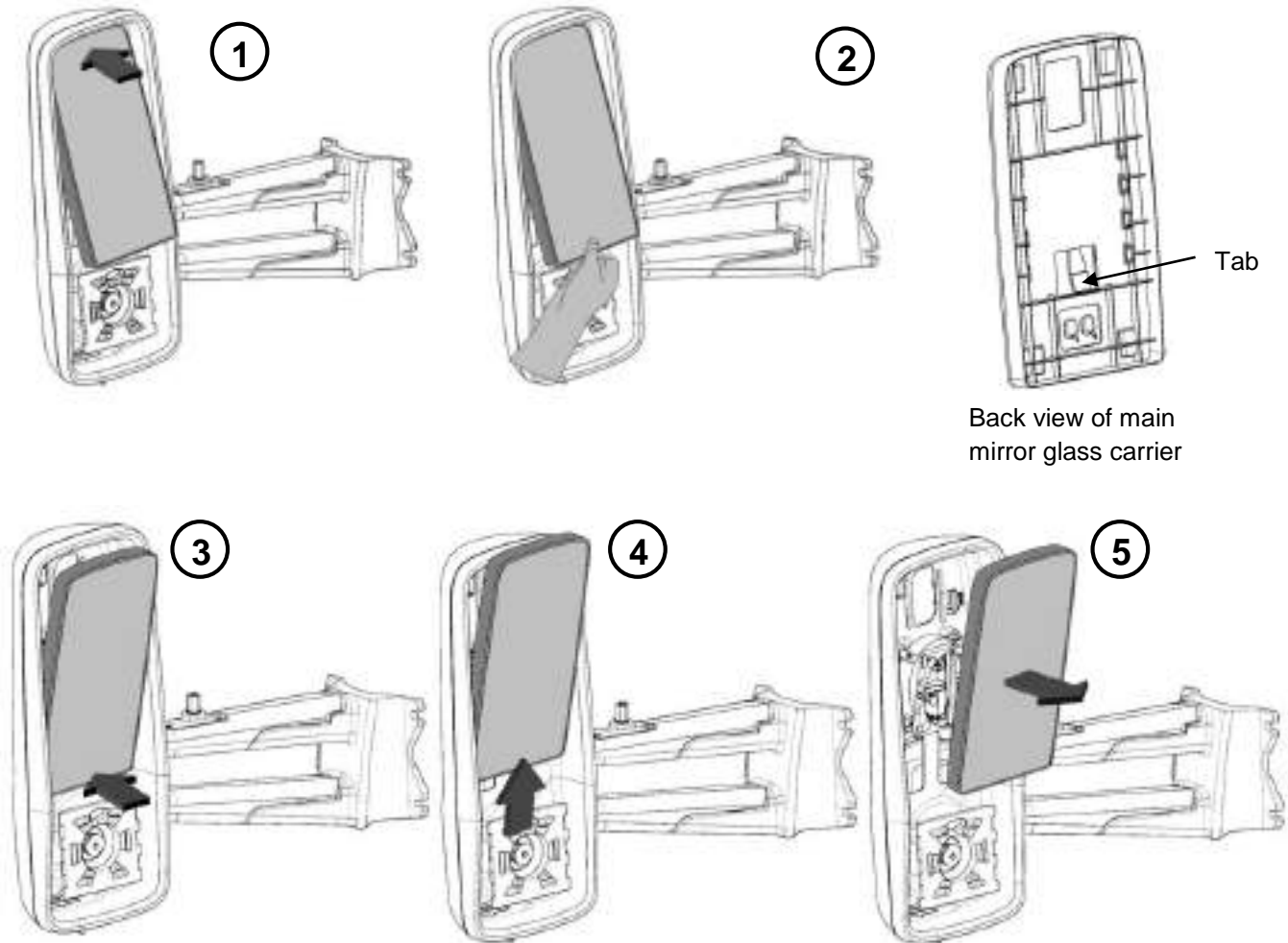


Fixed to bezel



2.2. MAIN MIRROR GLASS

The flat mirror glass has the option of being removed with or without having the convex mirror removed. However, removal of the convex first will provide additional hand clearance to lift up on the flat glass during removal.



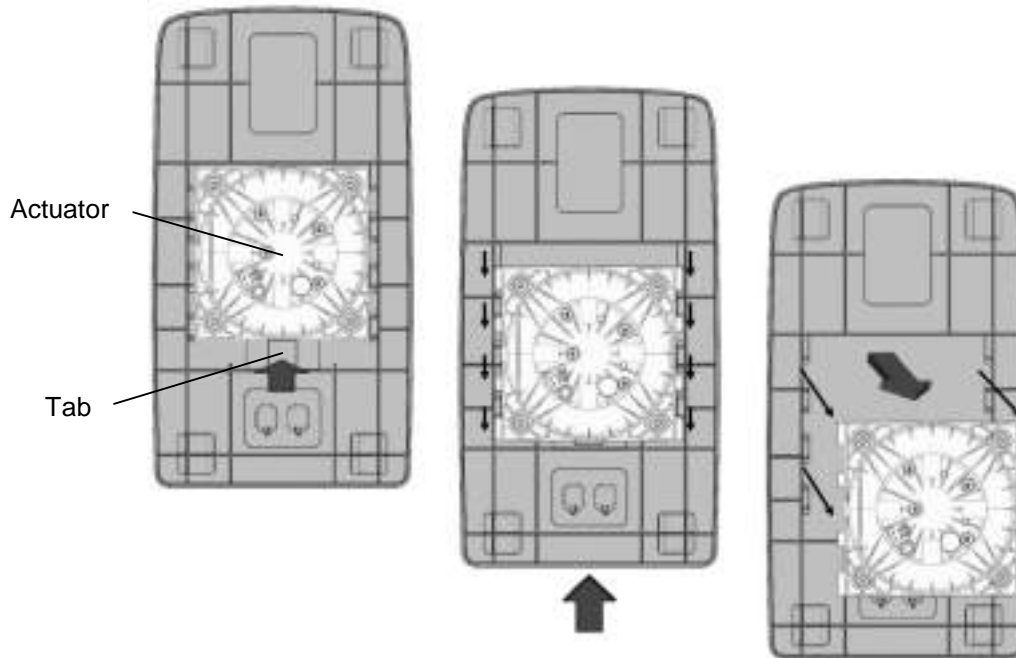
Removal:

1. Push the main mirror glass inward at the top.
2. Insert hand from the bottom of glass and press tab down with fingers while pushing glass upwards to disengage tab.
3. Push the main mirror glass inward at the bottom.
4. Push the main mirror glass up approximately $\frac{1}{2}$ " to disengage the tabs on the carrier plate from the actuator. (See note below.)
5. The main mirror glass can now be removed from the actuator.
6. Disconnect the heating element wires from the heater foil terminals by pulling firmly on the wire connectors to completely free the main glass from the mirror assembly.

**Installation:**

1. Install the replacement main carrier assembly in the reverse operation of it being removed.
2. Inspect the condition of the heating element wires (corrosion, exposed wire, etc...) before inserting the connectors onto the heater foil terminals. If they are in good condition, then insert the connectors.

Note: The actuator is fixed to the bezel. The illustration below demonstrates how to carefully remove the glass carrier plate from the actuator.

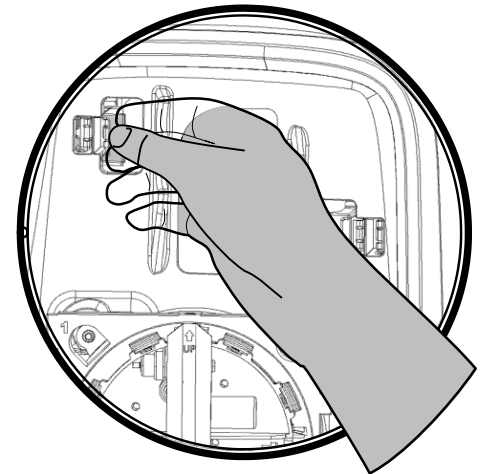
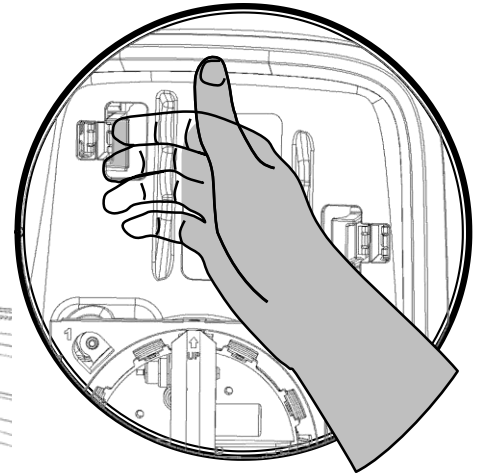
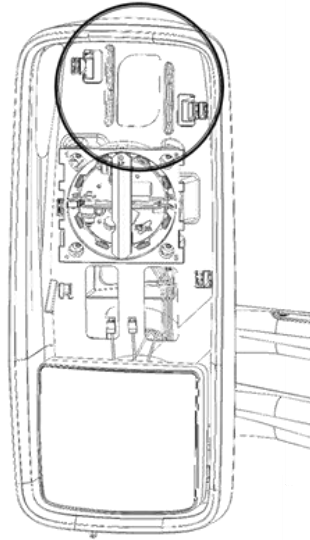




3. HOUSING REMOVAL AND REPLACEMENT

Removal:

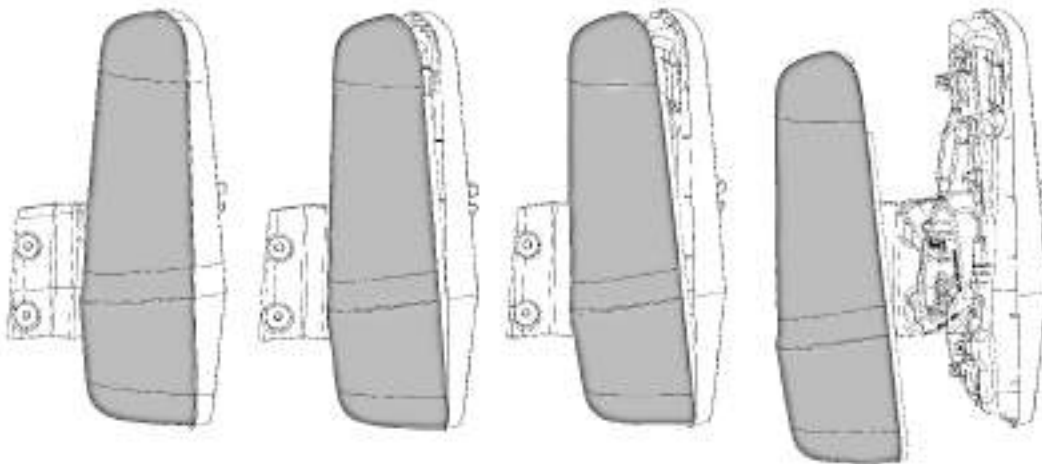
1. Remove the main mirror glass (see 2.2).
2. The bezel is equipped with an opening and two molded-in thumb tabs located at the top of the mirror housing as shown in the figure. The opening will give your hand the needed space to push on the thumb tabs which will disengage the housing clips from the bezel tabs.
3. Push on the top two tabs until the housing clips are completely disengaged from the bezel tabs.
4. Once the top two tabs are disengaged, the lower clips will disengage from the bezel tabs by pulling the housing away from the arm.



Installation:

1. Position the housing at the back of the mirror.
2. Engage the bottom of the housing, making sure that the side walls of the housing is inside the lip of the bezel. Also ensure the OAT sensor is positioned correctly on the Left Hand Mirror.

Apply force onto the back cover until all the clips have engaged and the housing is seated correctly. Make sure that the side walls of the housing are inside the lip of the bezel.



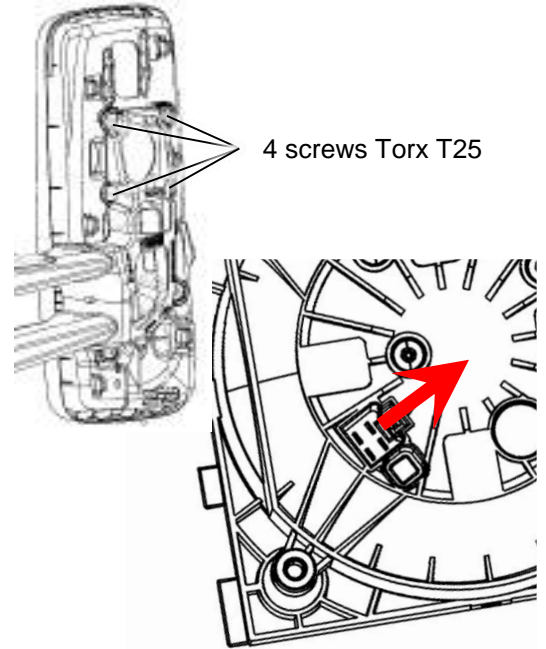


4. ACTUATOR

Precautions: If you don't have the proper tools for applying the torque shown below, then the actuator may become dysfunctional by applying the wrong torque. The actuators holes are a critical area and if a higher torque is applied, then the holes could fracture causing the actuator to become non-operational.

Removal:

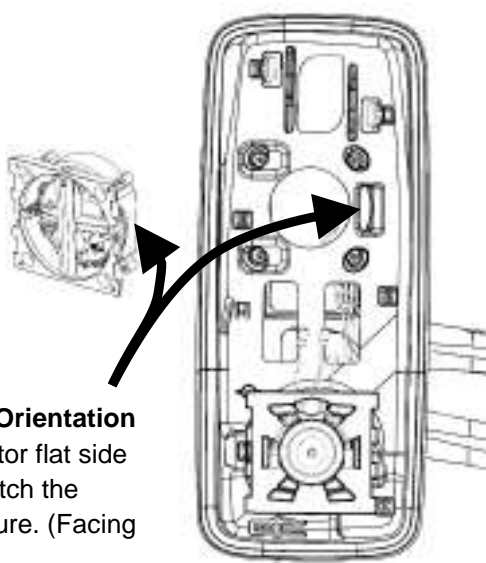
0. Optional: Remove the mirror system from the truck (see 1).
1. Remove the main glass (convex optional) (see 2).
2. Remove the Housing (see 3).
3. To remove the actuator connector from the actuator, push the lever on the actuator, as shown, and pull the wire harness.
4. Remove the 4 Screws – Torx T25 from the back of the mirror.



4 screws Torx T25

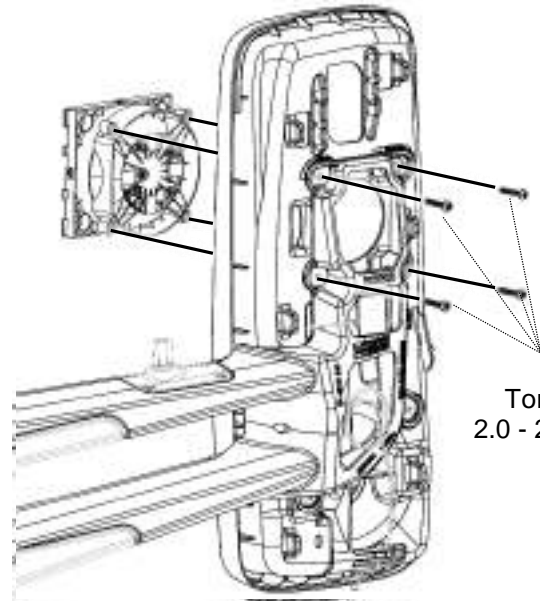
Installation:

1. Position the actuator correctly. See figures below.
2. Install the 4 screws Torx T25 (torque 2.0 - 2.8 Nm).
3. Plug the actuator connector. Make sure it is secured with the lever.
4. Re-install the glass, housing and the mirror system on the truck (see 3, 2.1).



Actuator Orientation

The Actuator flat side should match the Bezel feature. (Facing the truck)

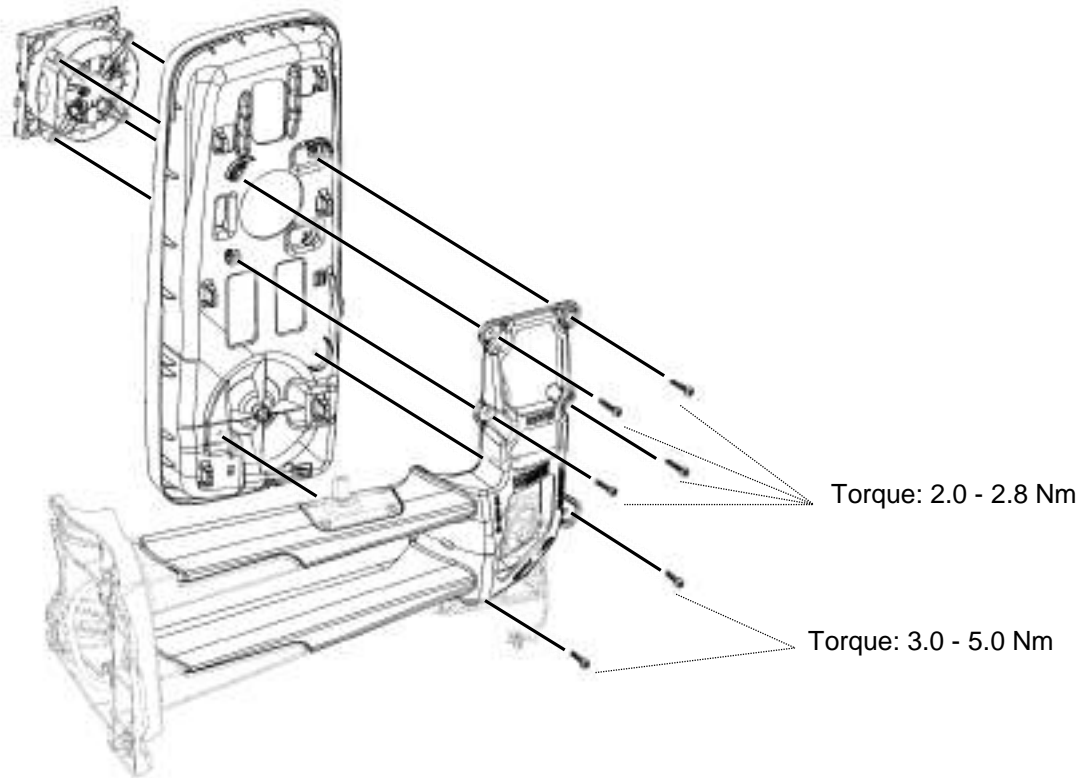


Torque
2.0 - 2.8 Nm



5. BEZEL

Precautions: If you don't have the proper tools for applying the torque shown below, then the actuator may become dysfunctional by applying the wrong torque. The actuators holes are a critical area and if a higher torque is applied, then the holes could fracture causing the actuator to become nonoperational.



Removal

0. Optional: Remove the mirror system from the truck (see 1).
1. Remove the glass and the housing (see 2, 3).
2. Unplug the actuator (see 4) and the OAT sensor (see 6.3.1) from the bezel.
3. Remove the 6 Screws – Torx T25 from the back of the mirror and remove the bezel, ensure that the wires are not entangled in the bezel when removing the bezel.

Installation

1. Position the bezel on the arm so that the holes are aligned and install the 2 lowest screws first.
2. Position the actuator and install the 4 screws.
3. Torque screws to values as shown in the figure above.
4. Plug the actuator connector. Make sure it is secured with the lever.
5. Rout the heater wires and OAT sensor (see 6.3.1).
6. Re-install the glass and housing (see 3, 2)



6. ELECTRICAL COMPONENT REPLACEMENT

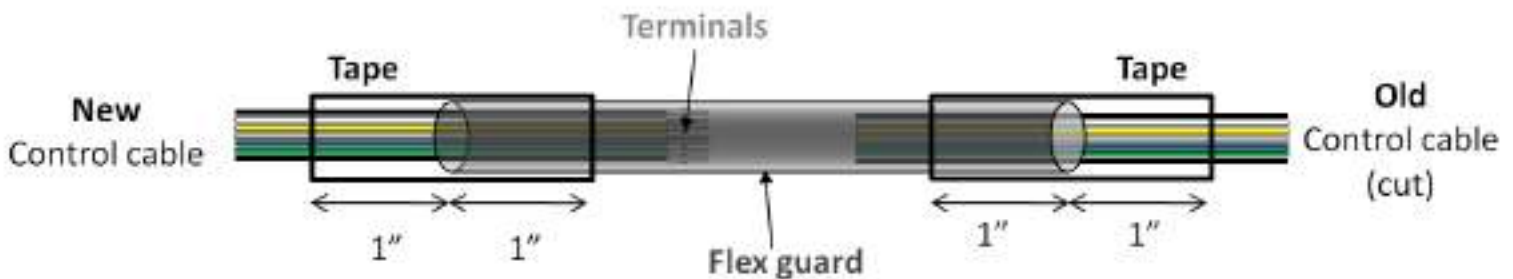
6.1. CONTROL CABLE REPLACEMENT

If your mirror system's electrical components and/or heating elements fail, then follow the troubleshooting section to determine the problem. If the problem can be determined then take the necessary steps to resolve the issue.

NOTE: Do **NOT** remove the existing control cable at the beginning. This cable will be used to guide the new control cable through the mirror's arm into the correct position.

Procedure:

1. Remove the mirror system from the truck (see 1) and disconnect the connectors carefully.
2. Remove carrier glass assemblies (see 2) and the housing (see 3).
3. Disconnect all connectors (i.e. actuator, heater foils) and remove the OAT (left hand only) from its location.
4. Cut the faulty cable wire just before the first heater foil connectors.
5. Insert this wire into the flex guard (supplied with the replacement kit) and tape them tight with electrical tape.
6. Insert the terminals of the new wire control cable at the other side of the flex guard and tape them tight.



7. Pull the old control cable through the arm until all wires of the new cable are outside of the mirror arm. Remove the flex guard (and tape) from the new control cable.
8. Insert the terminals ends of the cable into the correct holes on the connector (see 6.4.1) and ensure that the holes without wires are plugged with the yellow seal plug.
9. Attach the electrical connector back onto the connector housing while pushing the extra cable into the arm (see 6.4.3).
10. Rout the wire to the different components: Actuator, Heater foil, OAT sensor (left hand only) and reconnect the connectors into position (see 6.3).
11. Re-install the housing and carrier glass assemblies (see 3 & 2).
12. Plug the mirror and truck connectors together, fit the mirror onto the truck and secure it with the four bolts as specified.



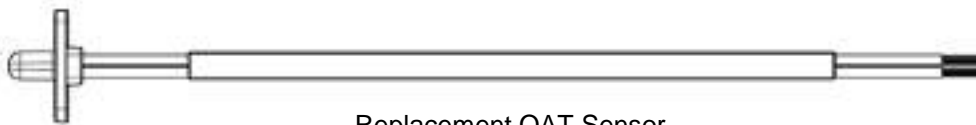
6.2. OAT SENSOR REPLACEMENT

The OAT sensor is located on the Left Hand Mirror (driver side).

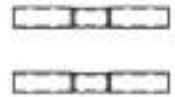
Before replacing the sensor, check if it is faulty. Remove the mirror and test the resistance with an ohmmeter between terminals 5 & 6 on the connector.

See the table below to compare the reading against actual temperatures.

Temp deg C (deg F)	Min Resistance (kOhms)	Nom Resistance (kOhms)	Max Resistance (kOhms)
-10 (13.8)	52.8	55.3	58.0
-5 (22.9)	40.5	42.3	44.2
0 (32.0)	31.3	32.7	34.0
5 (41.1)	24.4	25.4	26.4
10 (50.2)	19.2	19.9	20.6
15 (59.3)	15.2	15.7	16.3
20 (68.4)	12.1	12.5	12.9
25 (77.5)	9.7	10.0	10.3
30 (86.5)	7.8	8.1	8.3



Replacement OAT Sensor



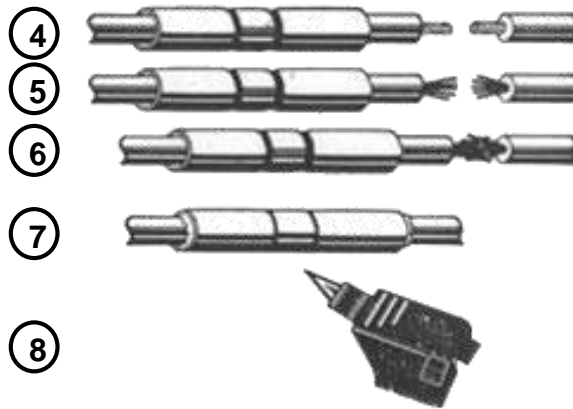
Butt Splice

Procedure:

1. Remove the mirror system from the truck (see 1), carrier glass assemblies (see 2) and the housing (see 3) from the mirror.
2. Remove the faulty OAT sensor by cutting the green and blue wires approximately 1/4" before the sensor and appropriately dispose the faulty OAT sensor.
3. Strip the ends of the wires on the remaining cable approximately 3/8" from the cut.
4. Use butt splice supplied and slide over one of the wires.
5. Separate the wire strands in a way that the wires fray as shown in the figure below.
6. Push the two wires (new OAT sensor & remaining cable) together to intertwine the two wire strands.
7. Slide the butt splice over the combined wires and center it.



8. Apply heat evenly around the length of the tubing from the center and out to the ends until the tubing recovers and the adhesive flows. Continue distributing the heat over the butt splice until the solder flows into the wire strands. Remove the heat and allow it to cool for a perfect connection.
9. Repeat step 4 - 8 above for the other wire.
10. Install OAT sensor as shown in 6.3.1



For Best Results: Use a heat device capable of producing a temperature of 500 °F. When using an open flame, do not isolate the flame on one area of the tubing. Make sure to distribute the heat evenly. Failure to heat the connector until the solder is melted will result in an inferior connection. Overheating the connector may cause damage to the tubing. The use of a liquid flux is recommended, especially with used wire.

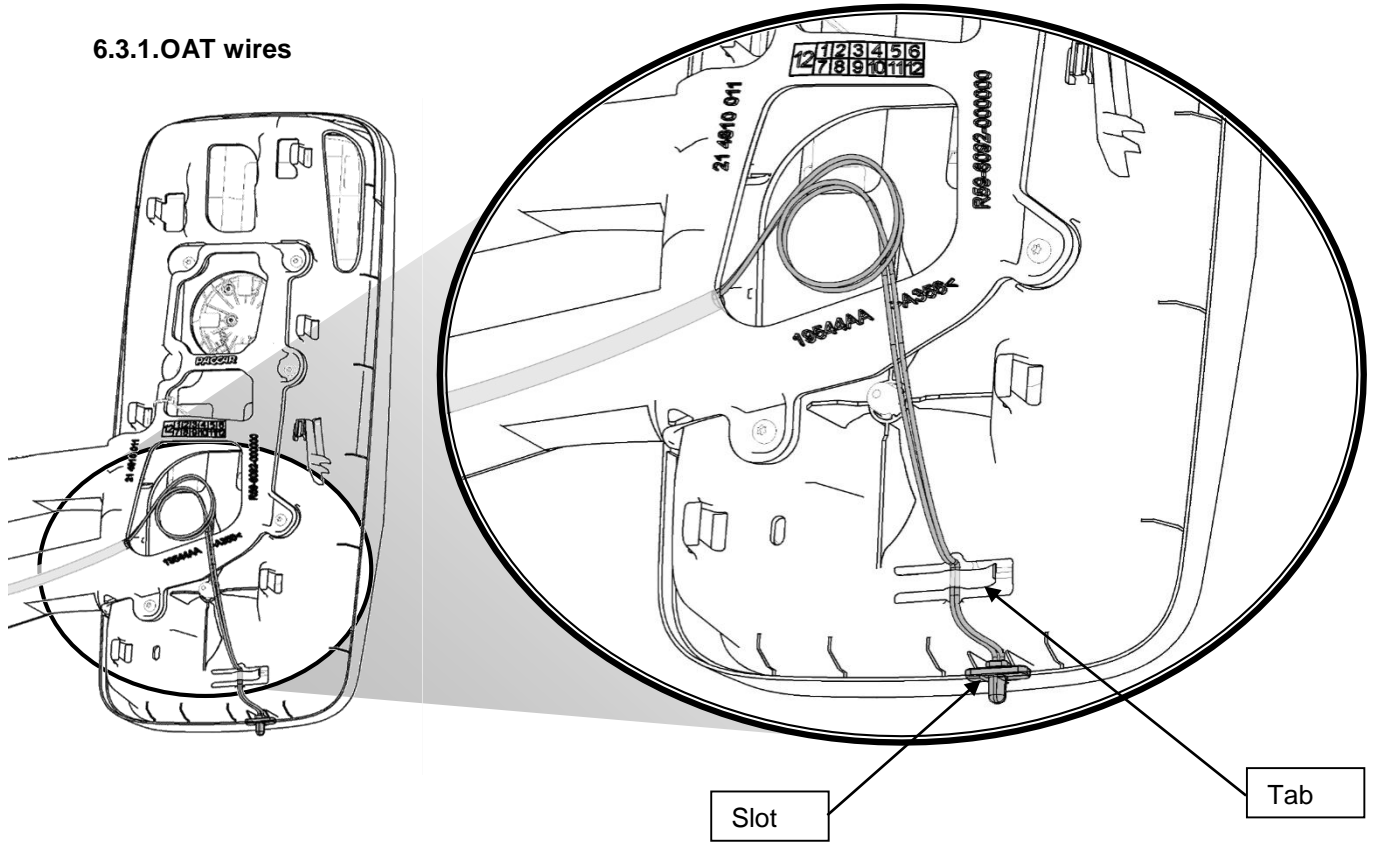
For more information see the following website (video available):

http://www.calcentron.com/Pages/elektralink/elektralink_sealed_solder_connectors.html



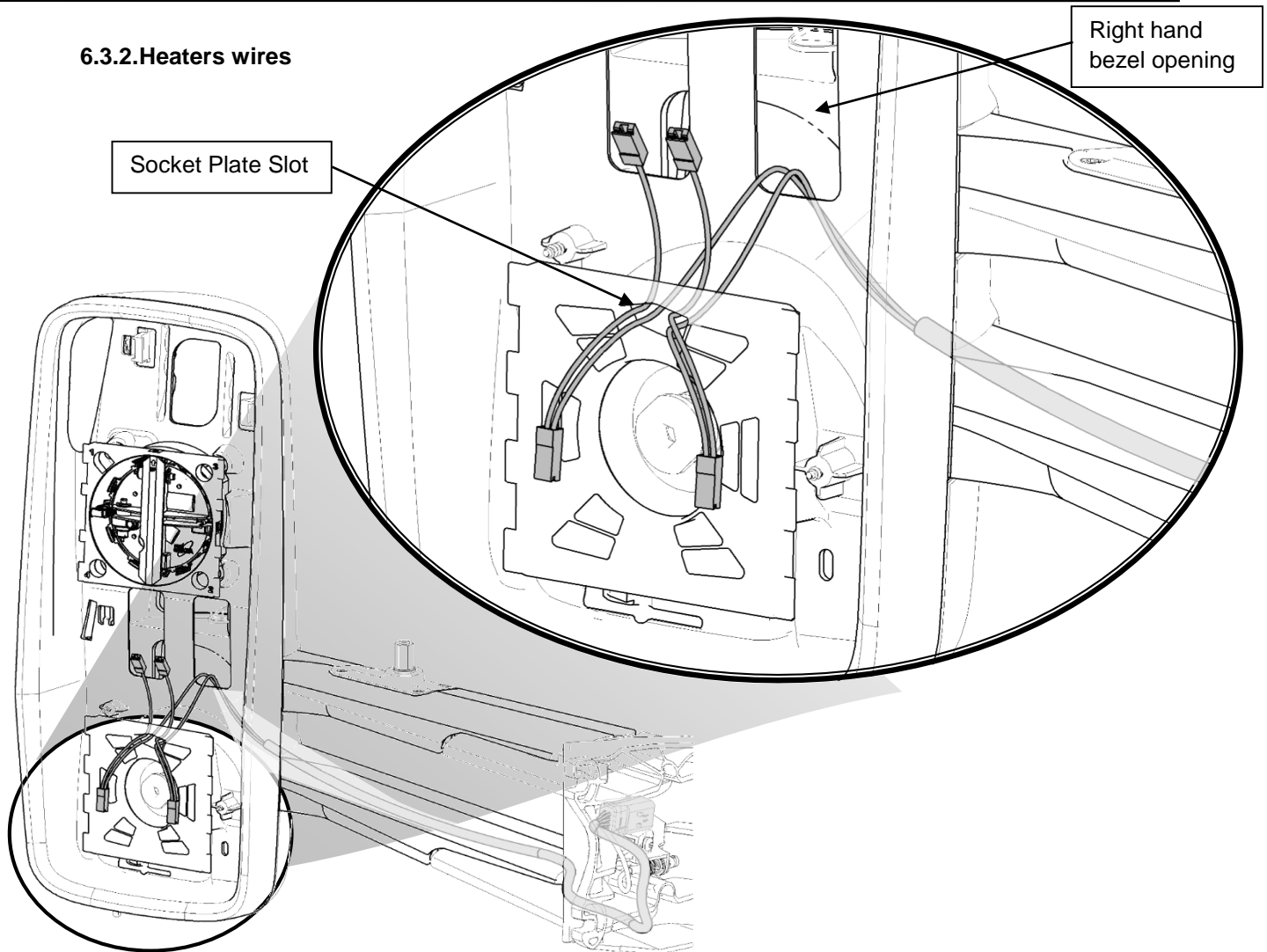
6.3. WIRES ROUTING

6.3.1. OAT wires



Routing:

1. Route the OAT wires between the bezel and arm.
2. Insert the OAT sensor into the slot located at the bottom of the bezel as shown above.
3. Place the blue and green wire in between the tab and bezel (shown above). This will help keep the OAT sensor in place during operation.

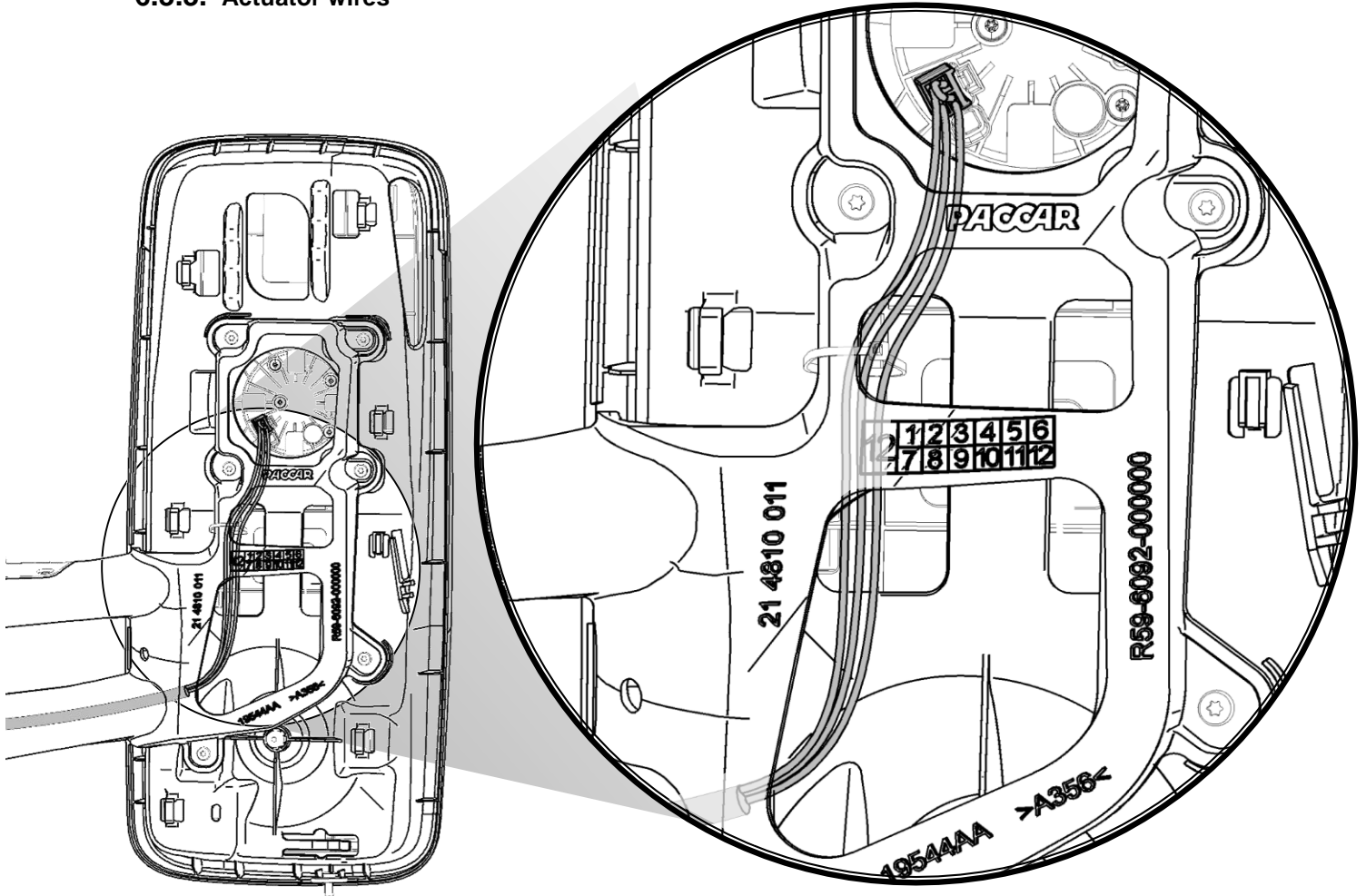
**Routing:**

1. Guide both sets of heater wires through the opening located on the right side of the bezel (shown above).
2. Guide the convex heater wires through the slot located on the adjustable socket plate. Insert all four connectors onto the heater foil terminals.

Note: The convex heater wires contain two sets of wires leading into the connector. The main heater wires branch off of the convex heater wires.



6.3.3. Actuator wires



Routing:

1. Route the actuator wires between the bezel and the arm.
2. Guide the wires along the right side of the arm and insert the connector into the actuator (shown above).
3. Insert a tie wrap in the location shown above, to avoid loose connection during operation.



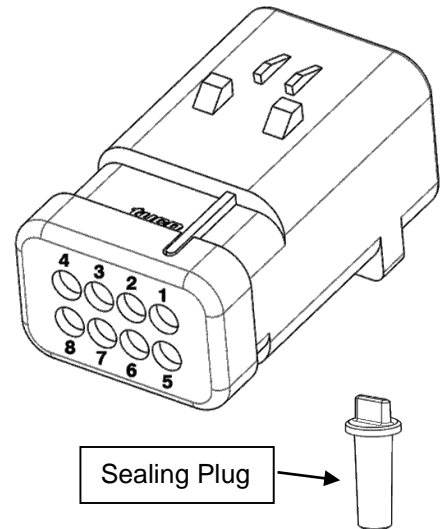
6.4. ELECTRICAL CONNECTOR

6.4.1. Wire pin layout

The wire pin layout does not change for Left Hand, Right Hand, Manual nor Remote Mirrors. Pin layout is the same for all mirrors.

See the table below for the wire pin layout.

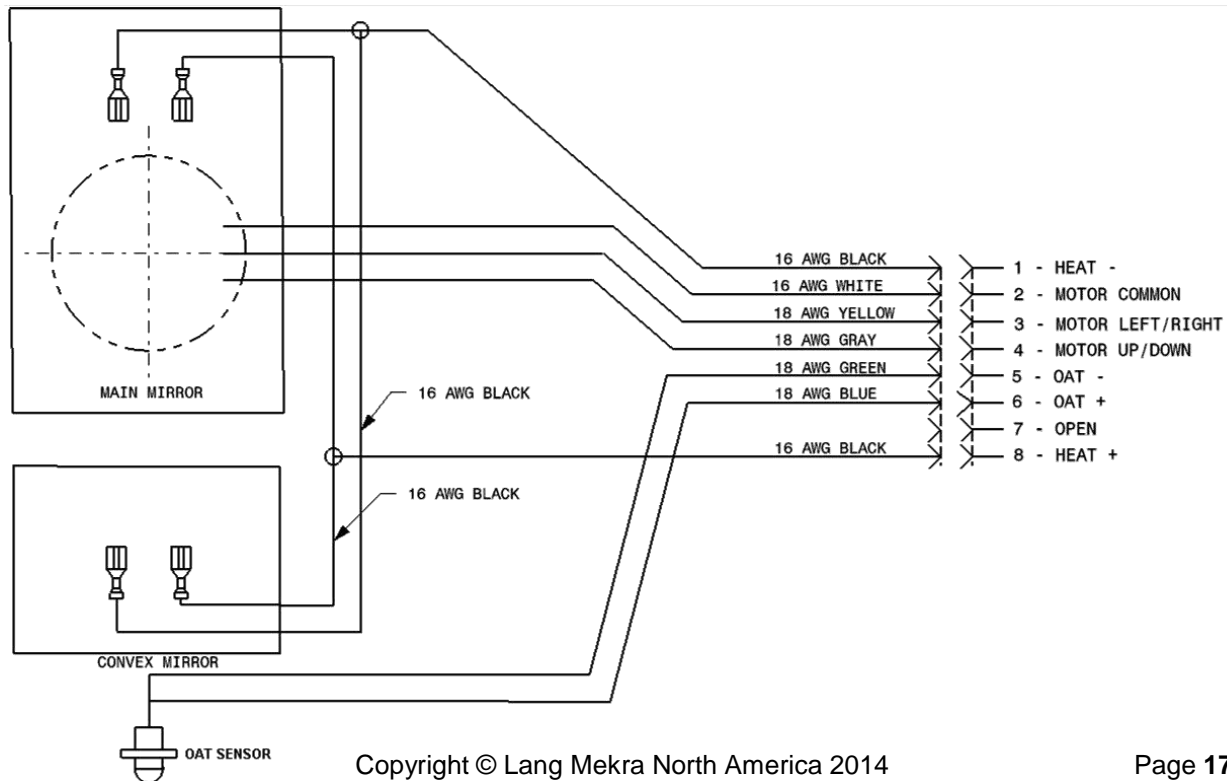
#	Color (Function)	Left Hand		Right Hand	
		Remote	Manual	Remote	Manual
1	Black (Heater-)	X	X	X	X
2	White (Act Grd)	X	-	X	-
3	Yellow(Act L/R)	X	-	X	-
4	Grey(Act U/D)	X	-	X	-
5	Green (OAT-)	X	X	-	-
6	Blue (OAT+)	X	X	-	-
7	- [Sealing Plug]	-	-	-	-
8	Black (Heater+)	X	X	X	X



- Add plug

Note:

- The 2 black heater wires have no polarity and can be inserted vice versa at either #1 or #8.
- Plug all unused cavities with a sealing plug.
- The electrical wire diagram of the left-hand mirror system is shown below. Except for the OAT sensor (green and blue wires) the diagram is the same for the right hand mirror.

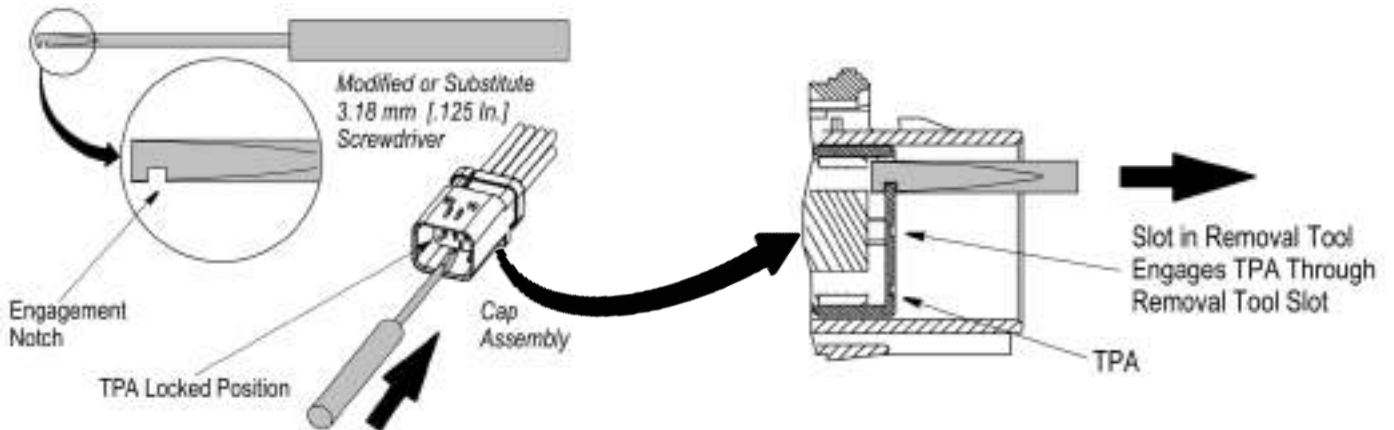




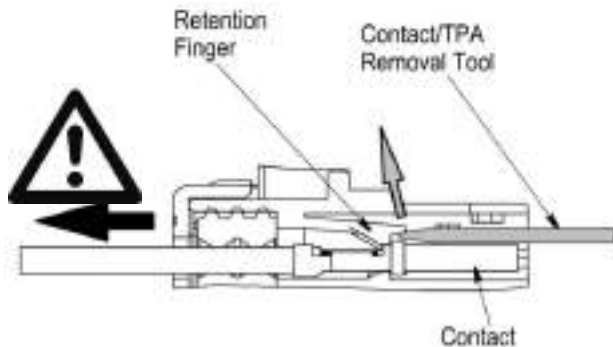
6.4.2. Removal of wire terminals

Note: A special tool is required to remove wires from the connector: Ref. Contact/TPA Removal Tool 776441-1. It can be substituted with a modified screwdriver or other.

1. Insert the removal tool into the extraction slot in the cap assembly - Terminal Position Assurance (TPA).
2. Hook the removal tool firmly against the edge of the slot and pull on the TPA until it is completely removed from the housing assembly. Retain the red cap for use with the connector assembly after the contacts are replaced.



3. Insert the tip of the contact/TPA removal tool into the contact cavity and deflect the contact retention finger. Gently pull the wire until the contact is free from the housing. Repeat this procedure for the remaining contacts to be removed.



Rotating the contacts to remove them from the housing without using the extraction tool may damage the housing resulting in reduced contact retention upon subsequent use of the housing.

More information on the Connector instruction datasheet: to download **Ctrl + Click** on the button

With courtesy of TE





6.4.3.Connector installation

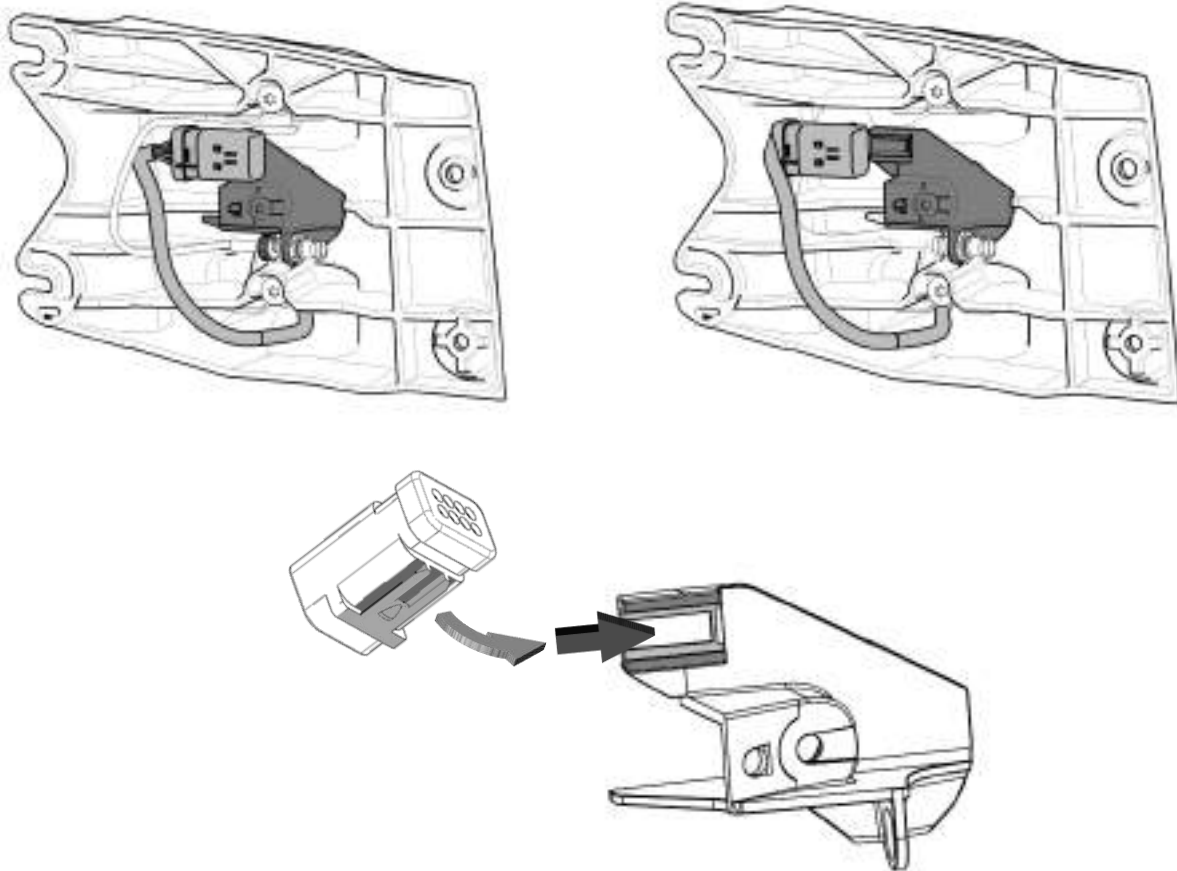
Removal:

1. To remove the connector, pull down on the connector to slide it out of the slot. See below.
2. The connector sits quite tight and one needs to pull and wiggle the connector in a downward direction until it slides out of the slot.

Warning: Using a lever between the holder and the top of the connector to slide it down can damage the wires, connector and connector housing.

Installation:

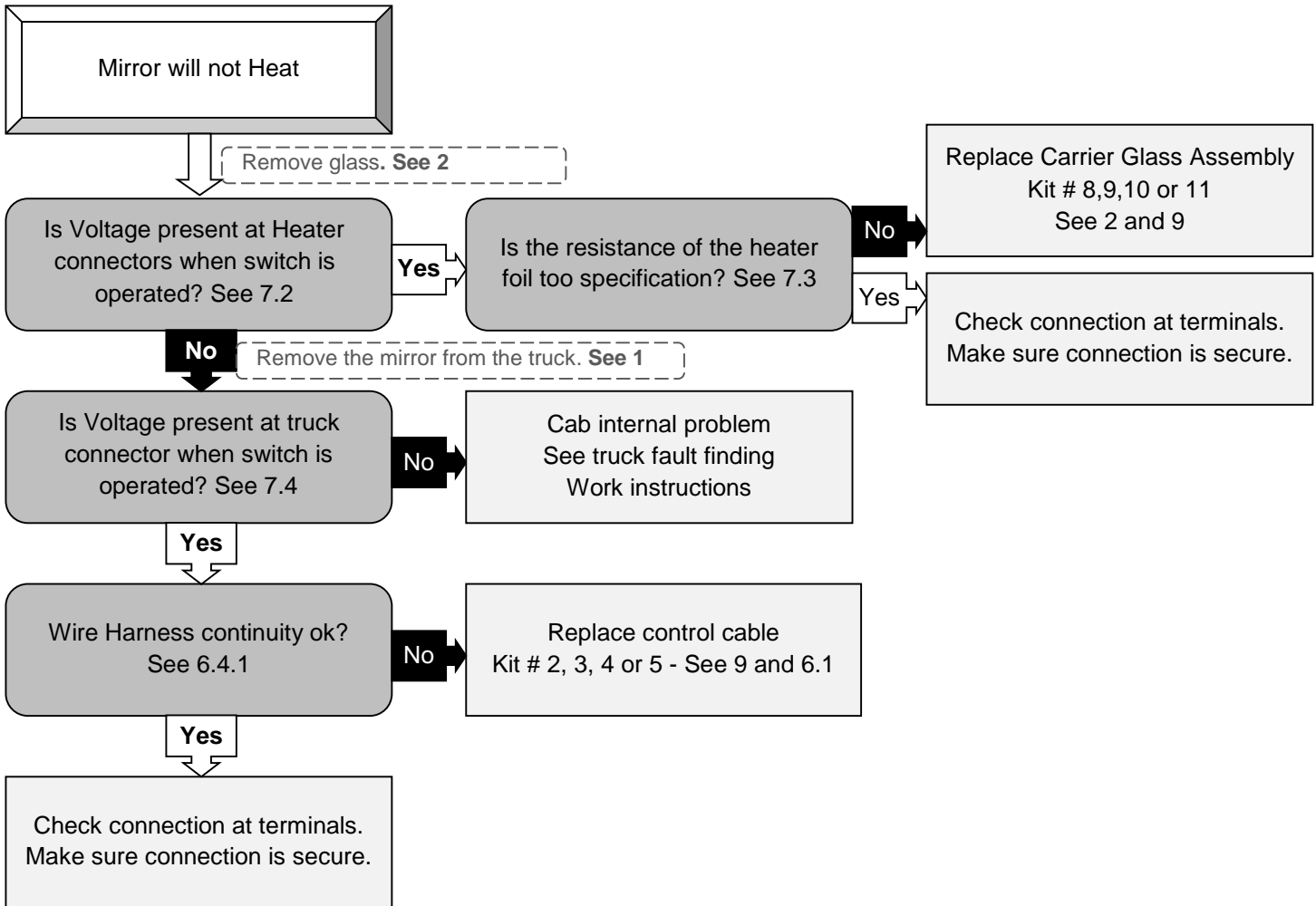
1. Attach the electrical connector onto the connector housing.
2. Slide the connector into the slot provided on the connector housing while pushing the extra cable into the arm.
3. Slide the connector until it is locked into place.





7. HEATERS TROUBLESHOOTING

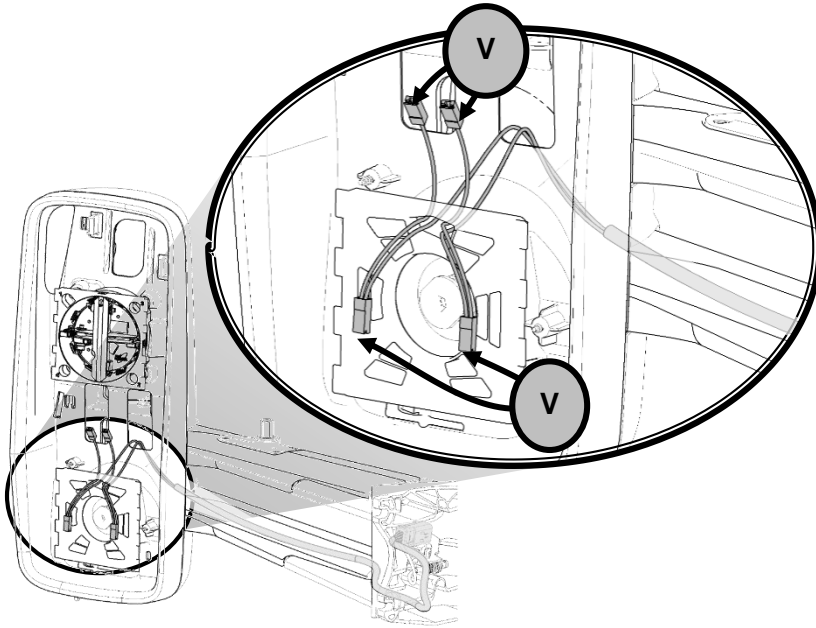
7.1. ANALYSIS



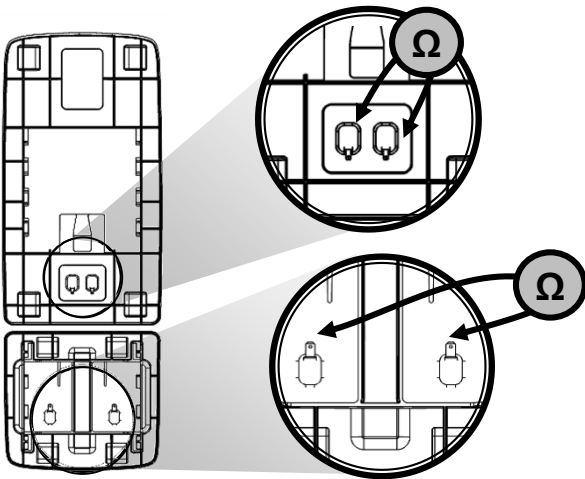


7.2. VOLTAGE AT HEATER TERMINALS

Check for voltage between the connectors on both sets of connectors when the heater is switched on.



7.3. HEATER FOIL CHECKING



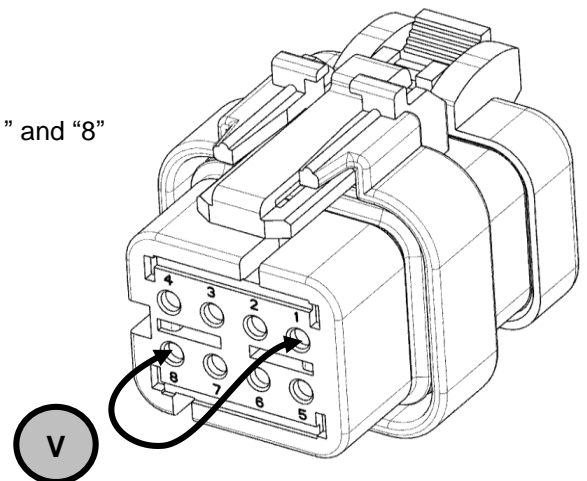
Measure the resistance of the heater foil in question. Compare your measurements with the table below.

Type	Min	Nom	Max
Main	3.8 Ω	4.4 Ω	5.0 Ω
Convex	6.2 Ω	7.1 Ω	8 Ω

7.4. TRUCK CONNECTOR CHECKING

When the heater is switched on → measure voltage between cavities “1” and “8”

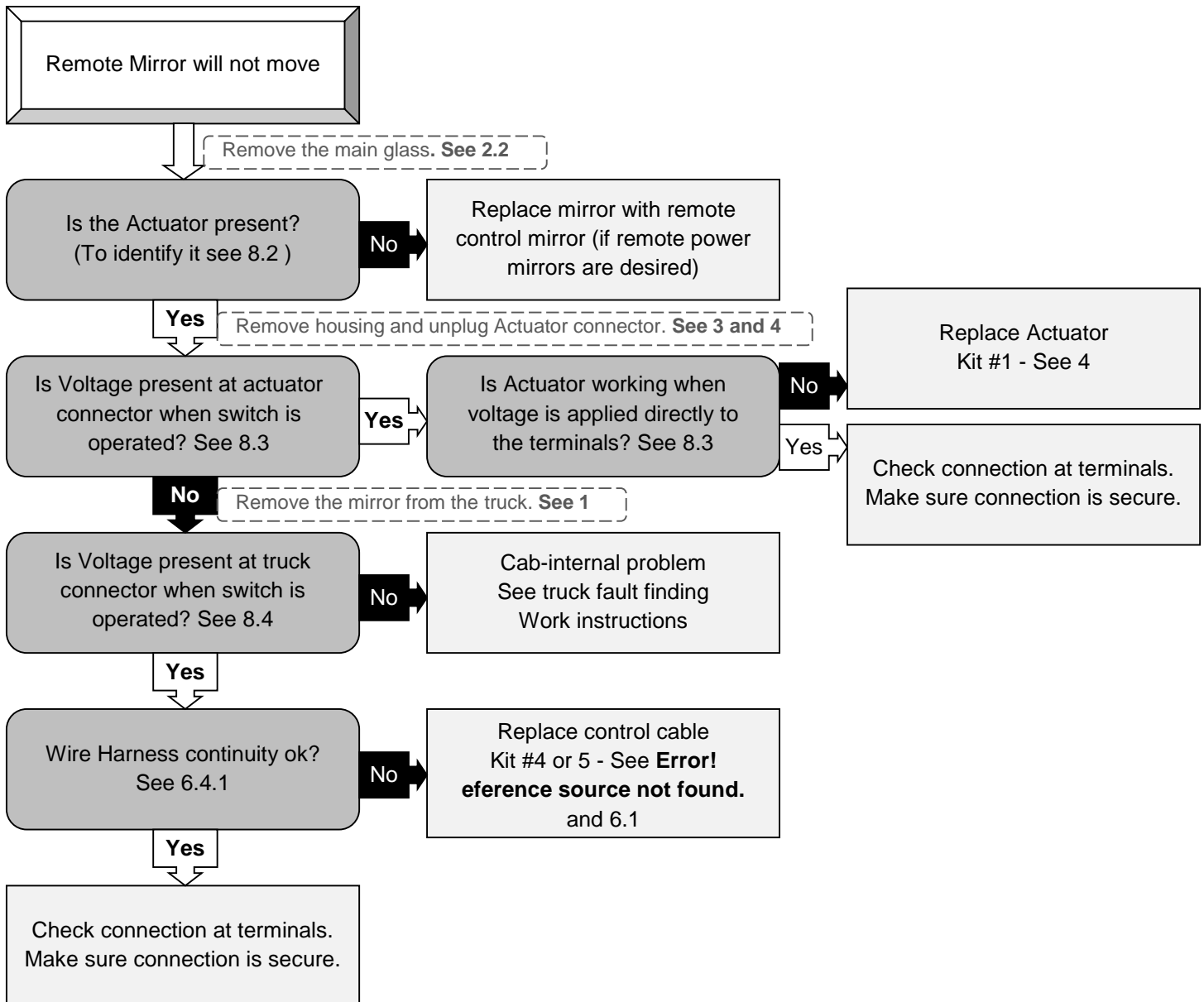
If no voltage is recorded then problem is inside the cab.





8. REMOTE TROUBLESHOOTING

8.1. ANALYSIS

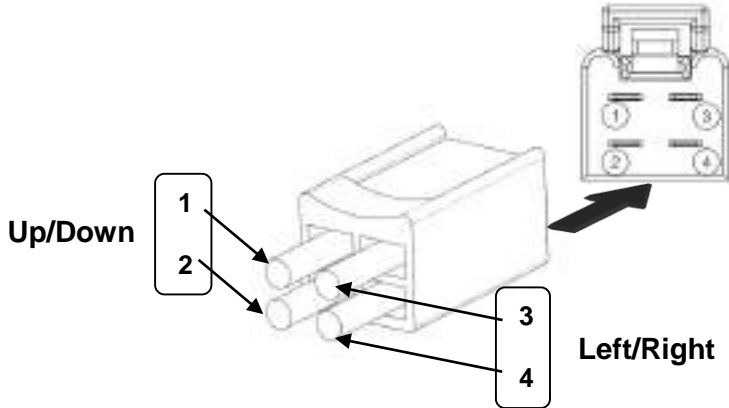




8.2. ACTUATOR VOLTAGE CHECKING

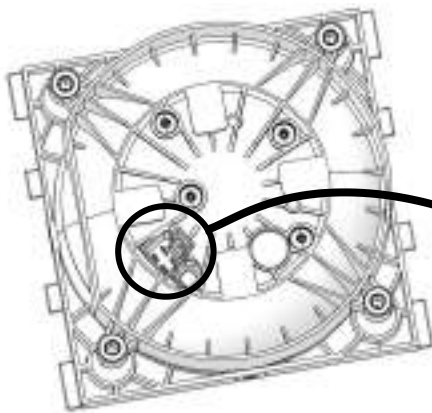
With a voltmeter check if there is 12V when operating the mirror from the truck cab.

- When operating up and down, check between ① and ②
- When operating Left and Right check between ③ and ④



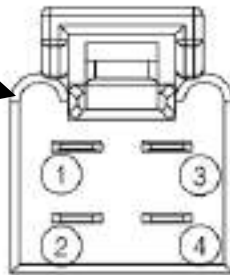
	Left Hand	Right Hand
1	White	Grey
2	Grey	White
3	White	Yellow
4	Yellow	White

8.3. ACTUATOR CHECKING



Apply 12V between ① and ②: the actuator should work up or down

Apply 12V between ③ and ④: the actuator should work left or right



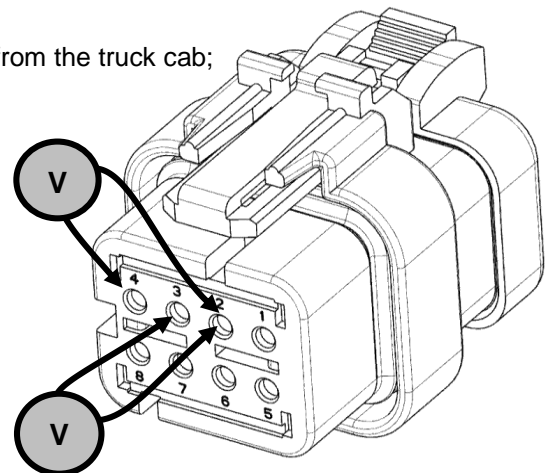
Direction	Motor			
	1	2	3	4
↑ Up	-	+		
↓ Down	+	-		
← Left			-	+
→ Right			+	-

8.4. TRUCK CONNECTOR CHECKING

With a voltmeter check if there is 12V **while operating** the mirror from the truck cab;

- Up and down - check between cavity "2" and "4"
- Left and Right - check between cavity "2" and "3"

If no voltage is recorded then problem is inside the cab.

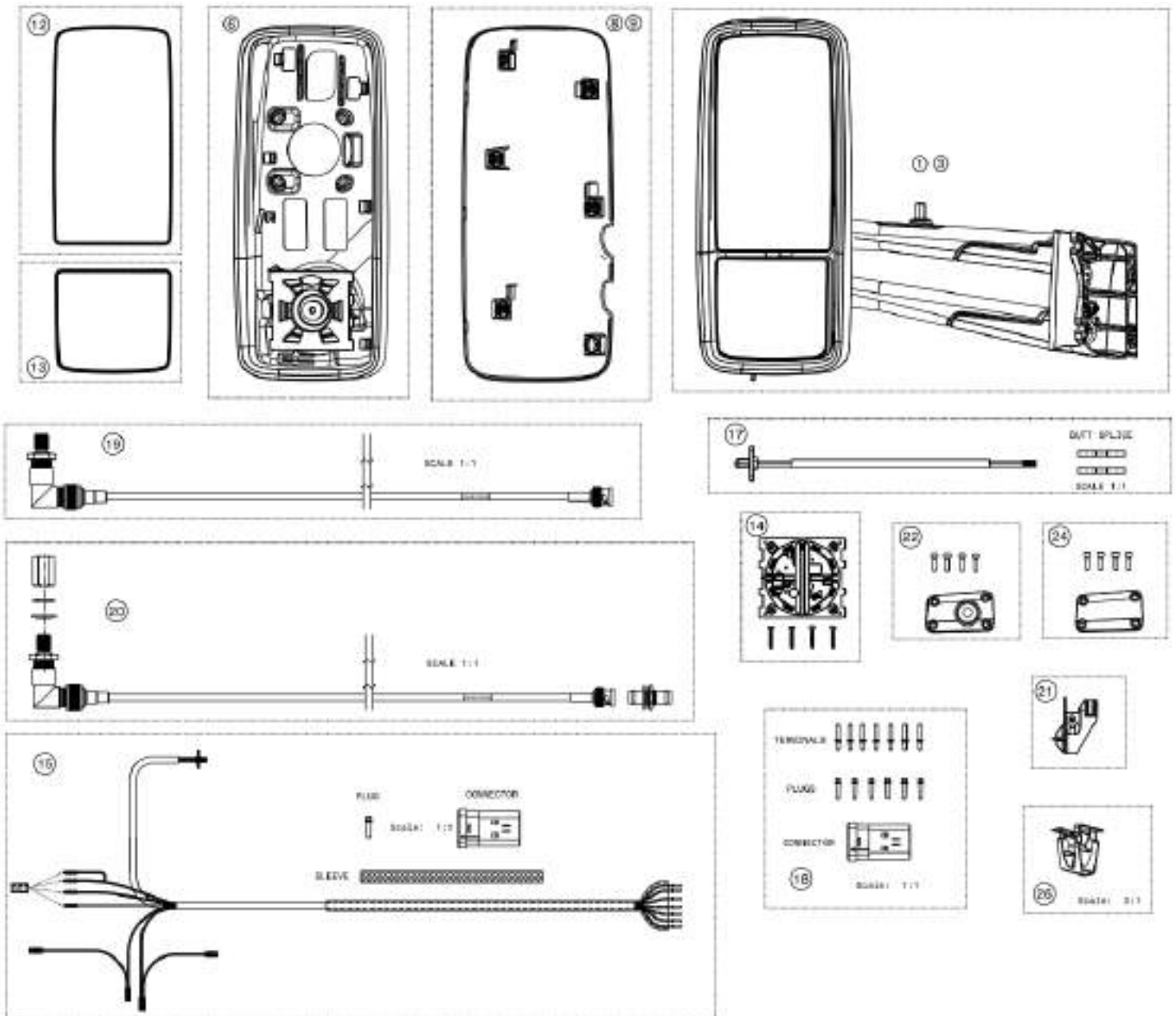



9. PDC LIST

ITEM	KENWORTH P#	LMNA P#	DESCRIPTION
1	R59-6092-220000	594810001-PDC	MIRROR SYS,LH,RMT,HTD
2	R59-6093-220000	594810002-PDC	MIRROR SYS,RH,RMT,HTD
3	R59-6092-221000	594810003-PDC	MIRROR SYS,LH,RMT,HTD,CB
4	R59-6093-221000	594810004-PDC	MIRROR SYS,RH,RMT,HTD,CB
5	R59-6089-102	594120002-PDC	LOOKDOWN MIRROR ASSEMBLY
6	614810003	614810003-PDC	KIT - BEZEL LH
7	614810004	614810004-PDC	KIT - BEZEL RH
8	R22-6123-100	134810003-PDC	HOUSING,LH,PRIMED WITH CLIPS
9			
10	R22-6124-100	134810004-PDC	HOUSING,RH,PRIMED WITH CLIPS
11			
12	154810011	154810011-PDC	CARRIER ASSY,MAIN,NH,HTD
13	154810012	154810012-PDC	CARRIER ASSY,CONVEX,NH,HTD
14	084803997	084803997-PDC	KIT - ACTUATOR
15	094800013	094800013-PDC	KIT - CONTROL CABLE,LH,RMT,HTD,OAT
16	094800014	094800014-PDC	KIT - CONTROL CABLE,RH,RMT,HTD
17	614800003	614800003-PDC	KIT - OAT REPLACEMENT
18	614800004	614800004-PDC	KIT - CONNECTOR
19	614810008	614810008-PDC	CB CABLE
20	614810005	614810005-PDC	KIT - CB CABLE WITH ACCESSORIES
21	204810008	204810008-PDC	ELECTRICAL CONNECTOR BRACKET
22	204810015	204810015-PDC	KIT - CB PLATE LH
23	204810016	204810016-PDC	KIT - CB PLATE RH
24	204810023	204810023-PDC	KIT - BLANK PLATE LH
25	204810024	204810024-PDC	KIT - BLANK PLATE RH
26	114810002	114810002-PDC	KIT - CLIPS

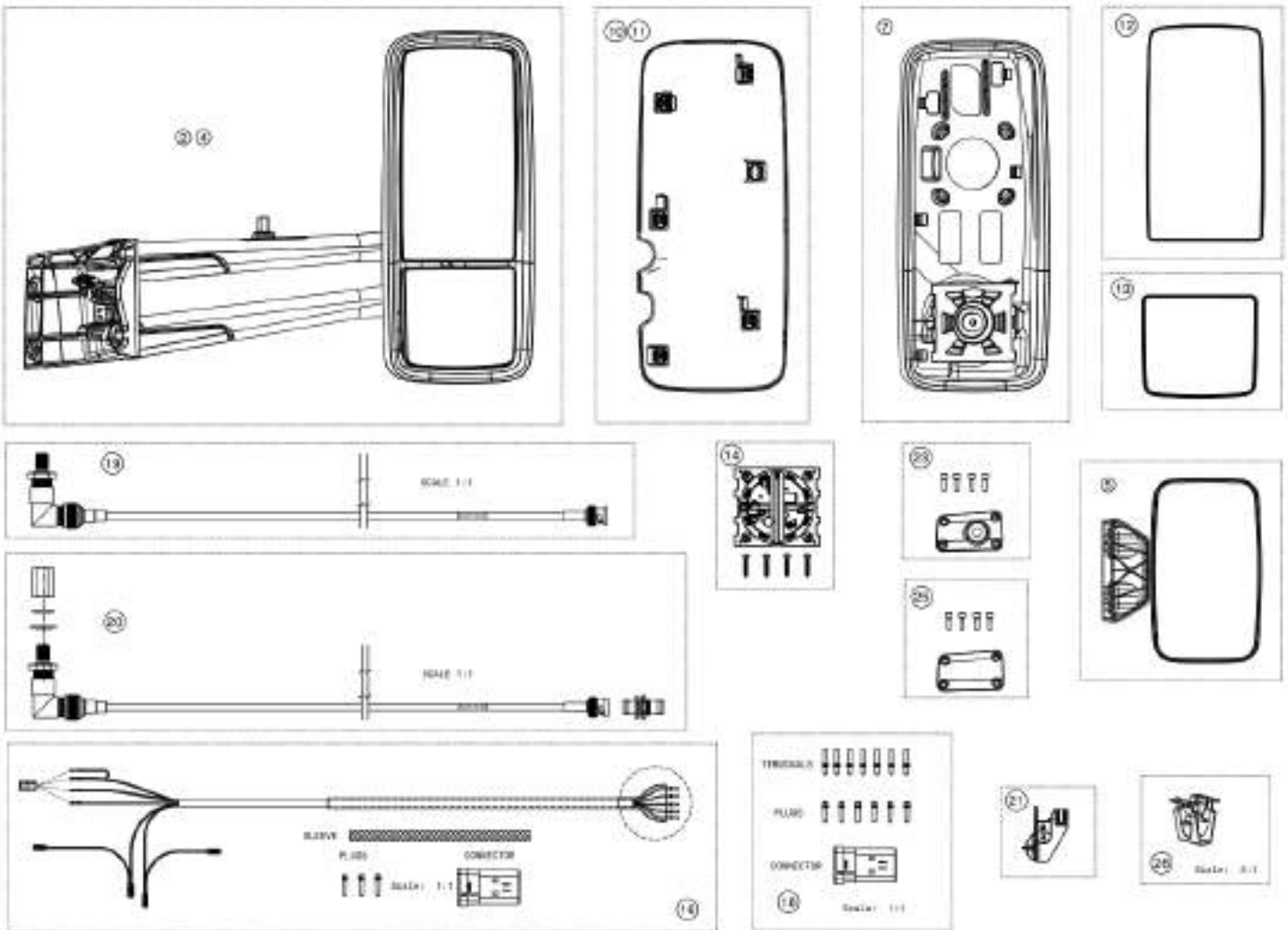


9.1. LEFT HAND PDC





9.2. RIGHT HAND PDC





10. WARRANTY COVERAGE

Lang-Mekra provides a warranty for all production and service parts per Paccar Supplier Warranty Agreement.

Warranty claims must be submitted through Paccar.

The warranty will cover:

- Functional quality of components
- Lang-Mekra workmanship
- Confirmed field failures
- Labor costs for replacement
- Approved administrative costs

The warranty will not cover:

- Glass breakage and other impact which have been abused or mistreated
- Minor reassembly
- Unnecessary service
- Unauthorized product alterations and/or additions
- Unreasonable costs

Please do not submit warranty claims for items that have suffered impact!

