

Invacare® Scorpion® Series

Scorpion, Scorpion-A

Scooter

Service Manual



CE



Scorpius

This product has passed certifications of CE, GMP Taiwan, ISO9001 and ISO13485.

In case of any discrepancy between the illustrations and accessories in this manual and the actual vehicle, the actual vehicle shall prevail.

CTM reserves the right to design and modify this scooter.

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1 Repair Items

1.1 Preparations for Repairs

- Please read this service manual carefully before attempting any repairs. Make sure you have identified the cause of the failure before you start.
- Before starting to work on the scooter remove the battery to avoid electric shock or damage to components of the electrical system.
- This service manual has been prepared for the automatic version of the scooter. However, it can be used when making repairs to the manual version. Some special repair procedures are marked as being “manual version only”.
- Some repair procedures are relatively complicated and may need the operation of two persons.
- Please refer to the torque specifications when you use electric, pneumatic, or even manual tools to tighten bolts, screws and nuts, to prevent damage to scooter parts.
- The drawings and diagrams in the manual may be slightly different from the appearance of the actual scooter. However, the repair procedures remain the same.
- After disassembling make sure the parts are set aside carefully to avoid losing any of them.
- When old parts are replaced with new ones, the screws, washers, pads or auxiliary fixation parts are not provided with the news parts. It may be necessary to use original parts when reassembling the scooter. However, if any screw, washer or other part should appear to be worn, corroded, or damaged, it should be replaced.
- When reassembling the scooter, please make sure to reassemble it in the proper order. Make sure all the parts are secure and the scooter is in a good roadworthy condition to avoid accidents or injury to riders or others.
- After the repair and reassembly has been completed, a test drive should be done to check that the fault has been eliminated and that the scooter functions properly.
- The following is a list of tools necessary for this work: For details of tool specifications, please refer to the instructions provided in the repair steps.

	The Service manual		Diagonal pliers		Lineman's pliers		Rubber hammer
	Flathead screwdrivers		Cross screwdrivers		Allen keys or drivers		
	Socket tool set		Adjustable wrench		Brush		

1.2 Service Manual Reading Instructions

- Please follow all the steps in the order they appear Step 1 → Step 2 as shown in the illustrations.
- Please refer to the pictures for instructions and details. The pictures appear on the right and include detailed descriptions of the procedures to be followed.
- Operation step code 
- Key location indication 
- Arrow direction indication 
- Detailed item code 
- Tools needed 
- Torque limits 
- Indication for notes

18+-2kgf-cm



**Caution**

If these instructions are not followed carefully the result could be damage to the scooter, or even personal injury.

**Recommendation**

Frequent reference to the manual during the repairs will facilitate the operation.

1.3 Torque Limit Conversion Chart

You can use this chart as an orientation to find the correct torque.

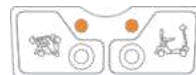
kgf*cm	Nm
15	1.5
50	4.9
60	5.9
70	6.9
100	9.8
150	14.7
200	19.6
250	24.5

1.4 Description of Failure

Parts Involved	Nature of Failure	Chapter Reference and Troubleshooting Method	
Buzzer	Buzzer function fault	SERVICE-1-2	Buzzer repair
Control Panel	Panel light controls abnormal	SERVICE-1-1	Top control panel repair
	Failure lamp comes on	Refer to "Self-Diagnostic Warning Light" on the next page	
Headlight/ Taillight	Headlight failure	SERVICE-3-1	Headlight repair
	Taillight failure	SERVICE-11-2	Taillight repair
N-D lever	N-D lever abnormal, does not work, or is jammed	SERVICE-13-5	Electromagnetic brake repair
Throttle	Scooter forwards or backwards travel abnormal	SERVICE-1-3	Starter VR repair
	Electromagnetic brakes failure	SERVICE-11-1	DR controller repair
Battery pack	Battery pack has been damaged	SERVICE-6	Battery pack repair
	Battery pack does not charge	SERVICE-6-1	Battery pack - Charger socket repair
	Battery pack power connection failure	SERVICE-6-2	Battery pack - power socket repair
	Lithium battery ← Conversion → Lead-acid battery	SERVICE-6-3	Battery pack – battery removal
Remote controller	Remote control faulty or lost	SERVICE-12-2	Remote control board repair
RF key	Sensor abnormal or lost	SERVICE-1-5	RF key setting
Speed regulator button	Speed regulator does not work	SERVICE-1-1	Top control panel repair
Tire	Crack/ deformation/ yellowing or puncture	SERVICE-4 SERVICE-5	Front wheel repair Rear wheel repair
	Tire tread depth less than 0.5 mm		
	Tire wobbles or is unstable		
Motor	Motor action abnormal or makes noisy sound	SERVICE-13-4	Motor repair

Seat	Seat damage repair or seat replacement	SERVICE-7	Seat repair
	Seat has become loose	SERVICE-8-3	Seat locking pin repair
	Seat spring action abnormal	SERVICE-8-2	Seat base spring repair
Steering bar	Height adjustment problem	SERVICE-2	Steering bar repair
Rear fender	Rear fender damaged or makes an unusual sound	SERVICE-11-4	Rear fender repair
Shroud	Damage to the exterior plastic shroud	SERVICE-1 SERVICE-9 SERVICE-10 SERVICE-11 SERVICE-12	Steering shroud repair Front lower shroud repair Front top shroud repair Rear top shroud repair Rear lower shroud repair
Frame	Frame has been deformed or broken	SERVICE-13	Frame repair

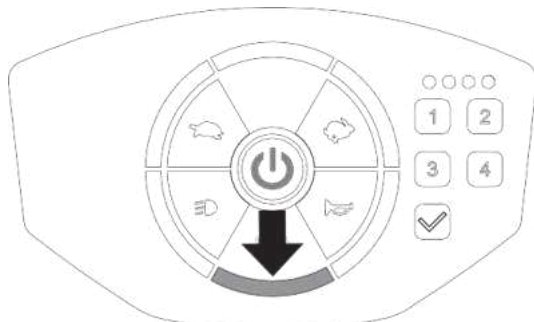
1.5 Folding/ Unfolding Errors

Number	Description	What to do
1	Power On	Turn off the main power switch
2	Battery Low	Charge the battery immediately
3	Seat springs fall off	Refer to <i>SERVICE-07-1 Seat Spring Repair</i>
4	Seatback is not flipped down	Flip down the seatback and restart the folding/ unfolding procedure.
5	Scooter is not on flat ground	Scooter cannot be folding/ unfolding if it's not placed (lay down) on a flat ground. Please place the scooter on a flat ground and restart the folding/ unfolding procedure.
6	Foreign object on footplate.	Check and remove the object on the footplate and restart the folding / unfolding procedure.
7	Optional accessories interference	Remove obstructions such as handrails or baggage etc.
8	Folding/ unfolding light indicator on scooter is not in orange (enter sleep mode)	Action: 1. Please wake up the folding/ unfolding function (see figure on the right) 2. <i>SERVICE-11-5 Folding/ Unfolding Board Repair.</i> 
9	Tapping error on the folding/ unfolding buttons	If the “Folding button” is pressed when the scooter has already been folded it will fold further. Press “Unfolding button” again and do this until the scooter has been fully expanded.
10	Scooter folds incorrectly	Possible Solution: 1. <i>SERVICE-13-1 Solenoid Valve Repair</i> <i>SERVICE-13-2 Folding Unit Repair (Manual Only)</i> 2. <i>SERVICE-13-3 Sliding Track Repair</i> <i>SERVICE-13-7 Linear Actuator Repair</i> 3. <i>SERVICE-13-8 Gas Spring Repair (Manual Version Only)</i> 4. <i>SERVICE-13 Frame Repair</i> 5. <i>SERVICE-13-6 Sliding Base Repair</i>
11	Scooter anti-tipping angle is too great	Scooter has anti-tipping protection. Please place it on flat ground to correct the problem.
12	Remote control inactive	Solution: 1. Battery needs to be replaced. 2. Refer to <i>SERVICE-12-2 Remote Control Board Repair.</i>
13	Folding/ unfolding button inactive.	Refer to <i>SERVICE-11-5 Folding/ Unfolding Board Repair.</i>

1.6 Self-Diagnostic Warning Light

When the main power switch is turned on, the self-diagnostic warning light will flash if there be any malfunction or failure.

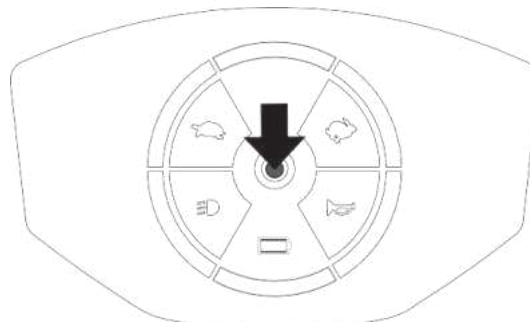
Automatic Version: self-diagnostic warning light, shared with the battery indicator.



Normal: remains on, as does the battery power indicator.

Failure: flashes according to the nature of the failure, see the table below.

Manual Version: self-diagnostic warning light, shared with the main power light.



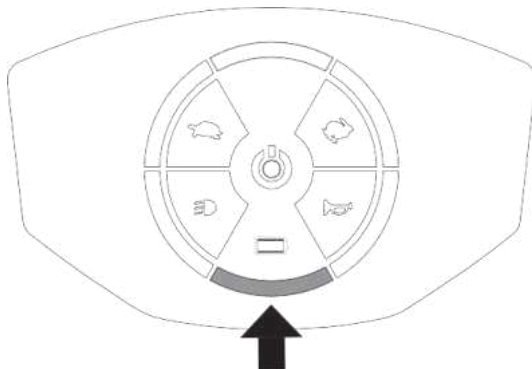
Normal: constant green light.

Failure: flashes according to the nature of failure, see the table below.

Number of Flashes	Possible Cause	Handling Method
1	Battery Low	The batteries are running low. • Recharge the batteries.
2	Low Battery Fault	The batteries have run out of charge. • Recharge the batteries. • Check the battery and associated connections and wiring.
3	High Battery Fault	Handling method: 1. Disconnect the battery pack and check the battery condition. 2. SERVICE-6 Battery Pack Repair.
4	Current limit time-out or controller overheat	Do not drive up steep slopes or overload the scooter.
5	N-D lever not set to D-position	Switch to D (drive) position. Turn off the power and turn on again.
	Electromagnetic brake failure	SERVICE-13-5 Electromagnetic Brake Repair.
6	The throttle is not in Neutral or the folding/ unfolding procedure is uncompleted.	Solution: Repeat the folding or unfolding procedure. SERVICE-1-3 Starter VR Repair.
	The folding/ unfolding procedure is uncompleted	Repeat the folding or unfolding procedure.
	Scooter battery is being charged	Turn off the main power and disconnect the charger.
	Micro switch failure	SERVICE-12-1 Micro Switch Repair.
7	Speed pot	SERVICE-1 Steering Shroud Repair.
8	Motor or relevant circuit failure	Solution: SERVICE-11-1 DR Controller Repair SERVICE-13-4 Motor Repair
9	Main cable, controller failure or controller temperature too high	Solution: SERVICE-11-1 DR Controller Repair SERVICE-2-1 Main Cable Repair

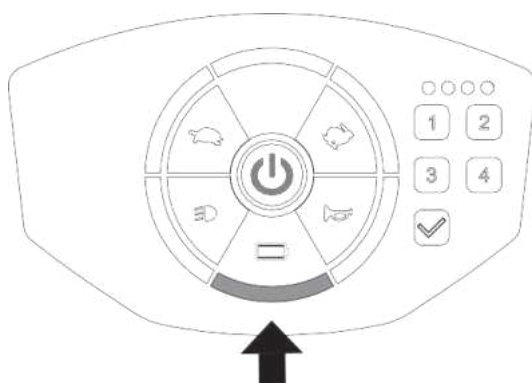
1.7 Battery Indicator Instructions

After turning on the main power switch, the scooter battery indicator should be checked:



Silicon Button Panel - Battery Indicator
(Total 5 LED lights)

Number of lights	Lead-acid battery	Lithium battery	Remarks
LED – 5 lights	$\geq 24.6 \text{ V}$	$\geq 27.4 \text{ V}$	
LED – 4 lights	$< 24.6 \text{ V}$	$< 27.4 \text{ V}$	
LED – 3 lights	$< 24.1 \text{ V}$	$< 24.1 \text{ V}$	Battery power may be insufficient for folding or unfolding
LED – 2 lights	$< 23.7 \text{ V}$	$< 23.7 \text{ V}$	
LED – 1 light	$< 23.4 \text{ V}$	$< 23.4 \text{ V}$	Riding is not recommended, and battery should be charged immediately

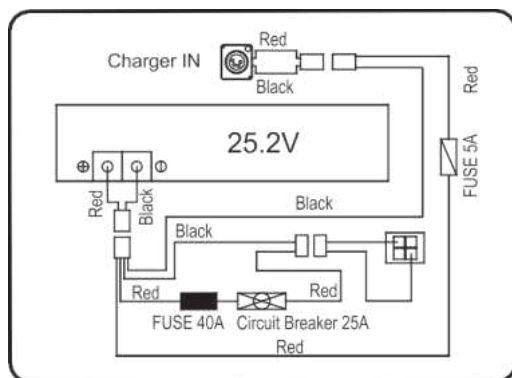


Touch Panel-Battery Indicator
(Total 6 LED lights)

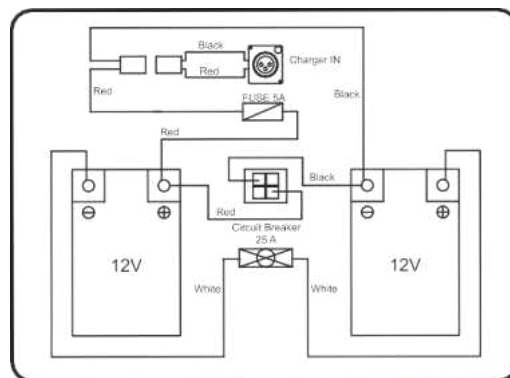
Number of lights	Lead-acid battery	Lithium battery	Remarks
LED – 6 lights	$\geq 27.4 \text{ V}$	$\geq 27.4 \text{ V}$	
LED – 5 lights	$< 26.6 \text{ V}$	$< 26.6 \text{ V}$	
LED – 4 lights	$< 25.7 \text{ V}$	$< 25.7 \text{ V}$	
LED – 3 lights	$< 24.8 \text{ V}$	$< 24.8 \text{ V}$	Battery may be insufficient for folding / unfolding
LED – 2 lights	$< 24.0 \text{ V}$	$< 24.0 \text{ V}$	Riding is not recommended, and battery should be charged immediately
LED – 1 light	Constantly lit up		Self-Diagnostic Warning Light

1.8 Battery circuit diagram

Lithium battery - Circuit diagram



Lead-acid battery - Circuit diagram



1.9 Basic Maintenance Instructions

Periodic maintenance of the scooter can prolong its life. This is particularly important after a rainy day, or when humidity is high.

1.10 Maintenance Recommendation

Seat: Clean with soap water and do not sit until the seat dried out.

Frame: Please use clean water and a wet cloth for cleaning.

Shroud: Use clean water and a wet cloth for wiping and cleaning. Wax can be used for protection after it has dried.

Caution: Spraying or washing the entire scooter may cause damage and must not be done.

1.11 Storage

- Do not park the scooter in direct sunlight or in the rain or snow. Avoid leaving it in a humid place for any length of time.
- When it is necessary to park the scooter in a place where it can be subject to moisture or extreme weather, take the battery out and keep it in a suitable dry place.
- When parking, ensure the seat is secured, the N-D lever set to D-position, and the power switch is "Off".
- Before carrying out any maintenance, turn off the power, and make sure the N-D lever is in D-position.
- If the scooter is to be parked for more than a week, make sure the battery is charged and disconnect it.
- Make sure the battery connector is not in a place where it may cause a short circuit.

1.12 Lithium Battery Storage

Storage temperature: Less than 1 year: -20 °C ~ 20 °C

Less than 3 months: -20 °C ~ 40 °C

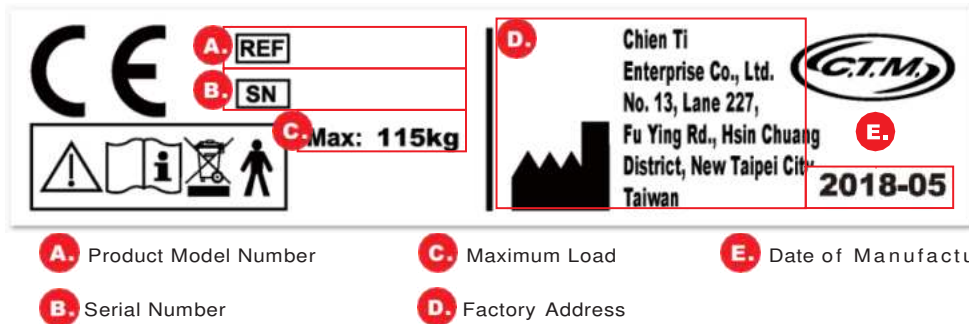
Less than 1 month: -20 °C ~ 50 °C

The highest temperature during battery transportation should be lower than 60 °C.

Lead-acid battery storage: storage temperature -30 °C ~ 50 °C

1.13 Scooter Information Label

Scooter information label is the identification of the scooter and is attached to the inner side of the seat bar. The label has the following information:



1.14 Repair Items

Please refer to the service procedures on the next pages.

The numbering of pictures on right side correspond to chapters of service procedures:

e.g. 1 → 2.1 SERVICE-01,
13 → 2.13 SERVICE-13

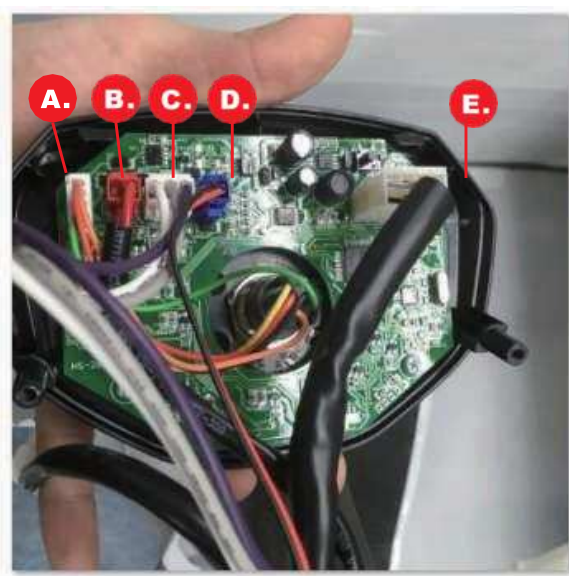
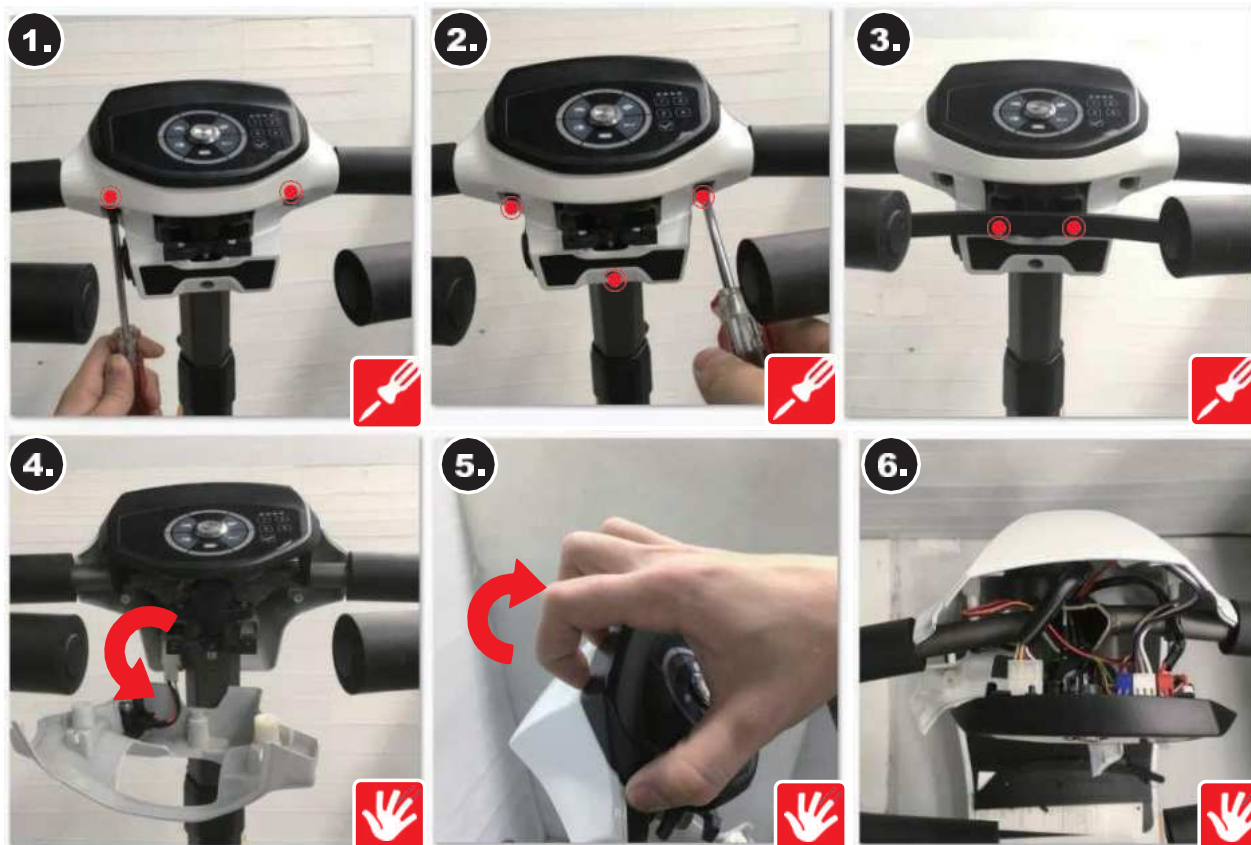


2 Service Procedures

2.1 SERVICE-01 Steering Shroud Repair

1. Remove the steering head rear shroud and panel screws (12 mm, 2 pcs).
2. Remove the three screws (12 mm, 3 pcs) on the steering head rear shroud.
3. Remove the starter rod screws (8 mm, 2 pcs).
4. Detach the steering head rear shroud.
5. Detach the panel and steering head top shroud.
6. Make sure all the connectors on the board are properly fastened.

❖ When reassembling be sure to use the exact reverse sequence of operations.



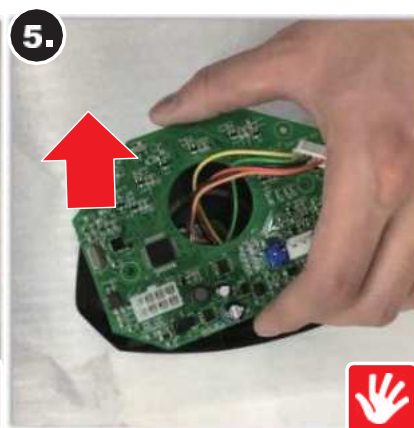
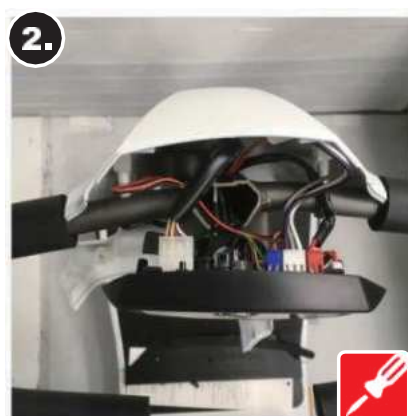
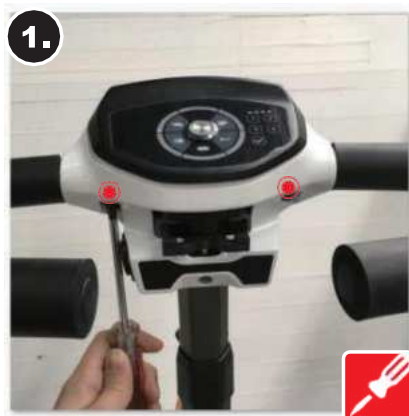
Board Circuit Comparison Diagram:

- A.** Metal power switch connector
- B.** Power connector
- C.** Starter VR connector
- D.** Buzzer connector
- E.** Main cable connector (including headlight, taillight, and folding/ unfolding board)

SERVICE-01-1 Top Control Panel Repair

1. Remove the steering head rear shroud and panel screws (12 mm, 2 pcs).
2. Open the steering head top shroud.
3. Also remove all the connectors on the top control board (refer to the instructions on the previous page for connectors).
4. Remove the four screws (8 mm, 2 pcs) on the top control board.
5. Remove the entire top control board and replace with a new one.

❖ After replacing the parts be sure to use the exact reverse sequence of operations for reassembly.



- The top control board connectors are color-coded to prevent mistakes when reconnecting. However, it is recommended that a photo be taken that shows the connector locations before removing the board to prevent a hassle during re-installation.
- Step 2. If it cannot be removed, please refer to
- *Service Procedures*



- Please do not touch the terminals on the top control board, to prevent damage to the control board circuitry.
- During replacement of the top control board, do not disturb the metal power switch in the center.
- Make sure to match the connector colors and do not make modifications to any cables or connections. Do not force connectors to avoid damage to the electrics and the scooter.

2.1.1 SERVICE-01-2 Buzzer Repair

Refer to Service Procedures SERVICE-01 Steering Shroud Repair steps as follows:

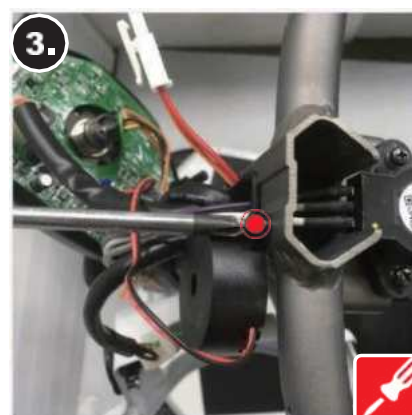
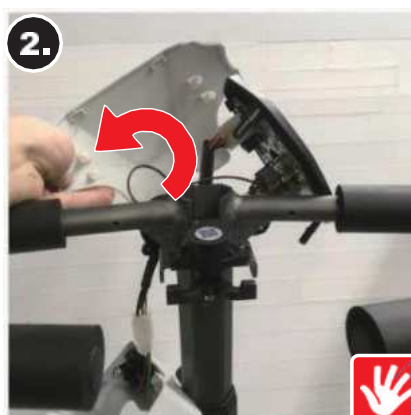
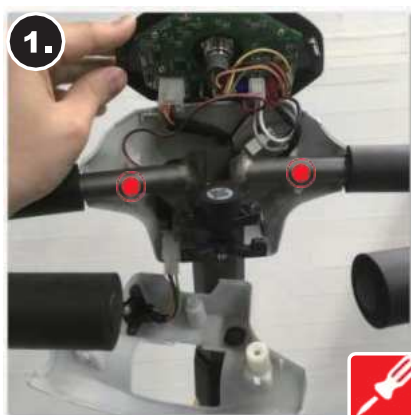
1. Find the buzzer connector (figure on the right)
2. Re-connect the buzzer connector (figure on the right)
3. If it is not effective, go to *Buzzer Replacement* below.



Buzzer Replacement:

Please refer to Service Procedures SERVICE-01 Steering Shroud Repair steps first, and then:

1. Remove the screws (16 mm, 2 pcs) on the handle and steering head front shroud.
 2. Remove the steering head front shroud and set it aside carefully.
 3. Remove the buzzer and handle screw (12 mm, 1 pc).
 4. Take out the buzzer and replace it with a new one.
- ❖ After the replacement of parts or re-installation, please follow the exact reverse sequence for reassembly.
❖ If buzzer function is not restored, go to SERVICE-01-1 Top Control Panel Repair.



15kgf-cm



- Step 1. Use one hand to remove the screws and the other hand to hold the steering head front shroud to prevent it from falling.
- Step 4. Use one hand to remove the screws and one hand to hold the buzzer to prevent it from falling.

2.1.2 SERVICE-01-3 Starter VR Repair

Please refer to Service Procedures SERVICE-01 Steering Shroud Repair steps as follows:

1. Find the starter VR connector (figure on the right).
2. Re-connect the starter VR (figure on the right).
3. If function is not restored, go to *Starter VR Replacement* below.

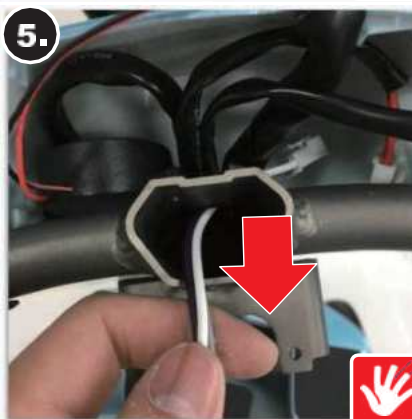
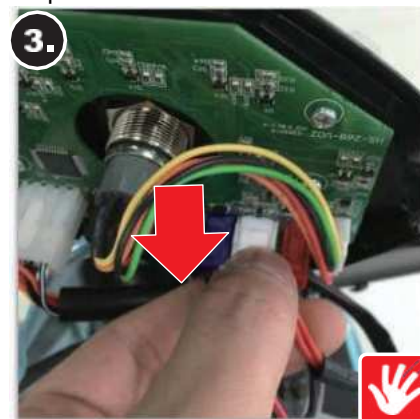
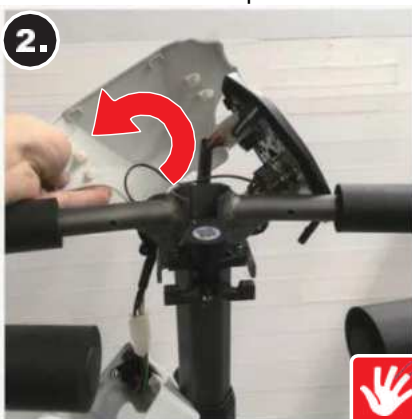
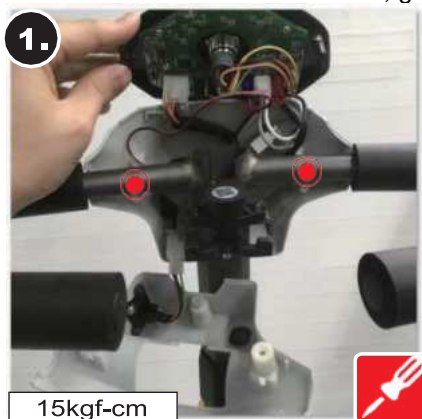


Starter VR Replacement:

Refer to Service Procedures SERVICE-01 Steering Shroud Repair steps as follows:

1. Remove the screws (16 mm, 2 pcs) on the handle and steering head front shroud.
2. Remove the steering head front shroud and set it aside carefully.
3. Remove the starter rod connector on the board.
4. Remove the screws (12 mm, 2 pcs) of steering bar and starter VR.
5. Take off the starter VR and connector.
6. Take out the starter controller and replace it with a new one.

- ❖ After the replacement of parts or re-installation, please follow the exact reverse sequence for reassembly.
- ❖ If function has not been restored, go to SERVICE-01-1 Top Control Panel Repair.



2.1.3 SERVICE-01-4 Metal Power Switch Repair

Please refer to Service Procedures SERVICE-01 Steering Shroud Repair steps as follows:

1. Find the metal power switch connector (figure on the right).
2. Reconnect the metal power switch connector.
3. If it is not effective, go to *Metal Power Switch Replacement* below.



Metal Power Switch Replacement:

Please refer to Service Procedures SERVICE-01 Steering Shroud Repair steps as follows:

1. Use needle-nosed pliers to unfasten the nut.
 2. Remove the metal power switch nut.
 3. Take out the switch and replace it with a new one.
- ❖ After the replacement of parts or re-installation, please follow the exact reverse sequence for reassembly.
 - ❖ If switch function has not been restored, refer to SERVICE-01-1 Top Control Panel Repair.

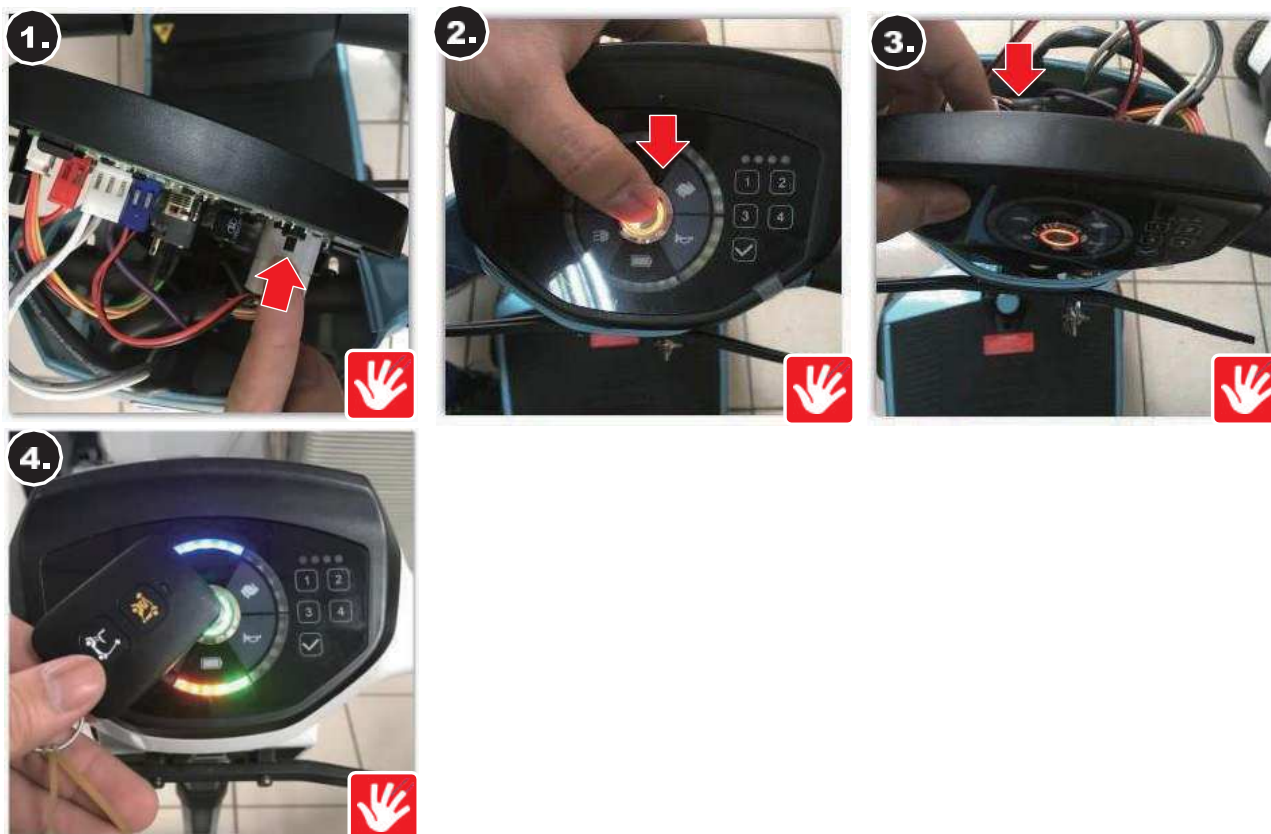


- The metal power switch can be fastened in place by hand. An overly tight fastening can cause the touch panel to be dented inwards.
- Do not put any force on the metal power switch circuit to prevent any damage that might affect its function.

2.1.4 SERVICE-01-5 RF Key Setting

Refer to Service Procedures SERVICE-01 Steering Shroud Repair steps as follows:

1. Find the top control board setting button.
 2. Press the metal switch once, and after turning on the power, the red metal switch light should be on.
 3. Press the setting button once, and the metal switch red light should flash.
 4. After the flashing stops, place the RF key near the metal switch. The scooter can be unlocked, and setting has been completed.
- ❖ Replace the steering head top shroud.
 - ❖ If this has not been effective, refer to SERVICE-01-1 Top Control Panel Repair.
 - ❖ The top control board of the scooter can memorize up to four sets of RF keys.



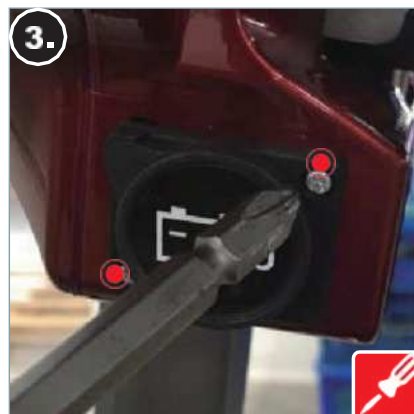
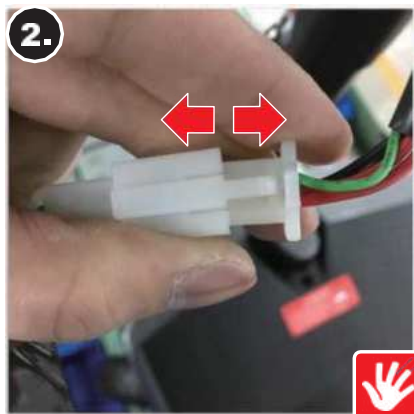
- After four RF keys have been memorized, setting a fifth key will cause the first key to be erased.
- Setting for the old version RF key (figure on the right) is the same, except in the new version the RF key is integrated in the remote control.



2.1.5 SERVICE-01-6 Steering Head Charger Socket Repair

Refer to Service Procedures SERVICE-01 Steering Shroud Repair steps as follows:

1. Find the steering head charger socket and connector.
 2. Remove the steering head charger connector.
 3. Use a cross-head screwdriver to remove the charger socket screws (8 mm, 2 pcs) on the outside of the steering head.
 4. Take out the complete steering head charger socket.
- ❖ After the replacement of parts or re-installation, please follow the exact reverse sequence for reassembly.
 - ❖ The lithium battery charger socket has 4 holes. The lead-acid battery charger socket has 3 holes.



- After changing the battery type from lead-acid to lithium, or vice-versa, make sure that the steering head charger socket and battery pack charger sockets match the type of battery installed. See *SERVICE-06 Battery Pack Repair*.
- Self-modification of charging cables or plugs and sockets is extremely dangerous and can lead to short circuits and even fire.

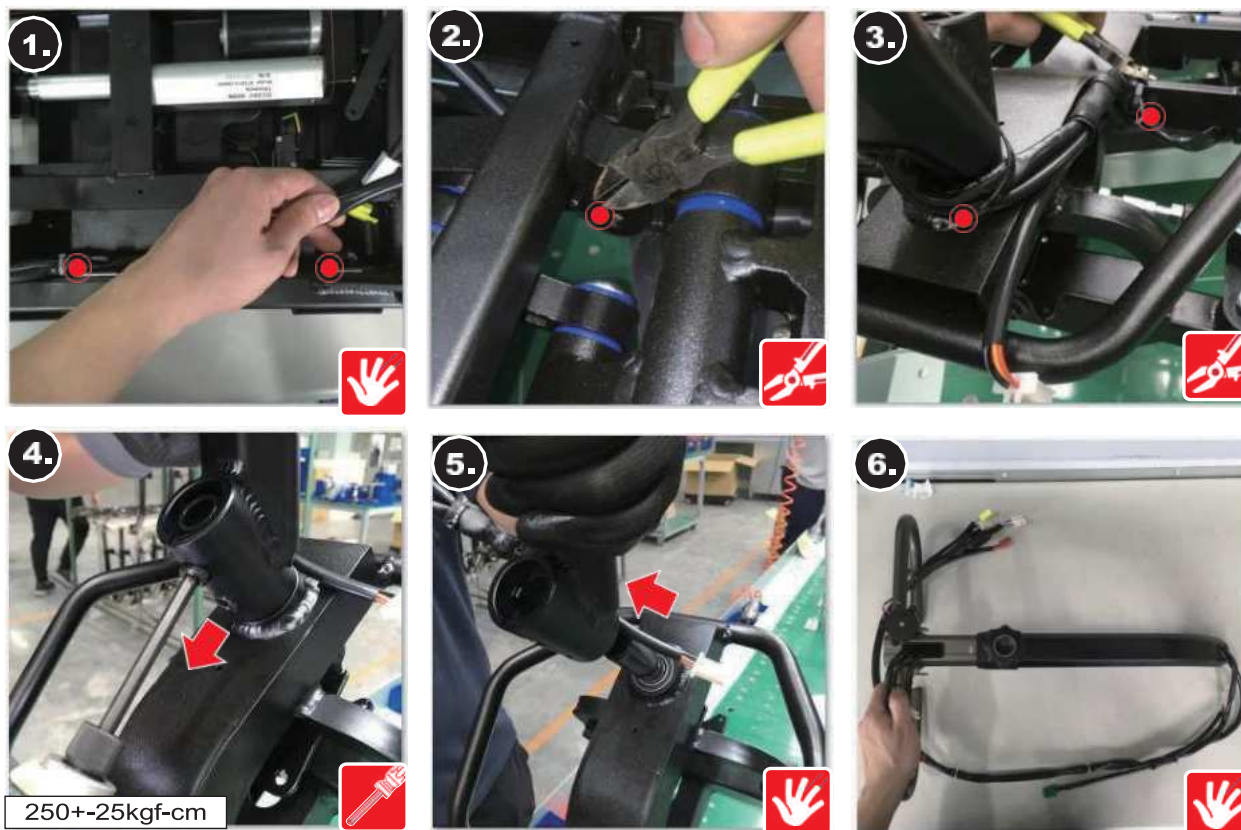
2.2 SERVICE-02 Steering Bar Repair

Remove shrouds as shown in *SERVICE-03 Headlight Shroud Repair*, *SERVICE-09 Front Lower Shroud Repair*, *SERVICE-10 Front Top Shroud Repair*, and *SERVICE-11 Rear Top Shroud Repair*.

Then proceed as follows:

1. Remove the rear frame - left side hook (2 pcs) main cable.
2. Cut and remove the cable tie (2 pcs) of the front frame at the left side.
3. Cut and remove the cable tie (2 pcs) at the front end of the front frame.
4. Remove the two hexagon screws (#6/40 mm, 2 pcs) connected to the frame and the steering bar.
5. Push the steering bar upwards for removal.
6. Take out the steering bar.

❖ After the replacement of parts or re-installation, please follow the exact reverse sequence for reassembly.

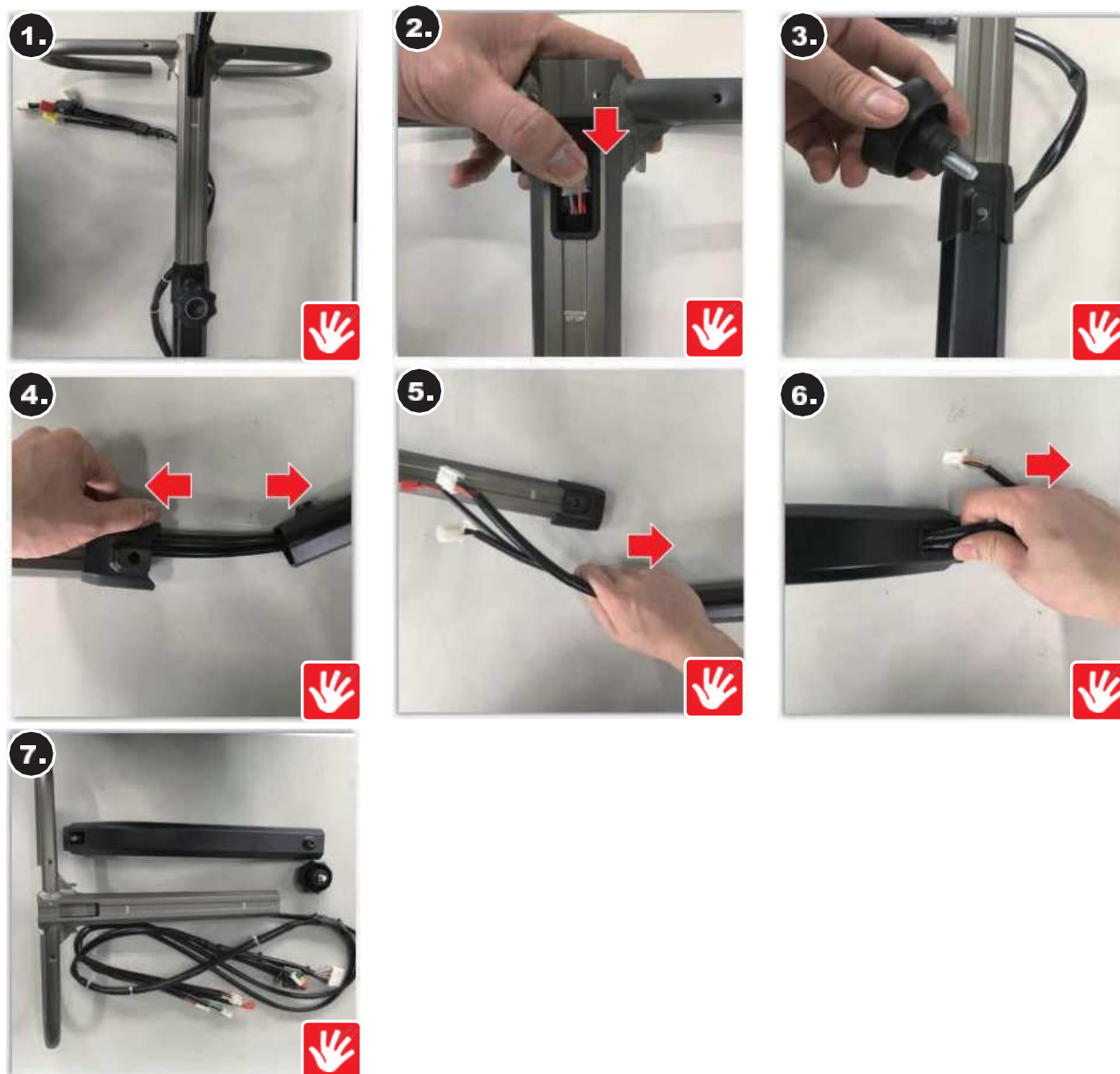


- Step 5. If it cannot be removed or replaced easily, use a rubber hammer to drive bar into position.
- After cutting (steps 2 and 3), when re-installing, use a new cable tie and place it in the original position.

2.2.1 SERVICE-02-1 Main Cable Repair

Follow the *SERVICE-02 Steering Bar Repair* steps and then:

1. Please refer to *SERVICE-01-2 Buzzer Repair* / *SERVICE-01-3 Starter VR Repair* to remove the buzzer and VR controller.
 2. Insert the front end of the main cable into the hole on the top of the steering bar.
 3. Remove the adjustment screw.
 4. Disengage the central locking pin to separate the steering bar into upper and lower sections.
 5. Remove the main cable from the upper section of the steering bar.
 6. Remove the main cable from the lower section of the steering bar.
 7. Take out the main cable and the complete steering bar.
- ❖ After the replacement of parts or re-installation, please follow the exact reverse sequence for reassembly.



2.3 SERVICE-03 Headlight Shroud Repair

1. Remove the screws (12 mm, 2 pcs) on the outside of the headlight shroud.
2. Remove the screws (12 mm, 2 pcs) from the inside of the headlight shroud.
3. Push the headlight shroud gently upward to separate it from the frame.

❖ After the replacement of parts or re-installation, please follow the exact reverse sequence for reassembly.



- If the scooter is folded it will be easier to carry out this operation.

2.3.1 SERVICE-03-1 Headlight Repair

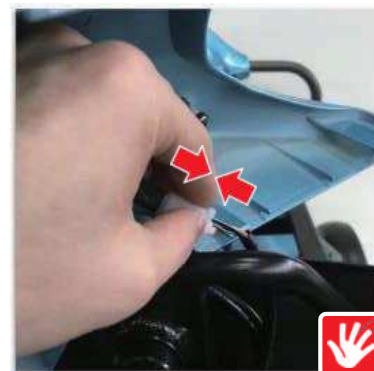
Refer to Service Procedures SERVICE-01 Steering Shroud Repair steps first, and then:

1. Find the headlight connector.
2. Reconnect the headlight connector.
3. If it is not effective, carry out the *Headlight Shroud Connector Inspection*.



Refer to *SERVICE-03 Headlight Shroud Repair* steps, then:

1. Find the headlight shroud connector (figure on the right).
2. Reconnect the headlight shroud connector (figure on the right).
3. If it is not effective, go to *SERVICE-03 Headlight Shroud Repair* to replace it with a new one.
4. If this does not solve the problem, refer to SERVICE-01-1 Top Control Panel Repair to replace this with a new one.

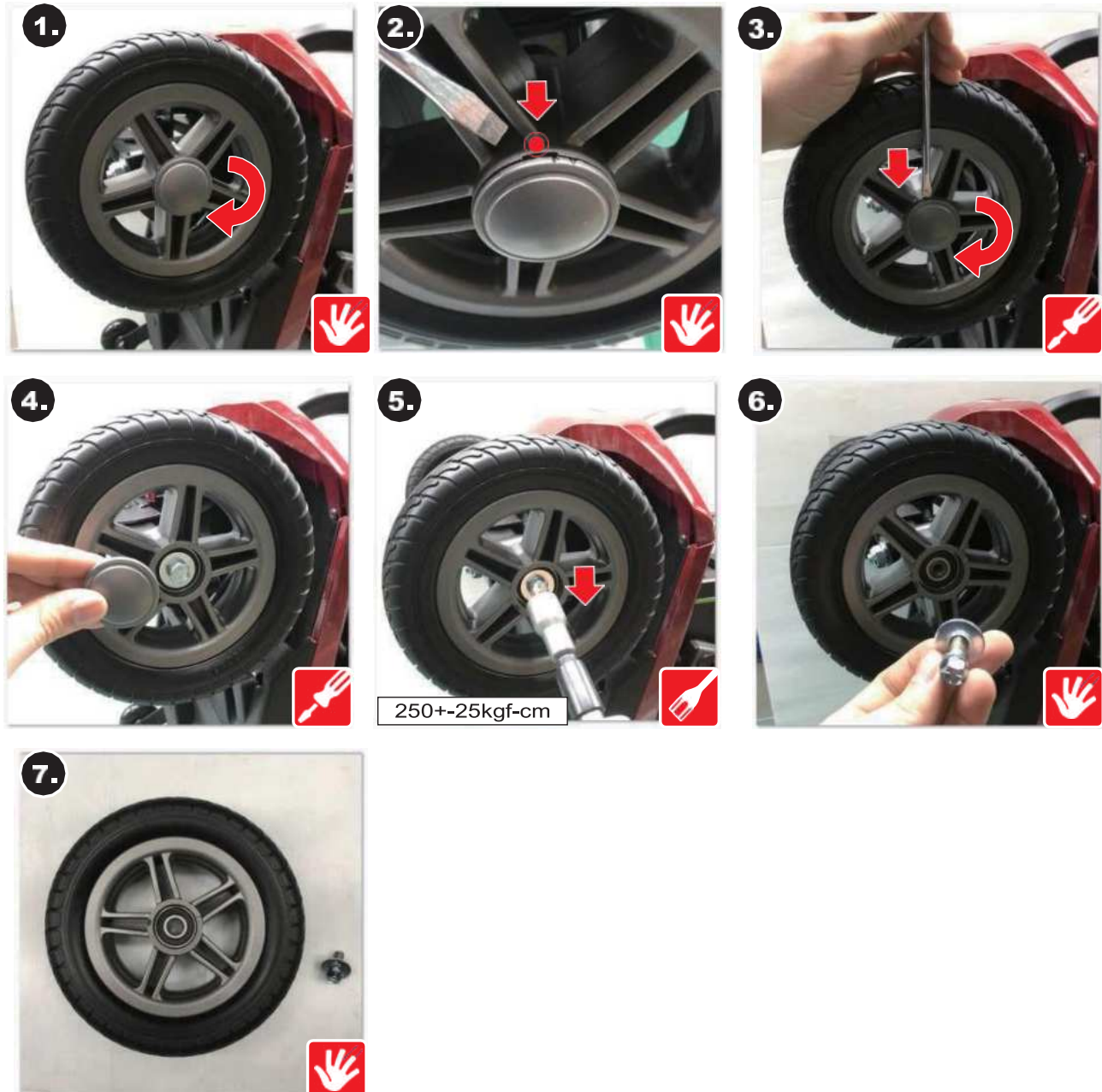


- The headlight is not a separate unit and cannot be replaced alone. It is necessary to replace the entire headlight shroud.

2.4 SERVICE-04 Front Wheel Repair

1. Rotate the wheel to find the notch on the wheel cap.
2. Insert a flat screwdriver into the notch.
3. Lift the wheel cap off to expose the hub.
4. Remove the hexagonal headed bolt (#12) and washer in the center of the axle.
5. Take the wheel off the axle.

❖ After the replacement of parts or re-installation, please follow the exact reverse sequence for reassembly.

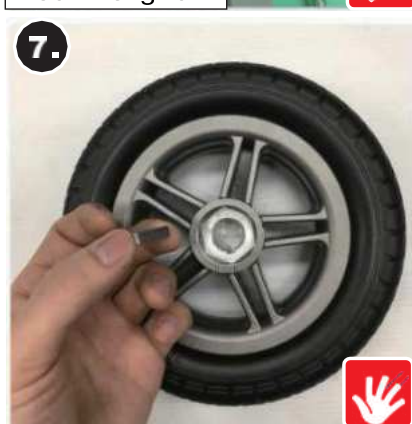


- Before taking the wheel off, lift the scooter and place a support under the axle to hold the scooter when the wheel has been taken off.
- When replacing the wheel make sure the sleeve is in the middle so the wheel will go on properly.

2.5 SERVICE-05 Rear Wheel Repair

1. Rotate the wheel to find the notch on the wheel cap.
2. Insert a flat screwdriver into the notch.
3. Lift the wheel cap off to expose the hub.
4. Loosen the hexagonal headed bolt (#12).
5. Remove the hexagonal headed bolt (#12) and washer in the center of the axle.
6. Take off the wheel and remove the black washer at the back.
7. Turn the wheel around and remove the feather key in the center to complete the action.

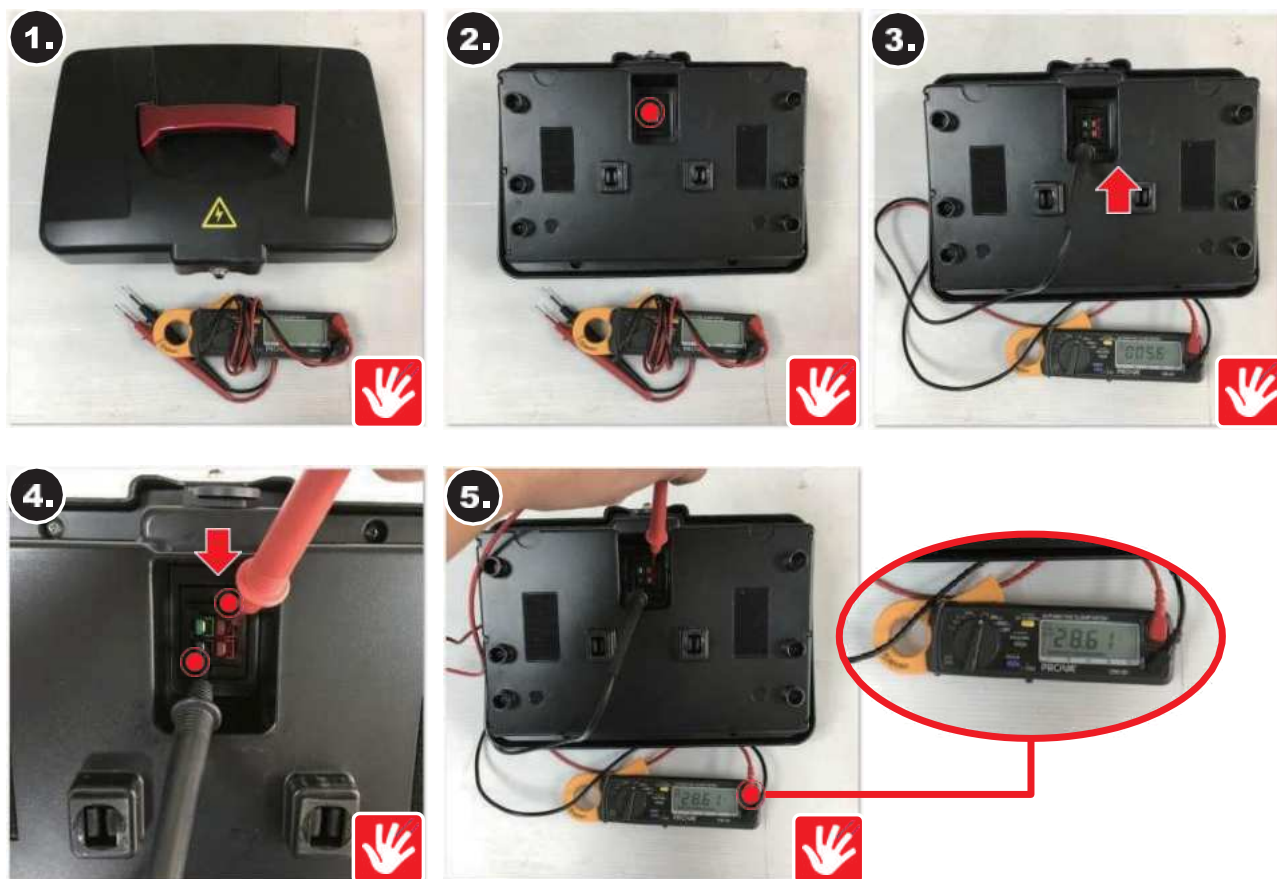
❖ After the replacement of parts or re-installation, please follow the exact reverse sequence for reassembly.



- After Step 5 the black washer may stick to the inside of the wheel hub or on the axle. Make sure it does not get lost. Keep the washer and the feather key safely aside for reuse because these parts are not provided with a new tire or wheel assembly.

2.6 SERVICE-06 Battery Pack Repair

1. Remove the battery pack from the scooter.
 2. Turn it around and find the battery pack power socket.
 3. Use a multi-meter to measure the battery voltage. The black socket is negative, the red socket is positive.
 4. Observe the reading on the multi-meter.
- ❖ Lithium battery measurement normal range: 19~29 V
 - ❖ Lithium battery measurement outside the normal range: below 19 V, please refer to the following *Battery Failure Instructions*.
 - ❖ If the battery voltage is within the normal range, but it cannot be charged, the charger may be faulty. Refer to *SERVICE-06-4 Charger Repair*.



Battery Failure Instructions:

Confirm that the connectors are normal. If the lithium battery voltage is below 19 V, please charge the battery. After charging the battery for 30 minutes, measure again to check if the voltage still is 19 V:

1. If the voltage rises with charge, continue charging until the battery is fully charged.
2. If the voltage remains below 19 V, the lithium battery has been damaged.
3. In this case, refer to *SERVICE-06-3 Battery Pack - Battery Removal*.

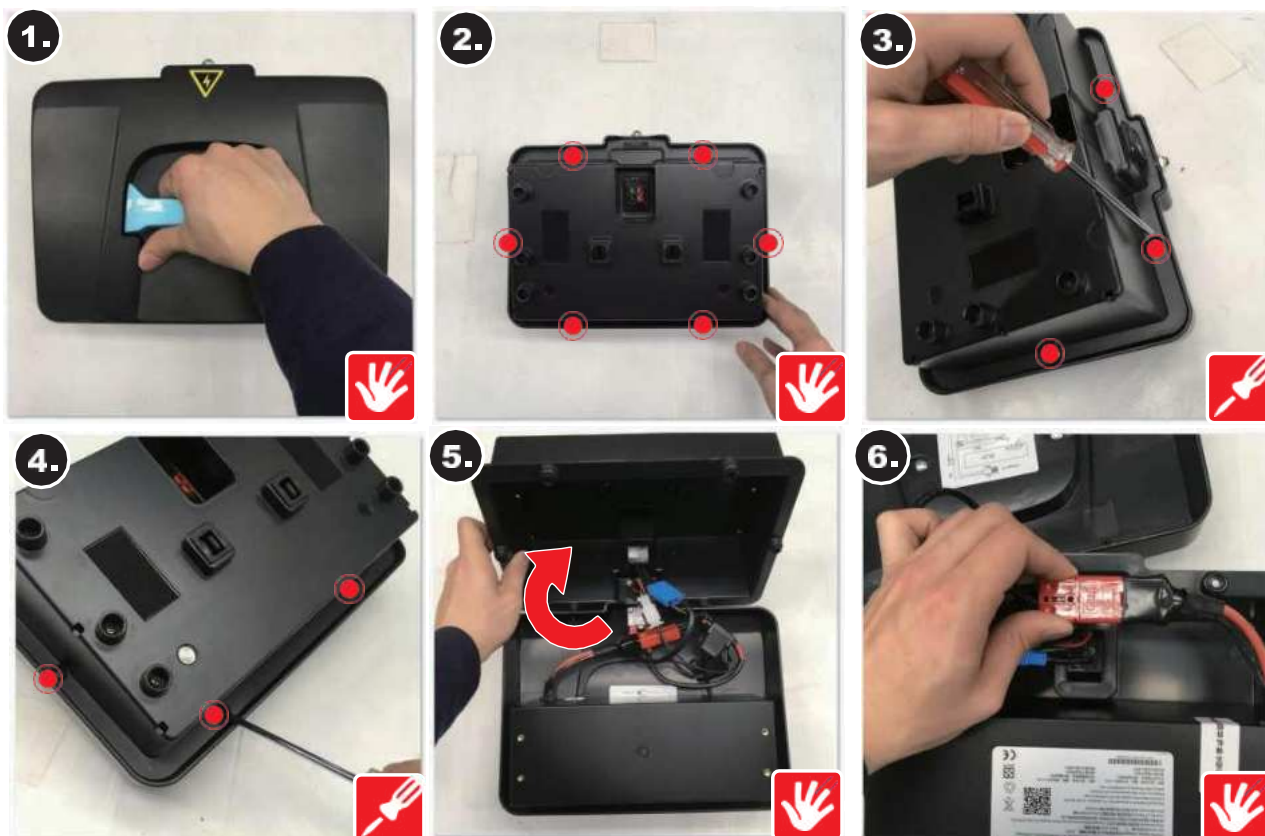


- The minimum voltage of a standard lead-acid battery is 19.2 V.

Battery Pack Wiring Inspection:

1. Remove the battery pack from the scooter.
 2. Turn the battery pack over and locate the six screws that hold the shroud.
 3. Remove the screws (12 mm, 6 pcs).
 4. Remove the shroud and open the battery pack.
 5. Remove the battery main cable connector.
 6. Then check the rest of the connectors.
- ❖ After removing the battery main cable connector, please set it aside safely.
 - ❖ For re-installation, please follow the exact reverse sequence.

- ❖ If a check shows the wiring to be normal, but the charger still does not charge the battery pack, the charger may need to be replaced.



Lead-Acid Battery Wiring Inspection:

1. Please follow the same steps as above to remove the battery pack.
2. The connectors inside the pack can then be checked.
 - a. Negative power output charging wire - check the position of the negative electrode hole on the battery pack.
 - b. Positive series wiring (without electrode wire).
 - c. Negative series wiring (without electrode wire).
 - d. Positive power output charging wire - check the position of the positive electrode hole on the battery pack.
 - e. Charger socket power cable.



- ❖ Repair of the lead-acid battery is generally the same as for the lithium battery. Except that *SERVICE-06-3 Battery Pack - Battery Removal* provides special instructions for the removal and replacement of each kind of battery. For the rest of the repair steps, refer to *SERVICE-06-1 Battery Pack - Charger Socket Repair* and *SERVICE-06-2 Battery Pack - Power Socket Repair*.



- When turning the battery pack over, do not drop it, or put it down hard on the table. Place it down gently and avoid damage. Damage to a lithium battery may cause a serious accident.
- Step 6. After removing the battery main cable connector, remember that the battery end is still electrically connected. Put it down carefully and make sure there is no chance of a short circuit.
- Do not attempt to modify or repair the lithium battery inside the battery pack. This can be very dangerous and represents a severe hazard.



- During the replacement of the battery pack, please remove the battery and prevent operation on the scooter directly to facilitate the replacement.

2.6.1 SERVICE-06-1 Battery Pack - Charger Socket Repair

Please refer to *SERVICE-06 Battery Pack Repair* steps and then:

1. Find the charger socket connector inside the battery pack (Figure 1 below).
2. Reconnect the battery pack charger socket connector.
3. If this does not restore function, refer to the following *Replacement Instructions*.

Replacement Instructions:

After completing the *SERVICE-06 Battery Pack Repair* steps:

1. Remove the battery pack charger socket.
 2. Remove the battery pack outer shroud and the charger socket screws.
 3. Remove the battery pack charger socket and remove the inside metal sheet at the same time.
 4. Take out the battery pack charger socket, and replace it with a new one.
- ❖ After the replacement of parts or re-installation, please follow the exact reverse sequence for reassembly.



2.6.2 SERVICE-06-2 Battery Pack - Power Socket Repair

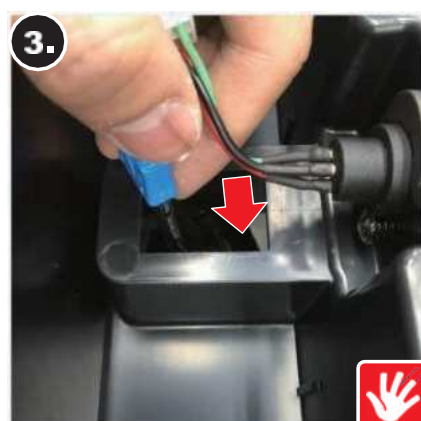
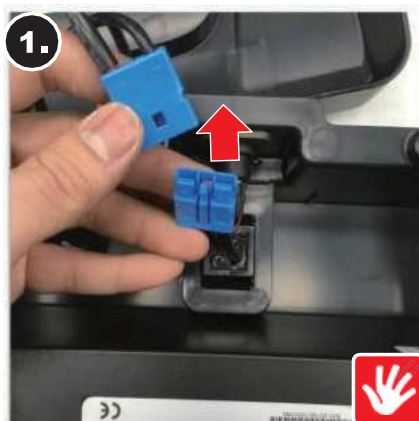
Please refer to *SERVICE-06 Battery Pack Repair* steps and then:

1. Find the battery pack charger connector (Figure 1 below).
2. Reconnect the battery pack charger socket connector.
3. If it is not effective, please refer to the following *Replacement Instructions*.

Replacement Instructions:

After completing the *SERVICE-06 Battery Pack Repair* steps:

1. Remove the battery pack charger socket.
 2. Squeeze the two sides of the charger socket inside the battery pack.
 3. Push it out of the battery pack gently.
 4. Replace the battery pack power socket with a new one.
- ❖ After the replacement of parts or re-installation, please follow the exact reverse sequence for reassembly.



Re-installation Instruction:

- ❖ When replacing the charger socket be sure it is the right way around. Please refer to the pictures on the right. If the connector position is incorrect, it will not be possible to reinstall the battery pack.

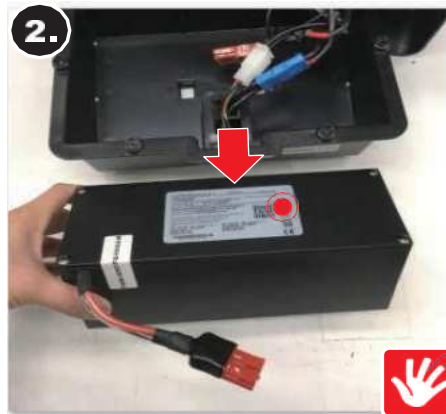


2.6.3 SERVICE-06-3 Battery Pack - Battery Removal

Please refer to *SERVICE-06 Battery Pack* Repair steps and then:

1. Turn the battery pack over gently and remove the screws to open the battery pack.
 2. Take the lithium battery out.
 3. The sticker on the lithium battery has a serial number and all the relevant information about the pack, this including the battery specifications, warnings, date of manufacture, etc.
- ❖ For re-installation, reverse the sequence of these steps.
 - ❖ To re-install a different type of battery (lithium battery/ lead-acid battery), please refer to the following battery setting instructions.

- ❖ A lead-acid battery is heavy and does not need to be secured with screws. Place it directly into the pack and make the connections.

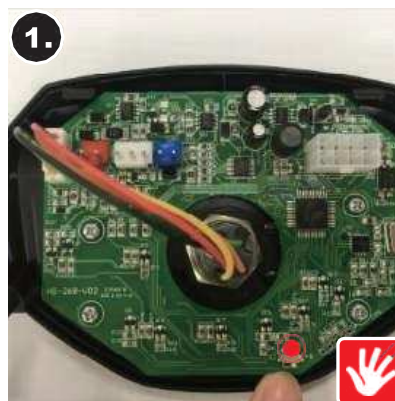


- A Lithium battery relevant specification.
- B Lithium battery warnings.
- C QR Code: Use such code to obtain information related to the lithium battery.
- D Lithium battery serial number barcode.

Battery Setting Instructions:

Please refer to Service Procedures SERVICE-01 Steering Shroud Repair steps, then:

1. Find the small battery type selection switch on the lower part of the top control board.
 2. Move it to LI (left): Lithium battery, or PB (right): Lead-acid battery.
 3. This switch resets the parameters to suit the type of battery. Make sure to push the switch completely to the end (either left or right). If this is not done properly, system determination may fail.
- ❖ The lead-acid/ lithium battery parameter setting can only be done on the automatic version.



- After a change of battery type, be sure to change the steering head charger socket and the battery pack charger socket. See *SERVICE-01-6 Steering Head Charger Socket Repair* and *SERVICE-06-1 Battery Pack - Charger Socket Repair*. Do not attempt to modify the charger socket or charger cable connector. This can be very dangerous and have severe consequences.
- If the selection switch is not set for the correct type of battery after a change of type, the scooter will run, but the battery level display on the panel will not show the correct state of the battery.
- Do not attempt to modify the charger socket or charger cable connector. This can be very dangerous and have severe consequences.

2.6.4 SERVICE-06-4 Charger Repair

1. Lithium battery standard 2A charger (see figure on the right)

- DC Output connector. Input range 100~240 V
(The mains plug may vary depending on the sockets used in the country or region.)

- AC Input connector: four pins.

Description: The charging indicator shows Standby: red light/ Charging: orange light/ Charged: green light.



2. Lead-acid battery charger (see figure on the right)

- DC** Output connector. Input range 100~240 V
(The mains plug may vary depending on the sockets used in the country or region.)

- AC** Input connector: three pins. 

Description: The charging indicator shows Standby: red light/ Charging: orange light/ Charged: green light.



3. Lithium battery standard 4 A charger (see figure on the right)

- DC** Output connector. Input range 100~240 V
(The mains plug may vary depending on the sockets used in the country or region.)

- AC** Input connector: four pins. 

Description: The charging indicator shows Standby: red light/ Charging: orange light/ Charged: green light.



Charger Failure and Troubleshooting

- ❖ Power charger indicator (red light) not lit up:

Troubleshooting → If the voltage to the socket is normal and the charger does not work, the charger needs to be replaced.

- ❖ Charging indicator (orange light) not lit up:

Troubleshooting → Check if the charger output connector is properly connected to the battery connector. If the connection is good, the battery may be faulty. Refer to *SERVICE-06-3 Battery Pack - Battery Removal* and replace the battery with a new one.

- ❖ Charging indicator (orange light) changed to (green light) immediately:

Troubleshooting → Check if the battery is fully charged. If not, then the battery may be faulty. Refer to *SERVICE-06-3 Battery Pack - Battery Removal*.



- The charger is a complicated device, and self-repair is not possible. If the charger fails to function, it must be replaced with a new one.



- There are two types of chargers, one for lithium batteries and another for lead-acid batteries and they are not interchangeable. These battery chargers are incompatible and the modification of cables or connectors in an attempt to convert a charger for use with another type of battery would be extremely dangerous.

2.7 SERVICE-07 Seat Repair

1. Use wrench (#12) and hex key to loosen the bolts and nuts holding the seat in place at the back.
2. Remove the bolts, nuts and washers and set them carefully aside.
3. Compress the spring inwards with the fingers and pull it out of the hole in the seat slide bracket.
4. Pull down and hold the seat springs to release the seat latch.
5. Push the seat bracket by thumbs towards the back of scooter to release the seat from latch.
6. When the seat is released from latch, grab the seat and push it towards the back of scooter to remove the seat.

- ❖ When replacing the seat, please follow the exact reverse sequence of these steps.

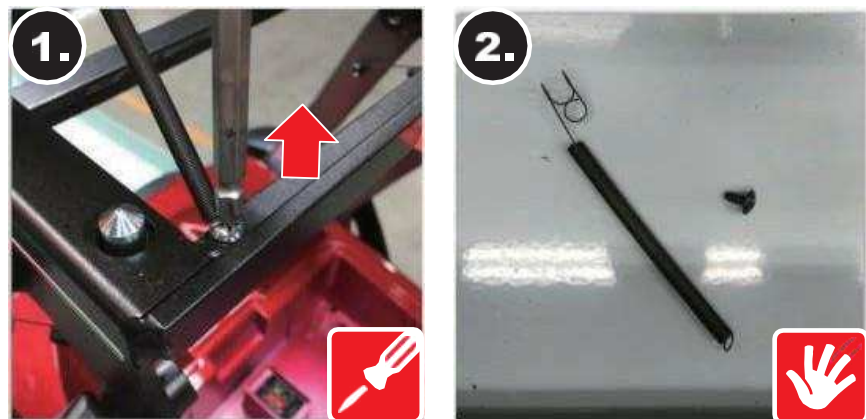


2.7.1 SERVICE-07-1 Seat Spring Repair

Please refer to *SERVICE-07 Seat Repair* steps first, then:

1. Remove the holding screws (6 mm, 2 pcs) at the front end of the seat base.
2. Take out the spring.

❖ Please follow the exact reverse sequence of these steps for reassembly.



2.8 SERVICE-08 Seat Bar Mechanism Repair

Follow the steps in *SERVICE-07 Seat Repair* to remove the seat.

1. Locate the rear fender and locking pin of the seat bar mechanism.
2. Push the rear fender outwards carefully to separate it from the seat bar mechanism.
3. Use an Allen key or driver to remove the socket head screws (5 mm #10, 2 pcs) on each side of the holding board.
4. Remove the socket head screws (25 mm #10, 4 pcs) on each side of the bar mechanism.
5. Take off the seat bar mechanism.

- ❖ For re-installation, please follow the exact reverse sequence of these steps.
- ❖ This operation could also be carried out without removing the seat base. However, the assembly is much more difficult to handle and is much heavier with the seat in place.
- ❖ For seat spring repair, please refer to *SERVICE-07-1 Seat Spring Repair*.



- After the screws have been removed from the seat bar mechanism, it can swing freely. Be careful not to get your fingers or a hand jammed under the bar mechanism during this operation.
- If the seat base is to be removed, please refer to *SERVICE-08-1 Seat Base Repair*.

2.8.1 SERVICE-08-1 Seat Base Repair

Please refer to *SERVICE-07 Seat Repair* steps first, then:

1. Use pliers to open the bar spring notch.
2. Separate the bar spring from the seat base.
3. Remove the hex screws (25 mm #10, 4 pcs) on both sides of the seat base and bar.
4. Take out the seat base.

- ❖ **When reassembling, please follow the exact reverse sequence of these steps.**

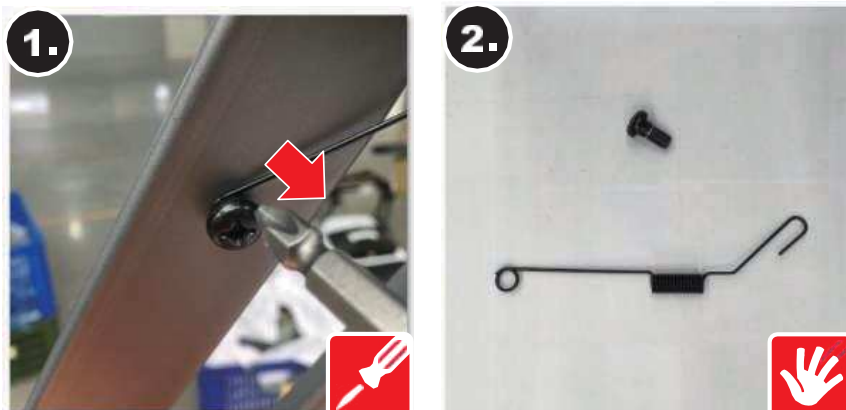


2.8.2 SERVICE-08-2 Seat Base Spring Repair

Please refer to *SERVICE-07 Seat Repair* steps first and follow Step 2 of *SERVICE-08-1 Seat Base Repair*, then:

1. Remove the seat bar screws (6 mm, 2 pcs).
2. Take out the seat base spring.

❖ When reassembling, follow the exact reverse sequence of these steps.



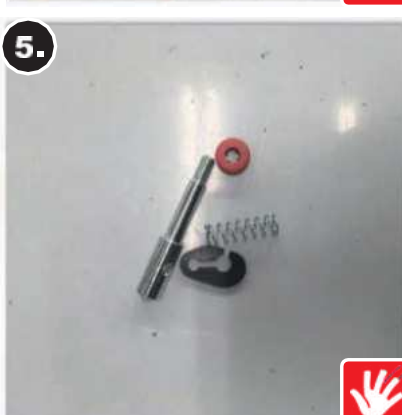
- Step 1. When opening the bar spring, be careful not to use too much force which might damage the spring.
- Step 2. For re-installation, please hook the spring onto the locking plate of the seat base from below. If it is to be removed, please refer to *SERVICE-08-2 Seat Base Spring Repair*.

2.8.3 SERVICE-08-3 Seat Locking Pin Repair

Please refer to *SERVICE-08-1 Seat Base Repair* to remove the seat base, then:

1. Hold in place quick-release screw on backside. Loosen the quick-release screw.
2. Take the quick-release screw out.
3. Remove the top washer.
4. Remove the seat locking pin and spring from the other side of the seat base.
5. Take out the seat spring.

❖ When reassembling, follow the exact reverse sequence of these steps.



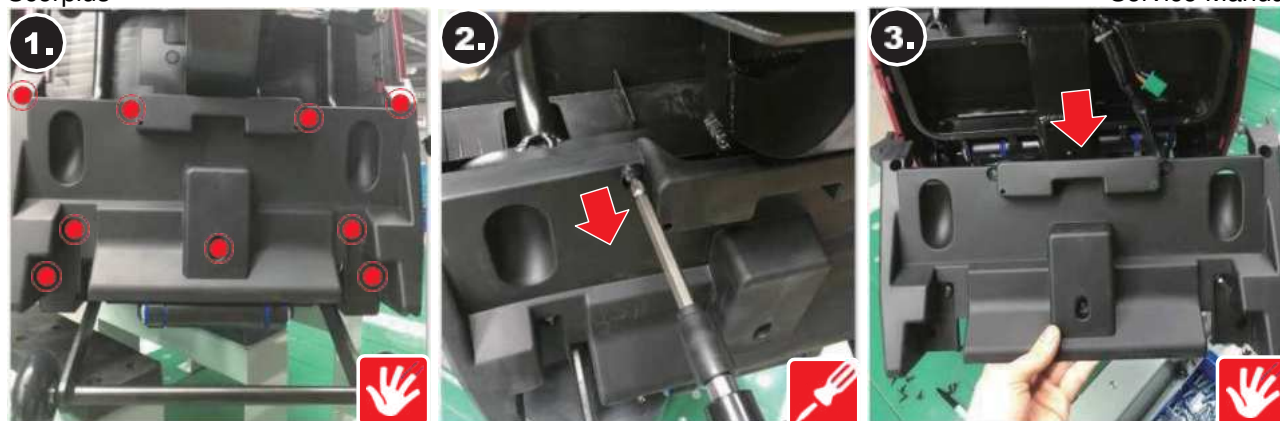
Note for re-installation:

When re-installing, apply a little amount of silicon oil to the pin. See the rectangular area shown in the picture on the right.



2.9 SERVICE-09 Front Lower Shroud Repair

1. There are 9 holding screws at the bottom of the scooter front lower shroud.
 2. Remove the shroud screws (12 mm, 9 pcs) and set them carefully aside.
 3. Take off the shroud.
- ❖ When reassembling, please follow the exact reverse sequence of these steps.



2.10 SERVICE-10 Front Top Shroud Repair

Please follow the *SERVICE-03 Headlight Shroud Repair* and *SERVICE-09 Front Lower Shroud Repair* steps first, then:

1. Remove the headlight shroud and front lower shroud.
2. Remove the central screw (16 mm, 1 pc) at the center of the front end of the top shroud.
3. Take off the shroud.

❖ When reassembling, please follow the exact reverse sequence of these steps.



- Before removing the shroud, elevate the front of the scooter on blocks, or fold it, so that the front wheels are off the ground. This makes inspection and replacement much easier.
- When removing the screws, start with those on the sides, and when replacing them start with those in the middle. This makes it easier to set the shroud's outer locking pins in place.

2.10.1 SERVICE-10-1 Front Top Shroud - Side Shroud Repair

Please follow *SERVICE-10 Front Top Shroud Repair* to remove the shroud, then:

1. Find the three locking pins at the sides of the front lower shroud – left- and right-side shroud.
2. Push the pins outwards.
3. Take the side shroud off both sides.

❖ When reassembling, please follow the exact reverse sequence of these steps.

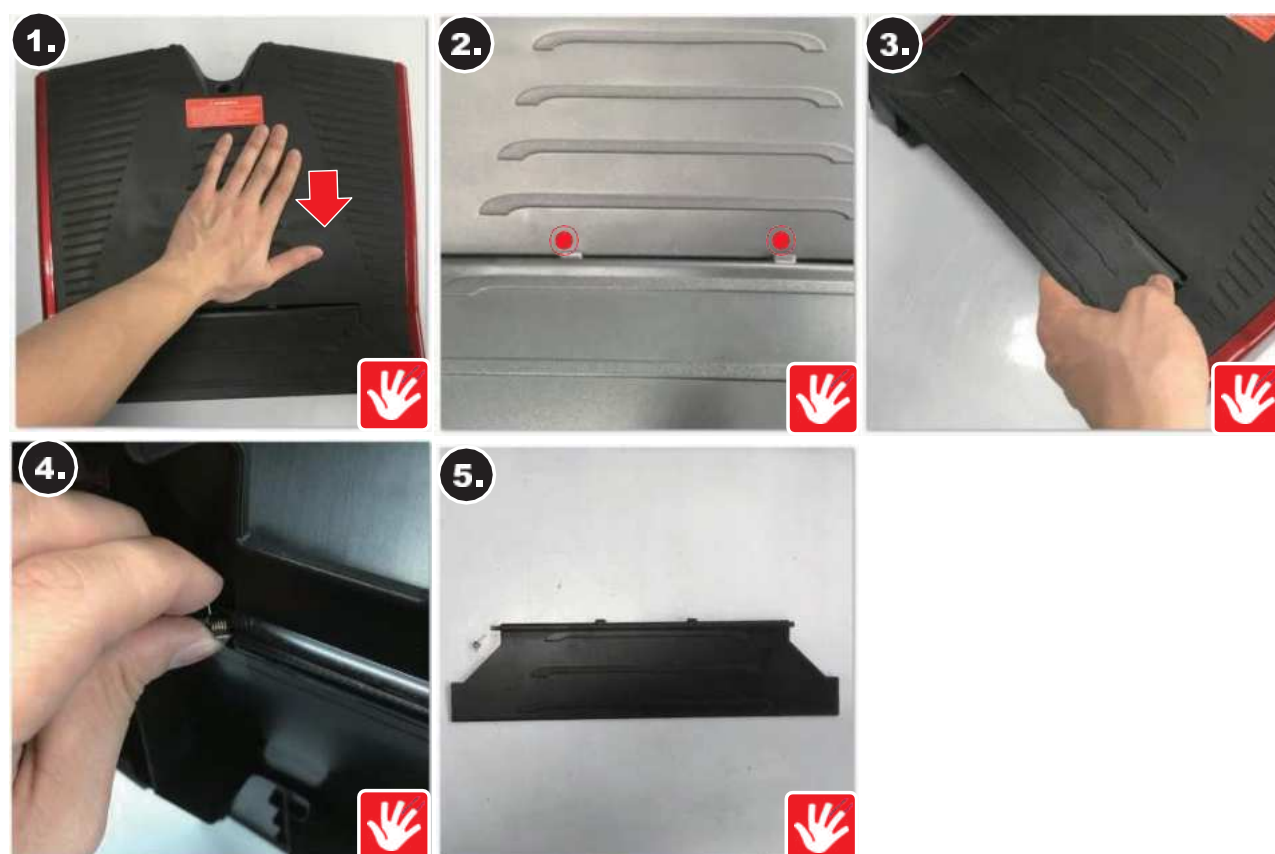


2.10.2 SERVICE-10-2 Footplate Shroud Replacement

Please follow *SERVICE-10 Front Top Shroud Repair* to remove the shroud, then:

1. Press the front top shroud downwards by hand.
2. Allow the shroud to disengage from the center locking pin.
3. Gently bend the shroud downwards to disengage from the right-side locking pin.
4. Remove the locking pin spring on the left side.
5. Take the footplate shroud off.

❖ When reassembling, please follow the exact reverse sequence of these steps.



- Step 5. When replacing the footplate spring, do not use too much force.
- This might deform it and cause a loss of function.
- Please do not leave the footplate shroud off, it must be replaced. Leaving it off is dangerous for the user and may also damage the scooter.



- After removing the footplate spring, keep it aside carefully. The re-installation of the spring is more complicated. Refer to the following figures for instructions for its replacement.

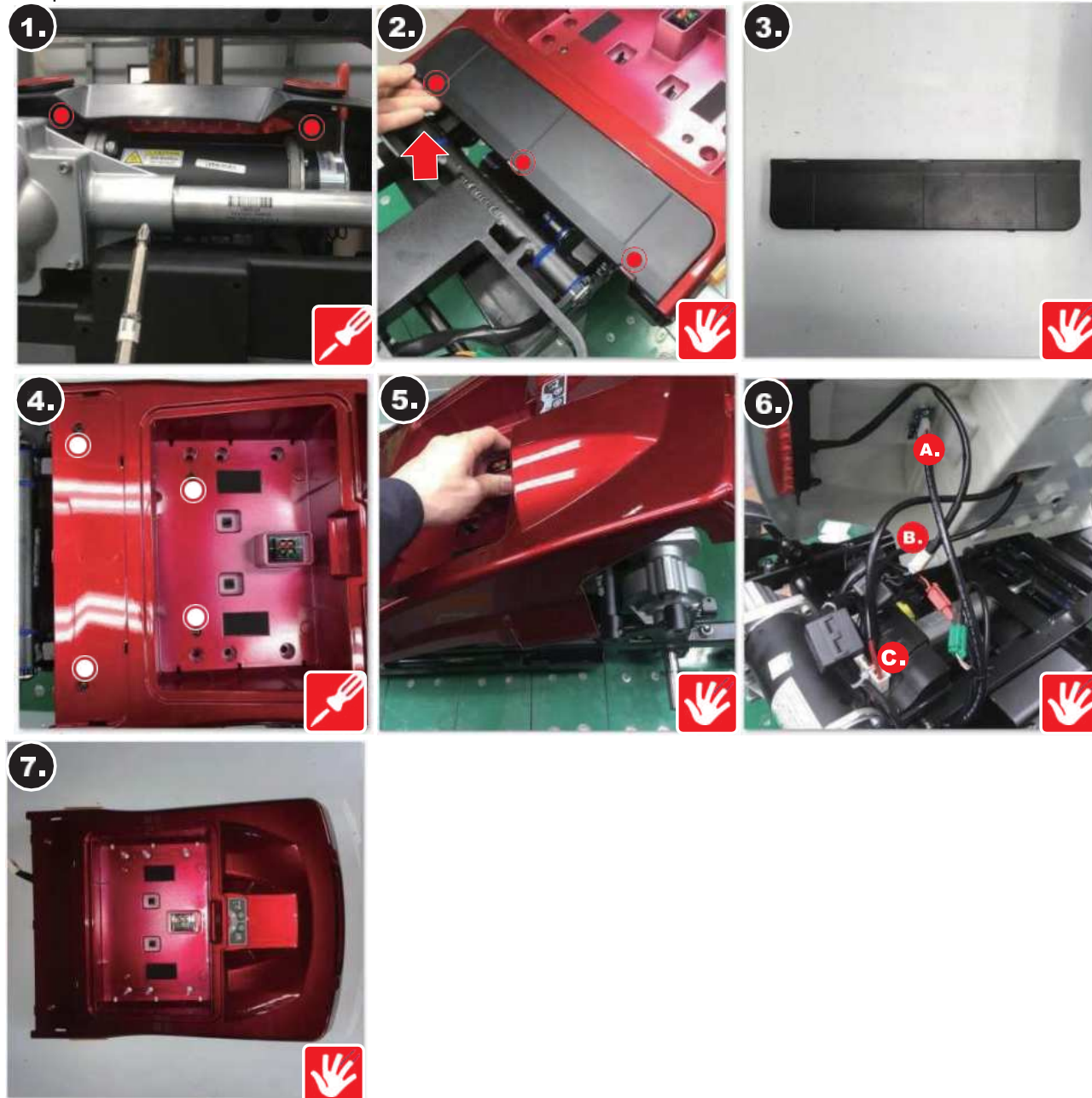
Spring Re-Installation Instructions

1. Spring location (Figure a. on the right): Long end to the left/ short end to the right.
2. Re-install at the locking pin on the left side of the footplate shroud.
3. Spring mounted into the locking pin on the left side.
4. For the rest of the re-installation refer to Step 3 → Step 1 of *SERVICE-10-2 Footplate Shroud Replacement*.

The footplate shroud should be lifted occasionally (without removal) so that the gears shown in Figure b. to the right, can be lubricated. This is important and should be done regularly to prolong the useful life of the scooter.

**2.11 SERVICE-11 Rear Top Shroud Repair**

1. Remove the two inner screws (12 mm, 2 pcs) underneath the rear top shroud.
 2. Remove the rear footplate shroud by disengaging the three locking pins and pulling it upwards.
 3. Take out the rear footplate shroud.
 4. Remove the four screws (12 mm, 4 pcs) at the rear of the top shroud.
 5. Raise the top shroud carefully.
 6. Remove the three connectors on the inside of the shroud.
 7. Take the shroud off.
- ❖ When reassembling, please follow the exact reverse sequence of these steps.
 - ❖ For instructions about the connectors, refer to the content of the next page.



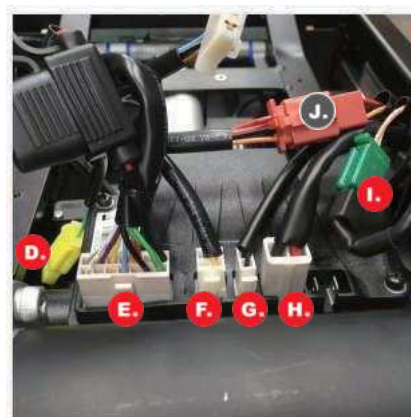
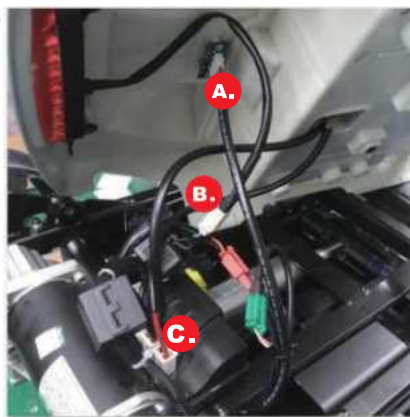
- Step 5. Lift the top shroud carefully. Do not use force because this could damage the three circuit connectors. These should be disconnected carefully.

2.11.1 SERVICE-11-1 DR Controller Repair

Picture showing rear top shroud circuit connectors.

- A.** Rear top shroud - folding board control connector
- B.** Rear top shroud - taillight connector
- C.** Rear top shroud - battery power connector
- D.** Remote control board - folding suppression connector
- E.** Main cable connector
- F.** Micro switch connector
- G.** Electromagnetic brake connector
- H.** Motor power connector
- I.** Linear actuator - power connector
- J.** Remote control board - power connector

- ❖ If the connections are good (the wires are undamaged and not loose), but the action still fails, refer to the following *DR Controller Replacement*.



- The connectors underneath the rear top shroud can be checked without removing the shroud. Refer to Step 5 of SERVICE-11 Rear Top Shroud Repair to ensure the connections are made (for connector instructions, please refer to the above connector codes).

DR Controller Replacement:

Please refer to *SERVICE-11 Rear Top Shroud Repair* for removal, then perform:

1. Unplug all the connectors on the controller.
 2. Remove the two screws on the DR controller to separate it from the frame.
 3. Take the DR controller out.
- ❖ When reassembling, please follow the exact reverse sequence of these steps.
 - ❖ After re-installation check to make sure all the connections are correct and secure.



2.11.2 SERVICE-11-2 Taillight Repair

Follow the Service Procedures SERVICE-01 Steering Shroud Repair steps, then:

1. Find the main cable connector (see picture on the right).
2. Check the connector for security and reconnect if necessary (picture on the right).
3. If this does not restore function, refer to the following method.



Please follow the *SERVICE-11 Rear Top Shroud Repair* steps for removal, then:

1. Find the taillight connector (figure on the right).
2. Check the connector for security and reconnect if necessary (figure on the right).
3. If this is not effective, go to the following *Replacement Instructions*.

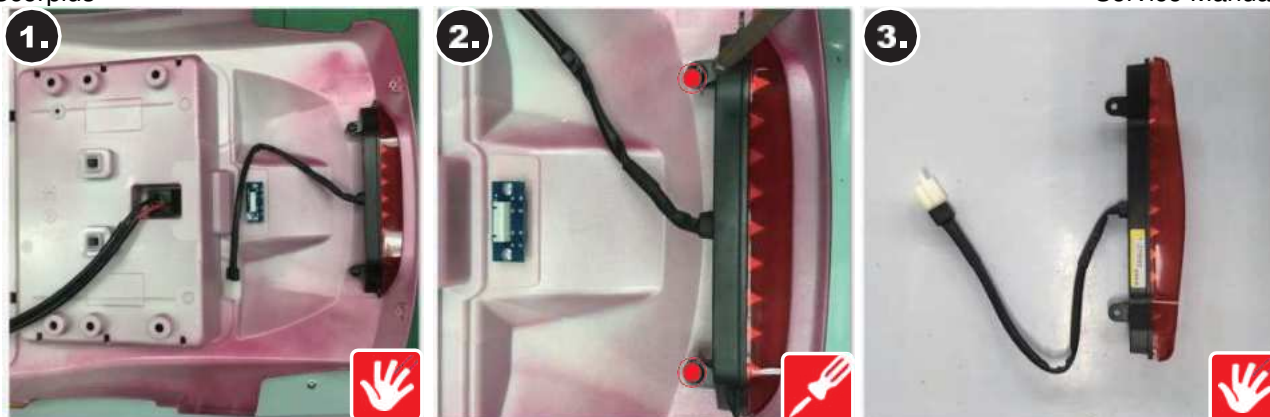


Replacement Instructions:

Please follow the *SERVICE-11 Rear Top Shroud Repair* steps for removal, then:

1. Locate the taillight at the rear of the scooter.
2. Remove the two screws holding the rear shroud.
3. Take out the taillight and replace it with a new one.

- ❖ When reassembling, please follow the exact reverse sequence of these steps.
- ❖ If this does not restore function, refer to: SERVICE-01-1 Top Control Panel Repair or SERVICE-11-1 DR Controller Repair to replace a faulty board.



2.11.3 SERVICE-11-3 Power Socket Repair

Please follow the *SERVICE-11 Rear Top Shroud Repair* steps, then:

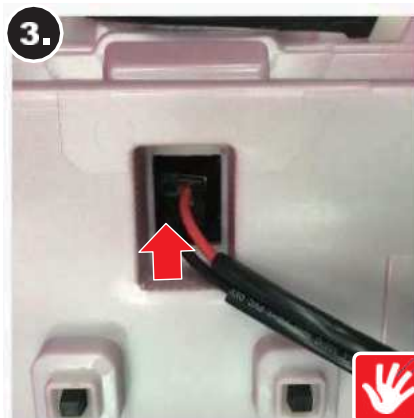
1. Find the power socket connector (picture on the right).
2. Check the connector for security and reconnect (picture on the right).
3. If this is not effective, please refer to the following *Replacement Instructions*.



Replacement Instructions:

Complete *SERVICE-11 Rear Top Shroud Repair* to remove the shroud, then:

1. Unplug the power socket connector.
 2. Squeeze the two sides of the power socket inside the battery pack.
 3. Push the socket out from the inside.
 4. Take the power socket out.
- ❖ When reassembling, please follow the exact reverse sequence of these steps.
 - ❖ During replacement or re-installation, please be aware of the connector position. Refer to the figure on the lower right and the instructions below.
 - ❖ If function is not restored, refer to *SERVICE-01-1 Top Control Panel Repair* or *SERVICE-11-1 DR Controller Repair* to replace a faulty board with a new one.



Re-Installation Instructions:

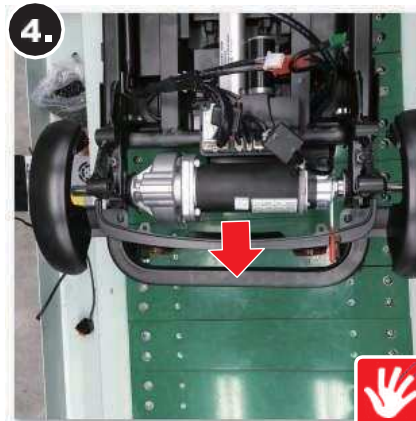
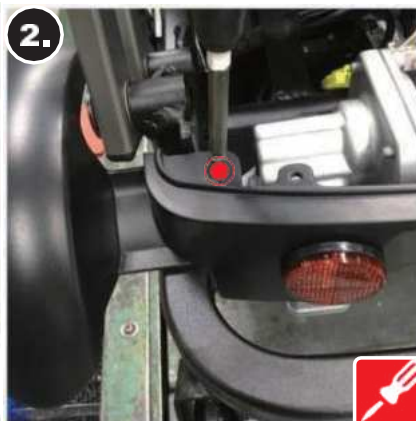
- ❖ When re-installing the power socket, make sure it is the right position, see the picture on the right. If the connector position is incorrect, it will not be possible to reinstall the battery pack.

**2.11.4 SERVICE-11-4 Rear Fender Repair**

Please follow the *SERVICE-11 Rear Top Shroud Repair* steps for removal, then:

1. Disengage the locking pins on both sides of the rear fender and seat bar mechanism.
2. and
3. Remove the screws (12 mm, 4 pcs) on both sides of the rear fender.
4. Pull the rear fender back to separate it from the frame.
5. Take the rear fender off.

- ❖ For re-installation, follow the exact reverse sequence of these steps.



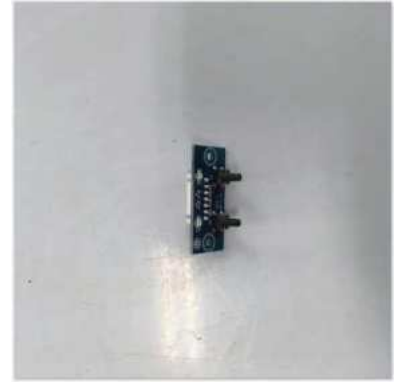
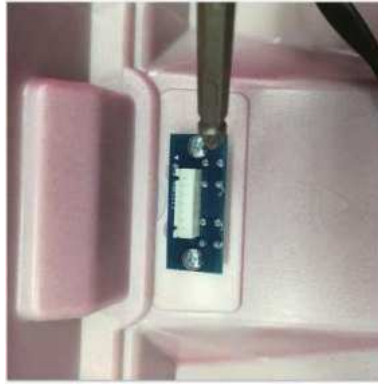
- Step 4. When the N-D lever is in the D position, the rear fender may not be easy to remove. Shift the gear to the N position to make removal easier.

2.11.5 SERVICE-11-5 Folding/ Unfolding Board Repair

Complete the steps of *SERVICE-11 Rear Top Shroud Repair* to remove the shroud, then:

1. Find the folding/ unfolding board inside the Scooter.
2. Remove the two screws holding the board.
3. Take the board out.

- ❖ For re-installation, follow the exact reverse sequence of these steps.



2.12 SERVICE-12 Rear Lower Shroud Repair

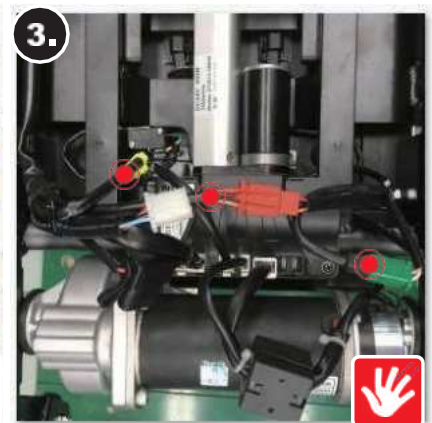
Please follow the *SERVICE-11 Rear Top Shroud Repair* steps for removal, then:

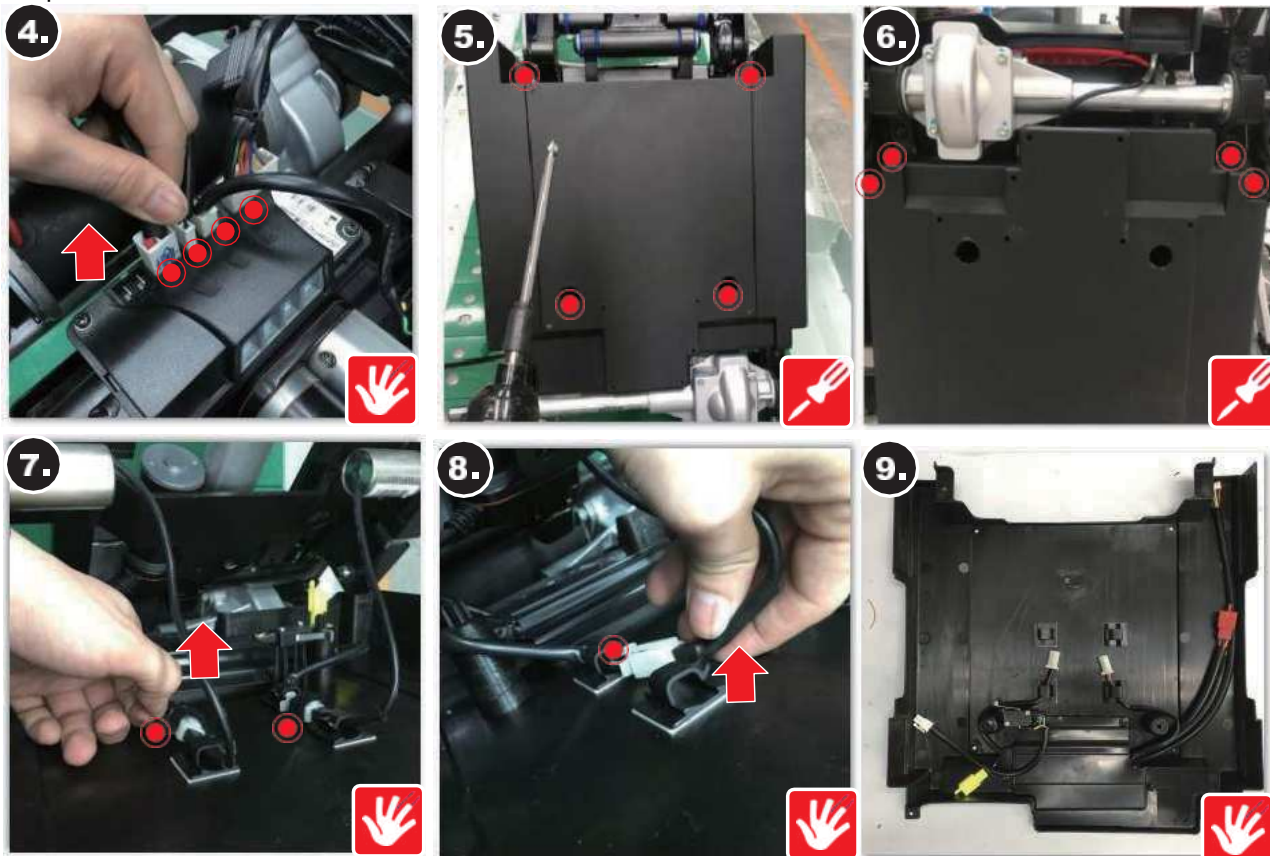
1. Remove the rear top shroud and find the cable ties on both sides.
2. Cut and remove the cable ties on the wires on both sides.
3. and
4. Unplug all the connectors on the rear lower shroud and DR controller.
5. Locate the four screws (12 mm, 4 pcs) holding the bottom of the rear lower shroud.
6. Remove the four screws.
7. Open the rear lower shroud and tear off the solenoid valve tape on both sides.
8. Disengage the solenoid valve connectors on both sides and disconnect the lower shroud hook.
9. Take the shroud off.

- ❖ When reinstalling, please carry out these steps in the exact reverse sequence. Please also refer to the Cautions on the next page.
- ❖ For relevant connectors, please refer to the instructions on the next page.



- Re-installation of the lower shroud is more complicated because incorrect connections will cause malfunction. Please refer to the re-installation instructions on the next page.
- Steps 3 and 4. For connector positions and instructions, please refer to the instructions in *SERVICE-11 Rear Top Shroud Repair*.





Connector Instructions:

L. Solenoid valve connector - left.

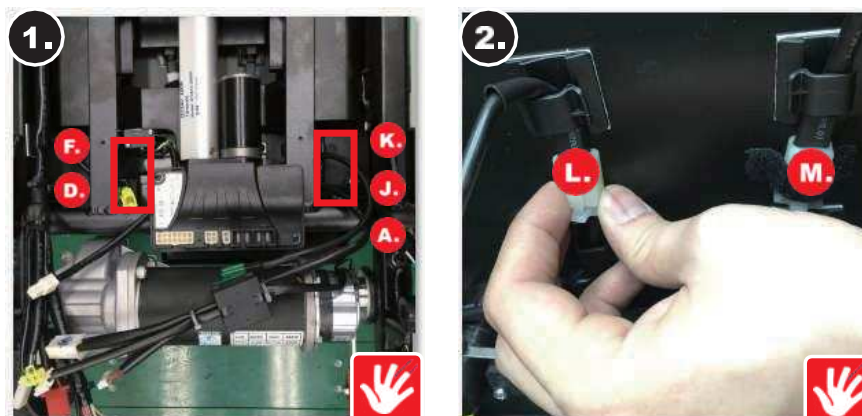
M. Solenoid valve connector - right.

For other connectors, please refer to the instructions in *SERVICE-11 Rear Top Shroud Repair*. For solenoid valve repair, please refer to *SERVICE-13-1 Solenoid Valve Repair*.



Re-Installation Instructions:

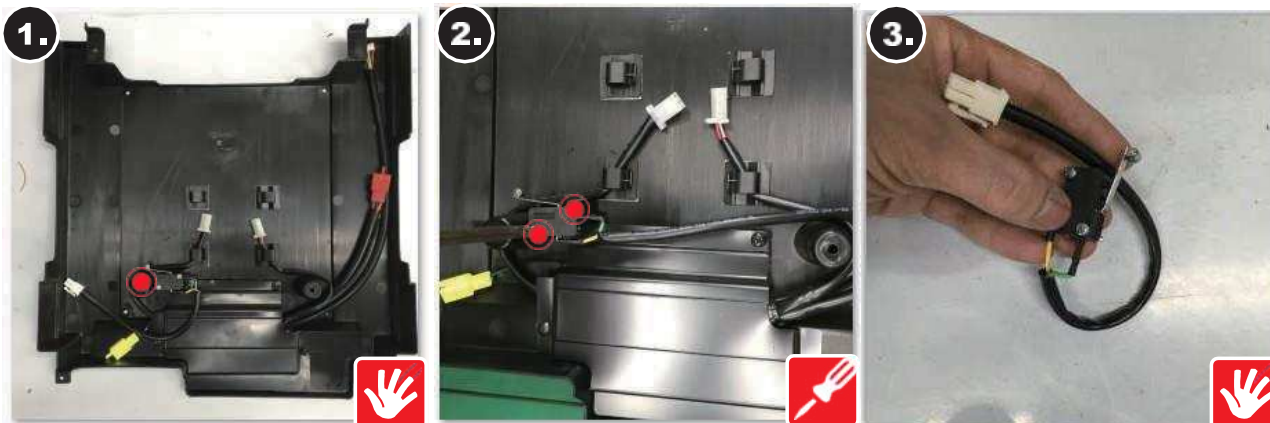
1. Connector wiring needs to be passed through the rectangular areas marked in the figure, and the wires must be sorted according to the connector codes shown in the picture.
2. When re-installing a solenoid valve connector, make sure the locking pin is facing up and attach the tape or sticker to prevent interference during folding. For other connectors, please refer to the instructions in *SERVICE-11 Rear Top Shroud Repair*.



2.12.1 SERVICE-12-1 Micro Switch Repair

Please carry out the *SERVICE-12 Rear Lower Shroud Repair* steps first, then:

1. Find the micro switch which is located on the inside of the rear lower shroud.
 2. Remove the two screws (8 mm, 2 pcs) on the shroud.
 3. Take micro switch out.
- ❖ When reinstalling, please carry out these steps in the exact reverse sequence.

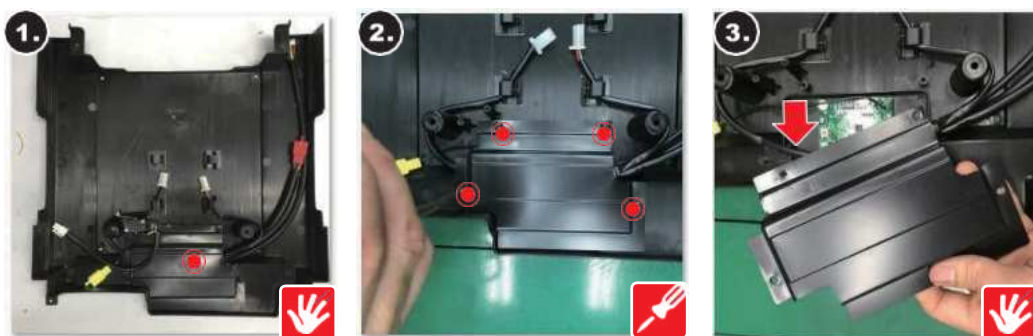


- When sorting out the wires make sure that the solenoid valve connector is not attached or secured to the rear lower shroud hook. It may interfere with folding of the scooter, or even rip and damage the solenoid valve connector. Pay special attention to this stage of the operation.

2.12.2 SERVICE-12-2 Remote Control Board Repair

Please carry out the *SERVICE-12-1 Micro Switch Repair* steps for removal, then:

1. Locate the waterproof shroud of the remote control board inside the rear lower shroud.
 2. Remove the four screws on the shroud.
 3. Take the shroud off to expose the remote control board.
- ❖ When reinstalling, please carry out these steps in the exact reverse sequence.
- ❖ For relevant operations of the remote control board, please refer to the following *Remote Control External Frequency Pairing Setting*.



Remote Control External Frequency Pairing Setting:

Unfold the scooter and equip with battery pack.

1. Turn on the main power switch and unlock the scooter.
2. Long-press the folding and unfolding buttons at the same time for 2 seconds. The board indicator (orange light) comes on to indicate it is ready for setup.
3. Press either the folding or unfolding button once of the remote control and the light indicator will flash. When the indicator stops flashing, setting is complete. A maximum of four remote controls can be set up on the same unit of scooter.

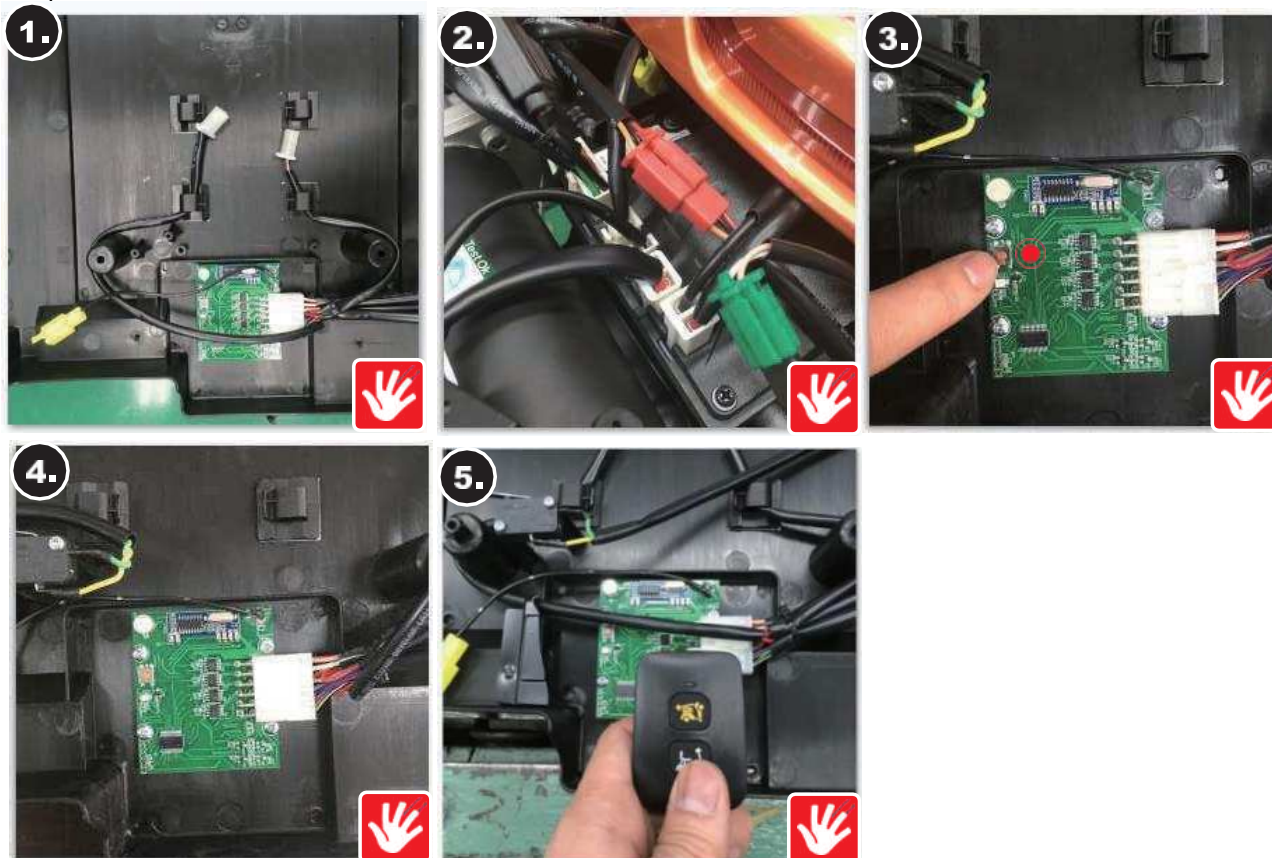
4. Turn off the main power switch.
 5. Press the folding/ unfolding button to check if the setting has been successful. Repeat the setting if the scooter does not fold.
- ❖ Step 2. In setting state, a long press of 5 seconds on either the folding or unfolding button will erase all remote control settings. After an erase the board indicator light will turn off.
 - ❖ If this does not work, go to *Remote Controller Internal Frequency Pairing Setting* on next page.



Remote Controller Internal Frequency Pairing Setting:

Refer to the *SERVICE-12-2 Remote Control Board Repair* steps, then:

1. Check all the connectors on the rear lower shroud with the DR controller (only connectors without locking).
- ❖ Refer to the connector instructions in *SERVICE-12 Rear Lower Shroud Repair* for details.
2. Turn on the power to the remote control board and press the setting button (long-press for 3 seconds).
 3. The remote control board blue light will come on and the remote control is ready for pairing.
 4. Press the “unfolding button”. When the indicator stops flashing, setting is complete.
- ❖ When reinstalling, carry out these steps in the exact reverse sequence.
 - ❖ If function has not been restored, refer to *Remote Control Board Replacement* on the next page.



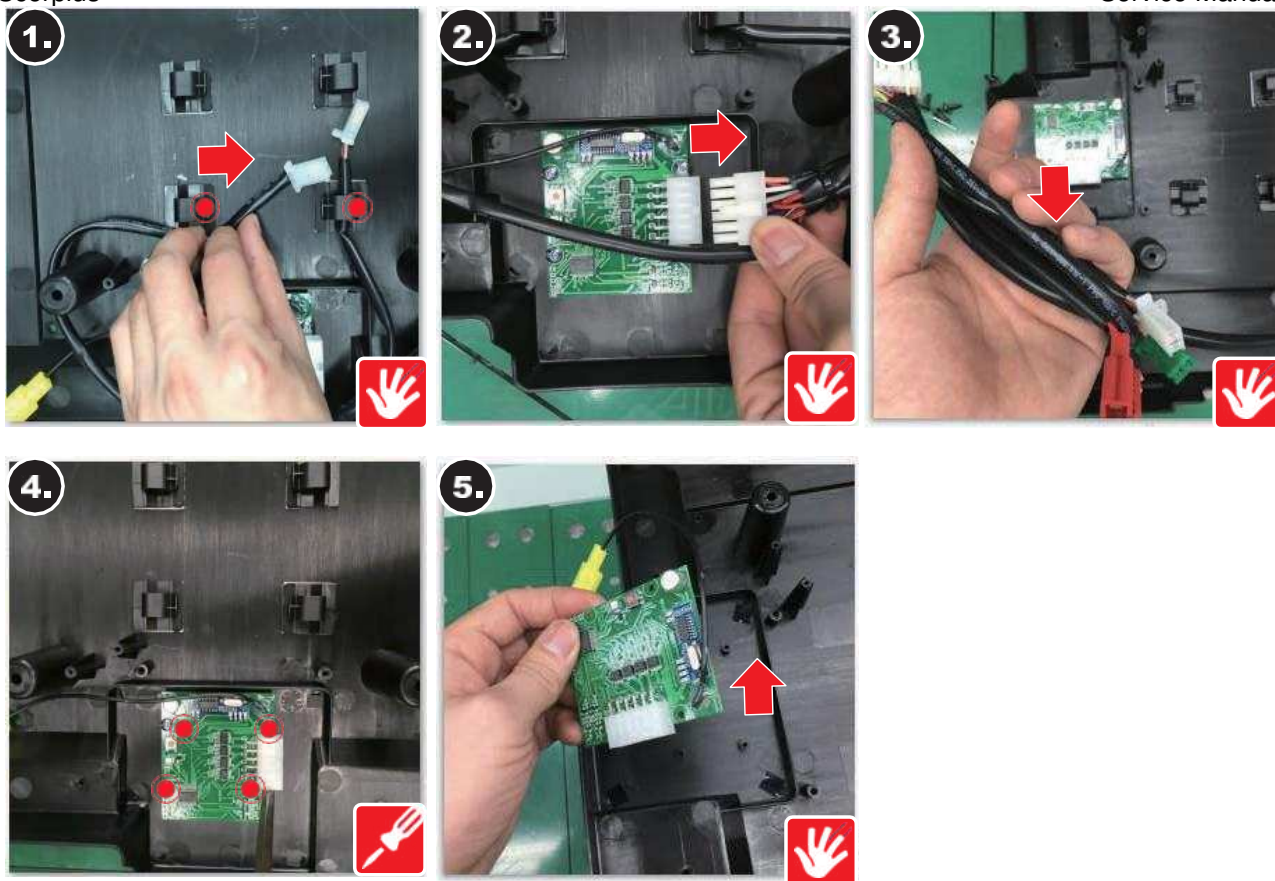
- The remote control board can be set for a maximum of four remote controls at the same time. When it is necessary to set more, erase the settings on the remote control (instructions are on the previous page) and start the setting again.
- Older versions of the remote controller (see picture on the right) can only be used for "remote control internal setting". They will not work with "remote control external setting".



Remote Control Board Replacement

Refer to the *SERVICE-12-2 Remote Control Board Repair* steps, then:

1. Detach the battery connectors from the hooks on the rear lower shroud.
 2. Remove the connectors from the remote control board.
 3. Remove the remote control board main cable.
 4. Remove the four screws (8 mm, 4 pcs) holding the remote control board in place.
 5. Take the remote control board out.
- ❖ When reinstalling, carry out these steps in the exact reverse sequence.
 - ❖ If function is not restored, refer to SERVICE-11-1 DR Controller Repair to replace it with a new one.



- Set the four screws and the remote control board main cable aside carefully because these parts are not included with a new board.
- When making the installation be careful not to damage the terminal on the control board.
- After the remote control board has been replaced, the RF remote controller that came with the scooter will need to be set up again.

2.12.3 SERVICE-12-3 Supporting Wheel Repair

Refer to *SERVICE-09 Front Lower Shroud Repair*, *SERVICE-10 Front Top Shroud Repair*, *SERVICE-11 Rear Top Shroud Repair* and *SERVICE-12 Rear Lower Shroud Repair*, and after removing the above items, then:

1. Secure the two fastening points on the supporting heel and the rear frame.
2. and
3. Use an Allen key or wrench (#10) to remove the holding screws (14 mm, 2 pcs) on both sides.
4. Disengage from the gear on the front frame.
5. Take the supporting wheel off.

❖ When reinstalling, make sure to carry out these steps in the exact reverse sequence.

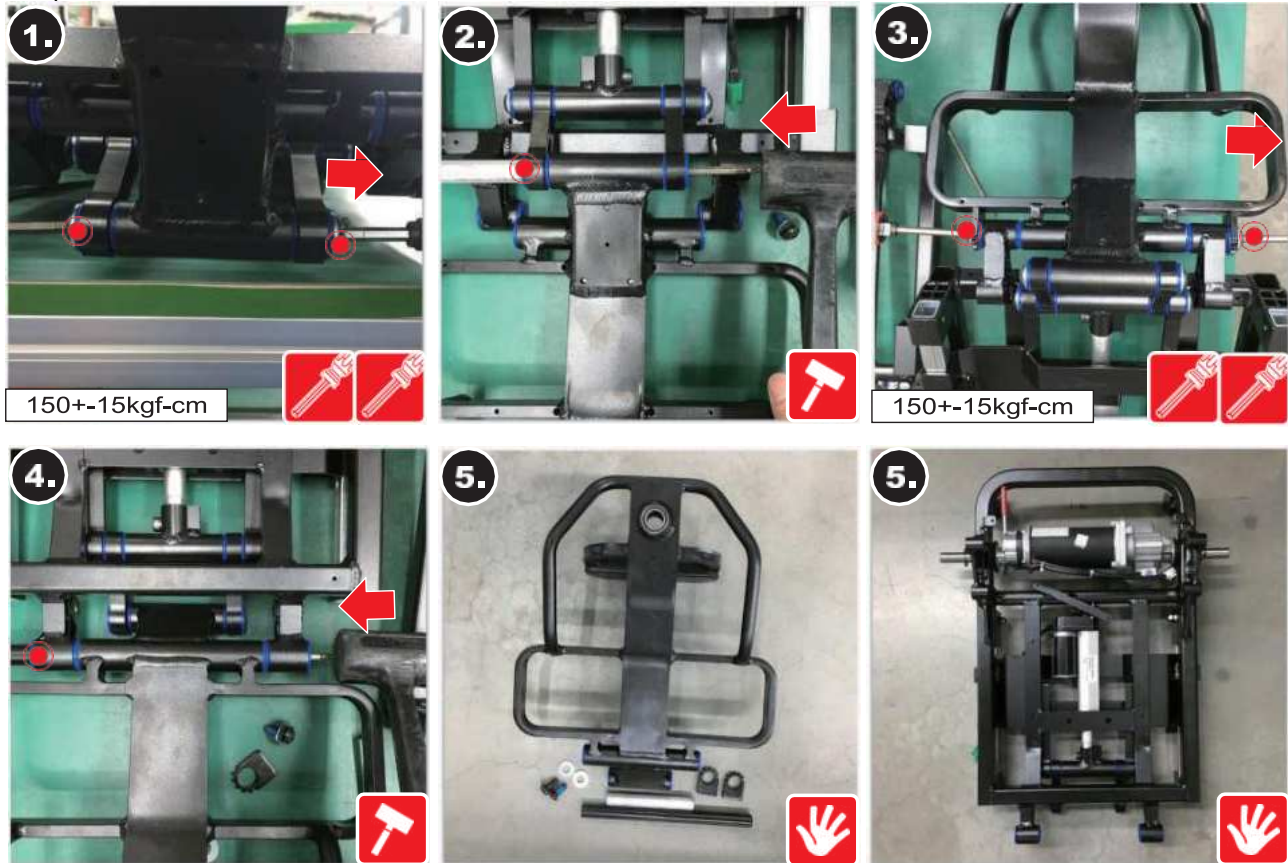


2.13 SERVICE-13 Frame Repair

Please refer to *SERVICE-09 Front Lower Shroud Repair*, *SERVICE-10 Front Top Shroud Repair*, *SERVICE-04 Front Wheel Repair*, *SERVICE-11 Rear Top Shroud Repair*, *SERVICE-12 Rear Lower Shroud Repair*, *SERVICE-05 Rear Wheel Repair*, *SERVICE-02 Steering Bar Repair* and *SERVICE-11-1 DR Controller Repair*, and after removing the above items, then:

1. Use an Allen key or driver (#6) to unfasten the screw on one side (underneath the front and rear frames). Then remove the screws (20 mm, 2 pcs), washers and gears on the other side.
2. After removing the screws at one end, use a rubber hammer and metal tool to knock out the small metal rod.
3. Use an Allen key or driver (#6) to unfasten a screw on one side of the top of the front and rear frames. Then remove the screws (20 mm, 2 pcs), washers and gears on the other side.
4. Then, as in step 2, use a rubber hammer and metal tool to knock out the large metal rod.
5. Take off the front frame.
6. Take off the rear frame.

❖ When reinstalling, please carry out these steps in the exact reverse sequence. Refer to the following *Re-Installation Instructions*.



Re-Installation Instructions:

- ❖ During re-installation of the screws and washers, please be careful about the placement of the gears on each side. The flat side of the gear must be flush with the front frame and the white dot must face upwards. An incorrect installation can result in a failure and will damage the scooter. See Figure 1 on the right for the correct arrangement.
- ❖ When re-installing the small and large metal rods apply some silicon oil to make installation easier (see Figure 2 on the right).



- Step 5. Front frame can be replaced with a new one and can also be repaired.
- Step 6. If the rear frame is not separated completely, and it needs to be replaced, please refer to SERVICE-13-6 Sliding Base Repair.

2.13.1 SERVICE-13-1 Solenoid Valve Repair

Please refer to *SERVICE-12 Rear Lower Shroud Repair* steps first, then:

1. Find the left and right solenoid valve wiring inside the lower shroud.
2. Check the connections and re-connect the wires if necessary.
3. If this does not restore function refer to the following *Solenoid Valve Replacement*.



Solenoid Valve Replacement:

Please unplug the **L.** and **M.** connectors.

1. and
2. Use an open wrench (#21) to loosen the valves.
3. Take them out.

❖ When replacing the valves follow the *Re-Installation Instructions* below and carry out the *Re-Installation Test*.



Re-Installation Instructions:

- ❖ Before re-installation, apply a little amount of medium-strength thread locking adhesive to the threads on the valve to ensure they do not come loose. See the picture on the right.
- ❖ Be careful not to get any gel on the plunger because this will cause a malfunction.
- ❖ During re-installation be careful to ensure the threaded portion goes in straight and the solenoid is tightened properly in place.



Re-Installation Test:

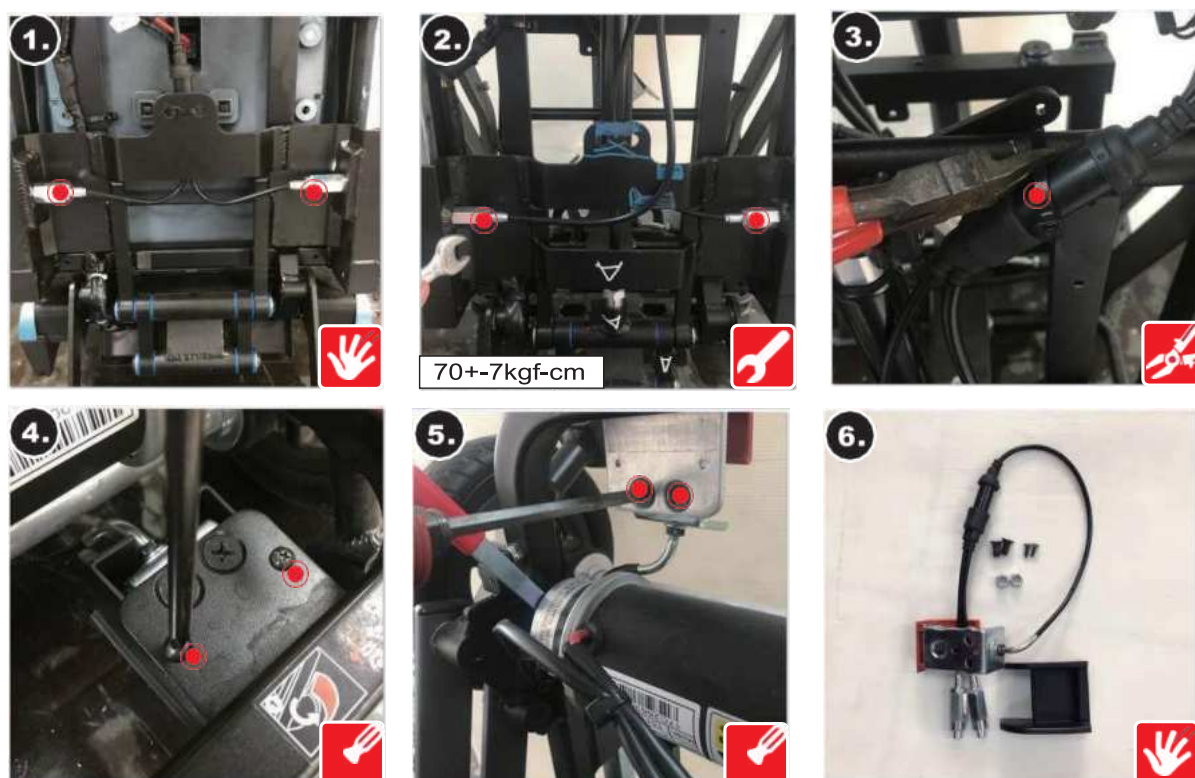
1. Turn on the power and allow the scooter to perform a folding → deployment action.
2. Make a mark 19 mm from the end of a short rod, see the picture on the right.
3. Remove the circular stickers on each side of the scooter frame, see picture.
4. Insert the probe into the hole on each side of the frame.
5. If the rod does not go past the 19 mm mark, the installation has been successful.
6. Replace the stickers to prevent water getting into the holes.



2.13.2 SERVICE-13-2 Folding Unit Repair (Manual Only)

Carry out all the *SERVICE-11 Rear Top Shroud Repair*, *SERVICE-12 Rear Lower Shroud Repair* and *SERVICE-11-5 Folding/ Unfolding Board Repair* steps, and when this has been done, then:

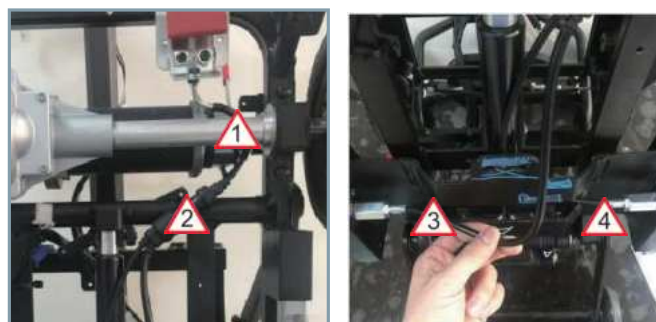
1. Locate the folding unit locking pins on each side of the bottom of the scooter frame.
 2. Use a wrench (#17) to remove the locking pins.
 3. Cut and remove the cable tie (x1 pc) on the frame and remove the steel cable.
 4. Use a cross-head screwdriver to remove the screws (12 mm, 2 pcs) from the plastic shroud.
 5. Use a cross-head screwdriver to remove the screws (20 mm, 2 pcs) that hold the folding unit.
 6. Take out the entire folding unit set.
- ❖ When replacing parts or re-installing, carry out these steps in the exact reverse sequence but also follow the re-installation instructions below.



Re-Installation Instructions:

For the folding unit re-installation cable wiring, please refer to the pictures on the right - pay particular attention to the items shown in triangles.

- 1 Cable wiring needs to pass through the middle of the motor.
- 2 A cable tie is necessary to hold the cable in place.
- 3 The left folding unit locking pin (longer steel cable) passes outside the sliding base.





The right folding unit locking pin (shorter steel cable) passes inside the sliding base.

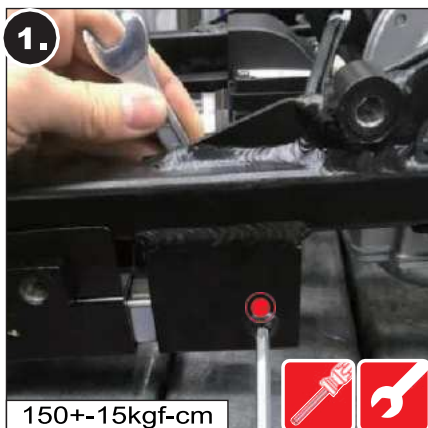


- With the scooter upright on an even surface confirm that it operates properly and does not jerk or skip.
- If the folding unit steel cable has been damaged, please replace it with a new one.
- Make sure to secure the folding unit cable to the frame with a new cable tie to ensure it is safe and secure.

2.13.3 SERVICE-13-3 Sliding Track Repair

Please carry out the *SERVICE-11 Rear Top Shroud Repair* and *SERVICE-12 Rear Lower Shroud Repair* steps, and then:

1. Use a wrench (#13) to hold the nut and a Allen key (#5) to unfasten the Allen socket screw (1 pc) holding the inner side of the sliding track.
 2. Use the Allen key (#5) to unfasten the other screw (1 pc) at the front of the sliding track.
 3. Push the left sliding track out from the back.
 4. Pull it out from the front.
 5. Take the left sliding track completely out.
- ❖ When replacing parts or re-installing, carry out these steps in the exact reverse sequence but also follow the *Re-Installation Instructions* below.
- ❖ To remove the right-hand sliding track follow the same procedure.



- If the sliding track does not come out easily (Steps 3 and 4), shake the frame or press the folding/ unfolding button several times to fold and unfold. This will push the sliding track out. Be careful to keep your fingers out of the way when doing this to avoid an accident.

Re-Installation Instructions:

- ❖ Before re-installing the sliding tracks apply a little amount of oil to the holes (see picture on the right) to facilitate folding and deployment.

**2.13.4 SERVICE-13-4 Motor Repair**

Please carry out the *SERVICE-11 Rear Top Shroud Repair*, *SERVICE-12 Rear Lower Shroud Repair* and *SERVICE-05 Rear Wheel Repair* steps, and then:

1. Use a wrench (#13) to hold the nuts on the right side of the frame and an Allen driver (#5) to unfasten the bolts (30 mm, 2 pcs).
 2. Follow the same procedure for the other side of the frame.
- ❖ The motor is quite heavy, be careful not to drop it when taking it out.
3. Remove the U-shaped fixing plates on both sides, and the motor can be taken out.
- ❖ When replacing the motor follow the same sequence of steps in exact reverse.



- The motor is heavy, and this operation should be given the attention of two people. One can support the motor while the other removes or replaces the bolts, etc. The scooter should be turned over to make this operation easier.

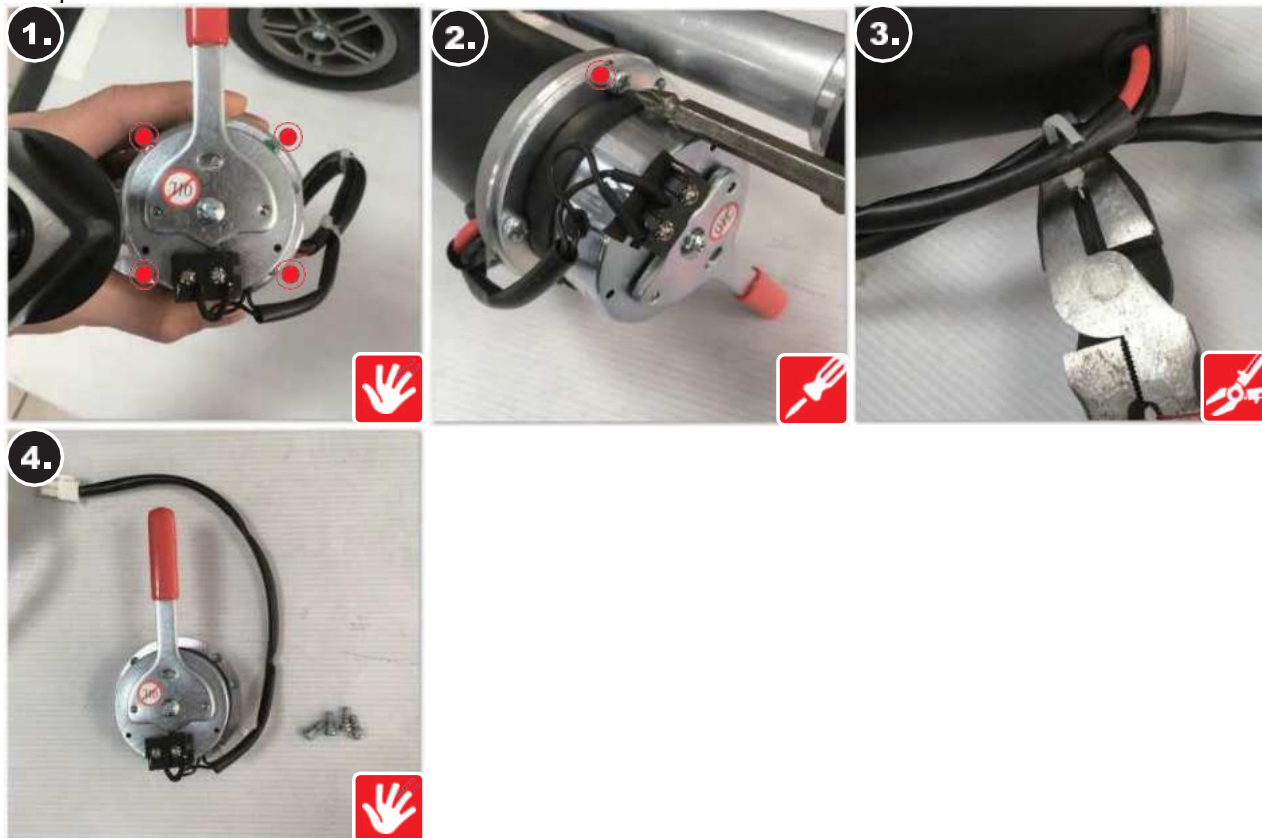


- After the motor has been removed, set it aside carefully and do not drop or damage it unless it is to be discarded.
- All the other parts, including the U-shaped fixing plates and the bolts and nuts need to be kept because they will not be provided with a new motor.

2.13.5 SERVICE-13-5 Electromagnetic Brake Repair

Please follow the steps in *SERVICE-13-4 Motor Repair*, and then:

1. Remove the motor, and locate the four screws holding the electromagnetic braking device to the motor.
 2. Use a cross-head screw driver to remove the screws and separate the device from the motor.
 3. After it has been taken off, cut and remove the cable tie holding the brake cable to the motor cable.
 4. Take off the electromagnetic braking device.
- ❖ When replacing the unit, follow the sequence of steps in reverse.

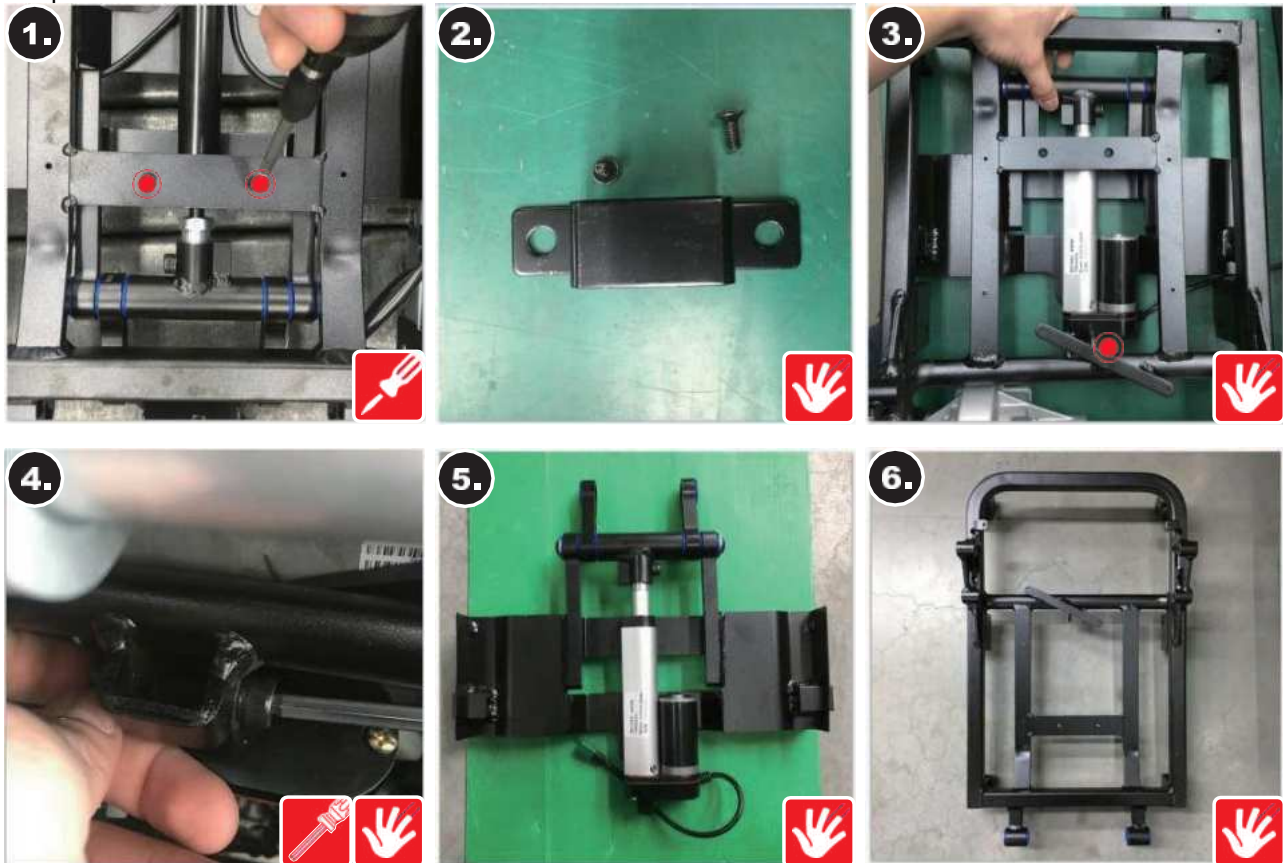


- When reinstalling the electromagnetic brake device, make sure that the lever is in the right place, to the rear, before fastening the four screws that hold it in place.
- Step 3. When removing the electromagnetic brake, be careful not to pull, or put any force, on the motor cable which would disturb the connections.

2.13.6 SERVICE-13-6 Sliding Base Repair

Carry out all the *SERVICE-13 Frame Repair*, *SERVICE-13-1 Solenoid Valve Repair* and *SERVICE-13-2 Folding Unit Repair (Manual Only)* steps and then:

1. Remove the two screws in the middle of the frame.
 2. Take out the U-shaped fixing plate.
 3. Remove the screws under the linear actuator (gas spring for the manual version).
 4. Use an Allen driver (#6) to hold the hex screws, and turn the quick-release nut by hand for removal.
 5. Take out the sliding base.
 6. At this stage the rear frame is completely removable and could be replaced during this operation.
- ❖ When replacing the unit, follow the exact sequence of steps in reverse.
 - ❖ For linear actuator repair, please refer to *SERVICE-13-7 Linear Actuator Repair*.
 - ❖ For repair of the gas spring, please refer to *SERVICE-13-8 Gas Spring Repair (Manual Version Only)*.



2.13.7 SERVICE-13-7 Linear Actuator Repair (Automatic Version Only)

Please refer to *SERVICE-13-6 Sliding Base Repair*.

1. Locate the linear actuator and sliding base fastening point at the top end of the linear actuator.
2. Use an Allen driver (#5) to remove the holding screw (40 mm, 1pc).
3. The linear actuator can then be separated from the sliding base.

❖ When replacing the unit, follow the same sequence of steps in reverse.

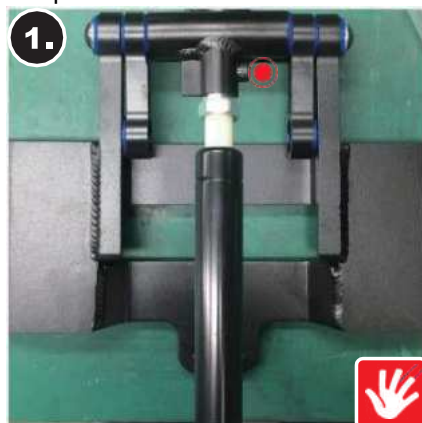


2.13.8 SERVICE-13-8 Gas Spring Repair (Manual Version Only)

Please carry out the *SERVICE-13 Frame Repair*, *SERVICE-13-1 Solenoid Valve Repair*, *SERVICE-13-2 Folding Unit Repair (Manual Only)* and *SERVICE-13-6 Sliding Base Repair* steps and then:

1. Locate the gas spring and sliding base at the top end of the gas spring.
2. Use an Allen driver (#5) to remove the holding screw (40 mm, 1 pc).
3. The gas spring can then be separated from the sliding base.

❖ When replacing the rod, follow the same sequence of steps in reverse.
 ❖ To install a new gas spring, the rubber sleeve on top of the gas spring needs to be removed to prevent abnormal actuation during folding or unfolding.



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