

# Invacare® Comet Series

Comet<sup>PRO</sup>, Comet<sup>Alpine+</sup>, Comet<sup>ULTRA</sup>



en **Scooter**  
**Service Manual**



PROVIDER: Keep this manual.  
The procedures in this manual **MUST** be performed by a qualified technician.



**Yes, you can.®**

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# 1 General

## 1.1 Introduction

This document contains important information about assembly, adjustment and advanced maintenance of the product. To ensure safety when handling the product, read this document and the user manual carefully and follow the safety instructions.

Find the user manual on Invacare's website or contact your Invacare representative. See addresses at the end of this document.

Invacare reserves the right to alter product specifications without further notice.

Before reading this document, make sure you have the latest version. You find the latest version as a PDF on the Invacare website.

Previous product versions may not be described in this Manual's current revision. If you require assistance, please contact Invacare.

For pre-sale and user information, see the user manual.

For more information about the product, for example product safety notices and product recalls, contact your Invacare representative. See addresses at the end of this document.

## 1.2 General Information

Service and maintenance work must be carried out taking this document into account.

Note that there may be sections in this document, which are not relevant to your product, since this document applies to all available models (on the date of printing). If not otherwise stated, each section in this document refers to all models of the product.

The models and configurations available in your country can be found in the country-specific sales documents.

It is imperative that you observe safety information.

Information about operation or about general maintenance and care work on the product should be taken from service manual.

Assembly of accessories/options might not be described in this document. Refer to the manual delivered with the accessory/option. Additional manuals can be ordered from Invacare. See addresses at the end of this document.

You can find information about ordering spare parts in the spare parts catalogue.

Spare parts must match original Invacare parts. Only use spare parts which have been approved by Invacare.

The product may only be maintained and overhauled by qualified personnel.

The minimum requirement for service technicians is suitable training, such as in the cycle or orthopedic mechanics fields, or sufficiently long-term job experience. Experience in the use of electrical measuring equipment (multimeters) is also a requirement. Special Invacare training is recommended.

Alterations to the scooter which occur as a result of incorrectly or improperly executed maintenance or overhaul work lead to the exclusion of all liability on the side of Invacare.

If you have any problems or questions contact your provider.

## 1.3 Notes on Shipping

- If the scooter has to be shipped back to the manufacturer for major repairs, you should always use the original packaging for transport.
- Please attach a precise description of the fault.

## 1.4 Symbols in This Manual

Symbols and signal words are used in this document and apply to hazards or unsafe practices which could result in personal injury or property damage. This document is printed in greyscale. For your information, the safety messages have the following colour coding according to ANSI Z535.6: Danger (Red), Warning (Orange), Caution (Yellow) and Notice (Blue). See the information below for definitions of the signal words.



### **DANGER!**

Indicates a hazardous situation that will result in serious injury or death if it is not avoided.



### **WARNING!**

Indicates a hazardous situation that could result in serious injury or death if it is not avoided.



### **CAUTION!**

Indicates a hazardous situation that could result in minor or slight injury if it is not avoided.



### **NOTICE!**

Indicates a hazardous situation that could result in damage to property if it is not avoided.



### **Tips and Recommendations**

Gives useful tips, recommendations, and information for efficient, trouble-free use.



### **Tools**

Identifies required tools, components and items which are needed to carry out certain work.

## 1.5 Images in This Manual

The detailed images in this manual are given marks to identify various components. Component marks in text and operational instructions always relate to the image directly above.

## 2 Safety

### 2.1 Safety Information



#### WARNING!

**Installation, mounting, maintenance or repairs made by unqualified persons can result in hazardous situations to you and others.**

- The procedures in this service manual, must be performed by a specialised provider or qualified service technician.
- Invacare expects that the qualified technician is familiar with the product, with good technical knowledge to understand and follow the steps of the described instructions in this manual, and equipped with proper tools.
- Do not handle this product or any available optional equipment without first completely reading and understanding these instructions and any additional instructional material such as user manuals, installation manuals or instruction sheets supplied with this product or optional equipment.



- The CE marking is invalidated if components or accessories/options are replaced or added that have not been approved for this product by Invacare.
- In this case, the company that adds or replaces the components or accessories/options is responsible for the conformity assessment/CE marking or for registering the scooter as a special design and for the relevant documentation.



The information contained in this document is subject to change without notice.

### 2.2 Safety and Fitting Instructions

These safety instructions are intended to prevent accidents at work, and it is imperative that they are observed.

#### Before any inspection or repair work

- Read and observe this repair manual and the associated user manual.
- Observe the minimum requirements for carrying out the work (see 1.2 *General Information*, page 3).

#### Personal Safety Equipment

##### Safety Shoes

The scooter, and some of its components, are very heavy. These parts can result in injuries to the feet if they are allowed to drop.

- Wear standardised safety shoes during all work.

##### Eye Protection

It is possible that battery acid can be discharged when working on defective batteries or when handling batteries improperly.

- Always wear eye protection when working on any defective or possibly defective batteries.

#### Safety Gloves

It is possible that battery acid can be discharged when working on defective batteries or when handling batteries improperly.

- Always wear acid-proof safety gloves when working on any defective or possibly defective batteries.

#### General Safety Information and Information About Fitting / Removal



#### DANGER!

##### Risk of Death, Serious Injury, or Damage

Lighted cigarettes dropped onto an upholstered seating system can cause a fire resulting in death, serious injury, or damage. scooter occupants are at particular risk of death or serious injury from these fires and resulting fumes because they may not have the ability to move away from the scooter.

- DO NOT smoke while using this scooter.



#### WARNING!

##### Risk of Serious Injury or Damage

Storing or using the scooter near open flame or combustible products can result in serious injury or damage.

- Avoid storing or using the scooter near open flame or combustible products.



#### CAUTION!

##### Risk of crushing

Various components such as the drive unit, batteries, seat etc are very heavy. This results in injury hazards to your hands.

- Note the high weight of some components. This applies especially to the removal of drive units, batteries and the seat.



#### CAUTION!

##### Injury hazard if the scooter starts moving unintentionally during repair work

- Switch the power supply off (ON/OFF key).
- Engage the drive.
- Before lifting up, secure the scooter by using chocks to block the wheels.



#### CAUTION!

##### Fire and burn hazard due to electrical short-circuit

- The scooter must be completely switched off before removal of voltage-carrying components! To do this, remove the batteries.
- Avoid short-circuiting the contacts when carrying out measurements on voltage-carrying components.



#### CAUTION!

##### Risk of burns from hot surfaces on the motor

- Allow the motors to cool down before commencing work on them.



**CAUTION!**

**Injury hazard and risk of damage to scooter due to improper or incomplete maintenance work**

- Use only undamaged tools in good condition.
- Some moving parts are mounted in sockets with PTFE coating (Teflon™). Never grease these sockets!
- Never use "normal" nuts instead of self-locking nuts.
- Always use correctly-dimensioned washers and spacers.
- When reassembling, always replace any cable ties which were cut during dismantling.
- After completing your work / before renewed start-up of the scooter, check all connections for tight fitting.
- After completing your work / before renewed start-up of the scooter, check all parts for correct locking.
- Only operate the scooter with the approved tyre pressures (see technical data in the user manual).
- Check all electrical components for correct function. Note that incorrect polarity can result in damage to the control system.
- Always carry out a trial run at the end of your work.



**CAUTION!**

**Any changes to the drive program can affect the driving characteristics and the tipping stability of the scooter**

- Changes to the drive program may only be carried out by trained Invacare providers.
- Invacare supplies all scooters with a standard drive program ex-works. Invacare can only give a warranty for safe scooter driving behavior - especially tipping stability - for this standard drive program.



**CAUTION!**

**Risk of Injury**

Adaptions to the scooter can influence the performance.

- When adaptions with third party products are made, this is only allowed within the scope of a valid combination agreement.
- The maximum values and restrictions of both products shall be observed.
- Machining, bending, welding, or bracing on any safety relevant components is not allowed.



Mark all current settings for the scooter (seat, armrests, backrest etc.), and the associated cable connecting plugs, before dismantling. This makes reassembly easier. All plugs are fitted with mechanical locks which prevent release of the connecting plugs during operation. To release the connecting plugs the safety locks must be pressed in. When reassembling ensure that these safety locks are correctly engaged.

## 3 Hygiene

### 3.1 Handling of Returned Used Products

When reconditioning or repairing returned scooters:

- Take precautions for yourself and the product.
- Use protection equipment as specified locally.

#### Before Transport (According to Biological Agents Ordinance)

Treat product according to following process steps:

Process Step	Component	Application	Conditioning technique	Work Station
Manual cleaning	Surface of used device	Before repair or reconditioning	Use saturated towel to apply cleaning detergent and remove residues after impact.	Cleaning and disinfection
Disinfection	Surface of used device	Before repair or reconditioning	Use saturated disinfectant wipes and clean* the device surface.	Cleaning and disinfection

\*The detergent "Nüscosept Spezial" has been tested on product surfaces.

#### Disinfection Tools

- Disposable wipes (fleece)
- Brushes to clean areas difficult to access

#### Further Information

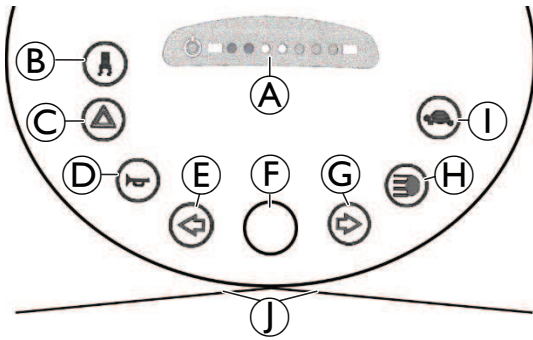


For more information contact your Invacare service department.

## 4 Setup

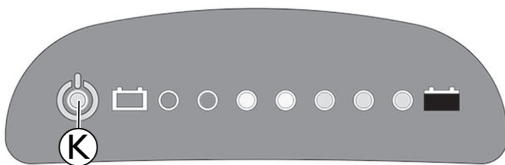
### 4.1 Operating Console (LED Version)

#### Arrangement



- Ⓐ Status display
- Ⓑ Switching on/off curve control (reduction of speed when driving in a curve)
- Ⓒ Hazard lights
- Ⓓ Horn
- Ⓔ Left-hand direction indicator (switches itself off automatically after 30 seconds)
- Ⓕ Speed control dial
- Ⓖ Right-hand direction indicator (switches itself off automatically after 30 seconds)
- Ⓗ Lighting
- Ⓘ Low speed mode
- ⓵ Drive lever

#### Status Display



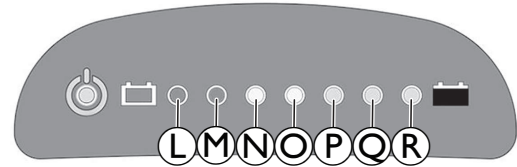
**i** The ON/OFF LED (Ⓚ) is used as a fault display (status display). It will flash if there is a problem with the scooter. The number of flashes indicates the type of error, see 5.3.3 *Error Codes And Diagnostic Codes*, page 14.

#### Battery Indication Gauge

**i** Low battery indication: Every time the scooter is activated or at work when battery capacity is lower than 25%, the electronic system will beep three times.

**i** Overdischarge protection: after a certain drive time on reserve battery power the electronic system switches the drive off automatically and brings the scooter to a standstill. If you do not drive your scooter for a while the batteries will "recuperate" and allow a further, but short, journey. However, after a very brief journey the battery reserve symbol will illuminate again and the electronic system will beep three times. This procedure leads to battery damage and should be avoided if possible!

Battery capacity: <25 %	Reduced driving range. Recharge the batteries at the end of your journey.
Battery capacity: <20 %	Battery reserve = severely restricted driving range. Recharge batteries immediately!



Ⓛ	Ⓜ	Ⓝ	Ⓞ	Ⓟ	Ⓠ	Ⓡ	Battery Capacity
☀	☀	☀	☀	☀	☀	☀	>80 %
☀	☀	☀	☀	☀	☀		<80 %
☀	☀	☀	☀	☀			<65 %
☀	☀	☀	☀				<50 %
☀	☀	☀					<35 %
☀	☀						<25 %
☀							<20 %

#### 4.1.1 Entering Setup (LED Display)

**i** This chapter applies to scooters with LED display.

1. Turn key to switch scooter off.
- 2.



Press buttons simultaneously and hold.


3. Turn key to switch scooter on.  
Scooter enters setup mode after two seconds. LED 2 and LED 8 will flash.


- 4.



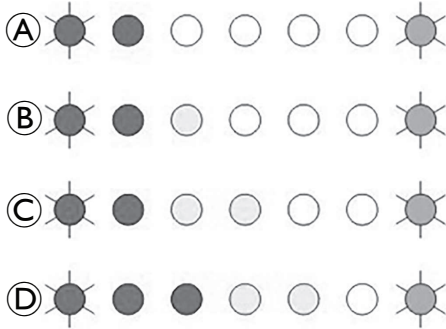
Release buttons to enter setup settings.

### 4.1.2 Setting Battery Gauge

 This chapter applies to scooter with LED display.

 Setting battery gauge is mandatory when retrofitting operating console.

Adjust the parameter in battery gauge to suit different types and sizes of batteries.



AGM Battery	
Ⓐ	small size batteries ( $\leq 50$ Ah, default)
Ⓑ	big size batteries ( $> 50$ Ah)
Gel Battery	
Ⓒ	small size batteries ( $\leq 50$ Ah)
Ⓓ	big size batteries ( $> 50$ Ah)

1.

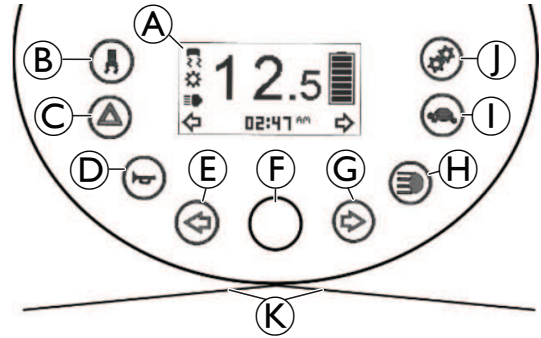


Press button to change settings.

2. Save settings by waiting for 10 seconds or pressing any other button except buttons above.

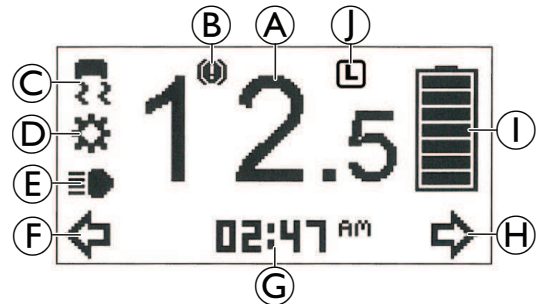
### 4.2 Operating Console (LCD Version)

Arrangement



- Ⓐ Status display
- Ⓑ Switching on/off curve control (reduction of speed when driving in a curve)
- Ⓒ Hazard lights
- Ⓓ Horn
- Ⓔ Left-hand direction indicator (switches itself off automatically after 30 seconds)
- Ⓕ Speed control dial
- Ⓖ Right-hand direction indicator (switches itself off automatically after 30 seconds)
- Ⓗ Lighting
- Ⓘ Low speed mode
- ⓵ Setting
- Ⓚ Drive lever

Status Display





- Ⓐ Speed indication
- Ⓑ Fault indication
- Ⓒ Curve control indication
- Ⓓ Maintenance indication<sup>1</sup>
- Ⓔ Head light indication
- Ⓕ Left turn indication
- Ⓖ Settings shown: ODO, TRIP, TEMP, TIME
- Ⓗ Right turn indication
- Ⓘ Battery status
- ⓵ Low speed selection indication

<sup>1</sup> If this symbol starts flashing for one minute every time the scooter is switched on, contact your provider.










**Battery Indication Gauge**

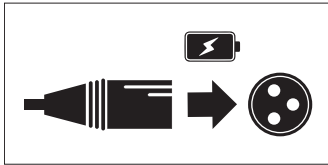
 Low battery indication: Every time the scooter is activated or at work when battery capacity is lower than 25%, the electronic system will beep three times.

 Overdischarge protection: after a certain drive time on reserve battery power the electronic system switches the drive off automatically and brings the scooter to a standstill. If you do not drive your scooter for a while the batteries will "recuperate" and allow a further, but short, journey. However, after a very brief journey the battery reserve symbol will illuminate again and the electronic system will beep three times. This procedure leads to battery damage and should be avoided if possible!

Battery capacity: <25%	Reduced driving range.Recharge the batteries at the end of your journey.An overlay reminds of charging, when switching off the scooter.
Battery capacity: <20%	Battery reserve = severely restricted driving range.Recharge batteries immediately!


						
>80%	<80%	<65%	<50%	<35%	<25%	<20%

**Charging Overlay**



As soon as the battery capacity is under 25% and the scooter is switched off, an overlay appears for several seconds on the status display as a reminder to charge the scooter.

**4.2.1 Entering Setup (LCD Display)**

 This chapter applies to scooters with LCD display.

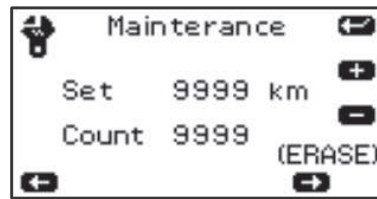
1. Turn key to switch scooter off.
- 2.



Press buttons simultaneously and hold.

3. Turn key to switch scooter on.

Scooter enters setup mode after two seconds.



Enter next display with button.




Enter next display with button.

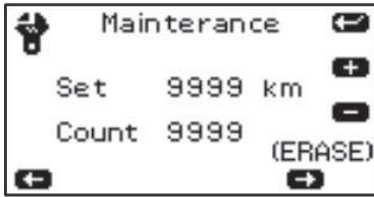



Enter next display with button.


### 4.2.2 Setting Counter

 This chapter applies to scooters with LCD display.

1. Enter setup settings as described in 4.2.1 *Entering Setup (LCD Display)*, page 9.



 Default setting is 0. You can set a km value as service interval.

If counter value is greater than set value,  symbol will flash for one minute, when scooter is switched on.

+	0 (OFF)+ 500 + 1000 +1500 + 2000 ..... + 9500 + 9999 (max)
-	9999 – 9500 – 9000 – 8500 – 8000 ..... – 500 – 0 (OFF)

- 2.



Press and hold button for 2 seconds to erase counter.

- 3.



Press button to increase value.

- 4.




Press button to decrease value.


- 5.



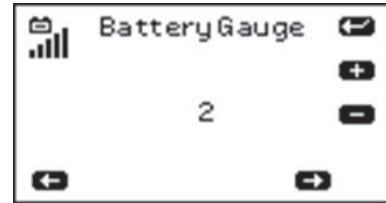
Press button to save and enter next page.

### 4.2.3 Setting Battery Gauge

 This chapter applies to scooters with LCD display.

 Setting battery gauge is mandatory when retrofitting operating console.

Adjust the parameter in battery gauge to suit different types and sizes of batteries.



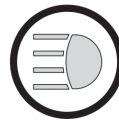
AGM Battery	
(1)	small size batteries (≤ 50 Ah, default)
(2)	big size batteries (> 50 Ah)
Gel Battery	
(3)	small size batteries (≤ 50 Ah)
(4)	big size batteries (> 50 Ah)

- 1.



Press button to increase value.

- 2.




Press button to decrease value.


- 3.



Press button to save and enter next page.

### 4.2.4 Setting Wheel Diameter

 This chapter applies to scooters with LCD display.

 Setting wheel diameter is mandatory when retrofitting operating console.

Set value according to wheel diameter 11", 12", 13", 14" or 15" for correct display of speed.



1.



Press button to increase value.

2.



Press button to decrease value.

3.



Press button to save and leave setup settings.

## 5 Servicing

### 5.1 General Safety Information on Installation Work

- !** **NOTICE!**  
Collisions can be caused if shim rings are removed from the drive wheels during installation work. Shim rings are frequently placed between drive shaft and wheel hub to compensate tolerances. Collisions can be caused if these shim rings are removed and not re-installed.
- Install all shim rings in exactly the same positions they were in before dismantling.

### 5.2 Tightening Torques

- !** **CAUTION!**  
**Risk of damage to scooter due to improperly tightened screws, nuts or plastic connections.**
- Always tighten screws, nuts etc. to the stated tightening torque.
  - Only tighten screws or nuts which are not listed here fingertight.

The tightening torques stated in the following list are based on the thread diameter for the nuts and bolts for which no specific values have been determined. All values assume dry and de-greased threads.

Thread	Tightening Torque in Nm $\pm 10\%$
M4	3 Nm
M5	6 Nm
M6	10 Nm
M8	25 Nm
M10	49 Nm
M12	80 Nm
M14	120 Nm
M16	180 Nm

### 5.3 Troubleshooting

#### 5.3.1 Operational Faults

Proceed as follows if you have any problems:

1. First assess the possible cause of the problem using the following table.
2. Check operating console status display. Evaluate flash code.
3. Carry out necessary checks and repairs as recommended in the following table.

### 5.3.2 Drive Fault Diagnosis

Problem	Other Symptoms	Possible Cause	Solution	Documentation
<b>Scooter will not start</b>	Status display on operating console does not illuminate	Batteries defective	Replace batteries	See user manual
		Completely discharged battery	Pre-charge batteries	
		Power supply to operating console interrupted	Check main fuse	See user manual for main fuse position
		Operating console defective	Check cable between modules for loose connections or damage	See 10.2.3 Replacing Power Module, page 48
	Replace operating console		See 10.2.1 Replacing Operating Console / Circuit Board, page 43	
Status display on operating console flashing	Various causes	Assess error code	See controls user manual	
<b>Scooter judders in drive mode</b>	None	Drive motor(s) defective	Replace motor(s)	See 10.4.2 Replacing Drive Unit (Differential with Drive Motor), page 54
		Drive lever potentiometer defective	Replace potentiometer	See 10.2.2 Replacing Potentiometer, page 45
<b>Batteries not being charged</b>	None	Batteries defective	Replace batteries	See user manual
	LEDs flashing on charger	Charger defective	Replace charger	See charger user manual
<b>Scooter runs too slowly</b>	None	Operating console defective	Replace operating console	See 10.2.1 Replacing Operating Console / Circuit Board, page 43
		Batteries defective	Replace batteries	See user manual
<b>Scooter does not reduce speed on bends</b>	None	Curve control device for bend travel not adjusted	Adjust curve control device	See 9.3 Replacing Curve Control Device (before 01_2025), page 39
		Curve control device defective	Replace curve control device	See 9.3 Replacing Curve Control Device (before 01_2025), page 39

### 5.3.3 Error Codes And Diagnostic Codes

Flash code	Fault	Consequence for the scooter	Comments
1	Batteries must be charged	Continues to drive	<ul style="list-style-type: none"> <li>The batteries are discharged. Charge the batteries as soon as possible.</li> </ul>
2	Battery voltage too low	Stops driving	<ul style="list-style-type: none"> <li>The batteries are depleted. Charge batteries.</li> <li>If you switch the scooter off for a few minutes, the batteries can often recuperate to such a stage that a short journey is still possible. You should only do this in an emergency, however, because this causes the batteries to become excessively discharged.</li> </ul>
3	Battery voltage too high	Stops driving	<ul style="list-style-type: none"> <li>The battery voltage is too high. If the battery charger is connected, disconnect it from the scooter.</li> <li>The electronic system charges the batteries when running downhill and when braking. This fault is caused when the battery voltage becomes too high during this process. Switch the scooter off and on again.</li> </ul>
4	Power time exceeded	Stops driving	<ul style="list-style-type: none"> <li>The maximum current was exceeded over too long a period, probably because the motor was overloaded or has been working against an immovable resistance. Switch the scooter off, wait a few minutes and then switch on again.</li> <li>The electronic system has determined a motor short-circuit. Check the wiring harness for short-circuit and check the motor.</li> <li>Contact your Invacare provider.</li> </ul>
5	Brake failure	Stops driving	<ul style="list-style-type: none"> <li>Ensure that the disengaging lever is in the engaged position.</li> <li>There is a defect in the braking coil or in the cabling. Check the magnetic brake and cabling for open or short-circuited circuitry. Contact your Invacare provider.</li> </ul>
6	No neutral position when switching scooter on.	Stops driving	<ul style="list-style-type: none"> <li>Drive lever is not in neutral when the keyswitch was turned. Put the drive lever in neutral, turn the power off and then turn on again.</li> <li>It may be necessary to replace the drive lever. Contact your Invacare provider.</li> </ul>
	Circuit board failure	Stops driving	<ul style="list-style-type: none"> <li>Circuit board got damaged while connecting or disconnecting the charger to the charger socket.</li> <li>Test resistance of drive lever to eliminate a defective lever.</li> <li>It may be necessary to replace the circuit board or drive lever. Contact your Invacare provider.</li> </ul>
7	Fault in speed potentiometer	Stops driving	<ul style="list-style-type: none"> <li>The drive lever controls could be faulty or incorrectly connected. Check the cabling for open or short-circuited circuitry.</li> <li>Potentiometer is not correctly adjusted and must be replaced. Contact your Invacare provider.</li> </ul>
8	Motor voltage error	Stops driving	<ul style="list-style-type: none"> <li>The motor or its cabling is defective. Check the cabling for open or short-circuited circuitry.</li> </ul>
9	Miscellaneous internal fault	Stops driving	<ul style="list-style-type: none"> <li>Contact your Invacare provider.</li> </ul>
10	Push/freewheel mode error	Stops moving	<ul style="list-style-type: none"> <li>The scooter has exceeded the permissible maximum speed during pushing or freewheeling. Switch the electronics system off and on again.</li> </ul>

### 5.3.4 Service Plan (Once a Year)

Component	Check	Remedy	Notes	✓
<b>Seat</b>	Check welded seams, fixings and upholstery	Tighten screws, replace parts if damaged		
	Check seat suspension	Grease the spring generously, replace parts if damaged	See 6.2 <i>Replacing Seat Suspension</i> , page 18	
<b>Frames (Chassis) / Battery Mounting</b>	Check fixings, welded seams and battery mounting	Tighten screws, replace parts if damaged		
	Check battery fixing straps			
<b>Wheel Suspension and Wheels</b>	Check drive wheels for tight fit	Tighten hub nuts, replace if necessary		
	Check front wheels for tight fit, float and side play	Adjust / replace	See 10.3.1 <i>Removing Front Wheels</i> , page 49 or 9.2.5 <i>Replacing Front Suspension Assembly</i> , page 38	
	Check pneumatic tire	Repair or replace if damaged	See 10.3.3 <i>Repairing Tyre Punctures</i> , page 52	
	Check tracking and steering link	Tighten screws		
Check tracking and steering				
<b>Brake</b>	Check brake function in pushing mode	Adjust or replace brake	See 11 <i>Brakes</i> , page 60	
<b>Shock Absorber</b>	Check shock absorber	Adjust or replace shock absorber	See 9.2.4 <i>Replacing Front Shock Absorber</i> , page 37 or 10.4.1 <i>Replacing Rear Shock Absorber</i> , page 52	
<b>Drive Units, Coupling Mechanism</b>	Check functions in drive and push modes	Replace motor if necessary	See 10.4.2 <i>Replacing Drive Unit (Differential with Drive Motor)</i> , page 54	
	Check clutch mechanism	Tighten screws / nuts, adjust or replace		
<b>Lighting</b>	Check function			
	Check cable / plug connections	Replace lightbulbs or cable	See 8.1 <i>Replacing Headlight</i> , page 23, 8.2 <i>Replacing Front Direction Indicators</i> , page 25 or 8.4 <i>Replacing Rear Lights / Direction Indicators</i> , page 27	
<b>Batteries</b>	Check batteries for damage	Replace batteries	See user manual	
	Check battery voltage	Charge batteries	See user manual	
	Check contacts and terminals	Clean contacts and terminals		

Component	Check	Remedy	Notes	✓
<b>Drive Controls</b>	Check status display (flashing)	Evaluate flash code	See 5.3.3 Error Codes And Diagnostic Codes, page 14	
	Check fixing	Tighten or replace fixing		
	Check cable, connecting plug	Replace cable, connecting plug		
	Check drive lever function	Replace drive lever		
	Check power supply	Replace cable, connecting plug or console		
<b>Drive Program</b>	Check drive program version. New version available?	Update software		
<b>Curve Control in Bends</b>	Check cable and connecting plug	Adjust or replace sensor on curve control device	See 9.3 Replacing Curve Control Device (before 01_2025), page 39	
	Check function			
<b>Screws</b>	Check screws for tight fit	Tighten screws if necessary		

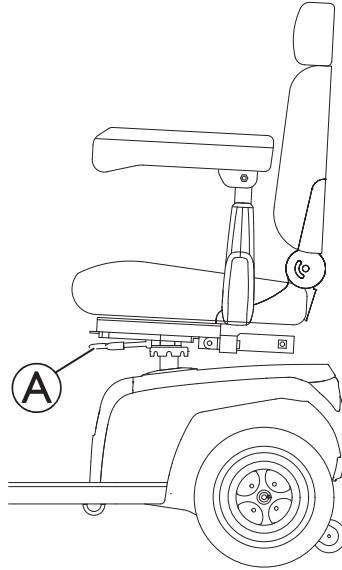


## 6 Seat System

### 6.1 Removing / Installing the Seat

The seat can be turned to one side to make getting in and out of the scooter easier. The seat is also easier to remove from this position.

The seat lever is located under the seat on the left.



#### Removing the Seat

1. Pull the lever Ⓐ to disengage the seat.
2. Hold the seat firmly by the backrest and front edge and remove it upwards.

#### Installing the Seat

1. Lower the seat assembly onto the seat post.
2. Pull the lever Ⓐ to allow the seat to drop into the locked position.
3. Lift up the seat assembly to ensure the seat is secured.

## 6.2 Replacing Seat Suspension



### CAUTION!

**Risk of injury or damage if the scooter is accidentally set into motion during repairs**

Unintended movement or rolling away of the scooter can lead to accidents or damage of the property.

— Secure scooter against unintended movement and rolling away.



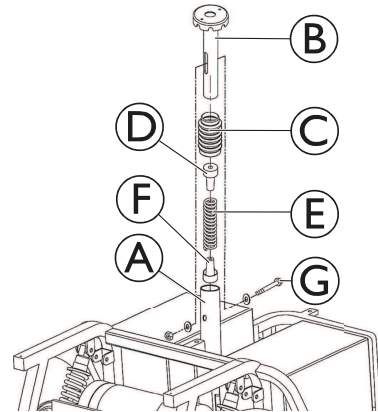
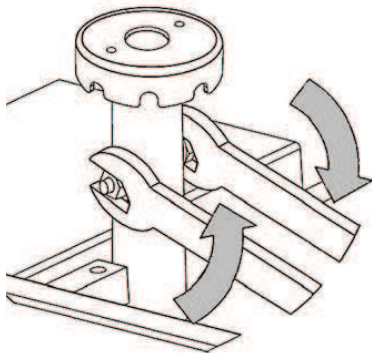
When disassembling, note position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.



- 17 mm wrench (2x)

1. Remove seat, see 6.1 Removing / Installing the Seat, page 17.

2.



Remove bolt ⑥, nut and washers.

3. Remove seat support tube ⑧ from receptacle tube ①.

4. Remove concertina type shroud ③ including spring ⑤ and plastic end pieces ④ and ⑦.

5. Fit plastic end pieces ④ and ⑦ to new spring.

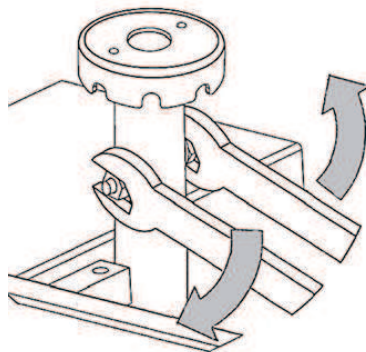
6. Grease spring generously. The spring should be covered completely.

7. Install concertina type shroud ③ including spring ⑤ and plastic end pieces ④ and ⑦.

8. Insert seat support tube ⑧ into receptacle tube ① and press down gently.

9. Reposition bolt ⑥, nut and washers.

10.



Firmly tighten seat support bolt.

11. Reposition seat.

## 6.3 Replacing Seat Support Tube



- 17 mm wrench (2x)

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud, see *7.1 Replacing Rear Shroud, page 20*.
- 3.



Remove securing bolt, nut and washers of seat support tube.

4. Replace seat support tube.
5. Adjust seat height.
6. Install parts in reverse order. Make sure the seat is in a locked position before use.

## 7 Shrouds

### 7.1 Replacing Rear Shroud



**CAUTION!**

**Risk of damage to shroud**

- Do not pull shroud straight up to remove.
- Follow instructions below.

1. Remove seat, see 6.1 *Removing / Installing the Seat*, page 17.

2.



Place one hand at the front, the other at the rear of the shroud (A).

3. Lift shroud up from front.

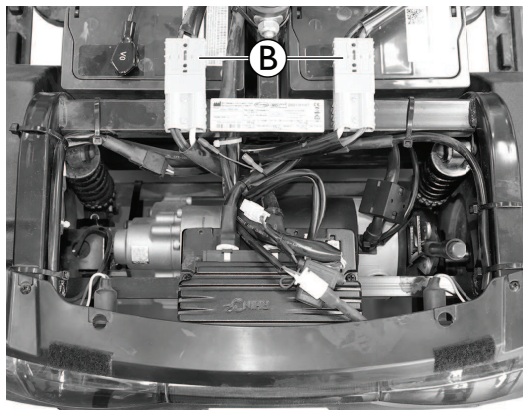
4.



Place hands on left and right side of shroud.


5. Twist and lift to remove shroud completely.

6.




For any following assembling work, disconnect battery cables (B) first.

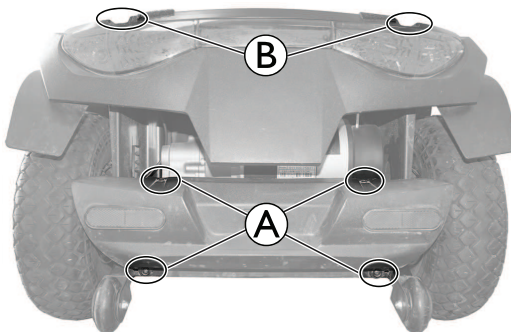
## 7.2 Replacing Rear Bumper Cover

 When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.

 If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.

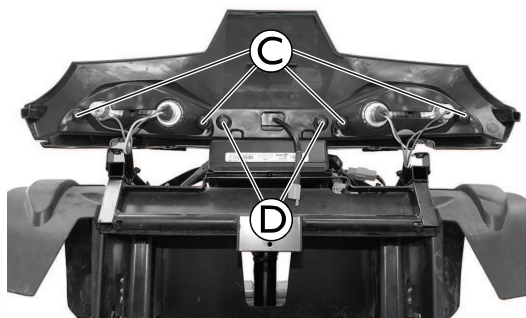
 • Phillips screwdriver

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
- 3.



Remove screws **A** to remove lower rear bumper cover.

4. Remove screws **B** to remove upper rear bumper cover.
5. Lift up upper rear bumper cover.
- 6.



Remove screws **C** to remove the rear lights.

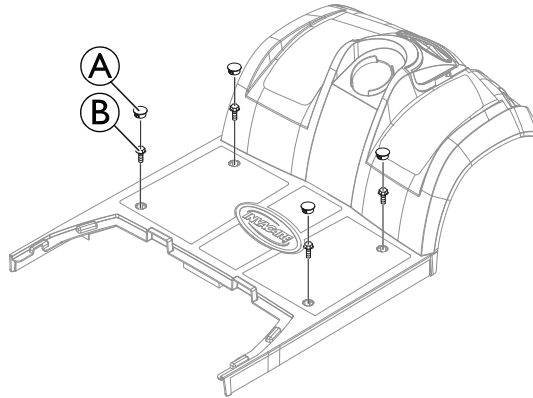
7. Remove screws **D** to remove centre brake light.
8. Replace rear bumper covers.
9. Install parts in reverse order.
10. Test all functions.

## 7.3 Replacing Front Shroud



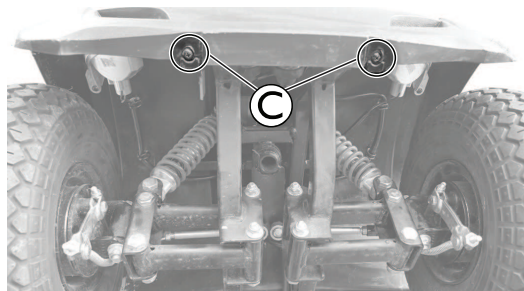
- 10 mm socket wrench
- Phillips screwdriver
- Jacking device

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
3. Remove steering column, see *9.1 Replacing Steering Column, page 29*.
- 4.



Remove four caps **A** and four screws **B**.

5. Jack up the scooter.
- 6.



Remove fixation screws on front bumper cover **C**

7. Take off front shroud.



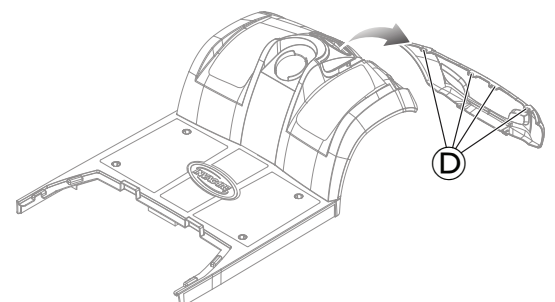
If only the front shroud needs to be replaced, the headlight (see *8.1 Replacing Headlight, page 23*) and front direction indicators (see *8.2 Replacing Front Direction Indicators, page 25*) need to be removed and reassembled onto the new front shroud.

8. Install parts in reverse order.
9. Test all functions.

### Replacing Front Bumper Cover

The front bumper cover is connected to the front shroud with screws **D**. The front bumper cover can be removed in two ways:

- a. Remove the front shroud with the front bumper cover and then remove screws **D** to disconnect and remove the front bumper cover.
- b. Do not remove the front shroud. Only remove screw **C** and **D** to disconnect and remove the front bumper cover.



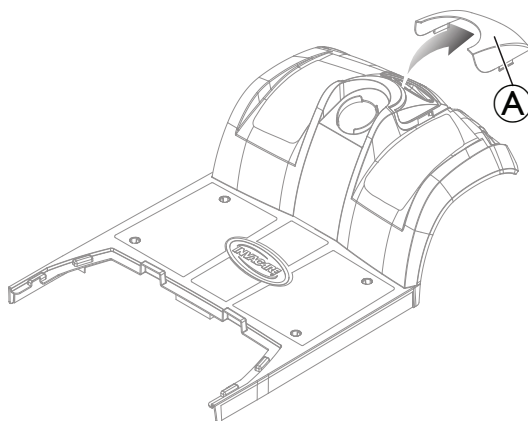
## 8 Lighting Unit

### 8.1 Replacing Headlight



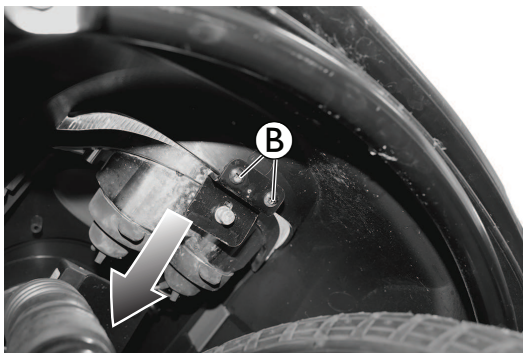
- Phillips screwdriver

1. Remove seat, see 6.1 *Removing / Installing the Seat*, page 17.
2. Remove rear shroud and disconnect battery cables, see 7.1 *Replacing Rear Shroud*, page 20.
3. Remove rear steering column shroud (see until Step 7 in 9.1 *Replacing Steering Column*, page 29) to disconnect head light cable from wiring harness.
- 4.



Remove colour panel ①

- 5.

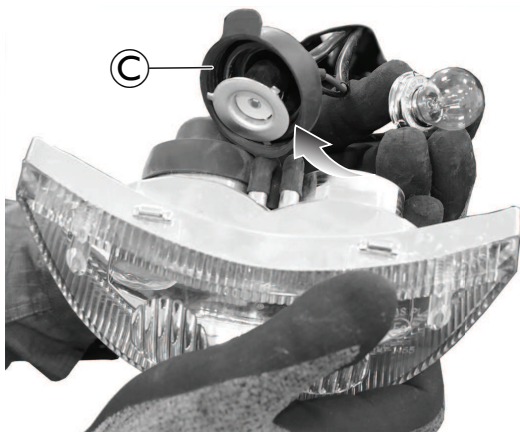


Remove screws ② to pull head light out of the front shroud.

6. Remove headlight.

## 7. Replacing Light Bulb

a.

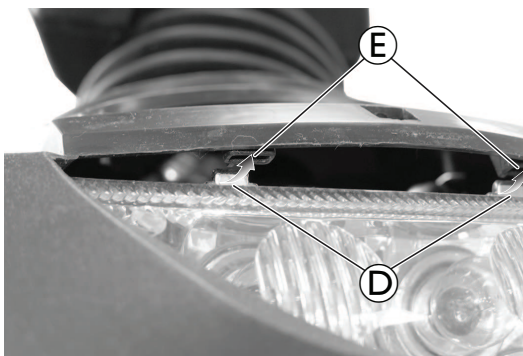


Disconnect light bulb holder from headlight.

b. Replace light bulb.

8. Install parts in reverse order.

9.




When inserting the head light back into the front shroud, make sure the plastic hooks © snap into the recesses ⑤.

10. Tighten screws ⑥.

11. Test all functions.



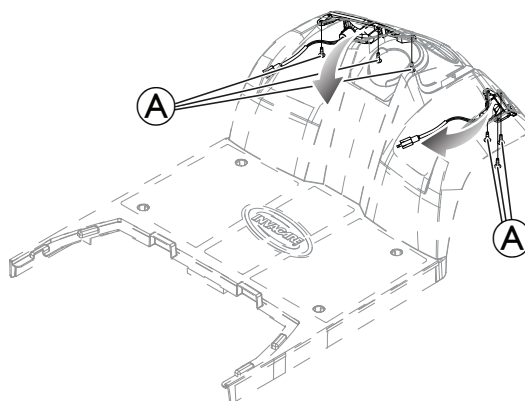
## 8.2 Replacing Front Direction Indicators

 When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.

 If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.


- 
-  • Phillips screwdriver  
• Jacking device
- 

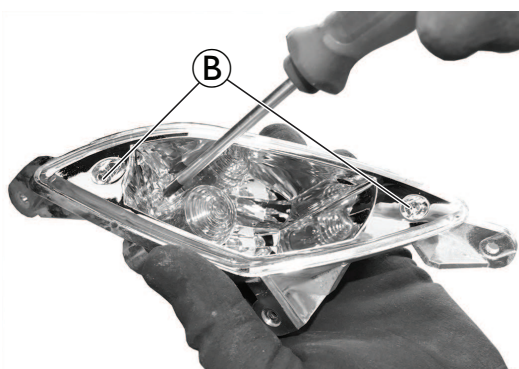
1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
3. Remove rear steering column shroud (see until Step 7 in *9.1 Replacing Steering Column, page 29*) to disconnect direction indicator cables from wiring harness.
4. Jack up the front, to make the direction indicator screws available without removing the front shroud.
5. Remove steering column, see *9.1 Replacing Steering Column, page 29*.
6. Remove front shroud, see *7.3 Replacing Front Shroud, page 22*.
- 7.




Remove direction indicator screws  to pull direction indicators out of the front shroud.

### 8. Removing Light Bulb

 The light bulbs can only be changed in the direction indicators of the 4-wheel version.



- a. Remove screws  on glass.
  - b. Remove glass.
  - c. Replace light bulb.
9. Install parts in reverse order.
  10. Test all function.

## 8.3 Replacing Centre Brake Light



### CAUTION!

#### Risk of burning if power cable is shorted

- Turn off the power completely before removing any power supply components of the scooter. Therefore take out the batteries.
- Avoid bridging of contacts during measurements on live electrical components.



When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.



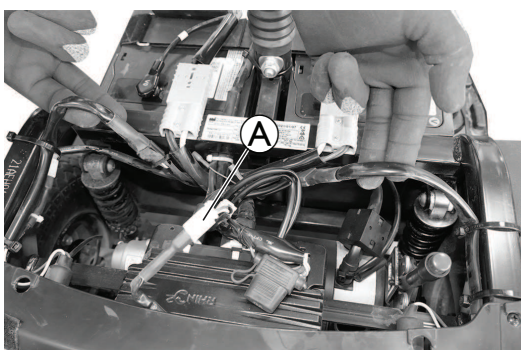
If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.



- Phillips screwdriver

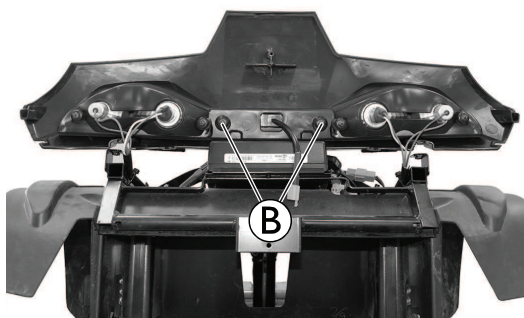
1. Remove seat, see 6.1 *Removing / Installing the Seat*, page 17.
2. Remove rear shroud and disconnect battery cables, see 7.1 *Replacing Rear Shroud*, page 20.
3. Lift up rear bumper cover, see 7.2 *Replacing Rear Bumper Cover*, page 21.

4.



Disconnect cable plug **A**.


5.



Remove screws **B**.

6. Replace centre brake light.
7. Install parts in reverse order.
8. Test all functions.

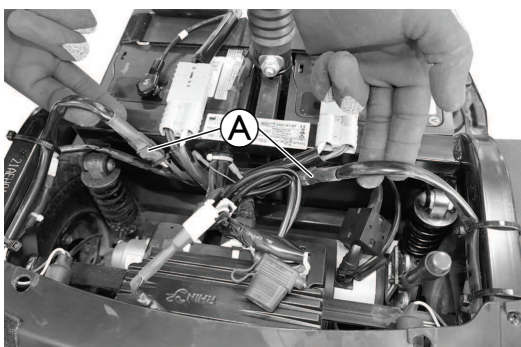
## 8.4 Replacing Rear Lights / Direction Indicators

 When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.

 If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.

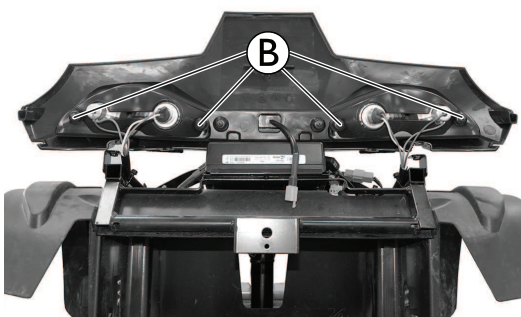
- 
-  • Phillips screwdriver  
• Slotted screwdriver
- 

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
3. Lift up rear bumper cover, see *7.2 Replacing Rear Bumper Cover, page 21*.
- 4.



Disconnect cable plugs **A**.

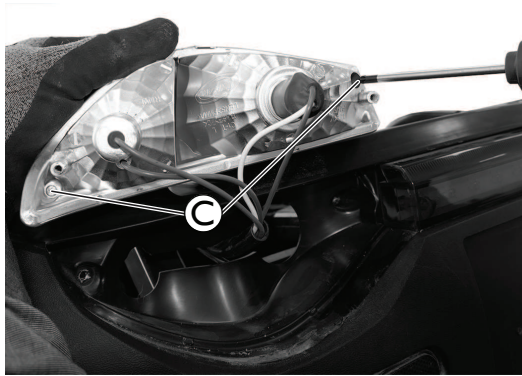
- 5.



Remove screws **B**.

## 6. Replacing Light Bulb

a.



Remove screws © from glass.

b.



Use slotted screwdriver to loosen the plastic hooks from the recesses.

c.



Remove glass.

d. Replace light bulbs.

7. Install parts in reverse order.

8. Test all function.

## 9 Steering

### 9.1 Replacing Steering Column


**Risk of accident**

Accidental rolling can lead to accidents.  
— Secure scooter against rolling away.



When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.

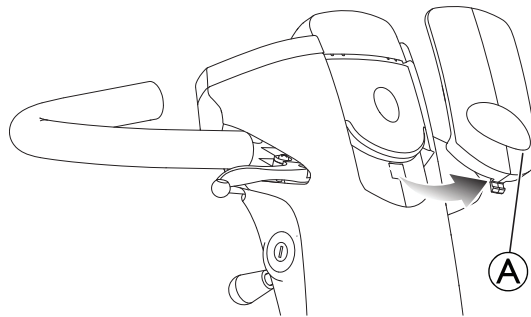


If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.

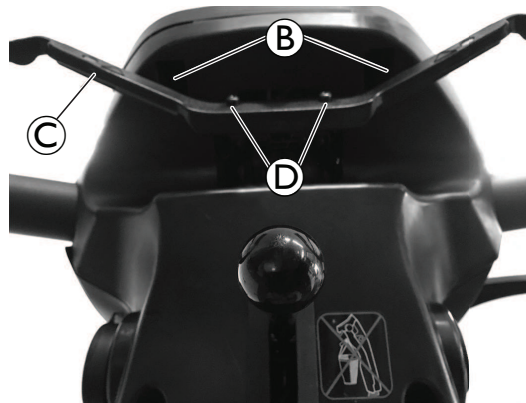


- 13 mm wrench
- 17 mm wrench
- Phillips screwdriver
- Jacking device

1. Remove seat, see 6.1 *Removing / Installing the Seat*, page 17.
2. Remove rear shroud and disconnect battery cables, see 7.1 *Replacing Rear Shroud*, page 20.
3. Jack up the front of the scooter so that the front wheels are off the ground.
- 4.



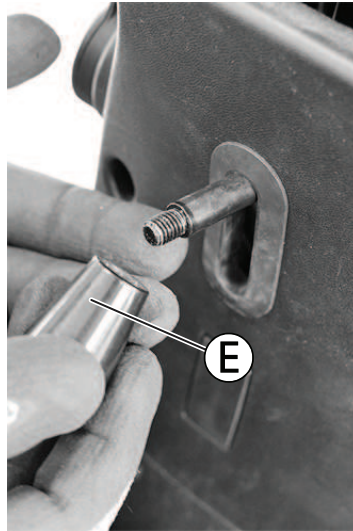
5. Remove colour panel (A).



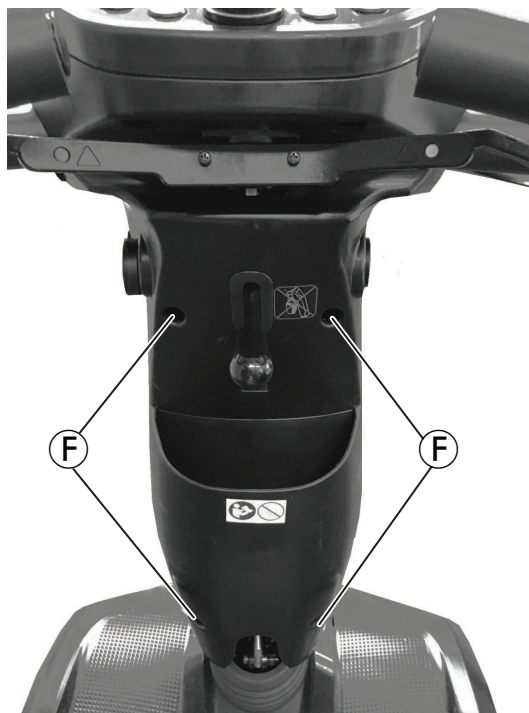
Remove screws (B) on operating console.

Remove screws (D) to remove the drive lever (C).

6.



7. Remove knob ⑤ on steering column adjustment lever.



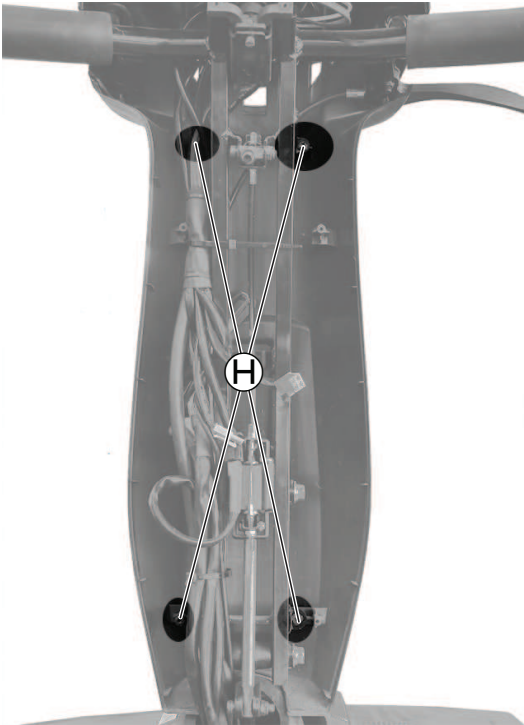
Remove screws ⑥ to remove rear steering column shroud.

8.



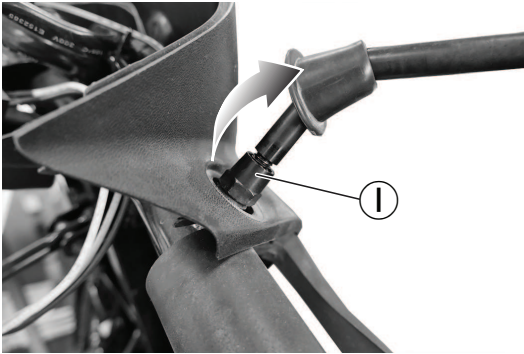
Loosen screws © to remove front basket holder.

9.



Remove screws ©.

10.



Remove nut ① to remove rear mirrors on both sides.

11. Remove front steering column shroud.

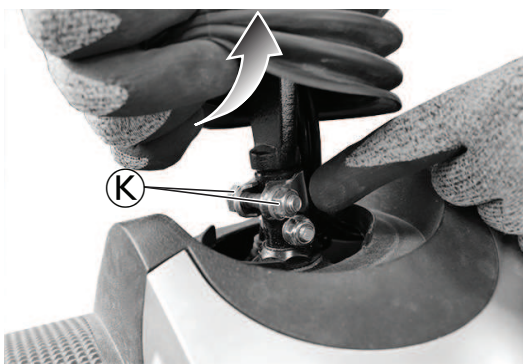
12. Disconnect brake cable:



- Pull break lever and loosen break cable ①.
- Remove break cable from break lever.

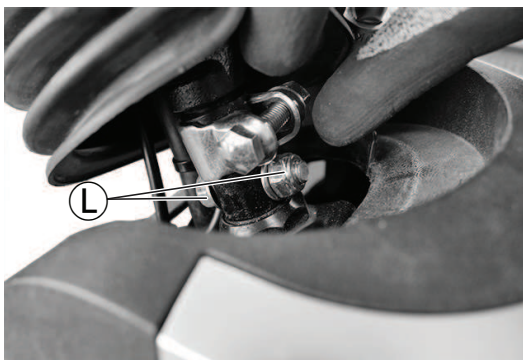
13. Disconnect all cables from wiring harness.

14.



Loosen screw and nut ① on clamp.

15.

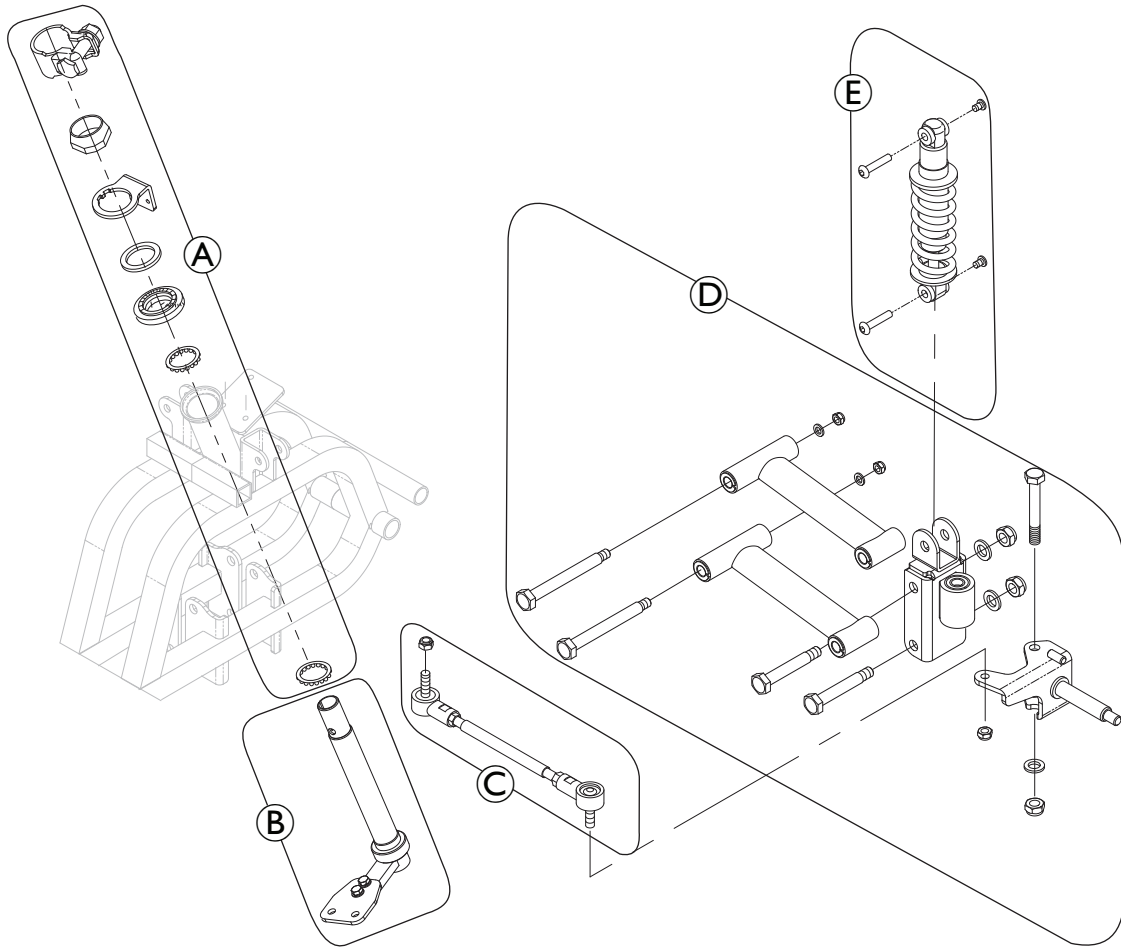


Remove screw, nut and washer ①.

16. Pull steering column out upwards.



## 9.2 Overview of Steering



- Ⓐ Bearing kit of the steering head assembly
- Ⓑ Steering head
- Ⓒ Rod assembly (only right side displayed)

- Ⓓ Front axle kit (only right side displayed)
- Ⓔ Shock absorber(only right side displayed)

## 9.2.1 Replacing Steering Head



### CAUTION!

#### Risk of accident

Accidental rolling can lead to accidents.

- Secure scooter against rolling away.



When removing, take care of small parts such as screws and washers. Put all small parts down so that they can be installed in correct sequence.

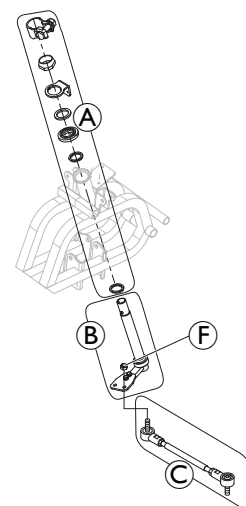
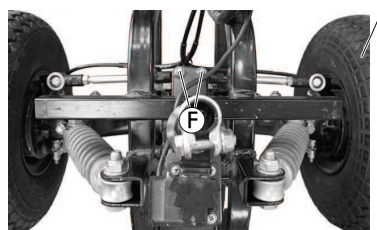


If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.



- 10 mm wrench
- 13 mm wrench
- 17 mm wrench
- 19 mm wrench
- 32 mm wrench
- Jacking device

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
3. Remove steering column, see *9.1 Replacing Steering Column, page 29*.
4. Remove front shroud and bumper cover, see *7.3 Replacing Front Shroud, page 22*.
- 5.



Remove nuts **F** to disconnect rod assemblies **C** from steering head **B**.

6. Remove bearing kit **A** and pull steering head out of chassis.
7. Install parts in reverse order.
8. Test all functions.

## 9.2.2 Replacing Rod Assembly



### CAUTION!

#### Risk of accident

Accidental rolling can lead to accidents.

- Secure scooter against rolling away.



When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.

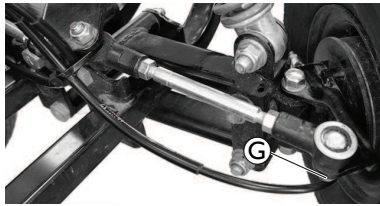


If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.

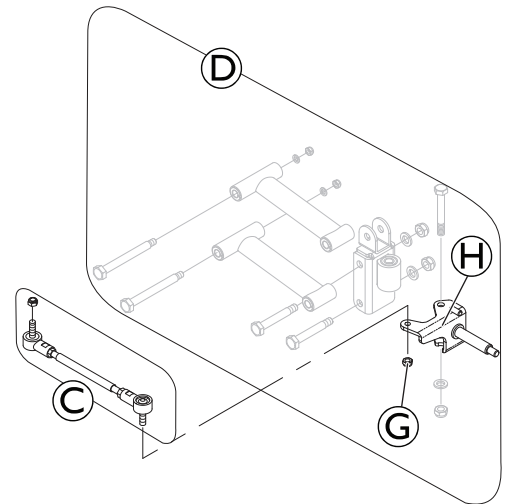


- 10 mm wrench
- 12 mm wrench
- 13 mm wrench
- Jacking device

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
3. Remove steering column, see *9.1 Replacing Steering Column, page 29*.
4. Remove front shroud and bumper cover, see *7.3 Replacing Front Shroud, page 22*.
5. Disconnect rod assemblies from steering head, see *9.2.1 Replacing Steering Head, page 34*.
- 6.



Remove nut ③ to disconnect rod assemblies ② from front axles ④.



7. Install parts in reverse order.
8. Test all functions.

### 9.2.3 Replacing Front Axle



**CAUTION!**

**Risk of accident**

Accidental rolling can lead to accidents.

- Secure scooter against rolling away.



When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.

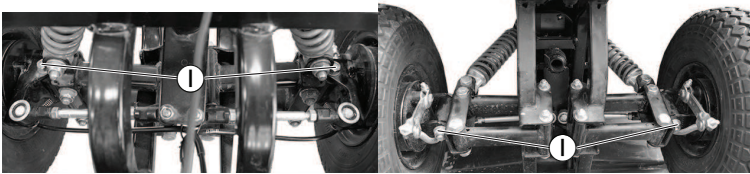


If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.



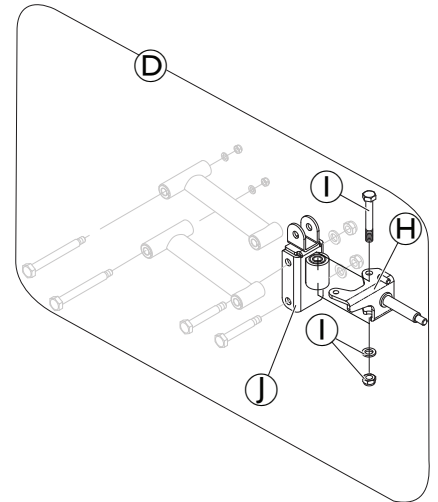
- 17 mm wrench
- 19 mm wrench
- Jacking device

1. Remove seat, see 6.1 *Removing / Installing the Seat*, page 17.
2. Remove rear shroud and disconnect battery cables, see 7.1 *Replacing Rear Shroud*, page 20.
3. Remove steering column, see 9.1 *Replacing Steering Column*, page 29.
4. Remove front shroud and bumper cover, see 7.3 *Replacing Front Shroud*, page 22.
5. Disconnect rod assemblies from steering head, see 9.2.1 *Replacing Steering Head*, page 34.
6. Remove rod assemblies, see 9.2.2 *Replacing Rod Assembly*, page 35.
- 7.



Remove screws, nuts and washers ① to disconnect front axles ② from front axle holders ③.

8. Install parts in reverse order.
9. Test all functions.



## 9.2.4 Replacing Front Shock Absorber



### CAUTION!

#### Risk of accident

Accidental rolling can lead to accidents.  
— Secure scooter against rolling away.



When removing, take care of small parts such as screws and washers. Put all small parts down so that they can be installed in correct sequence.

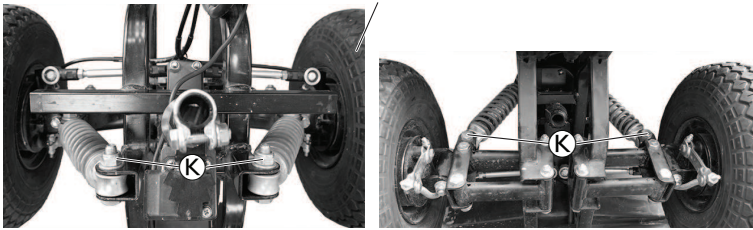


If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.



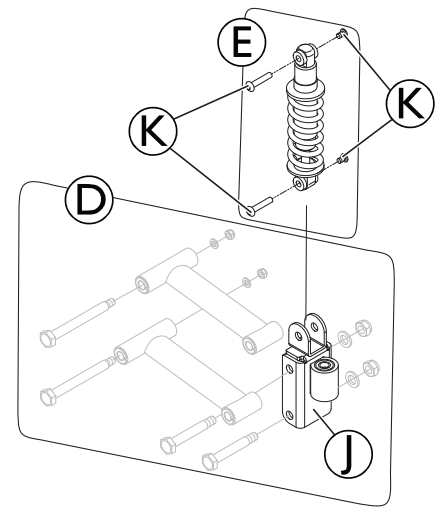
- 13 mm wrench

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
3. Remove steering column, see *9.1 Replacing Steering Column, page 29*.
4. Remove front shroud and bumper cover, see *7.3 Replacing Front Shroud, page 22*.
- 5.



Remove screws ① to disconnect shock absorber ⑤ from front axle holders ①.

6. Install parts in reverse order.
7. Test all functions.



## 9.2.5 Replacing Front Suspension Assembly



### CAUTION!

#### Risk of accident

Accidental rolling can lead to accidents.

- Secure scooter against rolling away.



When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.

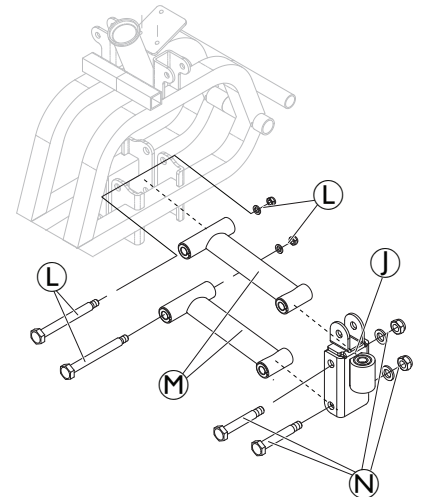
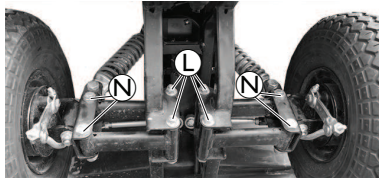


If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.



- 17 mm wrench
- 19 mm wrench
- Jacking device

1. Remove seat, see 6.1 *Removing / Installing the Seat*, page 17.
2. Remove rear shroud and disconnect battery cables, see 7.1 *Replacing Rear Shroud*, page 20.
3. Remove front wheels, see 10.3.1 *Removing Front Wheels*, page 49.
4. Remove steering column, see 9.1 *Replacing Steering Column*, page 29.
5. Remove front shroud and bumper cover, see 7.3 *Replacing Front Shroud*, page 22.
6. Disconnect rod assemblies from steering head, see 9.2.1 *Replacing Steering Head*, page 34.
7. Remove rod assemblies, see 9.2.2 *Replacing Rod Assembly*, page 35.
8. Remove shock absorber, see 9.2.4 *Replacing Front Shock Absorber*, page 37.
- 9.



Remove screws, washers and nuts **L** to disconnect front suspension assemblies **M** from chassis.

10. If necessary, remove screws, nut and washers **N** to disconnect front axle holders **J** from front suspension assemblies **M**.
11. Install parts in reverse order.
12. Test all functions.

## 9.3 Replacing Curve Control Device (before 01\_2025)



### CAUTION!

#### Risk of accident

Accidental rolling can lead to accidents.  
— Secure scooter against rolling away.




When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.

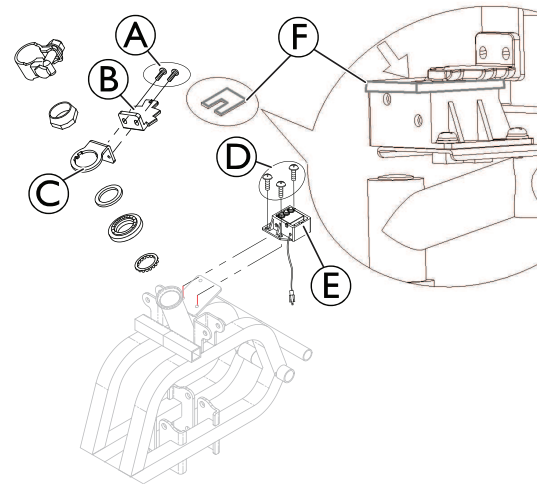


If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.



- Phillips screwdriver
- 32 mm wrench

1. Remove seat, see 6.1 *Removing / Installing the Seat*, page 17.
2. Remove rear shroud and disconnect battery cables, see 7.1 *Replacing Rear Shroud*, page 20.
3. Remove steering column, see 9.1 *Replacing Steering Column*, page 29.
4. Remove front shroud and bumper cover, see 7.3 *Replacing Front Shroud*, page 22 or 7.2 *Replacing Rear Bumper Cover*, page 21.
5. Remove screws **A** to disconnect limit switch trigger **B** from holder **C**.
  -  If you want to replace the holder **C**, you need to loosen and remove the bearing kit of the steering head, see 9.2.1 *Replacing Steering Head*, page 34.
6. Remove screws **D** to disconnect limit switch **E** from chassis.



### Adjusting

7. Set steering to straight ahead.
8. Align limit switch trigger straight using measuring gauge **F** (supplied with the replacement kit).
9. Hold the limit switch trigger in the adjusted position and tighten firmly.

### Check

10. Turn steering completely to right and then left.
11. When steering is turned to its limit, the three sensors on the limit switch should be visible.
12. Install parts in reverse order.
13. Check all functions.

## 9.4 Replacing Curve Control Device (after 01\_2025)



### CAUTION!

#### Risk of accident

Accidental rolling can lead to accidents.

- Secure scooter against rolling away.



When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.

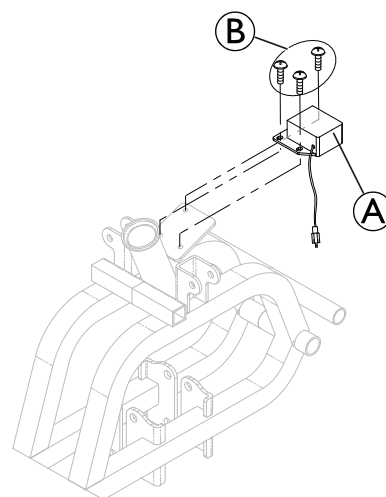


If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.



- Phillips screwdriver

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
3. Remove steering column, see *9.1 Replacing Steering Column, page 29*.
4. Remove front shroud and bumper cover, see *7.3 Replacing Front Shroud, page 22* or *7.2 Replacing Rear Bumper Cover, page 21*.
5. Remove screws **B** to disconnect curve control device **A** from holder.
6. Install parts in reverse order.
7. Check all functions.





## 9.5 Replace Key Cylinder



### CAUTION!

#### Risk of accident

Accidental rolling can lead to accidents.

- Secure scooter against rolling away.



When removing, take care of small parts such as screws and washers. Put all small parts down so that they can be installed in correct sequence.

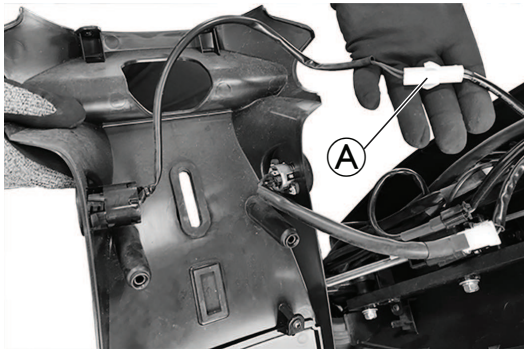


If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.



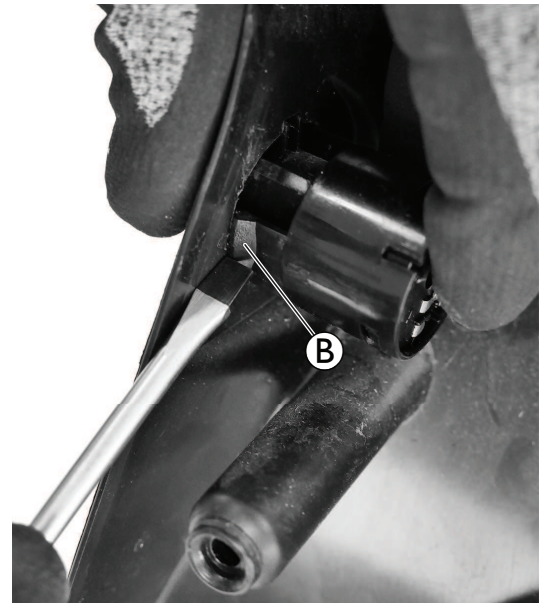
- Slotted screwdriver

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
3. Remove rear steering column shroud, see until Step 7 in *9.1 Replacing Steering Column, page 29*.
- 4.



Disconnect cylinder cable **A** from wiring harness.

5. Release plastic hook **B** to pull key cylinder out of shroud.
6. Install parts in reverse order.
7. Test all functions.



## 10 Drive Components

### 10.1 Batteries



#### CAUTION!

**Injury hazard and possible material damages if batteries are handled improperly**

- Observe the warning information on the batteries.
- Only use battery versions stated in the specifications.



#### CAUTION!

**Fire and burns hazard if battery terminal is bypassed**

- Take great care to ensure that the battery terminals are never short-circuited with tools or mechanical scooter parts.
- Ensure that the battery terminal caps have been replaced if you are not working on the battery terminals.



#### CAUTION!

**Risk of crushing**

Batteries can be extremely heavy. This results in injury hazards to your hands.

- Handle the batteries with care.
- Ensure that batteries do not fall to the ground when removed from chassis.
- Pay attention to hands.
- Use proper lifting techniques.



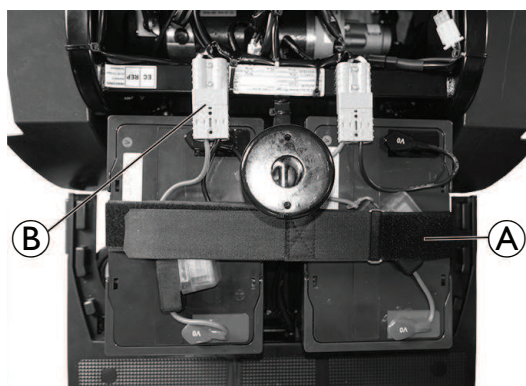
When removing, take care of small parts such as screws and washers. Put all small parts down so that they can be installed in correct sequence.

#### 10.1.1 General Instructions on Handling Batteries

- Never mix and match different battery manufactures or technologies, or use batteries that do not have similar date codes.
- Never mix gel with AGM batteries.
- The batteries reach their end of life when the drive range is significantly smaller than usual. Contact your provider or service technician for details.
- Always have your batteries installed by a properly trained scooter technician or a person with adequate knowledge. They have the necessary training and tools to do the job safely and correctly.

#### 10.1.2 Replacing Batteries

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear cover, see *7.1 Replacing Rear Shroud, page 20*.
- 3.



Open the battery retaining strap **A**.

4. Unplug battery connecting plug **B**.
5. Remove battery. Repeat procedure for other battery.
6. Install parts in reverse order.

### 10.1.3 Handling Damaged Batteries Correctly



**WARNING!**

**Risk of burns**

- Never touch or remove overheating batteries. Only unplug the charger.
- Never touch leaking batteries.



**WARNING!**

**Burn hazard**

Injury hazard due to discharged acid.

- Always wear acid-proof protective gloves when handling batteries.
- Always wear protective goggles when handling batteries.

**What to do if acid is discharged**

- Always take clothing which has been soiled by or dipped in acid off immediately!
- Rinse any areas of your skin which has come into contact with battery acid off immediately with plenty of water!

**If contact with eyes is made**

- You should also consult an eye specialist immediately afterwards!

- Place damaged batteries in an acid-resistant receptacle immediately after removing them.
- Only ever transport damaged batteries in an appropriate acid-resistant receptacle.
- Wash all objects that have come into contact with acid with lots of water.

#### Disposing of Dead or Damaged Batteries Correctly



**WARNING!**

**Environmental Hazard**

- DO NOT dispose of batteries in normal household waste.
- DO NOT throw batteries into a fire.
- Batteries MUST be taken to a proper disposal site. The return is required by law and free of charge.
- Only dispose of discharged batteries.
- Cover terminals of batteries prior to disposal.



**CAUTION!**

**Fire and burns hazard if battery is not stored correctly**

- Take great care to ensure that the battery terminals are never short-circuited by metallic parts or liquids.
- Ensure that the battery terminal caps have been installed before storing.

Batteries are following special disposal rules. Your provider has all information available to safely exchange and dispose the defect batteries.

## 10.2 Controls

### 10.2.1 Replacing Operating Console / Circuit Board



**CAUTION!**

**Risk of burns if power cable is shorted**

- Turn off the power completely before removing any power supply components of scooter.
- Avoid bridging of contacts during measurements on live electrical components.



**CAUTION!**

**Risk of damage to operating console /circuit board by instant high current / voltage**

- Unplug battery cable before removing / installing operating console.
- Make sure all pins are correctly connected.



**NOTICE!**

**Risk of Damaging Circuit Board by Electrostatic Discharge**




- Handle circuit boards only in Electrostatic Protected Areas (EPA).



When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.

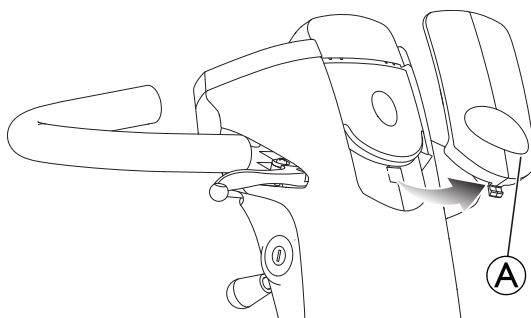


If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.

-  The plugs on the operating console cannot be wrongly connected because all plugs have a different size and only fit in one socket.
-  Setting battery gauge is mandatory when retrofitting operating console.
-  Setting wheel diameter is mandatory when retrofitting operating console.

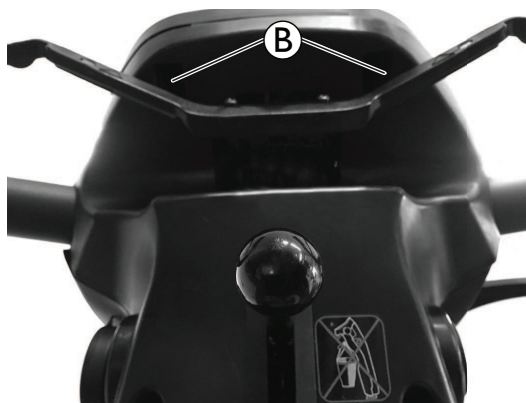
-  • Phillips screwdriver

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
- 3.



Remove colour panel **A**.

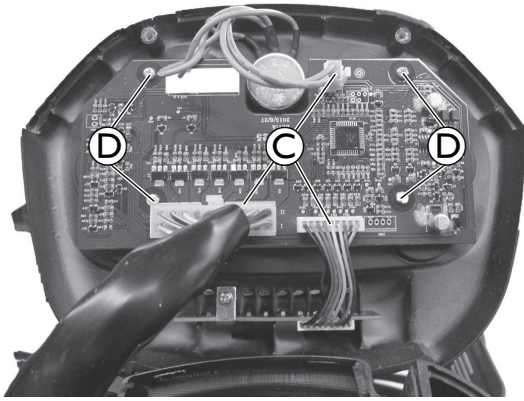
- 4.



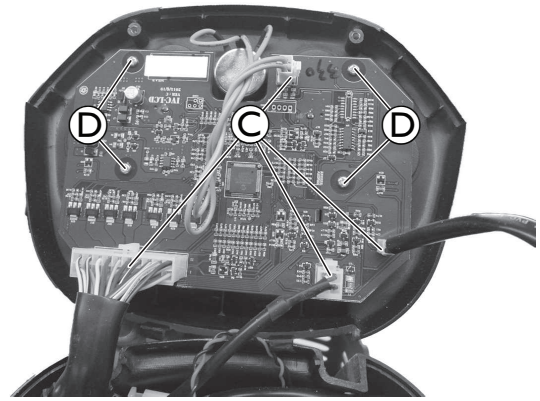
Remove screws **B** below operating console.

5. Fold operating console upwards.

6.



LED



LCD

Disconnect all plugs © from circuit board.

7. Remove screws ④ to disconnect circuit board from operating console.
8. Replace operating console (see Step a.) or replace circuit board (see Step b.).
  - a. Use screws ④ to connect new operating console with circuit board.
  - b. Use screws ④ to connect new circuit board with operating console.
9. Connect all plugs © with circuit board.
10. Install parts in reverse order.
11. Test all functions.

### 10.2.2 Replacing Potentiometer



**CAUTION!**

**Risk of burning if power cable is shorted**

- Turn off the power completely before removing any power supply components of the scooter. Therefore take out batteries.
- Avoid bridging of contacts during measurements on live electrical components.



**CAUTION!**

**Risk of damage to operating console by instant high current/voltage**

- Unplug battery cable before removing/installing operating console.
- Make sure all pins are correctly connected.



**CAUTION!**

**Risk of accident**

- Wrong potentiometer setting can result in dangerous driving situations.
- Connect potentiometer to drive lever mounting.



**NOTICE!**

**Risk of Damaging Circuit Board by Electrostatic Discharge**

- Handle circuit boards only in Electrostatic Protected Areas (EPA).



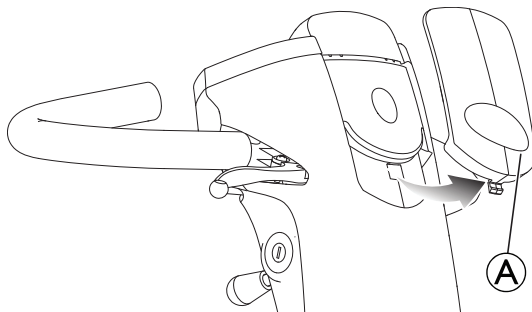
When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.



If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.

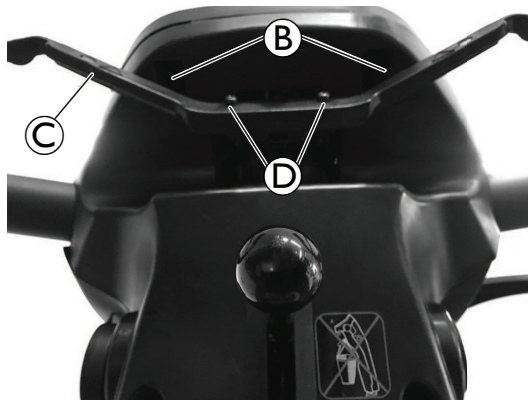
- Phillips screwdriver
- 2 mm Allen key

1. Remove seat, see 6.1 *Removing / Installing the Seat*, page 17.
2. Remove rear shroud and disconnect battery cables, see 7.1 *Replacing Rear Shroud*, page 20.
- 3.



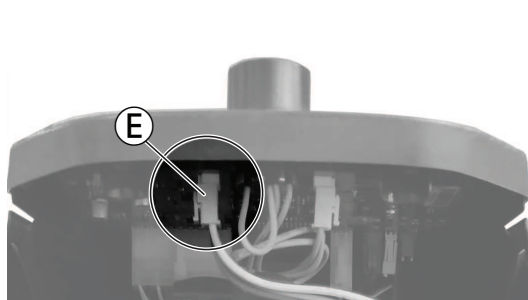
Remove colour panel (A).

- 4.



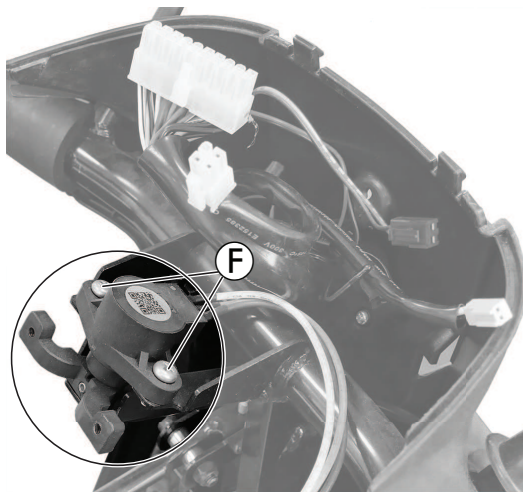
Remove screws (B) below operating console.

5. Remove screws (D) to remove drive lever (C).
6. Fold operating console upwards.
- 7.



Disconnect potentiometer plug (E) from circuit board.

8.

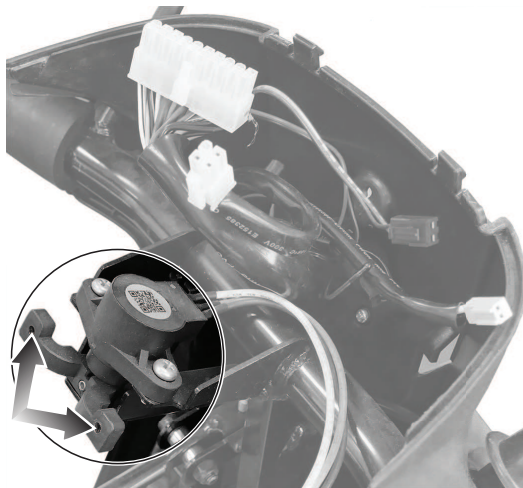


Remove screws ⑥ on potentiometer.

9. Replace potentiometer.

10. Reconnect potentiometer plug ⑤ with circuit board.

11.



Tighten drive lever ③ with screws ④ to potentiometer.

12. Install parts in reverse order.

13. Test all functions.

### 10.2.3 Replacing Power Module


**CAUTION!**
**Risk of accident**

When parking scooter on antitippers it is no longer slowed by motor brake. scooter can roll away out of control.

- Place scooter's rear frame on a supporting wooden block before you remove wheels.


**CAUTION!**
**Risk of burning if power cable is shorted**

- Turn off the power completely before removing any power supply components of the scooter. Therefore take out batteries.
- Avoid bridging of contacts during measurements on live electrical components.


**CAUTION!**
**Any changes to the drive program can affect the driving characteristics and the tipping stability of the scooter**

- Changes to the drive program may only be carried out by trained Invacare specialist providers.
- Invacare can only give a warranty for safe scooter driving behavior - especially tipping stability - for unaltered standard drive programs.


**CAUTION!**
**Risk of accident**

Accidental rolling can lead to accidents.

- Secure scooter against rolling away.



The controls system is supplied with a standard drive program. If you have carried out customer-specific modifications to the drive program, you will have to make these changes again after installing the new power module.



When disassembling, note position of small parts such as screws and washers. Put small parts down so that they can be reassembled in right sequence.



The plugs on the electronic module cannot be wrongly connected because all plugs have a different size and only fit in one socket.



If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.



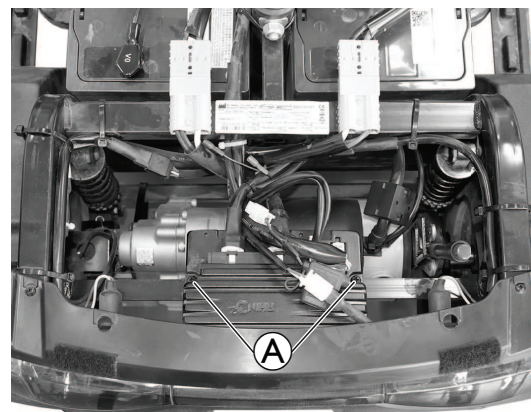
- Phillips screwdriver
- Jacking device
- To adapt the drive program: programming software or hand programming device and electronic system installation manual, available from Invacare.

1. Secure scooter against rolling away.
2. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
3. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
4. Disconnect all plugs from power module.
5. Remove screws **A** to take out power module.
6. Replace power module.
7. Install parts in reverse order.
8. Load drive program onto power module. See controls software description.



Please check the [Dynamic Controls website](#) for updates of the controls software, to make sure you have the latest version available.

9. Test all functions.





## 10.3 Wheels

### 10.3.1 Removing Front Wheels



**CAUTION!**

**Risk of accident**

When parking the scooter on antitippers, it is no longer slowed by the motor brake. The scooter can roll away out of control.

- Place scooter's rear frame on a jacking device before you remove wheels.



**CAUTION!**

**Risk of injury or damage if the scooter is accidentally set into motion during repairs**

Unintended movement or rolling away of the scooter can lead to accidents or damage of the property.

- Secure scooter against unintended movement and rolling away.

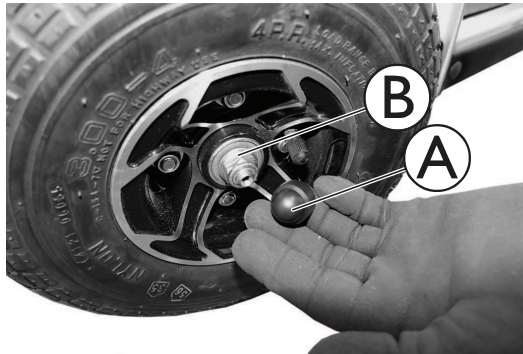


When removing, note position of small parts such as screws and washers. Put small parts down so that they can be installed in right sequence.



- 17 mm wrench
- Rubber hammer
- Flat screwdriver
- 17 mm self-locking nut
- Jacking device

1. Turn power off.
2. Jack up the front of the scooter so that the front wheels are off the ground.
- 3.



Remove cap (A) and nut (B).

4. Remove wheel.



If necessary, loosen wheel by tapping it lightly with a rubber hammer.

5. Install parts in reverse order, use a new self-locking nut.



**CAUTION!**

**Risk of injury from wheels coming loose**

If wheels are insufficiently secured during mounting, they can come loose when driving.

- When mounting wheels, tighten bolts with 30 Nm.
- Never use normal nuts instead of self-locking nuts.
- Always use new bolts with an undamaged coating.

6. Test all functions.

### 10.3.2 Replacing the Rear Wheels



#### CAUTION!

##### Risk of accident

When parking the scooter on antitippers, it is no longer slowed by the motor brake. The scooter can roll away out of control.

- Place scooter's rear frame on a jacking device before you remove wheels.



#### CAUTION!

##### Risk of injury or damage if the scooter is accidentally set into motion during repairs

Unintended movement or rolling away of the scooter can lead to accidents or damage of the property.

- Secure scooter against unintended movement and rolling away.



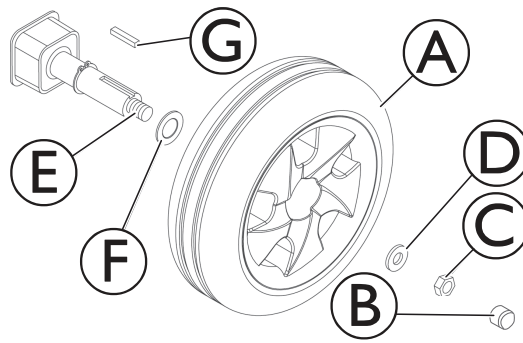
Take note of position and orientation of wheel and mounting hardware before removing.



When removing, note position of small parts such as screws and washers. Put small parts down so that they can be installed in right sequence.



- 17 mm spanner
- Rubber hammer
- Screwdriver
- 17 mm safety nut
- Jacking device



#### Removing the Rear Wheels

1. Remove seat, see 6.1 *Removing / Installing the Seat*, page 17.
2. Remove rear shroud and disconnect battery cables, see 7.1 *Replacing Rear Shroud*, page 20.
3. Jack up the rear frame assembly (not shown) so that the rear wheels **A** are off the ground.
4. Remove the cap **B**, locknut **C** and small washer **D** from the threaded end of the drive shaft **E**.
5. Remove the existing drive wheel assembly from the drive shaft.



If necessary, loosen wheel by tapping it lightly with a rubber hammer.

6. Remove the large washer **F** from the drive shaft.
7. Remove keystone **G** from drive shaft. Set aside.
8. If necessary, repeat STEPS 5 - 8 to remove other rear wheel.

## Installing the Rear Wheels



### CAUTION!

**No breaking efficiency without keystone!**

- Make sure to mount keystone ⑥ on drive shaft ⑤ when reassembling.

1. Place keystone ⑥ in cutout on drive shaft ⑤ as shown in the illustration above.



The keystone in the drive shaft **MUST** lineup with the cutout in the wheel hub.

If necessary, use a rubber hammer to gently tap drive wheel completely into position on the drive shaft.

2. Install the large washer ⑦ onto the drive shaft.
3. Install the drive wheel ① onto the drive shaft.
4. Secure wheel to drive shaft by installing the small washer ④ and locknut ③ onto the threaded end of the drive shaft. Securely tighten.
5. Install the cap ②.
6. Repeat STEPS 1-5 to install the other rear wheel.

### 10.3.3 Repairing Tyre Punctures



- Inner tube repair set **or** a new inner tube
- Talcum powder
- 12 mm wrench (depending on rim type)
- 10 mm wrench (depending on rim type)

1. Remove wheel, see *10.3.2 Replacing the Rear Wheels, page 50*.
2. Remove valve cap.
3. Deflate tyre by pressing in the centre valve pin.



**CAUTION!**

**Risk of explosion**

The wheel explodes if the air pressure has not been released from the wheel before the wheel rim is removed.

- Always let all the air out of the tyre before removing the rim.

4. Loosen and remove screws.
5. Remove both wheel rim halves out of tyre and remove inner tube.
6. Repair inner tube and refit in wheel, or replace it with new inner tube.



If the old inner tube has been repaired and is to be used again, and became wet during repair, it is easier to replace it if it is lightly dusted with talcum powder beforehand.

7. Refit wheel rim parts from outside into tyre.
8. Pump up tyre lightly.
9. Reinsert nuts and bolts which hold the wheel rim together and tighten fully.
10. Make sure that tyre is properly located on wheel rim.
11. Inflate tyre up to recommended tyre pressure.
12. Check to make sure that tyre is still located properly on wheel rim.
13. Screw valve cap back on.
14. Locate wheel on drive shaft again.
15. Apply handbrake and hold it there to centre brake.
16. Tighten wheel locknut with handbrake applied.



**CAUTION!**

**Risk of injury from wheels coming loose**

If wheels are insufficiently secured during mounting, they can come loose when driving.

- When mounting wheels, tighten bolts with 30 Nm.
- Never use normal nuts instead of self-locking nuts.
- Always use new bolts with an undamaged coating.

## 10.4 Drive Unit Assembly

### 10.4.1 Replacing Rear Shock Absorber



**CAUTION!**

**Risk of accident**

When parking scooter on antitippers it is no longer slowed by motor brake. The scooter can roll away out of control.

- Place scooter rear frame on a supporting wooden block before you remove wheels.





**CAUTION!**


**Risk of accident**

Accidental rolling can lead to accidents.

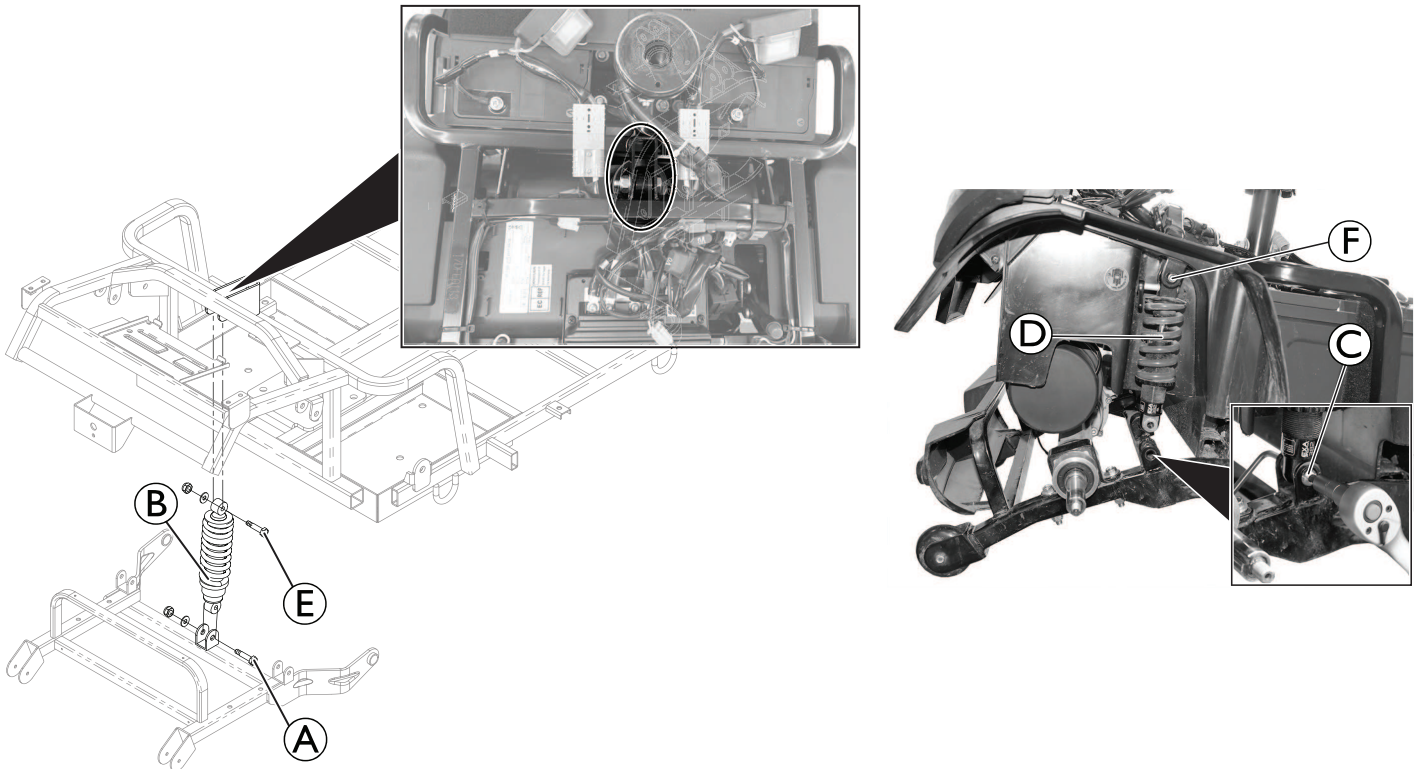
- Secure the scooter against rolling away.

 When disassembling, note position of small parts such as screws and washers. Put small parts down so that they can be reassembled in right sequence.

 Before you can replace the left-hand shock absorber, the drive motor needs to be removed, see *10.4.2 Replacing Drive Unit (Differential with Drive Motor)*, page 54.  
If the right-hand shock absorber is to be replaced, you do not need to remove the drive motor.

-  • 5 mm Allen key (2x)  
• 17 mm wrench (2x)

1. Remove seat, see *6.1 Removing / Installing the Seat*, page 17.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud*, page 20.
3. Remove upper rear bumper cover, see *7.2 Replacing Rear Bumper Cover*, page 21.
4. Remove rear wheels, see *10.3.2 Replacing the Rear Wheels*, page 50.



5. Remove bottom bolt, washer and nut (A) on central shock absorber (B).
6. Remove bottom bolts (C) on left and right shock absorbers (D).
7. Remove top bolt, washer and nut (E) on central shock absorber (B).
8. Remove top bolts (F) on left and right shock absorbers (D).
9. Replace shock absorber.
10. Install parts in reverse order.
11. Test all functions.

## 10.4.2 Replacing Drive Unit (Differential with Drive Motor)



### CAUTION!

#### Risk of accident

When parking scooter on antitippers it is no longer slowed by motor brake. scooter can roll away out of control.  
— Place scooter rear frame on a supporting wooden block before you remove wheels.



### CAUTION!

#### Risk of accident

Accidental rolling can lead to accidents.  
— Secure scooter against rolling away.



When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.



If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.

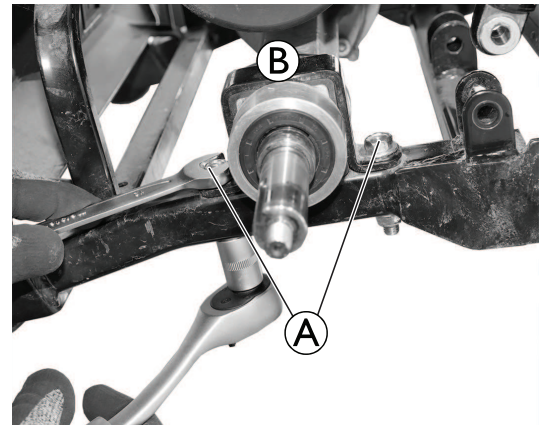


The plugs on the power module cannot be wrongly connected because all plugs have a different size and only fit in one socket.

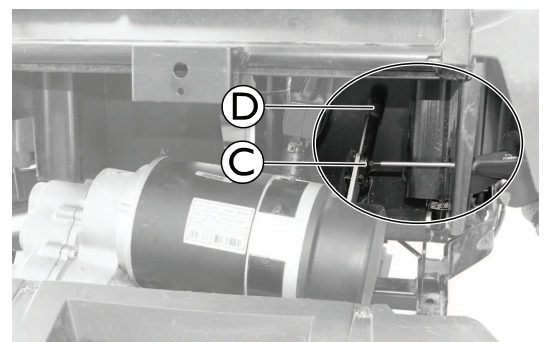


- 10 mm wrench
- 14 mm wrench
- 17 mm socket wrench
- 10 mm socket wrench
- Phillips screwdriver
- Jacking device
- 5 mm Allen key
- Thread locking adhesive (for example Loctite 243)

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
3. Remove upper rear bumper cover, see *7.2 Replacing Rear Bumper Cover, page 21*.
4. Jack up scooter under the frame at battery holder height.
5. Remove rear wheels, see *10.3.2 Replacing the Rear Wheels, page 50*.
6. Disconnect all plugs from power module.
7. Remove screws **A** to remove differential holder **B** on both sides of the chassis.

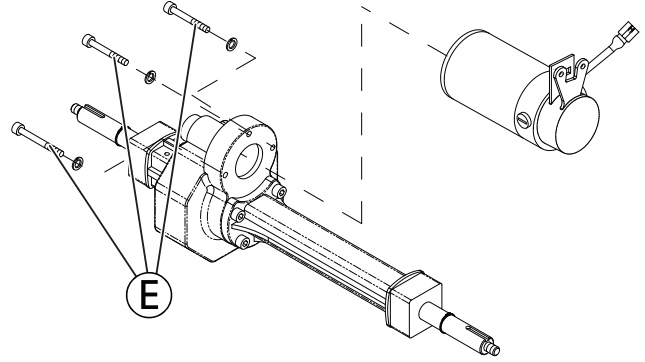
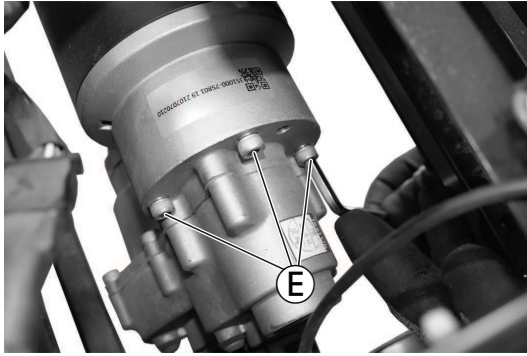


8. Remove screws **C** to remove disengaging lever **D**.



### Replacing Drive Motor Only

1.

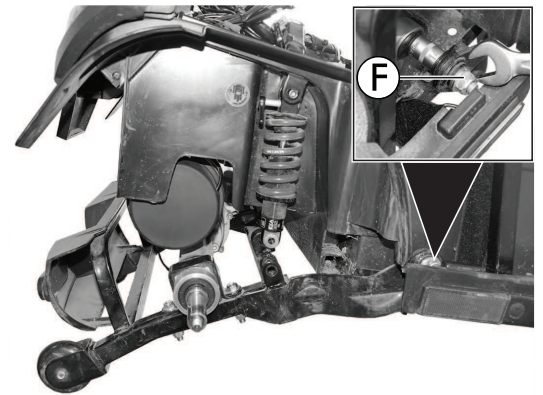


Remove screws and washers ⑤.

2. Disconnect motor from differential and take motor out of the chassis to the side.
3. Replace motor.

### Replacing Drive Unit

1. Loosen screws ⑥ on both sides of the chassis.
2. Remove lower bolts of central, left and right shock absorbers, see 10.4.1 *Replacing Rear Shock Absorber, page 52.*  
The swing arm drops for easier access to the drive unit.
3. Lift drive unit out of holder and take drive unit out of the chassis to the side.
4. Replace drive unit.



### Installation

1. Install parts in reverse order.




**CAUTION!**  
**Reduced function when clutch is mounted incorrectly**  
 — Make sure to mount clutch ③ with inscription “M” facing motor.

2. Apply thread locking adhesive (for example Loctite 243) to screws ⑥ on swing arm and tighten to 25 Nm.
3. Test all functions.



### 10.4.3 Replacing Carbon Brushes

 Always replace all the carbon brushes on both motors.



#### CAUTION!

##### Risk of accident


When parking scooter on antitippers it is no longer slowed by motor brake. scooter can roll away out of control.  
— Place scooter rear frame on a supporting wooden block before you remove wheels.



#### CAUTION!

##### Risk of accident

Accidental rolling can lead to accidents.  
— Secure scooter against rolling away.



 When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.

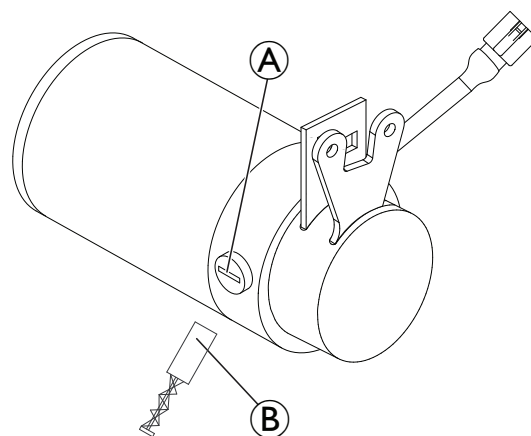
 If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.



- Slotted screwdriver
- Jacking device

#### Removing Carbon Brushes


1. Remove seat, see 6.1 *Removing / Installing the Seat*, page 17.
2. Remove rear shroud and disconnect battery cables, see 7.1 *Replacing Rear Shroud*, page 20.
3. Remove upper rear bumper cover, see 7.2 *Replacing Rear Bumper Cover*, page 21.
4. Jack up scooter under the frame at battery holder height.
5. Remove rear wheels, see 10.3.2 *Replacing the Rear Wheels*, page 50.
6. Disconnect all plugs from power module.
7. Remove drive unit, see 10.4.2 *Replacing Drive Unit (Differential with Drive Motor)*, page 54.
9. Remove plastic caps **A**.
  -  Note the fixing position and location of the carbon brushes.
  -  Used carbon brushes need to be refitted exactly in the same position from which they were taken from in order to guarantee optimum contact to the collector.
10. Make a marking on the drive motor and the carbon brushes in order to guarantee correct order of carbon brushes when refitting.
11. Remove carbon brushes **B** completely from drive motor.
12. Check carbon brushes and springs for level of wear, broken components or discolouration.





## Installing Carbon Brushes

1. Depending on condition of brushes and springs:
  - install existing brushes in exactly the same position from which they were taken from or
  - install new brushes.
2. Install all parts in reverse order.

 The following procedure is necessary to run new carbon brushes in after replacement to guarantee maximum performance.



### **CAUTION!**

#### **Risk of accidents**

Injuries to workers, damage to surroundings and scooter.

- Do not leave scooter unattended during the following procedure.
- Secure area.

3. Jack up scooter.
4. Allow motor to run for an hour in forward direction.
5. Allow motor to cool down for 30 minutes.
6. Allow motor to run for an hour in reverse direction.

### 10.4.4 Replacing Rear Swing Arm



#### CAUTION!

#### Risk of accident

Accidental rolling can lead to accidents.

- Secure scooter against rolling away.



When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.

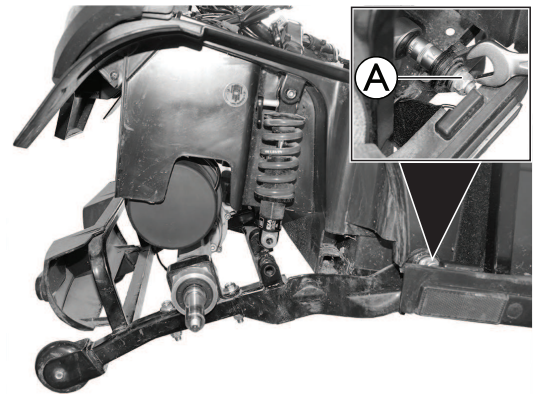


If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.



- 14 mm wrench
- 5 mm Allen key
- Thread locking adhesive (for example Loctite 243)

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
3. Jack up scooter under the frame at battery holder height.
4. Remove rear wheels, see *10.3.2 Replacing the Rear Wheels, page 50*.
5. Disconnect all plugs from power module.
6. Remove drive unit, see *10.4.2 Replacing Drive Unit (Differential with Drive Motor), page 54*.
9. Remove lower bolts of central, left and right shock absorbers, see *10.4.1 Replacing Rear Shock Absorber, page 52*.
10. Remove screws **A** on both sides of the chassis.
11. Replace rear swing arm.
12. Apply thread locking adhesive (for example Loctite 243) to screws **A** on swing arm and tighten to 25 Nm.
13. Install parts in reverse order.
14. Test all functions.



## 10.4.5 Replacing Fender



### CAUTION!

**Risk of injury or damage if the scooter is accidentally set into motion during repairs**

Unintended movement or rolling away of the scooter can lead to accidents or damage of the property.

- Secure scooter against unintended movement and rolling away.

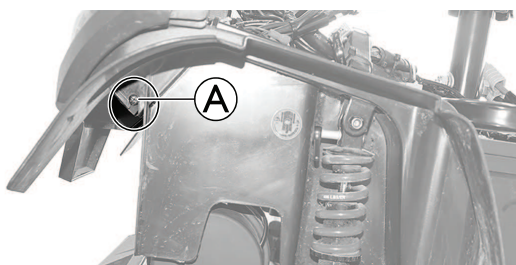


When removing, note position of small parts such as screws and washers. Put small parts down so that they can be installed in right sequence.



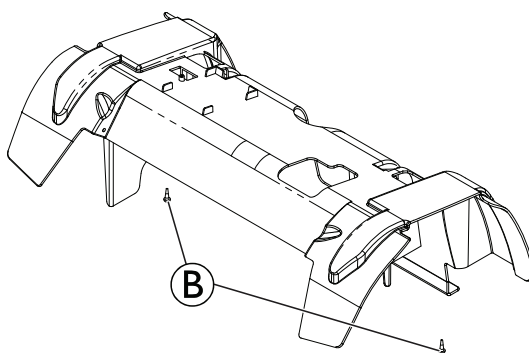
- Phillips screwdriver
- Jacking device

1. Remove seat, see 6.1 *Removing / Installing the Seat*, page 17.
2. Remove rear shroud and disconnect battery cables, see 7.1 *Replacing Rear Shroud*, page 20.
3. Remove upper rear bumper cover, see 7.2 *Replacing Rear Bumper Cover*, page 21.
4. Remove rear wheels, see 10.3.2 *Replacing the Rear Wheels*, page 50.
5. Remove driving unit, see 10.4.2 *Replacing Drive Unit (Differential with Drive Motor)*, page 54.
- 6.



Remove screws **A** on both sides of the fender.

7.



Remove screws **B** from underneath the fender to remove it.

8. Install parts in reverse order.
9. Test all functions.

## 11 Brakes

### 11.1 Replacing Brake Cable



#### CAUTION!

**Risk of injury or damage if the scooter is accidentally set into motion during repairs**

Unintended movement or rolling away of the scooter can lead to accidents or damage of the property.

- Secure scooter against unintended movement and rolling away.



When disassembling, note position of small parts such as screws and washers. Put small parts down so that they can be reassembled in right sequence.



You do not need to remove wheel to replace brake cable.

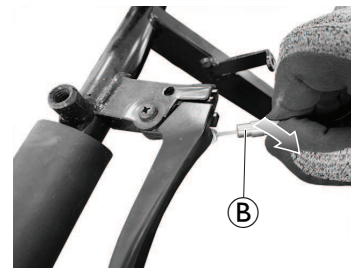
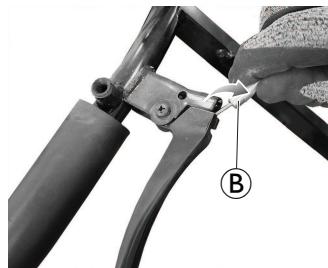
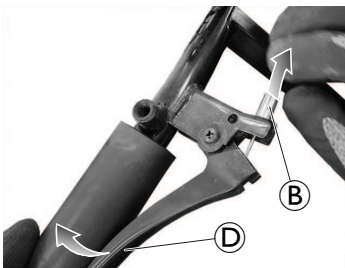
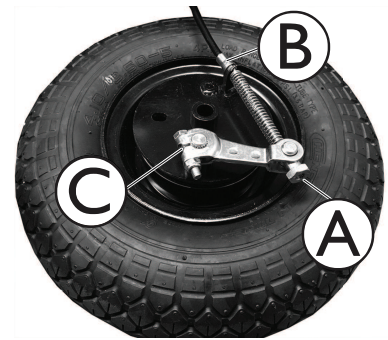


If necessary, remove cable ties for disassembling. Replace with new cable ties during reassembly.



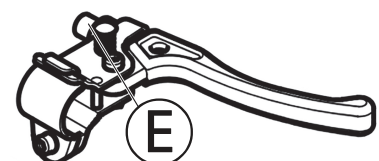
- 10 mm wrench
- Phillips screwdriver
- Jacking device

1. Jack up the front part of the frame so that the front wheel is no longer touching the floor.
2. Slacken brake cable using setting screw **(A)**.
3. Disconnect brake cable **(B)** at wheel .
4. Disconnect brake cable at brake lever on steering column.



- a. Pull brake lever **(D)** and pull brake cable **(B)**.
- b. Release brake lever and pull brake cable out of guide.
- c. Turn brake cable 90° and pull brake cable out completely.

5. Route brake cable through shroud.
6. Loosen brake lever screw **(C)** at wheel.
7. Replace brake cable.
8. Install parts in reverse order.
9. Adjust screws **(A)** on the wheel or brake lever setting screw **(E)** to optimise brake function.
10. Test braking function while pushing.



## 11.2 Replacing Hand Brakes



### CAUTION!

**Risk of injury or damage if the scooter is accidentally set into motion during repairs**

Unintended movement or rolling away of the scooter can lead to accidents or damage of the property.

- Secure scooter against unintended movement and rolling away.



When disassembling, note the position of small parts such as screws and washers. Put small parts down so that they can be reassembled in the right sequence.



- 10 mm wrench
- 17 mm wrench
- 19 mm wrench
- Jacking device

1. Remove seat, see *6.1 Removing / Installing the Seat, page 17*.
2. Remove rear shroud and disconnect battery cables, see *7.1 Replacing Rear Shroud, page 20*.
3. Jack up the front part of the frame so that the front wheel is no longer touching the floor.
4. Slacken both brake cables.
5. Disconnect brake cable at affected wheel.
6. Remove wheel bolt.
7. Pull wheel and brake off shaft.
8. Pull brake out of brake drum.
9. Replace brake lining or complete brake.
10. Refit wheel and brake.
11. Push wheel and brake onto shaft.
12. Apply brake so that brake shoes can align.
13. Install parts in reverse order.
14. Adjust braking force on wheel using brake lever setting screw.
15. Test braking function while pushing.



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