

# Invacare® Stream



en Power Wheelchair  
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.

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.

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 might not be described in this document. Refer to the manual delivered with the accessory. 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 mobility device 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 mobility device 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 manual and apply to hazards or unsafe practices which could result in personal injury or property damage. 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.



**IMPORTANT**

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



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



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!**

The procedures in this service manual, must be performed by a specialized dealer or qualified service technician.

- 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 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 4*).

#### Personal Safety Equipment

##### Safety shoes

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

- Wear standardized 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. Mobility device 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 mobility device.

- DO NOT smoke while using this mobility device.



**WARNING!**

**Risk of Serious Injury or Damage**

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

- Avoid storing or using the mobility device 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 mobility device starts moving unintentionally during repair work**

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

**CAUTION!****Fire and burn hazard due to electrical short-circuit**

- The mobility device 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 mobility device 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 mobility device, check all connections for tight fitting.
- After completing your work / before renewed start-up of the mobility device, check all parts for correct locking.
- Only operate the mobility device with the approved tyre pressures (see technical data).
- 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!****Risk of injury and damage to property, if the maximum speed reduction on a wheelchair with a lifter does not function correctly**

The wheelchair's control unit must reduce the maximum possible speed as soon as the lifter is raised.

- Test the maximum speed reduction for correct function after any maintenance work or modifications to the wheelchair.

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

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



Mark all current settings for the mobility device (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 mobility devices:

- 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

\*Invacare uses detergent "Nücosept special" 1.5% in water ml/ml

#### 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 General information on setup

The tasks described in this chapter are intended to be performed by trained and authorized service technicians for initial setup. They are not intended to be performed by the user.

### 4.2 Adjusting the seat angle / seat height

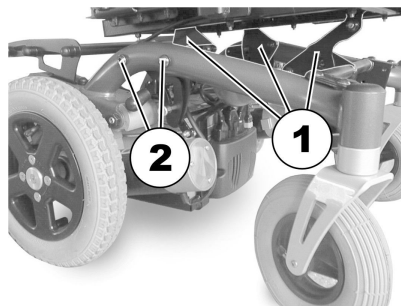
#### 4.2.1 Manual adjustment using perforated plates

There are three perforated plates underneath the seat for adjusting the seat angle and the seat height. These perforated plates in connection with the adjustable rear holding plates result in a multitude of different setting possibilities.

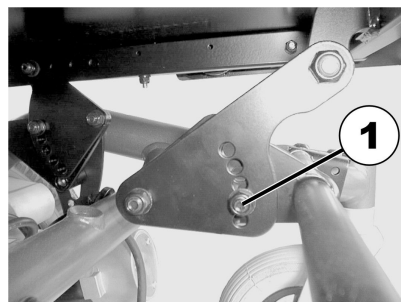
The adjustment range of the seat height is 42.5 cm to 50 cm. The adjustment range of the seat angle is 22°. Note: The higher the seat setting, the smaller the adjustment range of the seat angle!



- 5 mm Allen key
- 6 mm Allen key
- 13 mm wrench
- Torque wrench
- Thread locking adhesive such as Loctite medium-hard



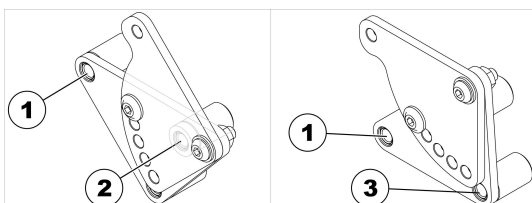
The picture above shows the position of the perforated plates (1) and the holding plate fixing screws (2) for adjusting the seat height and seat angle.



The picture above shows the front perforated plates. The procedure is similar for the rear perforated plates. A 13 mm wrench is required in addition to a 5 mm Allen key for adjusting the front perforated plates.

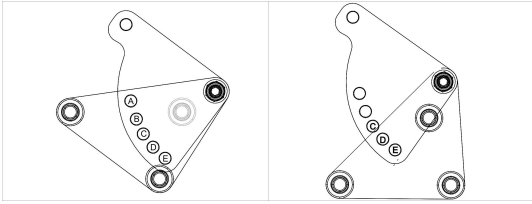
1. Loosen screw (1) and remove to adjust seat height/angle.
2. Adjust perforated plate to desired height/angle.
3. Apply thread locking adhesive to screw, re-insert screw and tighten to 40 Nm.

Seat height and angle can also be adjusted using the rear holding plate.



- Low setting = hole combination 1 and 2.
  - High setting = hole combination 1 and 3.
1. Loosen rear screw on one side (in bushing 1) so that holding plate can be swivelled up or down.
  2. Loosen front screw and remove. Depending on the position, the screw is either in bushing 2 or 3.

3. Repeat procedure on other side.
4. Apply thread locking adhesive to screw, re-insert screw and tighten to 25 Nm (+/- 3 Nm).



The swivelling rear perforated plates have five positions. These are labelled in the illustration above with the letters A to E. All five positions can be used if the holding plates are in the lower position (see above). Only positions B, C, D and E are possible in the higher position! When using position A, the holding plate collides with the seat frame.



The following seat heights are available:

<b>Holding plate in lower position:</b>	
Position of perforated plate:	Seat height:
A	44 cm
B	45.5 cm
C	45.5 cm
D	46.5 cm
E	47 cm


<b>Holding plate in higher position:</b>	
Position of perforated plate:	Seat height:
B	50.5 cm (at 6° seat angle)
C	48.5 cm
D	49.5 cm
E	51.5 cm

## 5 Testing

### 5.1 Testing Motor

-  • Phillips screwdriver, size 2
-  • Digital multimeter with resistance measurement

1. Remove shroud that covers power module. See *Shrouds*.
2. Unplug cable of motor **A** from power module.
3. Connect multimeter **B** to motor plug contacts **C** and **D** and measure resistance between contacts.

 A resistance of between 0.5 ohms and 5 ohms indicates a motor ready for operation. A resistance of between 15 ohms and infinity indicates a defective motor. High resistances are normally caused by bad connections or worn carbon brushes.

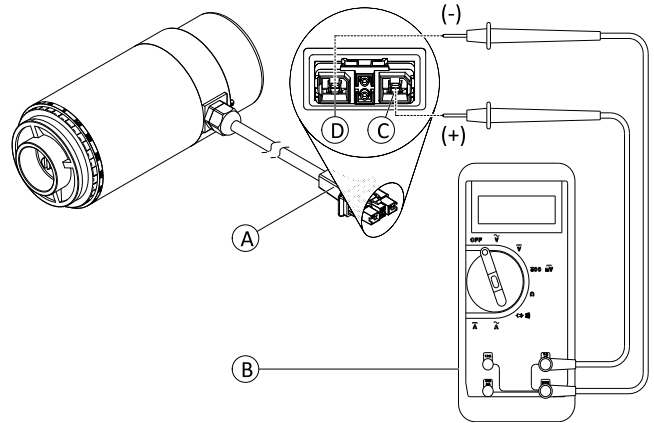



Fig. 5-1 DuraWatt motor serves as an example.

### 5.2 Testing Motor Brake

 This test should only be carried out on mobility device with conventional motor-gearbox units.





#### CAUTION!

**Risk of damage to power module due to shorts in motor brake**


- NEVER connect a shorted motor brake to an intact power module.
- Always replace shorted brakes immediately.



A defective motor can damage the power module, but a defective power module cannot damage the motor.

-  • Phillips screwdriver, size 2
-  • Digital multimeter with resistance measurement

1. Remove shroud that covers power module. See *Shrouds*.
2. Unplug cable of motor **A** from power module.
3. Connect multimeter **B** to motor plug contacts **E** and **F** and measure resistance between contacts.

 A resistance of between 40 ohms and 80 ohms indicates an intact brake. A resistance of 0 ohms or a very high resistance (mega-ohms or infinity) indicates a short-circuit, a bad connection or a defective brake.

4. If there is a defect, replace motor and send it to Invacare Service for inspection or repair.

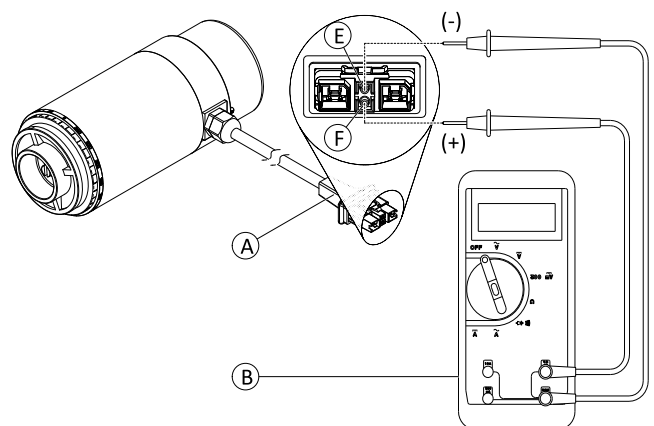



Fig. 5-2 DuraWatt motor serves as an example.


### 5.3 Rain test

- Check to ensure that the black battery terminal caps are secured in place, gaiter is not torn or cracked where water can enter and that all electrical connections are secure at all times.
- Do not use the mobility device if the gaiter is torn or cracked. If the gaiter becomes torn or cracked, replace immediately.

## 5.4 Field Load Test

Old batteries lose their ability to store and release power due to increased internal resistance. In this procedure, batteries are tested under load using a digital voltmeter to check battery charge level at the charger connector. The charger connector is located on the remote. When voltage at the output drops 1.0 volts under load (2.0 volts for a pair), replace the batteries.

 Read these instructions carefully and the manufacturer’s instructions on the digital voltmeter before proceeding.


-  • Voltmeter




**WARNING!**

– When performing the following steps, ensure your feet are clear from casters and wall, otherwise injury may result.


1. Switch electronics OFF on remote.
2. Make sure battery is fully charged. An extremely discharged battery will exhibit the same symptoms as a bad battery.
3. Remove footboard/legrests from mobility device.
4. Connect voltmeter leads to charger connector **A** on mobility device. Most digital voltmeters **B** are not affected by polarity. However, analog meters (meters with swinging needles) can be and should be used carefully.

 A good meter reading should be 25.5 VDC to 26.0 VDC with the chair in neutral.

5. Switch electronics ON on remote.
6. Ensure that your feet are clear from casters and wall.
7. Run mobility device in neutral for at least 2 minutes.
8. Sit in mobility device and place your feet against a door jam, workbench or other stationary object.
9. Carefully give forward command, trying to drive the mobility device through the stationary object. The load should draw between 30 amps to 40 amps from the batteries for 0.3 seconds.

 Performing this step puts a heavy load on the batteries as they try to push through the stationary object. If the wheels spin, have two individuals (one on each arm) apply as much downward pressure as possible on the arms of the mobility device.

10. Read meter while motors are straining to determine voltage under load.

 If the voltage drops more than 2.0 volts from a pair of fully charged batteries during the 0.3 seconds, they should be replaced regardless of the unloaded voltages.

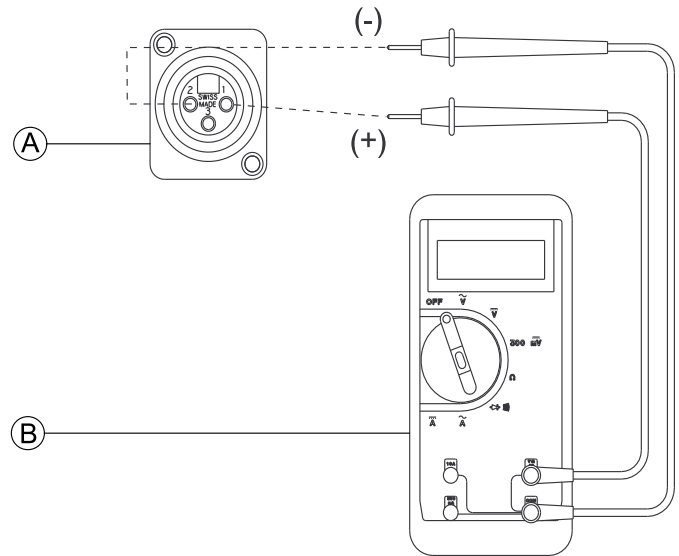


Fig. 5-3

## 5.5 Checking Battery Charge Level

The following “Dos” and “Don’ts” are provided for your convenience and safety.

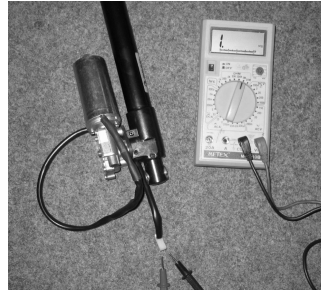
DON'T	DO
Don't perform any installation or maintenance without first reading this manual.	Read and understand this manual and any service information that accompanies a battery and charger before operating the personal transporter.
Don't perform installation or maintenance of batteries in an area that could be damaged by battery spills.	Move the personal transporter to a work area before cleaning terminals, or opening battery box.
Don't make it a habit to discharge batteries to the lowest level.	Recharge as frequently as possible to maintain a high charge level and extend battery life.

DON'T	DO
Don't use chargers or batteries that are not appropriate for the chair.	Follow recommendations in this manual when selecting a battery or charger.
Don't put new batteries into service before charging.	Fully charge a new battery before using.
Don't tip or tilt batteries.	Use a carrying strap to remove, move or install a battery.
Don't tap on clamps and terminals with tools.	Push battery clamps on the terminals. Spread clamps wider if necessary.

## 5.6 Checking Actuator



- Digital multimeter with resistance measurement



1. Turn OFF controls on remote.
2. If necessary, remove shroud.
3. Take note of the positions of all cables and sockets that they are connected to. Mark connectors and sockets or take a photograph with a digital camera.
4. Unplug actuator.
5. Connect multimeter to the contacts and measure the resistance between the contacts. The plug can have a different shape than shown in illustration.



A resistance below 1 ohms indicates a short-circuit. Very high resistances indicates (mega-ohms or infinity) indicates a defective actuator. Actuator must be replaced in both cases.

## 6 Service

### 6.1 General Warning Information on Installation Work



**CAUTION!**

**Risk of damage to vehicle**

Collisions can be caused if the adjusting washers are removed during fitting work to the drive wheels. Adjusting washers are often fitted between the drive shaft and the wheel hub to even out tolerances. If these adjusting washers are removed and not replaced again, collisions can be caused.

– Always replace the adjusting washers exactly as they were before you started dismantling.



**CAUTION!**

**Risk of injury and damage to property, if the maximum speed reduction on a mobility device with a lifter does not function correctly**

The mobility device's control unit must reduce the maximum possible speed as soon as the lifter is raised.

– Test the maximum speed reduction for correct function after any maintenance work or modifications to the mobility device.

### 6.2 Tightening Torques



**CAUTION!**

**Risk of damage to mobility device 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

### 6.3 Troubleshooting

#### 6.3.1 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 the remote status display. Evaluate the flash error code.
3. Carry out the necessary checks and repairs as recommended in the following table.

The various power modules can be fitted in connection with different remotes in the mobility device. Rectification of operational faults depends on the power module fitted. The power modules used are described in the corresponding controls manual.



The tables for rectification of operational faults listed in the following chapters are only an excerpt from the original manufacturer's manuals. You can obtain the original manuals from Invacare.

### 6.3.2 Drive Fault Diagnosis

Problem	Other symptoms	Possible cause	Solution	Documentation
<b>Mobility device will not start</b>	The remote status display illuminates normally and shows an error code.	Drive motors disengaged	Engage drive motors	See corresponding remote manual
	Remote status display does not illuminate	Batteries defective	Replace batteries	See 6.9 Batteries, page 31
		Completely discharge battery	Pre-charge batteries	See user manual
		Power supply to remote interrupted	Check main fuse	See <i>Main Fuse</i>
		Remote defective	Check cables between the modules for loose connections and damage	See <i>Checking Cables</i>
Remote status display blinking	Various causes	Assess error code	See corresponding remote manual	
<b>Mobility device judders in drive mode</b>	None	Batteries defective (unstable voltage)	Replace batteries	See 6.9 Batteries, page 31
		Drive motor(s) defective	Replace motor(s)	See 6.6 Drive Components, page 17
			Replace carbon brushes	
<b>Batteries not being charged</b>	None	Batteries defective	Replace batteries	See 6.9 Batteries, page 31
	LEDs blinking on charging unit	Charging unit defective	Replace charging unit	See user manual
<b>Mobility device runs too slowly</b>	None	Remote defective	Replace remote	See corresponding electronics manual
		Batteries defective	Replace batteries	See 6.9 Batteries, page 31

### 6.4 Service Plan (Once a Year)

Component	Check	Remedy	Notes	✓
Posture belt	Damage to posture belt	Replace belt if damaged	See 6.11 Replacing posture belt, page 33.	
	Belt lock function	Replace belt if damaged	See 6.11 Replacing posture belt, page 33.	
Armrests	Damage to armrests	Replace cover if damaged		
	Armrest fixings	Tighten screws		
Clothing guard	Damage to clothing guard	Replace clothing guard, if damaged		
	Clothing guard fixings	Tighten screws		
Seating	Cushion	Replace covers/ upholstery if damaged		
Tilt	Damage to tilt	Replace parts if damaged		

Component	Check	Remedy	Notes	✓
Backrest/ manual recline/ powered recline (if fitted)	Damage to backrest Seams Fixing Check cable Check function	Replace parts if damaged Tighten screws Replace cable or motor if necessary		
Frames (chassis) / battery mounting	Check fixings, welded seams and battery mounting	Tighten screws Replace components if necessary		
Wheel suspension and wheels	Check drive wheels for tight fit and side play	Adjust, replace wheel hubs	See 6.7 <i>Wheels</i> , page 21.	
	Check castors for tight fit, float and side play	Replace wheels, castor forks or wheel bearings	See 6.7 <i>Wheels</i> , page 21 and 6.6.2 <i>Replacing Steering Head Bearings on Castors</i> , page 20.	
	Tyres	Repair or replace if damaged	See 6.7 <i>Wheels</i> , page 21.	
	Check straight running	Replace wheels, castor forks or wheel bearings	See 6.7 <i>Wheels</i> , page 21.	
Drive units, clutch mechanism	Motors	Test motors	See 5.1 <i>Testing Motor</i> , page 11.	
	Check functions in drive and push modes Check clutch mechanism	Replace motor if necessary Tighten screws/ nuts, adjust or replace if necessary	See 6.6 <i>Drive Components</i> , page 17.	
Brakes	Check motor brake	Test motor brake	See 5.2 <i>Testing Motor Brake</i> , page 11.	
Legrests	Check welded seams, interlocking, screws, foot plates	Tighten, replace if necessary		
Lighting (if fitted)	Check cable Check function	Replace lamp or cable if necessary	See 6.10 <i>Lighting Unit</i> , page 32.	
Battery mounting	Check battery support and mounting belts for damage	Replace if necessary		
Batteries	Check batteries for damage	Replace batteries if necessary	See 6.9 <i>Batteries</i> , page 31.	
	Check battery voltage	Charge batteries	See user manual.	
	Check contacts and terminals	Clean contacts and terminals	See 6.9 <i>Batteries</i> , page 31.	
Remote / power module	Remote, status LED flashing	Evaluate error/ flash code	See remote user manual.	
	Fixings	Tighten fixings, replace if necessary		
	Cables and connecting plugs	Replace damaged cables and tighten connecting plugs, if necessary		
	Joystick function	Replace joystick knob if necessary Replace remote if necessary		
	Power supply	Replace damaged cables and tighten connecting plugs, if necessary		



Component	Check	Remedy	Notes	✓
Drive program	Drive program version	Update software if newer version available	See LiNX service manual.	
Screws (every six months)	Check screws for tight fit	Tighten screws if necessary		

## 6.5 Overview Components

### 6.5.1 Overview mobility device

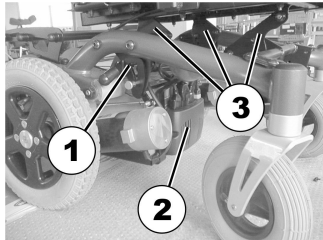


Fig. 6-1

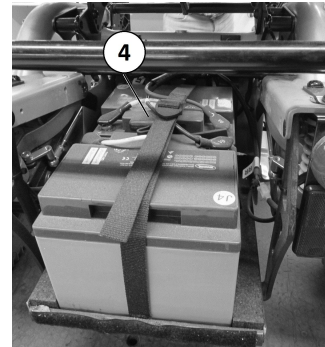


Fig. 6-2

- (1) Decoupling mechanism
- (2) Power module
- (3) Perforated plates for adjusting the seat height and seat angle
- (4) Main fuse

## 6.6 Drive Components

### 6.6.1 Replacing motor



#### CAUTION!

**Risk of crushing to hands and feet by weight of mobility device**

- Pay attention to the hand and feet.
- Use proper lifting techniques.



#### CAUTION!

**Risk of injury caused by uncontrolled movement of mobility device**

- Switch power supply off (ON/OFF key).
- Engage drive.
- Before raising mobility device, secure wheels by blocking them with wedges.
- Prevent mobility device from tipping by propping it up on a wooden block under battery case which is long and wide enough.
- If wooden block is too short or too high, mobility device can still tip.




#### CAUTION!

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

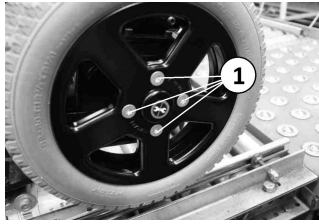
- Make sure that battery terminals are never shorted with tools or mechanical mobility device parts.
- Make sure that battery terminal caps have been replaced if you are not working on battery terminals.



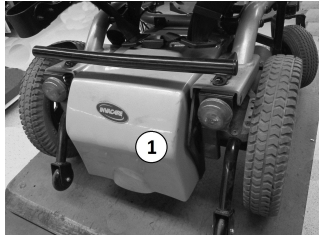
- Small, flat screwdriver
- Torx wrench with
  - TX40 Bit
- 8 mm Allen key
- 11 mm wrench
- 19 mm wrench
- Aglet, diameter 2.5 mm (for knocking the splint out of the decoupling leverage)
- Small hammer
- Side cutters
- Tie-wraps
- Wooden block (approx. 12 x 12 x 30 cm) for propping up mobility device

 Take care of small parts and observe sequence in which component parts are installed. Set them out in orderly fashion so that they can be installed again easily in correct sequence.

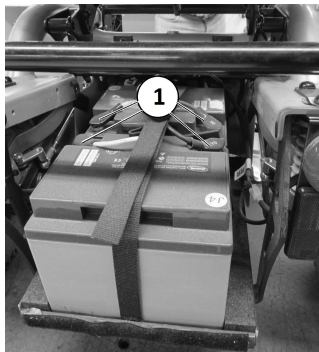
1. Prop up mobility device using wooden block.
- 2.



3. Loosen screws (1).
4. Pull wheel from wheel hub.

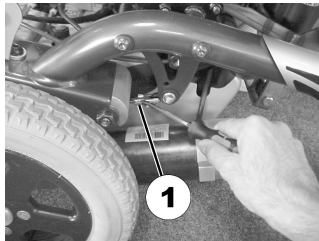


5. Remove battery shroud (1).



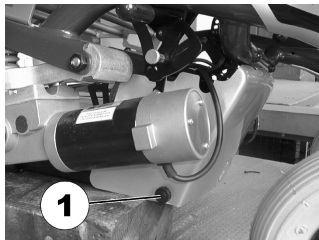
Pull off terminal caps (1) and push back to gain access to battery terminals.

6. Loosen clamps.
7. Remove batteries.
- 8.



To remove motor, front decoupling rod connection (1) must be disconnected. Release retaining ring (1) using small, flat screwdriver and pull out.

- 9.



10. Loosen and remove handscrews (1) on both sides of controls shroud.

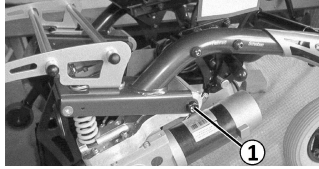
11.



Pull motor plug out of controls.

12. Motor cable is secured to frame with tie-wrap. Use side cutters to cut tie-wrap.

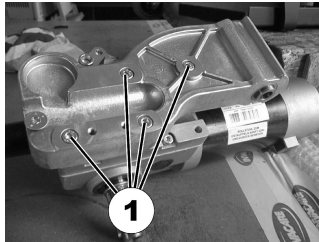
13.



Loosen and remove motor suspension.

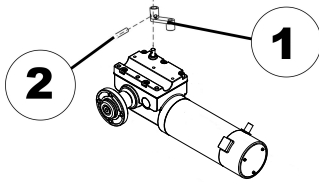
14. Remove motor from suspension in a downward direction.

15.



Loosen and remove four screws (1) on motor suspension.

16.



Use aglet and hammer to carefully knock splint (2) out of decoupling leverage (1)

17. Remove decoupling leverage (1) together with decoupling rod (cannot be seen in picture) from old motor.



**CAUTION!**

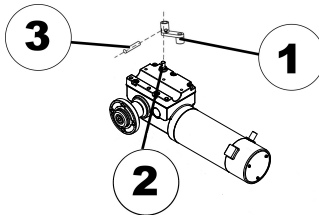
**Risk of damage to motor**

- Only apply moderate pressure to decoupling lever when fitting to metal rod on new motor.
- Do not use a hammer.



Easiest way to install decoupling lever is before motor and other parts are assembled.

18.



Carefully press decoupling leverage (1) onto rod (2) on new motor.

19. Press splint (3) in.

20. Install parts in reverse order.



**CAUTION!**

**Risk of injury if wheels come off**

- If drive wheels are insufficiently attached during assembly, they can come off during driving.
- Tighten TX40 countersunk screws to 30 Nm when mounting drive wheels.
  - Always use new screws with undamaged coating.

21. Secure motor cable with new tie-wrap.

## 6.6.2 Replacing Steering Head Bearings on Castors



### CAUTION!

#### Risk of Crushing to Hands and Feet by Weight of Mobility Device

- Pay attention to hand and feet.
- Use proper lifting techniques.



### CAUTION!

#### Risk of Uncontrolled Movement of Mobility Device

- Turn off power supply (ON/OFF key).
- Engage drive.
- Before raising mobility device, secure wheels by blocking them with wedges.
- Prevent the mobility device tipping by propping it up on a wooden block which is long and wide enough under the battery case. If the wooden block is too short or too high, the mobility device can still tip.



- 19 mm socket wrench
- Torque wrench
- Large screwdriver, flat
- Oblong wooden block (at least 14 cm x 14 cm x 30 cm)
- Parallel pin punches (6/8)
- Hammer (300 g - 500 g)

### Removing:

1.

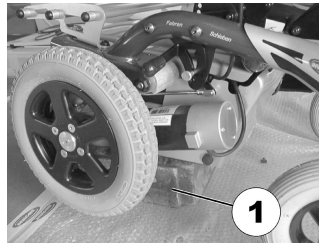


Fig. 6-3

Use wooden block (1) to prop up mobility device on side on which ball bearings are to be replaced.

2.



Fig. 6-4

Carefully remove the plastic cap (1) using the large screwdriver.

3. Use socket wrench to loosen and remove nut. Hold the wheel in such a way that it is not able to rotate when nut is removed.

4.

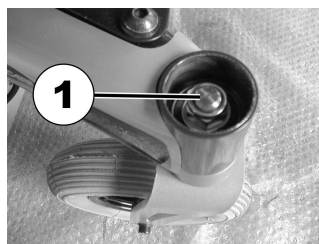


Fig. 6-5

Pull steering head shaft downward and out of steering head tube.

5. Remove shim and ball race from head of tube. The other ball race should be on shaft.

**Installing:****CAUTION!****Incorrect reassembly can damage bearings and cause castors to come off**

Single-row angular ball bearing rings are not identical on both sides. There is only one correct way to insert them.

- Bearings must always be installed so that narrow borders of the ball bearings are facing each other (inside).
- Steering head bolts and nuts must always be pressing against wide (outside) border of ball bearings. Otherwise, bearings will be pressed apart and damaged by bolts.

The illustrations show the wide border of the ball bearing on the outside of the ball race **Ⓐ** and the narrow ball bearing edge on the inside **Ⓑ**.



Fig. 6-6

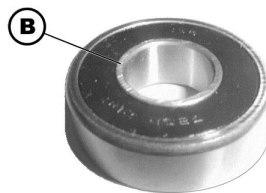


Fig. 6-7

1. Install parts in reverse order.
2. Tighten nut primarily to 20 Nm  $\pm$  2 Nm.
3. Loosen nut slightly.
4. Re-tighten to 15 Nm  $\pm$  1.5 Nm.
5. Check all moveable parts for ease of movement. After installation, castor should rotate freely but bearings should have no play.
6. Test all functions.

## 6.7 Wheels

### 6.7.1 Tyre Pressure

**CAUTION!****Risk of damage to rim and tyre when tyre pressure is exceeded**

- Observe recommended tyre pressure.

For recommended tyre pressure see inscription on tyre, rim, or contact Invacare. Compare table below for conversion.

psi	bar
22	1.5
23	1.6
25	1.7
26	1.8
28	1.9
29	2.0
30	2.1
32	2.2
33	2.3
35	2.4
36	2.5

psi	bar
38	2.6
39	2.7
41	2.8
42	2.9
44	3.0


### 6.7.2 Tyre Types


There are three different types of tyres or inner tubes, and specific points must be observed for the replacement of each type. The individual types of tyres can be easily distinguished:

- Pneumatic tyres have black valve caps.
- Puncture-protected tyres have red valve caps.
- Puncture-proof tyres have no valves.










There are five chapters about tyre repair and wheel replacement:





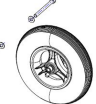





- *Replacing Drive Wheel (5-Screw Installation)*
- *6.7.5 Replacing Drive Wheel (1-Bolt Installation), page 24*
- *6.7.6 Replacing Castor Wheel on Double-Sided Fork, page 26*
- *Replacing Castor Wheels on Single-Sided Fork*
- *6.7.7 Replacing Tyres, page 28* deals with tube repair and replacing solid tyres.

 Not all chapters are necessarily contained in this manual.

 Specific tightening torques for wheels and rim halves are listed in *6.7.3 Specific Tightening Torques, page 22*.




### 6.7.3 Specific Tightening Torques


























	Drive Wheels								
	10" x 3"		12 1/2" x 2 1/4"			14"			
									
<b>Wheel Fixation</b>	70 Nm	70 Nm	33 Nm	35 Nm	70 Nm	33 Nm	60 Nm	25 Nm	18 Nm
<b>Rim Halves</b>	25 Nm	25 Nm	10 Nm	25 Nm	25 Nm	10 Nm	25 Nm	25 Nm	18 Nm

	Castor Wheels									
	6"		8"			9"			10"	
										
<b>Wheel Fixation</b>	18 Nm	18 Nm	25 Nm	16 Nm	16 Nm	25 Nm	25 Nm	25 Nm	18 Nm	100 Nm
<b>Rim Halves</b>	10 Nm	25 Nm	5 Nm	—	—	—	25 Nm	5 Nm	25 Nm	25 Nm

### 6.7.4 Overview of Power Wheelchair Models and Wheel Types

- Not all wheel types are available for all power wheelchairs, see footnotes.
- The symbols indicate three tyre types:

		
pneumatic = black valve cap	puncture-protected = red valve cap	puncture-proof = no valve

Models	Drive wheels								
	10" x 3"	12 1/2" x 2 1/4"			14"				
									
	4-Spoke Rim (1-Bolt Installation)	3-Spoke Rim (1-Bolt Installation)	5-Spoke Rim (1-Bolt Installation)	5-Spoke Plastic Rim (1-Bolt Installation)	3-Spoke Rim (1-Bolt Installation)	5-Spoke Rim (1-Bolt Installation)*	5-Spoke Rim (5-Screw Installation)	5-Spoke Rim for True Track*	Solid Rim (5-screw installation)
TDX SP2									
Storm <sup>4</sup> Series									
Kite									
Bora									
Fox									
Stream									
Mirage									
Dragon									
Pronto M41									
AVIVA RX									

\* For wheelchair-specific mounting instruction, see respective manual.

Models	Castor Wheels									
	6"		8"				9"		10"	
	Single-Sided/ Double-Sided Fork	Double-Sided Fork				Single-Sided/ Double-Sided Fork	Double-Sided Fork	Single-Sided/ Double-Sided Fork	Double-Sided Fork	Single-Sided Fork
TDX SP2	■									
Storm <sup>4</sup> Series									□ ■ ■	□ ■ ■
Kite							* * □ ■		□ ■ ■	□ ■ ■
Bora		■		□ ■	■		□ ■			
Fox		■	■							
Stream							■			
Mirage		■	□ ■		■					
Dragon							■			
Pronto M41	■									
AVIV-A RX						■		□ ■ ■		

\* For wheelchair-specific mounting instruction, see respective manual.

### 6.7.5 Replacing Drive Wheel (1-Bolt Installation)

This chapter deals with drive wheels that are installed with one central bolt.



**CAUTION!**  
**Risk of Crushing to Hands and Feet by Weight of Mobility Device**

- Pay attention to hand and feet.
- Use proper lifting techniques.



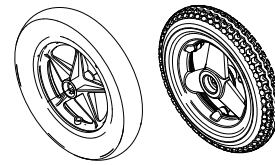
**CAUTION!**  
**Risk of Uncontrolled Movement of Mobility Device**

- Turn off power supply (ON/OFF key).
- Engage drive.
- Before raising mobility device, secure wheels by blocking them with wedges.
- Prevent the mobility device tipping by propping it up on a wooden block which is long and wide enough under the battery case. If the wooden block is too short or too high, the mobility device can still tip.





- 19 mm wrench
- Flat screwdriver
- Tightening kit
- Oblong wooden blocks (at least 14 x 14 x 30 cm)



### Removing Wheel

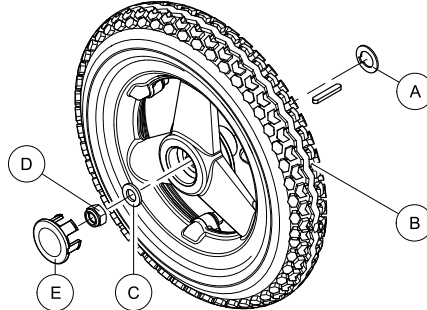


Fig. 6-8

1. Remove plastic cap **E**.
2. Loosen and remove nut **D** and washer **C**.
3. Remove wheel **B** from axle.
4. Remove remaining washer **A**.

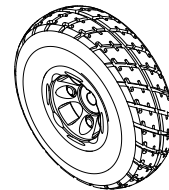
### Installing Wheel

1. Install parts in reverse order.
2. When installing wheel, pay attention to correct direction of rotation.
3. Tighten nut to prescribed torque. See 6.7.3 *Specific Tightening Torques*, page 22.

### Replacing Wheel (10" x 3")



- 19 mm wrench
- Oblong wooden blocks (at least 14 x 14 x 30 cm)



### Removing Wheel

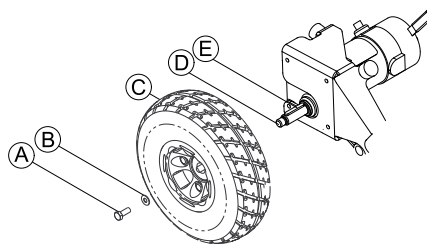


Fig. 6-9

1. Loosen and remove nut **A** and washer **B**.
2. Remove wheel **C** from drive shaft **D**. If necessary, use wheel puller to remove wheel from drive shaft.

### Installing Wheel

1. Apply anti-seize compound to drive shaft **D** and keystone **E**.



**Do not apply more than one-inch (25.4 mm) (in length) thin film of anti-seize compound to the drive shaft. Applying more than one-inch (25.4 mm) (in length) can cause the anti-seize compound to leak resulting in damage to flooring (carpet, tile, etc.).**






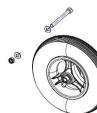

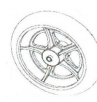

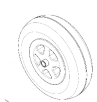


2. When installing wheel, pay attention to correct direction of rotation.
3. Align keystone in drive shaft with cutout in wheel hub and position wheel on drive shaft.



Ensure keystone in cutout on drive shaft. Keystone must line up with wheel hub cutout.

4. Tighten nut to prescribed torque. See 6.7.3 *Specific Tightening Torques*, page 22.

## 6.7.6 Replacing Castor Wheel on Double-Sided Fork

	<ul style="list-style-type: none"> <li>• 5 mm Allen key</li> <li>• 13 mm wrench</li> <li>• Oblong wooden block (at least 14 x 14 x 30 cm)</li> </ul>	
	<ul style="list-style-type: none"> <li>• 13 mm wrench (2x)</li> <li>• Oblong wooden block (at least 14 x 14 x 30 cm)</li> </ul>	
	<ul style="list-style-type: none"> <li>• 6 mm Allen key</li> <li>• 13 mm wrench</li> <li>• Oblong wooden block (at least 14 x 14 x 30 cm)</li> </ul>	
	<ul style="list-style-type: none"> <li>• 6 mm Allen key</li> <li>• 13 mm wrench</li> <li>• Oblong wooden block (at least 14 x 14 x 30 cm)</li> </ul>	
	<ul style="list-style-type: none"> <li>• 5 mm Allen key</li> <li>• Oblong wooden block (at least 14 x 14 x 30 cm)</li> </ul>	
	<ul style="list-style-type: none"> <li>• 5 mm Allen key</li> <li>• 13 mm wrench</li> <li>• Oblong wooden block (at least 14 x 14 x 30 cm)</li> </ul>	

### Removing Wheel

1. Place wooden block underneath mobility device and prop up mobility device.
2. Remove end-caps from bolt and nut (if applicable).
- 3.

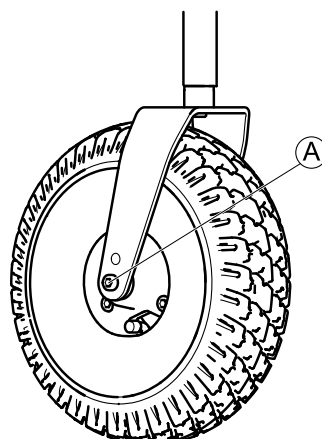


Fig. 6-10

4. Remove nut from bolt (A).
4. Remove bolt and wheel from fork.

### Installing Wheel

1. Install parts in reverse order.
2. When installing wheel, pay attention to correct direction of rotation.
3. Tighten nut to prescribed torque. See 6.7.3 *Specific Tightening Torques*, page 22.

## Replacing Castor Wheel (Aviva RX and Storm<sup>4</sup> Max)



- 5 mm Allen key (up to August 2016)
- TX40 Torx key (starting August 2016)
- Oblong wooden block (at least 14 x 14 x 30 cm)

### Removing Wheel

1. Loosen and remove bolts (A).
- 2.

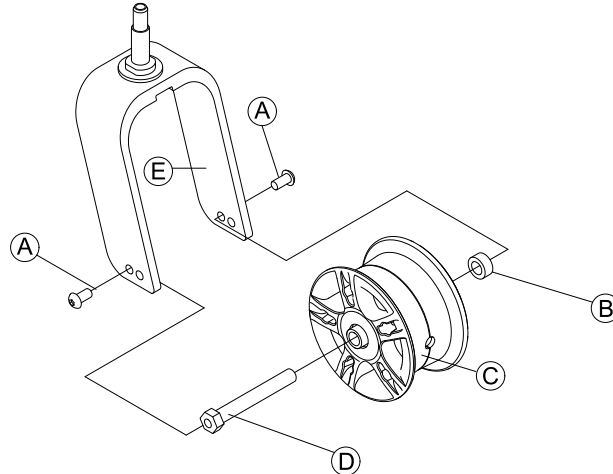


Fig. 6-11

Pull wheel (C) including axle (D) and bushing (B) out of fork (E).

### Installing Wheel



#### CAUTION!

#### Risk of injury from wheels coming loose

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

- When mounting wheels tighten bolts with prescribed torque.
- Secure all bolts using a suitable blocker.
- Never use normal nuts instead of self-locking nuts.
- Always use new nuts and bolts with an undamaged coating.

1. Install parts in reverse order. Pay attention to correct direction of rotation when installing wheels.
2. Test all functions.

## Replacing Castor Wheel (6 inch wheel)



- 2 x 7/16 inch wrench
- Oblong wooden block (at least 14 x 14 x 30 cm)



### Removing Wheel

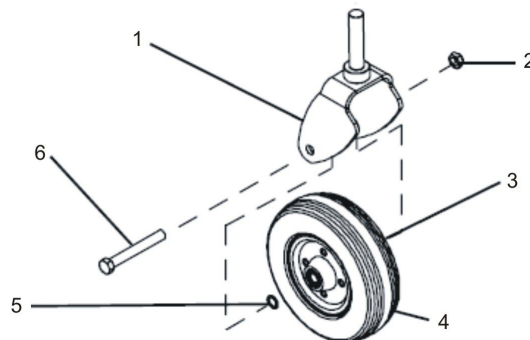


Fig. 6-12

1. Loosen nut (2).
2. Remove screw (6).
3. Remove two washers (3) and (5).
4. Remove wheel (4).
5. Replace any defective parts.

## Installing Wheel

1. Install parts in reverse order.
2. When installing wheel, pay attention to correct direction of rotation.
3. Tighten nut to prescribed torque. See 6.7.3 *Specific Tightening Torques*, page 22.

## 6.7.7 Replacing Tyres

### Repairing Pneumatic and Puncture-Protected Tyres



- 6 mm Allen key
- Tightening kit
- Oblong wooden block (at least 12 x 12 x 30 cm) for propping up mobility device
- Repair kit for tyre repair or a new inner tube
- Talcum powder
- Tyre pump or compressor



#### WARNING!

##### Risk of Injury

- If tyre with one or more damaged rim threads is inflated, rim could burst and cause serious injury.
- Do not inflate tyre if one or more rim threads are damaged.
  - Immediately replace rim with damaged threads.



#### WARNING!

##### Risk of Explosion

- There is considerable pressure in the tyre. Risk of injury. Parts can be thrown out and injure you if you do not secure rim halves.
- Secure rim halves with joiner's clamps.



##### Risk of Damage to Rim Threads

- Incorrectly tightened screws can cause damage to rim threads.
- Tighten rim screws with prescribed tightening torque.

1. Remove wheel as described in respective chapter in this manual.



#### CAUTION!

##### Risk of Damage by Gel When Repairing Puncture-Protected Tyres With Red Valve Caps

- Valve can become blocked by the puncture protection gel and get unusable.
- During following work you should always hold up valve so that puncture protection gel cannot enter valve.

2. Remove valve cap.
3. Let air escape completely out of tyre by firmly pressing in pin in the centre of valve.



#### CAUTION!

##### Risk of Explosion

- The wheel explodes if air pressure has not been released from wheel before wheel rim is removed.
- Always let all air out of tyre before removing rim.

- 4.

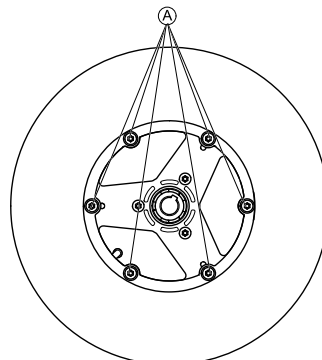


Fig. 6-13 This picture is an example.

Remove screws Ⓐ on inside of wheel.

5. Remove rim halves from wheel.
6. Remove inner tube from tyre.
7. Repair inner tube and re-fit it, or replace it with a new one.



If 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.

8. Install tyre in reverse order.
9. Apply rim halves to wheel.
10. Inflate tyre a little.
11. Place screws in wheel rim and tighten screws with prescribed torque. Make sure that inner tube is not clamped between wheel rim halves.
12. Make sure that tyre is contacting wheel rim directly.
13. Inflate tyre to prescribed pressure.
14. Make sure that tyre is still closely contacting wheel rim.
15. Screw valve cap on.
16. Install wheels according to instruction. See respective chapter.

### Repairing Solid Tyre



- 6 mm Allen key
- 3 joiner's clamps with plastic caps



#### Risk of Damage to Rim Threads

- Incorrectly tightened screws can cause damage to rim threads.
  - Tighten rim screws with prescribed tightening torque.

1. Remove wheel as described in respective chapter in this manual.
2. Secure rim halves against unexpected discharge with three joiner's clamps. When doing so, make sure that you do not scratch rims.
- 3.

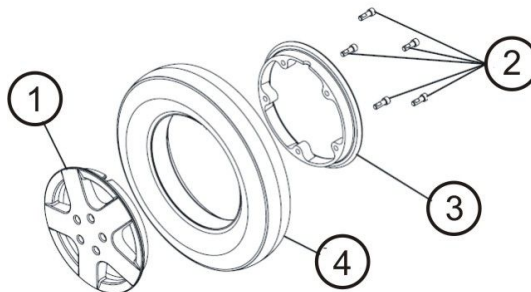


Fig. 6-14

- Loosen and remove screws (2) on inside of wheel.
4. Loosen joiner's clamps carefully and alternately until you can remove rim halves without risk.
5. Remove inner (3) and outer (1) half of rim from tyre (4).
6. Replace any defective or worn parts.
7. Install tyre in reverse order.
8. When fitting rim halves together, make sure that drill holes and threads for screws are placed exactly on top of each other.
9. Place joiner's clamps in position.
10. Tighten joiner's clamps alternately in small stages until rim halves are precisely aligned.
11. Install and tighten screws.
12. Remove joiner's clamps.
13. Install wheel as described in respective chapter in this manual.

## 6.8 Electronics

### 6.8.1 Checking and replacing main fuse



#### WARNING! Risk of fire

- A short circuit can cause extremely high currents which can result in spark formation and fire.
- Always use an original strip fuse with the approved amperage.
  - If the main fuse has blown, first rectify the cause before fitting a new one.

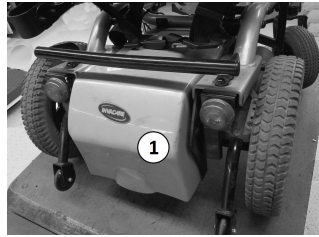


- 8 mm wrench
- 60A plug-in fuse



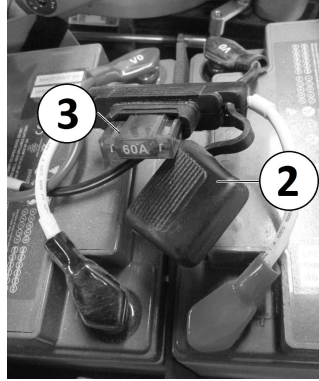
If fuse holder is damaged it can be replaced completely together with battery cables.

1.



Remove battery shroud (1).

2.



Fuse holder of Shark controls system is located on top of batteries.

3. Open fuse holder shroud (2).

4. If fuse has blown, determine cause of fault and remedy if necessary. Main fuse should only be replaced when fault has been remedied.

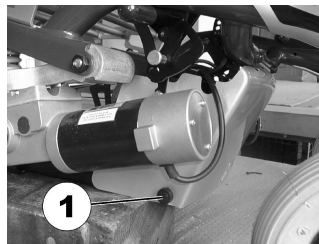
5. Replace fuse (3).

6. Install parts in reverse order.

7. Test all functions.

## 6.8.2 Checking cable

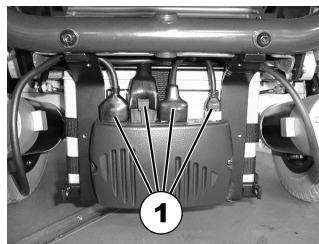
1.



Unscrew handwheels (screws) (1) on both sides of shroud for controls.

2. Remove shroud for controls.

3.



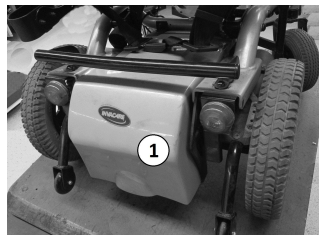
Check all cables for visible damage and crushing. Replace damaged cables.

4. Pull on each plug (1) carefully. It must not come out of socket.

5. If a plug is loose, apply slight pressure to push plug into socket. It must lock in place.

6. Check whether plug is now fitted firmly inside socket. If not, please repeat preceding work step.

7.



Remove battery cover.

8.



Check battery cables (1) for visible damage and crushing. Replace damaged cables.

9. Re-install shroud for controls and battery shroud.
10. Test all functions.

### 6.8.3 Updating Software

See LiNX service manual.

## 6.9 Batteries



#### CAUTION!

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

The installation of new batteries may only be carried out by authorised specialists.

- 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 mobility device 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.



#### 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!



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.

### 6.9.1 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 mobility device technician or a person with adequate knowledge. They have the necessary training and tools to do the job safely and correctly.

## 6.9.2 Handling Damaged Batteries Correctly



### CAUTION!

#### Corrosion and burns from acid leakage if batteries are damaged

- Remove clothes that have been soiled by acid immediately.

#### After contact with skin:

- Immediately wash affected area with lots of water.

#### After contact with eyes:

- Immediately rinse eyes under running water for several minutes; consult a physician.

- Always wear safety goggles and appropriate safety clothing when handling damaged batteries.
- 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

Dead or damaged batteries can be given back to your provider or directly to Invacare.

## 6.9.3 Replacing batteries



### CAUTION!

#### Risk of fire and burns if battery terminal is bypassed

- Take care to make sure that battery terminals are never shorted with tools or mechanical mobility device parts.
- Make sure battery terminal caps have been replaced if you are not working on battery terminals.



### CAUTION!

#### Risk of crushing

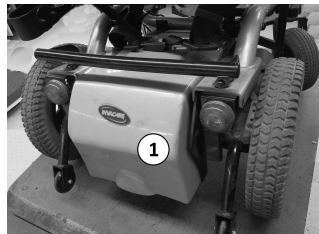
The batteries are extremely heavy. This results in injury hazards to your hands.

- Bear in mind that the batteries are sometimes very heavy.
- Please handle the batteries with care.



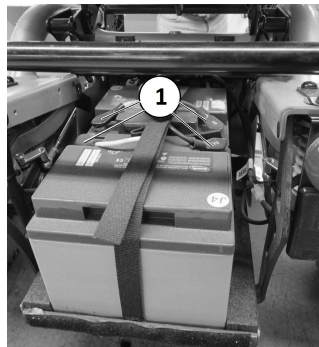
- 11 mm wrench

1.



Remove battery shroud (1).

2.



Pull terminal caps (1) upward and push back in order to reach battery terminals.

3. Loosen clamps.

4. Remove batteries to rear.

## 6.10 Lighting Unit

### 6.10.1 Replacing headlight (LED light)



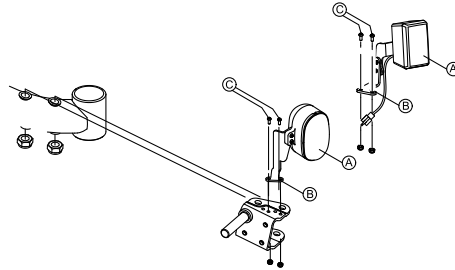
Replacing an individual LED is not possible. If there is a defect, replace entire headlight.





- 4 mm wrench
- Philips screwdriver

1. For position of the plugs see corresponding controls manual or earlier revision of this manual.
2. Remove legrests.
3. Adjust seat angle so that there is enough space to work. See *Setup*.
4. Disconnect remote bus cable from power module or ACT.
5. Remove headlight plug from lighting PCB.
6. Free cable or remove any tie-wraps.
- 7.



Loosen screws ©.

8. Remove headlight (A) and lamp holder (B).
9. Install parts in reverse order.
10. Test all functions.

### 6.10.2 Replacing rear light (LED light)

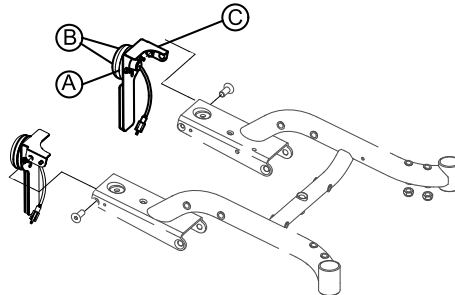


Replacing an individual LED is not possible. If there is a defect, replace entire rear light.



- Phillips screwdriver
- 13 mm wrench

1. For plug position, see corresponding controls manual or earlier revision of this manual.
2. Remove legrests.
3. Disconnect remote bus cable from power module or ACT.
- 4.



Remove rear light plug from lighting PCB.

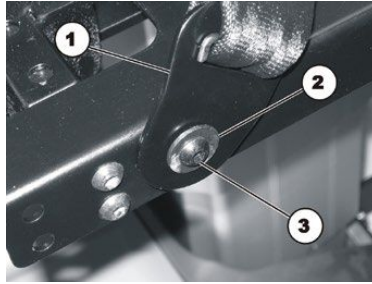
5. Free cable or remove any tie-wraps.
6. Loosen and remove Phillips screw ©.
7. Loosen and remove screws ©.
8. Remove rear light © from splash guard and replace it.
9. Install parts in reverse order.
10. Test all functions.

### 6.11 Replacing posture belt




- 10 mm socket wrench
- 4 mm Allen key

## Removing posture belt



1. Remove plastic cap (5).
2. Loosen bolt (3) and associated nut (covered in figure).
3. Remove nut incl. washer.
4. Remove screw incl. posture belt, washer (2) and washer arranged behind.

 Another nut is fixed between two washers (2) and (4) as a spacer so that belt mounting can rotate freely.

5. Replace posture belt (1).

## Installing posture belt

1. Install parts in reverse order.



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