

Invacare® AVIVA™ FX Series

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.

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 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 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.



NOTICE

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.

1.4 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 provider 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 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 mobility device 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 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.

**CAUTION!****Risk of Injury**

Adaptions to the mobility device 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 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 Seating Position

Adjusting the seating position in order to adapt the mobility device optimally to the requirements of the user, we recommend that you ask your authorised Invacare provider to adjust seat depth individually. Adapting the seat to the user's seating position depends on the seat that has been fitted, and should be carried out in the following sequence.

1. Adjusting the lower leg length and seat depth. See 4.2.1 *Adjusting Lower Leg Length*, page 9 and 4.2.2 *Adjusting Seat Depth*, page 9.
2. Adjusting the center of gravity of the seat frame. See 4.2.3 *Adjusting Centre of Gravity of Seat*, page 10.
3. Checking that the swivel castors can move freely.
4. Repetition of steps 2 to 4, if necessary.



WARNING!

Risk of injury after tilting of mobility device caused by blocked steering wheels

- Always check the seat depth settings for both forward and reverse movement. Make sure that steering wheels can rotate freely and have not contact to any fixed mobility device component.



WARNING!

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 vehicle driving behavior - especially the tipping stability - for this standard drive program.



WARNING!

Risk of crushing

The seat is very heavy. Risk of injury to hands and feet.

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



CAUTION!

Risk of tipping over

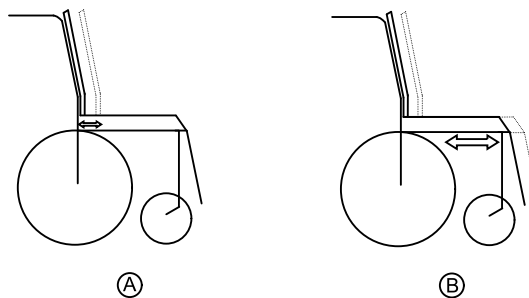
Any change in the seating position can negatively influence the stability of the mobility device.

- Always make sure that the mobility device is stable and will not tip over, after adjusting seating position.

4.2.1 Adjusting Lower Leg Length

Invacare offers a range of legrests which can be adjusted individually. See user manual.

4.2.2 Adjusting Seat Depth



A: Seat depth

B: Centre of gravity of the seat/ seat position

Modulite Seat

The seat depth **A** can be adjusted by moving the position of the backrest in relation to the seat surface. See user manual of Modulite.

Ultra Low Maxx Seat

The seat depth (A) can be adjusted by moving the position of side rails with front seat plates in relation to the backrest. See user manual of Ultra Low Maxx.

4.2.3 Adjusting Centre of Gravity of Seat

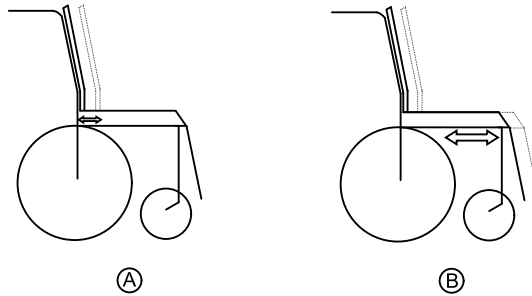
The centre of gravity of seat (CoG) can be adjusted by mounting seat frame farther towards front or the rear of seat.



CAUTION!

The seating system of the mobility device is delivered ex works with a standard adjustment of centre of gravity (CoG), which meets 80 % – 90 % of user requirements. CoG can be adjusted individually. However, any change in this adjustment setting can negatively influence the stability of the mobility device.

- You must perform an individual risk analysis every time you change the centre of gravity of the seating position, in order to ensure the safety and stability of the mobility device.

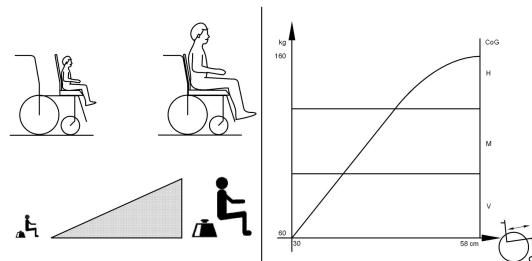


A: Seat depth

B: centre of gravity of the seat/ seat position



The user weight and seat depth have strong influences on the choice of the centre of gravity (CoG). If the user is heavy and the seat depth is greater, the focus should be the farther back. For best possible driving characteristics of rear-wheel drive mobility devices, the weight should be distributed: 30 % – 40 % front and 60 % - 70 % rear. For center wheel drives the weight should be distributed 25 % front, 50 % center and 25 % rear.



CAUTION!

Risk of damage due to collisions of the legrests with other parts of the mobility device



- Set the legrests to the smallest angle before adjusting the seat centre of gravity.
- Pay attention with adjusting seat centre of gravity that legrests do not touch any other parts of mobility device. This ensures that the legrests can not collide with other parts of mobility device.

4.3 Adjusting Seat Height


How you adjust the seat height depends on the seating system and the tilt mechanism, see 6.12.1 Replacing Height Adjustment Bracket — Tilt and Lifter-Tilt Modules, page 53.

5 Testing

5.1 Testing Motor

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

1. Remove shroud that covers power module. See 6.6 *Shrouds, page 21*.
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.

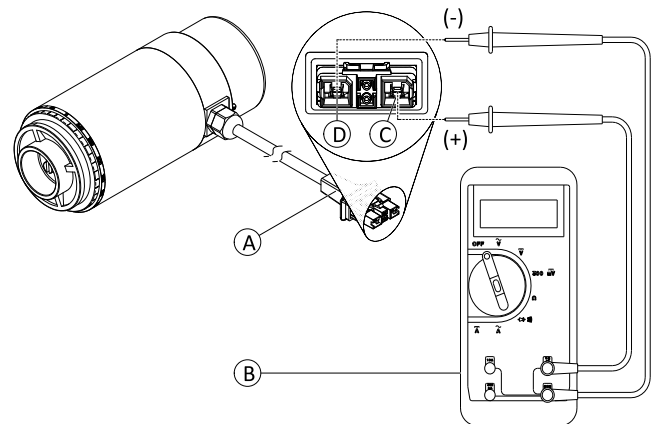



Fig. 5-1 DuraWatt motor serves as an example.

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 6.6 *Shrouds, page 21*.
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.

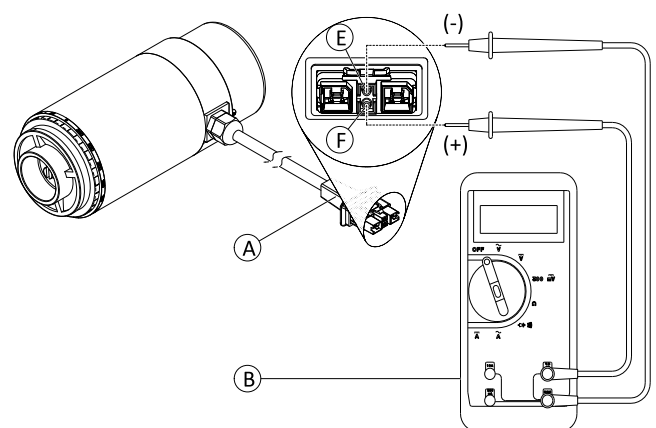



Fig. 5-2 DuraWatt motor serves as an example.


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.

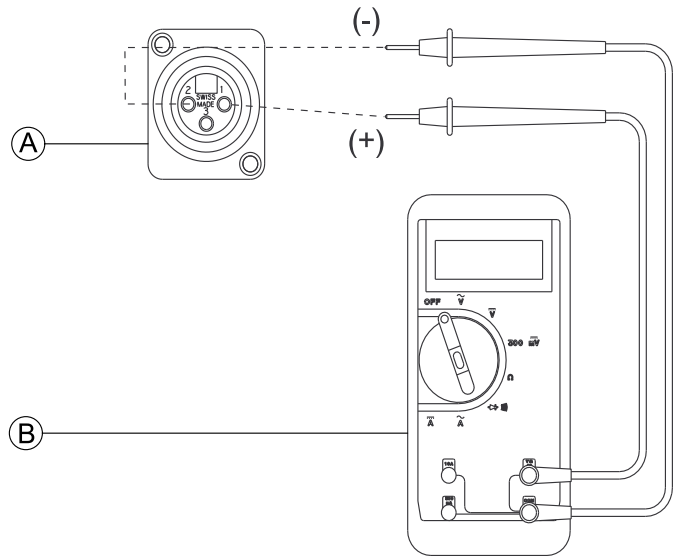


Fig. 5-3

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.

6 Service

6.1 General Warning Information on Installation Work



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 electronics must reduce the maximum possible speed as soon as the lifter is raised above 100 mm.

- 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.



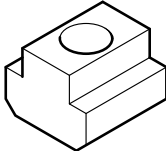
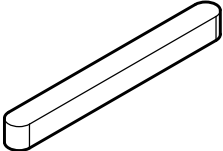

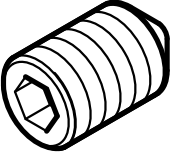
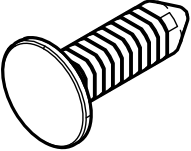
- Always tighten screws, nuts etc. to the stated tightening torque.
- Only tighten screws or nuts which are not listed here fingertight.

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 Glossary of Frequently Used Mounting Hardware

Some mounting hardware may be difficult to identify in the drawings within this document. For easier identification, see the following table for common mounting hardware delivered with our mobility devices and spare parts.

Wedge lock washer		SL retainer clip	
T-nut		Feather key	
Shaft retaining ring		Set screw	
Cone-shaped pin			

6.4 Troubleshooting

6.4.1 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.

6.4.2 Drive Fault Diagnosis

Problem	Other symptoms	Possible cause	Solution	Documentation
Mobility device will not start	The remote status display illuminates normally and shows an error code.	Drive motors disengaged	Engage drive motors.	See user manual.
	Remote status display does not illuminate	Batteries defective	Replace batteries.	See 6.10 Batteries, page 44.
		Completely discharged battery	Pre-charge batteries.	See user manual.
		Power supply to remote interrupted	Check status of circuit breaker.	See user manual.
	Check cables between modules for loose connections or damage.		See 6.10.8 Checking Cables, page 51.	
	Remote defective	Replace remote.	See 6.9.1 Replacing Power Module, page 43.	
Remote status display flashing	Various causes	Assess error code.	See remote manual.	
Mobility device judders in drive mode	None	Batteries defective (unstable voltage)	Replace batteries.	See 6.10 Batteries, page 44.
		Drive motor(s) defective	Replace motor(s).	See 6.7.2 Replacing Motor/Gearbox Unit, page 26.
Mobility device pulls to left or right	None	Drive motors running asymmetrically	Change programming to synchronise motors.	See LiNX service manual.
	Tyre visibly dented	Not enough tyre pressure	Check tyre pressure, replace inner tube and/or valve if necessary.	
Error message does not disappear	None	Bad connections	Check all connecting cables.	See 6.10.8 Checking Cables, page 51.
		Motor brake defective	Measure internal resistance of brakes, replace motor if defective.	See 5.2 Testing Motor Brake, page 11 and 6.7.2 Replacing Motor/Gearbox Unit, page 26.

Problem	Other symptoms	Possible cause	Solution	Documentation
Motors stop and start again	None	Voltage decline	Stop driving and allow electronics to cool down.	
Motor runs but loses power	None	High motor load allows power module to lower voltage	Stop driving and allow electronics to cool down.	
Motors stop and do not start again	None	High motor load allows power module to lower voltage	Leave mobility device switched on and let power module operate. Charge batteries overnight with electronics turned on.	
	None	Circuit breaker switched off	Check cabling and switch on circuit breaker.	See 6.10.8 <i>Checking Cables</i> , page 51 and user manual.
	None	Motor defective	Measure internal resistance of motor, replace motor if defective.	See 5.1 <i>Testing Motor</i> , page 11 and 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26.
	None	Power module defective	Replace power module	See 6.9.1 <i>Replacing Power Module</i> , page 43.
Motors lose power while driving	None	Bad connections	Turn off electronics, wait 10 seconds, turn on electronics. Check all cabling.	See 6.10.8 <i>Checking Cables</i> , page 51.
Motor judders or runs irregularly, or only one motor runs	None	Clutch(es) defective	Replace clutch.	See 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26.
		Bearing defective	Replace motor.	See 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26.
		Collector defective	Measure internal resistance of motor, replace motor if defective.	See 5.1 <i>Testing Motor</i> , page 11 and 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26.
Motors do not run	None	Bad connections	Check all cabling.	See 6.10.8 <i>Checking Cables</i> , page 51.
		Circuit breaker switched off	Check cabling and switch on circuit breaker.	See 6.10.8 <i>Checking Cables</i> , page 51 and user manual.
		Batteries defective	Replace batteries.	See 6.10 <i>Batteries</i> , page 44.
		Cabling to power module or remote defective	Check cabling.	See 6.10.8 <i>Checking Cables</i> , page 51.
		Power module defective	Replace power module.	See 6.9.1 <i>Replacing Power Module</i> , page 43.
	Corroded contacts	Contacts defective	Check cabling, replace if necessary.	See 6.10.8 <i>Checking Cables</i> , page 51.

Problem	Other symptoms	Possible cause	Solution	Documentation
Motor makes clicking noise	None	Clutch(es) defective	Replace clutch.	See 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26.
		Bearing defective	Replace motor.	See 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26.
		Collector defective	Measure internal resistance of motor, replace motor if defective.	See 5.1 <i>Testing Motor</i> , page 11 and 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26.
Scraping noise or motor blocked	None	Clutch(es) defective	Replace clutch.	See 6.7.4 <i>Replacing Motor/Gearbox Clutch</i> , page 28.
		Bearing defective	Replace motor.	See 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26 and 6.7.4 <i>Replacing Motor/Gearbox Clutch</i> , page 28.
		Gearbox defective	Replace gearbox.	See 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26 and 6.7.4 <i>Replacing Motor/Gearbox Clutch</i> , page 28.
Gearbox makes clicking noise	None	Gearbox defective	Replace gearbox.	See 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26 and 6.7.4 <i>Replacing Motor/Gearbox Clutch</i> , page 28.
		Drive wheel loose	Tighten drive wheel, secure bolts with thread locking adhesive if necessary.	See 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26.
Gearbox loses oil	None	Sealing ring on drive shaft defective	Replace gearbox if sealing ring defective.	See 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26 and 6.7.4 <i>Replacing Motor/Gearbox Clutch</i> , page 28.
Irregular running	None	Drive shaft movable or bent	Check drive shaft, replace gearbox, if defective.	See 6.7.2 <i>Replacing Motor/Gearbox Unit</i> , page 26 and 6.7.4 <i>Replacing Motor/Gearbox Clutch</i> , page 28.
Batteries not being charged	None	Circuit breaker defective	Check circuit breaker.	See 6.10.6 <i>Replacing Circuit Breaker</i> , page 50.
		Cable defective	Check cabling.	See 6.10.8 <i>Checking Cables</i> , page 51.
		Batteries defective	Replace batteries.	See 6.10 <i>Batteries</i> , page 44.
	LEDs flashing on charger	Charger defective	Replace charger.	See charger user manual.

Problem	Other symptoms	Possible cause	Solution	Documentation
Short charging period	None	One of the batteries could be defective	Replace batteries.	See 6.10 Batteries, page 44.
Mobility device runs too slowly	None	Remote defective	Replace remote.	See 6.9.1 Replacing Power Module, page 43.
		Batteries defective	Replace batteries.	See 6.10 Batteries, page 44.

6.4.3 Charging device fault diagnosis

Symptom	Possible cause	Solution
No LEDs illuminating on battery charger	Charging device not connected to mains supply.	Ensure that the battery charger has been plugged in.
	No mains supply	Check the mains supply with a voltmeter.
	Defective mains supply cable.	Check the mains supply cable. Replace damaged cables or send the battery charger to Invacare Service for repair.
	LEDs are burnt out	Send the battery charger to Invacare Service for repair.
	An internal fuse might be burnt out.	Send the battery charger to Invacare Service for repair.
Batteries do not charge	Fuse on mobility device has burnt out.	Check mobility device fuses. See “Main fuse”.
	Battery charger not connected to mobility device.	Ensure that the battery charger has been connected to the mobility device.
	No mains supply	Check the mains supply with a voltmeter.
	Defective mains supply cable.	Check the mains supply cable. Replace damaged cables or send the battery charger to Invacare Service for repair.
	Battery charger could be defective.	Use a battery charger which you know is working properly to charge the batteries. Send the defective battery charger to Invacare Service for repair.
	Battery voltage is too low to operate mobility device.	Replace the batteries. See “Removing batteries”

6.5 Service Plan (Once a Year)



CAUTION!

Risk of injury and damage to property, if maximum speed reduction on wheelchair with lifter does not function correctly

The wheelchair’s electronics 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.

Component	Check	Remedy	Notes	✓
Posture belt	Damage to posture belt	Replace belt if damaged	See <i>Replacing Posture Belt</i> in service manual of seating system.	
	Belt lock function	Replace belt if damaged	See <i>Replacing Posture Belt</i> in service manual of seating system.	

Component	Check	Remedy	Notes	✓
Armrests	Damage to armrests	Replace cover if damaged		
	Armrest fixings	Tighten screws		
Fender	Damage to fender	Replace fender		
	Fender fixings	Tighten screws		
Powered tilt	Tight fit of SL retainer clip	Replace SL retainer clip, if necessary		
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 6.8 <i>Wheels</i> , page 33.	
	Check castors for tight fit, float and side play	Replace wheels, castor forks or wheel bearings	See 6.8 <i>Wheels</i> , page 33.	
	Tyres	Repair or replace if damaged	See 6.8 <i>Wheels</i> , page 33.	
	Check suspension	Repair or replace if damaged	See 6.8 <i>Wheels</i> , page 33.	
	Check straight running	Replace wheels, castor forks or wheel bearings	See 6.8 <i>Wheels</i> , page 33.	
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	Check carbon brushes, replace if necessary (not with lifetime brushes) Replace motor if necessary Tighten screws/nuts, adjust or replace if necessary	See 6.7 <i>Drive Components</i> , page 25.	
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		
Power legrests (if fitted)	Check cable Check contacts Check functions	Replace cable if necessary		
Lighting (if fitted)	Check cable Check function	Replace lamp or cable if necessary	See 6.11 <i>Lighting unit</i> , page 53.	
Battery mounting	Check battery support and mounting belts for damage	Replace if necessary		

Component	Check	Remedy	Notes	✓
Batteries	Check batteries for damage	Replace batteries if necessary	See 6.10 Batteries, page 44.	
	Check battery voltage	Charge batteries	See user manual.	
	Check contacts and terminals	Clean contacts and terminals	See 6.10 Batteries, page 44.	
Remote / power module	Remote, status LED flashing	Evaluate error/flash code	See 6.4 Troubleshooting, page 15.	
	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			
Chair configuration	Check chair configuration version	Update software if newer version available	See LiNX service manual.	
Screws (every 6 months)	Check screws for tight fit	Tighten screws if necessary		

6.6 Shrouds

6.6.1 Replacing Rear Shroud

Removing Rear Shroud

1. Make sure mobility device is powered down.
2. Disengage top of rear shroud (A) from battery box (B) by pulling up rear shroud.
3. Disengage keyholes (C) from battery box pegs (D) by pulling up rear shroud.
4. Remove rear shroud from battery box, one side at a time.

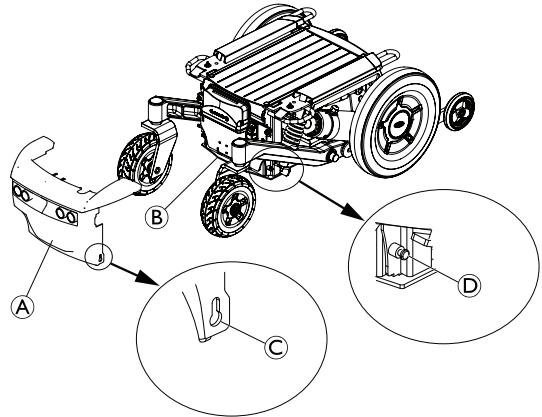


Fig. 6-1 Seat assembly not shown for clarity.

5. If lights are present, disconnect front lights connector (E) and light power cable connector (F) from rear lighting harness (G) inside of rear shroud.

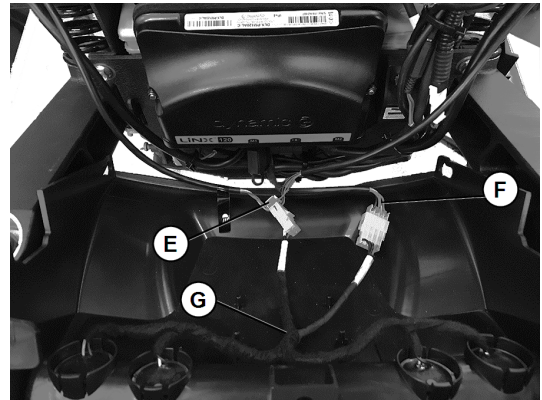


Fig. 6-2

Installing Rear Shroud

1. If lights are present, connect front lights connector ⑤ and light power cable connector ⑥ to rear lighting harness ③ inside of rear shroud. Ensure they are connected in proper location, marked by labels on each cable.
2. Install keyhole ③ in bottom of rear shroud onto pegs ④ on battery box, one side at a time.
3. Rotate top of rear shroud forward under bumper screws ⑧, if present.

Route cables:

- Route motor cables ① and light cables ② through top opening in both sides of rear shroud.
 - Group other cables ④ and route through front right opening in top shroud.
4. Push rear shroud down to engage rear shroud with pegs on battery box.
 5. Rotate top of rear shroud all the way forward and push down to engage securely with battery box.

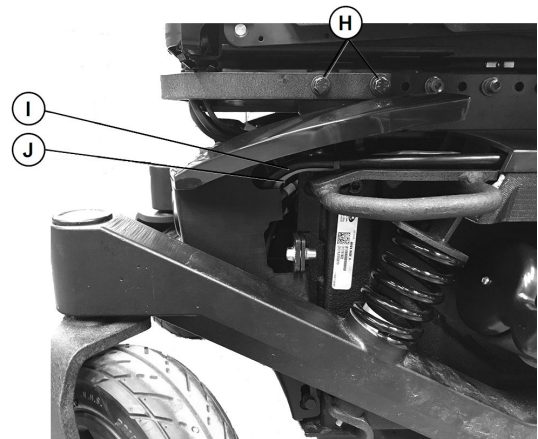


Fig. 6-3

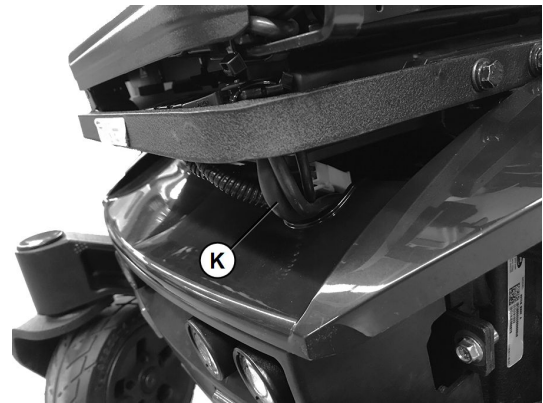


Fig. 6-4

6.6.2 Replacing Rear Top Shroud



- Flat screwdriver

1. Make sure mobility device is powered down.
2. Remove rear shroud. Refer to 6.6.1 *Replacing Rear Shroud*, page 21.
3. Remove star washers ③.
4. Disengage rear top shroud ① from rear shroud ② by pulling rear top shroud up.
5. Installation of rear top shroud takes place in reverse order.

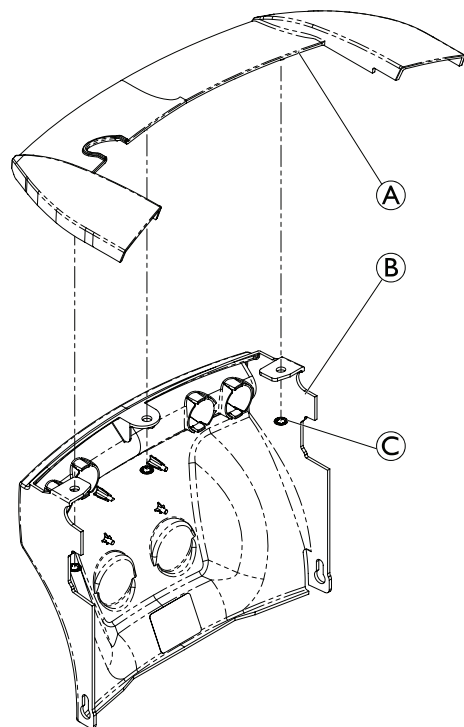


Fig. 6-5

6.6.3 Replacing Top Shroud



- 4 mm Allen key
- Torque wrench

Removing Top Shroud

1. Make sure mobility device is powered down.
2. Remove fasteners **B** from top shroud **A**.
3. Remove top shroud from battery box.

Installing Top Shroud

1. Slide top shroud **A** over base frame from front of base.
2. Install fasteners **B** into top shroud. Tighten to 2.8 Nm.

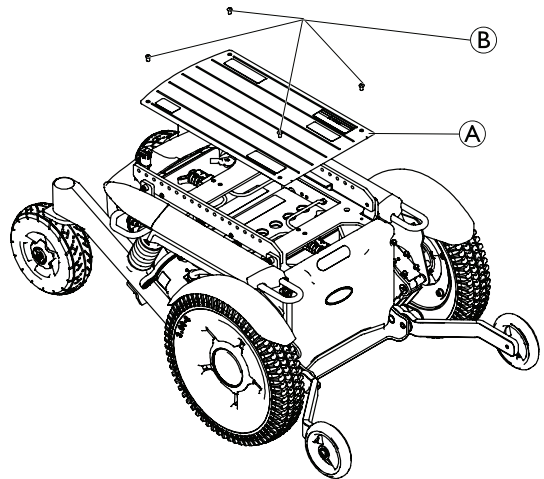


Fig. 6-6 Seat assembly not shown for clarity.

6.6.4 Replacing Front Shroud



- 10 mm socket wrench
- Torque wrench

Removing Front Shroud

1. Make sure mobility device is powered down.
2. Remove screws **A** securing front shroud **B** to front of battery box.
3. Lift front shroud up off battery box tabs **C** and pull towards front of mobility device to release front shroud from battery box.

Installing Front Shroud

1. Install front shroud **B** onto battery box tabs **C**.
2. Secure front shroud with screws **A** to battery box. Tighten screws to 10 Nm.

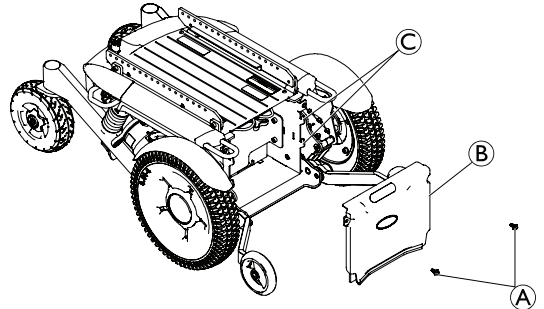


Fig. 6-7 Seat assembly not shown for clarity.

6.6.5 Replacing Side Shrouds

Removing Side Shrouds

1. Make sure mobility device is powered down.
2. Disconnect side shroud **A** from battery box by pulling side shroud up.
3. Remove side shroud from battery box.

Installing Side Shrouds

1. Position side shroud onto battery box.
2. Secure side shroud in place by pressing side shroud down.

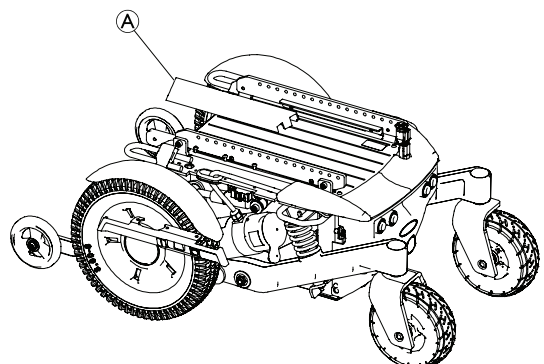


Fig. 6-8 Seat assembly not shown for clarity.

Removing/Installing Side Panel Shrouds



- 4 mm Allen key

1. Make sure mobility device is powered down.
2. Remove side shrouds.
3. Remove screws **B** securing side panel shroud **C** to frame.
4. Remove side panel shroud.
5. Install parts in reverse order.

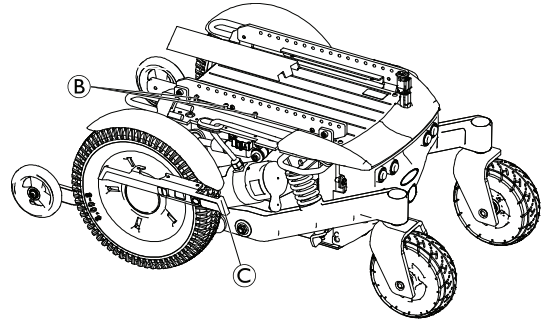


Fig. 6-9 Seat assembly not shown for clarity.

6.6.6 Replacing Fender



CAUTION!

Risk of Crushing to Hands and Feet by Weight of Component

- Heavy components may cause injury or damage if dropped or not properly secured.
- Pay attention to hand and feet.
 - Use proper lifting techniques.
 - Properly secure heavy equipment or components when servicing.



CAUTION!

Risk of Uncontrolled Movement of Mobility Device

- Uncontrolled movement of the mobility device can cause injury or damage.
- Power down mobility device.
 - Engage drive.
 - Before raising mobility device, secure wheels by blocking them with wedges.
 - Prevent the mobility device from tipping by propping it up on wooden blocks which are long and wide enough under the battery case. If the wooden blocks are too short or too high, the mobility device can still tip.



- 4 mm Allen key
- 10 mm wrench
- Torque wrench

1. Make sure mobility device is powered down.
2. Remove drive wheel. Refer to 6.8.6 *Replacing Drive Wheel (1-Bolt Installation)*, page 37.
3. Remove screws **A** securing fender bracket **C** to gearbox.
4. Remove nuts **E** securing fender **B** and light bracket **D** (if present) to fender bracket **C**.
5. Remove fender.
6. Install parts in reverse order.



Tighten the hardware as listed below:

- Fender bracket **C** to 4 Nm
- Gearbox screws **A** to 18 Nm

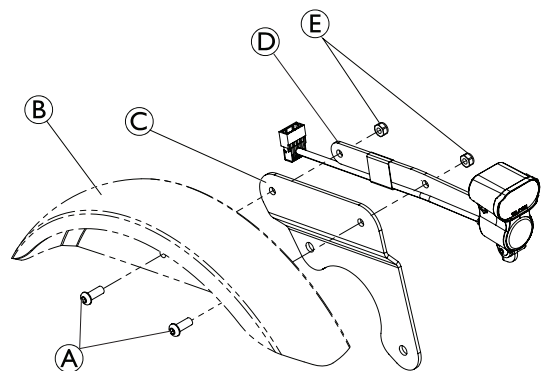


Fig. 6-10

6.6.7 Replacing Rim Cap and Insert (Drive Wheel)



- Flat screwdriver

1. Insert tip of screwdriver between cap ③ and insert ②.
2. Remove insert.
3. Insert tip of screwdriver between rim and cap at fulcrum ④.
4. Loosen and remove cap.
5. Replace defective parts.
6. Hold cap over rim.
7. Carefully push cap into rim.
8. Hold insert over cap.
9. Carefully push to fasten insert, until foot of insert ① snaps and insert ② clings to cap.

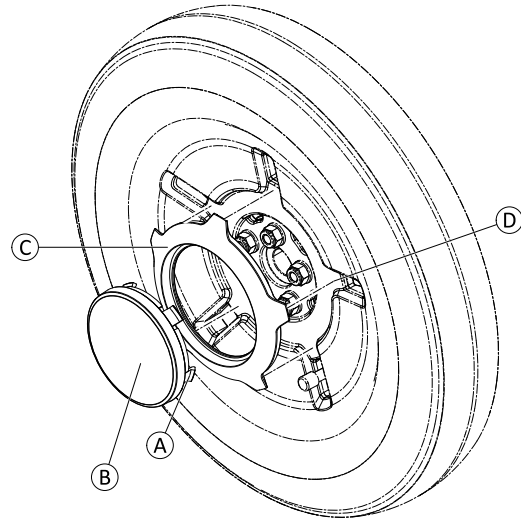


Fig. 6-11

6.6.8 Replacing Rim Cap (Castor Wheel)

- ! Risk of Damage to Rim Caps.**
 Incorrect installation of rim cap can lead to damage on rim cap itself or loosening of rim cap.
- Install rim cap with notch positioned at valve.
 - Position cap straight on rim and carefully push on outer edges for initial fixation.
 - Ensure not to damage fixation pins on rear side while installing to rim.



- Flat screwdriver

1. Remove wheel from fork.
2. Insert tip of screwdriver between rim and cap at fulcrum ④.
3. Loosen and remove cap.
4. Replace defective parts.
5. Position cap over rim.
6. Carefully push cap into rim.
7. Re-install wheel to fork.

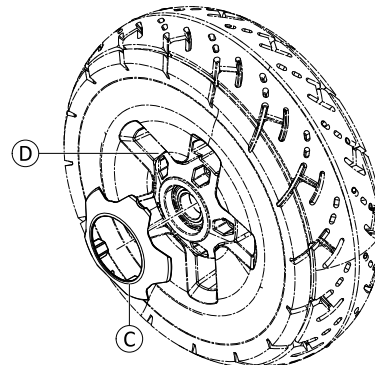


Fig. 6-12

6.7 Drive Components

6.7.1 Overview Motor/Gearbox Unit

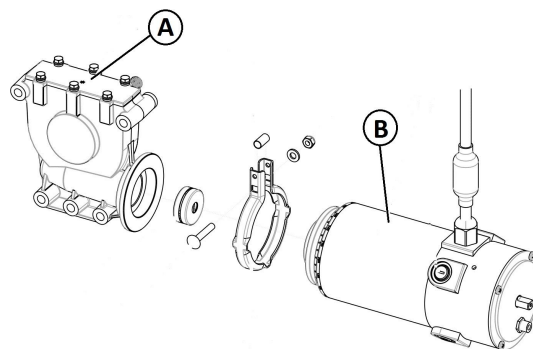


Fig. 6-13

The motor/gearbox unit consists of a gearbox ① and a motor ②. These parts may be replaced as a unit or separately.

6.7.2 Replacing Motor/Gearbox Unit



CAUTION!

Risk of Crushing to Hands and Feet by Weight of Component

Heavy components may cause injury or damage if dropped or not properly secured.

- Pay attention to hand and feet.
- Use proper lifting techniques.
- Properly secure heavy equipment or components when servicing.



CAUTION!

Risk of Uncontrolled Movement of Mobility Device

Uncontrolled movement of the mobility device can cause injury or damage.

- Power down mobility device.
- Engage drive.
- Before raising mobility device, secure wheels by blocking them with wedges.
- Prevent the mobility device from tipping by propping it up on wooden blocks which are long and wide enough under the battery case. If the wooden blocks are too short or too high, the mobility device can still tip.



DuraWatt motors are maintenance-free, due to lifetime brushes.



- 4 mm Allen key
- 6 mm socket wrench
- 10 mm socket wrench
- 10 mm wrench
- Oblong wooden blocks (at least 14 x 14 x 30 cm)

Removing Motor/Gearbox Unit

1. Make sure mobility device is powered down.
2. Remove rear shroud. Refer to 6.6.1 *Replacing Rear Shroud*, page 21.
3. Remove side shroud. Refer to 6.6.5 *Replacing Side Shrouds*, page 23.
4. Remove drive wheel. Refer to 6.8.6 *Replacing Drive Wheel (1-Bolt Installation)*, page 37.
5. Disconnect motor cables Ⓑ from power module Ⓐ.
6. Note location of motor cable routing and cable tie locations for existing motor. If necessary, take a photo.
7. Remove cable ties for free access to motor cable.

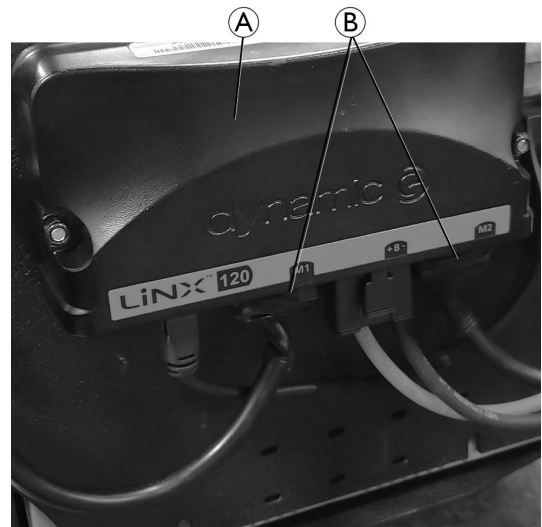


Fig. 6-14

8. Remove screws Ⓒ and Ⓓ from motor/gearbox unit Ⓔ.



The upper screws Ⓒ are longer than the lower screws Ⓓ.

9. If present, disconnect front light cable connector behind fender (not shown).
10. Remove motor/gearbox unit.

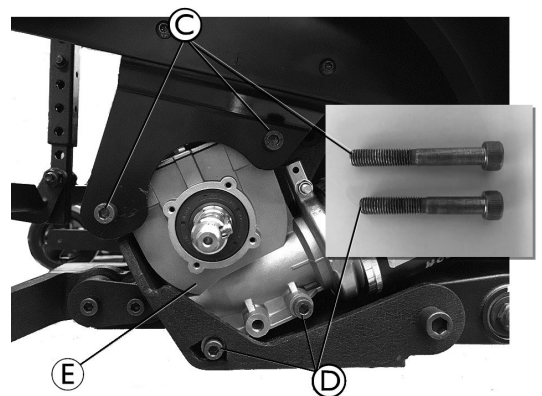



Fig. 6-15

Installing Motor/Gearbox Unit


1. Replace defective components:
 - For replacing motor/gearbox unit proceed to Step 2.
 - Motor or gearbox:
 - A. Remove nut and washer (2).
 - B. Remove screw (1) which secures sealing ring (3).
 - C. Carefully bend sealing ring apart and remove it.
 - D. Replace motor or gearbox.
 - E. Install new sealing ring. The square hole for screw needs to be toward the inside of mobility device.
 - F. Insert screw through sealing ring.


 If necessary, use a clamp to assist with installation.

G. Install washer and nut. Do not tighten completely.

H. Proceed to Step 2.

2. Use scale (F) on motor to align motor to indicator mark (G) on gearbox:
 - Left motor: 200°
 - Right motor: 350°
3. Before installing new motor/gearbox unit, make sure sealing ring is correctly mounted:
 - Sealing ring securely attaches motor and gearbox.
 - If sealing ring is incorrectly installed, rotate it around for proper seal.
 - Sealing ring must be installed that self-locking nut is located on outside.
4. Secure sealing ring. Tighten nut to 8.5 Nm.
5. Install motor/gearbox unit. Reverse steps from *Removing Motor/Gearbox Unit*.

 Inspect screws and motor swing arm mounting holes for damage before installation. If screws or mounting holes are stripped or damaged, replace screws or motor swing arm.

6. Install all cable ties in location noted when motor/gearbox unit was removed. Make sure to tie motor cable (I) to frame at location indicated (H).
 -  The motor cables must pass through the center of the grommet (H) to ensure proper slack for motor movement.
7. Make sure that motor cable cannot be pinched or bent, and that it is not exposed to chafing in any place.
8. Test all functions.

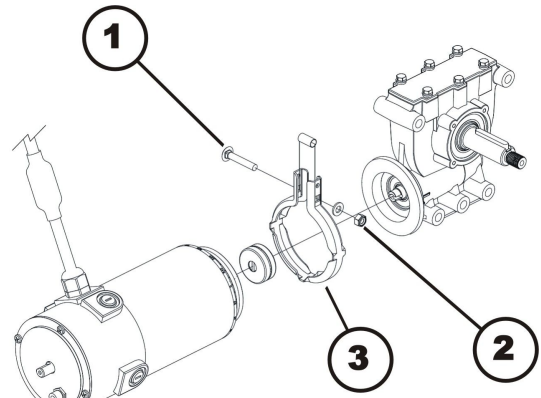


Fig. 6-16

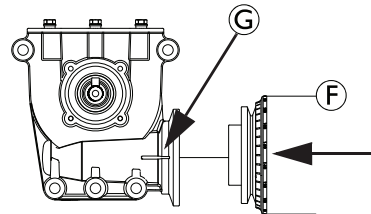


Fig. 6-17

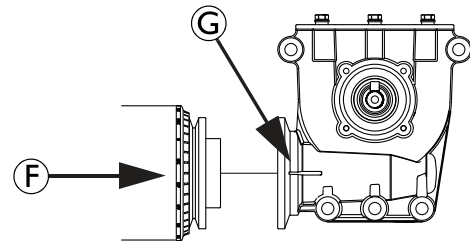


Fig. 6-18

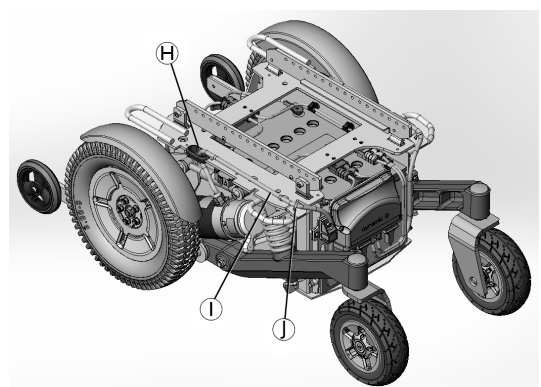


Fig. 6-19

6.7.3 Replacing or Rotating Motor/Gearbox Unit Sealing Ring



CAUTION!

Risk of Crushing to Hands and Feet by Weight of Component

Heavy components may cause injury or damage if dropped or not properly secured.

- Pay attention to hand and feet.
- Use proper lifting techniques.
- Properly secure heavy equipment or components when servicing.



- 6 mm socket wrench

Removing Sealing Ring

1. Remove motor/gearbox unit. Refer to 6.7.2 *Replacing Motor/Gearbox Unit*, page 26.
2. Remove nut and washer (2).
3. Remove screw (1) which secures sealing ring (3).
4. Carefully bend sealing ring apart and remove it.

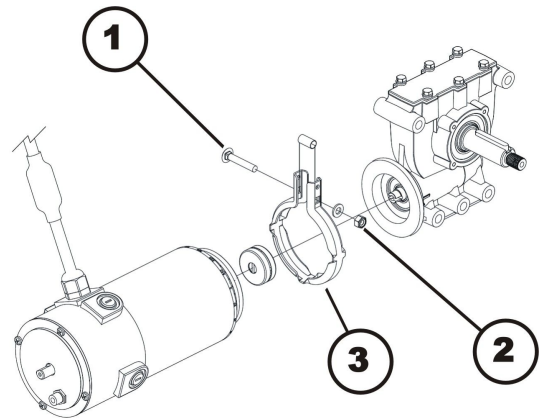



Fig. 6-20

Installing Sealing Ring

1. Install new sealing ring. The square hole for screw needs to be toward the inside of mobility device. Sealing ring must be installed that self-locking nut is located on outside.
2. Insert screw through sealing ring.
 -  If necessary, use a clamp to assist with installation.
3. Install washer and nut. Do not tighten completely.
4. Use scale (F) on motor to align motor to indicator mark (G) on gearbox:
 - Left motor: 200°
 - Right motor: 350°
5. Secure sealing ring. Tighten nut to 8.5 Nm.
6. Install motor/gearbox unit. Reverse steps from 6.7.2 *Replacing Motor/Gearbox Unit*, page 26.
7. Test all functions.

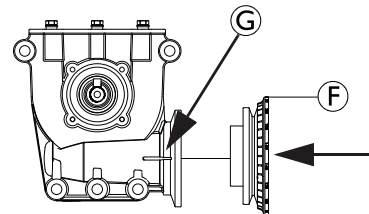


Fig. 6-21

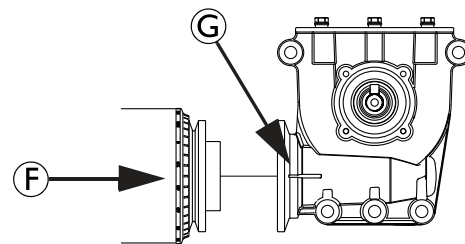


Fig. 6-22

6.7.4 Replacing Motor/Gearbox Clutch



CAUTION!

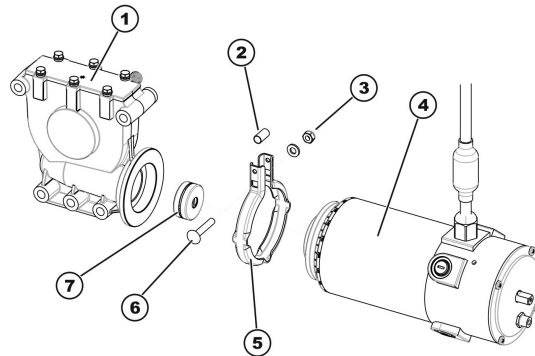
Risk of crushing

Motor / gearbox unit is very heavy. Risk of injury to hands.

- Pay attention to heavy weight.



- 5/8" Allen key
- 7/8" Allen key
- 5/16" Allen key
- 6 mm Allen key
- Phillips screwdriver size 2
- 10 mm wrench
- 1/2" wrench
- 1/4" wrench
- 5/16" wrench
- Torque wrench 0 - 20 Nm (or similar)
- Torque wrench 5 - 25 Nm (or similar)
- Torque wrench 10 - 80 Nm (or similar)
- Two long wooden blocks, min. 14 x 14 x 30 cm



Removing Motor/Gearbox Clutch

1. Removing motor/gearbox unit, as described in *Replacing Motor/Gearbox Unit*.
2. Loosen and remove self-securing nut (3).
3. Remove carriage screw (6), which secures sealing ring (5).
4. Carefully bend sealing ring apart and remove it.
5. Pull motor (4) and gearbox unit (1) carefully apart.
6. Remove clutch individual parts (7).
7. Replace clutch, if necessary.

Installing Motor/Gearbox Clutch

1. Install new clutch (7) on motor axle. Pay attention to position of groove.
2. Position locking ring (5) on motor (4) or gearbox (1).
3. Carefully insert motor into gearbox. Pay attention to position of groove in axle of gearbox. If necessary, rotate motor and gearbox to correct position.
4. Insert carriage bolt through locking ring. Do not forget spacer sleeve (2).
5. Install washer and self-locking nut.
6. Do not tighten self-locking nut completely, as motor orientation must be adjusted during installation.
7. Install motor/gearbox unit, as described in *Replacing Motor/Gearbox Unit*.

6.7.5 Replacing Engaging Lever and Cap



- Phillips screwdriver
- TX20 Torx key
- 2.5 mm Allen key
- Medium-strength thread locking adhesive (Loctite 242 or similar)
- Torque wrench

Removing Engaging Lever and Cap

1. Remove screws **C** and **D** securing engaging lever cap **A** to engaging lever **B**.
2. Remove engaging lever cap.
3. Remove set screw **E** from engaging lever.
4. Remove engaging lever from motor **F**.

Installing Engaging Lever and Cap

1. Install engaging lever **B** onto motor **F** by securing engaging lever to motor with set screw **E**. Tighten to 6.2 Nm.
2. Install engaging lever cap **A** onto engaging lever. Apply thread locking adhesive on screw **C** and tighten to 1.7 Nm.
Tighten screw **D** to secure engaging lever cap to engaging lever.

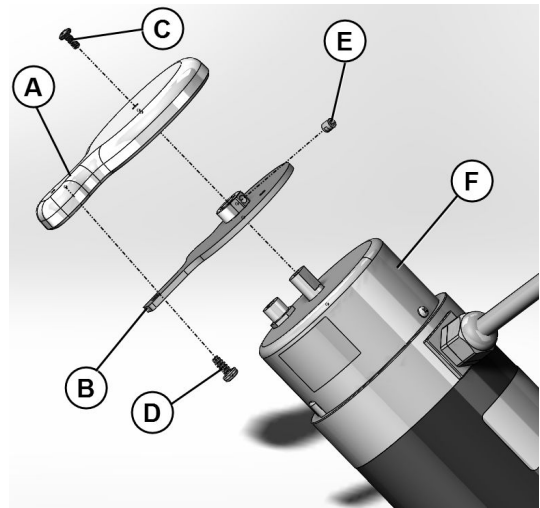


Fig. 6-23

6.7.6 Replacing Rubber Bumper



CAUTION!

Risk of Crushing to Hands and Feet by Weight of Component

Heavy components may cause injury or damage if dropped or not properly secured.

- Pay attention to hand and feet.
- Use proper lifting techniques.
- Properly secure heavy equipment or components when servicing.



CAUTION!

Risk of Uncontrolled Movement of Mobility Device

Uncontrolled movement of the mobility device can cause injury or damage.

- Power down mobility device.
- Engage drive.
- Before raising mobility device, secure wheels by blocking them with wedges.
- Prevent the mobility device from tipping by propping it up on wooden blocks which are long and wide enough under the battery case. If the wooden blocks are too short or too high, the mobility device can still tip.



- 10 mm socket wrench

1. Loosen nut **B** securing rubber bumper **H** to frame.
2. Compress rear suspension arm **A**.
3. While compressing rear suspension arm, remove rubber bumper by grabbing nut and sliding bumper out trough slot in battery box tab.
4. Install parts in reverse order.



Tighten the hardware as listed below:

- Nut **B** securing rubber bumper to 8.5 Nm

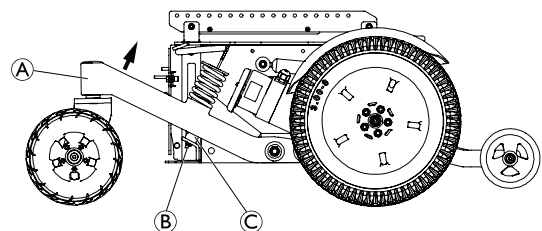


Fig. 6-24

6.7.7 Replacing Shock Damper



CAUTION!

Risk of Crushing to Hands and Feet by Weight of Component

Heavy components may cause injury or damage if dropped or not properly secured.

- Pay attention to hand and feet.
- Use proper lifting techniques.
- Properly secure heavy equipment or components when servicing.

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

Uncontrolled movement of the mobility device can cause injury or damage.

- Power down mobility device.
- Engage drive.
- Before raising mobility device, secure wheels by blocking them with wedges.
- Prevent the mobility device from tipping by propping it up on wooden blocks which are long and wide enough under the battery case. If the wooden blocks are too short or too high, the mobility device can still tip.



- 6 mm Allen key
- 8 mm Allen key
- 19 mm socket wrench
- Oblong wooden blocks (at least 14 x 14 x 30 cm)

1. Remove drive wheel. Refer to 6.8.6 *Replacing Drive Wheel (1-Bolt Installation)*, page 37.
2. Remove top rear screw ① and loosen top front screw ② securing fender bracket ③ to top of motor gearbox ④.

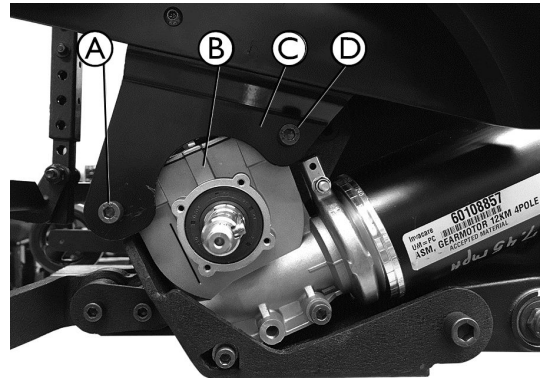


Fig. 6-25

3. Rotate fender bracket ③ forward to expose shock damper ⑤.

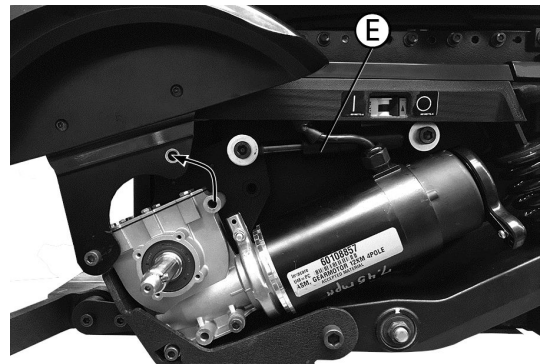


Fig. 6-26

4. Remove two shock damper screws ⑥ and washers ⑦.
5. Remove shock damper ⑤.
6. Install parts in reverse order.



Tighten the hardware as listed below:

- Fender bracket screws ① to 18 Nm
- Shock damper screws ⑥ to 40 Nm
- Drive wheel nut to 61 Nm

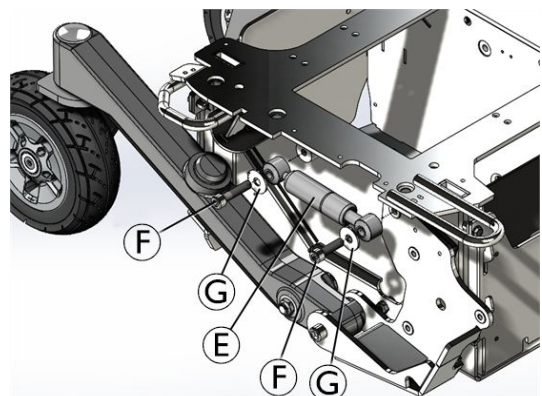


Fig. 6-27

6.7.8 Replacing Suspension Spring



CAUTION!

Risk of Crushing to Hands and Feet by Weight of Component

- Heavy components may cause injury or damage if dropped or not properly secured.
- Pay attention to hand and feet.
 - Use proper lifting techniques.
 - Properly secure heavy equipment or components when servicing.



CAUTION!

Risk of Uncontrolled Movement of Mobility Device

Uncontrolled movement of the mobility device can cause injury or damage.

- Power down mobility device.
- Engage drive.
- Before raising mobility device, secure wheels by blocking them with wedges.
- Prevent the mobility device from tipping by propping it up on wooden blocks which are long and wide enough under the battery case. If the wooden blocks are too short or too high, the mobility device can still tip.



- 10 mm socket wrench
- 3/4" socket wrench (if needed)
- 19 mm socket wrench (if needed)
- 8 mm Allen key (if needed)
- Oblong wooden blocks (at least 14 x 14 x 30 cm)

1. Replace rubber bumper. Refer to 6.7.6 *Replacing Rubber Bumper*, page 30.
2. Rotate rear swing arm **A** down to free suspension spring **C**.
3. Remove suspension spring.
4. Install parts in reverse order



Tighten the hardware as listed below:

- Nut securing rubber bumper to 8.5 Nm

5. If suspensions spring does not remove / install freely, perform following steps:
 - A. Remove drive wheel. Refer to 6.8.6 *Replacing Drive Wheel (1-Bolt Installation)*, page 37.
 - B. Remove rear shock damper screw **D** and washer **E**.
 - C. Remove rear swing arm nut **G** and washer **H**.
 - D. Slide rear swing arm **F** and motor/gearbox unit **I** away from base along battery box pivot pin **J** to gain additional clearance for suspension spring removal / installation.



Tighten the hardware as listed below:

- Shock damper screws **D** to 40.1 Nm
- Drive wheel nut to 61 Nm
- Rear swing arm nut **G** to 16.3 Nm

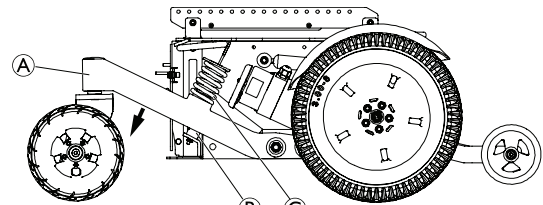


Fig. 6-28

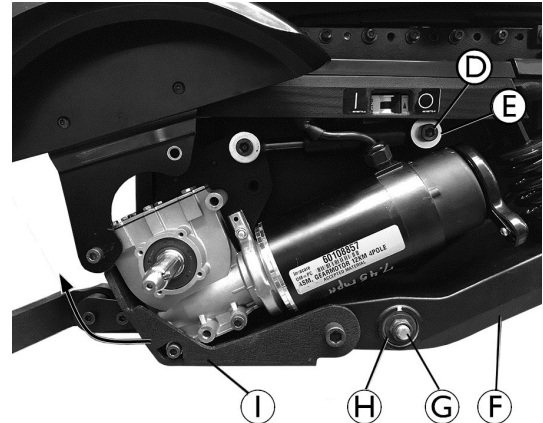


Fig. 6-29

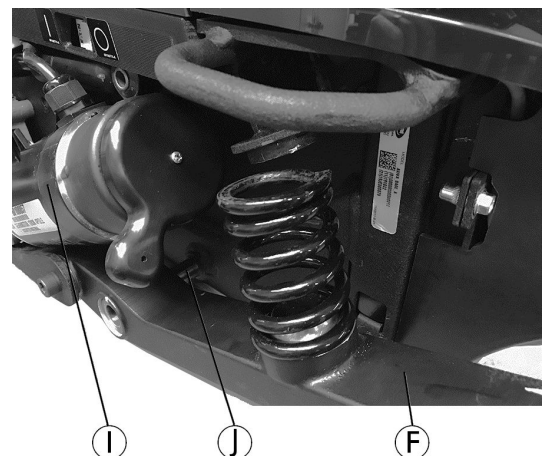


Fig. 6-30

6.7.9 Replacing Castor Fork



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

Removing Castor Fork

1. Place wooden block underneath mobility device and prop up mobility device.
2. Remove cap **A**.
3. Loosen and remove nut **B**, washer **C** and spacer **D** that secure castor fork **E** to swing arm **F**.
4. Remove fork downwards.

Installing Castor Fork

1. Install parts in reverse order.
2. Tighten hardware until castor spins 1.5 times around when spun by hand.
3. Check all moveable parts for ease of movement.
4. Install cap

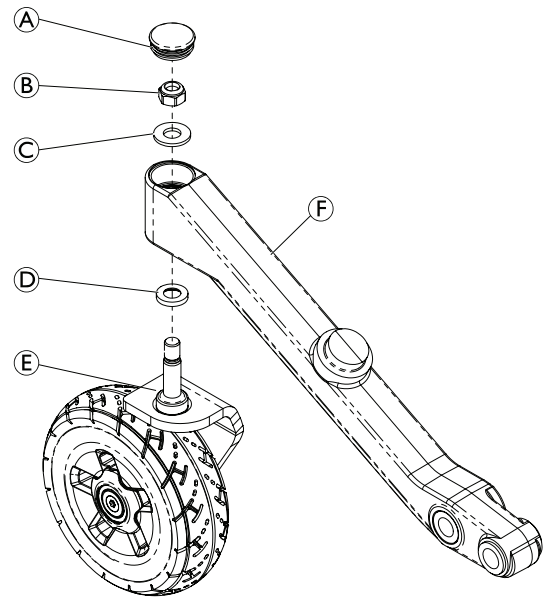


Fig. 6-31

Adjusting Castor Fork

1. Remove cap **A**.
2. Prop up mobility device.
3. Spin castor **C**.
4. Adjust nut **B** until castor spins 1.5 times around when spun by hand.
5. Place mobility device on the ground again.
6. Test maneuverability of mobility device.
7. Repeat adjustment procedure if necessary until castors are correctly adjusted.
8. Install cap.

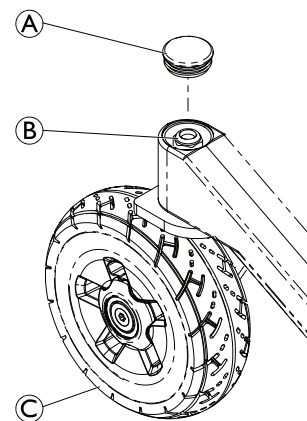


Fig. 6-32

6.8 Wheels

6.8.1 Repair Instructions



CAUTION!

Risk of damage or injury if the mobility device is accidentally set into motion during repairs

- Switch the power off (ON/OFF Button).
- Engage the motors.
- Secure the mobility device against rolling away by placing wedges under the wheels.



CAUTION!

Risk of hands and feet being crushed by the weight of the wheelchair

- Pay attention to your hands and feet.
- Use the correct lifting techniques.

6.8.2 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
38	2.6
39	2.7
41	2.8
42	2.9
44	3.0

6.8.3 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 several chapters about tyre repair and wheel replacement. Not all chapters are necessarily contained in this manual.

- For AVIVA FX and AVIVA RX: *6.8.6 Replacing Drive Wheel (1-Bolt Installation), page 37*
- For Bora, Fox and Kite: *Replacing Drive Wheel (1-Bolt Installation)*
- *Replacing Castor Wheel on Double-Sided Fork*
- *6.8.7 Replacing Castor Wheels on Single-Sided Fork, page 38*
- *6.8.8 Replacing Tyres, page 39* deals with tube repair and replacing solid tyres.



Specific tightening torques for wheels and rim halves are listed in *6.8.4 Specific Tightening Torques, page 35*.

6.8.4 Specific Tightening Torques

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





































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

6.8.5 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 (1-Bolt Installation)			
TDX SP2												
Storm⁴ Series												

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 (1-Bolt Installation)	
Kite					  		  		
Bora		 	 						
Fox		 							
Stream						 			
Mirage			 						
Dragon			 						
Pronto M41									
AVIVA RX									  
AVIVA FX									 

* 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 ⁴ Series									□ ■ ■	□ ■ ■
Kite							* * □ ■		□ ■ ■	□ ■ ■
Bora		■		□ ■	■		□ ■			
Fox		■	■							
Stream							■			
Mirage		■	□ ■		■					
Dragon							■			
Pronto M41	■									
AVIVA RX						■		□ ■ ■		
AVIVA FX						■				

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

6.8.6 Replacing Drive Wheel (1-Bolt Installation)

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



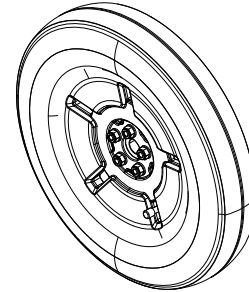
CAUTION!
Risk of Crushing to Hands and Feet by Weight of Mobility Device
 – Pay attention to hand and feet.
 – Use proper lifting techniques.

**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
- Torque wrench
- Oblong wooden block (at least 12 x 12 x 30 cm) for propping up mobility device



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.

1. Remove legrests.
2. Place wooden block under frame to prevent mobility device from rolling away.
3. Remove rim cap.
4. Loosen and remove nut and washer which secure wheel.
5. Remove wheel from hub.
- 6.

**CAUTION!****Risk of Injury if Wheels Come Off**

- If drive wheels are insufficiently tightened during assembly, they can come off during driving.
- Always use new screws with undamaged coating.
 - Tighten screws to prescribed torque when mounting drive wheels.

Install parts in reverse order.

7. When installing wheel, pay attention to correct direction of rotation.

6.8.7 Replacing Castor Wheels on Single-Sided Fork

- 24 mm wrench
- Oblong wooden block (at least 14 x 14 x 30 cm)

**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. Remove nut and washer from bolt.
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 6.8.4 *Specific Tightening Torques*, page 35.

Replacing Castor Wheel (AVIVA FX, AVIVA RX, TDX SP2)

- TX30 Torx key (TDX SP2)
- TX40 Torx key (AVIVA FX, AVIVA RX)
- Oblong wooden block (at least 14 x 14 x 30 cm)



Removing Wheel

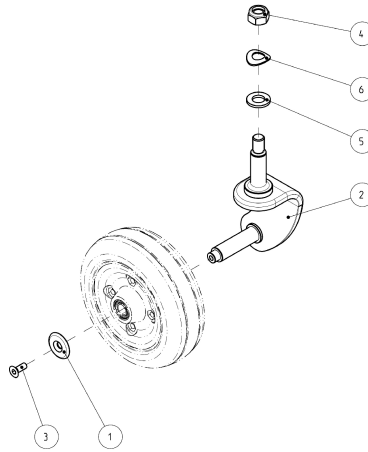


Fig. 6-33

1. Loosen and remove screw (3) including washer (1).
2. Remove castor.
3. Replace castor.

Installing Wheel

1. Install parts in reverse order.
2. When installing wheel, pay attention to correct direction of rotation.
3. Tighten screw (3).

6.8.8 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.

- 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.

-

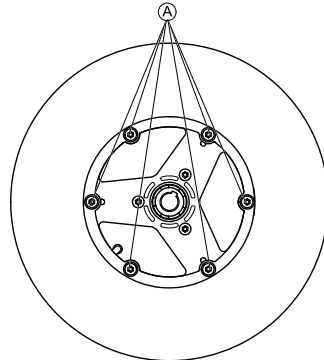


Fig. 6-34 This picture is an example.

Remove screws (A) on inside of wheel.

- Remove rim halves from wheel.
- Remove inner tube from tyre.
- 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.

- Install tyre in reverse order.
- Apply rim halves to wheel.
- Inflate tyre a little.
- Place screws in wheel rim and tighten screws with prescribed torque. Make sure that inner tube is not clamped between wheel rim halves.
- Make sure that tyre is contacting wheel rim directly.
- Inflate tyre to prescribed pressure.
- Make sure that tyre is still closely contacting wheel rim.
- Screw valve cap on.
- 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.

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

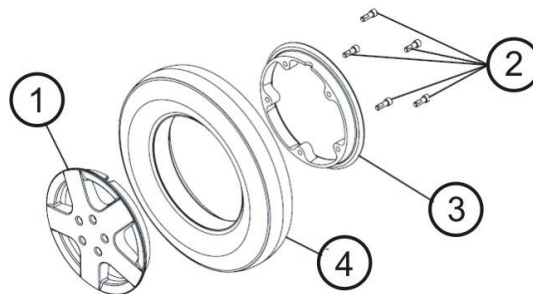


Fig. 6-35

Loosen and remove screws (2) on inside of wheel.

- Loosen joiner's clamps carefully and alternately until you can remove rim halves without risk.
- Remove inner (3) and outer (1) half of rim from tyre (4).
- Replace any defective or worn parts.
- 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.

6.8.9 Replacing Anti-Tipper Unit

-  • 6 mm Allen key
-  • 8 mm Allen key
- Oblong wooden blocks (at least 14 x 14 x 30 cm)

1. Place wooden blocks underneath mobility device and prop up mobility device.
2. Remove drive wheel. Refer to 6.8.6 *Replacing Drive Wheel (1-Bolt Installation)*, page 37.
3. Remove rear shock damper screw **A** and washer **B**.
4. Rotate motor/gearbox weldment **C** to expose anti-tipper hardware.

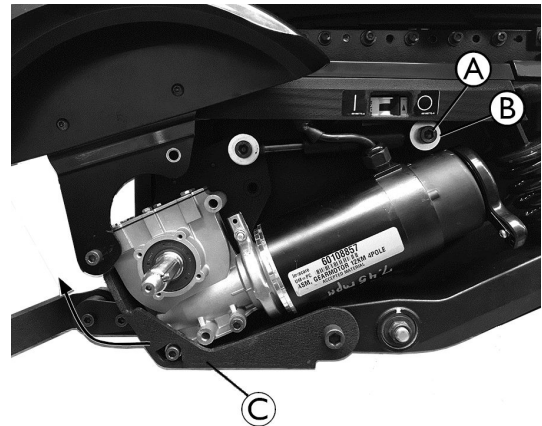


Fig. 6-36

5. Remove screws **E**, anti-tip plate **D**, shock absorber insert **F** and solid stop **H** securing anti-tipper arm **G** to anti-tipper frame **I**.
6. To remove anti-tipper wheel, refer to 6.8.10 *Replacing Anti-Tipper Wheels*, page 42.
7. Install parts in reverse order.



Note the orientation of some items:

- Shock absorber inserts and solid stops should be towards the front of the mobility device.
- Anti-tipper arms should be oriented as shown in the graphic.



Tighten the hardware as listed below:

- Anti-tipper arm screws **E** to 27 Nm
- Shock damper screw **A** to 40.7 Nm

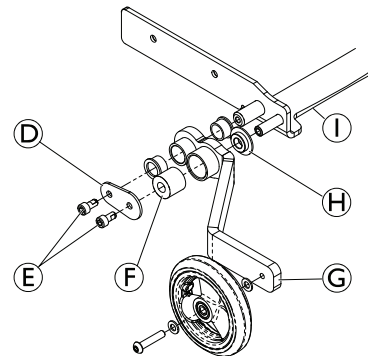



Fig. 6-37 Only one anti-tipper arm shown. Both sides installed the same way.

6.8.10 Replacing Anti-Tipper Wheels

-  • 5 mm Allen key
- Medium-strength thread locking adhesive (Loctite 242 or similar)

1. Remove bolt **A** and washers **B** securing anti-tipper wheel **C** to anti-tipper arm **D**.
2. Tighten new anti-tipper wheel to anti-tipper arm with new bolt and washers.
3. Apply thread locking adhesive on bolt.
4. Tighten bolt to 13.6 Nm.

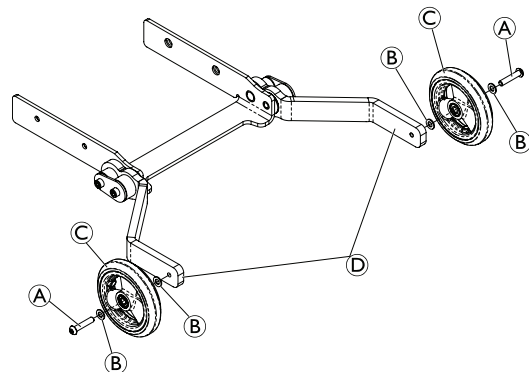


Fig. 6-38

6.9 Electronics

6.9.1 Replacing Power Module



- 8 mm socket wrench
- Torque wrench

Removing Module

1. Remove rear shroud, refer to 6.6.1 *Replacing Rear Shroud, page 21*.
2. Note the location of each cable connected to the power module (A) for proper reinstallation.
3. Disconnect the motor cables (C), main power cable (D), LiNX bus (to seating) cable (E), lighting cable, and actuator cable from the power module.



Not all cables are shown.

4. Remove the two nuts (B) securing the power module (A) to the rear battery door.
5. Remove the power module from the battery door.

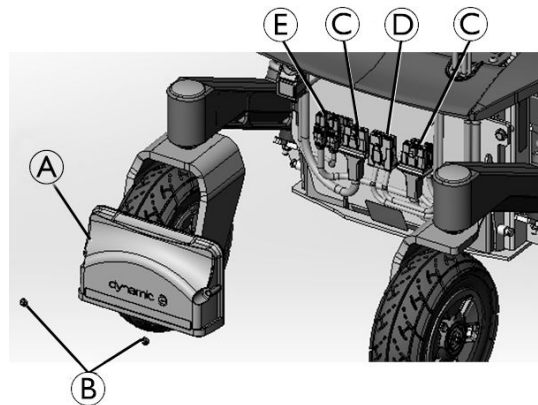


Fig. 6-39

Installing Module

1. Reverse this procedure to install the power module. Torque nuts to 6 Nm.
2. Connect and secure the power module cables in the locations noted earlier in this procedure.
3. Refer to the LiNX Service manual for power module programming information.
4. Test all functions.

6.9.2 Replacing G-Trac Sensor



- 10 mm wrench

Removing Sensor

1. Switch controls OFF.
2. Remove rear shroud, refer to 6.6.1 *Replacing Rear Shroud, page 21*.
3. Take note of positions of all cables and the sockets that they are connected to. Mark connectors and sockets or take a photo with digital camera.
4. Loosen and remove self locking nut (A).
5. Remove sensor (B) from battery door (C).
6. Disconnect sensor cable from power module.

Installing Sensor

1. Install sensor in reverse order.
2. Connect cable connectors to power module.
3. The sensor must be installed with cable pointing downwards.
4. Test all functions.

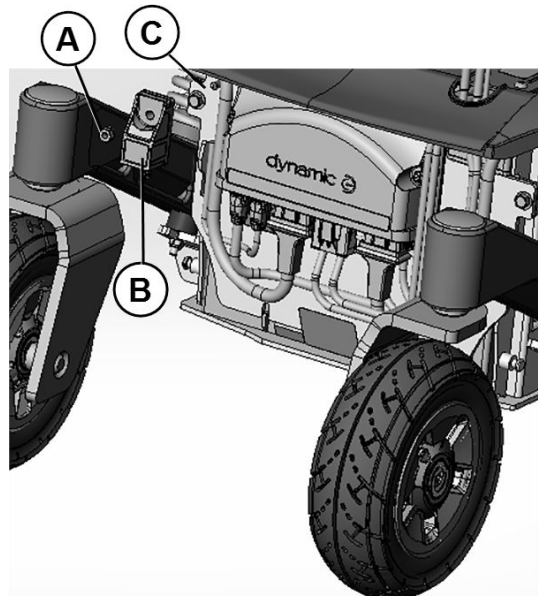


Fig. 6-40

6.9.3 Replacing Cable Harness

According to the configuration of the mobility device different variants of the cable harness are used. The course of action is the same for all variants.



If you want to retrofit an option, such as light, it may require a new cable harness.

1. Remove right power module shroud.
2. Unplug all cables on power module.
3. Remove rear shroud. If fitted, unplug cables of rear lights.
4. Unplug all cables between chassis and seating system.
5. Remove battery shroud.
6. Remove batteries.
7. Remove main frame shrouds.
8. If fitted, unplug cables of headlight.
9. Replace cable harness.
10. Install parts in reverse order.
11. Test all functions.

6.9.4 Updating Software

See LiNX service manual.

6.10 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.

6.10.1 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.

6.10.2 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.

6.10.3 Replacing Batteries



- 10 mm wrench
- Torque wrench

Removing Batteries

1. Make sure that circuit breaker is in the OFF position.
2. Remove rear shroud, refer to 6.6.1 *Replacing Rear Shroud*, page 21.
3. Disconnect left motor cable ② from power module ①.

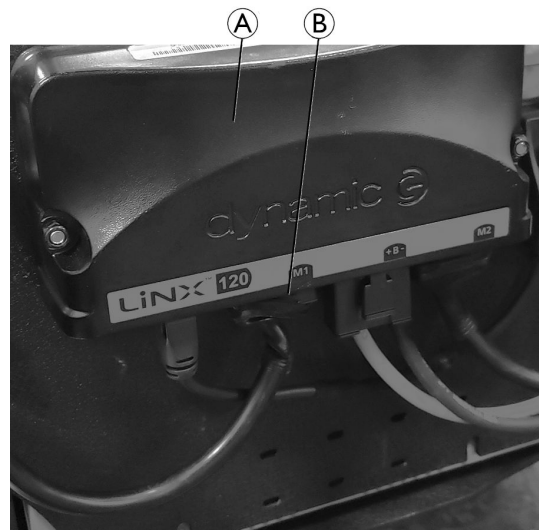


Fig. 6-41

4. Remove bolts ④ .
- 5.



The power module ① and G-Trac sensor ⑤ remain attached to the battery door assembly during the following procedure.

Lift up and pull back to remove the battery door assembly ⑥ from the battery box ③.

6. Swing battery door assembly with power module and attached cables over the right rear swing arm and gently place on the ground.

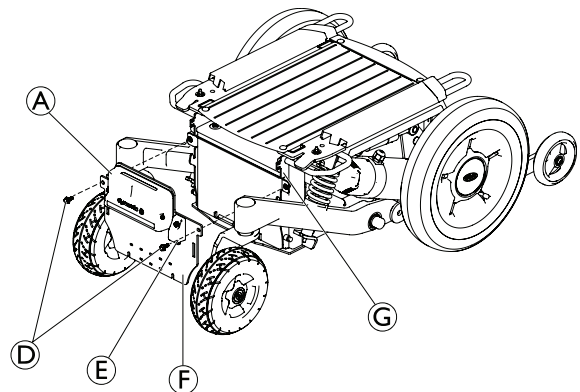



Fig. 6-42

7. Disconnect rear battery harness ① (red handle).
 8. Slide rear battery ⑥ out of battery box.
-  Ensure battery cable covers (not shown) do not snag on cables attached to the power module.

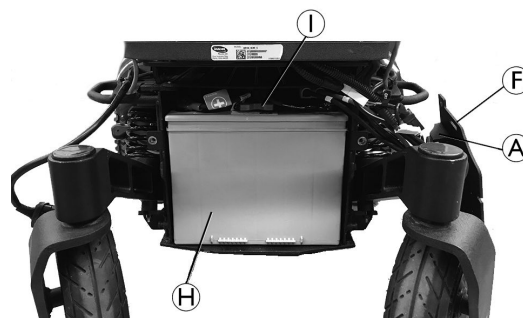



Fig. 6-43

Removing Front Battery

9. Remove front shroud, refer to 6.6.4 Replacing Front Shroud, page 23.
 10. Remove front battery harness ① (red handle).
 11. Slide front battery ⑫ out of rear of battery box.
-  Ensure battery cable covers (not shown) do not snag on cable clips ⑬ inside of battery box.

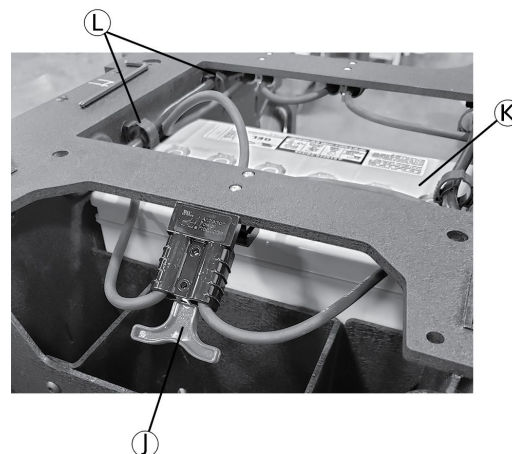




Fig. 6-44

Installing Batteries

 Batteries must be installed in the orientation specified for proper connection.

Installing Front Battery

1. Slide front battery ⑫ into rear of the battery box with the connector oriented towards the front of mobility device.
-  Ensure battery cable covers (not shown) do not snag on cable clips ⑬ inside of battery box.
2. Connect front battery harness ① (red handle).
 3. Install front shroud, refer to 6.6.4 Replacing Front Shroud, page 23.

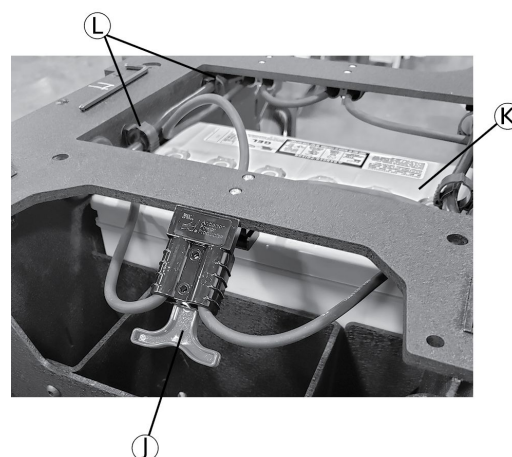


Fig. 6-45

Installing Rear Battery

4. Slide rear battery ⑥ into battery box with the connector oriented towards the rear of mobility device.
5. Connect rear battery harness ① (red handle).

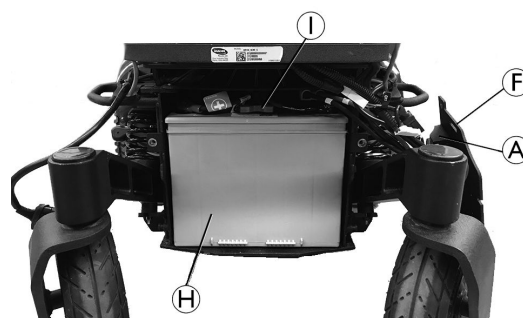



Fig. 6-46

6. Lift battery door assembly ⑥ with power module ① and attached cables over right rear swing arm and position it at the rear of battery box.
7. Lift up and install battery door assembly onto battery box.
 -  Ensure hooks of battery box are seated properly in the slots on battery box door. Power module and G-Trac sensor ⑤ remain attached to battery door assembly during this procedure.
8. Install bolts ④ to secure battery door assembly to rear of battery box ③. Tighten bolts to 10 Nm.

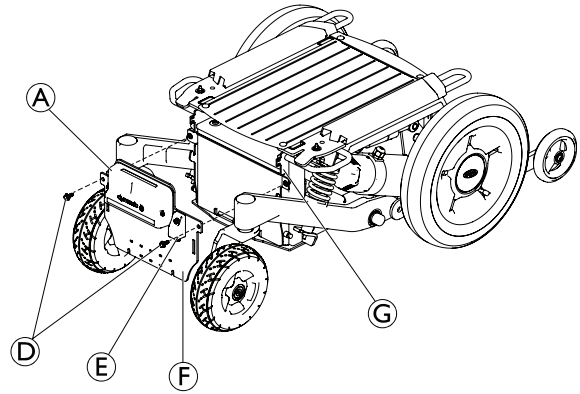


Fig. 6-47

9. Connect left motor cable ② to power module ①.
10. If tie wraps were removed, during removal procedure, replace missing tie wrap cables as noted in removal procedure.
11. Install rear shroud, refer to *6.6.1 Replacing Rear Shroud, page 21*.
12. Switch circuit breaker to ON position.





-  If installing new batteries, the battery synchronization procedure must be performed within 24 hours of powering on the mobility device. Otherwise the battery gauge does not display accurate battery charge levels. For more information refer to the LiNX service manual.



Fig. 6-48

6.10.4 Replacing Base Battery Harness

-  • 4 mm Allen key
-  • Phillips screwdriver
-  • 6 mm socket wrench

1. Remove batteries. Refer to 6.10.3 Replacing Batteries, page 45.
2. Remove top shroud, refer to 6.6.3 Replacing Top Shroud, page 23.
3. Remove side shroud and side panel shroud on both sides, refer to 6.6.5 Replacing Side Shrouds, page 23.
4. Loosen screws **B** securing battery cables **A** to circuit breaker **C**.
5. Remove battery cables from circuit breaker.

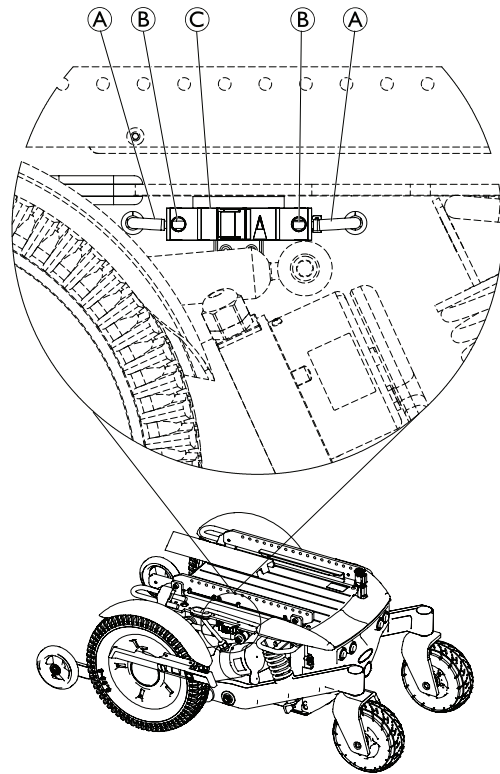


Fig. 6-49

6. Remove screws **D**, nuts **I** and washers **H** securing battery connectors **F** to frame.
7. Remove battery cable **J** from wire locking clips **K**.
8. Feed battery cables **G** through bushings **E** in battery box.
9. Remove base battery harness assembly from battery box.
10. Replace wire locking clips.
11. Replace bushings in battery box.

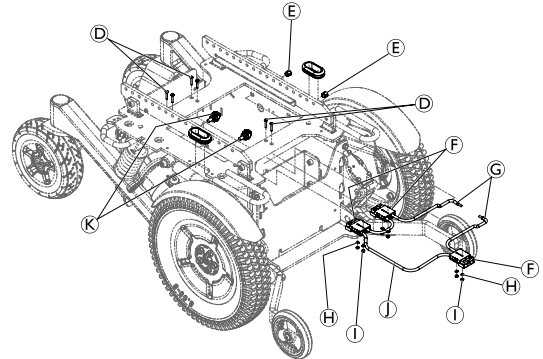


Fig. 6-50

12. Examine motor cables **L** and note routing, tie wrap locations and connection to power module **N**. Take a photo if necessary.
13. Disconnect motor cable from power module.
14. Cut tie wraps **M** securing motor cables.
15. Feed motor cables through rubber grommets **O**.
16. Replace rubber grommets.
17. Install parts in reverse order.

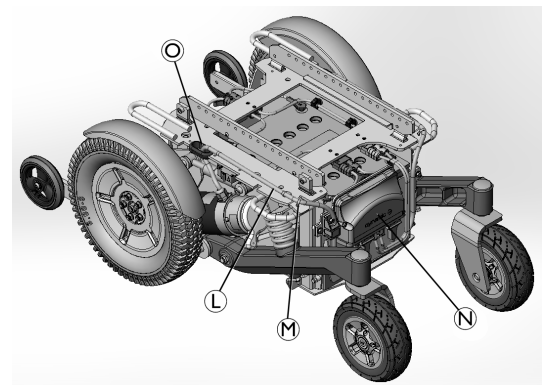




Fig. 6-51

 Install all cable ties in the location noted when the motor cable was removed. Make sure to tie motor cable to frame at the locations indicated.

-  Tighten the hardware as listed below:
- Battery connector nuts **I** to 1.8 (2) Nm
 - Circuit breaker screws **B** to 1.8 (2) Nm
 - Side panel shroud screws to 2.8 (3) Nm

6.10.5 Replacing Battery Cables



WARNING!

Risk of death or serious injury

Failure to observe these warnings can cause an electrical short resulting in death, serious injury, or damage to the electrical system.

- The POSITIVE (+) RED battery cable MUST connect to the POSITIVE (+) battery terminal(s)/post(s). The NEGATIVE (-) BLACK battery cable MUST connect to the NEGATIVE (-) battery terminal(s)/post(s).
- NEVER allow any of your tools and/or battery cable(s) to contact BOTH battery post(s) at the same time. An electrical short may occur and serious injury or damage may occur.
- Install protective caps on positive and negative battery terminals.
- Replace cable(s) immediately if cable(s) insulation becomes damaged.
- DO NOT remove fuse or mounting hardware from POSITIVE (+) red battery cable mounting screw.



- Torque wrench



Battery cable © polarity — POSITIVE (+) or NEGATIVE (-) — is determined by the label and terminal cover (not shown) colour. Battery cable polarity is NOT determined by the markings on the battery connector ②.

1. Remove batteries. Refer to *Removing Batteries in chapter 6.11.3 Replacing Batteries, page 45*.
2. Note orientation of battery cables © on batteries ⑤.
3. Slide battery terminal covers (not shown) back on battery cables to expose battery terminals ⑥.
4. Remove screws ① securing battery cables to battery terminals.
5. Discard existing battery per local laws and regulations. Refer to user manual for information about Disposal.
6. Orient battery cables as noted in Step 2.
7. Secure NEGATIVE (-) battery cable to NEGATIVE (-) battery terminal with existing mounting screw. Tighten screw to 6 Nm.
8. Secure POSITIVE (+) battery cable to POSITIVE (+) battery terminal with existing mounting screw. Tighten screw to 6 Nm.
9. Position each battery terminal cover (not shown) over top of each battery terminal.
10. Install batteries into mobility device. Refer to *Installing Removing Batteries in chapter 6.11.3 Replacing Batteries, page 46*.

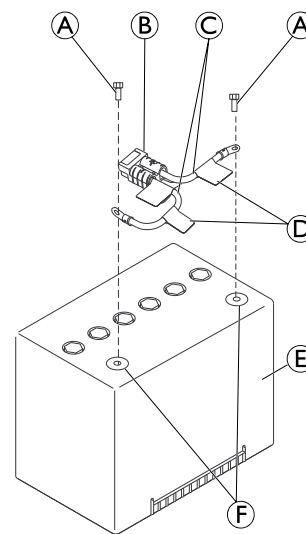



Fig. 6-52

6.10.6 Replacing Circuit Breaker

-  • 4 mm Allen key
- Phillips screw driver

1. Make sure that circuit breaker is in the OFF position.
2. Remove side shroud and side panel shroud. Refer to *6.6.5 Replacing Side Shrouds, page 23*
3. Loosen screws **B** securing battery cables **A** to circuit breaker **C**.
4. Remove battery cables from each side of circuit breaker.

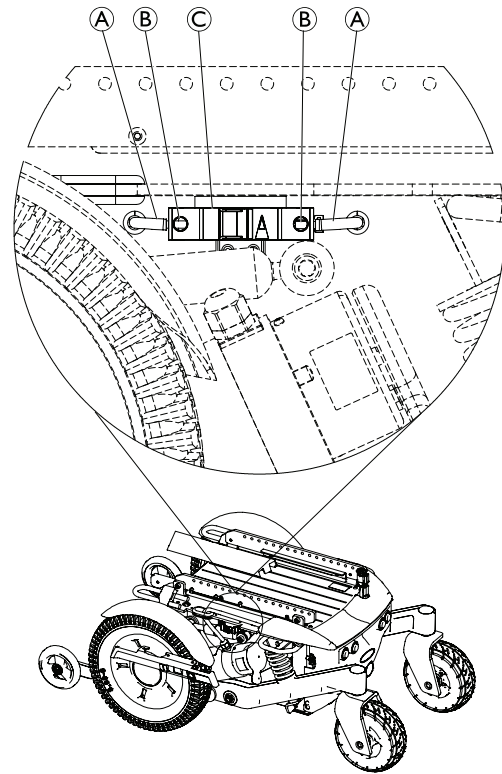




Fig. 6-53

5. Pull tab **D** on back right side of circuit breaker and rotate right side of circuit breaker away from bracket (not shown).
6. Remove circuit breaker from bracket (not shown).
7. Remove foam **E** from top of circuit breaker **C**.
8. Install parts in reverse order.

 If needed, loosen circuit breaker screws fully for additional clearance to seat battery cables during installation.

-  Tighten the hardware as listed below:
- Screws securing battery cables to 2 Nm
 - Side panel shroud screws to 3 Nm

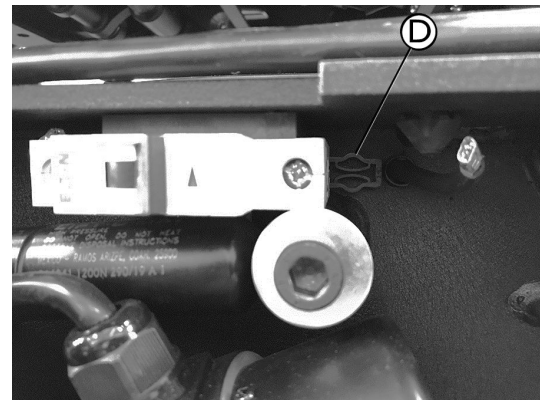


Fig. 6-54

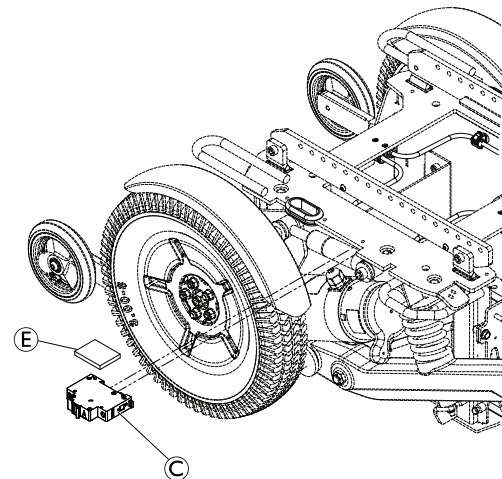


Fig. 6-55

6.10.7 Cleaning Battery Terminals



WARNING!

Risk of Injury

Exposure to battery acid may result in injury.

- The use of rubber gloves is recommended when working with batteries.
- Do not allow the liquid in the battery to come in contact with skin, clothes or other possessions. It is a form of acid and harmful or damaging burns may result. Should the liquid touch your skin, wash the area IMMEDIATELY and thoroughly with cool water. In serious cases or if eye contact is made, seek medical attention IMMEDIATELY.
- Do not install / reinstall a battery with a cracked or otherwise damages case.

1. Examine battery terminals for corrosion.
2. Verify plastic caps are in place over battery cell holes.
3. Clean terminals by using battery cleaning tool, wire brush or medium grade sand paper.



Upon completion, areas should be shiny not dull.

4. Carefully dust off all metal particles.

6.10.8 Checking Cables

1. Turn off electronics on remote.
2. Remove rear shroud. See *6.6 Shrouds, page 21*.
3. Remove batteries. See *6.10 Batteries, page 44*.
4. Check all cables for visible damage, crushing points or abrasion points.
5. Replace damaged cables.
6. Pull on each plug carefully. The plug must not come out of its socket when pulled on lightly.
7. If a plug is loose, apply slight pressure to push plug into socket. The plug must snap in place securely.
8. Check that plug is firmly attached to its socket.
9. Install parts in reverse order.
10. Test all functions.

6.10.9 Replacing Battery Doors



- 4 mm socket wrench

Replacing Battery Front Door

1. Remove front shroud. Refer to *6.6.4 Replacing Front Shroud, page 23*.
2. Remove screws **A** securing front battery door **B** to front shroud **C**.
3. Remove front battery door.
4. Install parts in reverse order.

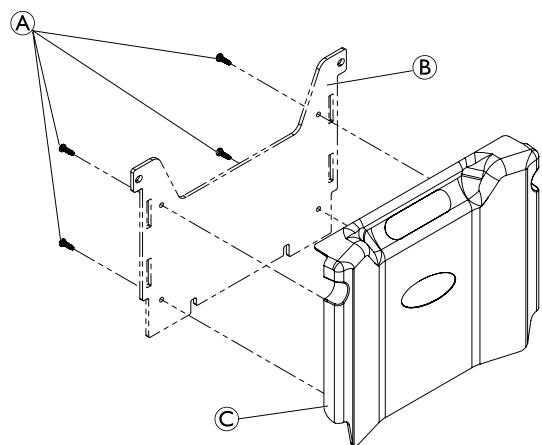




Fig. 6-56

Replacing Rear Battery Door

1. Remove rear shroud. Refer to *6.6.1 Replacing Rear Shroud, page 21*.
2. Note location of each cable connected to power module ③ for proper reinstallation.
3. Note location of tie wraps (not shown) securing cables connected to power module.
4. Remove self locking nut ⑥ securing G-Trac sensor ⑤ to rear battery door ① and remove G-Trac sensor.
5. Disconnect motor cables ②, main power cable ④, LiNX Bus cable ⑤, lighting cable and actuator cable from power module.

 Not all cables are shown in the graphic. It is not necessary to disconnect the G-Trac sensor cable from the power module.

6. Remove nuts ⑧ and power module from battery door.
7. Remove bolts ⑨ securing battery door to rear of battery box ①.
8. Remove rear battery door from battery box by lifting up and pulling back rear battery door.
9. Install parts in reverse order.

-  Tighten the hardware as listed below:
- Battery door bolts ⑨ to 10 Nm
 - Power module nuts ⑧ to 6 Nm
 - G-Trac sensor nut ⑥ to 3 Nm

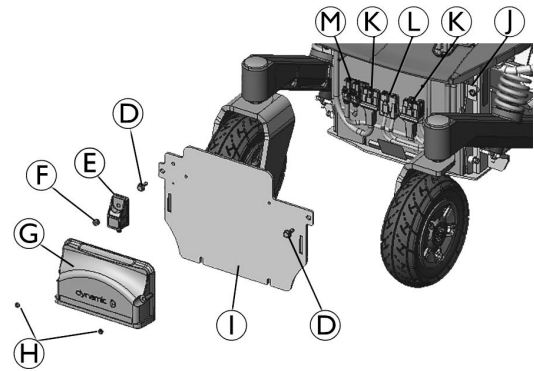


Fig. 6-57

6.11 Lighting unit

6.11.1 Replacing Headlight



- 4 mm Allen key
- 6 mm Allen key
- 10 mm socket wrench
- 19 mm socket wrench

1. Remove drive wheel. Refer to *6.8.6 Replacing Drive Wheel (1-Bolt Installation)*, page 37.
2. Remove top screws **B** securing fender bracket **A** to gearbox **C**.

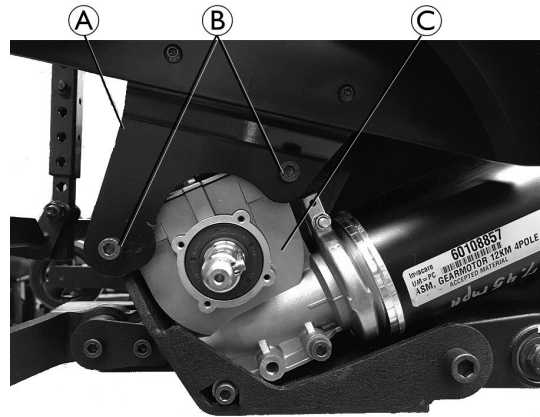


Fig. 6-58

3. Disconnect headlight cable **F**.
4. Remove nuts **H** securing fender **D** and light bracket **G** to fender bracket **E**.
5. Remove light bracket.
6. Install parts in reverse order.



Tighten the hardware as listed below:

- Light bracket nuts **H** to 4 Nm
- Fender bracket screws **B** to 18 Nm
- Drive wheel nut to 61 Nm

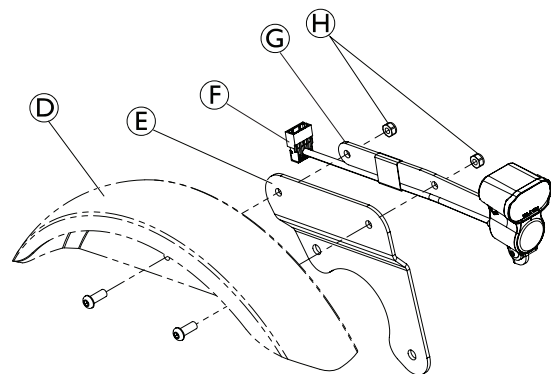


Fig. 6-59

6.11.2 Replacing Rear Light

This component is not serviceable. Replace the bottom part of the rear shroud instead.

6.12 Seating

This chapter deals with the replacement of interface components between the base of the mobility device and the corresponding seating system.

For detailed instructions on the seating system, see the service manual of the corresponding seating system.

6.12.1 Replacing Height Adjustment Bracket — Tilt and Lifter-Tilt Modules

This chapter deals with replacing the height adjustment brackets for a seat with tilt or lifter-tilt module. Replacing the brackets by other variants (see spare parts catalogue) allows to retrofit another seat height to the mobility device.



CAUTION!

Risk of Crushing to Hands and Feet by Weight of Component

- 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.



- 5 mm Allen key
- 6 mm Allen key
- Oblong wooden blocks (at least 6 cm x 6 cm x 30 cm)

1. Unplug all cables from the electronic modules which run from seat to chassis.
2. Loosen and remove screws **A**, spring washers **B** and washers **C** from seat height bracket **D** on both sides.
3. Remove seat (not shown for clarity) with lifter-tilt module **E** from chassis.
4. Place seat with module on wooden blocks.

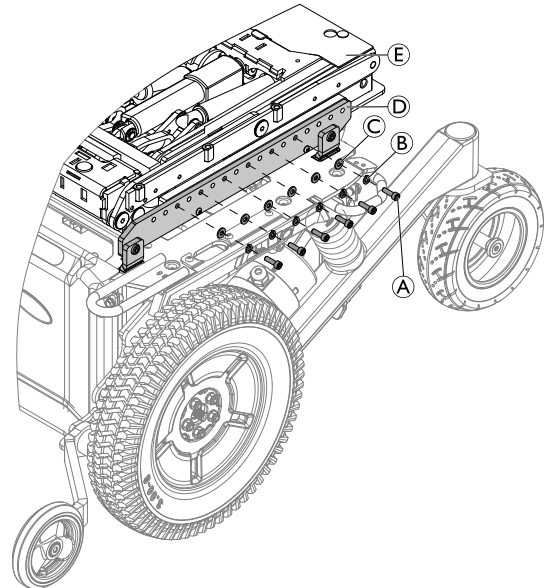


Fig. 6-60

5. Loosen and remove screws **F** on both sides.
6. Replace seat height brackets **D** on both sides.
7. Adjust desired seat to floor height with holes **G**, in seat height bracket.
See below more information about the seat to floor height.
8. Re-install screws **F**. Tighten screws.
9. Place seat with module on chassis.
10. Install screws **A** spring washers **B** and washers **C**. Tighten screws.
11. Plug in all cables.
12. Test all functions.

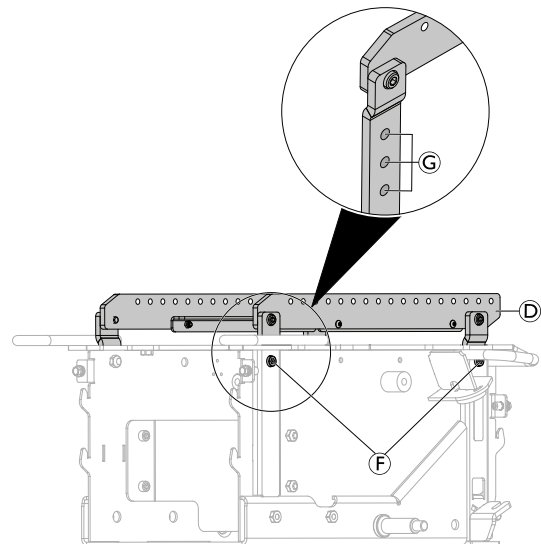


Fig. 6-61

There are two different brackets available for adjusting the seat to floor height:

- Ⓐ Seat to floor height 470 mm
- Ⓑ Seat to floor height 495 mm
- Ⓒ Seat to floor height 520 mm

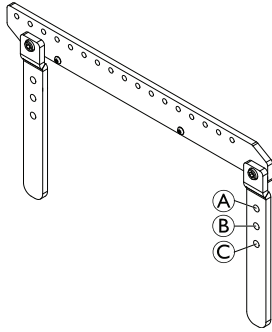


Fig. 6-62

- Ⓓ Seat to floor height 440 mm

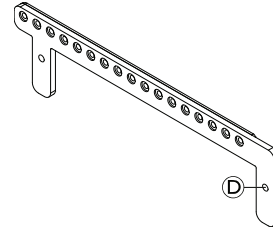


Fig. 6-63

7 Mounting Adaptation Kit for Dahl Docking Systems MK II and Variodock

Installation of Dahl Docking Stations in Vehicles

Only professional companies in the business of converting or building wheelchair accessible vehicles can order the docking system from Dahl Engineering. A qualified and experienced technician must carry out the installation. Dahl Engineering can provide vehicle specific installation instructions for a large range of vehicles, which must be respected by the fitter. Please contact Dahl Engineering for further information about approved vehicles and fitting positions. Dahl Engineering contact details are available at: www.dahlengineering.dk.



NOTICE!

Do not use any other screws than those supplied by Dahl Engineering (Part No. 502800).
– Standard countersunk M8 screws are not strong enough in the event of a collision.

To install the locking plate use Dahl adaptation kit (Part No. 501540).

Dahl Engineering offers two Dockings systems, the MK II (Dahl No. 501750), and a new power height adjustable called Dahl VarioDock (Dahl No. 503600).

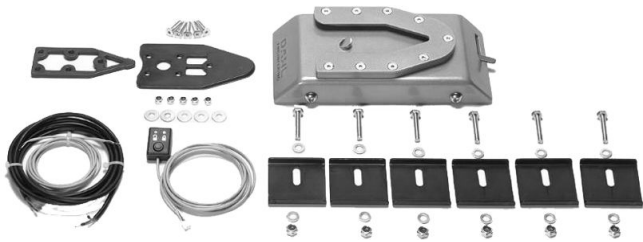


Fig. 7-1 MK II (Dahl No. 501750)



Fig. 7-2 VarioDock (Dahl No. 503600)



For more information about spare parts, accessory/option part installation in vehicles and maintenance of the Dahl Docking system, contact Dahl Engineering www.dahlengineering.dk.



The maximum kerb weight of the mobility device must not exceed 200 kg.



- TX27 Torx key
- Low-strength thread locking adhesive (Loctite 222 or similar)

1. Remove batteries. See *Removing Batteries*.
2. Place nuts **A** in predrilled holes in plate **B** and battery box **C** with the recess down.
3. Mount plate **B**, 8 mm spacer **D** and lock plate **E** with screws **F** (Part No. 502800) to nuts **A**.
 - i** 8 mm spacer is mandatory. Additional spacers can be mounted to lock plate.
4. Tighten screws (16 - 18 Nm).

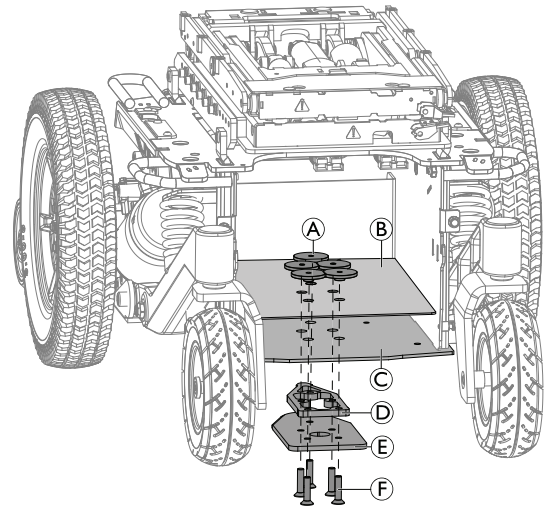


Fig. 7-3

5. Mark where to cut screws **F**.
6. Remove screws **F**, lock plate and 8 mm spacer.
7. Cut screws.

i It is very important to check correct length of screws. If screws are too short to reach through threads, screws do not have strength to carry required load. If screws are too long, batteries or other components can be damaged. If screws are cut too short, replace them with original Dahl screws only.

8. Apply thread locking adhesive on screws.
9. Mount, 8 mm spacer and lock plate again with screws **F** to plate **B** and nuts **A**.
10. Tighten screws (16 - 18 Nm).
11. Place plastic spacers **C** on plate **B** inside the battery box **C**, to avoid batteries coming into contact with the nuts and bolt ends.
12. Connect mobility device with Dahl Docking station. Make sure lock plate is securely locked and all release methods work as intended. For more information about using the Dahl Docking system, see user manual.

i A warning tone will sound if lock plate is not properly engaged.

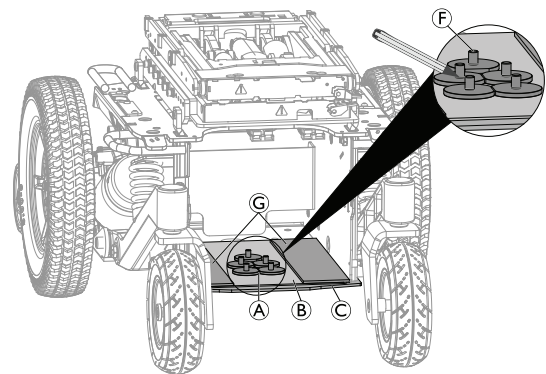


Fig. 7-4

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