



Invacare®

G40 with ACS-System



SERVICE - MANUAL

The manual contains:

Information on troubleshooting

Information on testing parts

Repair instructions

Edition: 12.2001



General information

This service manual contains all information necessary for maintenance and servicing of the "G40" wheelchair.

- Maintenance and servicing work is to be carried out in accordance with this service manual.
- Comply with all safety instructions
- Information on operation, general maintenance and servicing can be found in the operating manual of "G40".
- Refer to the replacement parts catalog for information on ordering replacement parts.
- Maintenance and repair work on the "G40" may onla be performed by qualified personnel.

-Maintenance technicians should at least be trained in a relevant field, e.g. as a two-wheeled vehicle or orthopaedics technician, or have an equivalent amount of professional experience.

-Personnel should also be familiar with electrical measurement equipment (multimeters).

- Should you encounter difficulties or have any questions, please contact INVACARE-SERVICE:

Switchboard: Tel. +049 (0)5731-754-0

Fax. +049 (0)5731-754-111

Service: Tel. +049 (0)5731-7545-(70-80)

Fax. +049 (0)5731-7542-(08-16)

Adress: Invacare Deutschland GmbH

Dehmer Str. 66

D-32549 Bad Oeynhausen

PO Box: Invacare Deutschland GmbH

Postfach 60 01 06

D-32 527 Bad Oeynhausen

- INVACARE can not be held liable for changes to the "G40" resulting from maintenance and servicing work carried out incorrectly or not according to the relevant instructions.

Information concerning transportation

- If the wheelchair has to be sent away to the manufacturer for more serious repairs, always use the original packaging for transportation.
- Please include a detailed account of the fault.
- We reserve the right to make changes in the interests of technical progress.

You will notice the following symbols in this repair manual:

NOTE:

This symbol indicates general information concerning special features and helpful advice for installation.



ACAUTION:

Please pay special attention to this symbol. It indicates

>Safety instructions<.

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1.0 Safety and installation instructions

The safety instructions are provided in the interests of working safety and must under all circumstances be complied with.

Prior to all inspection and repair work:

- Read this service manual and the appertaining user manual.
- Ensure that minimum qualifications for performing relevant work are fulfilled (see chapter entitled "General information").



Caution:

- *Note that some components are heavy. You should take this into account above all when removing the batteries.*
- *The power supply for the wheelchair must be switched off before any conductive parts are removed. Remove the batteries.*
- *When performing tests on conductive parts, ensure that the contacts are not short-circuited.
> Danger of fire and injury from burns <*
- *Only use tools which are in perfect working order and are not damaged.*

During work and assembly:

- Mark the current settings of the wheelchair (seat, armrests, back etc.) and the combination of cable connections before carrying out disassembly work. This will make assembly an easier task afterwards.



ACHTUNG:

- *Support the raised wheelchair with suitable supports before you begin assembly. Use the bottom tube frames of the chassis. Also see the illustration G40, bottom view, chapter 6.0.*
- *You should under no circumstances use "normal" nuts instead of self-locking nuts.*
- *Always use correctly-sized washers or separators.*

Note:

- All plug connectors are fitted with mechanical clamps which prevent slipping when the wheelchair is in operation.
- These clamps must be pressed in to release the connectors.
- When carrying out assembly work, ensure that the clamps are fitted properly.
- For checks and repair works you can fold up the seat system and arrest. This position is called service position.

Prior to initial use / after repair work:



Caution:

- *Check firm mounting of all fastening screws.*
- *Check that all parts are properly locked in place.*
- *Check regulation tyre pressure (2.5 bar) before starting the machine.*
- *Always perform a test-drive after repair work.*

2.0 List of tools

A standard toolkit comprising the following minimum inventory is required:

Combination ring and open-end spanner	SW 6, 7, 8, 10, 11, 12, 13, 17, 19
Allan key	2,5 mm, 3mm, 4mm, 5 mm, 6 mm, 8mm, 10mm
Torque wrench	(commercially available)
Socket spanner set	
Screwdrivers for slotted screws	various
Crosstip screwdriver	No.1, No.2
Side-cutting pliers	
Flat pliers	
Round pliers	
Cable lug pliers	
Wooden or plastic hammer	
Tyre repair set	(commercially available)
Air pressure gauge	
Valve extraction tools	
Special tool for removing wheel bearing	
Multimeter with test points and various cable clips	
Bridging cable	
Soldering iron 30W	
Assembly pliers for Starlock caps	(commercially available)
Removing tools for front wheel hub	(available by INVACARE-Service)

You will require the following for setting at the ACS control:

Programming unit	Item no.
Software package, incl. interface cable and dongle	Item no.

3.0 Inspecton plan

Component	Check	Action	Chapter	✓
Armrests and sides	<ul style="list-style-type: none"> • Damage to and attachment of armrests • Damage to and attachment of side panels • Mirrors 	<ul style="list-style-type: none"> > Tighten screws. Replace overlay. > Tighten screws. Replace sides. > Replace. 	7.1	
Seat	<ul style="list-style-type: none"> • Damage and screw fastenings, stitching 	<ul style="list-style-type: none"> > Tighten screws. Replace parts. 	7.5	
Backrest with safety belt	<ul style="list-style-type: none"> • Adjustment function • Damage and screw fastenings, stitching • Belt and belt buckle 	<ul style="list-style-type: none"> > Adjust or replace bowden wire, gas spring. > Tighten screws. Replace parts. > Replace. 	7.3	
Latching mechanism of seat in service position	<ul style="list-style-type: none"> • Damage and secure latching into place 	<ul style="list-style-type: none"> > Make moving > Tighten screws. Replace parts. 	7.5	
Chassis with frame, side grips and covering	<ul style="list-style-type: none"> • Screw attachments, welded joints, damages 	<ul style="list-style-type: none"> > Tighten, replace. 	8.1	
Wheel suspension and wheels	<ul style="list-style-type: none"> • Function and damage of shock absorbers • Wheel suspension • Wheel bearing • Tyre equipment 	<ul style="list-style-type: none"> > Replace. > Replace. > Adjust, replace. > Fit on new ones. 	8.2 bis 8.4	
Hand brake	<ul style="list-style-type: none"> • Function • Loose bowden wires, sleeves damaged • Wear, damage of brake discs and brake calipers 	<ul style="list-style-type: none"> > Adjust, replace. > Tighten, adjust, replace. > Replace. 	8.5	
Drive and steering assembly	<ul style="list-style-type: none"> • Check function in driving and freewheel operation • Check toggle link 	<ul style="list-style-type: none"> > Adjust, replace. > Adjust, replace. 	9.0	
Legrests	<ul style="list-style-type: none"> • Welded joint, lock, screw attachment • Footboard 	<ul style="list-style-type: none"> > Tighten, replace. > Tighten, replace. 	7.2	

Component	Check	Action	Chapter	✓
Batteries	<ul style="list-style-type: none"> • Damage of battery and box, corrosion on contacts • Check of contacts and pole clips • Check battery voltage 	<ul style="list-style-type: none"> > Clean contacts, replace battery or box > Tighten, replace. > Charge battery, replace. 	10.1 bis 10.2	
Light-servo module and lighting system	<ul style="list-style-type: none"> • Function servo- and light module • Damage of lights • Function of light bulbs 	<ul style="list-style-type: none"> > Replace cable, connector or module. > Replace lights. > Replace light bulbs. 	12.3 und 11.0	
Drive electronic and main module	<ul style="list-style-type: none"> • Status display flashes • Voltage supply 	<ul style="list-style-type: none"> > Replace module. > Replace cable, connector or module. 	12.1	
Drive electronic Remote	<ul style="list-style-type: none"> • Attachment • Cables, plug connections • Function joystick • Voltage supply 	<ul style="list-style-type: none"> > Tighten, replace. > Replace. > Replace remote. > Replace cable, connector or panel. 	12.2	
Speedometer	<ul style="list-style-type: none"> • Check function 	<ul style="list-style-type: none"> > Replace batteries, cable, connector, speedometer or sensor. 	12.4	

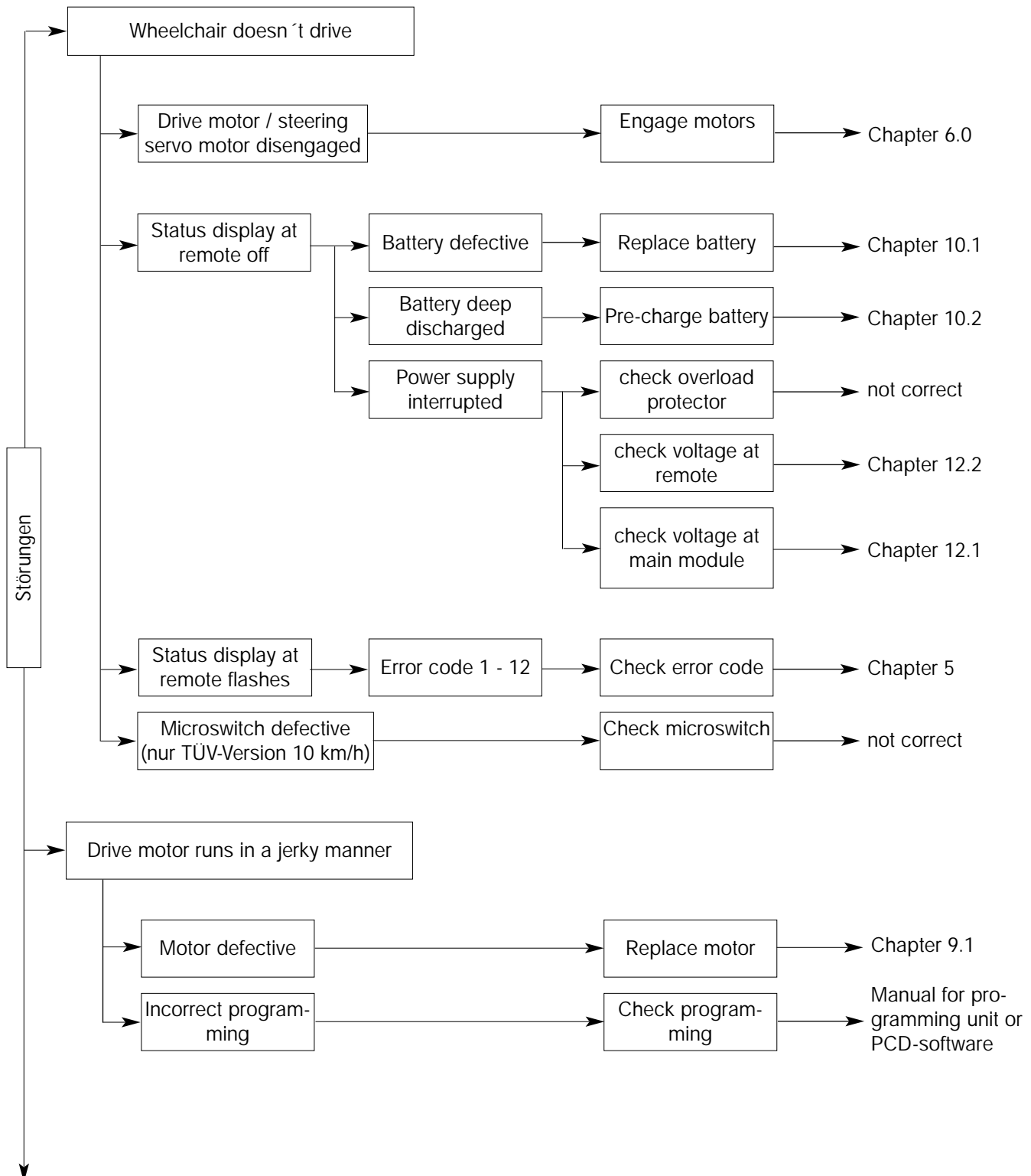
4.0 Operation troubles

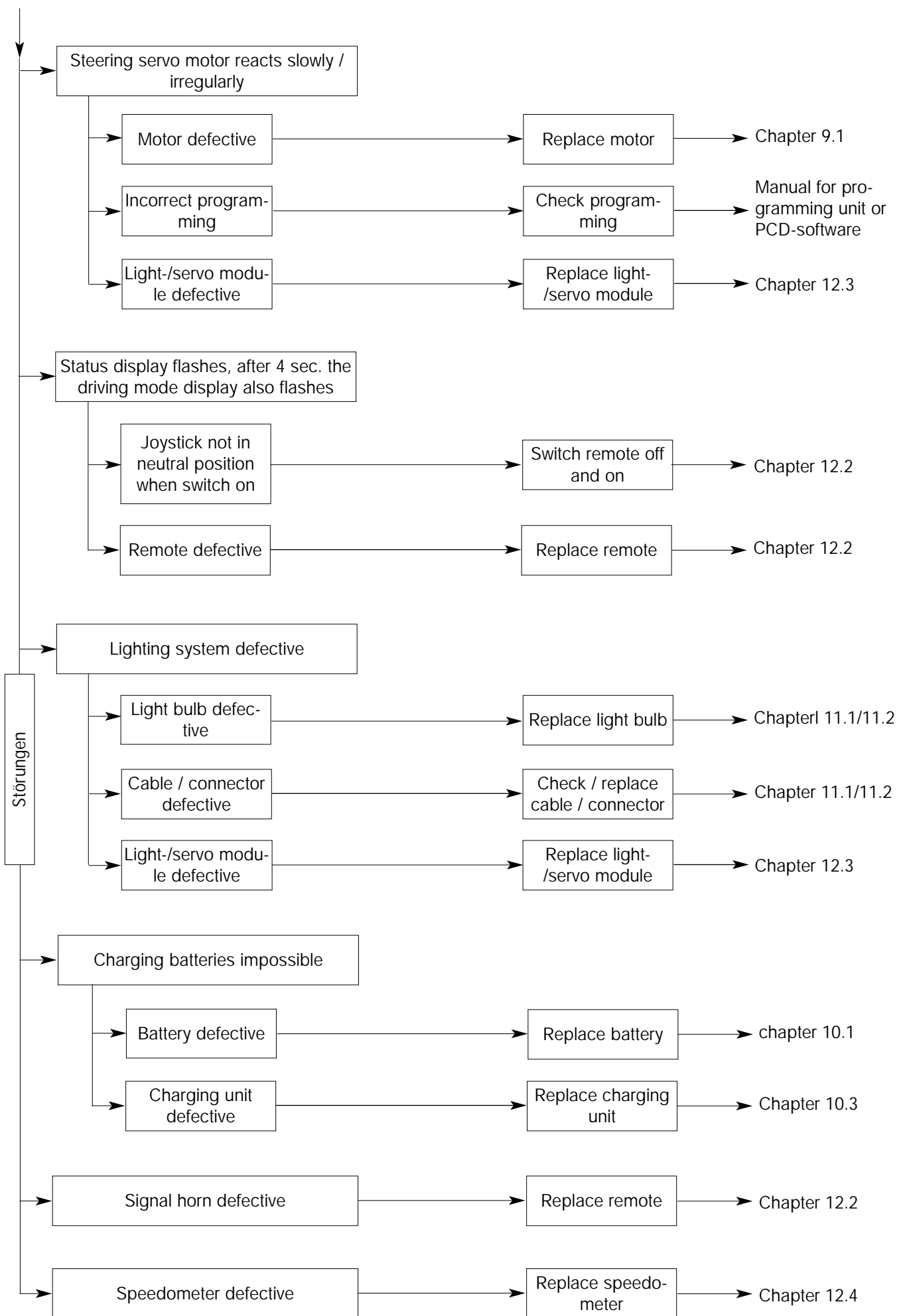
4.1 General instructions

Do the following if there are any troubles in driving mode, at lighting system or power supply:

- Analyze the in 4.2 described troubleshooting.
- Check the status display at remote and analyze the error codes like in chapter 5.1.
- Do the required checks / repair work. Note the cross references in the appertaining chapters in the manual or in the appertaining documentation.

4.2 Troubleshooting





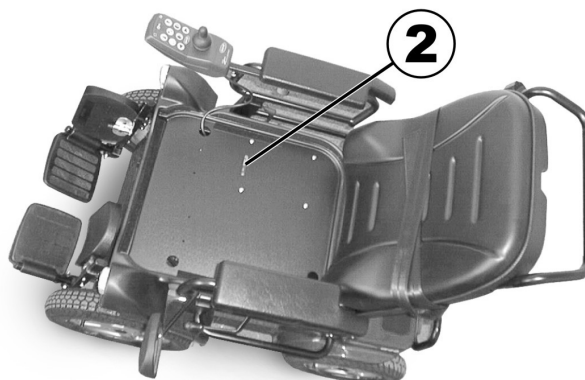
5 Error Codes and Diagnostic Codes

When the electronic system recognises an error, this is displayed by combined blink code at the remote and at the servo light module. Some errors can be automatically corrected by the electronic system. To do this switch the remote off and on again. Wait approx. 5 seconds each time before switching the remote on again. If the error can be corrected, the blinking on the status bar indicator stops. If the error is not corrected by this process, localise the error using the following blink codes. You must remove the seat cushion to be able to see the servo light module LED. The cushions are held by Velcro strips, and can easily be removed upwards.

Remote status bar indicator (1)



Servo light module status bar indicator (2)



5.1 G40 error codes and diagnostic codes (up to serial number 101176/201727 / October 2004)

Remote status bar indicator LED blink code	Servo light module LED blink code	Cause	Fault remedy
1	-	ACS module defective	<ul style="list-style-type: none"> • Check modules, replace defective module
	1	Connections between the ACS modules defective, or SLM defective	<ul style="list-style-type: none"> • Check the connections between the modules and replace if necessary. • Replace SLM.
	2	Error in the servo motor	<ul style="list-style-type: none"> • Check connection to servo motor. • Check servo motor for short circuit or interruption
2	-	ACS accessory parts defective	<ul style="list-style-type: none"> • Check connections to accessories • Check accessories

Remote status bar indicator LED blink code	Servo light module LED blink code	Cause	Fault remedy
	3	Potentiometer on servo motor (steering) defective	<ul style="list-style-type: none"> • Check that the rotating pin in the potentiometer is not slipping, and that the housing of the potentiometer hasn't come loose. • Check the contact pins of the potentiometer for continuity or short circuit. • Check that the declutching mechanism is engaged and does not slip. • Check that the steering is not overloaded. • Check the connecting cable and plug to the servo motor.
	4	Lighting system defective (error in SLM or in cabling)	<ul style="list-style-type: none"> • Check the lighting system for short circuit and continuity. • Check light bulbs.
	5	Steering disengaged	<ul style="list-style-type: none"> • Re-engage the steering: Switch the electronics system off and on again. • Check the connecting cable and plug to the servo motor.
3	-	<p>Drive may be disengaged</p> <p>Interruption or short circuit in motor connection M1 (motor or motor cable defective / carbon brush defective)</p>	<ul style="list-style-type: none"> • Engage motor. Switch electronics off and back on again. • Check connections to the Transaxle. • Check carbon brushes
4	-	<p>Drive may be disengaged</p> <p>Interruption or short circuit in motor connection M2 (motor or motor cable defective / carbon brush defective)</p>	<ul style="list-style-type: none"> • Engage motor. Switch electronics off and back on again. • Check connections to the Transaxle. • Check carbon brushes
5	-	Interruption or short circuit in the connection to the magnetic brake or in the magnetic brake itself	<ul style="list-style-type: none"> • Check connections to the magnetic brake • Check magnetic brake

Remote status bar indicator LED blink code	Servo light module LED blink code	Cause	Fault remedy
6	-	Interruption or short circuit in the connection to the magnetic brake or in the magnetic brake itself	<ul style="list-style-type: none"> • Check connections to the magnetic brake • Check magnetic brake
7	-	Battery voltage too low	<ul style="list-style-type: none"> • Charge battery
	7	Battery voltage too low (below 17V)	<ul style="list-style-type: none"> • Check battery connections • Check fuses. • Check batteries and replace if necessary.
8	-	Battery voltage too high (this error can occur when the batteries are fully charged and the wheelchair is driven downhill at high speed)	<ul style="list-style-type: none"> • Switch on lights to use electricity and thus lower battery voltage. • Check battery charger
9	-	CANL error / communication error between the modules	<ul style="list-style-type: none"> • Check BUS cable
	9	An invalid voltage was detected on the CANL line / fault on the CANL line / communication via CANL not possible	<ul style="list-style-type: none"> • Check continuity of the ACS bus cable. • Check for short circuits between the contact pins of the ACS bus. A short circuit or an interruption in another ACS module can cause this error.
10	-	CANH error / communication error between the modules	<ul style="list-style-type: none"> • Check BUS cable
	10	An invalid voltage was detected on the CANH line / fault on the CANH line / communication via CANH not possible	<ul style="list-style-type: none"> • Check continuity of the ACS bus cable. • Check for short circuits between the contact pins of the ACS bus. A short circuit or an interruption in another ACS module can cause this error.
11	-	Time limit exceeded at maximum current (drive)	<ul style="list-style-type: none"> • Switch the electronics system off and on again.
	11	Time limit exceeded at maximum current (servo)	<ul style="list-style-type: none"> • Switch the electronics system off and on again.
12	-	Compatibility problems between ACS modules	<ul style="list-style-type: none"> • Check modules / replace incompatible module

5.2 G40 error codes and diagnostic codes (from serial number 101176/201728 / November 2004)

Remote status bar indicator LED blink code	Servo light module LED blink code	Cause	Fault remedy
1	-	ACS module defective	<ul style="list-style-type: none"> • Check modules, replace defective module
	1	Connections between the ACS modules defective, or SLM defective	<ul style="list-style-type: none"> • Check the connections between the modules and replace if necessary. • Replace SLM.
	2	Error in the servo motor	<ul style="list-style-type: none"> • Check connection to servo motor. • Check servo motor for short circuit or interruption
2	-	ACS accessory parts defective	<ul style="list-style-type: none"> • Check connections to accessories • Check accessories
	3	Potentiometer on servo motor (steering) defective	<ul style="list-style-type: none"> • Check that the rotating pin in the potentiometer is not slipping, and that the housing of the potentiometer hasn't come loose. • Check the contact pins of the potentiometer for continuity or short circuit. • Check that the declutching mechanism is engaged and does not slip. • Check that the steering is not overloaded. • Check the connecting cable and plug to the servo motor.
	4	Lighting system defective (error in SLM or in cabling)	<ul style="list-style-type: none"> • Check the lighting system for short circuit and continuity. • Check light bulbs.
	5	Steering disengaged	<ul style="list-style-type: none"> • Re-engage the steering: Switch the electronics system off and on again. • Check the connecting cable and plug to the servo motor.

Remote status bar indicator LED blink code	Servo light module LED blink code	Cause	Fault remedy
3	-	Interruption or short circuit in motor connection M1 (motor or motor cable defective / carbon brush defective)	<ul style="list-style-type: none"> • Check connections to the Transaxle. • Check carbon brushes
4	-	Interruption or short circuit in motor connection M2 (motor or motor cable defective / carbon brush defective)	<ul style="list-style-type: none"> • Check connections to the Transaxle. • Check carbon brushes
5	-	Drive may be disengaged Interruption or short circuit in the connection to the magnetic brake or in the magnetic brake itself	<ul style="list-style-type: none"> • Engage motor. Switch electronics off and back on again. • Check connections to the magnetic brake • Check magnetic brake
6	-	Drive may be disengaged Interruption or short circuit in the connection to the magnetic brake or in the magnetic brake itself	<ul style="list-style-type: none"> • Engage motor. Switch electronics off and back on again. • Check connections to the magnetic brake • Check magnetic brake
7	-	Battery voltage too low	• Charge battery
	7	Battery voltage too low (below 17V)	<ul style="list-style-type: none"> • Check battery connections • Check fuses. • Check batteries and replace if necessary.
8	-	Battery voltage too high (this error can occur when the batteries are fully charged and the wheelchair is driven downhill at high speed)	<ul style="list-style-type: none"> • Switch on lights to use electricity and thus lower battery voltage. • Check battery charger
9	-	CANL error / communication error between the modules	• Check BUS cable
	9	An invalid voltage was detected on the CANL line / fault on the CANL line / communication via CANL not possible	<ul style="list-style-type: none"> • Check continuity of the ACS bus cable. • Check for short circuits between the contact pins of the ACS bus. A short circuit or an interruption in another ACS module can cause this error.
10	-	CANH error / communication error between the modules	• Check BUS cable

Remote status bar indicator LED blink code	Servo light module LED blink code	Cause	Fault remedy
	10	An invalid voltage was detected on the CANH line / fault on the CANH line / communication via CANH not possible	<ul style="list-style-type: none"> • Check continuity of the ACS bus cable. • Check for short circuits between the contact pins of the ACS bus. A short circuit or an interruption in another ACS module can cause this error.
11	-	Time limit exceeded at maximum current (drive)	<ul style="list-style-type: none"> • Switch the electronics system off and on again.
	11	Time limit exceeded at maximum current (servo)	<ul style="list-style-type: none"> • Switch the electronics system off and on again.
12	-	Compatibility problems between ACS modules	<ul style="list-style-type: none"> • Check modules / replace incompatible module

6.0 Arrangement of assemblies, components and features

The following illustrations show the arrangement of the main assemblies, components and features for right-handed people. The terms are the same as the component terms in the replacement parts catalog.

G40, front view

- 1 Leg rests complete, appertaining to seat system
- 2 Chassiscovering
- 3 Seat shell, appertaining to seat system
- 4 Seat padding, appertaining to seat system
- 5 Back padding, appertaining to seat system
- 6 Mirror
- 7 Front lighting system, integrated in seat shell
- 8 Front wheels, powered
- 9 Back wheel, steerable



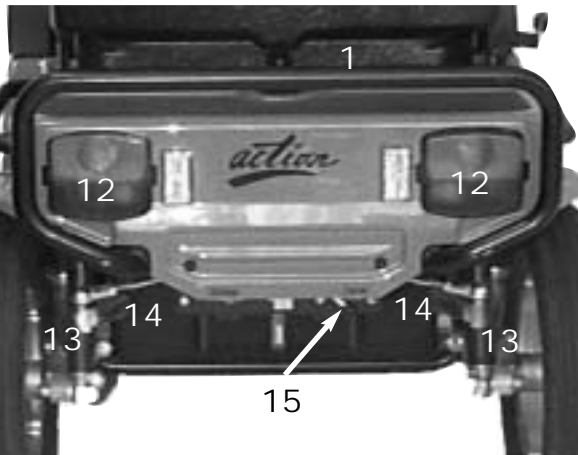
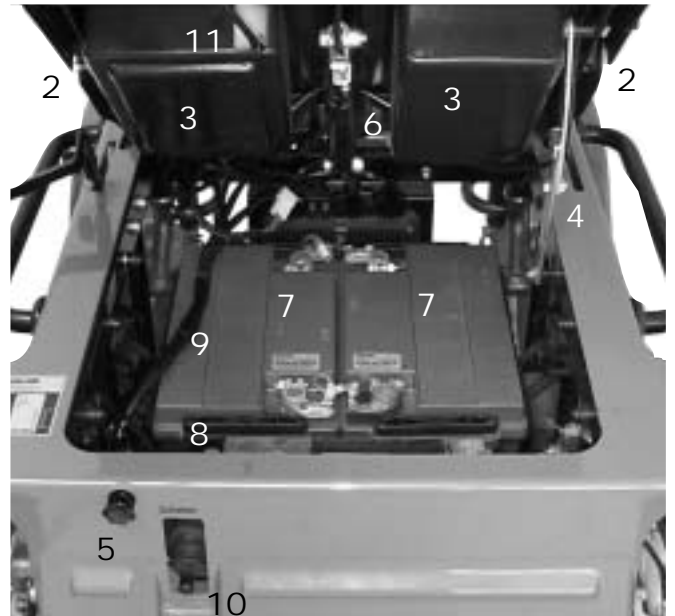
G40, side view



- 10 Frame with back shell 11 and grip 12
- 13 Sides complete with arm rests
- 14 Side grip
- 15 Covering
- 16 Remote with speedometer
- 17 Hand brake complete with brake disc 18
- 19 Back rest adjusting, complete
- 20 Walking stick holder
- 21 Walking stick loop

- 1 Chassis (Tube frame back, bottom)
- 2 Seat frame, appertaining to seat system
- 3 Seat shell with indentations for electronic modules
- 4 Locking mechanism of seat support for service
- 5 Locking mechanism of seat in closed position
- 6 Gas spring for back rest adjusting
- 7 Batteries in battery box
- 8 Battery box
- 9 Cable form for drive motor

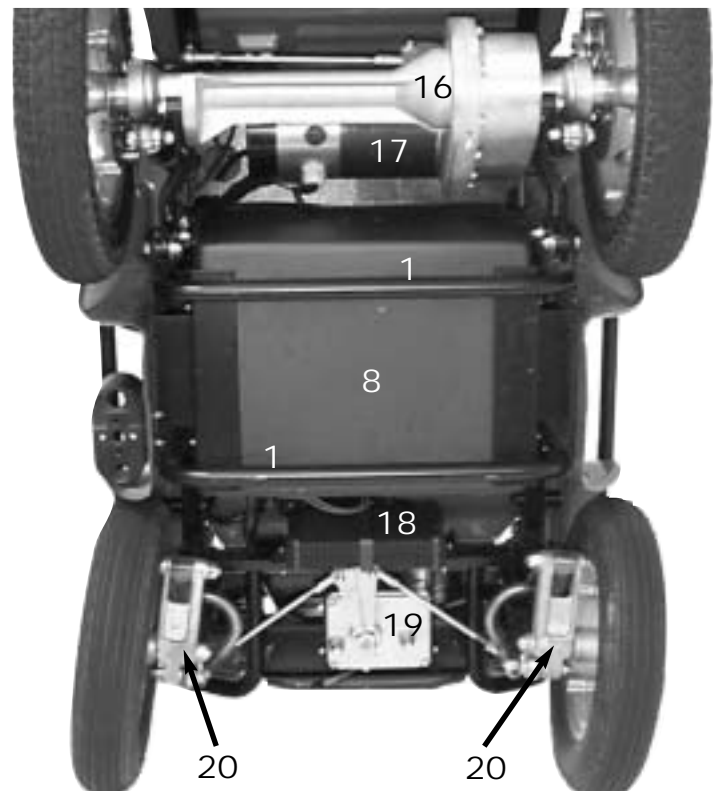
G40, service view



- 10 Disengaging lever for drive motor
- 11 Cable form for servo-/light module
- 12 Lighting system back, integrated in chassis
- 13 Shock absorbers, back
- 14 Steering rod, appertaining to power-assisted steering

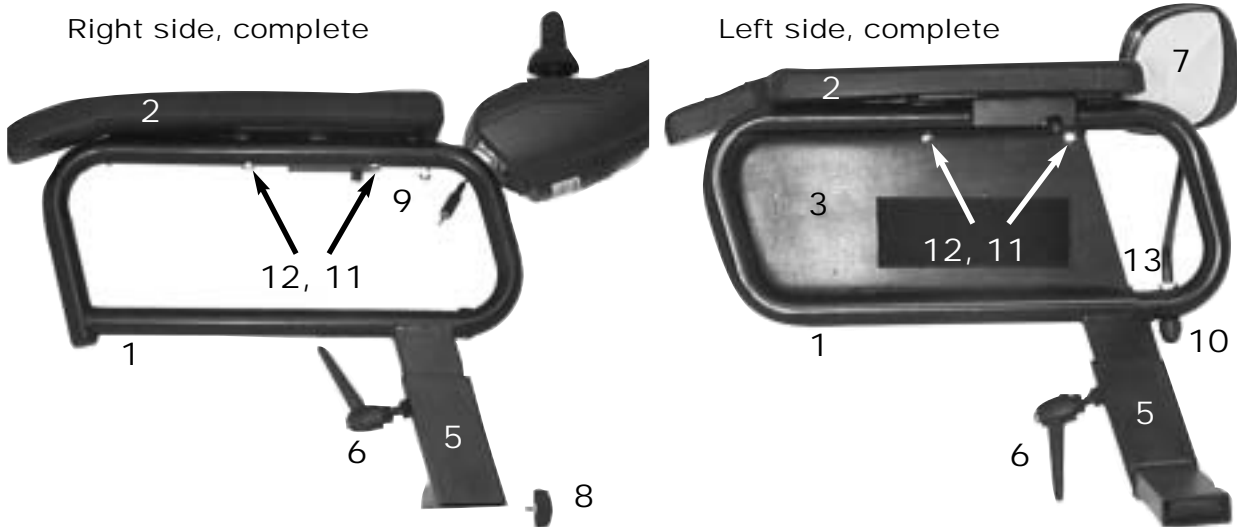
G40, bottom view

- 15 Disengaging lever for servo motor
- 16 Gear box with front axle
- 17 Drive motor, flange mounted to gear box
- 18 Main module of drive electronics
- 19 Servo steering with motor
- 20 Wheel suspension, back



7.0 Checks and repair work at seat system

7.1 Arm rests and sides



- | | |
|-----------------------------|----------------------------------|
| 1 Arm rest tube frame | 2 Arm rest |
| 3 Side covering | 4 Bag (not illustrated) |
| 5 Side mount | 6 Clip lever M8x60 |
| 7 Mirror | 8 Wing screw M6x10 |
| 9 Hexagon head screw M6x16 | 10 Nut M8, self locking with cap |
| 11 Hexagon head screw M5x35 | 12 Disc 5,4 |
| 13 Nut M8 | |

Check

- Arm rest damaged?
- Screws of arm rest loose?
- Bag damaged?
- Side covering damaged?
- Arm rest tube frame damaged?
- Side mount damaged?
- Clip lever damaged?
- Mirror damaged?

Action

- > Replace arm rest.
- > Tighten screws.
- > Replace bag.
- > Replace side covering.
- > Replace arm rest tube frame.
- > Replace side mount.
- > Replace clip lever.
- > Replace mirror.

NOTE:

If there is an arm rest with integrated remote:

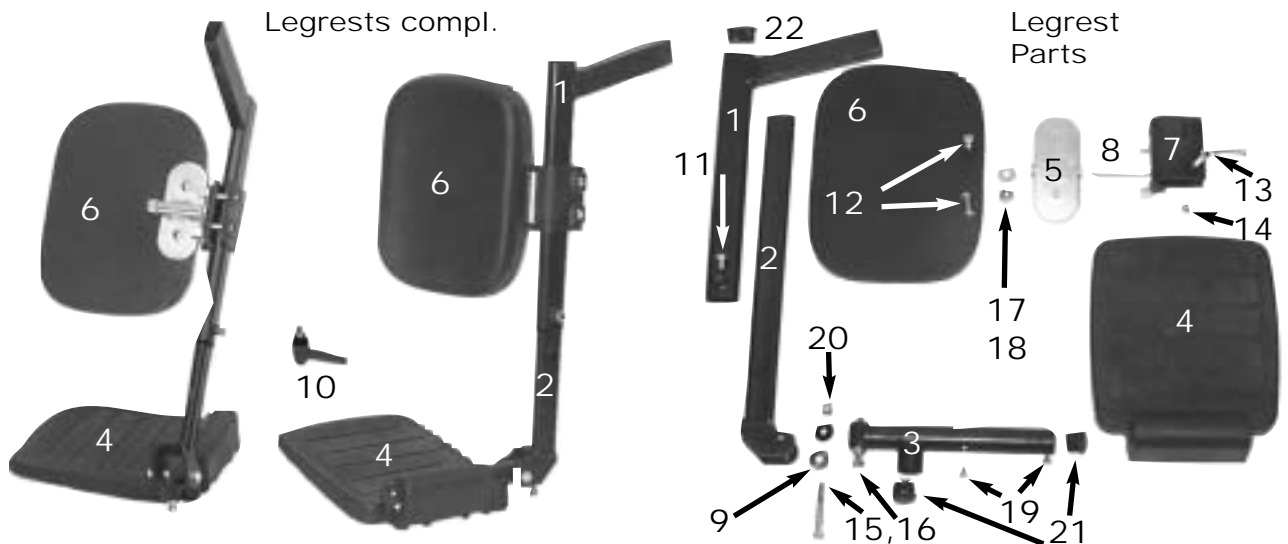
Switch off wheelchair, take plug out of remote, release remote and take it out of arm rest.

Complete disassembly

- Bring seat system in service position and arrest.
- Release wing screw (8) and draw off sides with arm rest sideways away from chassis.
- Release clip lever and draw off side mount downwards.
- Release bag (4) from side covering (3) (velcro fastener).
- Release screws (11) with discs (12) at side covering and draw off arm rest (2).
- Release plastic rivets at bottom of side covering with a screw driver and draw off side covering (3) from arm rest tube frame.
- Remove cap, release nut (10) and draw off mirror (7) out of arm rest tube frame (1).

Assembly

- The assembly is carried out in reverse order.



- | | | |
|--------------------------------------|--|-------------------------------|
| 1 Legrest, top | 2 Insertion tube | 3 Footplate mount |
| 4 Footplate | 5 Calfsupport holder | 6 Calfsupport |
| 7 Calf pad mount | 8 Calfsupport pivot | 9 2 Plastic discs 17x6,5 |
| 10 Clamping lever M6x10 | 11 Hexagon head screw M6x10 | 12 Fillister-head screw M6x16 |
| 13 Countersunk screw M5x25 | 14 Nut M5 (self locking) | 15 Screw M6x45 |
| 16 Nut M6 | 17 Nut M8 | 18 Disc 8,4 |
| 19 Fillister-head self-tapping screw | 20 Hat nut M6 | 21 Slide SL 18 |
| 22 Slide F30x15 | 23 Clamping sleeve 5x20 (Not shown, belongs to 7 and 8.) | |

Check

- Screws loose?
- Calfsupport damaged?
- Footplate damaged?
- Footplate mount damaged?
- Welded joints or insertion tube defective?
- Welded joints or top legrest defective?
- Calfsupport pivot goes heavily, defective?
- Slides missing or damaged?

Action

- > Tighten screws.
- > Replace calfsupport.
- > Replace footplate.
- > Replace footplate mount.
- > Replace insertion tube.
- > Replace top of legrest.
- > Make pivot moving or replace.
- > Replace slide.

Complete disassembly:

- Bring seat system in service position and arrest.
- Release clamping lever (10) and draw off legrest from chassis.
- Release hexagon head screw und draw off top of legrest from insertion tube.
- Release fillister-head screw and draw off calf support.
- Release countersunk screws (13 and nuts (14) and remove calf pad mount(7).
- Remove nut (17) and disc (18) and remove calf support holder (5) from pivot (8).
- Remove clamping sleeve (23) and remove calf support pivot (8) from clip part (7).
- Remove tin screws (19) and draw off footplate (4) from footplate mount.
- Remove screw (15) with hatnut (20) and discs (9) and draw off footplate mount from insertion tube.
- Release slide (21/22) from footplate mount/top of legrest with a screwdriver.

Assembly

- Assembly is carried out in reverse order.

NOTE:

- The screw (15) with nut (16) serves for adjusting of footplate.
- Don't tighten the screw (15) with hatnut (20) and nut (17) too strong.

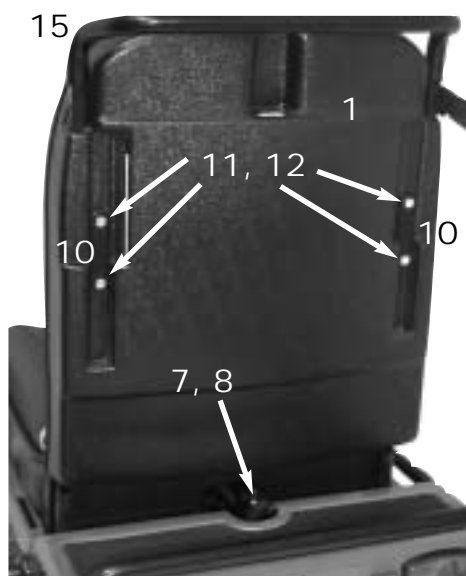
7.3 Backrest with frame, padding and grip

Backrest, front view, without padding



- 1 Back shell
- 3 Backmount socket
- 5 Disc 17,0
- 7 Clutch part for gas spring
- 9 Safety belt (not shown)
- 11 Hexagon head screw M6x20
- 13 Threaded bolt M6x6
- 15 Grip

Backrest, back view



- 2 Backframe
- 4 Starlock caps 16,0
- 6 Backpadding (not shown)
- 8 Wing screw M6x10
- 10 Mounting plate for safety belt
- 12 Disc 6,4
- 14 Walking stick loop
- 16 Chassis

Check

- Backpadding damaged?
- Screws at backframe loose?
- Backshell damaged?
- Backframe damaged, welded joints defective?
- Grip damaged?
- Walking stick loop damaged?
- Safety belt damaged?
- Backframe does not go easily?

Action

- > Replace backpadding.
- > Tighten screws.
- > Replace back shell.
- > Replace backframe.
- > Replace grip.
- > Replace walking stick holder.
- > Replace safety belt.
- > Make moving or replace backmount socket.

Complete disassembly:

- Draw off backpadding from seat shell (velcro fasteners).
- Release crosstip screw and remove walking stick loop (14).
- Release threaded bolts (13) and pull out grip (15).
- Release wing screw (8) and pull out clutch part from backframe (2) downwards.
- Release hexagon head screws (11) with discs (12) and remove safety belt (9) with mounting plate (10).
- Pull out backshell (1) from backframe (2) downwards.
- Note position of discs (5).
- Release starlock caps (4) with a flat screwdriver and remove backmount socket (3) with discs (5).
- Remove backframe (2) from chassis.

Assembly

- Assembly is carried out in reverse order.

NOTE:

- Use new starlock caps (4) for assembly.
- During assembly of backframe (2) take care, that the discs (5) are pushed into the backmount socket in right order.

For assembly of backframe at chassis do the following:

- Position chassis, back- and side frame so, that you can insert backmount socket (3) with discs.
- Put in the starlock caps into the pliers as you can see below.
- Position pliers with caps (4) on both sides on the backmount socket and tighten.
- Tighten pliers with a ring spanner until the caps are completely pressed on.
- Release starlock pliers and take off.
- Complete assembly of backrest.

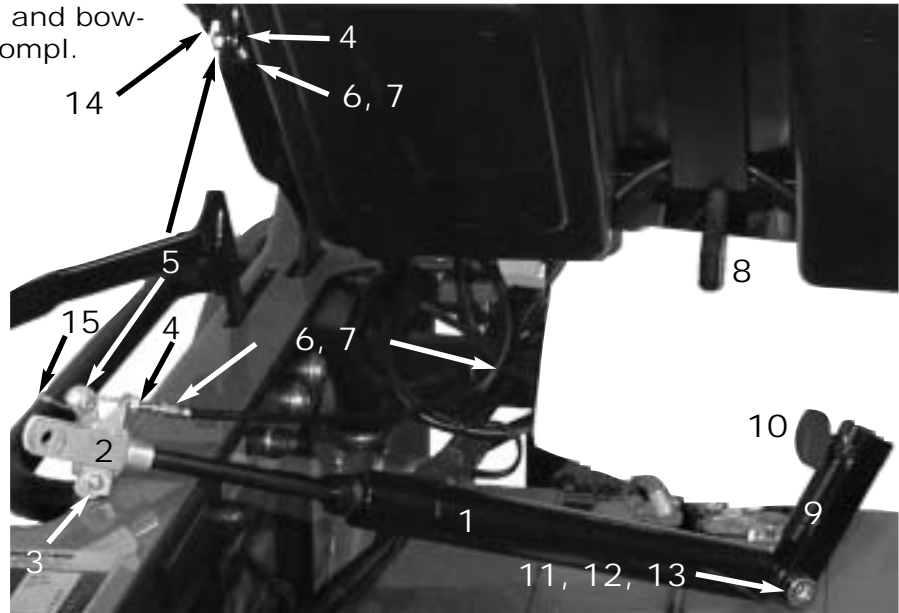
Starlock pliers with caps



Insertion of caps



- Gas spring and bowden wire compl.
- 1 Gas spring
 - 2 Fork M10x1
 - 3 Trip lever for gas spring
 - 4 Adjustment screw
 - 5 Clamping screw
 - 6 Bowden wire
 - 7 Bowden wire sleeve
 - 8 Backframe
 - 9 Clutch
 - 10 Wing screw M6x10
 - 11 Hexagon head screw M10x35
 - 12 2 discs 10,5
 - 13 Nut M10
 - 14 Adjusting lever for backrest
 - 15 Cap for bowden wire



Check

Check gas spring and bowden wire!

- Bowden wire defective?
- Bowden wire sleeve defective?
- Gas spring defective?
- Trip lever does not move easily or is defective?
- Fork defective?
- Hanger assembly of gas spring does not move easily?
- Clutch defective?
- Adjusting defective?

Action

- > Readjust bowden wire.
- > Replace bowden wire.
- > Replace bowden wire sleeve.
- > Replace gas spring.
- > Make moving or replace trip lever
- > Replace fork.
- > Make moving hanger assembly or replace screwing.
- > Replace clutch.
- > Replace adjusting lever.

Complete disassembly

- Release wing screw (10) and draw off clutch (9) from backframe (8).
- Bring seat system in service position and arrest.
- Release hexagon head screw with nut and discs and take off fork (2) from seat frame.
- Turn gas spring (1) out of fork (2).
- Release screw (11) with nut (13) and discs (12) and take off clutch (9) from gas spring (1).
- Release clamping screws (5) and nuts and screw out adjusting screws (4).
- Pinch off caps (15) from bowden wire (6) and take off bowden wire sleeve (7).
- Release screw and nut and take off trip lever(3) from fork (2).

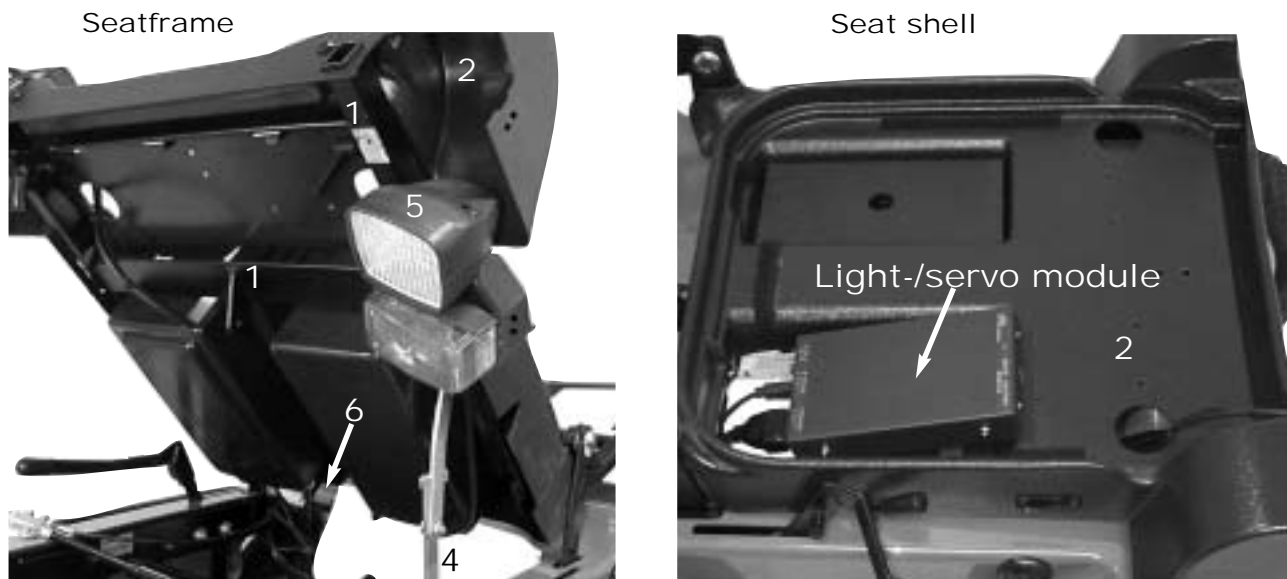
Assembly

- Assembly is carried out in reverse order.

NOTE:

- Mark or note the position of adjusting screws before disassembly.
- Screw in gas spring at assembly until stop into fork.
- Adjust bowden wire so, that at screwed in gas spring????????????????????
- After drawing in a new bowden wire, caps must be squeezed on.
- The adjusting lever is stored in seat frame and arrested with a starlock cap. For disassembly you first have to remove the seat shell. See chapter 7.5.

7.5 Seatframe, seat shell and padding



- | | | | |
|---|----------------------------------|---|-----------------------------------|
| 1 | Seatframe | 2 | Seat shell |
| 3 | Padding (not shown) | 4 | Latching mechanism |
| 5 | Front lighting equipment, compl. | 6 | Connector row for lighting system |

Check

- Padding damaged?
- Seat shell damaged?
- Seatframe warped or welded joints defective?
- Screwed connections of latching mechanism loose?
- Latching mechanism warped or defective?

Action

- > Replace padding.
- > Replace seat shell.
- > Straighten frame.
- > Replace frame.
- > Tighten screws.
- > Straighten or replace.

NOTE:

- Take care during disassembly / assembly that the cable forms to the front lighting, to light-/servomodule and to remote run freely and aren't damaged.
- Before disassembly of seatframe and seat shell you first have to remove backframe and backshell. After that secure seatframe with fitting sockets at chassis.

Complete disassembly

- Remove backframe and backshell. See chapter 7.3.
- Secure frame (1) with sockets and remove padding (3) from seat shell (2) (velcro fasteners).
- Release plug from light-/servomodule and take module out of seat shell (2).
- Bring seat in service position and fix it.
- Take off gas spring from seat frame and release bowden wire from gas spring.
- Remove plastic rivets with a screw driver and take off the front lighting carefully out of seat shell downwards.
- Draw off plug from connector row (6), remove cable connector, disengage lighting cable carefully and remove lamps completely.
- Release screws from seat support and remove both parts of support from seatframe (1).
- Remove securing socket again and take off frame (1) with seat shell (2) from chassis.
- Press seat shell (2) at front and sides carefully outwards and take off from frame (1).

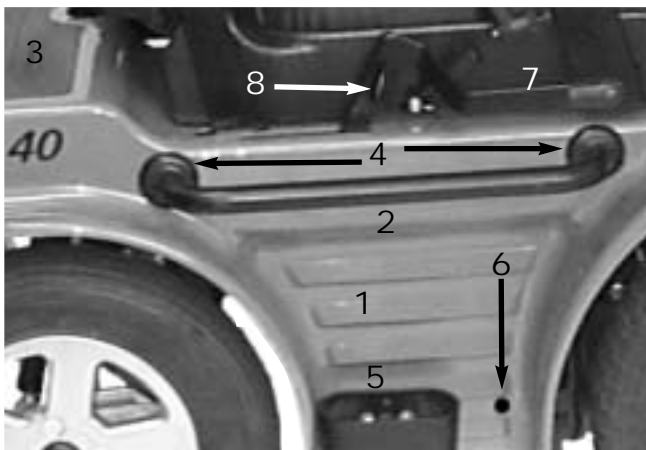
Assembly

- Assembly is carried out in reverse order.

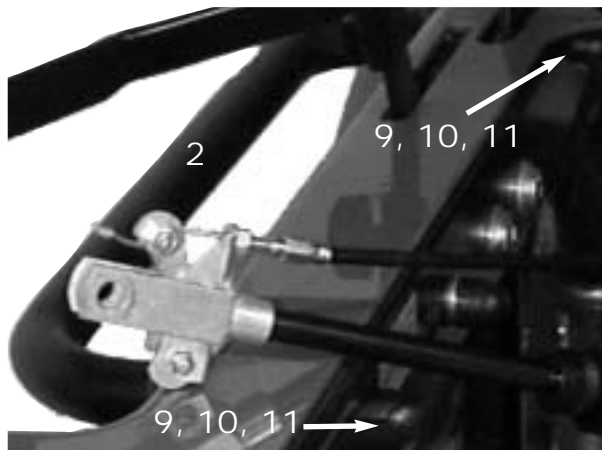
8.0 Checks and repair work at chassis

8.1 Chassiscovering, grips and cover coating

Chassiscovering



Side grip



- | | | |
|-----------------------|-----------------------------|-----------------|
| 1 Chassiscovering | 2 Side grip | 3 Cover coating |
| 4 Rosettes | 5 Stick holder | 6 Plastic rivet |
| 7 Brake lever | 8 Wing screw M6x10 | 9 Cap SKS 8 |
| 10 Hexagon head screw | 11 Securing disc Schnorr M8 | |

Check

- Cover coating loose or damaged?
- Side grip or rosette damaged?
- Chassiscovering damaged?
- Stick holder damaged?

Action

- > Stick or replace coating.
- > Replace side grip or rosette.
- > Replace chassiscovering.
- > Replace stick holder.

Disassembly side grip

- Bring seat system in service position and arrest.
- Remove caps (9), remove hexagon head screws (10) with discs (11) and take off grip (2) with rosettes (4).

Assembly

- Assembly is carried out in reverse order.

disassembly chassiscovering

NOTE:

Before the disassembly of chassiscovering you first must disassemble the seat system completely. See chapter 7.1 to 7.5.

- Remove hexagon head screws with nuts and take off stick holder (5).
- Release wing screw (8) and take off brake lever (7).
- Remove side grips (2) with rosettes (4).
- Remove the eight plastic rivets (6), two at sides, two at front, two at back.
For doing that you first must draw off the pins (in covering) with pliers out of the rivets. Then remove the rivets from outside with a screwdriver.
- Take off chassiscovering from chassis upwards.

Assembly

- Assembly is carried out in reverse order.

NOTE:

- Back and front wheels are all fixed with four countersunk screws on the wheel hubs.
- Construction of rims is equal.
- Because of that the disassembly is identical.

- | | |
|---|--------------------------------|
| 1 Front wheel, compl. | 7 Back wheel, compl. |
| 2 Rim (part 1) with 3 (part2) | 8 Rim (part 1) with 9 (part 2) |
| 4 Tyre casing with tube 5 | 10 Tyre casing with tube 11 |
| 6 Countersunk screw with - hexagon socket | 12 Had cap screw with hexa |



Check

- Tyre loses air?

Action

> Repair or replace tube.

- Tyre casing damaged?
- Screws loose?
- Rims damaged??

> Check casing on foreign substance.
 > Replace tyre casing.
 > Tighten screws.
 > Replace rims.

Complete disassembly

- Release countersunk screws (6) crosswise.
- Prop up wheel chair, so that the wheel is free.
- Screw out countersunk screws (6) completely and take off wheel (1or7).
- Let out air, release head screw (12) crosswise and remove.
- Disassemble rim (part1, part 2).
- Remove tube out of tyre casing.
- Repair or renew tube (size 3.00-10 front, 3.00-8 back).

Assembly

- Fill in little air until tube is round.
- Put tube in tyre casing and put in both rim halves from outside into casing.



CAUTION:

- *The recesses of rim halves must surround the valve.*
- *The tube must not be squeezed between the rim halves.*

- Put in head screw (12), drive in crosswise and tighten with torque wrench (25 to 30 Nm).
- Pump up tyre to a pressure of 2,5 bar and screw on valvecap.
- Put wheel on hub, set in countersunk screws (6) and tighten crosswise with 25 Nm.



CAUTION:

- *The countersunk screws (6) must not be greased.*
- *During factory assembly the screws are set in with plasbolt. They can be assembled / disassembled up to 6 times.*
- *At the latest screws must be cleaned during 7. assembly and then set in with Loctite.*
- *Tighten screws with 25 Nm.*

8.3 Wheel suspension back

NOTE:

- Change or repair of steering column (4) must be done by INVACARE-service.

1 Shock absorber, soft	2 Stub axle
3 floating socket in steering column	4 Steering column
6 Nut M12	5 Head screw M12x120
8 Wheel hub	7 Disc 13,0
10 Ball bearing 6001ZZ (in hub))	9 Socket (in hub)
13 Telescopic spring mount	11 Nut M8
15 Head screw M8x35	12 Disc 8,4
17 Securing disc M8 (13, 15 and 17 top at steering column))	14 Screw M8x55
	16 Stopper SL35 (not shown)

Check

- | | |
|------------------------------|---------------------------|
| • Shock absorber defective? | > Replace shock absorber. |
| • Screwings loose? | > Tighten screws. |
| • Wheel does not run easily? | > Replace wheel bearing. |
| Hub damaged? | > Replace hub. |
| Stub axle defective? | > Replace stub axle. |

Disassembly shock absorber

- Prop up wheel chair so that shock absorber is accessible.
- Remove screw (15) with disc (17) from telescopic spring mount (13).
- Remove screw (14) with nut (11) and disc (12) and take off shock absorber.

Assembly

- Assembly is carried out in reverse order.

Disassembly of stub axle and wheel hub

- Disassemble back wheel. See chapter 8.2.
- Disassemble shock absorber. See above.
- Remove nuts (6) and discs (7) from floating socket (3).
- Screw out screw (5) out of stub axle (2) and remove with disc (7) from steering column.
- Take off stub axle (2) with wheel hub (8) from steering column (4).
- Remove stopper (16) from wheel hub (8).
- Remove nut (6) with disc (7), draw off screw (5) with disc (7) out of wheel hub (8) and take wheel hub from stub axle (2).
- Remove ball bearing (10) with a special tool out of hub (8) and remove socket (9).

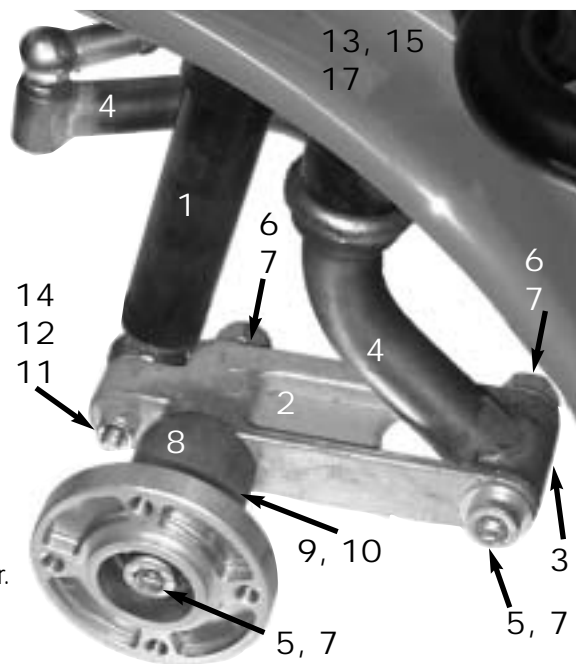
Assembly

- Assembly is carried out in reverse order.

NOTE:

- Before set in ball bearing (10) you must set in the socket (9).
- Do not cant bearing during pressing in.
- Do not forget floating socket (3) during assembly of stub axle.
- Do not forget discs and stick on in right order.
- Hold up nuts (6) during assembly.

Wheel suspension back



8.4 Wheel suspension front

NOTE:

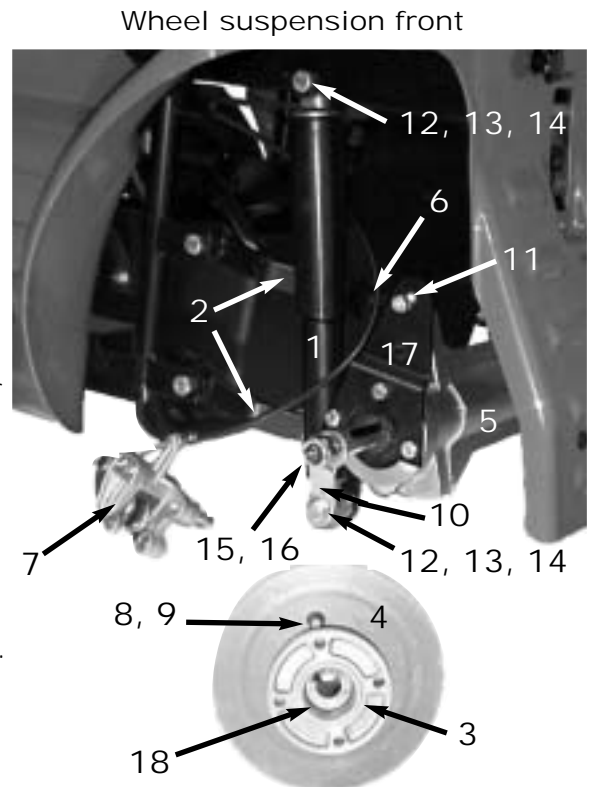
- Change or repair of front axle (5), gear rocker arm (2) and all components appertaining to gear must be done by INVACARE-service.

1 Shock absorber, hard	2 Gear rocker arm
3 Wheel hub	4 Brake disc 160x2
5 Front axle, compl..	6 Bowden wire, compl..
7 Brake caliper, compl..	8 Cable socket
9 Roundmagnet 625-6.0 (for speedometer sensor)	10 Mounting for sensor (with speedom. sensor)
11 Head screw M6x12	12 Head screw. M8x35
13 Nut M8	14 Disc 8,4
15 Wheel nut M12x1,5	16 Disc 13,0
17 Mounting of brake caliper	18 Stopper SL35 (not shown)

Check

- Shock absorber defective? > Replace shock absorbers.
- Screws loose? > Tighten screws.
- Hub damaged? > Replace hub.

Action



Disassembly shock absorbers

- Disassemble front wheel See chapter 8.2.
- Bring seat system in service position and arrest.
- Remove screw (12) with disc (14) and nut (13) at bottom and remove mounting (10) with sensor.
- Remove screw (12) with disc (14) and nut (13) at top of chassis and take off shock absorbers.

Assembly

- Assembly is carried out in reverse order

Disassembly wheel hub

- Disassemble front wheel. See chapter 8.2.
- Release two screws (11) and remove brake caliper (7) from mounting (17).
- Release stopper (18).
- Remove wheel nut (15) and disc (16) and take off wheel hub (3) and brake disc (4) with a removing tool
- Release four countersunk screws (M6 with hexagon) and take off brake disc (4) from hub (3).

NOTE:

- Muttern und Scheiben zu Schrauben (11) nicht verlieren. Die Muttern sind im Bremssattel eingelassen.
- Paßfeder für Radnabe (in Vorderachse eingelassen) nicht verlieren.

Assembly

- Assembly is carried out in reverse order.

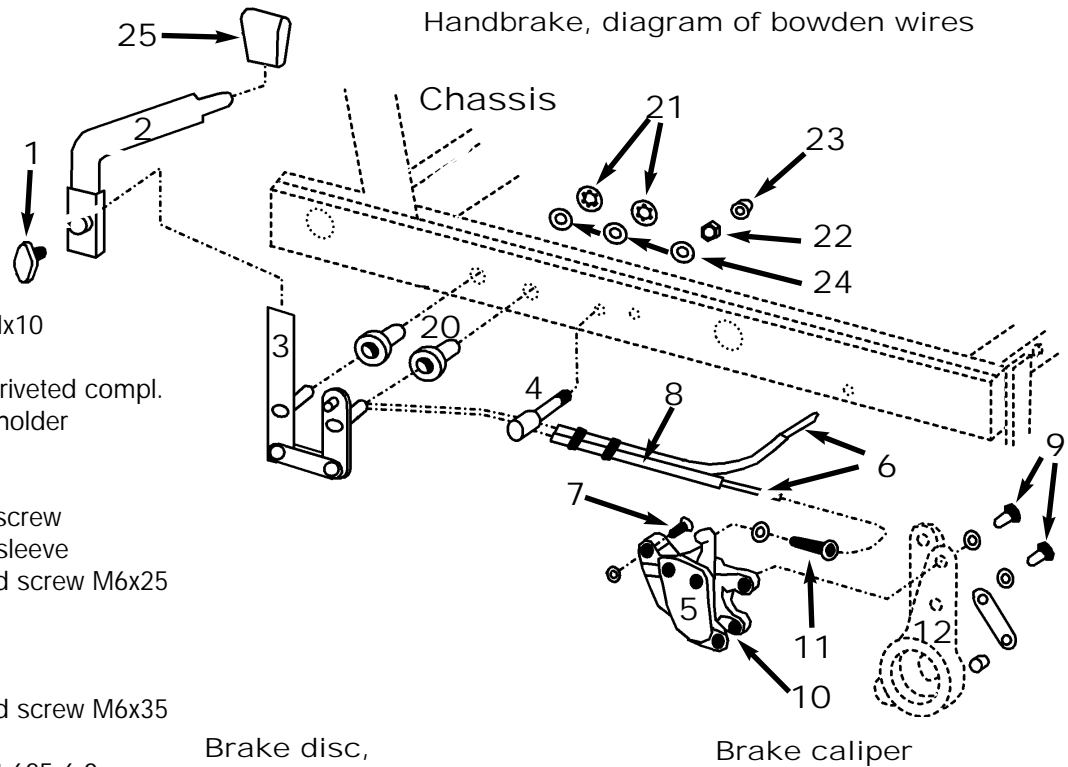


CAUTION:

- The front axle must not be greased.
- Dirt or rust is to be removed. Use rust remover or fine emery paper.

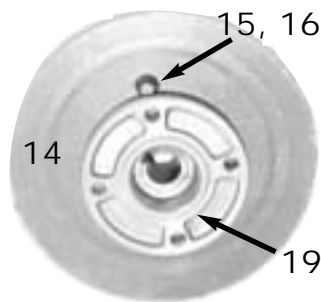
NOTE:

- Put on hub during assembly in such way, that the feather glides into the free space of hub without canting.
- For tightening the nut (15) engage motor.

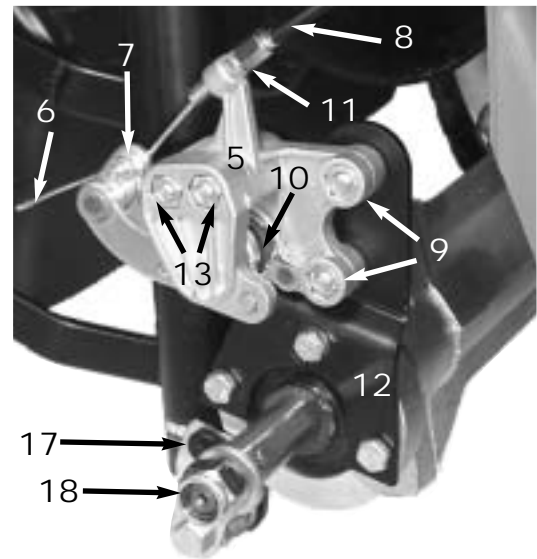


- 1 Wing screw Mx10
- 2 Brake lever
- 3 Brake straps, riveted compl.
- 4 Bowden wire holder
- 5 Brake caliper
- 6 Bowden wire
- 7 Cable clamp screw
- 8 Bowden wire sleeve
- 9 Hexagon head screw M6x25
- 10 Brake shoes
- 11 Fixing screw
- 12 Mounting
- 13 Hexagon head screw M6x35
- 14 Brake disc
- 15 Roundmagnet 625-6.0
- 16 Cable socket
- 17 Speedometer sensor
- 18 Wheel nut M12x1,5
- 19 Hub
- 20 Sockets
- 21 Starlock caps 8,0
- 22 Nut M8
- 23 Cap SKS 8
- 24 Disc 8,4
- 25 Brake lever button

Brake disc, disassembled



Brake caliper



Check

- Brake shoes defective?
- Brake disc defective?
- Brake does not apply?
- Brake lever defective?

Action

- > Replace brake shoes.
- > Replace brake discs.
- > Adjust brake.
- > Replace brake lever.

Disassembly brake lever

- Release wing screw (1) and take of brake lever (2).

Disassembly brake caliper

- Disassemble front wheel. See chapter 8.2.
- Remove screws (9) with discs and nut and take off brake caliper (5).
- Release cable clamp screw with nut and disc, pull out bowden wire (6) and remove brake caliper completely. Should the occasion arise you first must pinch off the caps of bowden wire.
- Release screws (13) with discs and nuts and disassemble the halves of brake caliper.
- Release cross slotted screws and remove brake shoes (10).

NOTE:

- Adjust brake so, that the bowden wire has a play of 15mm. Brake completely released or completely applied.

Assembly

- Assembly is carried out in reverse order.

Disassembly Brake disc

- Disassemble front wheel. See also chapter 8.2.
- Remove brake caliper (5) from mounting (12). See above.
- Remove nut (18) and disc and take off wheel hub (19) with brake disc from axle.
- Release four countersunk screws (M6 with hexagon) and take off brake disc (14) from hub.

Assembly

- Assembly is carried out in reverse order..

NOTE:

- Do not forget roundmagnet and socket.

Disassembly brake straps and bowden wire

- Release wing screw (1) and take off brake lever (2).
- Remove chassis covering. See chapter 8.1.
- Disassemble brake calipers (5) (at both front wheels). See above.
- Remove cap (23) and release nut (22) until you can draw the bowden wires (6) out of the holder (4).
- Remove starlock caps (21) with a screwdriver (dislever) and take off discs (24).
- Take off brake straps (3) with sockets (20) from chassis and take apart bowden wires (6) from brake straps.
If necessary pinch up the caps of bowden wires.
- Disassemble bowden wires (6) with bowden wire sleeves (8) from chassis.

Assembly

- Assembly is carried out in reverse order.

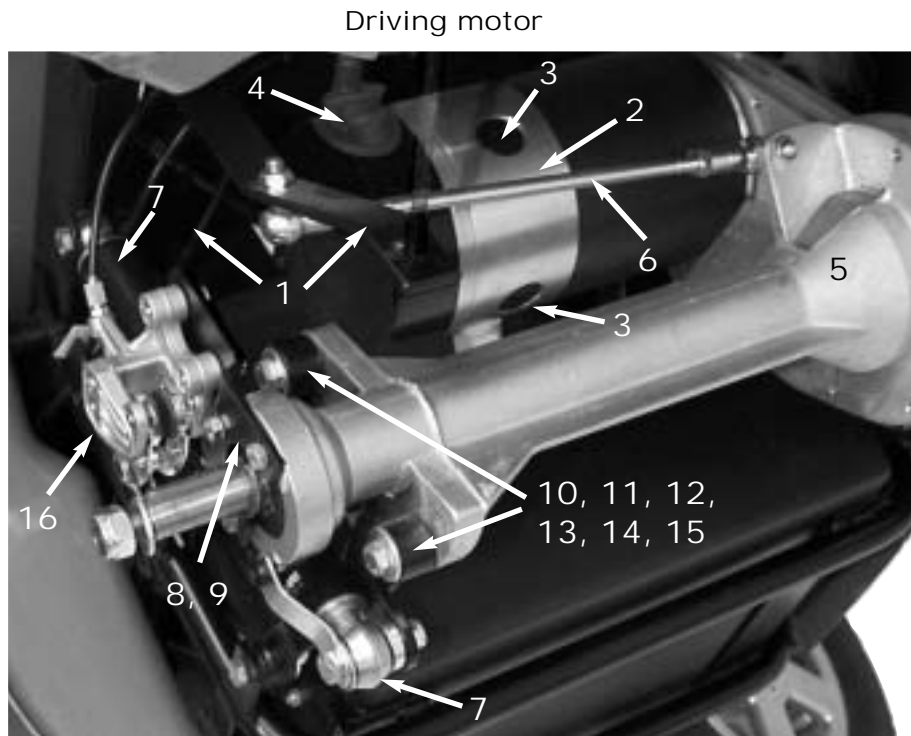
NOTE:

- During assembly new starlock caps must be used.
- For assembling of caps see chapter 7.3, assembly of starlock caps at backrest.

9.0 Checks and repair work at motor, gear, servo and steering

9.1 Driving motor and gear

- 1 Chassis
- 2 Driving motor 450W
- 3 Stopper with carbon brush
- 4 Disengaging lever
- 5 Gear, compl.
- 6 Thread rod with square hinge
- 7 Shock absorber
- 8 Mounting
- 9 Hexagon head screw. M5x20
- 10 Gear rocker arm
- 11 Hexagon head screw M8x35
- 12 Rubber support
- 13 Socket 12x1,8; 8x18
- 14 Disc 8,4
- 15 Nut M8
- 16 Brake caliper



NOTE:

- Motor and gear are maintenance-free. Only basic checks can be done
- The driving unit can only be replaced completely.

Check

Action

- | | |
|--|---------------------------|
| • Motor vibrates, has operation sounds?> | Check or replace motor. |
| • Motor does not start? | > Check or replace motor. |
| • Elektric brake does not apply? | > Check or replace brake. |
| • Gear has operation sounds or blocks? | > Replace driving unit. |

Check circuit of motor

- Bring seat system in service position and arrest.
- Take off both motor plugs from main module.
- Engage motor (driving mode).
- Check with multimeter (measuring range Ohm) as shown in diagram. It must show circuit.
- Disengage motor (freewheel operation) and repeat measurement. The measured value should ascend to infinite when driving operation is changed into freewheel operation.

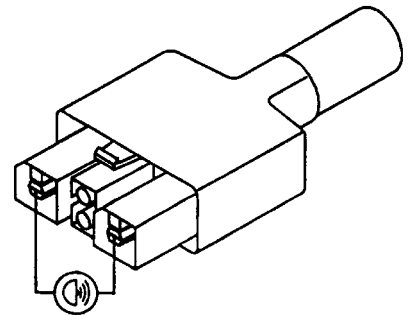
Check electric brake

- Check with multimeter (measuring range Ohm) as shown in diagram. The measured value should lie between 20 and 200 Ohm.

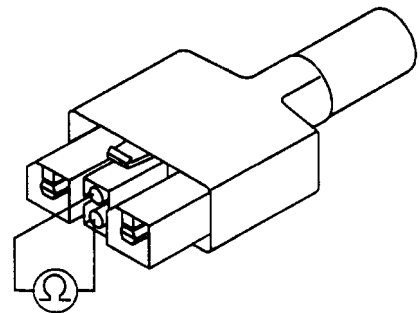
Check carbon brush

- Remove the four closure caps (3) and take out carbon brushes.
- Measure length of brushes. The original length lies at 13mm. The abrasion limit is 11mm.
- Check working surface visually. The working surface must not show any grooves.

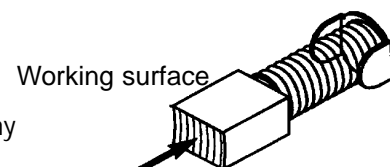
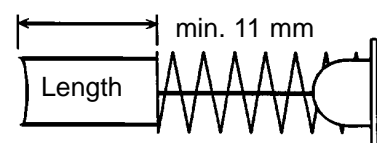
Check circuit of motor



Check electric brake



Check carbon brush



Setting in of carbon brushes

- Set in carbon brushes carefully into the carbon brush mounting of motor.

NOTE:

- The carbon brush must not cant.
- Press feather of carbon brush with soldering cap carefully down, until it sticks in mounting.
- Screw on closure cap.

Disassembly of driving unit



CAUTION:

- *Note the weight of driving unit.
> Danger of crushing<*

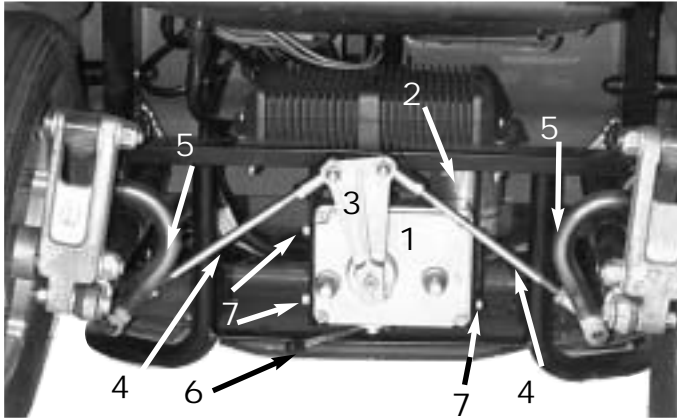
NOTE:

- The driving unit can only be completely replaced.
- Repairwork at driving unit must be done by INVACARE-service.

- Bring seat system in service position and arrest.
- Remove both motor plugs at main module and also plug connection at voltage supply.
- Remove cable binder at motor cable if necessary.
- Prop up wheelchair that it is accessible from below and supply driving unit in addition to that.
- Disassemble front wheels. See chapter 8.2.
- Disassemble wheel hubs with brake discs. See chapter 8.3.
- Release three screws (9) and remove mounting of brake caliper (8).
- If necessary remove speedometer sensor carefully.
- Remove screwing at bottom of shock absorber (7) so far, that the shock absorbers are freed from front axle
- Remove screwing from thread rod (6) so far, that the thread rod is freed from gear.
- Release screws (11) and nuts and remove rubber support (12) with sockets (13) and discs (14), so that the driving unit is freed from gear rocker arms (10).
- Remove driving unit downwards out of wheelchair.

Assembly

- Assembly is carried out in reverse order.



Power-assisted steering unit
View from below

- 1 Power-assisted steering unit, compl.
- 2 Servo motor
- 3 Steering bracket
- 4 Thread rods M8x188 RL with square hinges, nuts and split pins
- 5 Steering rod
- 6 Disengaging lever
- 7 Hexagon head screws M5x15

NOTE:

- The power-assisted steering unit is maintenance-free.
- Only basic checks can be done.
- The unit can only be completely replaced.
- Repairwork at power-assisted steering unit must be done by INVACARE-service.

Check

- Steering servo does not react?
- Steering bracket or gear rocker arms damaged?

Action

- > Replace power-assisted steering unit.
- > Replace defective parts.

Disassembly of power-assisted steering unit, compl.

- Remove seat padding, so that light-servo module is accessible.
- Release connector to power-assisted steering unit.
- Prop up wheelchair so far, that the power-assisted steering unit is accessible.

NOTE:

- Before disassembling mark /note the adjustment of square hinges on the thread rods.

- Release screwings and free up thread rods (4) from steering rod (5).
- Release four hexagon head screws (7) and remove power-assisted steering servo (1) with connector cable downwards out of wheelchair.
- Release screwings and take off thread rods (4) from steering bracket (3).
- Release nuts and screw off square hinges from thread rods.
- Remove hexagon head screw (M5x20) with disc and take off steering bracket (3) from power-assisted steering unit.

Assembly

- Assembly is carried out in reverse order.

NOTE:

- During assembly take care, that the thread rods with square hinges are adjusted in right length.
- Before assembly the balls and ball pans of square hinges must be cleaned and greased again.
- The square hinges must show upwards during assembly.
- The correct position of securing pins must be checked.
- The square hinges must be counteracted with the appropriate nuts.

10.0 Checks and repair work at voltage supply

10.1 Check of batteries, battery box and battery voltage

NOTE:

- Secure that both batteries are loaded.
If total voltage lies under 24 V, load batteries completely (see chapter 10.2).
- Sinks battery voltage during operation under 24 V, the voltage supply to the motor is interrupted and remote display flashes.
- The voltage of each battery should not sink under 11.5 V.
- A fall of voltage can be checked in driving mode with switched on lighting system and applied hand brake.

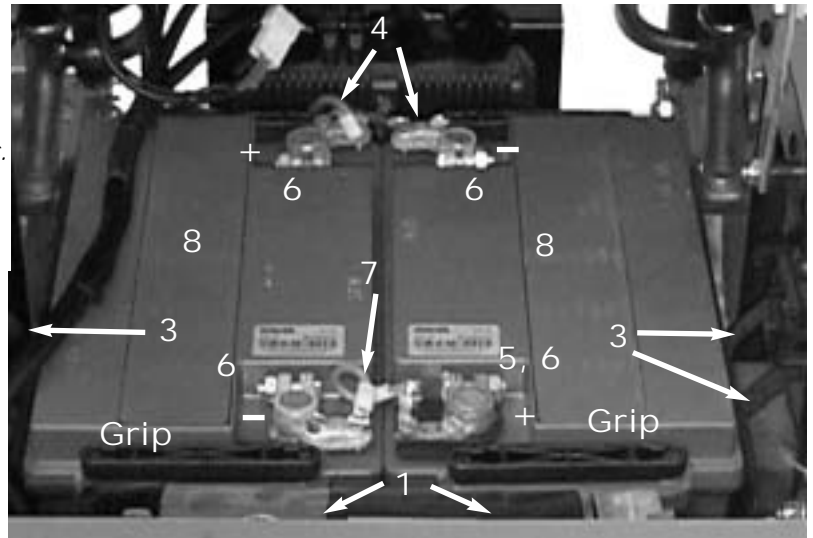


CAUTION:

- *Be careful with tools.*
Do not bridge battery poles.
> Danger of short circuit <
- *Note the high weight of batteries.*
> Danger of crushing <

- 1 Battery box
- 2 Battery box cover (not shown)
- 3 Double tension belt
- 4 Connections with cable form
- 5 Battery pole plate
- 6 Battery pole clips
- 7 Cable bridge
- 8 Gel batteries 12V 60Ah

Batteries complete



Check

- Voltage of a battery under 11.5 V?
- Voltage falls heavily down under load (driving operation, handbrake applied, switched on lighting system) ?
- Battery contacts corroded or damaged?
- Check all cables and plug connections.
- Battery box or battery box cover damaged?
- Double tension belt damaged?
- Grip with carrying strap damaged?

Action

- > Load batteries (see chapter 10.2).
- > Load batteries (see chapter 10.2) or replace.
- > Clean or replace contacts.
- > Replace if necessary.
- > Replace if necessary.
- > Replace double tension belt.
- > Replace if necessary.

Measure voltage

- Bring seat system in service position and arrest.
- Pull double tension belts (3) upwards and remove sideways from battery box cover (2).
- Remove battery box cover (2) upwards out of wheelchair.
- Check single and total voltage of batteries with a multimeter (range 50V / 25V DC).

Disassembly

- Release screwings and remove connections (4), battery pole clips (6), cable form (7) and battery pole plate (5).
- Pull up grips and remove batteries (8) carefully upwards out of wheelchair.
- Release cross slotted screws on left and right side at bottom of battery box (1) and take out box.
- Release screws and nuts M5 and remove double tension belts.

Assembly

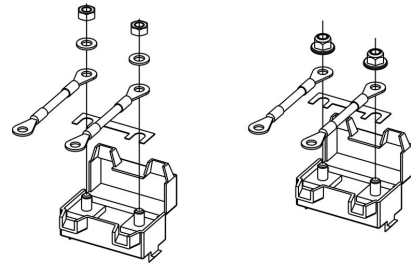
- Assembly is carried out in reverse order.

This page was inserted here to provide an important warning.



WARNING: Danger of fire exists if the fuse is incorrectly assembled!

- Only ever assemble the fuse in the order shown in the illustration at right!
- Always tighten nuts to between 3.3 and 3.5 Nm!



Until 03.2004

1. Fuse
2. Fuse compartment
3. Washer
4. Nut M5

After 03.2004

1. Fuse
 2. Fuse compartment
 3. Nut DIN 6923
-

NOTE:

Also note the loading instructions for batteries

- in the user manual of "G40",
- in the user manual of charging unit,
- on front and rear of charging unit.

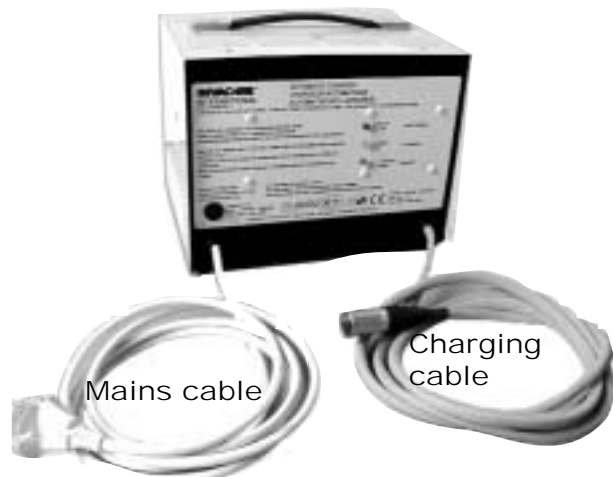
For care and maintenance of mechanical components of batteries see chapter 10.1.



CAUTION:

- Exercise care when checking / loading. Avoid short circuit at battery poles.
> Danger of short circuit <

INVACARE-Charging unit

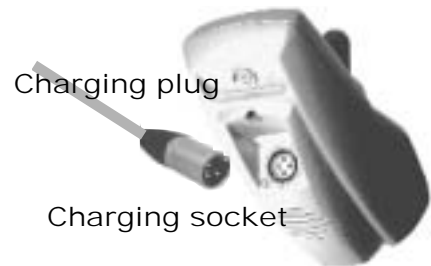


Check

Action

- Status display at remote flashes 7 times (deep discharging)? > Measure battery voltage.
- Status display at remote flashes 8 times (excess voltage)? > Charging unit defective. See chapter 10.3.
- Measure voltage of batteries:
 - Voltage under 11,5V? > Load with original charging unit
 - Voltage under 8V? (Battery deep discharged.) > Pre-load with unregulated charging unit up to 9V. (Description see below.)
- Different voltage (Tolerance $\pm 0,2$ V) at both batteries? > Replace batteries.

Remote



Loading process



CAUTION:

- During loading batteries must not lie on side or stand edgewise. The batterypoles must show upwards.
- At G40 with ACS use only gelbatteries (loading power maximal 7 A). Wetbatteries (loading power max. 10 A) overload cables.
- Batteries and charging unit must be set out ambient temperature because the loading is also controlled with temperature sensors. Elongated cables and different locations of charging unit and batteries cause faulty loading.

NOTE:

- Processing during loading of batteries with INVACARE-charging unit: Also see user manual of G40.
- Pay attention to connecting order of INVACARE-charging unit: First connect charging plug, then mains plug.
- Deep discharged batteries can not be loaded with INVACARE-charging unit.
- If batteries are not loaded completely they must be replaced.
- During full loading the display "full loading" on charging unit must light. When a charging voltage of 28 V is reached, also the LED´s at remote flash. The voltage of a single battery shall amount during full loading and in room temperature (ca. 20 - 22°C) $14 \pm 0,2$ V.

Loading of deep discharged batteries

When measuring a battery voltage of under 8 V, the battery is deep discharged.

For loading deep discharged batteries do the following:

- Remove batterypole clips and connections to wheelchair. See chapter 10.1.
- Pre-charge each battery and measure charging voltage.
- Pre-charge battery with an unregulated charging unit up to 9 V.
After that interrupt charging process with unregulated charging unit.



CAUTION:

- *During loading batteries must not lie on side or stand edgewise.*
- *Do not load batteries with the unregulated charging unit completely. Batteries could be destroyed.*

> *Danger of explosion* <

- Assemble batterypole clips and connections.
- Load battery with INVACARE-charging unit over charger socket of remote completely. The loading process should be led for at least 48 hours.

10.3 Battery charging unit

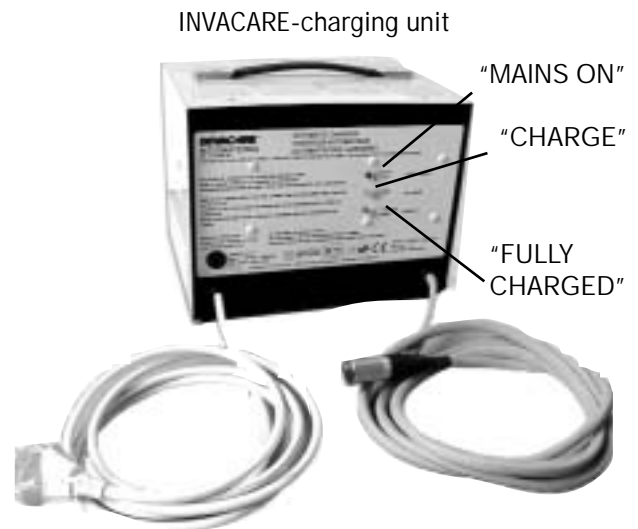
NOTE:

Also note the loading instructions for batteries:

- in the user manual of charging unit,
- on front and rear of charging unit.

Check of functions

- Plug in mains plug of charging unit.
 - Red LED "MAINS ON" lights up.
- Divide mains plug from mains.
- Plug in charging plug at charging socket of remote and then plug in mains plug again.
 - Green LED "FULLY CHARGED" lights up for ca. 3 sec.
 - then changes to yellow LED "CHARGE".
- Pull out mains plug.
- Pull out charger plug.

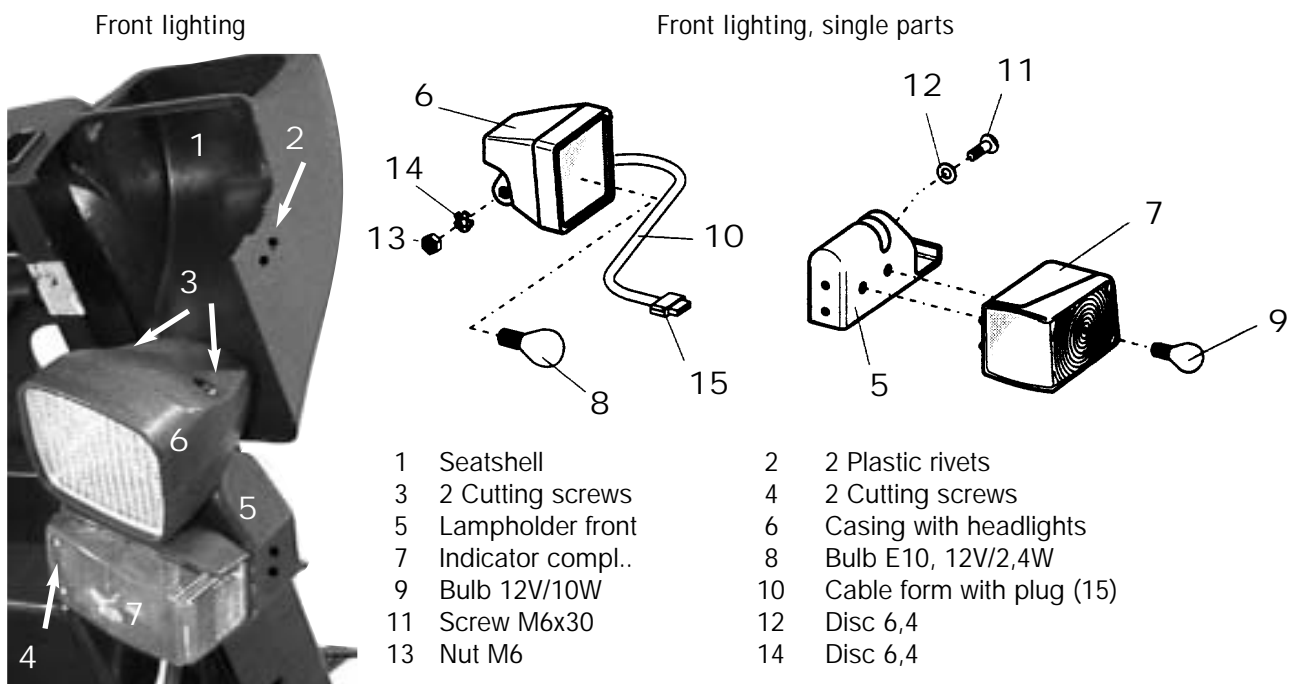


Trouble index for INVACARE-charging unit

Trouble	Cause	Action
<ul style="list-style-type: none"> • Red LED "MAINS ON" is not lit? 	<ul style="list-style-type: none"> - Mainsvoltage 230 V fails. - Charging unit defective. 	<ul style="list-style-type: none"> > Check 230 V mains. > Replace charging unit.
<ul style="list-style-type: none"> • Yellow LED "CHARGE" is not lit. 	<ul style="list-style-type: none"> - Batteries deep discharged. - Charging unit defective. 	<ul style="list-style-type: none"> > Check battery voltage. > Replace charging unit.
<ul style="list-style-type: none"> • Green LED "FULLY CHARGED" is not lit? 	<ul style="list-style-type: none"> - Excess voltage of batteries. Flash code status display? - Charging unit defective. 	<ul style="list-style-type: none"> > Check charging voltage. > Replace charging unit.

11.0 Checks and repair work at lighting system

11.1 Lighting system front



NOTE:

- Before controlling the lighting system secure that batteries are loaded.
- Switch on lights at remote for control.

Check

- Front lighting failed completely?
- One indicator defective?
- One headlight defective?

Action

- > Replace light-/servo module
- > Replace bulb.
- > Replace bulb.

Replace indicator lamp

- Release cutting screws (4) and take off indicator cap.
- Remove indicator bulb out of bayonet socket and replace.

Replace headlight bulb

- Bring seat system in service position and arrest.
- Remove plastic rivets (2) with a screwdriver and let lighting system fall down out of seatshell.
- Release cutting screws (3) and take off upper part of casing (6).
- Take out headlight of bottom part of casing, pull out socket and replace bulb.

Complete disassembly of lighting unit

- Take lighting unit out of seatshell and remove lamp. See above.
- Release plug (15) from connector row (at back of chassis) and remove cable binder.
- Remove lighting unit completely out of seatshell.
- Remove screw (11) with nut (13) and discs (12, 14) and take off headlight casing (6) from lampholder (5).
- Open indicator, remove lamp and mirror, solder off cable and screw off indicator casing from lampholder (5).

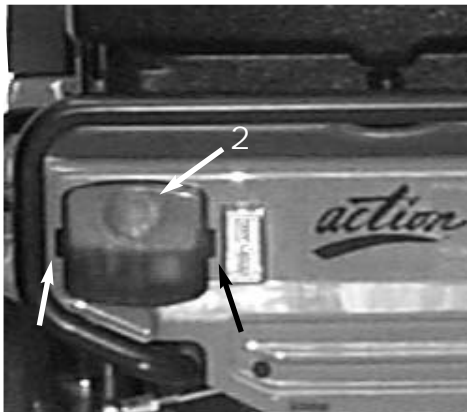
Assembly

- Assembly is carried out in reverse order.

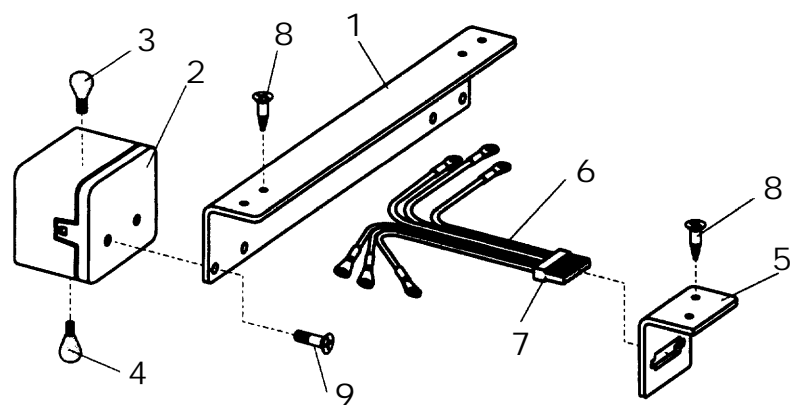
NOTE:

- Note connecting order.

Back lighting



Back lighting, single parts



- | | | | |
|---|-------------------------|---|----------------------------|
| 1 | Backlightholder | 2 | Backlight compl. |
| 3 | Indicator bulb 12V/21W | 4 | Backlight bulb 12V/5W |
| 5 | Holding square for plug | 6 | Cable form with plug 7 |
| 8 | Countersunk screw M5x20 | 9 | Fillister-head screw M4x15 |

NOTE:

- Before controlling the lighting system secure that batteries are loaded.
- For control switch on lights at remote.

Check

- Back lighting failed completely?
- One indicator defective?
- One backlight defective?

Action

- > Replace light-/servo module.
- > Replace bulb.
- > Replace bulb.

Replace indicator bulb

- Insert a flat screwdriver into recess at side of light (see arrows), push away clicking lever softly from light and draw off simultaneously backlight cap backwards.
- Repeat operation on the other side and take off backlight cap.
- Remove indicator bulb out of bayonet socket and replace.

Replace backlight

- Remove backlight as described above.
- Remove backlight bulb out of bayonet socket and replace.

Complete disassembly of backlight

- Remove backlight cap like above.
- Remove lamps like above.
- Flachsteckhül????????????????????????????????

NOTE:

- Note connecting order.

- Remove two screws (9) and take off backlight (2) from backlightholder.

Disassemble cable form

- Remove backlight like above.
- Prop up wheelchair that it is accessible from below.
- Draw off plug (7), pull cable form carefully out of holder (1) and remove.

Assembly

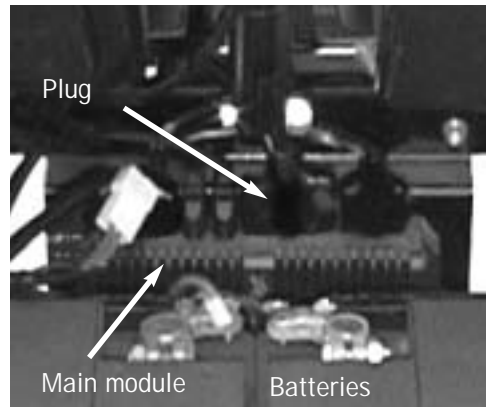
- Assembly is carried out in reverse order.

12.0 checks and repair work at electronics

12.1 Main module

- The main module is maintenance-free. Only basic checks can be done.
- The module is mounted at back of chassis in front of the backwheels.
- Before control you must secure that the batteries are loaded.

Main module, serviceview



Status display

For a simple visual assessing of defects the module is equipped with a green light diode for status display.

Check of status display:

- Swith on wheelchair at remote.
- Check light diode (see index below).

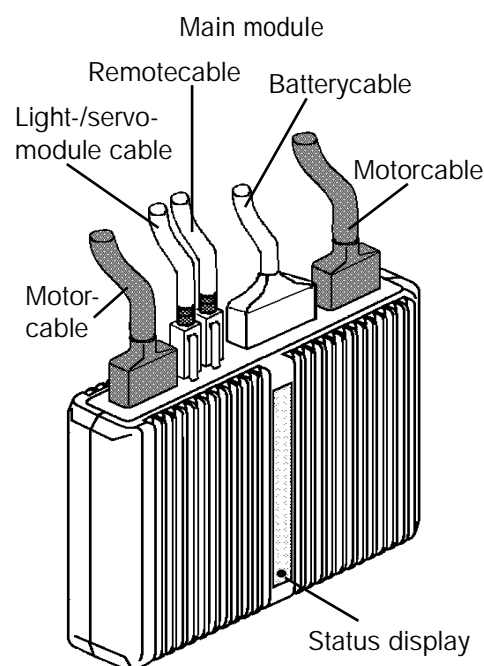
Check

- Status display lightens?
- Status display off?

Action

- > Module is in order.
- > Check voltage supply of module.
Check programming.
- > Replace module.

- Status display flashes?



Check voltage supply to main module

- Bring seat system in service position and arrest.
- Draw off plug of battery cable out of main module.
- Measure voltage at contacts of battery plug.
Both left contact pins are connected with the positive pole, both right contact pins are connected with the negative pole of battery.
The voltage must be at least 19 V.

Trouble index for main module

Trouble	Cause	Action
<ul style="list-style-type: none"> • Voltage under 19 V? 	<ul style="list-style-type: none"> - Batteries deep discharged. 	<ul style="list-style-type: none"> > Pre-charge battery. See chapter 10.2. > Replace battery.
<ul style="list-style-type: none"> • No voltage? 	<ul style="list-style-type: none"> - Cable defective. 	<ul style="list-style-type: none"> > Replace cable.

Disassembly

- Bring seat system in service position and arrest.
- Mark plugs and draw off from main module.
- Release both cross slotted screws of module.
Screws are accessible from rear of wheelchair (bottom).
- Remove module.
- If necessary release the voltage supply cable from batteries, remove batteries (see chapter 10.1).

Release cable socket at battery box and replace cable completely.

Assembly

- Assembly is carried out in reverse order.

NOTE:

- Secure that all plugs are clicked in correctly.

NOTE:

- Before control of remote check the charging state of batteries.
- Then check status display on errorcodes.

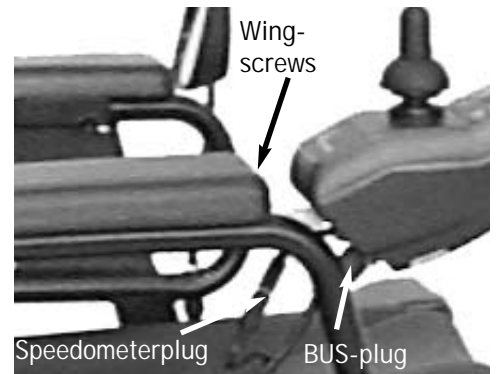


Kontrolle

- Status display flashes?
- BUS-plug defective?
- BUS-cable damaged?
- Movement of drive lever impaired, damaged?
- Remote mounting (armrest) damaged?
- Display or keyboard faulty?
- Voltage supply to remote faulty?
(Measurement see below)

Maßnahme

- > Check error codes. See chapter 5.1.
- > Replace BUS-cable. Replace BUS-cable.
- > Replace remote.
- > Renew wing screws, replace mounting.
- > Replace remote.
- > Check: Battery voltage, BUS-plug, BUS-cable, main module.



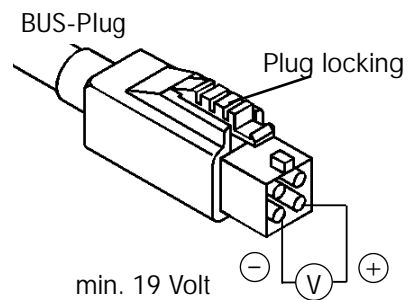
Check voltage supply to remote

- Pull BUS-plug out of remote.
- Measure voltage at marked contacts (see diagram)
The voltage must be at least 19 V.



CAUTION:

Do not short circuit contacts. Danger of short circuit.



Trouble index for remote

Trouble	Cause	Action
<ul style="list-style-type: none"> • No voltage? 	<ul style="list-style-type: none"> - BUS-cable defective. - BUS-plug defective. - Main module defective. 	<ul style="list-style-type: none"> > Check/replace BUS-cable. > Check/replace BUS-plug. > Check main module. > Check voltage to main module. See chapter 12.1.
<ul style="list-style-type: none"> • Voltage under 19 V? 	<ul style="list-style-type: none"> - Deep discharged battery. 	<ul style="list-style-type: none"> > Check battery. See chapter 10.1.

Disassembly

- Pull out BUS-plug of remote.
- Draw off speedometer plug.
- Release wing screws at inner side of armrest.
- Draw off remote out of mounting.
- Remove mounting from armrest.
- Remove cable binder, release crosstip screws and take off speedometer with mounting from remote.
- If necessary remove seat padding, bring seat in service position and arrest.
- Remove all cable binders from BUS-cable, release BUS-plug at main module and replace BUS-cable completely.

Assembly

- Assembly is carried out in reverse order.

NOTE:

- During assembly use new cable binders.
- Secure that all plugs are clicked in correctly.

12.3 Light-servo module

NOTE:

- The light-servo module is maintenance-free. Only basical checks can be done.
- The module is mounted in the seatshell.
- Before control secure that the batteries are loaded.

Status display

For the simple visual assessing of defects the module is equipped with a green light diode for status display.

Check of status display:

- Take padding out of seatshell, so that the status display at light-servo module can be seen.
- Switch on wheelchair at remote.
- Check light diode (see diagram below).

Check

- Status display lightens?
- Status display off?

Action

- > Module is in order.
- > Check voltage supply of module.
Check programming.

- Status display flashes when indicator is on?

- > Back indicator bulb defective. Replace bulb.

- Statusdisplay flashes?

- > Replace module.

Check voltage supply to light-servo module

- Pull BUS-plug out of light-servo module.
- Measure voltage at marked contacts (see diagram).
The voltage must at least be 19 V.



CAUTION

Do not short circuit contacts. Danger of short circuit.

Trouble index for light-servo module

Trouble	Cause	Action
<ul style="list-style-type: none"> • No voltage? 	<ul style="list-style-type: none"> - BUS-cable defective. - BUS-plug defective. - Main module defective. 	<ul style="list-style-type: none"> Check/replace BUS-cable. > Check/replace BUS-cable. > Check main module. Check voltage supply to main module. See chapter 12.1.
<ul style="list-style-type: none"> • Voltage under 19 V? 	<ul style="list-style-type: none"> - Battery deep discharged. 	<ul style="list-style-type: none"> > Check battery. See chapter 10.1.

Disassembly

- Remove padding out of seatshell.
- Remove plug from light-servo module.
- Take module out of seatshell.
- If necessary release BUS-plug from main module and replace BUS-cable completely.

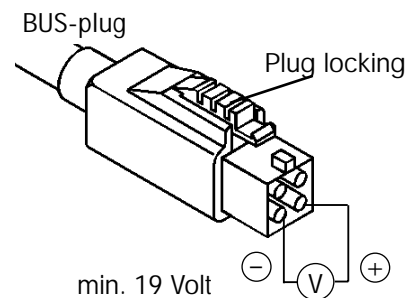
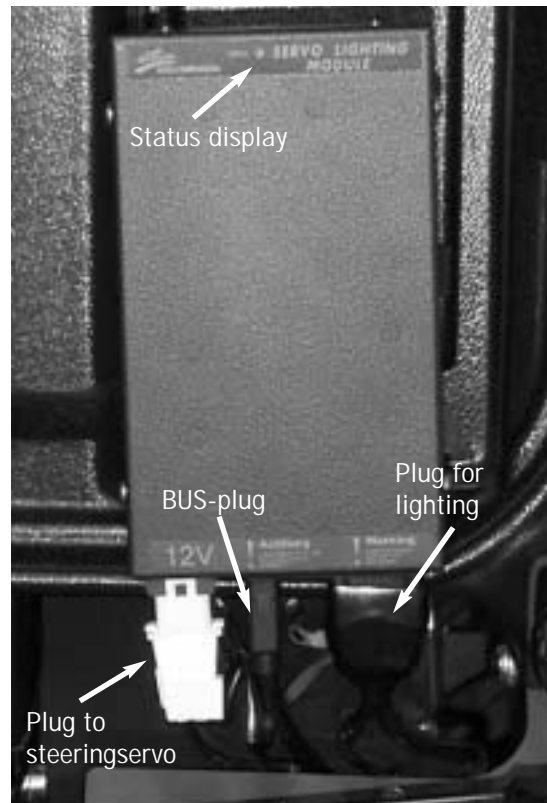
Assembly

- Assembly is carried out in reverse order.

NOTE

- Secure that all plugs are clicked in correctly.

Light-servo module, service view



NOTE:

- The speedometer is maintenance-free. Only basic checks can be done.
- The speedometer has an own battery.
- The pick-up for the speedometer is mounted down at the front wheel next to brake disc.
- The connection cable for the pick-up is fixed with cable binders at the BUS-cable of remote and at the motor cable.

Check	Action
• Speedometer display off?	> Replace battery. > Replace speedometer.
• Speedometer display can not be adjusted (Push-buttons top and bottom)?	> Replace speedometer.
• Speedometer is in driving operation without function?	> Replace pick-up. > Replace connection cable.



Check speedometer

- Prop up wheelchair in a manner that the right front wheel moves freely.
- Disengage motor (freewheel operation).
- Turn front wheel manually in driving direction and check speedometer. Speed gauge (KMH) must count upwards from 0 to ca. 3 to 4 KMH.
- Release Klinkenstecker, dislock speedometer and take off from contact plate.
- Vheck continuity of the cable between Klinkenstecker and contact plate with a multimeter (Ohmmeter).

Check connection cable

- Screw off Klinkenbuchse that contacts are accessible.
- Remove front wheel that pick-up is accessible.
- Remove Schrupfschlauch at bottom of pick-up from connection cable that soldering places are accessible.
- Check continuity of cable between Klinkenbuchse and pick-up with a multimeter (Ohmmeter).

Disassembly

- Disbolt speedometer and take off from contact plate.
- Release cross slotted screwsat back of speedometer, take off covering and replace batteries (2x 1.5V; type SR44).
- Release screw with clamp and cable binder from remote.
- Draw off rubber ring and take off contact plate with cable and Klinkensteckerfrom mounting.
- Release two cross slotted screws and remove mounting from remote.
- Remove cable binder, remove Schrupfschlauch, solder off cable from pick-up and remove cable.
- Geber abschrauben und entfernen.

Assembly

- Assembly is carried out in reverse order.

NOTE

- Renew Schrupfschlauch and cable binder.

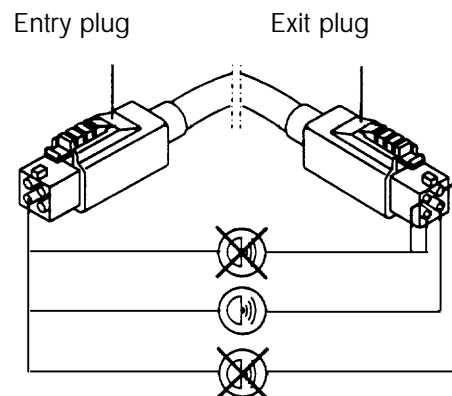
13.0 Continuity check of cables

Measuring construction



Measuring example:

Continuity check at BUS-cable



NOTE:

- Information on handling of multimeter can be taken out of appertaining user manual.

All cables can be examined on defects like e.g. cable breaking with a continuity check. The check is done with a multimeter. The manner in which the correct continuity is signalized (Signalsound or 0 Ohm) depends on the construction of multimeter.

Process

- Adjust the multimeter on continuity check or the smallest resistance measuring range (Ohm).
- Release all plug connections of the checked cable.
- Connect the positive cable of measuring instrument with a contact of entry plug and the negative cable with the corresponding contact of exit plug.

NOTE:

- Entry- and exit plug can be fixed freely.
During measuring they must not be changed.

- Check the continuity over the contacts from entry and exit plug.
- Check all contacts and cores of cable in that way for short circuit or cable breaking.

Trouble index for cable

Trouble	Cause	Action
<ul style="list-style-type: none"> • Continuity over several contacts/cores? 	- Short circuit in cable.	> Replace cable.
<ul style="list-style-type: none"> • Continuity not measurable? 	- Cable breaking.	> Replace cable.

NOTE:

- In a similar way the bulbs, windings of motor or switches can be checked.

14.0 Programming of wheelchair

For trouble diagnostics of ACS-electronic and for adjustment of standard or customer-specific driving profiles the DYNAMIC wizard PCD-software version 2.0 should be used.

- P rogramming
- C onfiguration
- D iagnostics

The programme makes possible diagnosis and adjustment with the help of a commercially available PC up from modelrow 386 SX with the operating systems DOS (up from version 3.1) or Windows 95. Beyond that a PC-independent programming instrument can be used.

The article number of software or the programming instrument can be found in chapter 2.0 list of tools. You can get more information to PCD-software or the programming instrument at INVACARE-service,????????

15.0 Storing of wheelchair

If it is necessary to store the wheelchair for a longer period you should do following actions:

- Check tyre pressure and fill up to rated pressure if necessary. See chapter 8.2.
- Load batteries for 48 hours with INVACARE-charging unit. See chapter 10.2.
- Remove pole clips of batteries. See chapter 10.1.
- Store batteries in a cool place (if necessary disassemble and store separately). See chapter 10.1.

During renewed putting it into operation check tyre pressure and battery voltage and fill in / load if necessary.

1 Warnings on modifying the programming of the wheelchair



WARNING: Every alteration to the drive programme can influence vehicle handling and the tipping stability of the wheelchair!

- *Alterations to the drive programme must only be carried out by authorised Invacare®-dealers!*
 - *Invacare® supplies all wheelchairs from the factory with a standard drive programme. Invacare® can only assume a warranty for the safe vehicle handling of the wheelchair – in particular tipping stability - for this standard drive programme!*
-

2 Torques

Please note the following torques for all adjustment and maintenance work during which it is necessary to loosen and re-tighten screws or nuts:

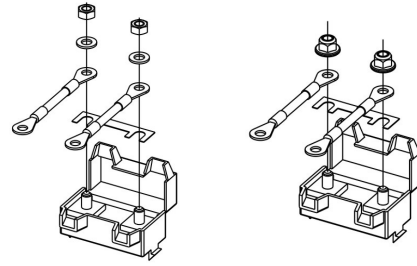
Thread diameter	M5	M6	M8	M10	M12	M16
Fastening torque (Nm)	3.4-4.9	5.9-7.8	14-19	25-34	44-61	115-155
Fastening torque (mkp)	0.35-0.80	0.60-0.80	1.4-1.9	2.6-3.5	4.5-6.2	11.5-16

Deutsch



ACHTUNG: Feuergefahr besteht falls die Streifensicherung falsch montiert wird!

- Montieren Sie die Streifensicherung ausschließlich in der Reihenfolge, wie im Bild rechts gezeigt!
- Muttern stets mit 3,3 bis 3,5 Nm anziehen!



bis 03.2004

1. Streifensicherung
2. Kabelschuh
3. Unterlegscheibe
4. Mutter M5

ab 03.2004

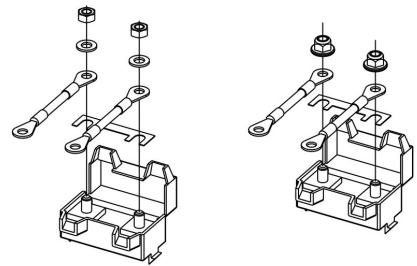
1. Streifensicherung
2. Kabelschuh
3. Mutter DIN 6923

Englisch



WARNING: Danger of fire exists if the fuse is incorrectly assembled!

- Only ever assemble the fuse in the order shown in the illustration at right!
- Always tighten nuts to between 3.3 and 3.5 Nm!



Until 03.2004

1. Fuse
2. Fuse compartment
3. Washer
4. Nut M5

After 03.2004

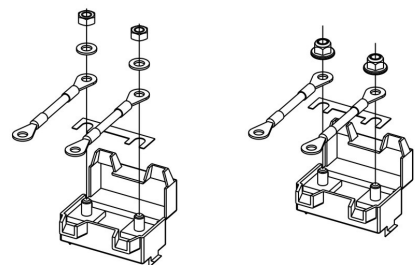
1. Fuse
2. Fuse compartment
3. Nut DIN 6923

Französisch



ATTENTION : risque d'incendie si le fusible à lames est mal monté !

- Monter le fusible à lames exclusivement dans l'ordre indiqué sur l'illustration de droite !
- Toujours serrer les écrous avec 3,3 à 3,5 Nm !



jusque 03.2004

1. Fusible à lames
2. Cosse de câble
3. Rondelle
4. Ecrou M5

à partir de 03.2004

1. Fusible à lames
2. Cosse de câble
3. Ecrou DIN 6923

1.1 Updating software

Invacare is continuously carrying out further development and improvements to drive programs for electric mobility products. For this reason, you should always check whether the drive program version number is up-to-date when carrying out any repairs or regular maintenance. If a newer version is available, the drive program must be updated. The procedure for updating the drive program is described in the wizard software operating manual.



Note:

If you have carried out customer-specific modifications to the drive program, you will have to make these changes again after installing the new drive program.



CAUTION: any changes to the drive program can affect the driving characteristics and the tipping stability of the vehicle!

- *Changes to the drive program may only be carried out by trained Invacare® specialist dealers!*
 - *Invacare® can only give a warranty for safe vehicle driving behaviour - especially the tipping stability - for unaltered standard drive program!*
-



Requirements:

- Dynamic® Wizard software
 - Operating manual for Wizard software
 - Further requirements, such as a minimum system configuration for the PC used for programming, required programming cables etc. can be taken from the Wizard software operating manual.
-