

Permobil C500

Power wheelchair



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Introduction

The Service Manual is intended for technical personnel who maintain and repair power wheelchairs. It is important that anyone who performs maintenance and repairs described in this manual reads and understands the content of this manual so that the work is performed professionally. Always state the chassis number when contacting Permobil to ensure that the correct information is provided.

Technical Support

In the event of technical problems, you should contact your dealer, or Permobil Inc. USA at 800-736-0925.

Spare parts

Spare parts must be ordered through your dealer.

Warranties

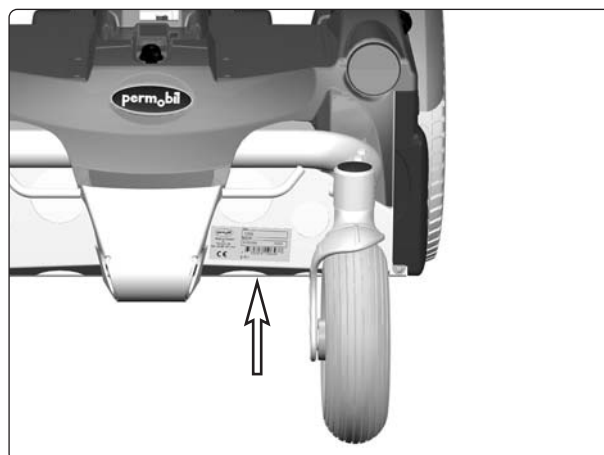
Contact your dealer or Permobil Inc. USA for information about the warranties for this chair.

Maintenance

See the information in the Owner's Manual.

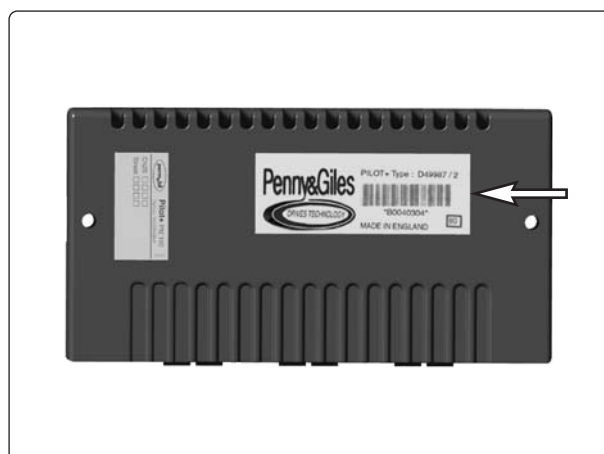
Identification plates

Chassis



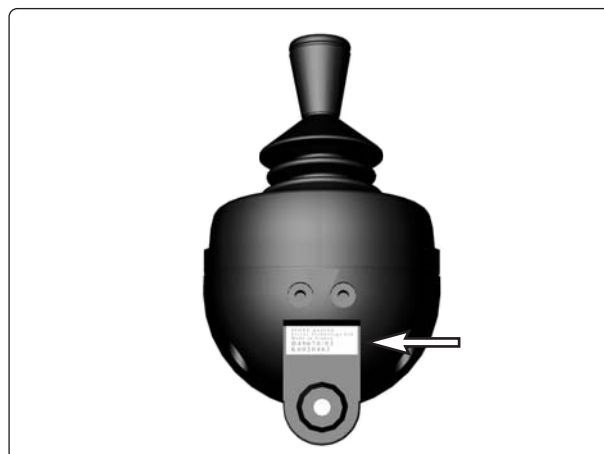
Chassis identification number.

Pilot+ controller



Pilot+ controller identification number.

Control panel Pilot+

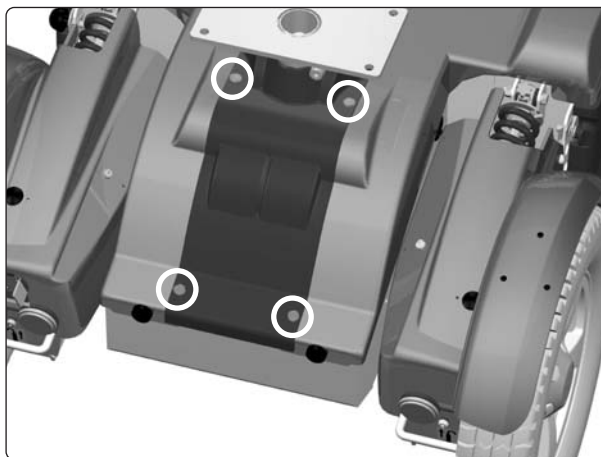


Control panel Pilot+ identification number.

Covers

Removing the seat elevator cover

1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. The seat elevator cover is mounted with four plastic plugs which can be flipped up using a screwdriver.
3. Remove the seat elevator cover by lifting it upwards/forwards.



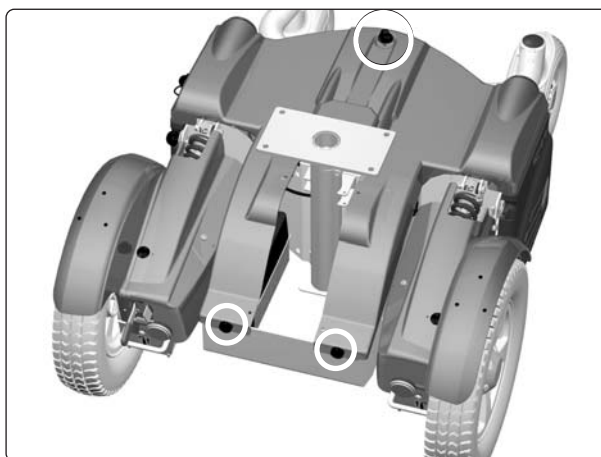
The seat elevator cover is mounted with four plastic plugs.

Fitting

Fit the cover in the reverse order.

Removing the chassis cover

1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Remove the seat elevator cover, see above.
3. Remove the two knobs on the front edge of the cover, see fig.
4. Unscrew the knob at the far back of the chassis cover, see fig.
5. Remove the chassis cover by lifting it upwards/backwards.



The chassis cover is mounted with two knobs at the front edge and one knob at the back.



NOTE

If the chair is equipped with lighting, disconnect the rear-light cabling at the connector fitted on the cabling.

Fitting

Fit the cover in the reverse order.

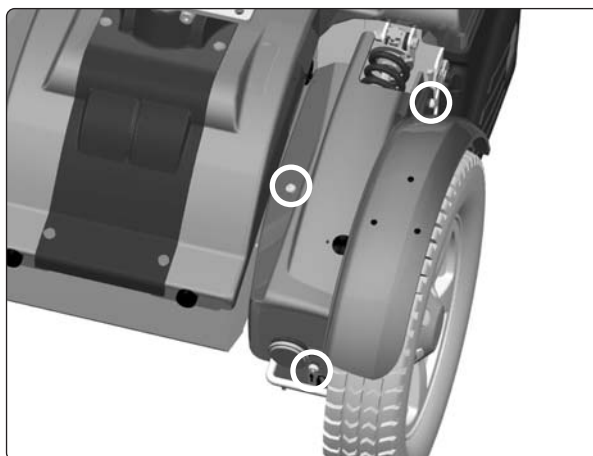
Removing the front fender

1. Remove the three screws, see fig.
2. Remove the front fender by lifting it upwards/forwards.



NOTE

If the chair is equipped with lighting, remove the chassis- and seat elevator cover. Disconnect the front-light cabling at the connector fitted on the cabling.



The front fender is mounted with three screws.

Fitting

Fit the front fender in the reverse order.

Batteries

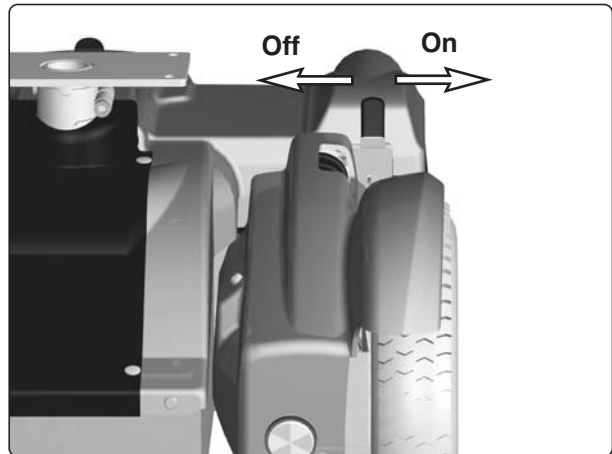


WARNING

Be careful when using metal objects when working with batteries. A short-circuit can easily cause an explosion. Always use safety gloves and safety goggles.

Removal

1. Place the wheelchair on a level surface.
2. Switch off the main power switch on the control panel.
3. Put the circuit breaker in the "OFF" position.



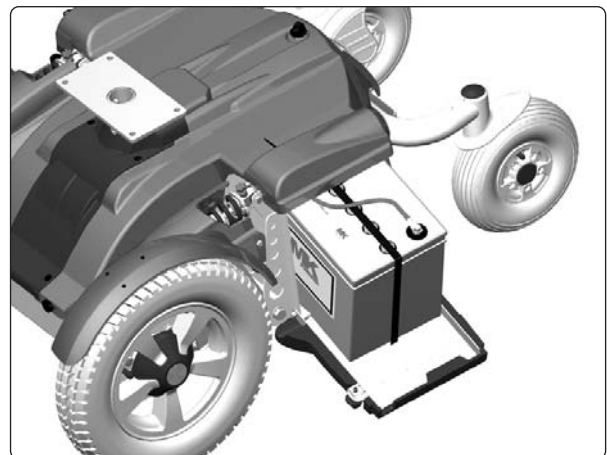
Circuit breaker (Off/On).

4. Loosen the rear end of the chassis cover a little by unscrewing the knob that holds the cover.
5. Open the battery covers by loosening the knobs that holds the battery covers, and drop the covers down.



The knobs on the chassis and the battery cover.

6. Use the battery straps to pull each battery out just enough so you can loosen the outer battery connection.
7. Loosen the outer battery connection.
8. Pull the batteries completely out and disconnect the inner battery connections.
9. Remove the batteries.



Pulling out the batteries

Batteries

Fitting

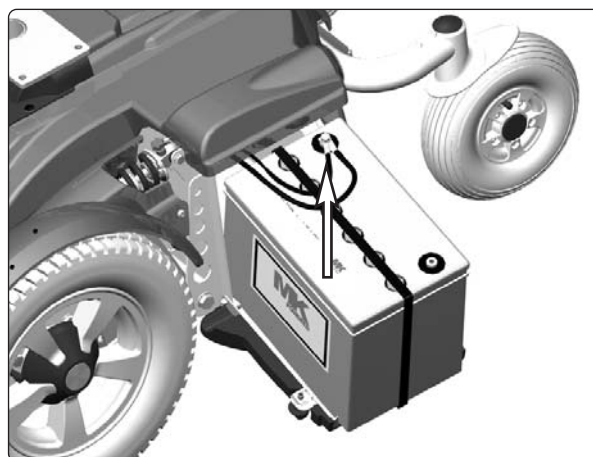
1. Lift new batteries into the chassis using the battery belt. Leave the battery belt on the batteries. Place the battery with the battery terminals facing backwards, see fig.



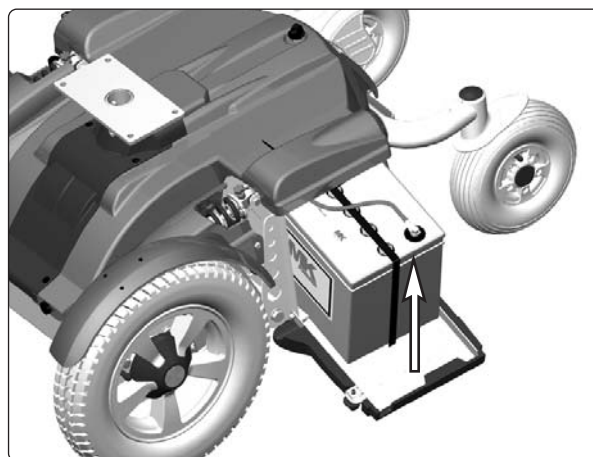
WARNING

Be careful when using metal objects when working with batteries. A short-circuit can easily cause an explosion. Always use safety gloves and safety goggles.

2. Fit the inner battery connections.
3. Push the batteries halfway into the chassis.
4. Fit the outer battery connections.
5. Push the batteries fully into the chassis.

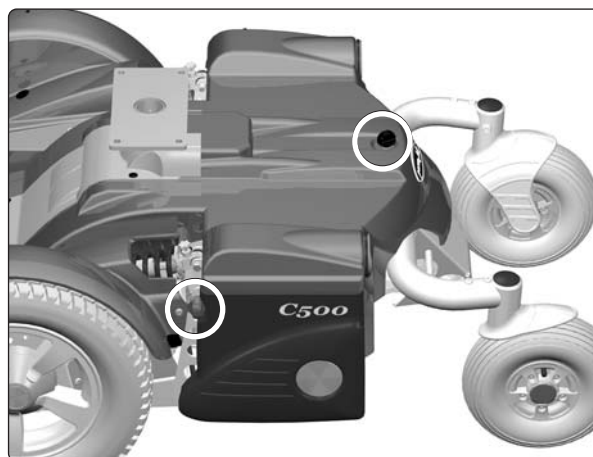


Fit the inner battery connections.



Fit the outer battery connections.

6. Close the battery covers and tighten the knobs.
7. Put the circuit breaker in the "ON" position. It is accessed through a hole in the chassis cover; see figure.



*The knobs on the chassis-
and the battery cover.*

Front wheels

Removal

1. Turn off the main power switch on the control panel.
2. Lift the wheelchair chassis and support it on blocks so that the wheel is off the ground.
3. Remove the hubcap (1), bolt (2) and the three washers (3 and 4); see figure.
4. Pull the wheel off the shaft. Use puller 304103-99-0 if the wheel is tight; see figure.

Fitting

1. Check that the wheel shaft and rim are undamaged. Clean as necessary to remove dirt and rust. Replace damaged parts.
2. Check that the key is firmly attached and undamaged; fit a new key if necessary.
3. Lubricate the shaft with a thin layer of copper paste (Würth 0893800x, Art. no.: 1820540).



WARNING

Do not use any type of lubrication in the threaded hole in the axle or on the bolt.

4. Fit the wheel onto the axle. The use of hand force only is preferred, but, if need be, carefully use a rubber mallet, whose head diameter is no less than 1.5 inches (38 mm), to ensure that the rim is fully seated upon the motor.



NOTE

Hitting too hard with a rubber mallet could cause damage to the gear.

5. Mount the three washers (3) and 4) onto the bolt (2) and secure the wheel. **Use a torque wrench to tighten the bolt to 24 ft-lbs (33Nm).** Install the hub cap (1). See Fig. 13.



NOTE

The washer (4) should be placed with the most flat side inwards.

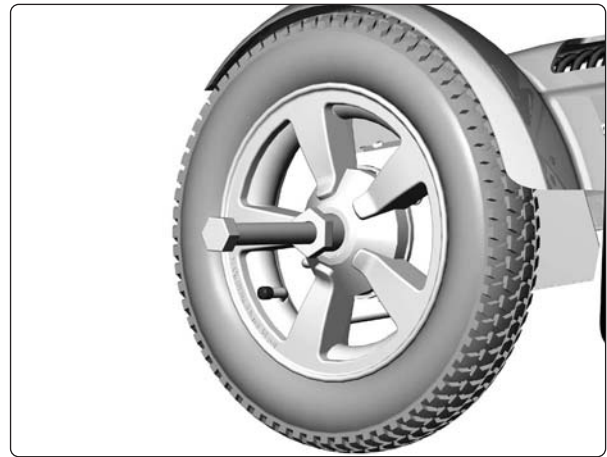


WARNING

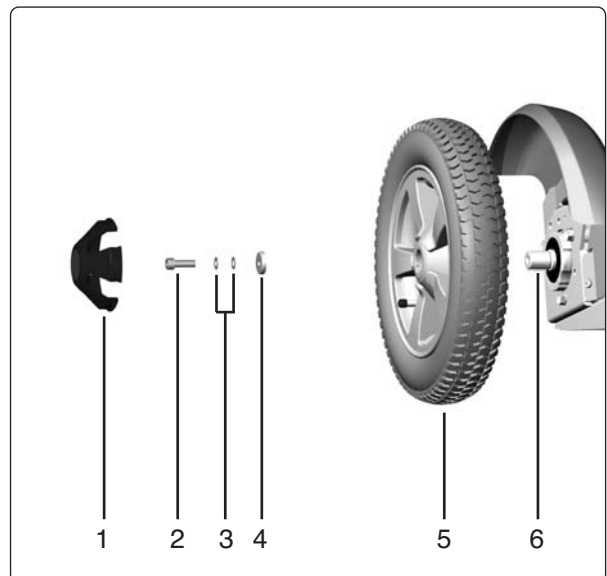
The bolt must be used once only. Removed bolt is not allowed to be refitted.

Other types of bolts or washers are not to be used.

Do not use any other type of thread lock.



Puller 304103-99-0.



Fitting of rim.

Pos.	Description
1	Hubcap
2	Bolt, ISO 4762 M8x25 10.9 Fe/Zn 5 C2 / Locking coat DIN 267-28
3	Shim washer DIN 988 8 A2 (DB 8x14x0.5 Stainless)
4	Washer, 8 HB 305 Fe/Zn 5 C2 (TBR SB 8,4x26x5)
5	Front wheel
6	Key DIN 6885A 6x6x22

Front wheels

Replacement of inner tube

1. Turn off the main power switch on the control panel.
2. Put the wheelchair up on blocks so that the wheel is free and then let the air out of it.
3. Force the tire off the rim.
4. Remove the broken inner tube.
5. Fit a new inner tube.
6. Refit the tire.
7. Fill the tire with air, see below.



Filling Valve, front wheel

Filling with air

Check at regular intervals that the wheelchair's tires have the prescribed tire pressure. An incorrect tire pressure can cause deterioration in stability and maneuverability, plus extremely low air pressure can give rise to abnormal wear as well as shorter driving distances. So check regularly to see that the tires are maintained at a pressure of 29 psi (200 kPa).

1. Unscrew the plastic cap on the air valve of the tire.
2. Connect the compressed air nozzle to the air valve and adjust the tire pressure to the prescribed level.

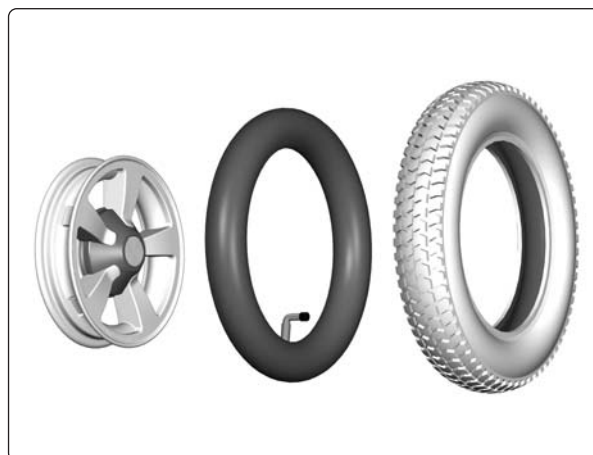


Force the tire off the rim.



WARNING

The recommended air pressure for front/rear tires is 29 psi (200 kPa). Overfilling causes a risk of explosion. Incorrect tire pressure can involve a deterioration of stability and maneuverability, so check regularly that the tire contains the prescribed air pressure.



Rim, innertube and tire.

Rear wheels

Removal

1. Turn off the main power switch on the control panel.
2. Lift the wheelchair chassis and support it on blocks so that the wheel is off the ground.
3. Remove the hucap (1).
4. Remove the screw (2) and the washer (3).
5. Pull the wheel off the shaft.

Fitting

1. Check that the wheel shaft and rim are undamaged. Clean as necessary to remove dirt and rust. Replace damaged parts.
2. Fit the wheel onto the axle with the use of hand force only. Make sure the rim is fully seated upon the axle.
3. Fit the washer (3) onto the screw (2) and secure the wheel.

Use a torque wrench to tighten the bolt to 17.7 ft-lbs (24 Nm).



NOTE

Do not use a Pneumatic impact wrench.

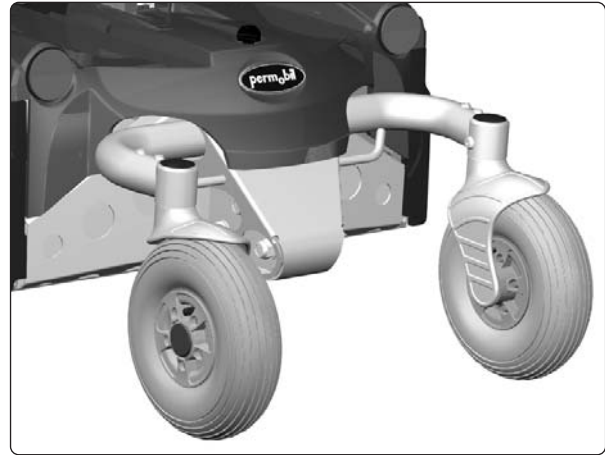


WARNING

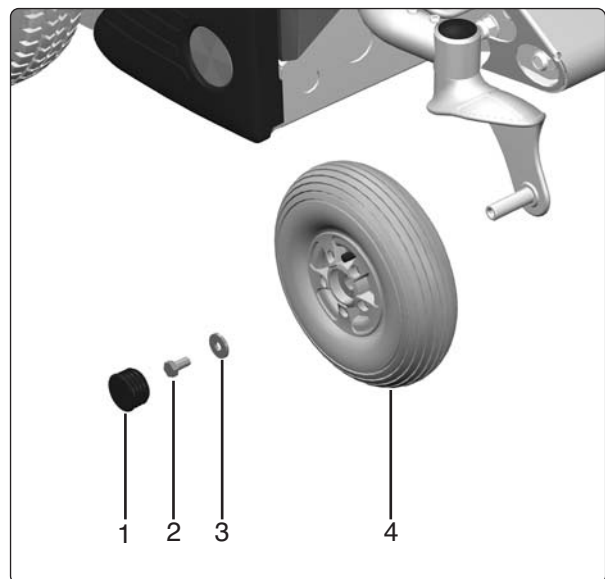
The bolt must be used once only. Removed bolt is not allowed to be refitted.

Other types of bolts or washers are not to be used.

Do not use any other type of thread lock.



Rear wheel



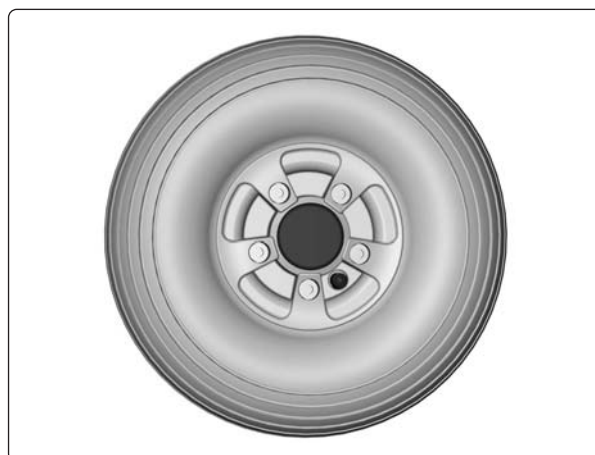
Fitting of rim.

Pos.	Description
1	Hubcap
2	Bolt, ISO 4017 M8x16 8.8 Fe/Zn 5 C1 / Locking coat DIN 267-28
3	Washer, 8.5x23x3
4	Rear heel

Rear wheel with air

Replacement of inner tube

1. Turn off the main power switch on the control panel.
2. Lift the wheelchair chassis and support it on blocks so that the wheel is off the ground.
3. Remove the rear wheel, see page 12.
4. Let the air out of the tire.
5. Remove the five bolts with nuts that holds the inner and outer part s of the rim together, see figure below.
6. Remove the broken inner tube.
7. Fit a new inner tube in the tire.
8. Refit the rim parts, fit the outer part with the innertubes valve thru the hole, see fig. Assemble the rim with the tire, making sure the tube doesn't get trapped between the two halves of the rim
9. Refit the five bolts with nuts.
10. Fill the tire with air, see below.



Filling Valve, rear wheel



WARNING

The recommended air pressure for front/rear tires is 29 psi (200 kPa). Overfilling causes a risk of explosion. Incorrect tire pressure can involve a deterioration of stability and maneuverability, so check regularly that the tire contains the prescribed air pressure.

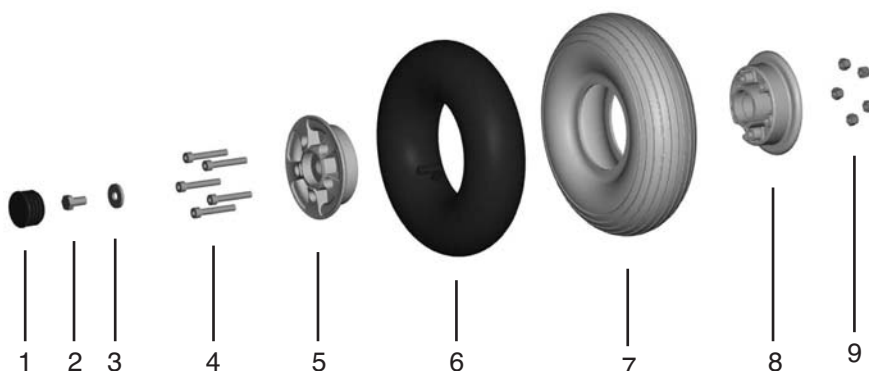
If the wheel bolt is removed for tire service, replace it with a new, unused part from Permobil and tighten the bolt to the recommended torque. Also, inspect the drive axle and wheel rim for any damage. Damage to either part can cause the wheel bolt to loosen or fracture. Permobil recommends that wheel bolts be used only one time.

Filling with air

Check at regular intervals that the wheelchair's tires have the prescribed tire pressure. An incorrect tire pressure can cause deterioration in stability and maneuverability, plus extremely low air pressure can give rise to abnormal wear as well as shorter driving distances. So check regularly to see that the tires are maintained at a pressure of 29 psi (200 kPa).

1. Unscrew the plastic cap on the air valve of the tire.
2. Connect the compressed air nozzle to the air valve and adjust the tire pressure to the prescribed level.

Pos.	Description
1	Hubcap
2	Bolt, ISO 4017 M8x16 8.8 Fe/Zn 5 C1 / Locking coat DIN 267-28
3	Washer, 8.5x23x3
4	Bolt, ISO 4762 M6x40 8.8 Fe/Zn 5 C1
5	Rim, Outer part.
6	Inner tube, 210x65 TR-87
7	Tire, 2,50x3 (210x65)
8	Rim, Inner part.
9	Locking nut, ISO 7040, M8 Fe/Zn 5 C1



Rim with innertube and tire.

Support Wheels

The support wheels should always be fitted in the lower position, see fig.

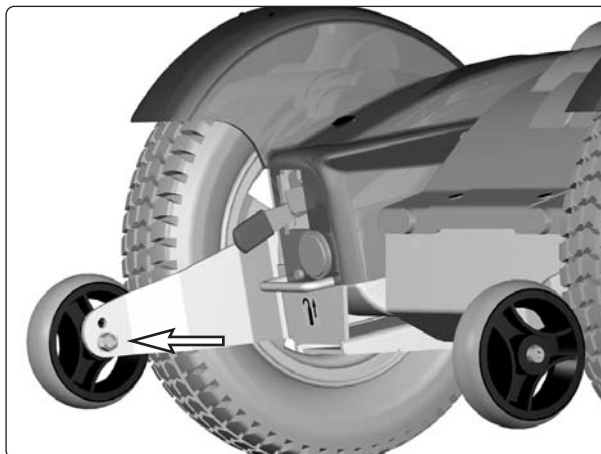
Removing the support wheels

1. Turn off the main power switch on the control panel.
2. Remove the bolt, see fig.



WARNING

Removing the support wheels entails an increased risk of the wheelchair tipping over. Wheelchairs with support wheels fitted as standard must not be driven when the support wheels are removed.



The support wheels should always be fitted in the lower position.

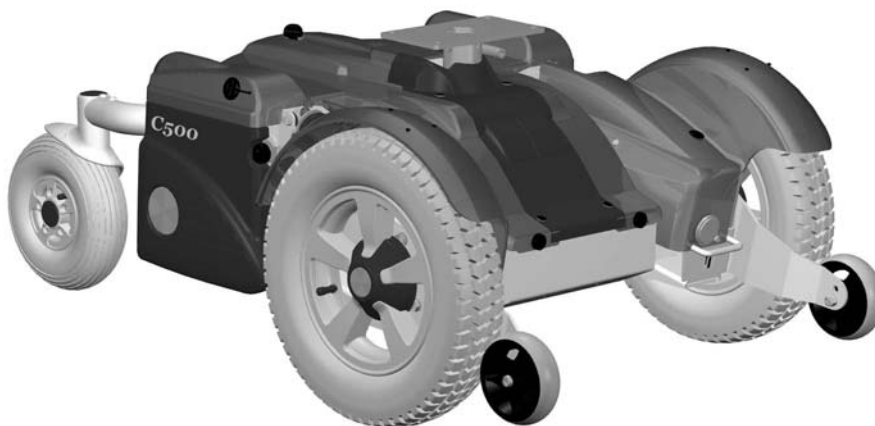
Fitting

1. Turn off the main power switch on the control panel.
2. Fit the support wheel with screw, washer and nut in the lower position, see fig.



NOTE

The support wheels should always be fitted in the lower position.



Chassis with support wheels fitted.

Support Wheels

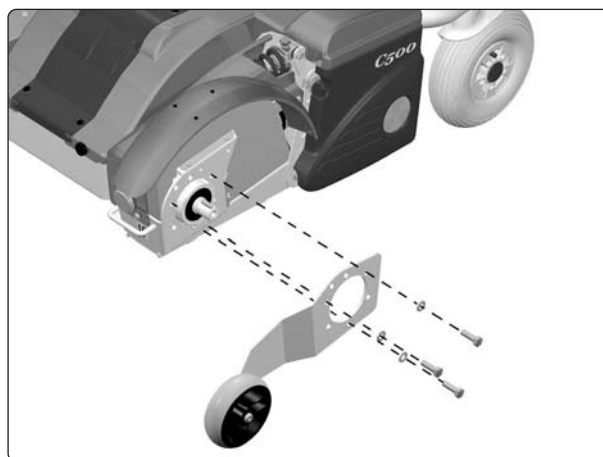
Removing the support wheel unit

1. Turn off the main power switch on the control panel.
2. Remove the front wheel on the side in question, see page 10.
3. Remove the three bolts that holds the support wheel unit and the drive unit.



WARNING

Removing the support wheels entails an increased risk of the wheelchair tipping over. Wheelchairs with support wheels fitted as standard must not be driven when the support wheels are removed.



Removal/fitting of the support wheel unit.

Fitting

Fit the support wheel unit in the reverse order.

Wheel Forks

Removal

1. Switch off the main power switch on the control panel.
2. Lift up and chock up the wheelchair chassis so that the wheel in question is free of the ground.
3. Remove the cap from the top of the link arm. See fig.
4. Remove the wheel fork. It is fitted with one bolt from above, see fig.

Fitting

Fit the wheel fork in the reverse order.

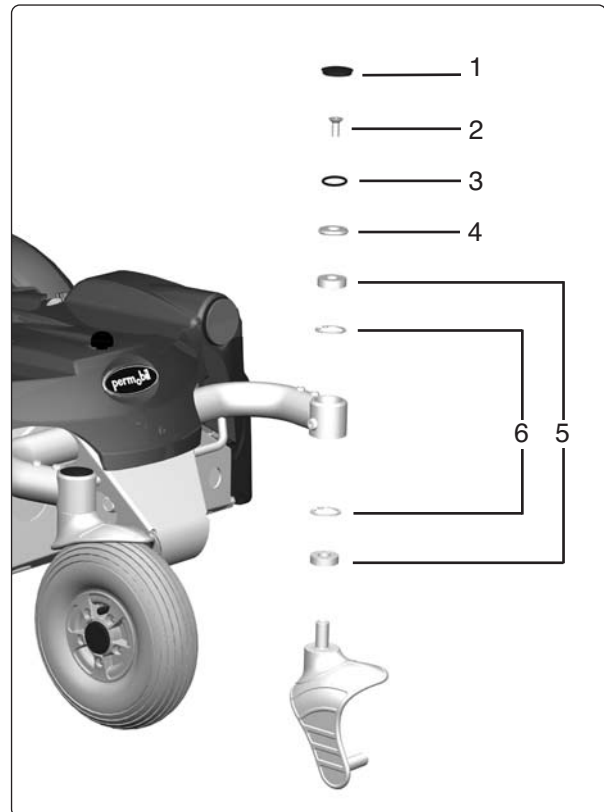
Fit the O-ring on the friction plate. See figure



NOTE

Lubricate the O-ring with Lubricant friction brake,
Part. no: 1820405

No other type of lubricant than that stated here may be used.



Wheel fork with friction brake.

Use a torque wrench to tighten the bolt to 17.7 ft-lbs (24Nm).



NOTE

Do not use a Pneumatic impact wrench.

Pos.	Description
1	Plastic plug
2	Bolt, ISO 4017 M8x16 8.8 Fe/Zn 5 C1/ Locking coat DIN 267-28
3	O-ring, Ø24,2x3 EPDM
4	Friction plate
5	Bearing 6002-2RS1 (15x32x9)
6	Circlip DIN 472 Ø32 Lubricant friction brake, Momentum, PRO AA 2/0,025

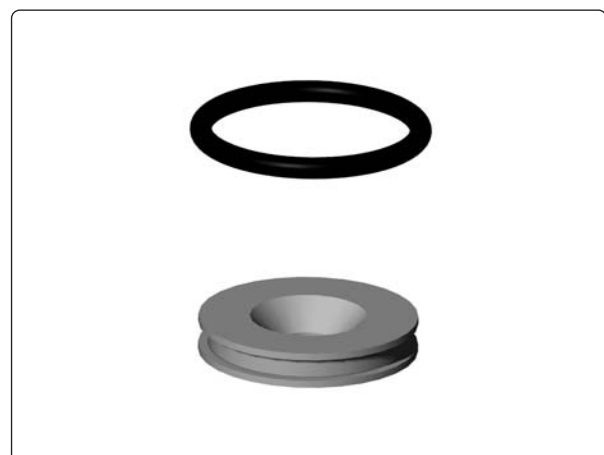


WARNING

The bolt must be used once only. Removed bolt is not allowed to be refitted.

Other types of bolts or washers are not to be used.

Do not use any other type of thread lock.



Fit the O-ring in the groove of the friction plate.

Rear wheel suspension

Removal

1. Switch off the main power switch on the control panel.
2. Lift up and chock up the wheelchair chassis so that the rear wheel suspension is free of the ground.
3. Remove the rear wheel suspension. It is fitted with three bolts with two washers and one nut each, see fig.
4. Pull the rear wheel suspension straight backwards.

Fitting

1. Check that the rear wheel suspension bushings are undamaged. Clean as necessary to remove dirt and rust. Replace damaged parts.
 2. Fit the rear wheel suspension to the chassis.
 3. Fit the three bolts with washers and nuts, see fig.
- Tighten the bolts holding the rear wheel suspension in place with a torque wrench.

Use a torque wrench to tighten the bolt to 67 ft-lbs (91Nm).



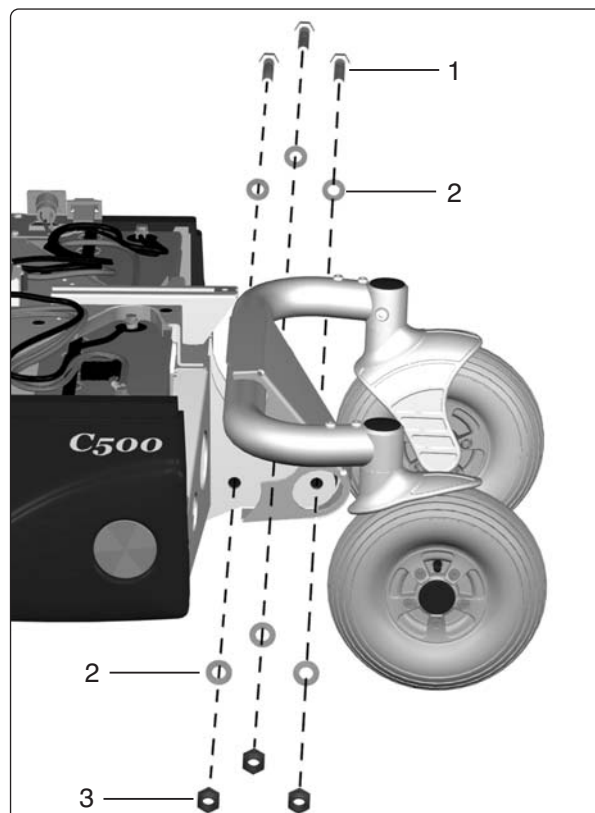
WARNING

Other types of bolts or washers are not to be used.



NOTE

Do not use a Pneumatic impact wrench.



The rear wheel suspension is fitted with three bolts with two washers and one nut each.

Pos.	Description
1	Bolt, DIN 931 M12x75 8.8 FE/Zn 8 C1
2	Washer, ISO 7089 12 200 HV Fe/Zn 8 C1 (13x24x2.5)
3	Nut, DIN 982 M12 8 Fe/Zn 8 C1

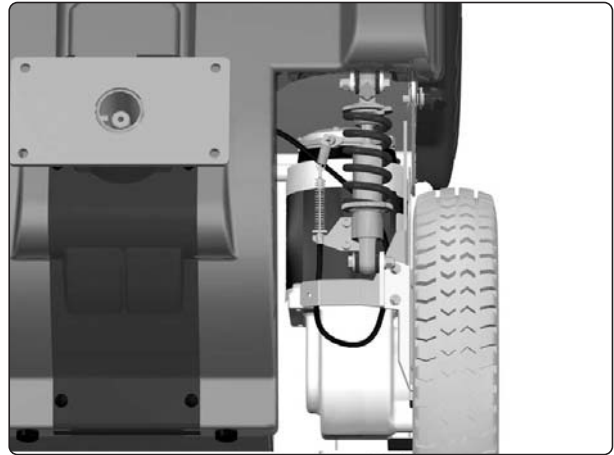
Shock Absorbers

Removal

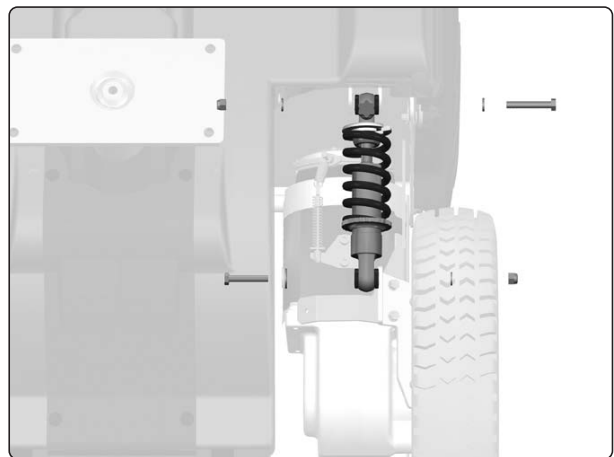
1. Switch off the main power switch on the control panel.
2. Remove the front fender on the side in question, see page 7.
3. Lift up and chock up the wheelchair chassis so that the wheel in question is free of the ground.
4. Loosen the shock absorbers front end. It is fitted with a bolt, two washers and a nut, see fig.
5. Loosen the shock absorbers rear end. It is fitted with a bolt, two washers and a nut, see fig.

Fitting

Fit the shock absorber in the reverse order. Adjust the shock absorbers spring force before fitting, see below.



Shock absorber



The shock absorber is fitted with a bolt, two washers and a nut

Adjusting

Before the new shock absorber is mounted, it must be adjusted to the proper value.



NOTE

On early models of the chassis, DNM shock absorbers are fitted. Make sure using the right settings for the right shock absorber.

The spring force

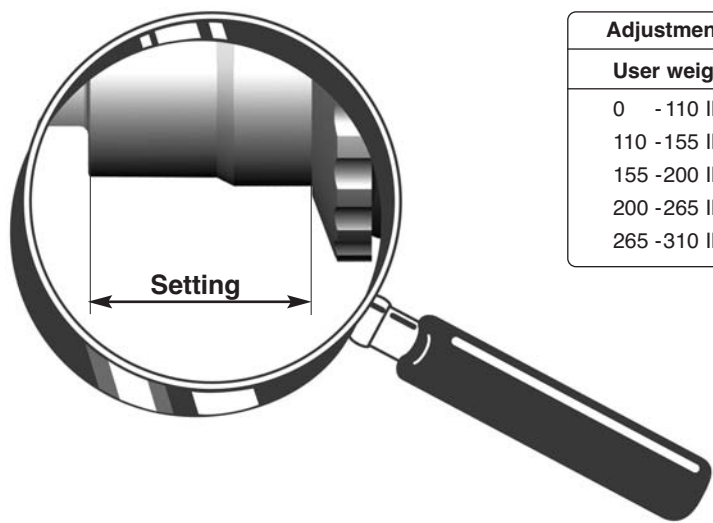
The spring force can be set to suit different user weights using the adjustment nut. Increase the dimension for a harder suspension, decrease the dimension for a softer suspension, see fig.

Return damping valve

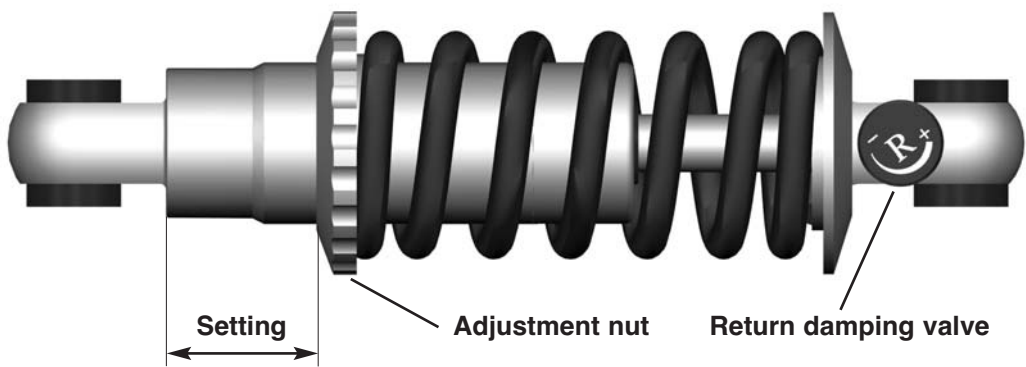
To get standard setting, screw the return damping valve fully clockwise by hand. Then screw the valve fully counterclockwise, counting the "clicks". Then screw the valve halfway clockwise i.e. halve the number of "clicks".

Screw the valve clockwise (open the valve) for softer damping, or counterclockwise (close the valve) to have harder damping .

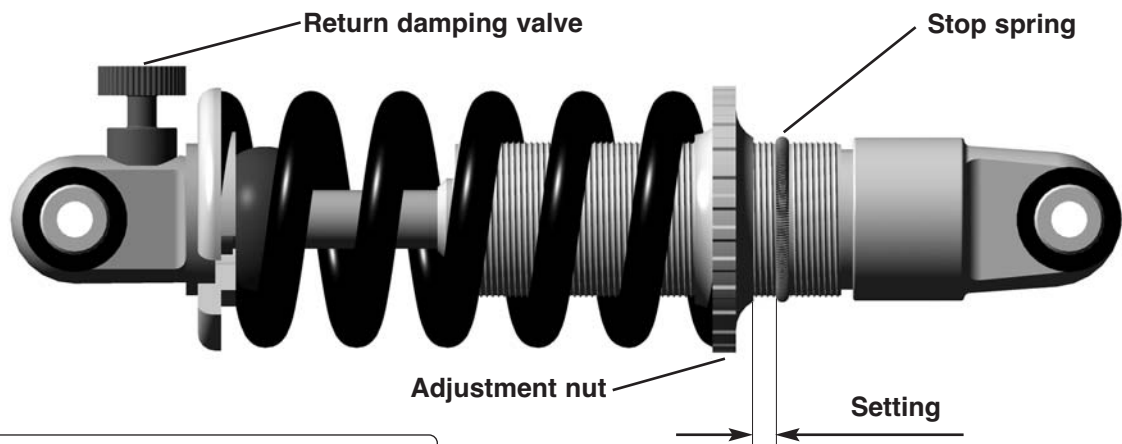
Adjusting the KS 291 Shock Absorber



Adjustment of shock absorber spring	
User weights	Setting
0 - 110 lbs	5/8 inch (16 mm)
110 - 155 lbs	21/32 inch (17 mm)
155 - 200 lbs	3/4 inch (19 mm)
200 - 265 lbs	13/16 inch (21 mm)
265 - 310 lbs	15/16 inch (24 mm)



Adjusting the DNM Shock Absorber



Adjustment of shock absorber spring	
User weights	Setting
0 - 110 lb.	0 - 3/32 inch
110 - 155 lb.	3/32 - 5/32 inch
155 - 200 lb.	5/32 - 1/4 inch
200 - 264 lb.	1/4 - 3/8 inch



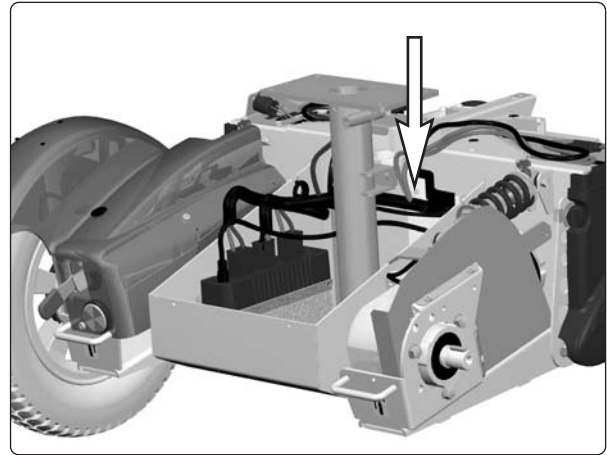
NOTE

Make sure the stop spring is in the right position.

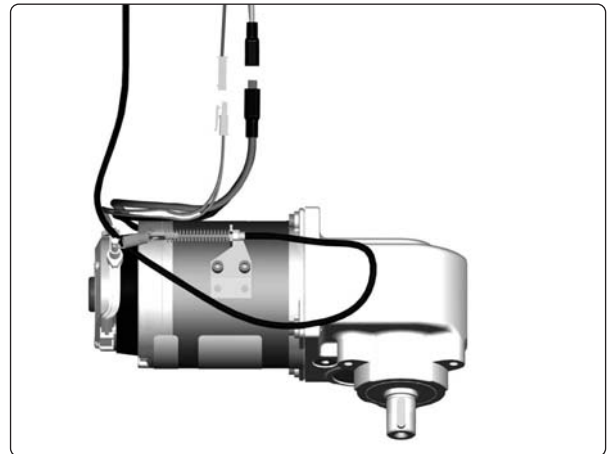
Slewing brackets

Removal

1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Switch off the main power switch on the control panel.
3. Remove the seat elevator cover, chassis cover and the front fender on the side in question, see page 7.
4. Lift up and chock up the wheelchair chassis so that the wheel in question is free of the ground.
5. Remove the front wheel, see page 10.
6. Disconnect the electrical connection for the drive motor and the magnetic wheel lock. The connections are positioned on the inside of the chassis, on each side of the seat elevator/seat post, see fig.
7. Disconnect the wheel lock release cable

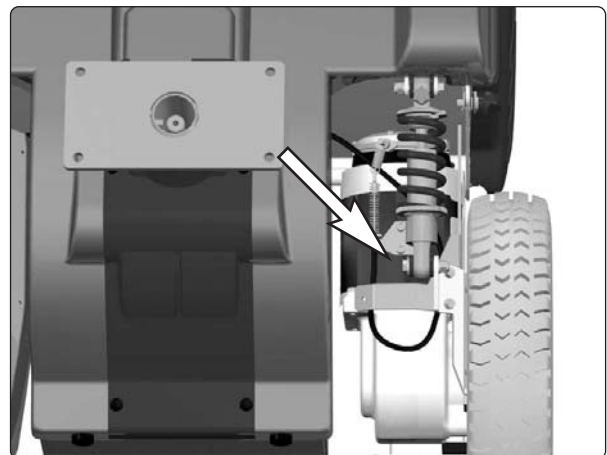


The electrical connections of the drive motors and the wheel locks are positioned on the inside of the chassis, on each side of the seat elevator/seat post.



The electrical connection for the drive motor and the magnetic wheel lock.

8. Remove the shock absorbers front bracket, see fig.



The shock absorbers front bracket.

Slewing brackets

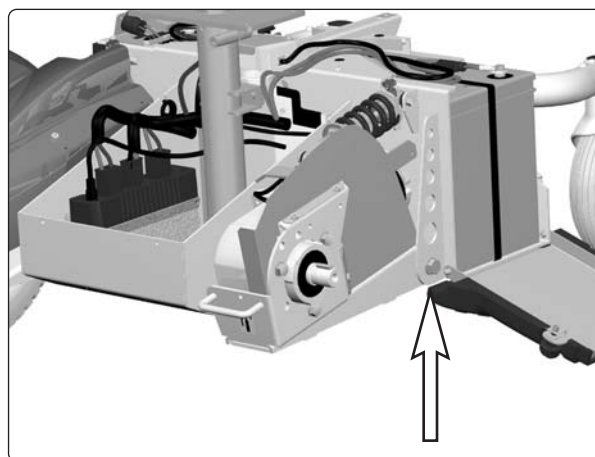
9. Loosen the rear end of the chassis cover a little by unscrewing the knob that holds the cover.
10. Open the battery cover on the side in question by loosening the knobs that holds the battery cover, and drop the cover down.
11. Remove the slewing bracket, it is fitted with a bolt with washer.

For removal of the drive motor, see page 28.

Fitting

Fit the slewing brackets in the reverse order. Tighten the bolt holding the wheel fork in place with a torque wrench.

Use a torque wrench to tighten the bolt to 11 ft-lbs (15Nm).

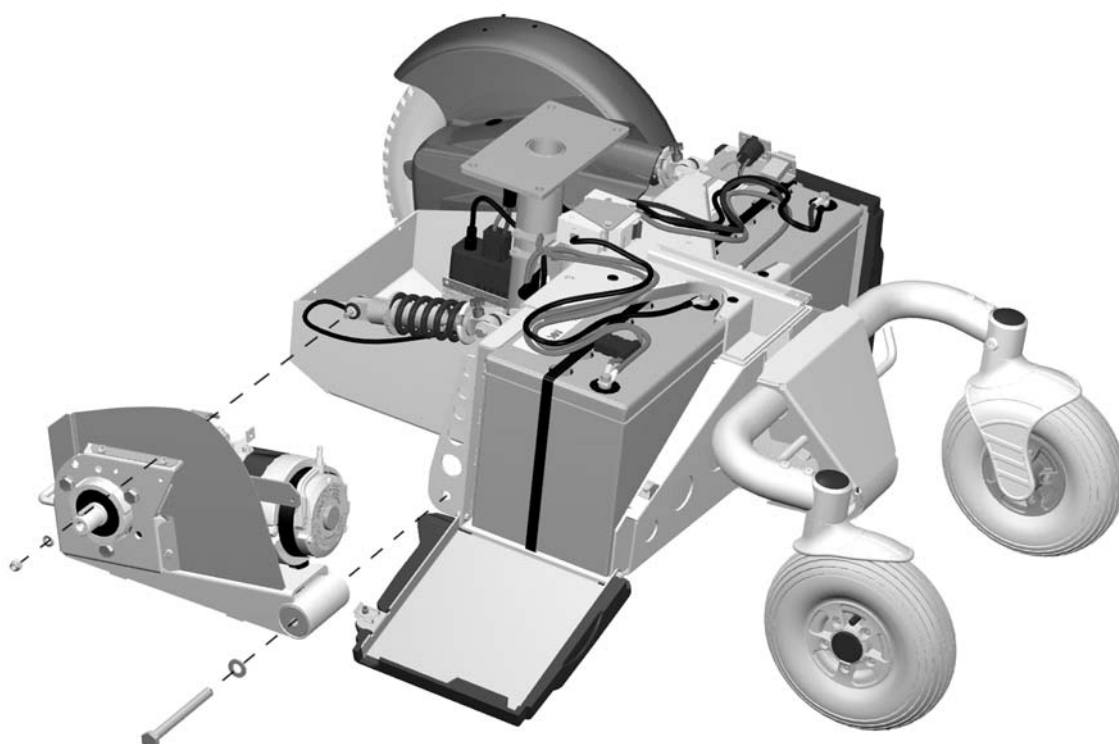


Slewing bracket attachment.



NOTE

Do not use a Pneumatic impact wrench.

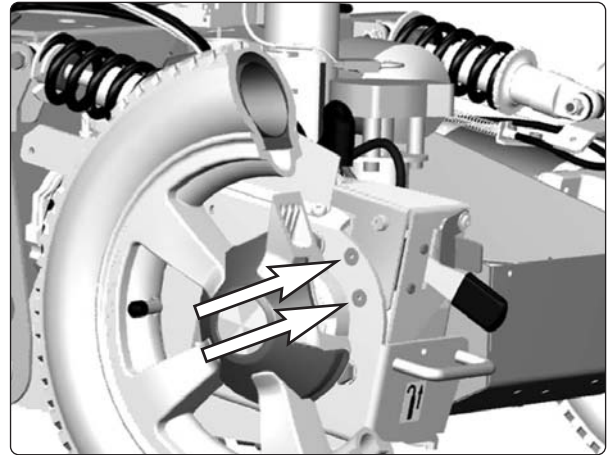


Removal/fitting of slewing brackets.

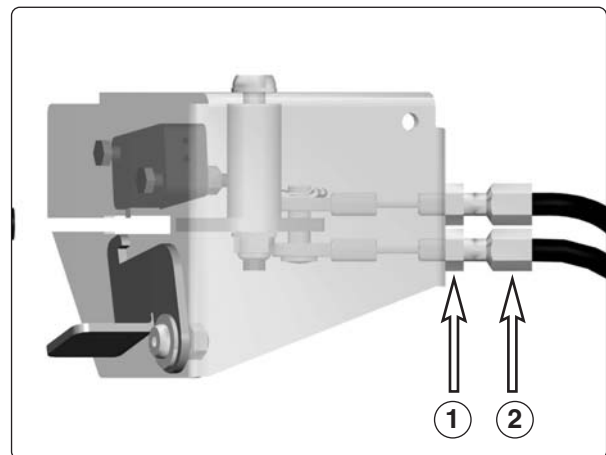
Wheel lock release cable

Removal

1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Switch off the main power switch on the control panel.
3. Remove the seat elevator cover, chassis cover and the right front fender, see page 7.
4. Remove the wheel lock release mechanism. It is attached with two screws; see fig.
5. Remove the lock nut (1).
6. Screw in the adjusting screw (2) fully.

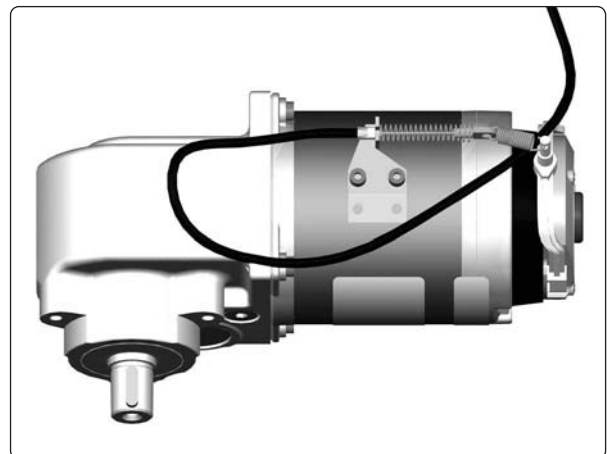


The wheel lock release mechanism is attached with two screws.



*Adjustment of wheel lock release cable.
Lock nut (1) Adjusting screw (2).*

7. Remove the cable at the magnetic wheel lock by pulling the cable casing forward and passing the cable through the slot in the cable holder. Detach the wheel lock release cable from the magnetic wheel lock.
8. Remove the cable from the release lever.

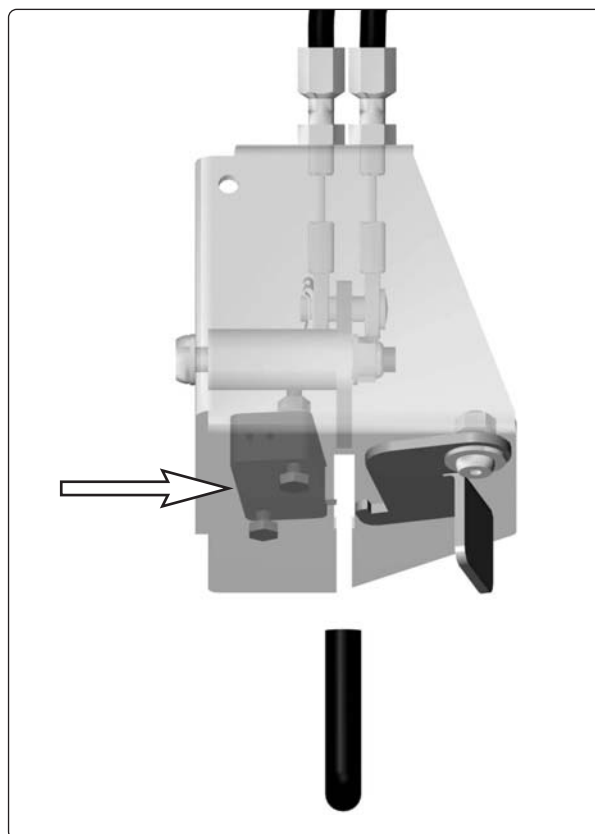


Wheel lock release cable attachment at the magnetic wheel lock.

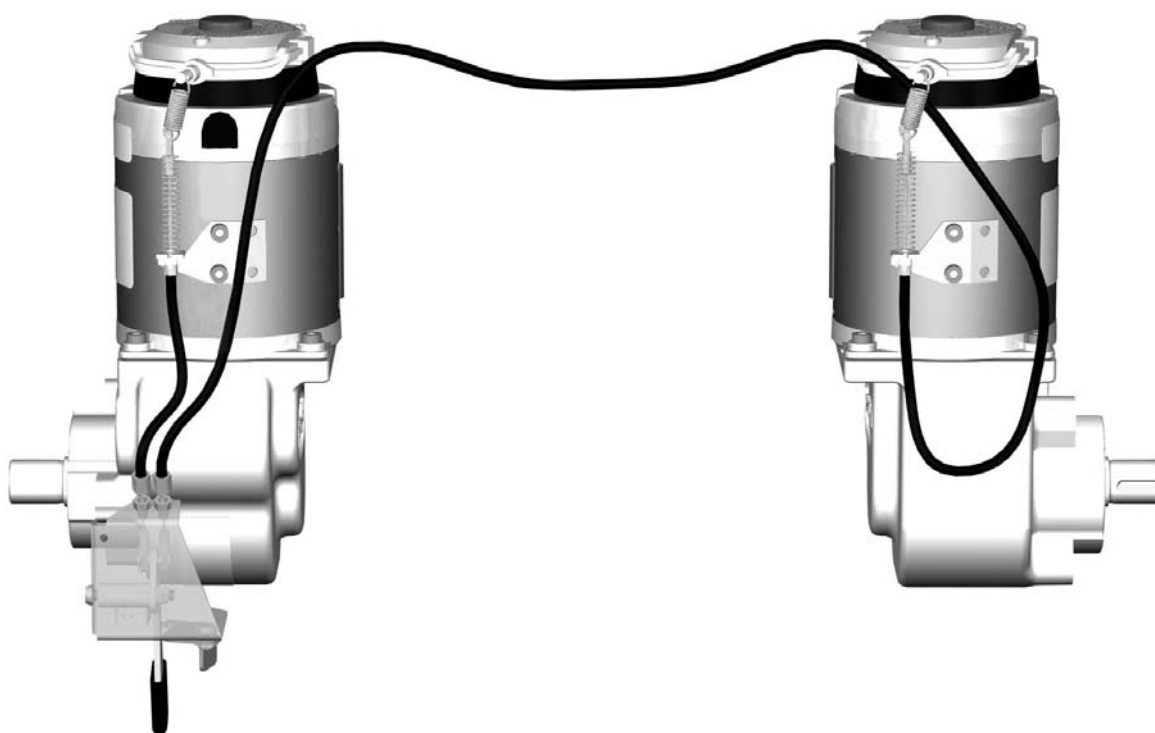
Wheel lock release cable

Fitting

1. Fit the cable at the magnetic wheel lock first, then at the release lever.
2. Adjust the cable sleeve length with the adjusting screw (2) so that the cable is sufficiently tensioned so that the wheel lock release sensor (see figure) is actuated just before the cable pulls the release.
3. Ensure that the wheel cannot be turned before the wheel lock release sensor has been actuated.
4. Ensure that the wheel can be turned when the wheel lock release coupling is released with the release lever.
5. Tighten the lock nut (1).
6. Refit the wheel lock release mechanism and the covers.



Wheel lock release sensor.



Mechanism for wheel lock release.

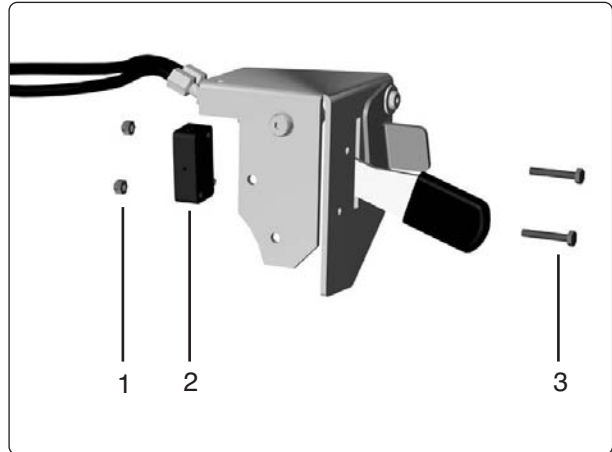
Wheel lock release sensor

Removal

1. Switch off the main power switch on the control panel.
2. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
3. Remove the seat elevator cover, chassis cover and the right front fender, see page 7.
4. Remove the wheel lock release mechanism; see page 22.
5. Remove the wheel lock release sensor. It is attached with two screws, see fig.
6. Disconnect the electrical connection of the wheel lock release sensor, it's positioned on the wheel lock release sensors cabling.

Fitting

Fit the Wheel lock release sensor in the reverse order.



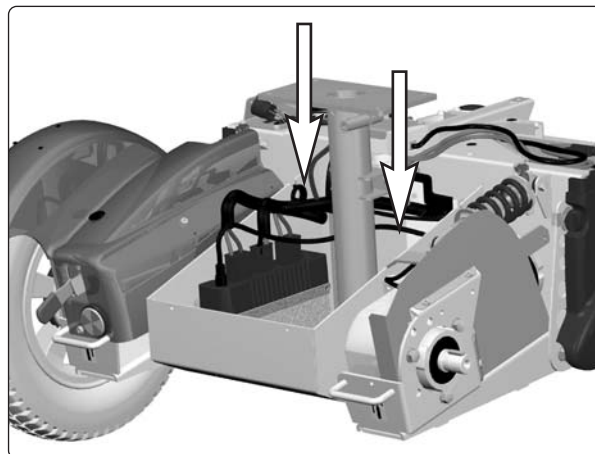
Wheel lock release sensor.

Pos.	Description
1	Locking nut, DIN 985 M3 6 Fe/Zn 5 C1
2	Wheel lock release sensor, VS10N001A/Highly
3	Screw, ISO 4017 M3x16 8.8 Fe/Zn 5 C1

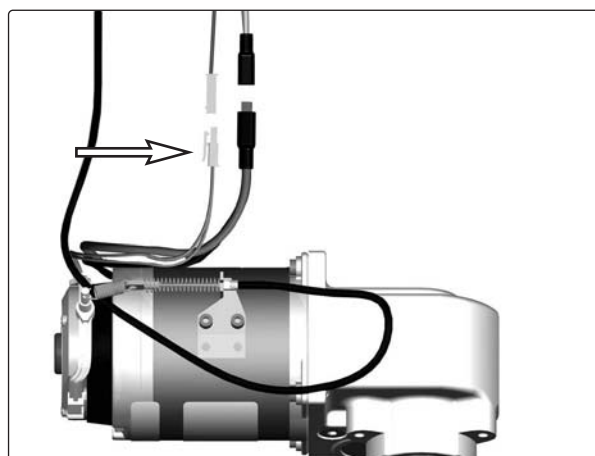
Magnetic wheel lock

Removal

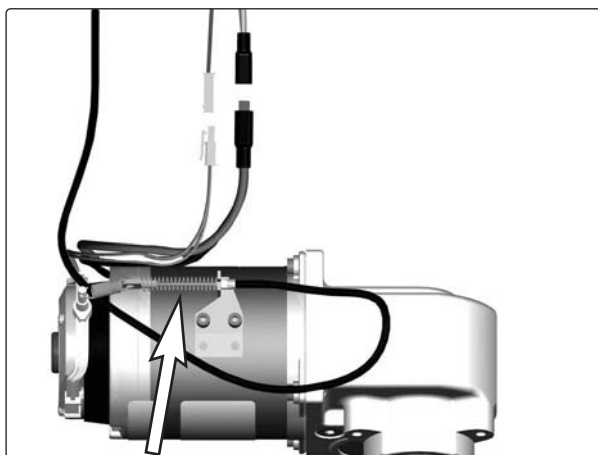
1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Switch off the main power switch on the control panel.
3. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
4. Remove the seat elevator cover, chassis cover and the front fender on the side in question, see page 7.
5. Disconnect the electrical connection of the magnetic wheel lock. The connections are positioned on the inside of the chassis, on each side of the seat elevator/seat post.
6. Pull the cable casing forward, out through the slot in the cable holder and detach the wheel lock release cable from the magnetic wheel lock; see fig.
7. Lift up and chock up the wheelchair chassis so that the wheel in question is free of the ground.
8. Loosen the shock absorbers front end. Follow the instructions on page 18 until paragraph 4.
9. Position the slewing bracket more downwards for easier access to the magnetic wheel lock, see fig.
10. Remove the three screws that secure the wheel lock; see figure 38. Note the position of the wheel lock release lever and rubber seal's placement to facilitate subsequent reassembly. Remove the wheel lock with wheel lock disk and cover.



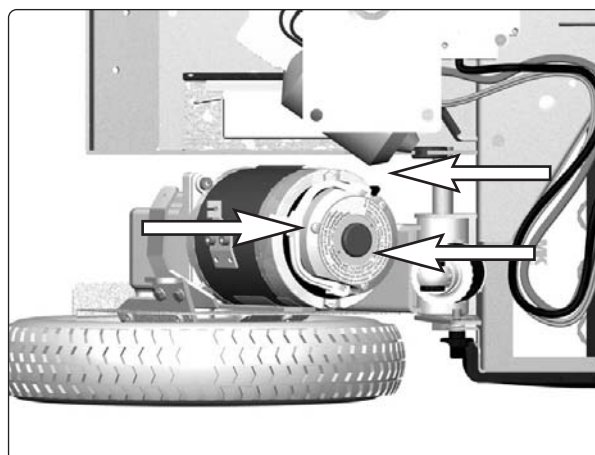
The electrical connections of the magnetic wheel locks are positioned on the inside of the chassis, on each side of the seat elevator/seat post.



Electrical connection of the magnetic wheel locks.



Remove the wheel lock release cable.



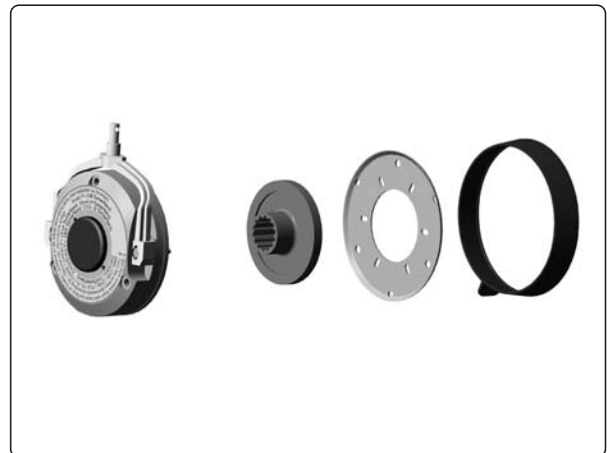
Remove the magnetic wheel lock.

Fitting

1. Using the adjusting screws, adjust the magnet wheel lock in accordance with the instructions on the back of the magnetic wheel lock; see fig.

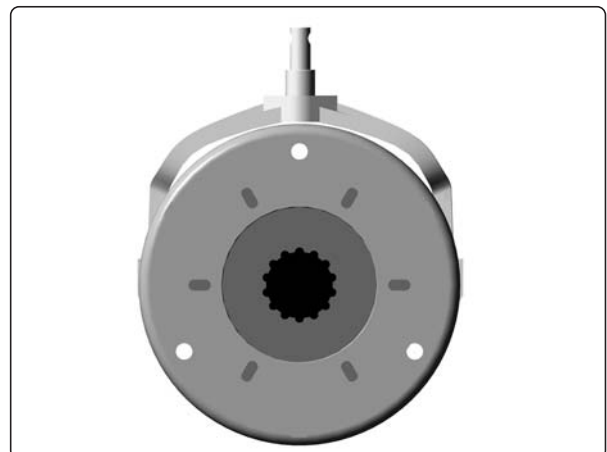


Wheel lock adjustment is made using the two adjusting screws.



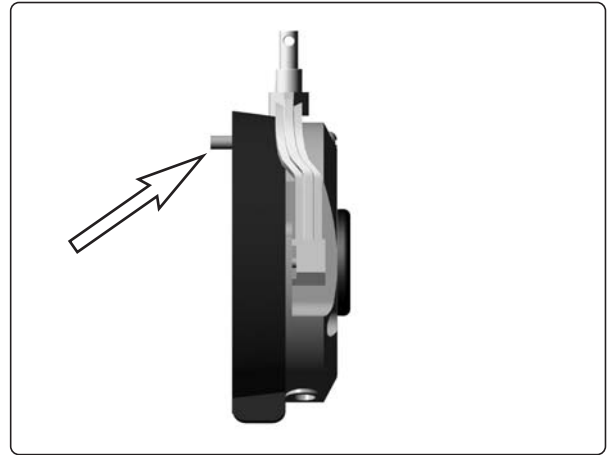
Magnetic wheel lock, wheel lock disk, cover and rubber seal disassembled.

2. Fit the wheel lock disk in the magnetic wheel lock.
3. Fit the cover.



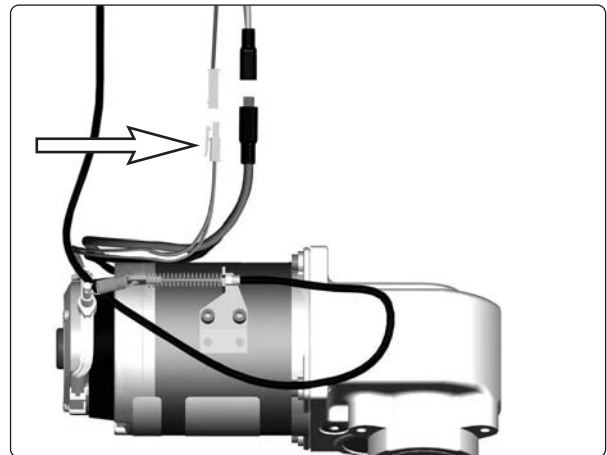
Magnetic wheel lock, wheel lock disk and cover assembled.

4. Insert a screw to align the parts. Attach the rubber seal with the drainage hole down. Be attentive to the position of the wheel lock release lever; fit the wheel lock so that the wheel lock release lever is aligned with the motor's cable bracket. Now fit the magnetic wheel lock using the three screws.
5. Refit the shock absorbers front end, see page. 18.



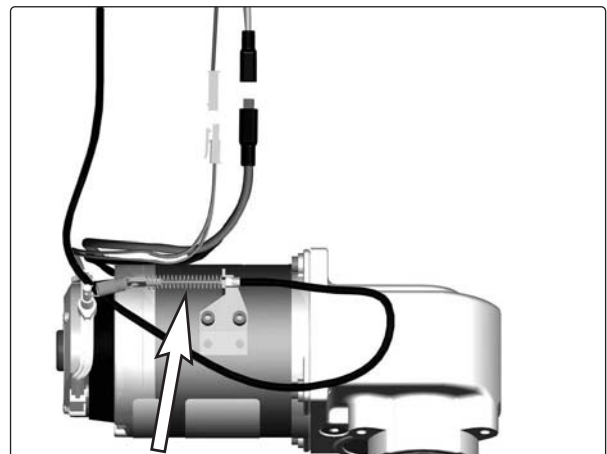
*Align the parts with one another
using one of the attachment screws.
Fit the rubber seal.*

6. Connect the magnetic wheel lock's electrical connection; see fig.



*Magnetic wheel lock
electrical connection*

7. Fit the wheel lock release cable; see figure 44.
8. Fit the covers; see page 7.

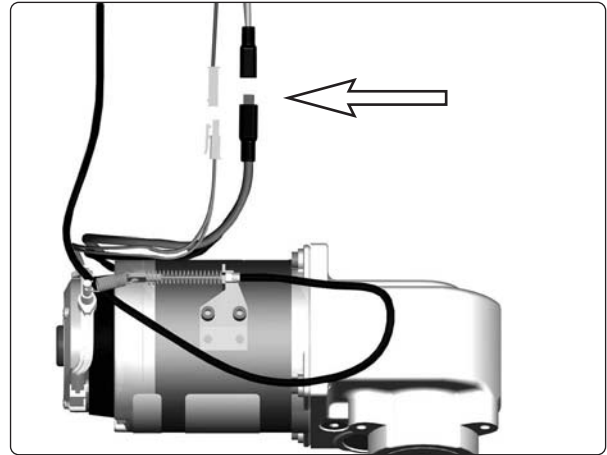


Fit the wheel lock release cable.

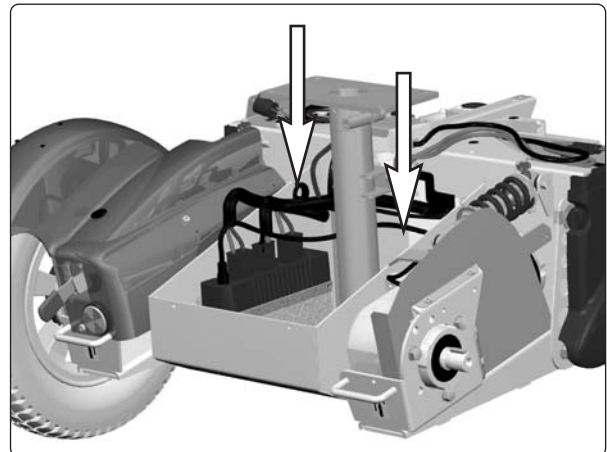
Drive motor

Removal

1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Switch off the main power switch on the control panel.
3. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
4. Remove the seat elevator cover, chassis cover and the front fender on the side in question, see page 7.
5. Lift up and chock up the wheelchair chassis so that the wheel in question is free of the ground.
6. Remove the wheel in question, see page 10.
7. Disconnect the electrical connection for the drive motor and the magnetic wheel lock. The connections are positioned on the inside of the chassis, on each side of the seat elevator/seat post.

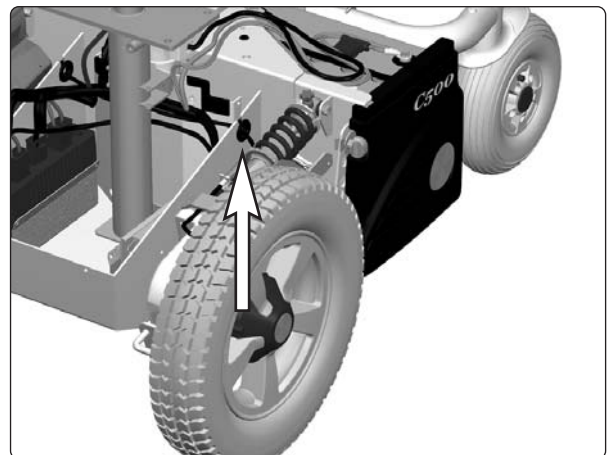


The electrical connection for the drive motor and the magnetic wheel lock.



The electrical connections of the wheel locks and drive motors are positioned on the inside of the chassis, on each side of the seat elevator/seat post.

8. Pull the drive motor's connection cable out through the chassis cable pass-through; see fig.



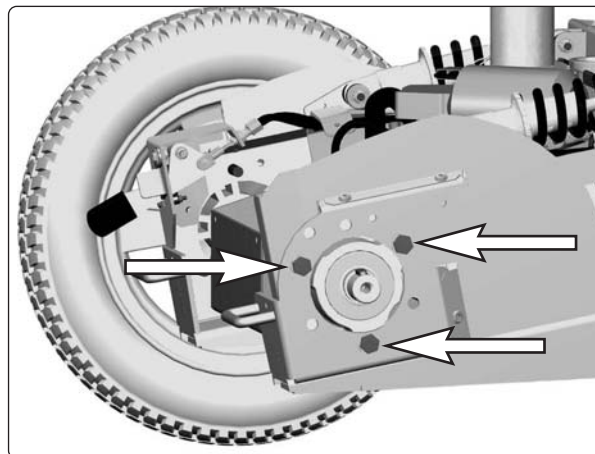
Cable pass-through hole.

Drive motor

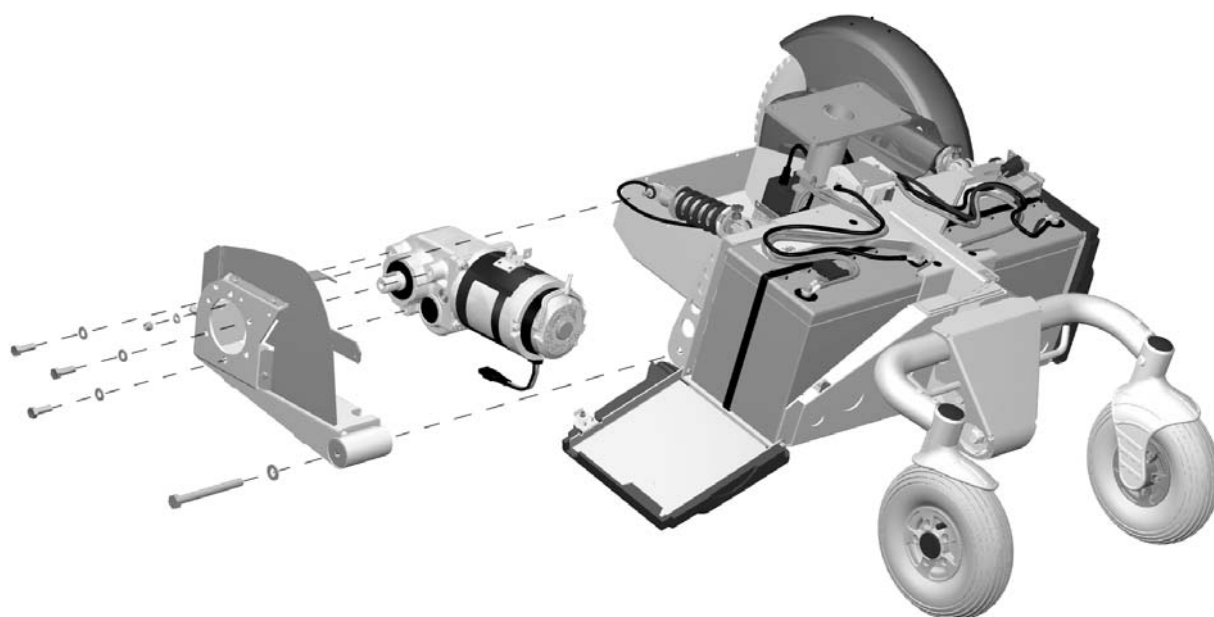
9. Remove the drive motor. It is attached with three screws; see fig.

Fitting

Fit the drive motor in the reverse order.



Drive motor mounting screws.



Drive motor with gear.

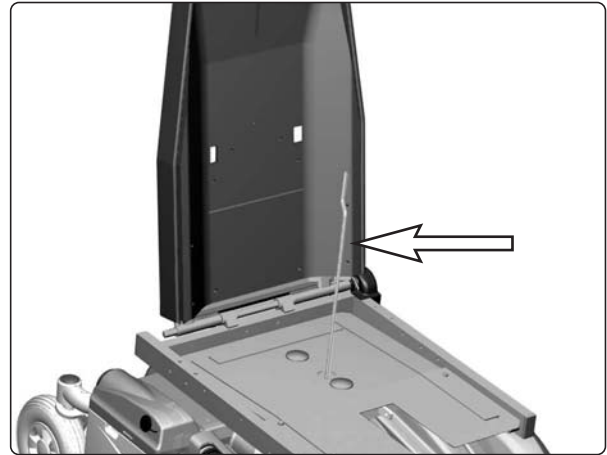
Seat elevator

Manual Raising/

Lowering of the Seat elevator

If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually.

1. Switch off the main power switch on the control panel.
2. Remove the cushion and plastic plugs from the seat.
3. Raise/lower the seat using the seat elevator crank supplied. See figure.



Manual Raising/Lowering of the Seat elevator



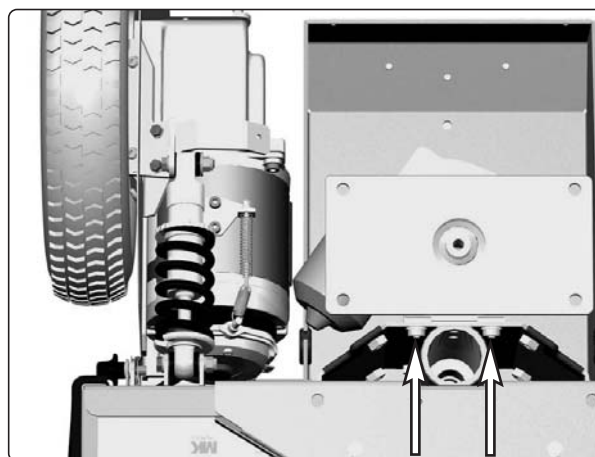
WARNING

Drills must not be used in connection with manual operation of the seat elevator. There is a risk of damage to materials.

Seat elevator

Removal

1. Raise the seat to the highest position. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Switch off the main power switch on the control panel.
3. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
4. Remove the seat elevator cover and the chassis cover, see page 7.
5. Remove the seat.



Seat elevator's upper attachment screws.



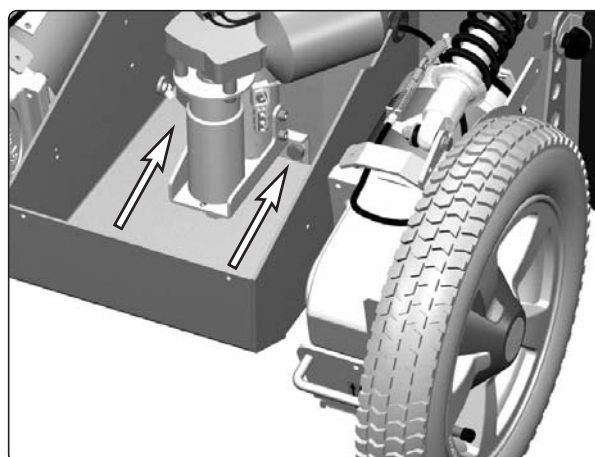
NOTE

The seat is heavy. Two people should therefore lift it. Be careful with the cabling.

6. Remove the Seat elevator. It is attached with four screws, see fig.

The upper attachment screws are accessible from the the battery boxes. Open the battery covers and pull each battery out just enough to get access to the screws through the holes in the chassis.

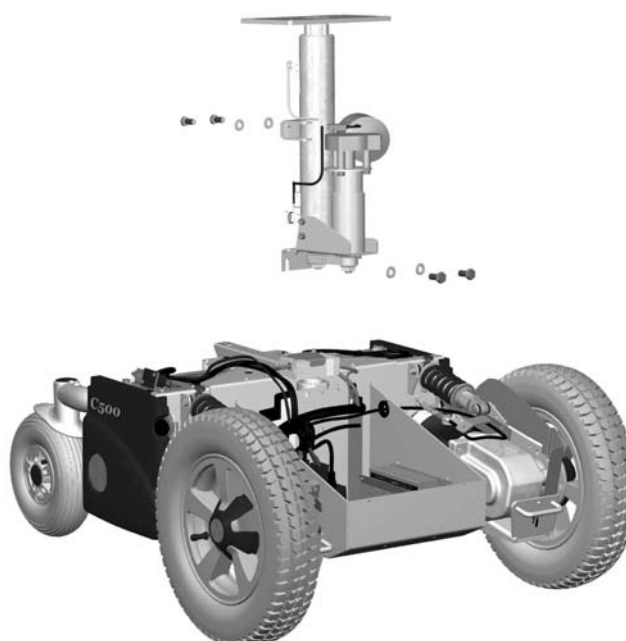
7. Disconnect the seat elevator cabling from the SLS drive stage. For more information on the SLS drive stage, see page 38.
8. Lift the seat elevator straight up out of the chassis.



Seat elevator's lower attachment screws.

Fitting

Fit the seat elevator in the reverse order.



The Seat elevator is attached with four screws.

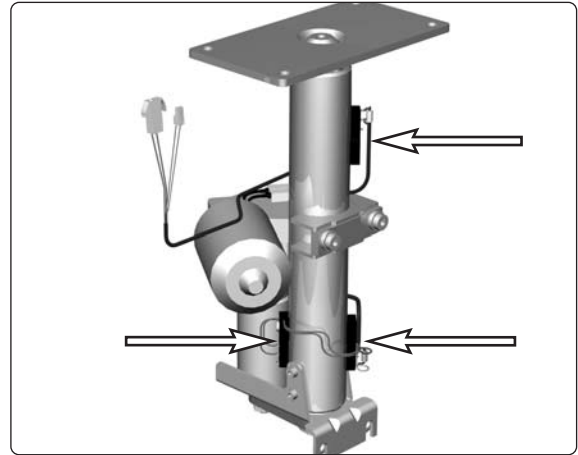
Seat elevator cable

Removing

1. Remove the seat elevator; follow the instructions on page 31.
2. Remove the seat elevator sensors. Note the position of the sensors for refitting, see fig.

Fitting

Fitting is the reverse procedure.



Attachment of the sensors to the seat elevator.

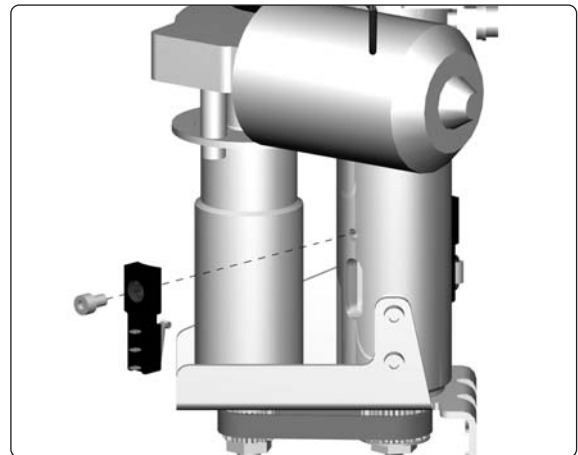
Seat elevator motor

Removing

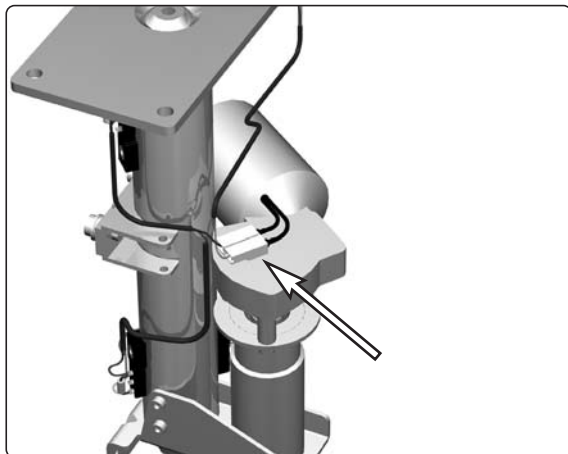
1. Disconnect the seat elevator cable at the motor, note the position of the connectors, see fig.
2. Remove the seat elevator motor by taking out the three bolts that hold it, see fig.

Fitting

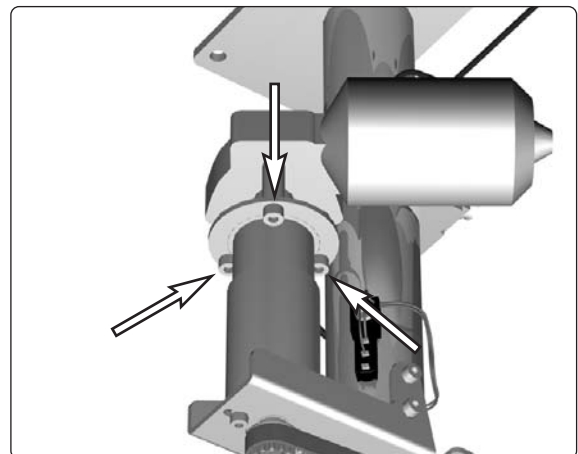
Fitting is performed in reverse order.



Attachment of the sensors to the seat elevator.



Seat elevator motor connector.

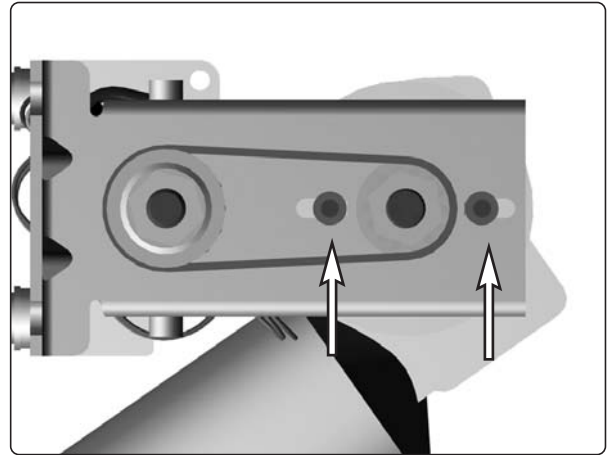


The motor is attached by three bolts.

Seat elevator drive belt

Removing

1. Remove the seat elevator, see page 31.
2. Loosen the two bolts holding the shaft to the seat elevator motor. Push the shaft sideways to slacken the drive belt.
3. Remove the belt from the motor shaft, then from the toothed wheel on the seat elevator screw.
4. Fit the new belt using the reverse procedure.
5. Adjust the belt tension as described below.
6. Fit the seat elevator, see page 31.



The seat elevator shaft is attached by two bolts.

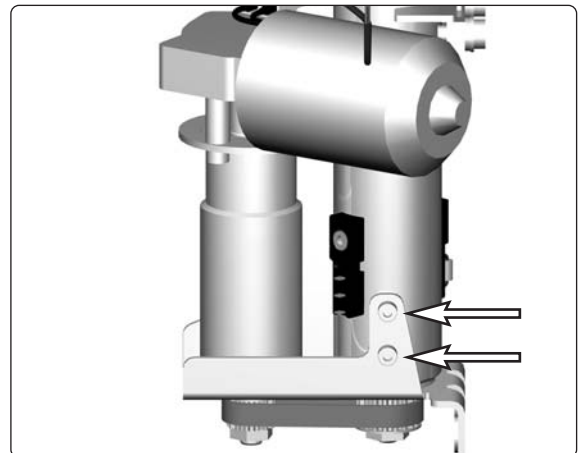
Adjusting the belt tension

1. Loosen the two bolts near the belt, see fig.
2. Adjust the belt tension by moving the motor shaft sideways.
3. Tighten the two screws.
4. Check the belt tension. The belt is correctly tensioned when it can be pressed in 4-5 mm, see fig.

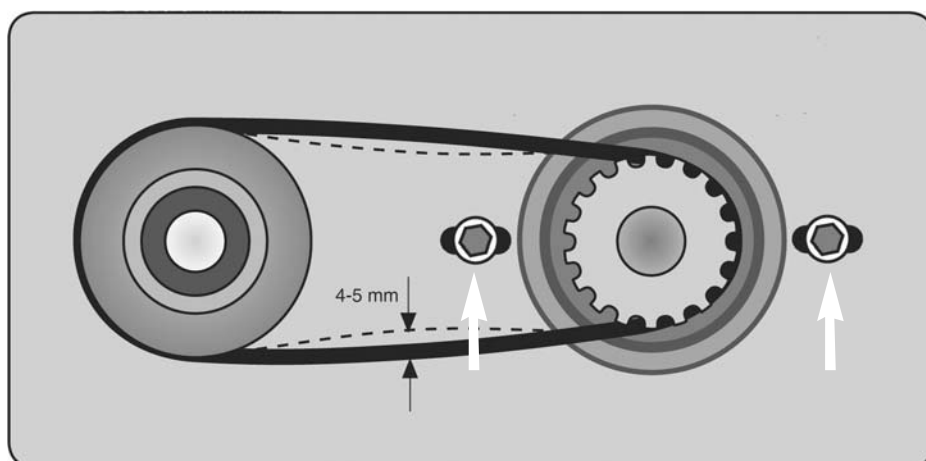


NOTE

Check that the seat elevator gear plate are firmly attached with the four screws.



Check that the seat elevator gear plate are firmly attached with the four screws.



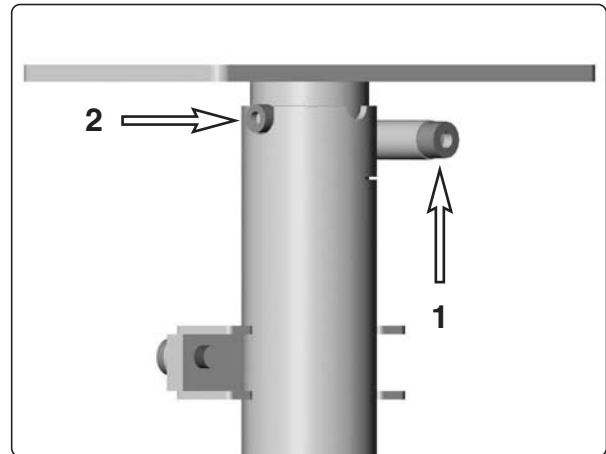
The drive belt tension can be adjusted after the two bolts have been loosened.

Fixed seat post

Adjusting the Seat Height

The length of the fixed seat post can be adjusted to five different fixed positions.

1. Switch off the main power switch on the control panel.
2. Loosen the screw that locks the fixed height position of the seat post. See figure.
3. Raise the seat using the seat elevator crank supplied.
4. Screw the height adjustment screw in place in the desired height position.
5. Lower the seat using the seat elevator crank supplied. Turn the seat so that the height adjustment screw ends up in its groove. See figure.



1. Locking screw .

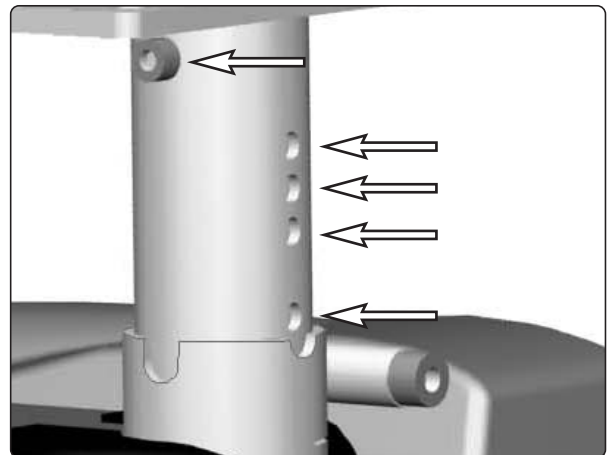
2. Height adjustment screw in its groove.



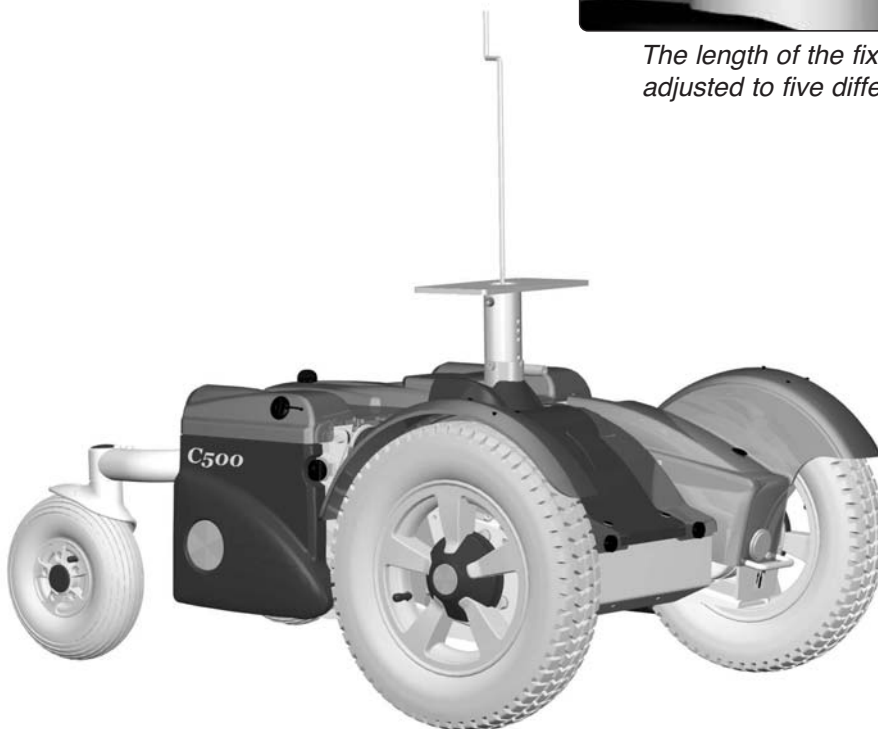
NOTE

After adjusting, make sure the height adjustment screw ends up in its groove.

On early models of the chassis, the fixed seat tube has only four positions.



The length of the fixed seat post can be adjusted to five different fixed positions.

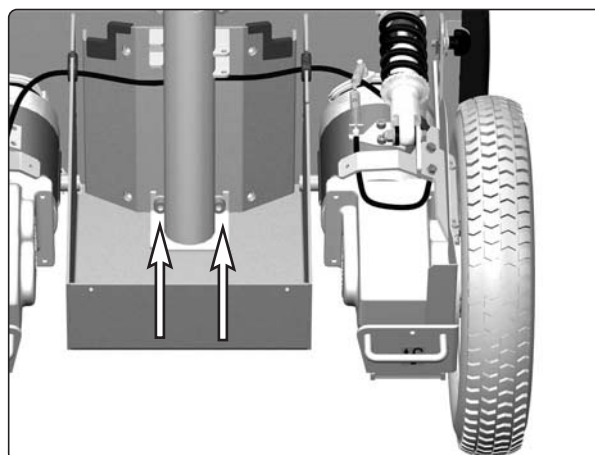


Adjusting the Seat Height using the seat elevator crank.

Fixed seat post

Removal

1. Switch off the main power switch on the control panel.
2. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
3. Raise the seat to its highest position, see page 34.
4. Remove the seat elevator cover and the chassis cover, see page 7.
5. If the wheelchair is equipped with seat tilt, disconnect the seat tilt cabling from the SLS drive stage. For more information on the SLS drive stage, see page 38.
6. Remove the seat and if equipped, the seat tilt.



The Seat Post's lower attachment screws.



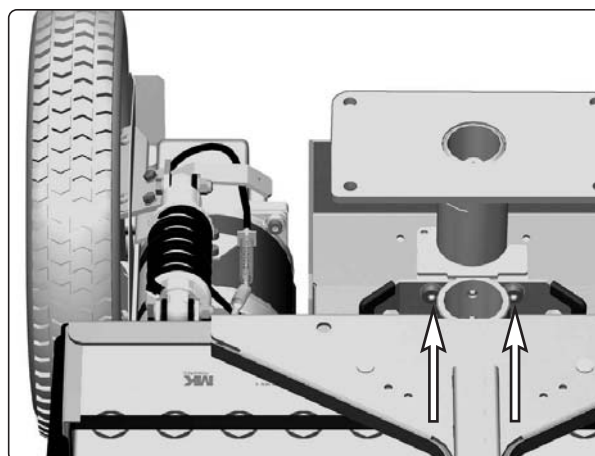
NOTE

Because the seat is heavy, it should be lifted by two persons. Be careful with the cabling.

7. Remove the fixed seat tube. It is attached with four screws, see fig.

The upper attachment screws are accessible from the the battery boxes. Open the battery covers and pull each battery out just enough to get access to the screws through the holes in the chassis.

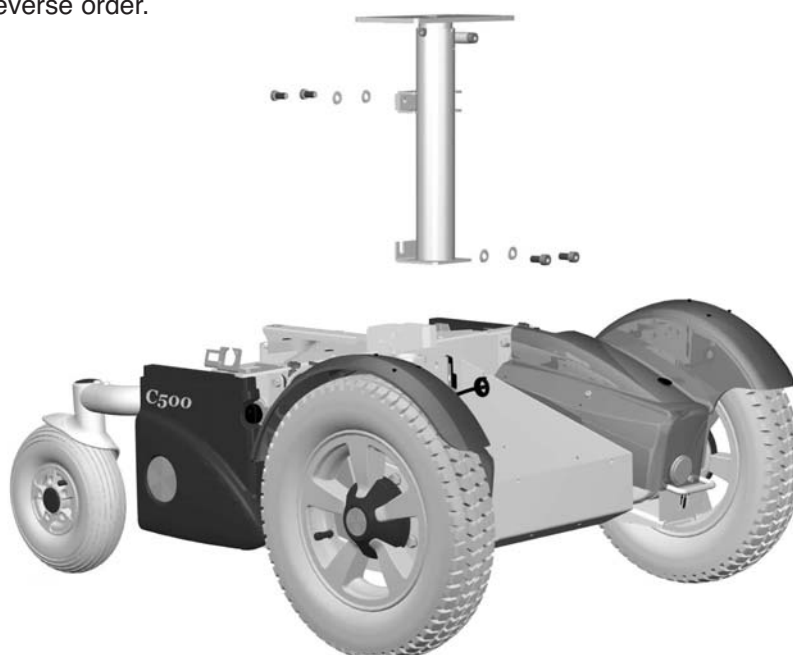
8. Lift the seat post straight up out of the chassis.



The Seat Post's upper attachment screws.

Fitting

Fit the fixed seat tube in the reverse order.



The Fixed seat tube is attached with four screws.

Control panel Pilot+

Removal

1. Switch off the main power switch on the control panel.
2. Disconnect the control panel cable by pulling the connector at the rear of the control panel straight backwards.
3. To remove the control panel, remove the screws holding the common bracket for the control panel and Seat control panel, see figure. Remove the control panel bracket by removing the two screws on the rear of the control panel, see figure.

Fitting

Fit the control panel in the reverse order.



The Control panel and Seat control panel bracket.

Seat control panel

Removal

1. Switch off the main power switch on the control panel.
2. Remove the cover of the Seat control panel by pulling it straight upwards. If the lid is stuck, you can carefully use a screwdriver to pry between the lid and the lower part of the end of the box, see figure.
3. You can now lift the circuit board and cable out of the box.
4. Disconnect the cable from the circuit board by pulling the connector straight upwards, see figure.
5. To remove the control panel, remove the screws holding the common bracket for the control panel and Seat control panel, see figure. Remove the Seat control panel bracket by removing the two screws on the underside of the box, see figure. Note the position of the bracket for refitting.

Fitting

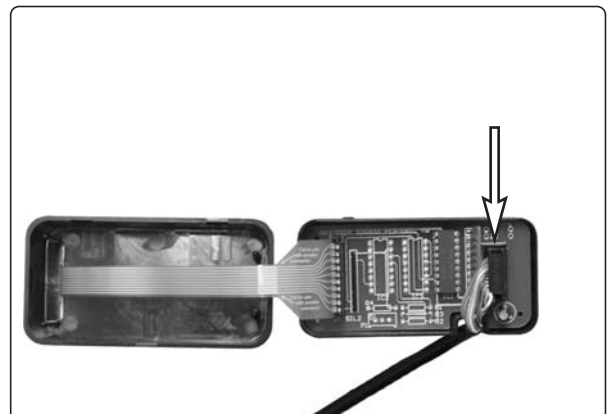
Fit the seat control panel in the reverse order.



The Control panel and Seat control panel fixings.



Removing the Seat control panel lid.



The Seat control panel electrical connector.

Pilot+ controller

Removal

1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Switch off the main power switch on the control panel.
3. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
4. Remove the seat elevator cover and the chassis cover, see page 7.
5. Lift the Pilot+ controller out of its holder, see fig. 50.
6. Disconnect the electrical connections to the pilot+ controller, being attentive to their placement: see figure

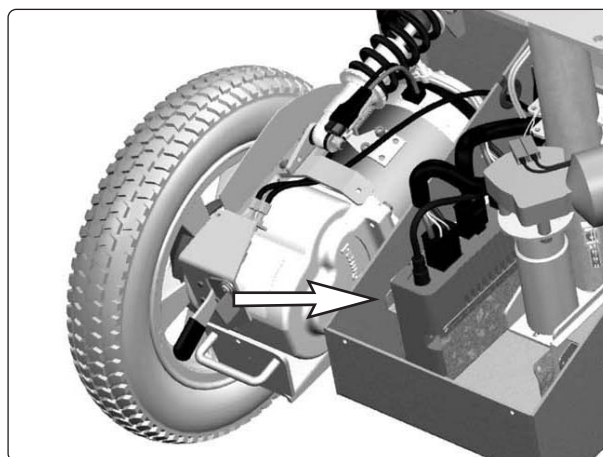


NOTE

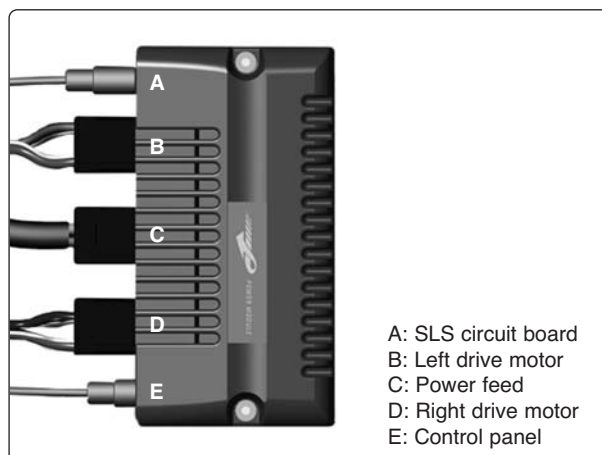
The Pilot+ controller connectors A and E have the same function. Cabling from SLS circuit board and control panel can therefore be switched if desired.

Fitting

Fit the Pilot+ controller in the reverse order.

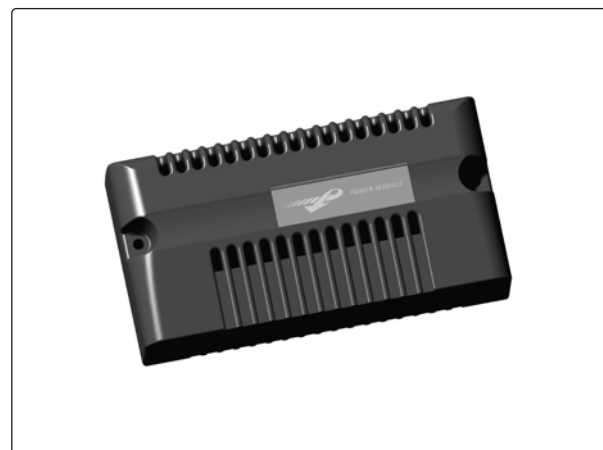


The Pilot+ controller sits in its container without fastening screws.



A: SLS circuit board
B: Left drive motor
C: Power feed
D: Right drive motor
E: Control panel

Pilot+ controller cable connections.

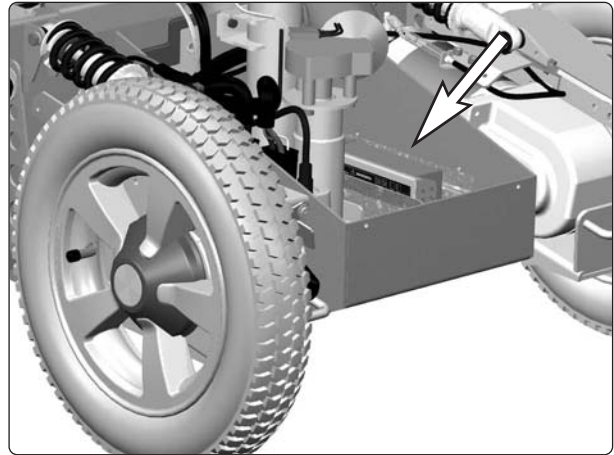


Pilot+ controller

SLS Drive Stage

Removal

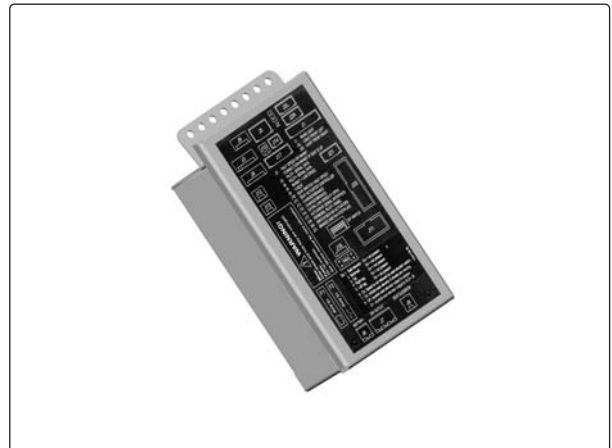
1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Switch off the main power switch on the control panel.
3. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
4. Remove the seat elevator cover and the chassis cover, see page 7.
5. Lift the SLS drive stage out of its holder, see fig.
6. Remove the lid from the drive stage.
7. Clip the cable ties that hold the cables and its electrical connections, being attentive to their placement to facilitate subsequent refitting.



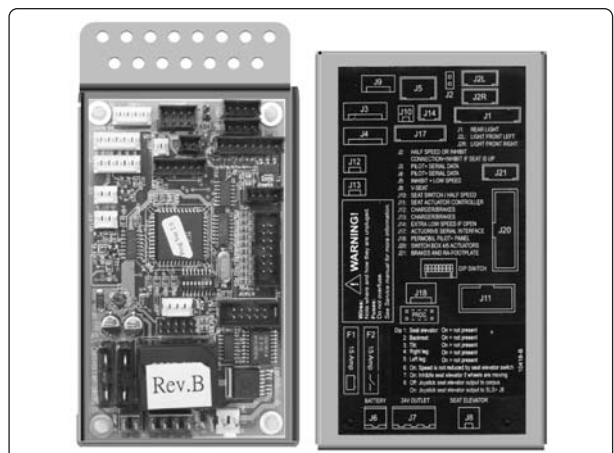
The SLS-Drive Stage sits in its container without fastening screws.

Fitting

Fit the SLS drive stage in the reverse order.



SLS Drive Stage.



SLS Drive Stage.

Circuit breaker and fuses

Resetting the circuit breaker

The circuit breaker also serves as a battery isolator but is normally referred to as a circuit breaker.

Circuit breaker replacement is normally not required; it is of the automatic type that can be reset when tripped.



NOTE

A tripped circuit breaker often entails a major electrical fault. The cause should be carefully investigated before resetting.

Circuit breaker replacement

1. Remove the seat elevator cover and the chassis cover, see page 7.
2. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see fig.
3. Disconnect the minus cable from the left battery.
4. Disconnect the plus cable from the right battery.



NOTE

Bend the battery connection cables off to the side to prevent them from coming in contact with the battery terminals.

5. Remove the circuit breaker by removing the two screws, see fig.



NOTE

Note the orientation of the circuit breaker with consideration to subsequent mounting. The ON/OFF positions must agree with the decal.

6. Disconnect the cables from the circuit breaker by removing the screws; see figure 68.
7. Put the new circuit breaker in the "OFF" position.
8. Connect the cables to the new circuit breaker.



NOTE

Check that the cables are firmly attached.

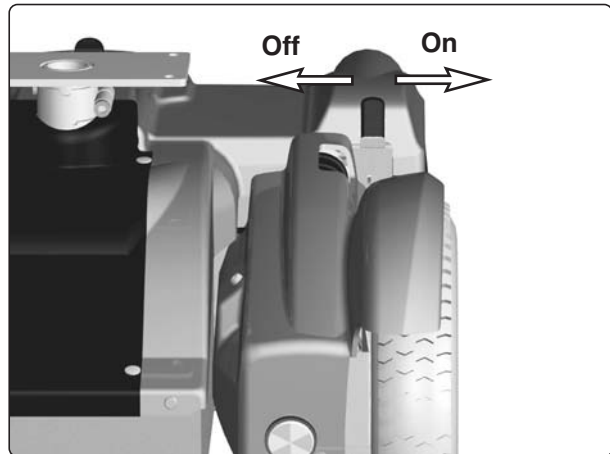
9. Mount the new circuit breaker with the two screws, see fig.



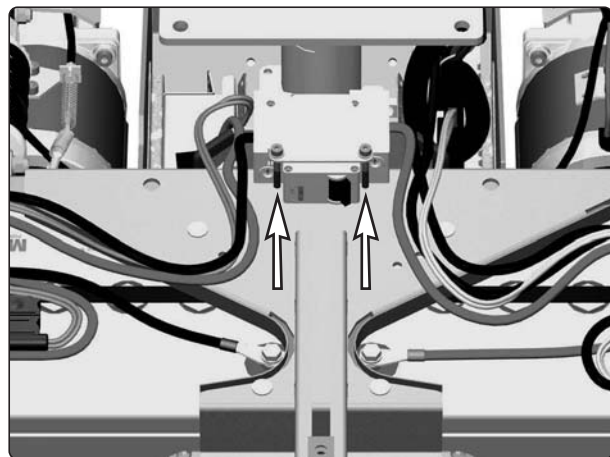
NOTE

Note the orientation of the circuit breaker with consideration to subsequent mounting. The ON/OFF positions must agree with the decal.

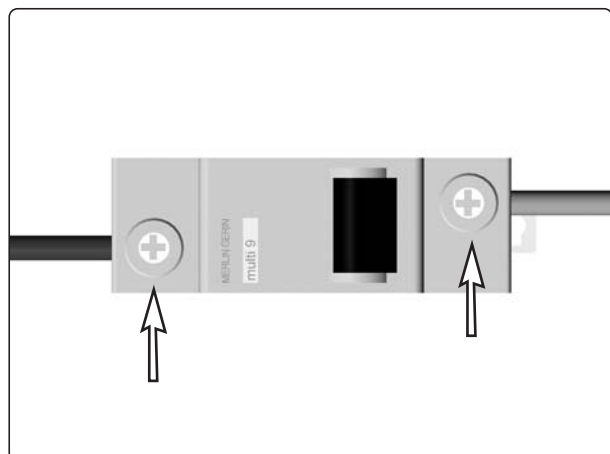
10. Reconnect the battery connection cables to the batteries.
11. Refit the seat elevator cover and the chassis cover, see page 7.
12. Put the circuit breaker in the "ON" position; see fig.



Circuit breaker/Battery isolator.



Circuit breaker bracket.



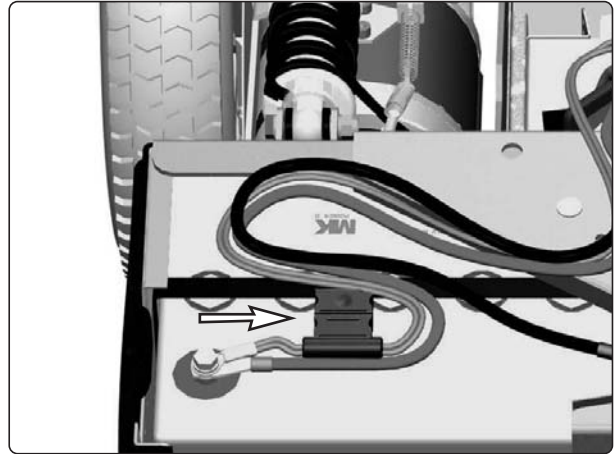
Circuit breaker cable connection.

Circuit breaker and fuses

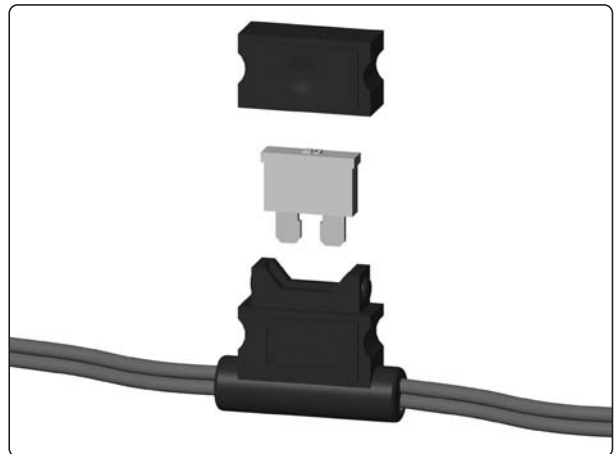
Replacing the SLS Fuse

The SLS fuse is located in its holder on the top of the left battery.

1. Switch off the main power switch on the control panel.
2. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
3. Loosen the rear end of the chassis cover a little by unscrewing the knob that holds the cover, see page 8
4. Open the left battery covers by loosening the knob that holds the battery cover, and drop the cover down.
5. Use the battery strap to pull the battery out just enough to get access to the SLS fuse holder.
6. Open the cover of the fuse holder by pulling it straight out.
7. Replace the blown fuse.
8. Close the cover of the fuse holder.
9. Push the battery back in to the chassis.
10. Close the battery cover and tighten the knob
11. Tighten the knob that holds the chassis cover.
12. Put the circuit breaker in the "ON" position; see page 39.



SLS-Fuse.



Replacing the SLS Fuse.

Replacing the Charging Fuse

The charging fuse is located in its holder on the right side off the chassis, see fig.

1. Switch off the main power switch on the control panel.
2. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
3. Remove the seat elevator cover and the chassis cover, see page 7.
4. Replace the blown fuse.
5. Refit in the reverse order.



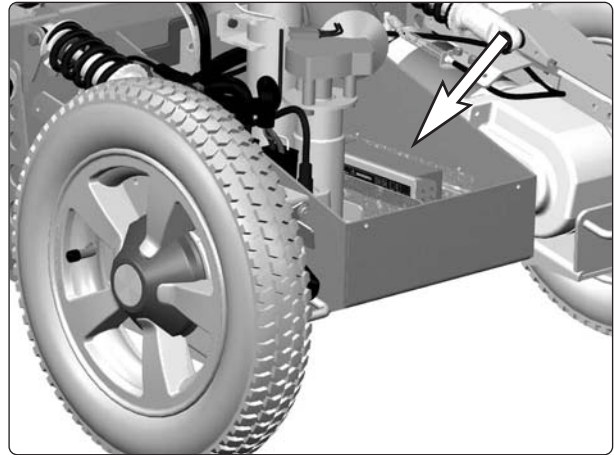
Charging Fuse.

Circuit breaker and fuses

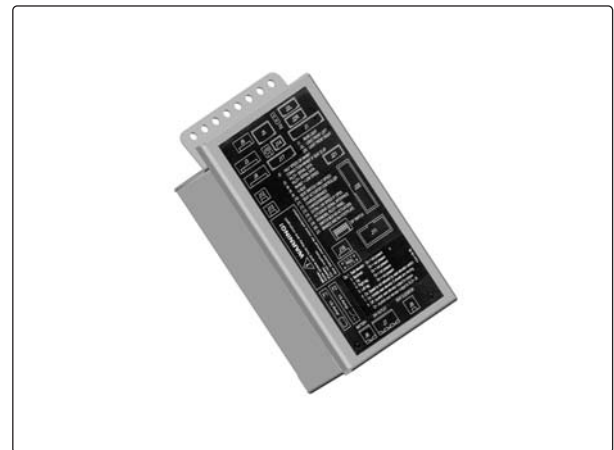
Replacing Fuses for the Seat/Lighting

There are two fuses on the SLS Drive stage, F1 (24V unswitched) and F2 (24V switched). These protect two outlets. One output (24V unswitched) supplies power regardless of if the chair is turned on or off. The other output (24V switched) supplies power only when the chair is turned on. The seat and lighting are normally connected to this outlet.

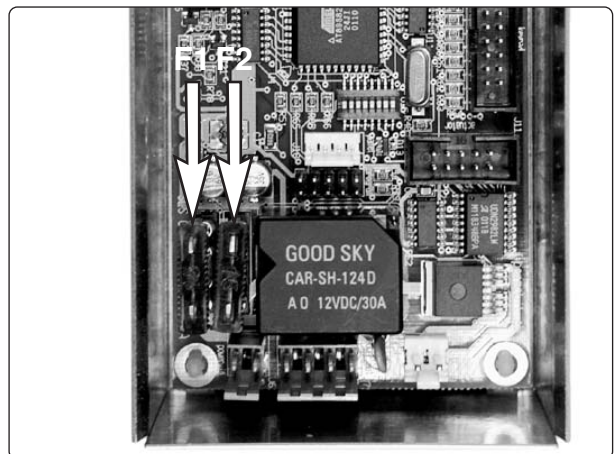
1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Switch off the main power switch on the control panel.
3. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
4. Remove the seat elevator cover and the chassis cover, see page 7.
5. Lift the SLS drive stage out of its holder, see fig.
6. Remove the lid from the drive stage.
7. Replace the blown fuse.
8. Refit the lid to the box.
9. Place the SLS Drive stage in its holder.
10. Refit the seat elevator cover and the chassis cover, see page 7.
11. Put the circuit breaker in the "ON" position. It is accessed through a hole in the chassis cover; see page 39.



The SLS-Drive Stage sits in its container without fastening screws.



SLS-Drive Stage.



*F1: 24V unswitched 15A.
F2: 24V switched 15A Seat/Lighting.*

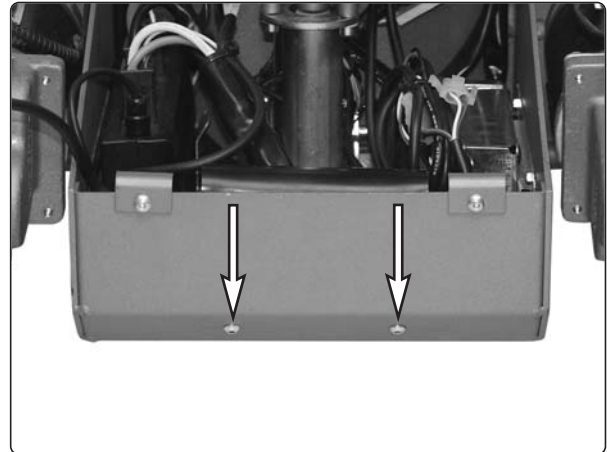
ESP module (Applies to C500S)

Removal

1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Switch off the main power switch on the control panel.
3. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
4. Remove the seat elevator cover, chassis cover, see page 7.
5. Unscrew and remove the two screws which hold the ESP module in position, see fig.
6. Remove the ESP module connecting cable (1) from the Pilot+ controller, drawing it straight out, see fig.
7. Remove the control panel connection cable (2) from the ESP module, drawing it straight out, see fig.

Fitting

1. Fit the ESP module connecting cable (1) to the output connection, see fig.
2. Fit the Control Panel connection cable (2) to the ESP module, see fig.
3. Attach the ESP module in the chassis using the two screws, see fig.



The ESP module is mounted and attached with two screws to the front edge of the chassis.



ESP module.



NOTE

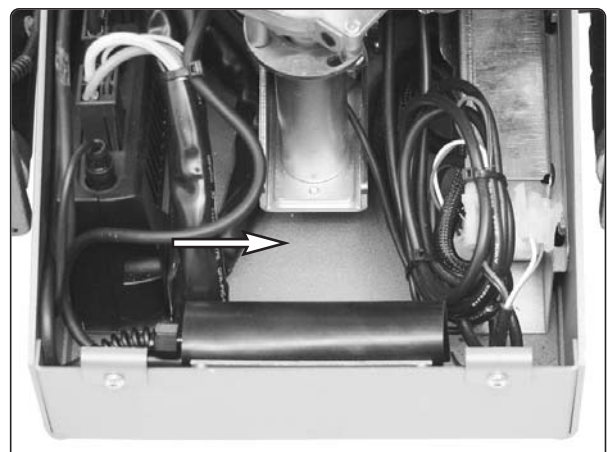
Check that the ESP module is firmly in position and that the screws are screwed in securely.

4. Tip down the protective rubber sheet on the back of the ESP module, see fig.



NOTE

Check that no cables cross the area under the seat elevator, near the drive belt of the seat elevator, see fig.



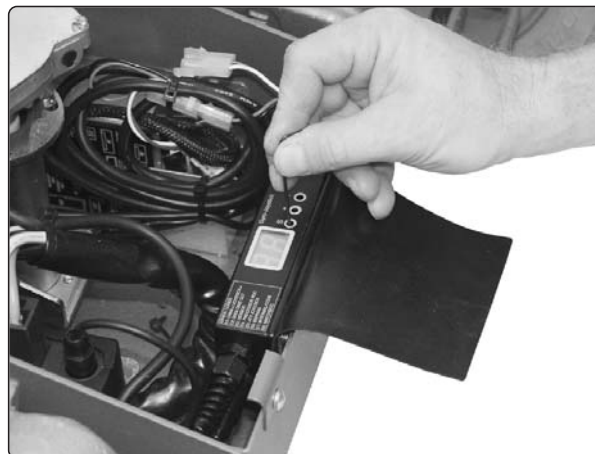
Keep area beneath seat elevator free of cabling.

5. The ESP module is ready programmed from the factory. If the module is to be reprogrammed, see the technical manual of the ESP module for full details.

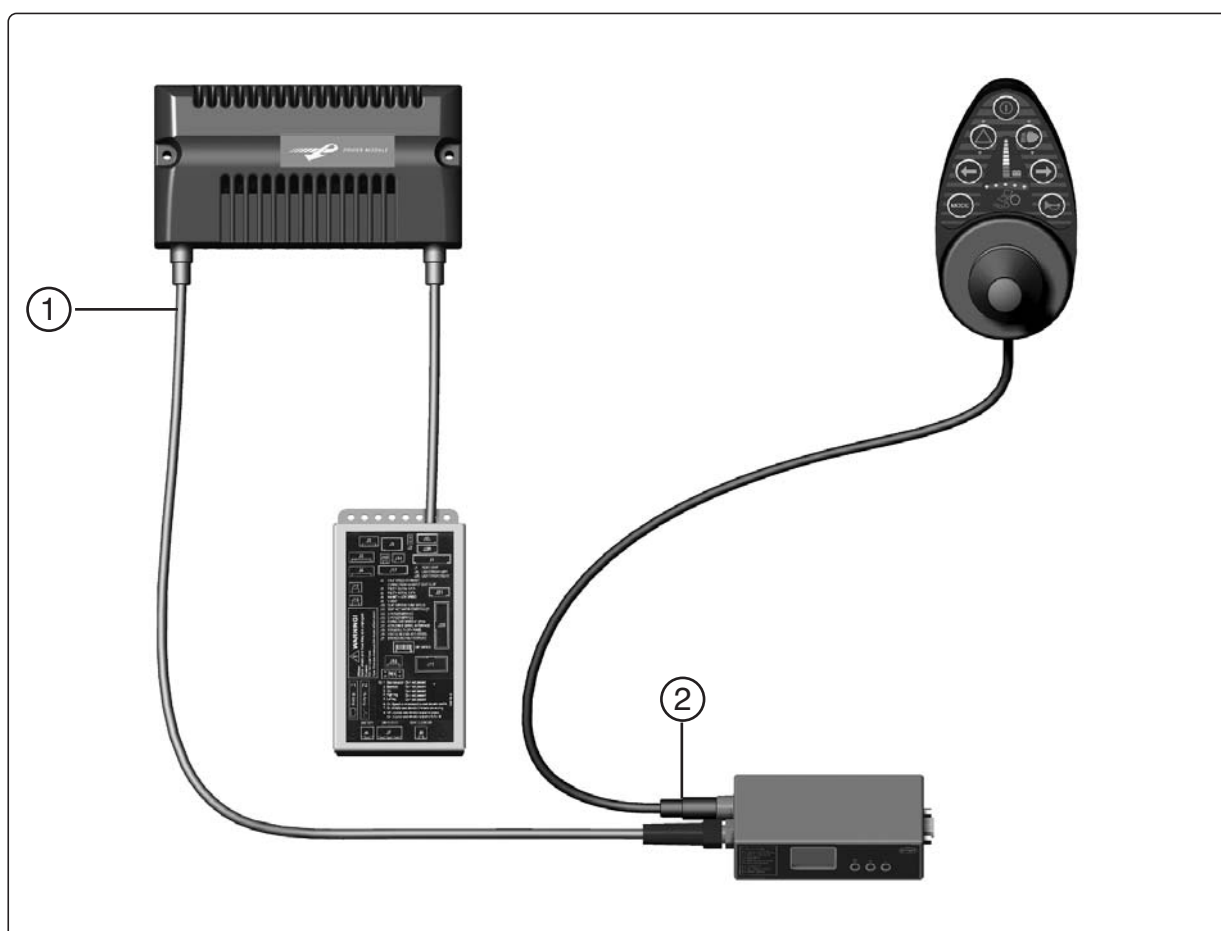
**WARNING**

The ESP module and the Pilot+ output connection must be correctly programmed when the wheelchair is in use. Otherwise the wheelchair may be very difficult to maneuver, with a high risk of accidents.

Test the way the wheelchair runs in a large open space. If the ESP module is incorrectly installed or incorrectly programmed, the chair may move rapidly in the wrong direction. Check carefully that it runs correctly in response to the controls.



Programming the ESP module.

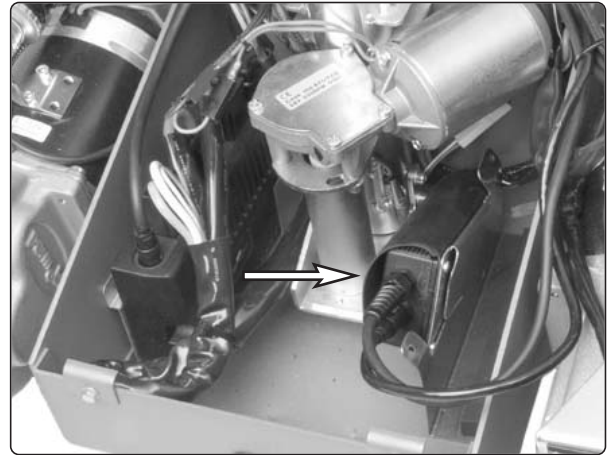


The connections to the ESP module.

ESP module (Applies to C500S Lowrider)

Removal

1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Switch off the main power switch on the control panel.
3. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
4. Remove the seat elevator cover, chassis cover, see page 7.
5. Lift the SLS Drive out of its holder, see page 38.
6. Carefully tilt the ESP module, making the two bolt heads release from the guide holes in the SLS Drive holder. Lift the ESP module straight upwards, see fig.
7. Remove the ESP module connecting cable (1) from the Pilot+ controller, drawing it straight out, see fig.
8. Remove the control panel connection cable (2) from the ESP module, drawing it straight out, see fig.



The ESP module is mounted on the SLS Drive holder.



ESP module.

Fitting

1. Fit the ESP module connecting cable (1) to the output connection, see fig.
2. Fit the Control Panel connection cable (2) to the ESP module, see fig.
3. Mount the ESP module with bracket on the SLS Drive holder, see fig.



NOTE

Make sure the two bolt heads are fitted in the guide holes in the SLS Drive holder.

4. Remount the SLS Drive in its holder, see page. 38.
5. Tip down the protective rubber sheet on the side of the ESP module, see fig.



NOTE

Check that no cables cross the area under the seat elevator, near the drive belt of the seat elevator, see fig.



Keep area beneath seat elevator free of cabling.

5. The ESP module is ready programmed from the factory. If the module is to be reprogrammed, see the technical manual of the ESP module for full details.

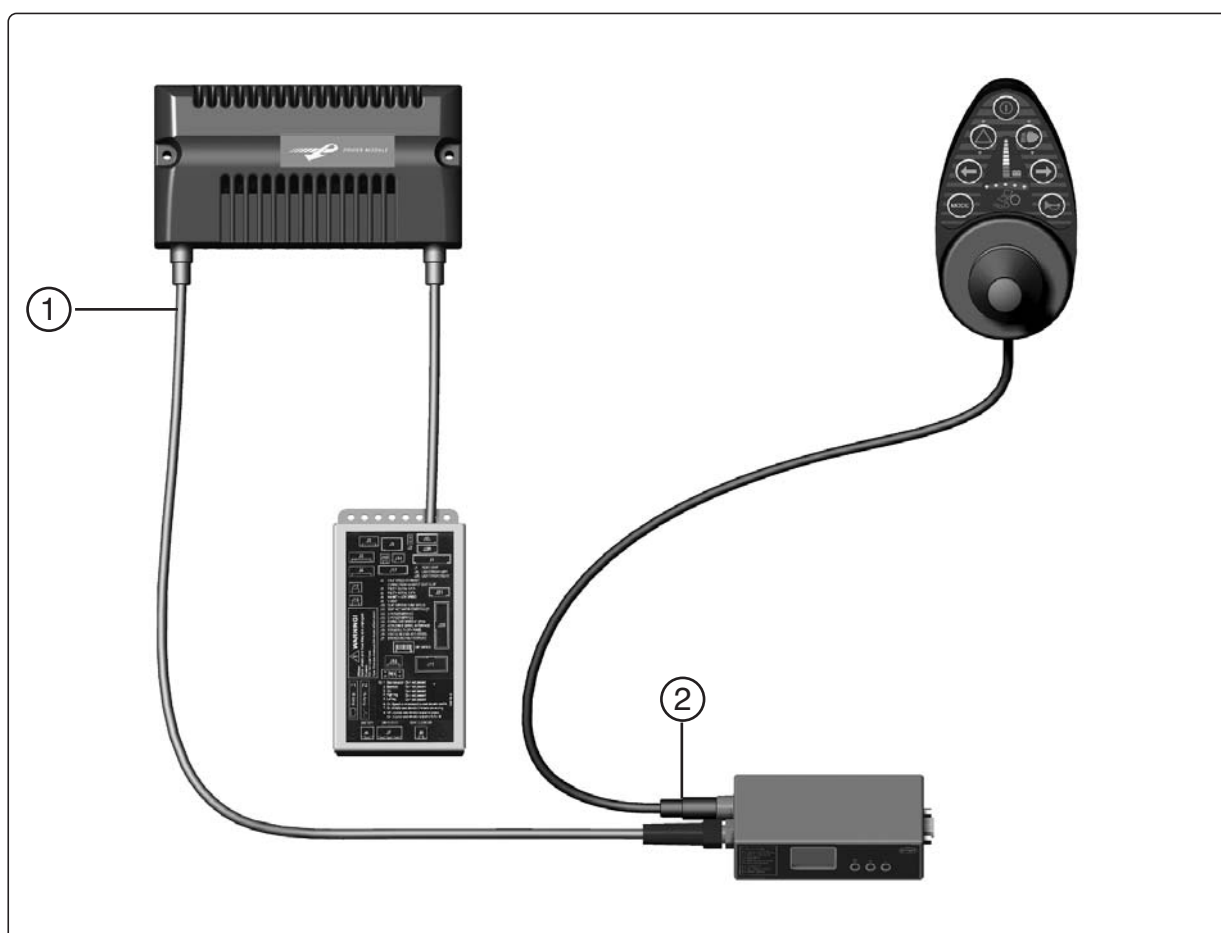
**WARNING**

The ESP module and the Pilot+ output connection must be correctly programmed when the wheelchair is in use. Otherwise the wheelchair may be very difficult to maneuver, with a high risk of accidents.

Test the way the wheelchair runs in a large open space. If the ESP module is incorrectly installed or incorrectly programmed, the chair may move rapidly in the wrong direction. Check carefully that it runs correctly in response to the controls.



Programming the ESP module.



The connections to the ESP module.

Lights (Accessories)

Removing the front lights

1. Switch off the main power switch on the control panel.
2. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
3. Remove the seat elevator cover, chassis cover and the front fender on the side in question, see page 7.
4. Disconnect the electrical connection of the front light in question, it's positioned on the front light cabling on the inside of the chassis.
5. Clip the cable ties that hold the cable.
6. Remove the Cable pass-through on the front fender in question.
7. Remove the front light in question. It is attached with three screws; see fig.



Front lights

Fitting

Fit the front light in the reverse order.



The front light is attached with three screws.

Lights (Accessories)

Removing the rear lights

1. Switch off the main power switch on the control panel.
2. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 39.
3. Remove the seat elevator cover and the chassis cover, see page 7.
4. Disconnect the electrical connection of the rear light in question, it's positioned on the rear lights cabling on the inside of the chassis.
5. Remove the rear light in question. It is attached with two screws; see fig.



Rear lights

Fitting

Fit the rear lights in the reverse order.



The rear lights are attached with two screws each.

Control System

The wheelchair's control system can be programmed in order to optimize the performance of the wheelchair while also maintaining a high level of safety, regardless of other settings and options on the wheelchair. The control system can also be programmed in order to make adjustments needed for a specific user.

To get more information about standard parameter files, contact your dealer, or Permobil Inc. USA.

The chart below shows the different standard parameter files that are available.

Available standard parameter files
C500 Pilot+ 7,5 km/h
C500 Pilot+ S 12 km/h

Trouble Shooting Guide

The troubleshooting guide below describes a number of events that can arise when you use your wheelchair, as well as providing suggestions for solutions. Note that this guide does not describe all the possible events that can arise, and you should always get in touch with your service contact or Permobil when you are unsure

EVENT	POSSIBLE CAUSE	SOLUTION
The wheelchair does not start.	Batteries discharged.	Charge the batteries.
	The cable connection to the control panel has become loose.	Attach the cable to the control panel.
	Main fuse blown.	See page 39.
The wheelchair can not be driven.	Battery charger connected.	Terminate the charging and remove the charging cable from the charging outlet.
	Wheel lock release activated.	Reset the wheel lock release.
	Wheelchair locked	Unlock the wheelchair. See Owner's manual.
Battery voltage indicator on the control panel rapidly blinking and the wheelchair can not be driven.	Fault indicated in the drive electronics.	See pages 50-51.
Battery voltage indicator on the control panel blinking once every 2.5 seconds and the wheelchair can not be driven.	The control system is in Sleep Mode.	Switch the start button on the control panel off and on again.
The wheelchair stops while being driven.	The cable connection to the control panel has become loose.	Attach the cable to the control panel.
The wheelchair can only be driven with reduced speed. <i>Applies for electrical seat elevator or seat tilt only.</i>	Seat tilt or seat elevator raised too high.	Lower seat elevator or seat tilt. See Owner's manual.
The wheelchair will not charge.	Main fuse blown.	Change Main Fuse See page 39.

Error signals - Battery voltage indicator

Every time the wheelchair is started up, a check is performed on parts of the wheelchair's electronics. If any faults have arisen in these parts, this is shown on the control panel's battery voltage indicator by one or more blinking lights.

Constant light

Everything is in order. How many lights are lit, depends upon how much voltage there is in the batteries. With fully charged batteries, all lights are lit.

Slowly blinking red lights

The batteries need to be charged immediately.

Rapidly blinking, 1 - 10 lights

Error signals, an error has arisen and the wheelchair can not be driven.

Error signals

The number of blinking lights indicate what the problem could be.

- Note the number of blinking lights.
- Turn off the wheelchair.
- Turn the wheelchair back on again.
- If the error persists, count the number of blinking lights, check possible causes and solutions in the table on the adjoining page.



Battery voltage indicator



NOTE

Possible error signals on the battery voltage indicator are not displayed while the wheelchair is being driven, they only first appear the next time the wheelchair is restarted.



WARNING

The remedying of errors that are indicated via the battery voltage indicator must be performed by a person with sufficient expertise to be able to perform such in a professional manner. Always contact an authorized serviceman when in doubt.

CAUSE		SOLUTION
High battery voltage	10 Green	Check the battery and the connections between the battery and the control unit.
Failure in wheel lock circuit	9 Green	Check the connections to the magnetic wheel lock.
Fault in electronics	8 Green	Check the contacts to the output stage. If the fault persists, change the output stage.
Fault in the control panel	7 Orange	Make sure the joystick isn't actuated at switch-on, change the control panel.
	6 Orange	
Short circuit right drive motor	5 Orange	Check the drive motor connections and cable.
Open circuit, right drive motor	4 Orange	Check the connection to the right drive motor.
Short circuit left drive motor	3 Red	Check the drive motor connections and cable.
Open circuit, left drive motor	2 Red	Check the connection to the right drive motor.
Low battery voltage	1 Red	Check the condition of the battery. Check the connection between the battery and the control unit.

Example:

Lights 1-7, 3 red and 4 orange, blinking rapidly upon start-up and the wheelchair can not be driven.

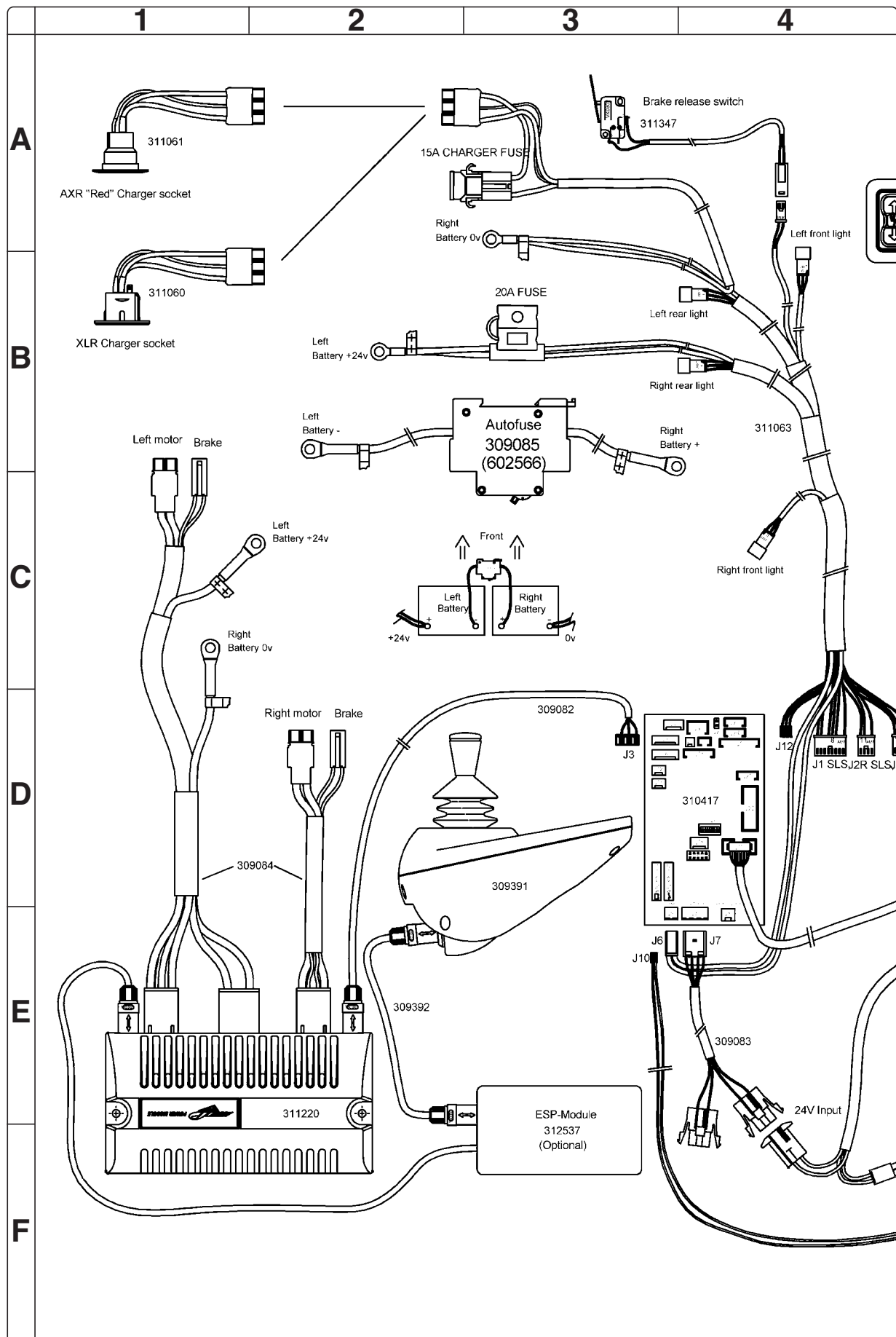
Cause:

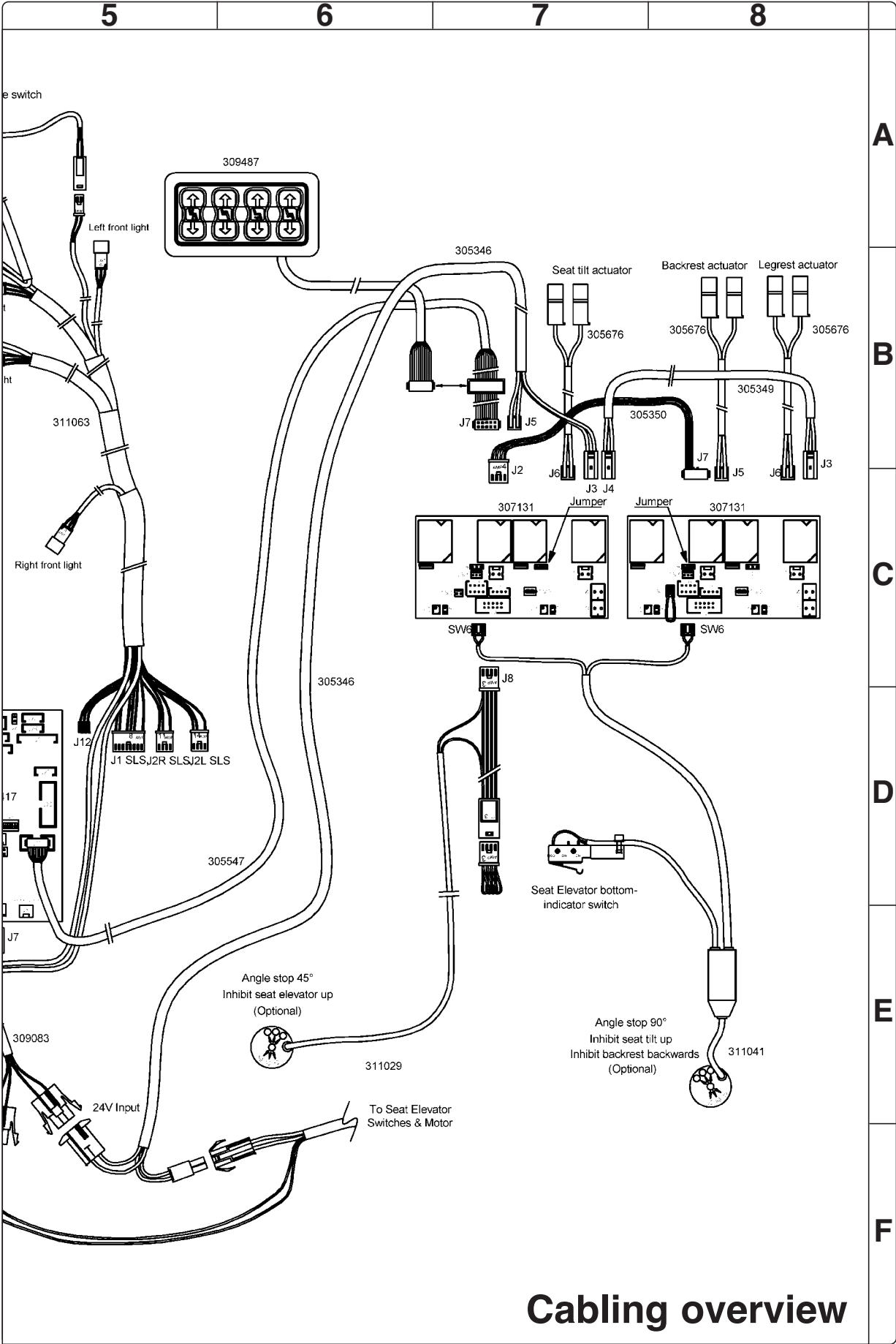
Fault in the control panel.

Solution:

Make sure the joystick isn't actuated at switch-on, change the control panel.

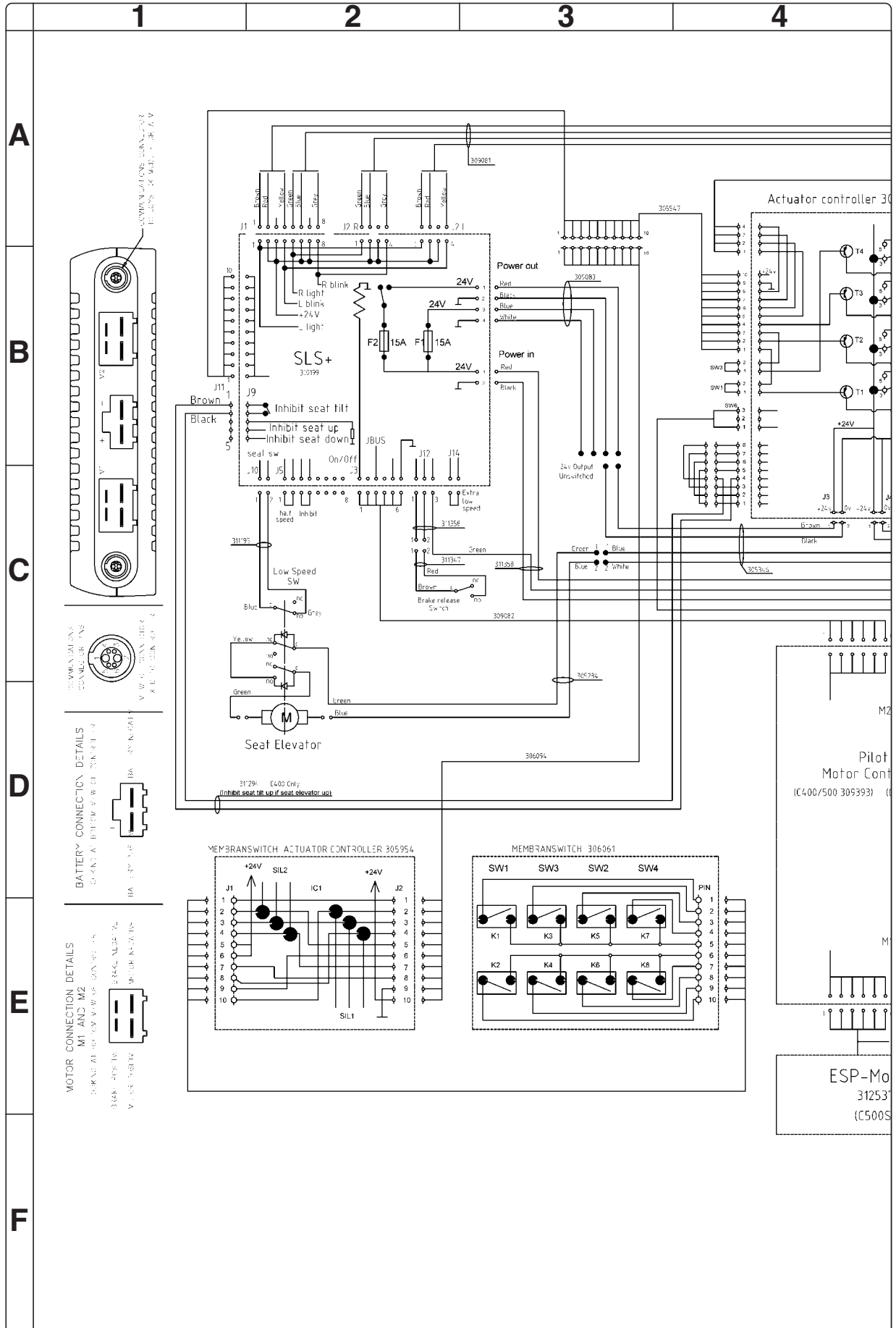
Cabling overview

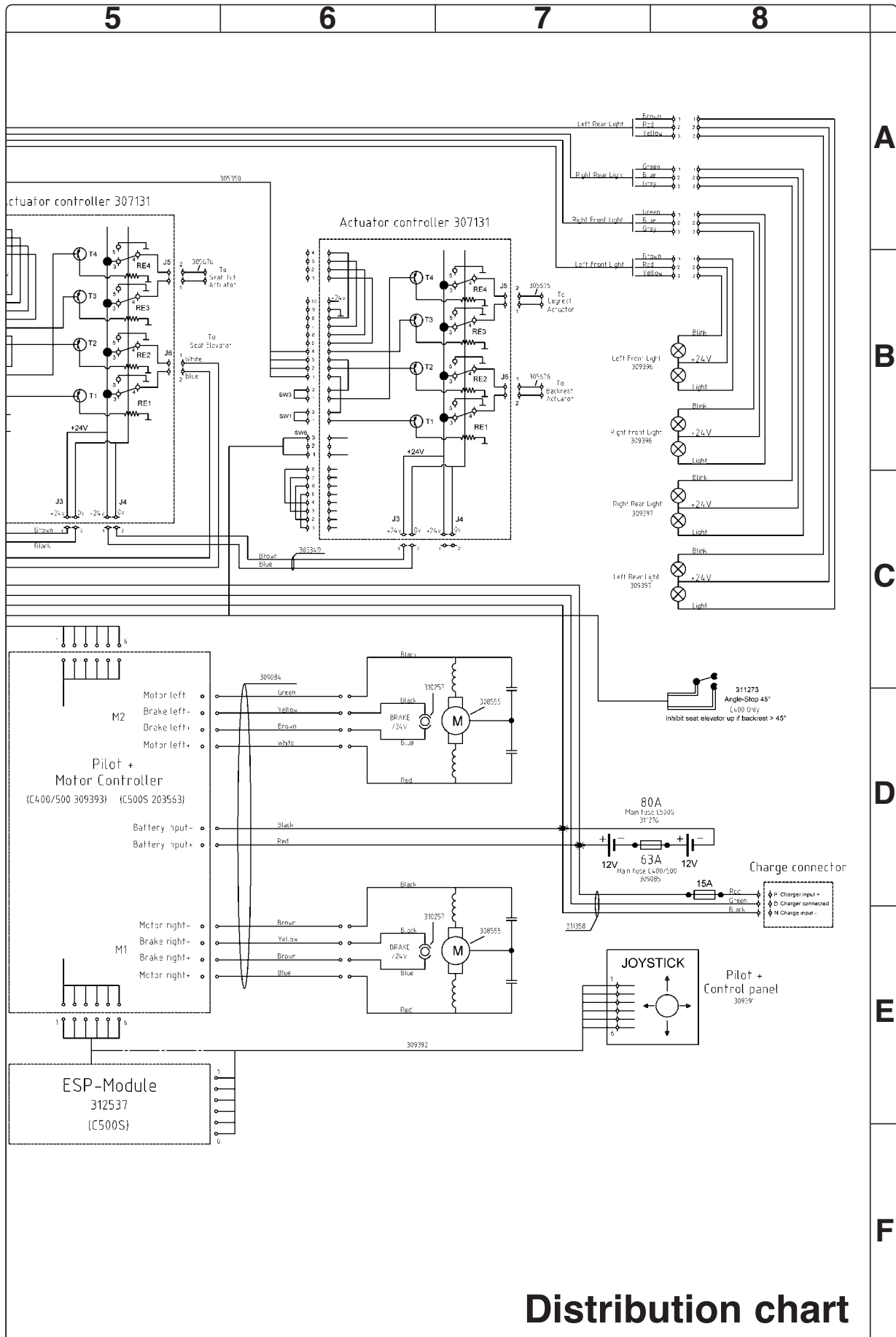




Cabling overview

Distribution chart





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