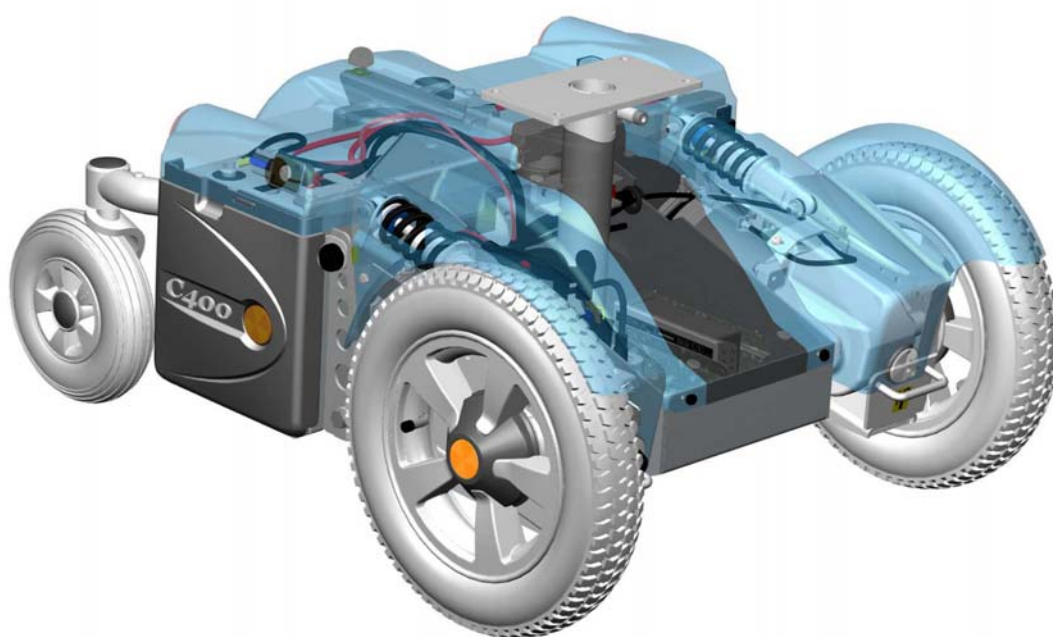


# *Permobil C400*

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

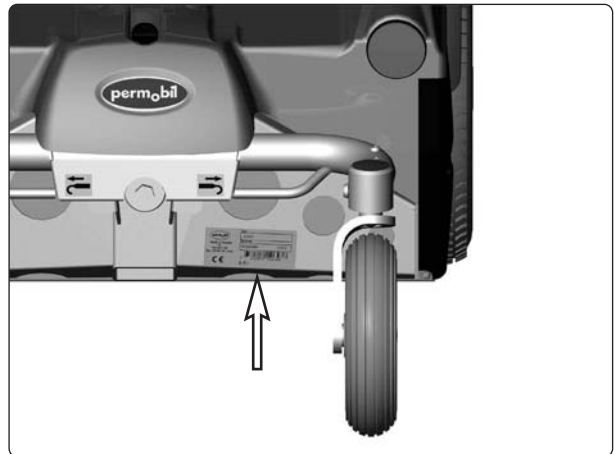
Contact your dealer or Permobil Inc. USA for information about the warranties for this chair.

### Maintenance

See the information in the Owner's Manual.

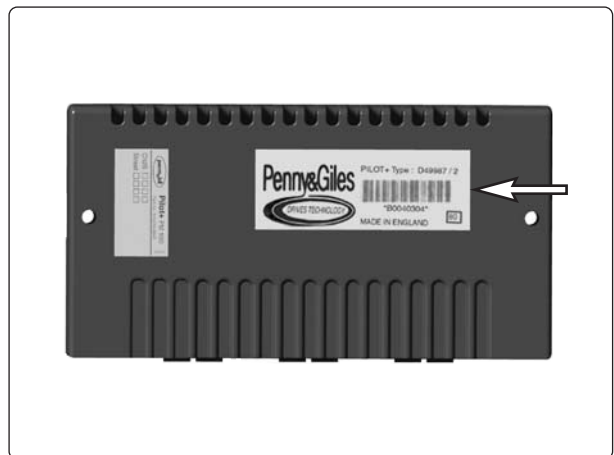
## Identification plates

### Chassis



*Chassis identification number.*

### Pilot+ controller



*Pilot+ controller identification number.*

### Control panel Pilot+



*Control panel Pilot+ identification number.*

**Control panel VSI**

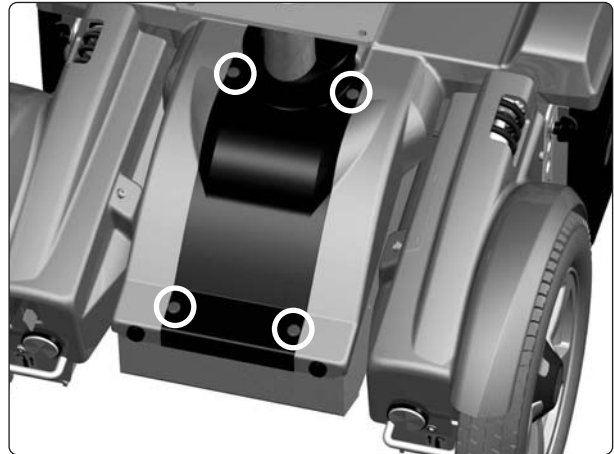


*Control panel VSI identification number.*

## 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.



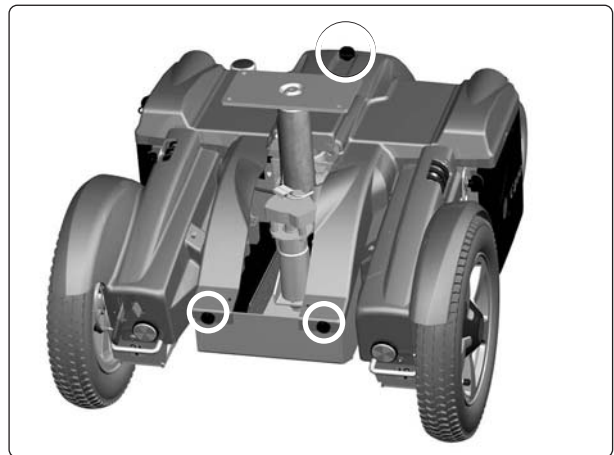
*The seat elevator cover is mounted with four plastic plugs.*

### 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 a 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.



## Covers

### 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

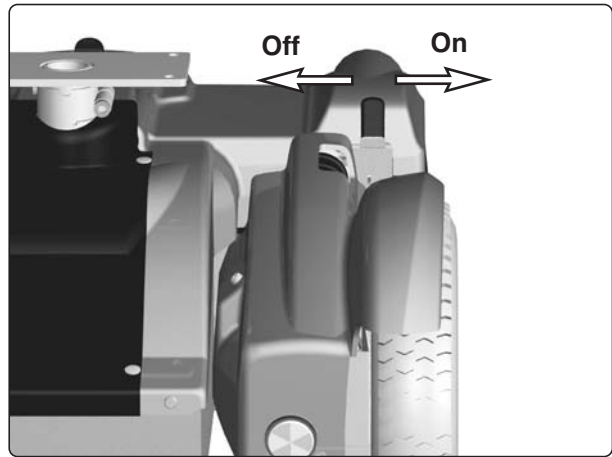


### WARNING

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.

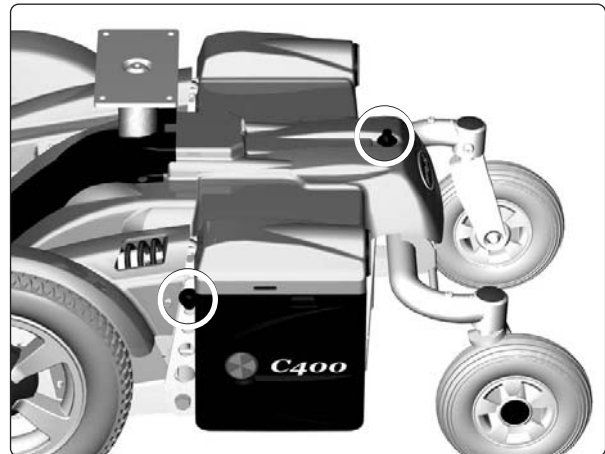
### Removal

1. Place the wheelchair on a level surface.
2. Switch off the main power switch on the control panel.
3. On wheelchairs with Pilot+ control system, put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 41.
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.

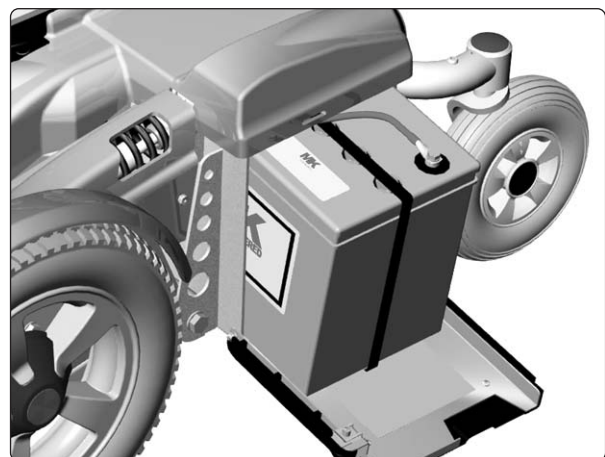


*Circuit breaker (Off/On).*

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.



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



*Pulling out the batteries*

## Batteries

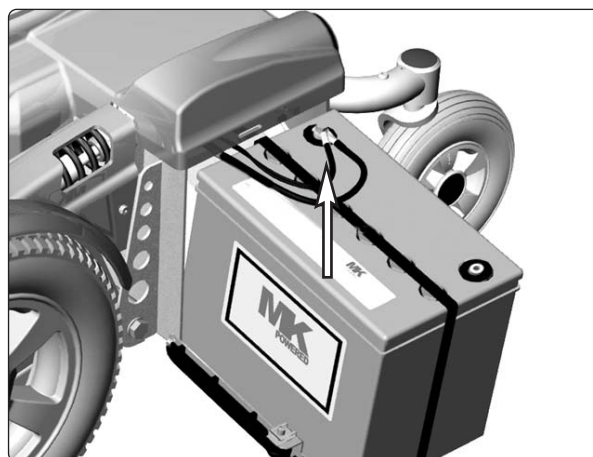
### Fitting

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.



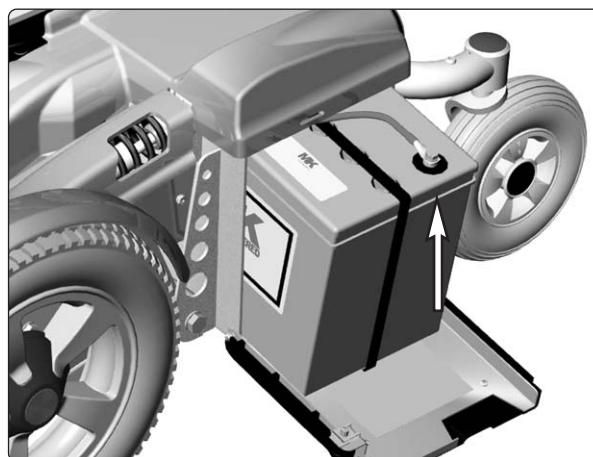
#### WARNING

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.



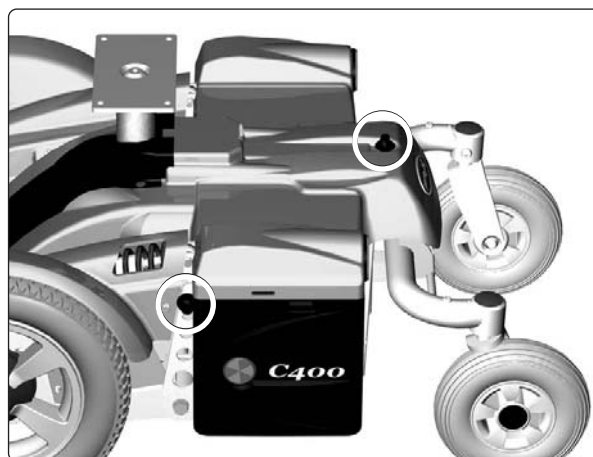
*Fit the inner battery connections.*

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 outer battery connections.*

6. Close the battery covers and tighten the knobs.
7. On wheelchairs with Pilot+ control system, put the circuit breaker in the "ON" position. It is accessed through a hole in the chassis cover; see page 41.



*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.

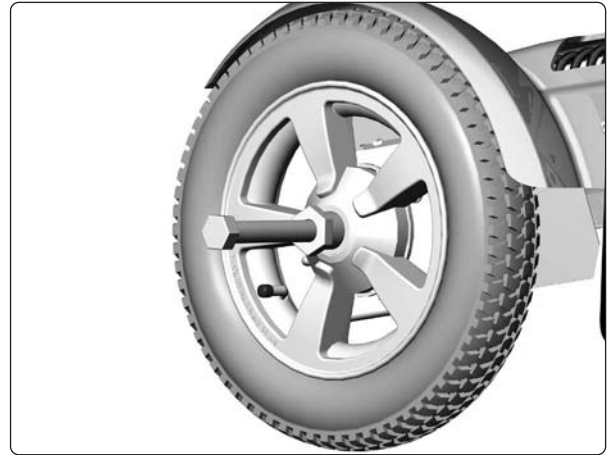


#### WARNING

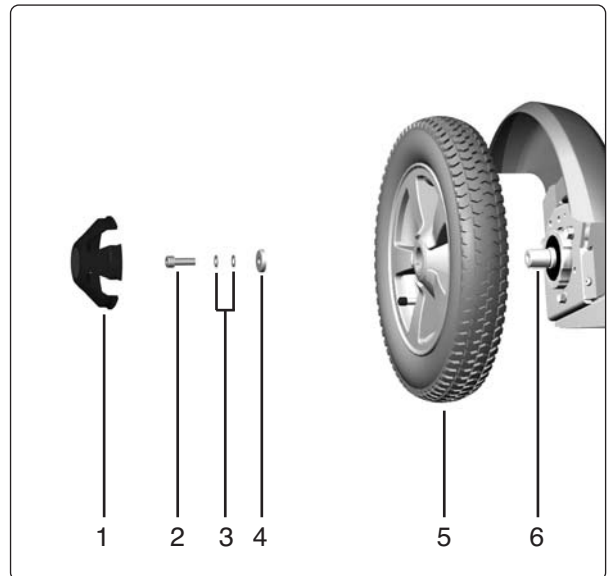
The bolt must be used once only. Removed bolt is not allowed to be refitted.

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

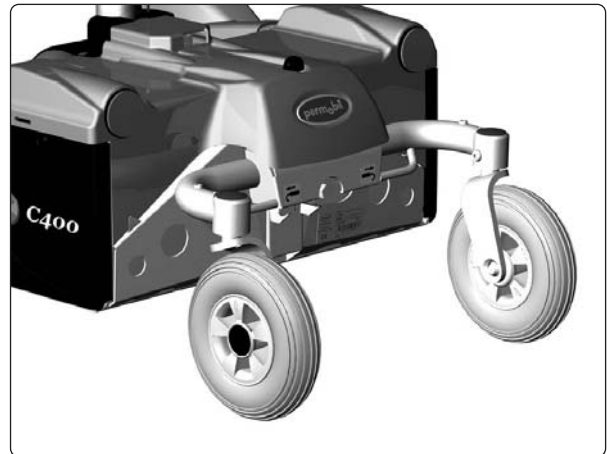
### Removal

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).**



*Rear wheels*



#### NOTE

Do not use a Pneumatic impact wrench.

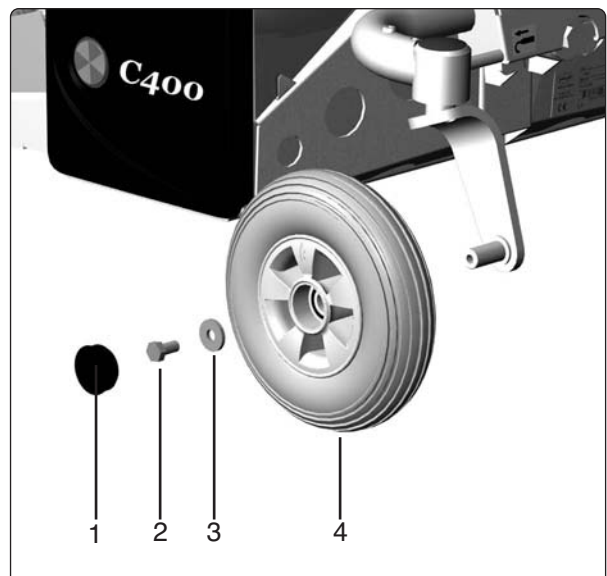


#### WARNING

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.



*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

## Support Wheels

The support wheels should always be fitted in the upper 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.

### 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.

#### OBSERVERA

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

### Removing the support wheel unit

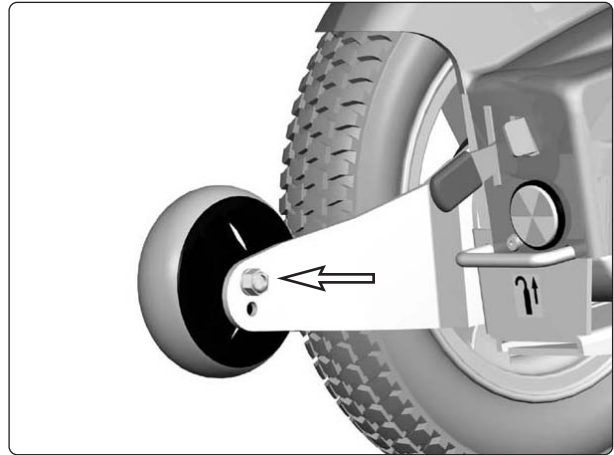
1. Turn off the main power switch on the control panel.
2. Remove the front wheel on the side in question, see page 12.
3. Remove the three bolts that holds the support wheel unit and the drive unit.

#### WARNING

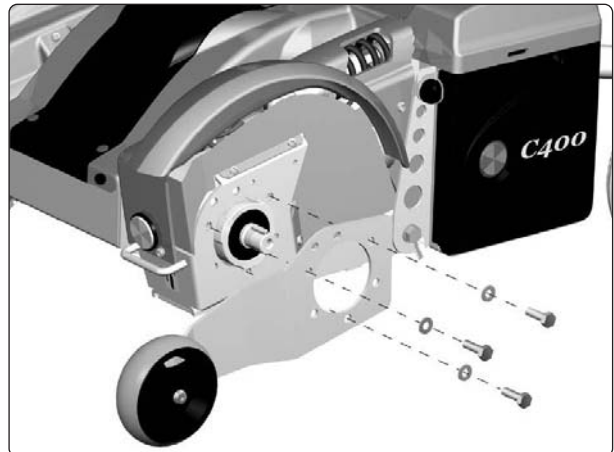
Removing the support wheels entails an increased risk of the wheelchair tipping over. Wheelchairs with support wheels fitted as standard must not be driven when the support wheels are removed.

### Fitting

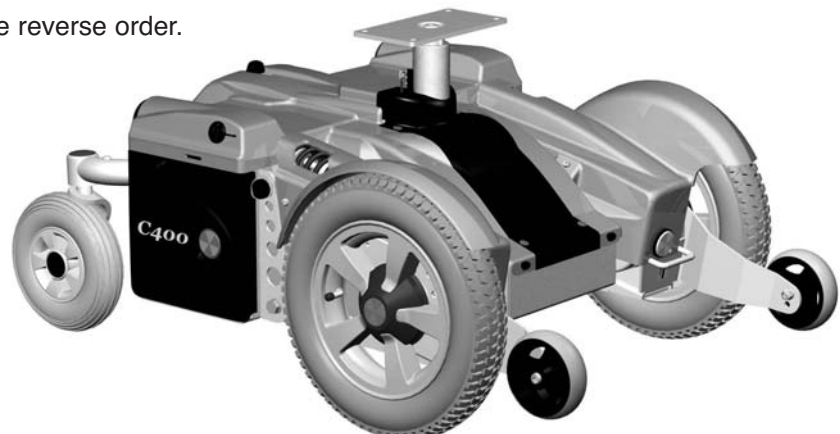
Fit the support wheel unit in the reverse order.



*The support wheels should always be fitted in the upper position.*



*Removal/fitting of the support wheel unit.*



*Chassis with support wheels fitted.*

## Wheel Forks

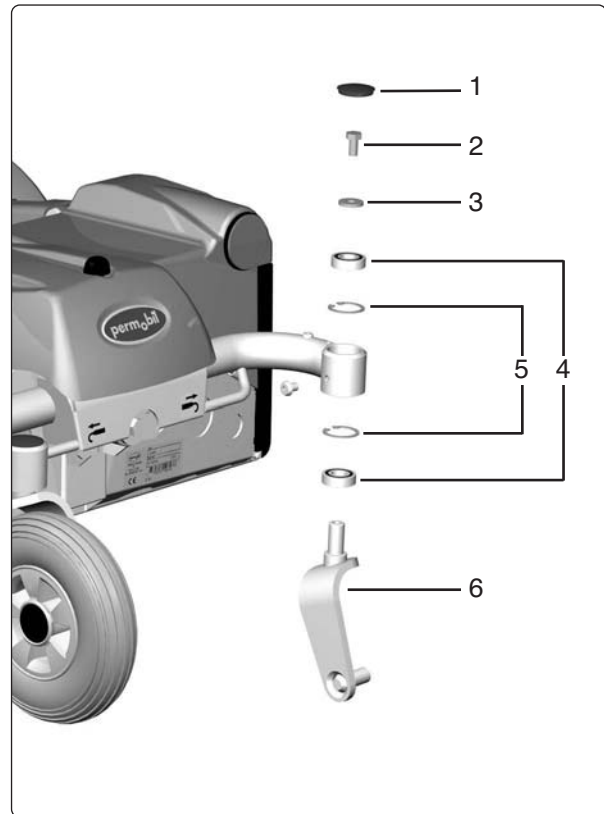
### Removal

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 screw from above, see fig.

### Fitting

Fit the wheel fork in the reverse order.

**Use a torque wrench to tighten the bolt to 32 ft-lbs (43Nm).**



*Wheel fork*



#### 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.

Pos.	Description
1	Plastic plug
2	Bolt, ISO 4017 M8x16 8.8 Fe/Zn 5 C1/ Locking coat DIN 267-28
3	Washer, 8.5x23x3
4	Bearing 6002-2RS1, 15x32x9
5	Circlip DIN472, Ø32



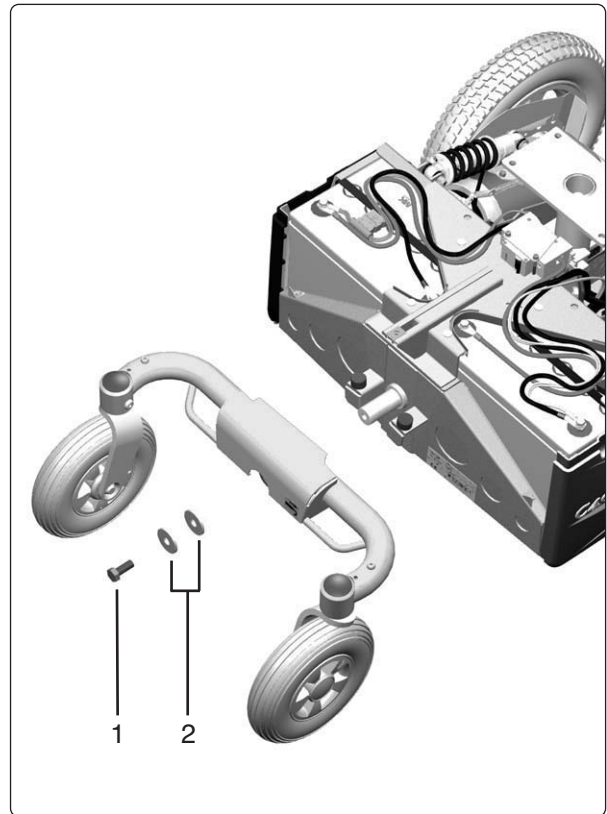
## Rear wheel suspension

### 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 a bolt with two washers, see fig.
4. Pull the rear wheel suspension straight backwards.

### Fitting

1. Check that the axle and the rear wheel suspension bushings are undamaged. Clean as necessary to remove dirt and rust. Replace damaged parts.
2. Lubricate the shaft with a thin coating of grease (Lubetec Redguard, art. no.1190) or oil.



*Rear wheel suspension.*

#### WARNING

Do not use any type of lubrication in the threaded hole or on the bolt. Clean as necessary.

3. Fit the rear wheel suspension onto the axle using hand force only.
4. Fit the two washers on the bolt and secure the rear wheel suspension.

**Use a torque wrench to tighten the bolt to 39 ft-lbs (53 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.

Pos.	Description
1	Bolt, ISO 4017 M10x25 8.8 Fe/Zn 8 C1/ Locking coat DIN 267-28
2	Washer, 10 Fe/Zn 8 C1 (SRKB 11x35x3)

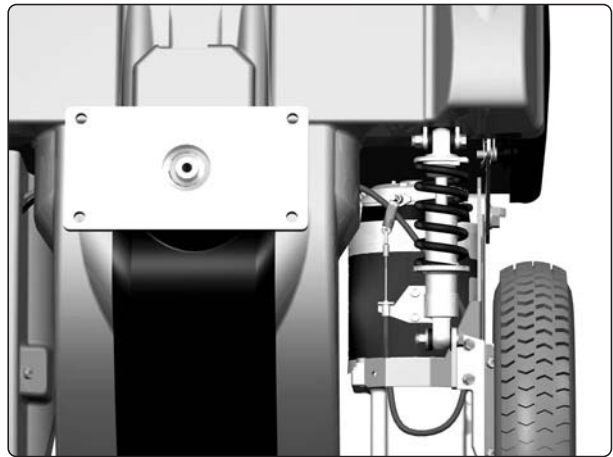
## Shock Absorbers

### Removal

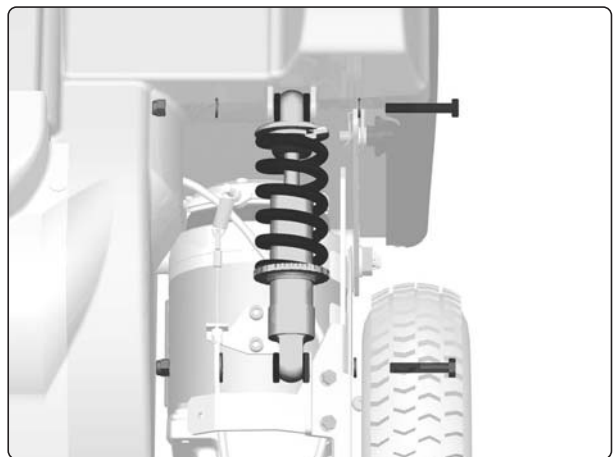
1. Switch off the main power switch on the control panel.
2. Remove the front fender on the side in question, see page 9.
3. Lift up and chock up the wheelchair chassis so that the wheel in question is free of the ground.
4. Loosen the shock absorbers front end. It is fitted with a bolt, two washers 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 page 19.



*Shock absorber*



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

## Shock Absorbers

### Adjustment

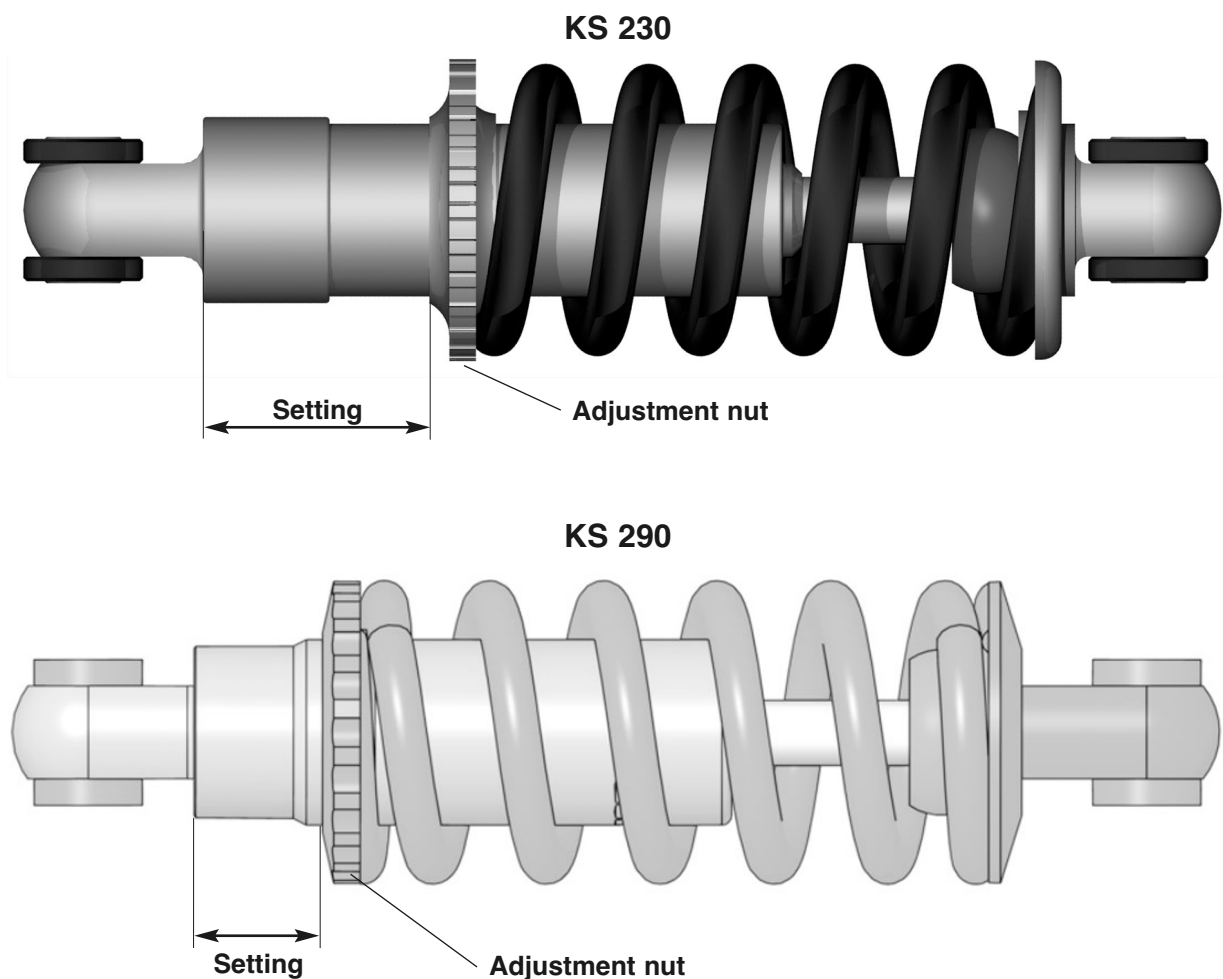
Before the new shock absorber is mounted, it must be adjusted to the proper value.

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. below.

#### NOTE

Make sure using the right settings for the right shock absorber.

On early models of the chassis, KS 230 shock absorbers are fitted. On models manufactured before 2006-03, two different types of springs exist, these springs are of different length and require different settings. On models manufactured before 2006-03, check the spring length; lift the wheelchair chassis and support it on blocks so that the wheel is off the ground, loosen the adjustment nut until the spring is loose and measure the spring length. Adjust the dimension according to the table below. The date of manufacture is found on the chassis identification plate, see page 6.



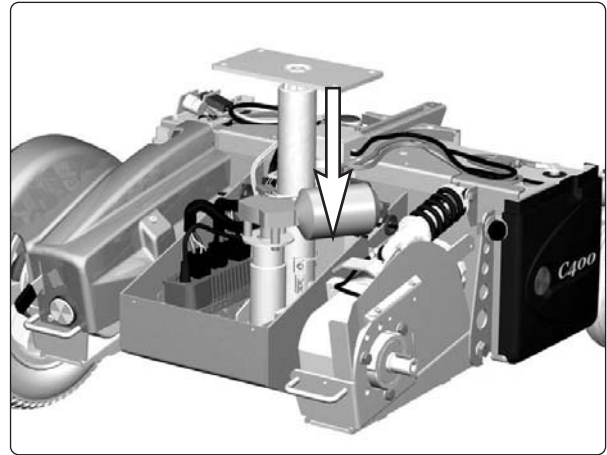
Adjustment of shock absorber spring			
	KS 230		KS 290
User weights	*Spring length: 85mm.	*Spring length: 95mm.	*Spring length: 95mm.
	Setting	Setting	Setting
0 - 110 lbs	1 9/16 inch (40 mm)	1 1/4 inch (32 mm)	1 inch (25 mm)
110 - 155 lbs	1 5/8 inch (41 mm)	1 5/16 inch (33 mm)	1 1/32 inch (26 mm)
155 - 200 lbs	1 11/16 inch (43 mm)	1 11/32 inch (34 mm)	1 1/16 inch (27 mm)
200 - 265 lbs	1 23/32 inch (44 mm)	1 7/16 inch (36 mm)	1 9/64 inch (29 mm)
265 - 300 lbs	1 25/32 inch (45 mm)	1 17/32 inch (39 mm)	1 1/4 inch (32 mm)

\* Length of the untensioned spring.

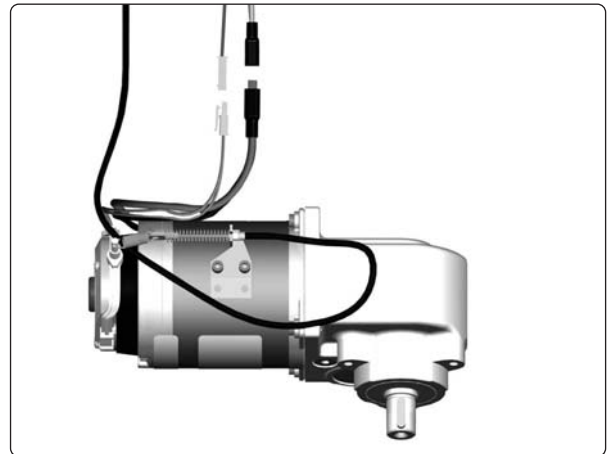
## Slewing brackets

### 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 8-9.
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 12.
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

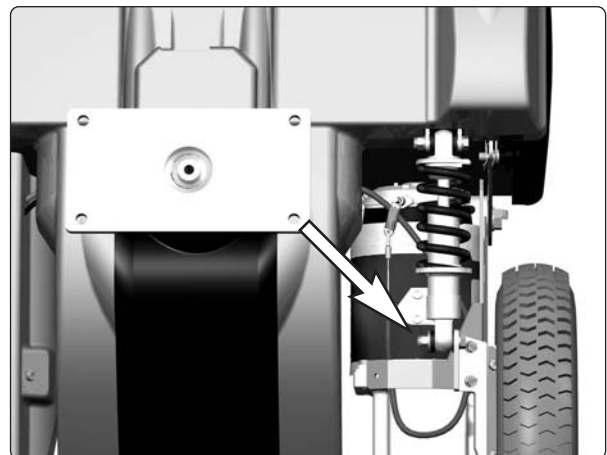


*The electrical connections of the drive motor and the wheel locks are positioned on the inside of the chassis, on each side of the seat elevator/seat post.*



*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. Remove the slewing bracket, it is fitted with screw and washer.

For removal of the drive motor, see page 28.

### Fitting

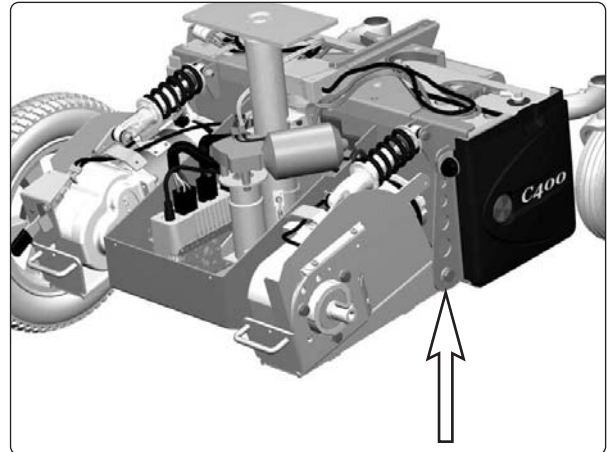
Fit the slewing brackets in the reverse order. Tighten the bolt holding the wheel fork in place with a torque wrench.

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

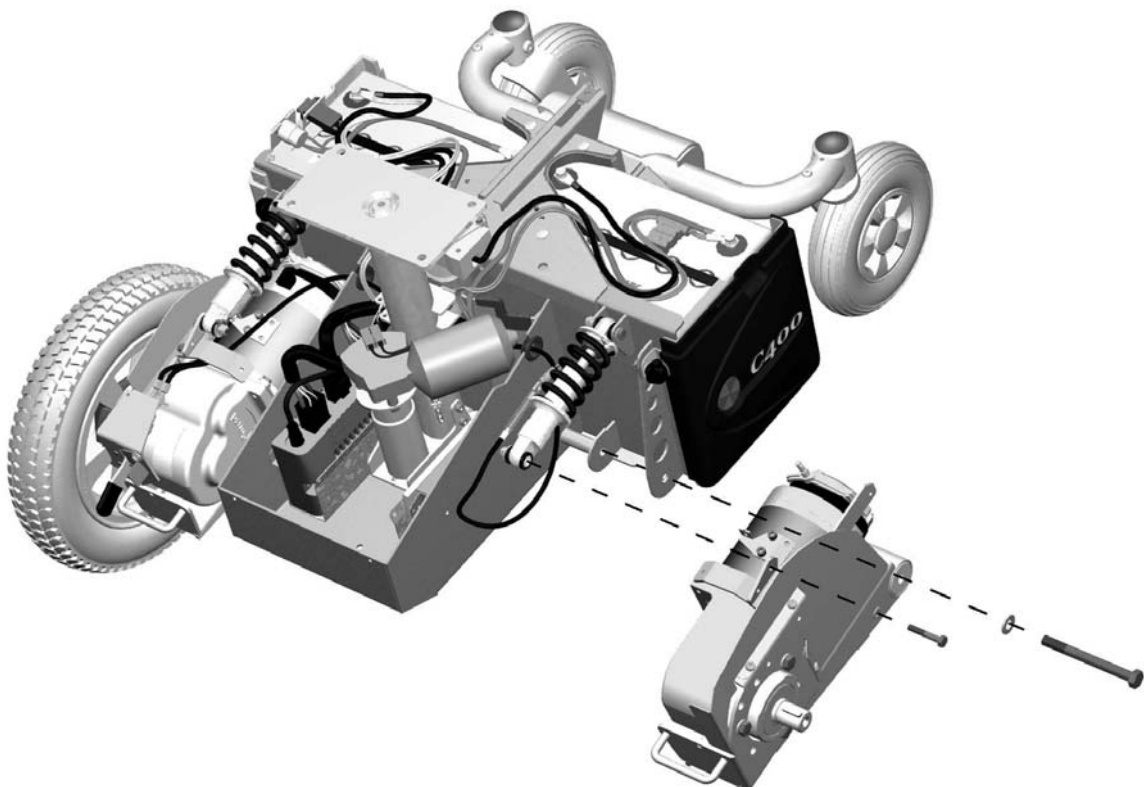


#### NOTE

Do not use a Pneumatic impact wrench.



*The slewing bracket is fitted with a screw and washer.*

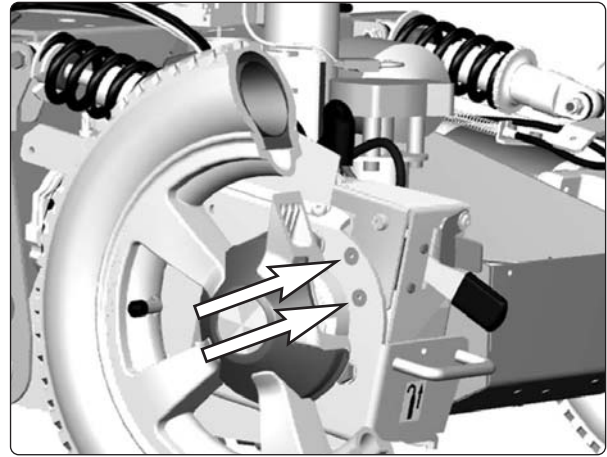


*Removal/fitting of slewing brackets.*

## Wheel lock release cable

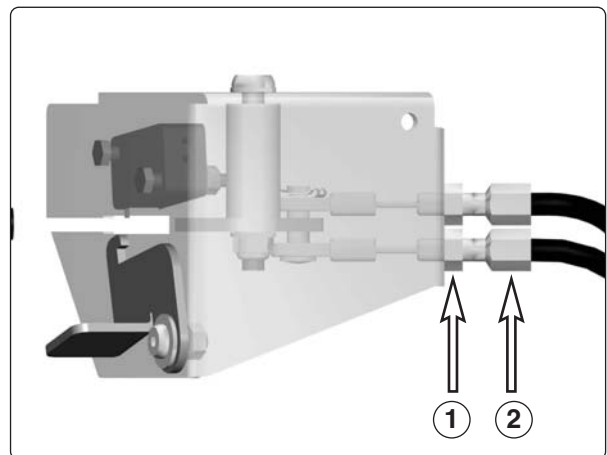
### Removal

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 8-9.
4. Remove the wheel lock release mechanism. It is attached with two screws; see fig.



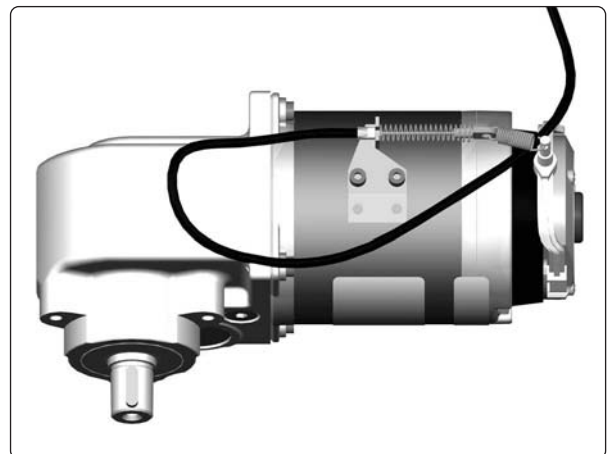
*The wheel lock release mechanism is attached with two screws.*

5. Remove the lock nut (1).
6. Screw in the adjusting screw (2) fully.



*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.

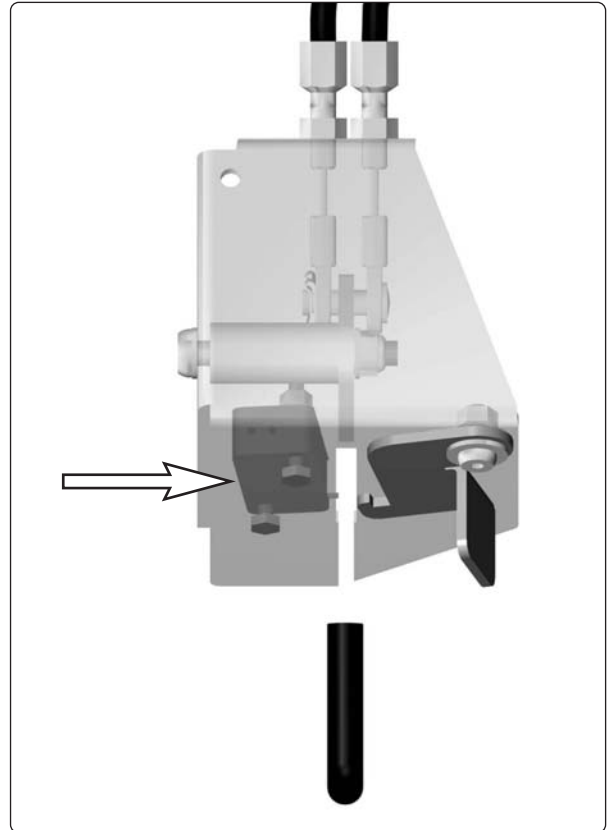


*Wheel lock release cable attachment at the magnetic wheel lock.*

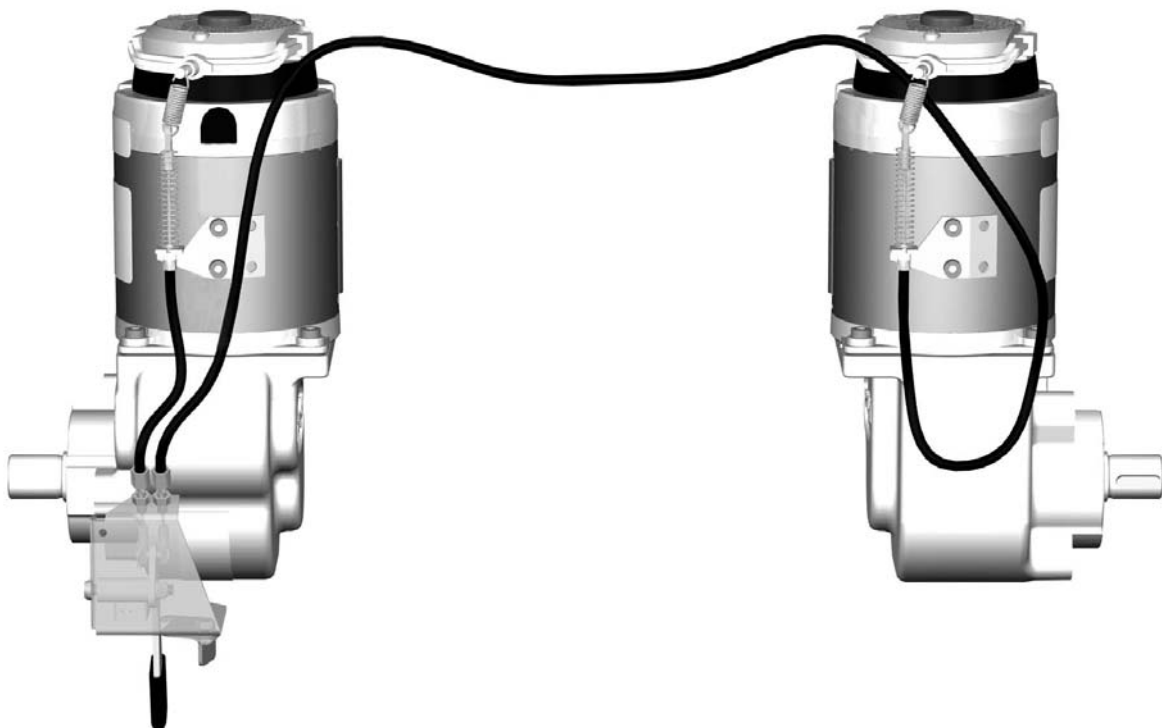
## Wheel lock release cable

### 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.*

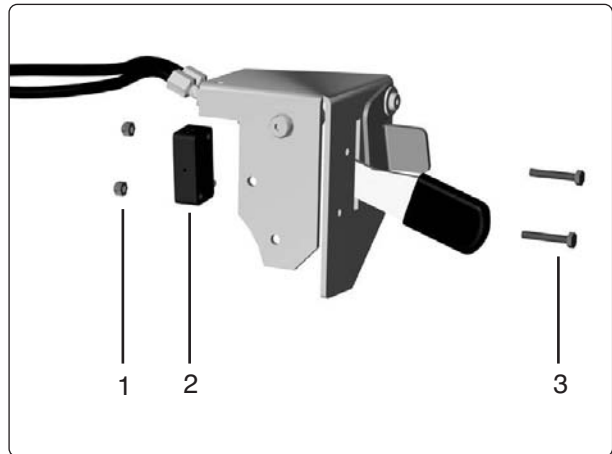
## Wheel lock release sensor

### Removal

1. Switch off the main power switch on the control panel.
2. On wheelchairs with Pilot+ control system, put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 41.
3. Remove the seat elevator cover, chassis cover and the right front fender, see page 8-9.
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.*

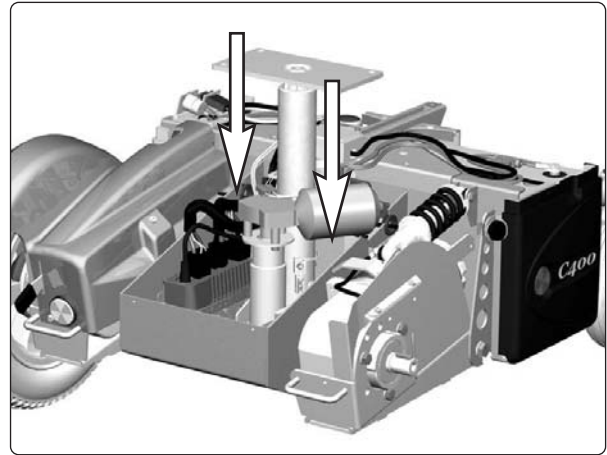
Pos.	Description
1	Locking nut, DIN 985 M3 6 Fe/Zn 5 C1
2	Wheel lock release sensor, VS10N001A/Highly
3	Screw, ISO 4017 M3x16 8.8 Fe/Zn 5 C1



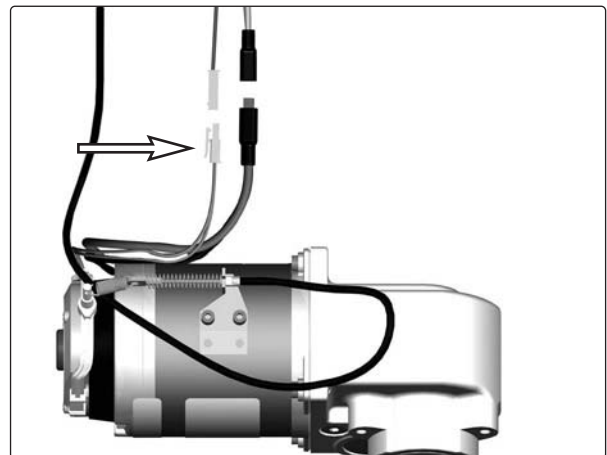
## Magnetic wheel lock

### Removal

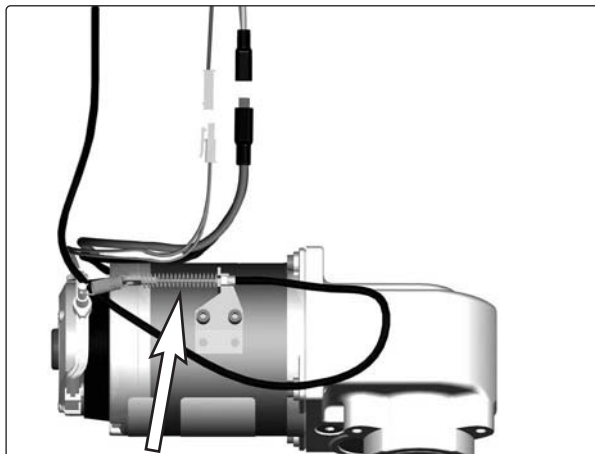
1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Switch off the main power switch on the control panel.
3. On wheelchairs with Pilot+ control system, put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 41.
4. Remove the seat elevator cover, chassis cover and the front fender on the side in question, see page 8-9.
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.
10. Remove the three screws that secure the wheel lock; see fig. 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.



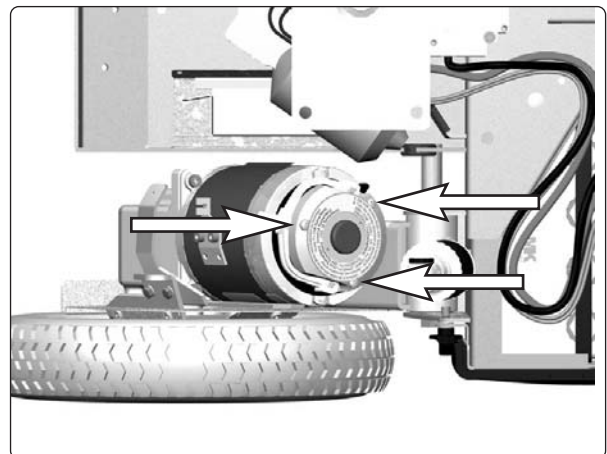
*The electrical connections of the magnetic wheel locks are positioned on the inside of the chassis, on each side of the seat elevator/seat post.*



*Electrical connection of the magnetic wheel locks.*



*Remove the wheel lock release cable.*



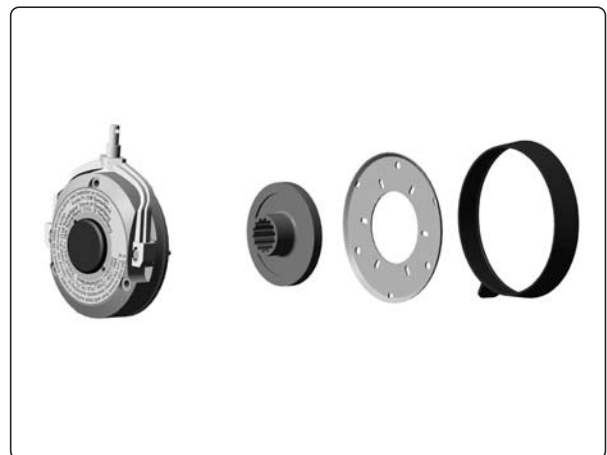
*Remove the magnetic wheel lock.*

### 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.

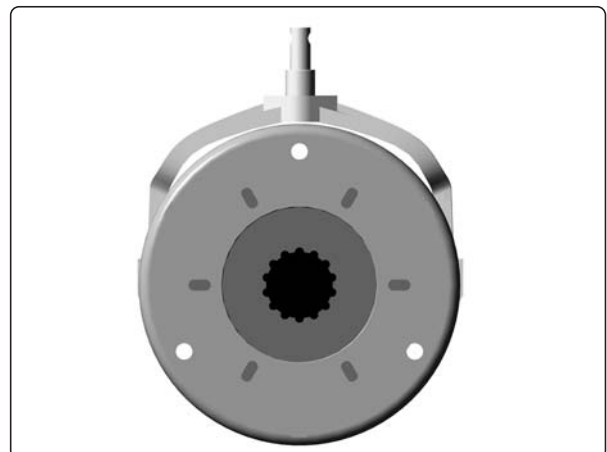


*Wheel lock adjustment is made using the two adjusting screws.*



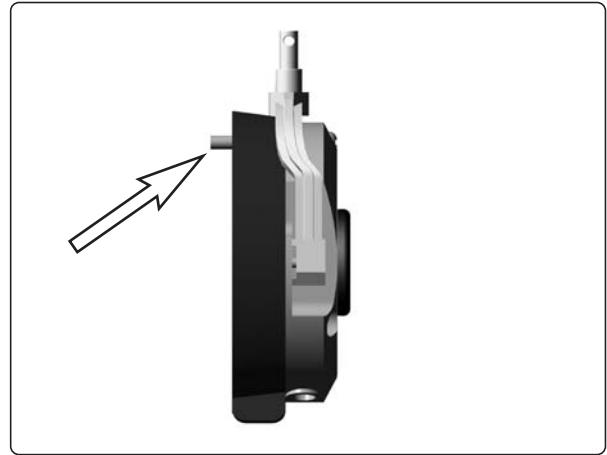
*Magnetic wheel lock, wheel lock disk, cover and rubber seal disassembled.*

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



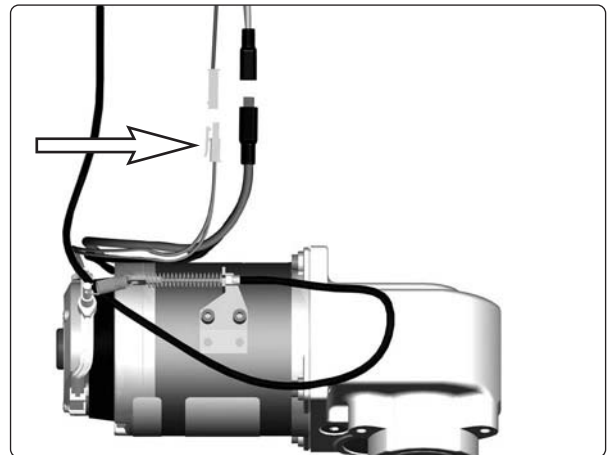
*Magnetic wheel lock, wheel lock disk and cover assembled.*

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.



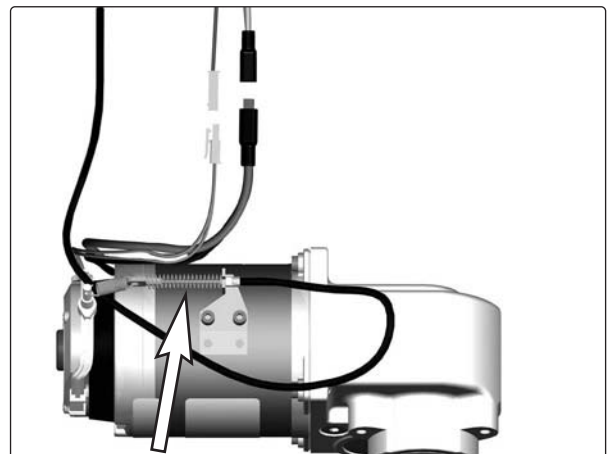
*Align the parts with one another using one of the attachment screws.  
Fit the rubber seal.*

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



*Magnetic wheel lock electrical connection*

7. Fit the wheel lock release cable; see fig.
8. Fit the covers; see page 8-9.

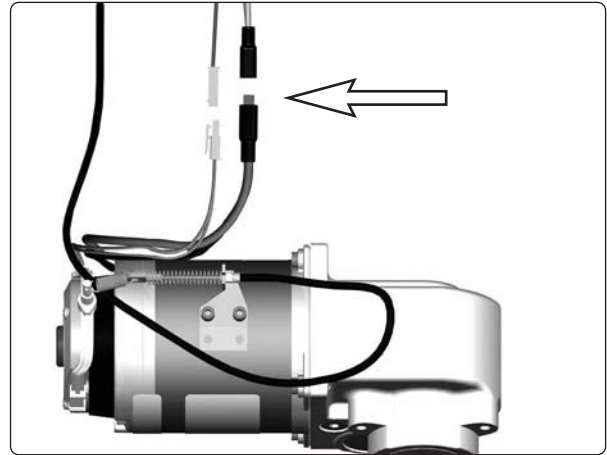


*Fit the wheel lock release cable.*

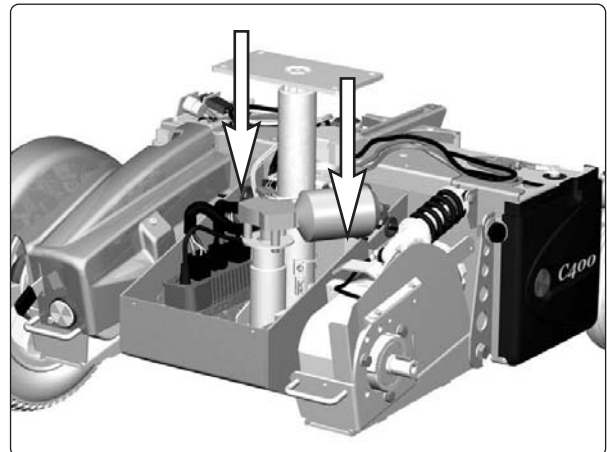
## Drive motor

### 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. On wheelchairs with Pilot+ control system, put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 41.
4. Remove the seat elevator cover, chassis cover and the front fender on the side in question, see page 8-9.
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 12.
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.

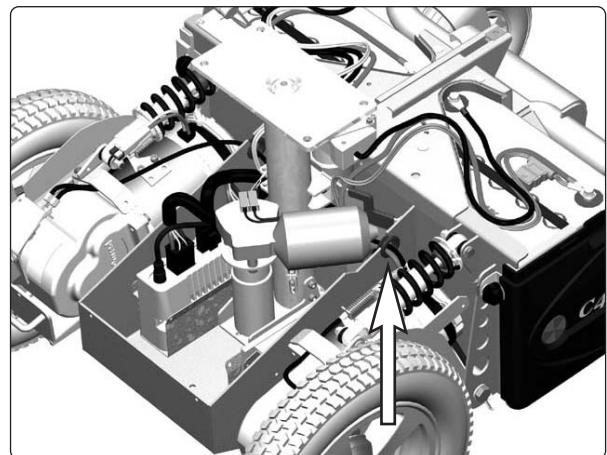


*The electrical connection for the drive motor and the magnetic wheel lock.*



*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.



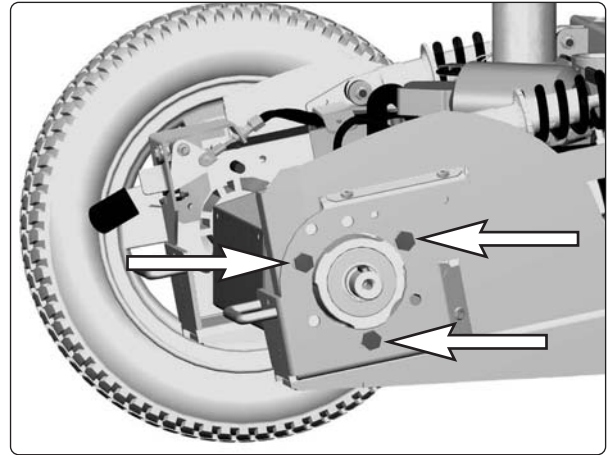
*Cable pass-through hole.*

## Drive motor

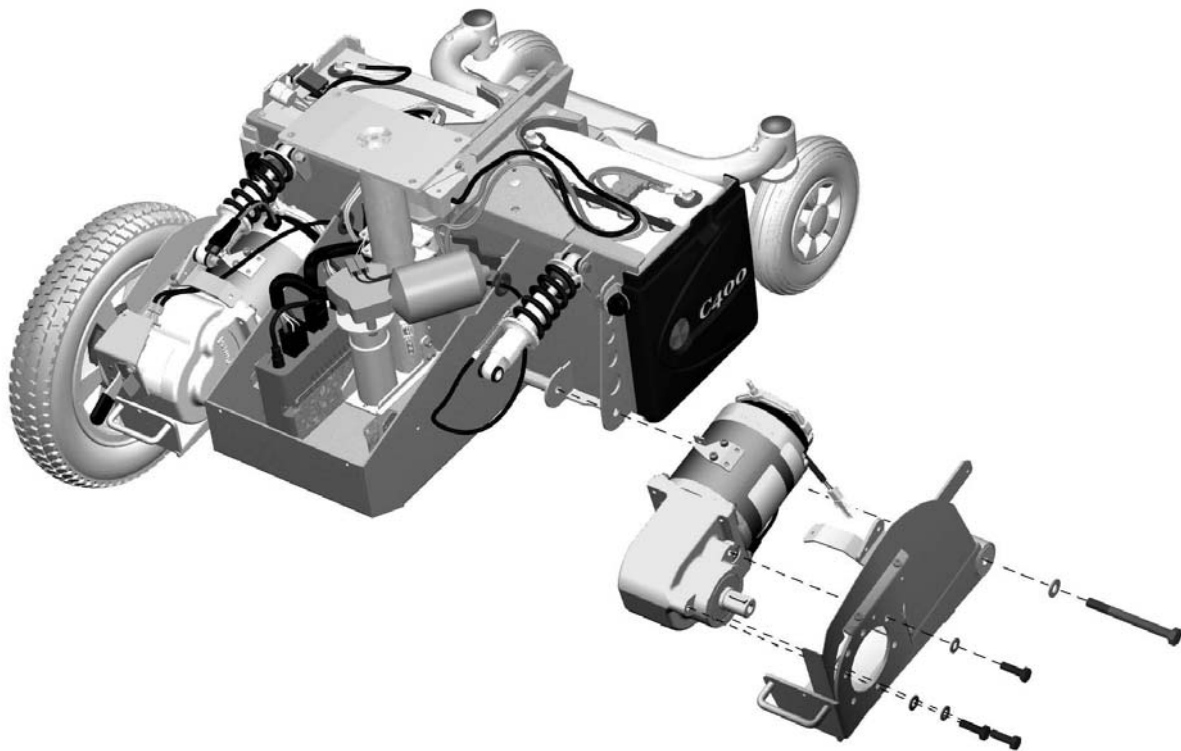
9. Remove the drive motor. It is attached with three screws; see fig.

### Fitting

Fit the drive motor in the reverse order.



*Drive motor mounting screws.*



*Drive motor with gear.*

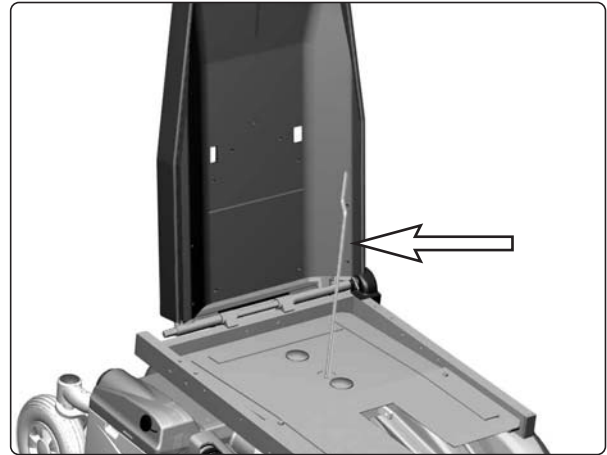
## Seat elevator

### 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. On wheelchairs with Pilot+ control system, put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 41.
4. Remove the seat elevator cover and the chassis cover, see page 8.
5. Remove the seat.



#### 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 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. VSI

Divide the seat elevator cabling at the contact on the cables. Remove the cabling for the half-speed sensor.

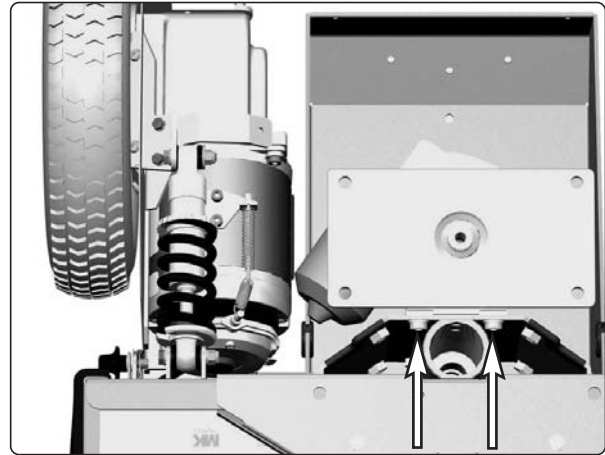
#### Pilot+

Disconnect the seat elevator cabling from the SLS drive stage. For more information on the SLS drive stage, see page 39.

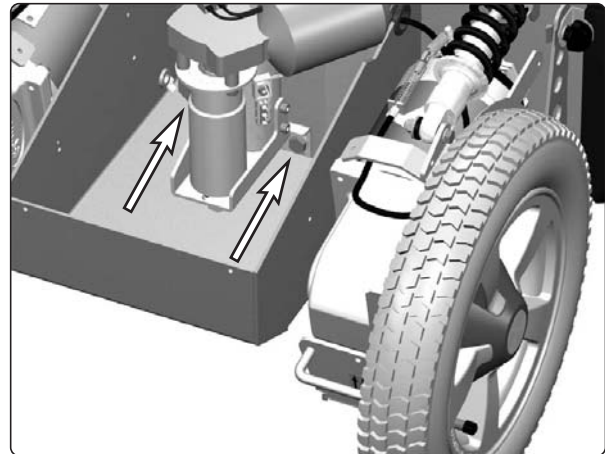
8. Lift the seat elevator straight up out of the chassis.

### Fitting

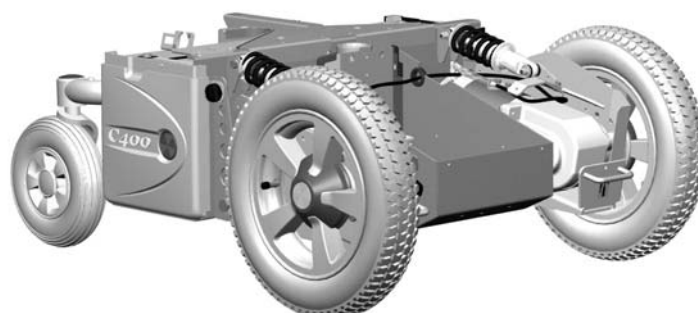
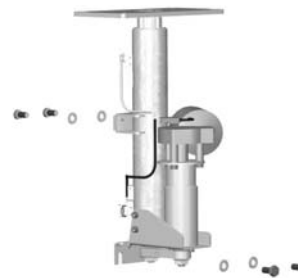
Fit the seat elevator in the reverse order.



*Seat elevator's upper attachment screws.*



*Seat elevator's lower attachment screws.*



*The Seat elevator is attached with four screws.*

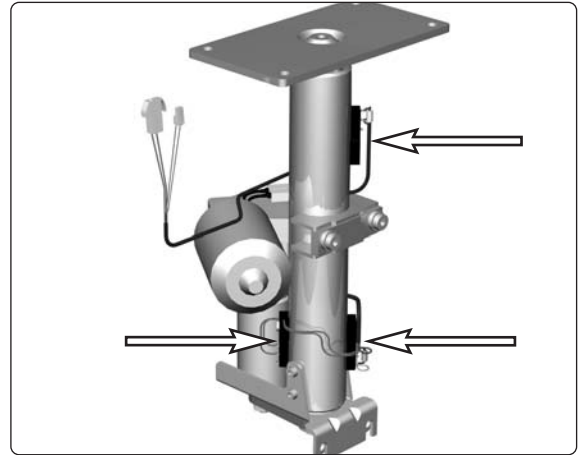
## Seat elevator cable

### 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.*

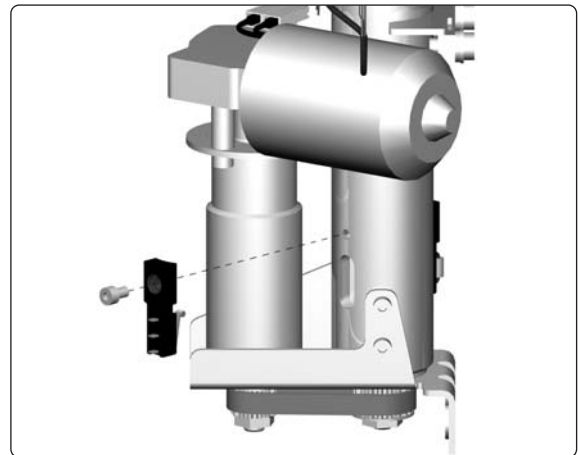
## Seat elevator motor

### Removing

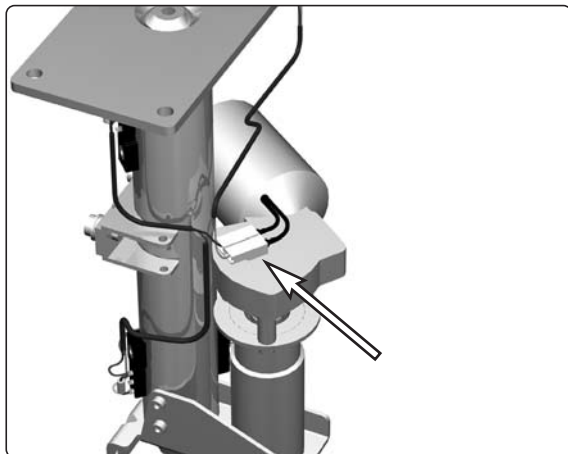
1. Disconnect the seat elevator cable at the motor, note the position of the connectors, see fig.
2. Remove the seat elevator motor by taking out the three bolts that hold it, see fig.

### Fitting

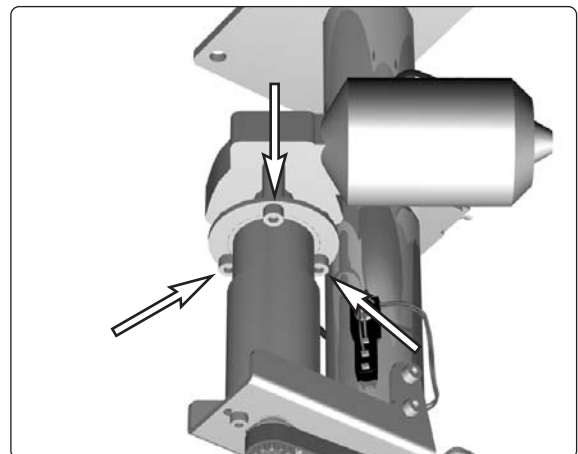
Fitting is performed in reverse order.



*Attachment of the sensors to the seat elevator.*



*Seat elevator motor connector.*



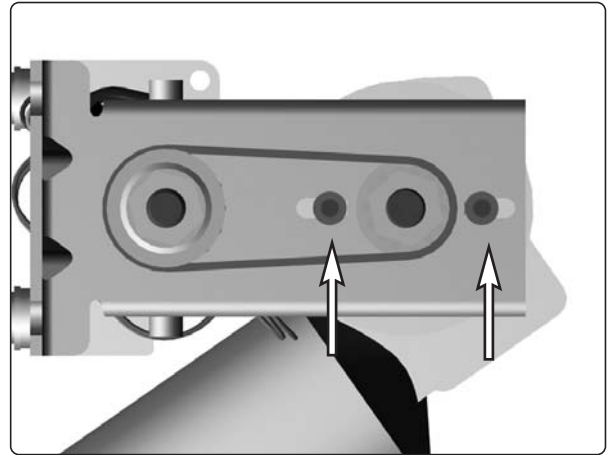
*The motor is attached by three bolts.*



## 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.*

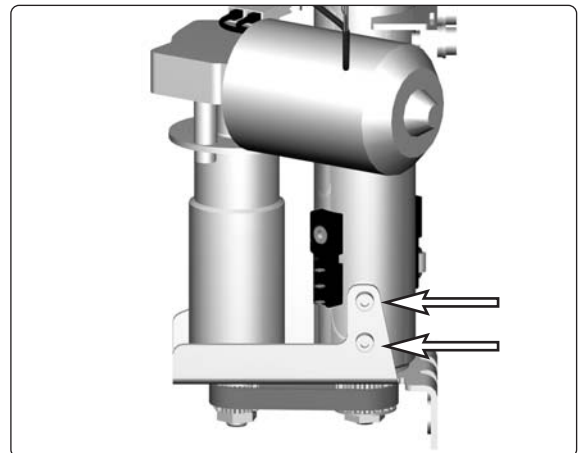
### Adjusting the belt tension

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.

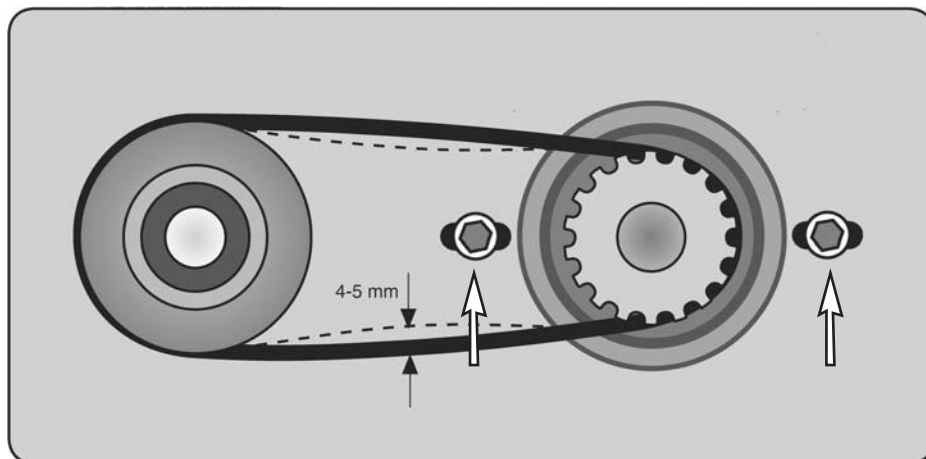


#### NOTE

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.*



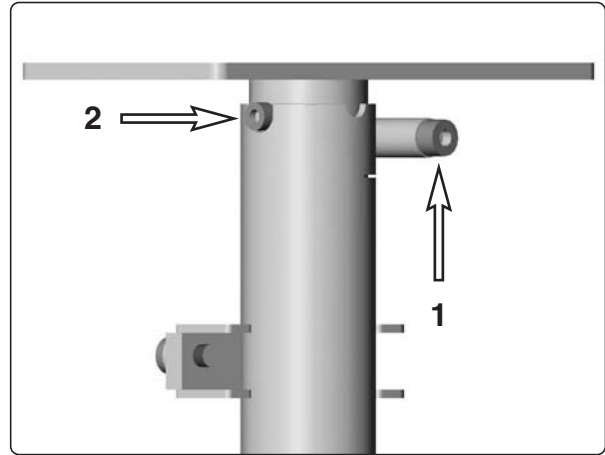
*The drive belt tension can be adjusted after the two bolts have been loosened.*

## 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 fig.



1. Locking screw .

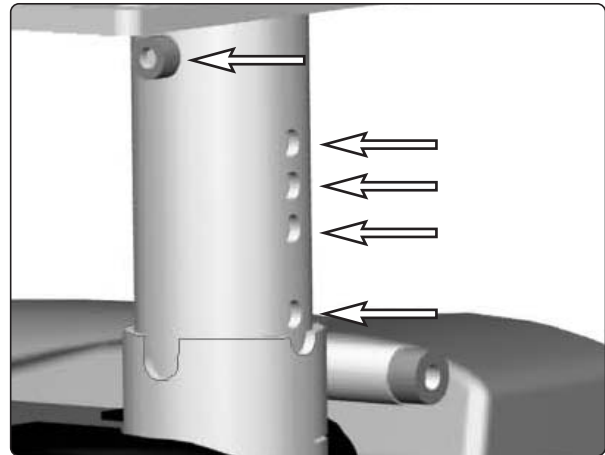
2. Height adjustment screw in its groove.



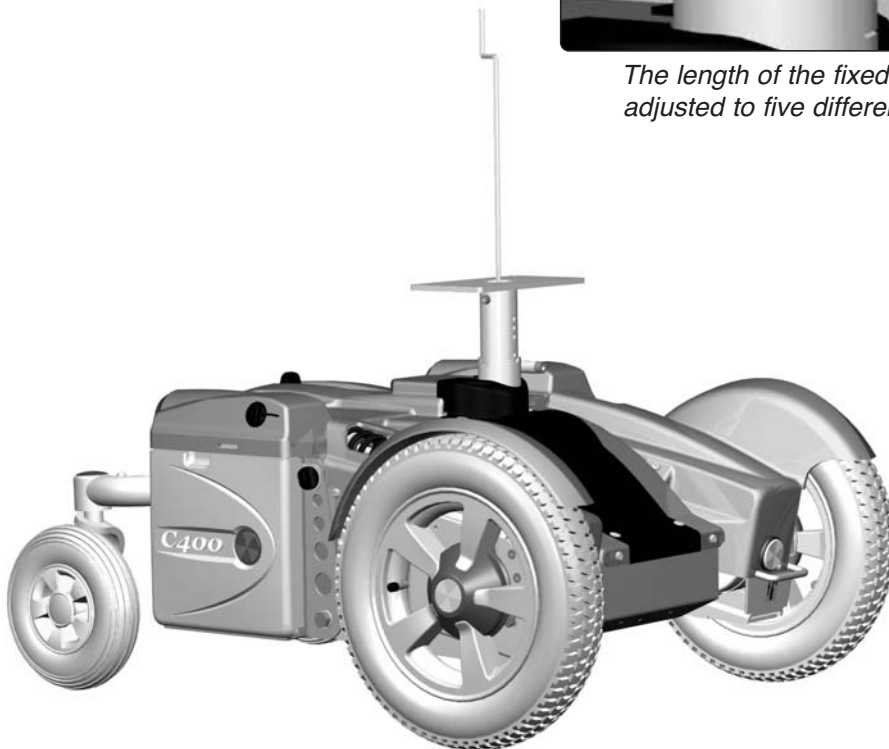
#### NOTE

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. On wheelchairs with Pilot+ control system, put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 41.
3. Raise the seat to its highest position, see page 34.
4. Remove the seat elevator cover and the chassis cover, see page 8.
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 39.
6. Remove the seat and if equipped, the seat tilt.



#### NOTE

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

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

The upper attachment screws are accessible from 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. VSI

If the chair is equipped with seat tilt, divide the seat tilt cabling at the contact on the cables. Remove the cabling for the halfspeed sensor.

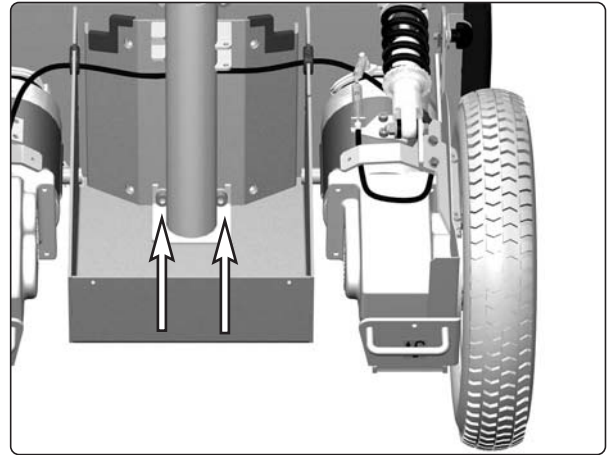
#### Pilot+

If the chair 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 39.

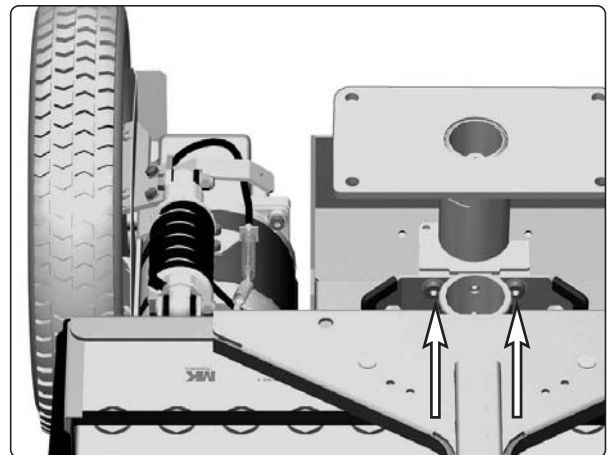
8. Lift the fixed seat post straight up out of the chassis.

### Fitting

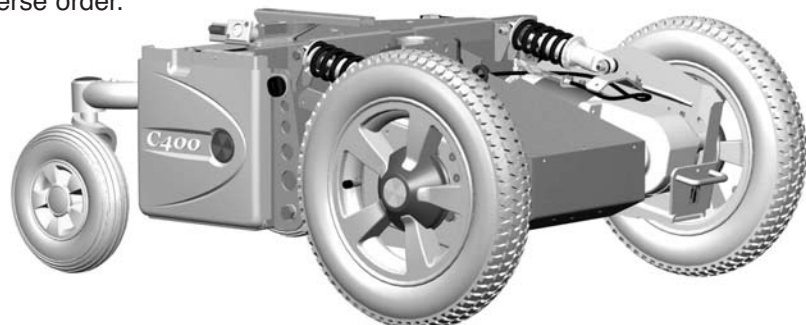
Fit the fixed seat post in the reverse order.



*The Seat Post's lower attachment screws.*



*The Seat Post's upper attachment screws.*



*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.



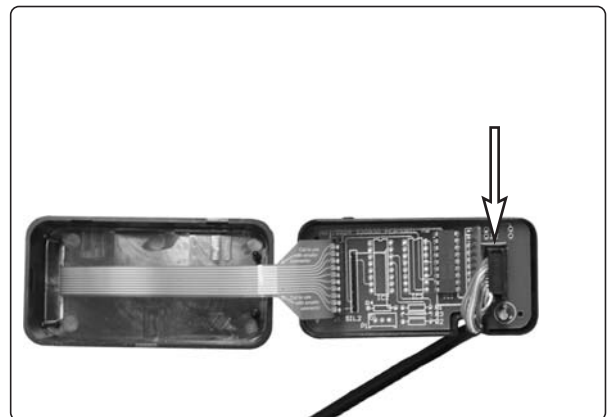
*The Control panel and Seat control panel fixings.*

### Fitting

Fit the seat control panel in the reverse order.



*Removing the Seat control panel lid.*



*The Seat control panel electrical connector.*

## Control panel VSI

The VSI control panel is a unit that, in addition to a joystick and control buttons, also contains all other electronics required, including a controller. The control panel and complete cabling are replaced as one unit.

### 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 chassis cover. See page 8.
4. Cut off the cable ties that hold the control panel cabling. Note the positions of the cable ties for subsequent fitting.
5. Disconnect the contacts for the drive motors, magnetic wheel locks, any actuators and the batteries.
6. Remove the control panel by unscrewing and removing the two screws on the lower side of the control panel.

### Fitting

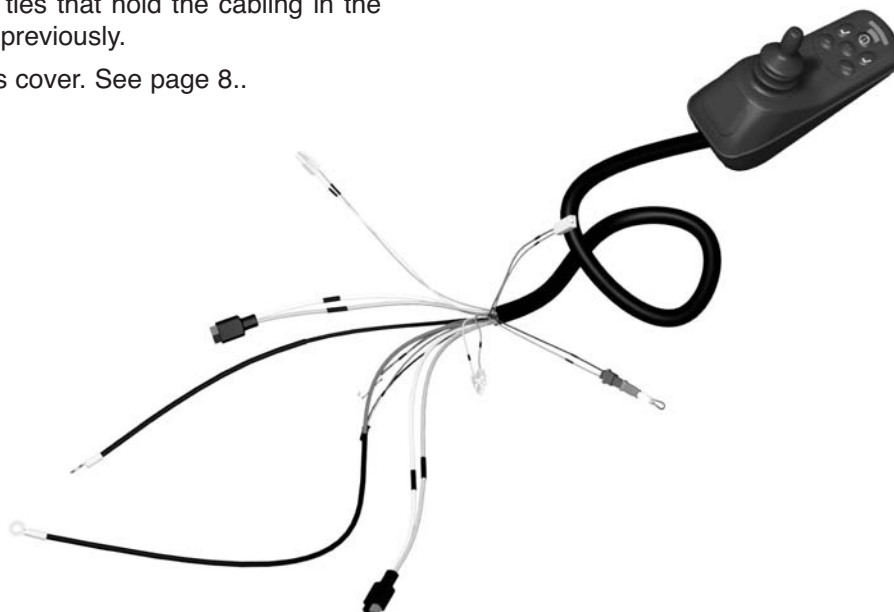
1. Fit the control panel using two screws on the lower side of the control panel.
2. Connect the contacts for the drive motors, magnetic wheel locks, any actuators and the batteries.
3. Fit the cable ties that hold the cabling in the same way as previously.
4. Fit the chassis cover. See page 8..



*Control panel VSI*



*The Control panel fixings.*



*Control unit VSI*

## Pilot+ controller (Pilot+ only)

### 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 41.
4. Remove the seat elevator cover and the chassis cover, see page 8.
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

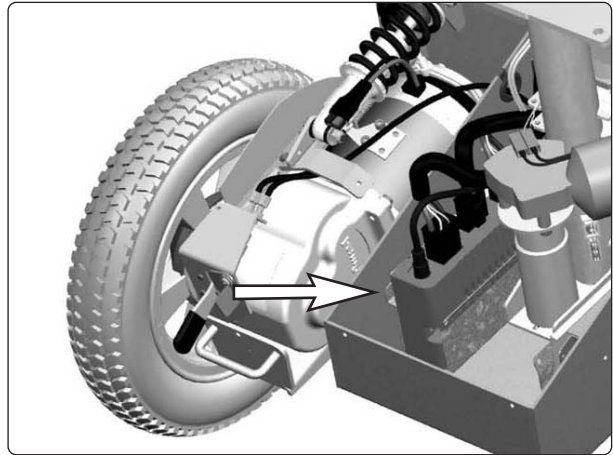


#### NOTE

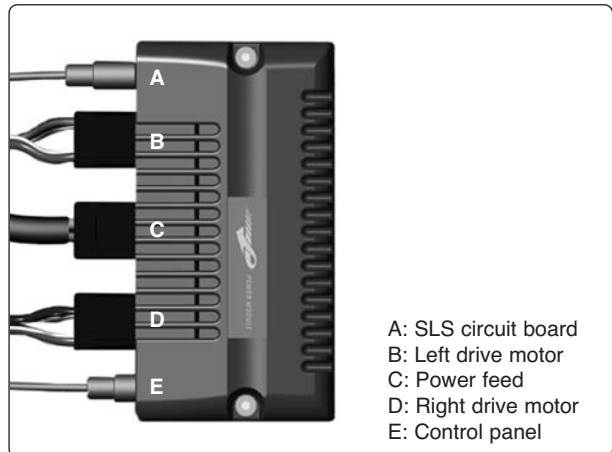
The Pilot+ controller connectors A and E have the same function. Cabling from SLS circuit board and control panel can therefore be switched if desired.

### Fitting

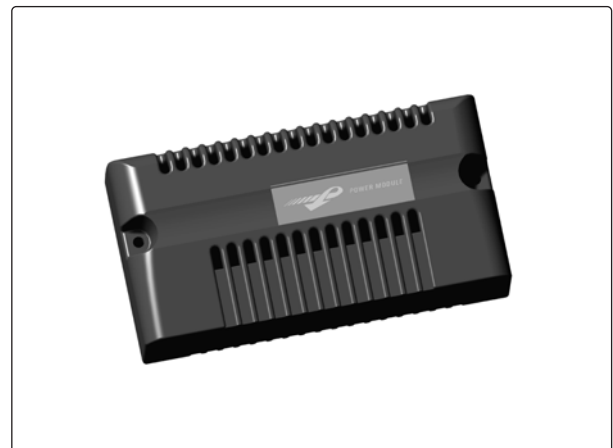
Fit the Pilot+ controller in the reverse order.



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



*Pilot+ controller cable connections.*

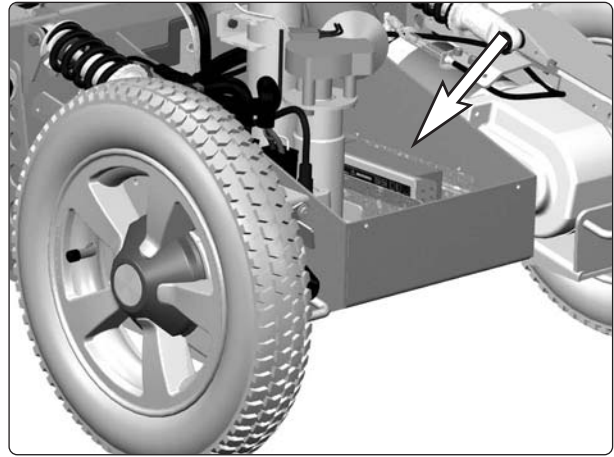


*Pilot+ controller*

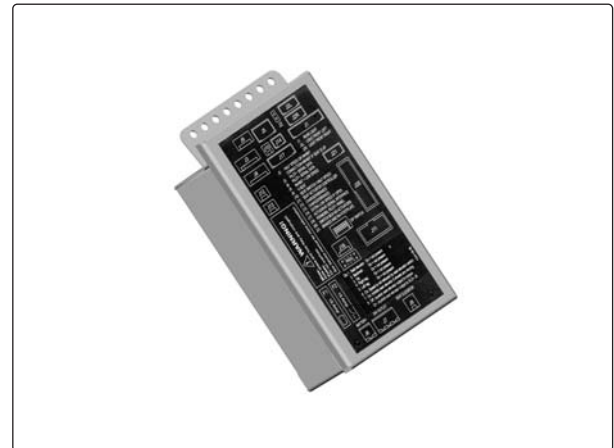
## SLS Drive Stage (Pilot+ only)

### 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 41.
4. Remove the seat elevator cover and the chassis cover, see page 8.
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.



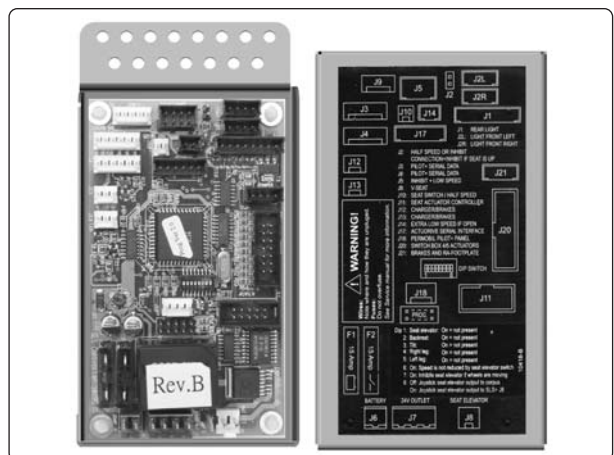
*The SLS-Drive Stage sits in its container without fastening screws.*



*SLS Drive Stage.*

### Fitting

Fit the SLS drive stage in the reverse order.



*SLS Drive Stage.*

## Circuit breaker and fuses

### Main Fuse (VSI)

The main fuse is located under the chassis cover behind the seat elevator/fixed seat post.



#### NOTE

If the main fuse blows, there is often a major electrical fault. The cause of the fault should be checked carefully before the fuse is replaced.

### Replacing the Main Fuse

1. Switch off the main power switch on the control panel.
2. Remove the seat elevator cover and the chassis cover, see page 8.
3. Unscrew and disassemble the fuse holder.
4. Replace the fuse.
5. Screw the fuse holder back together.
6. Place the fuse holder in the intended place behind the seat elevator/fixed seat post.
7. Refit the seat elevator cover and the chassis cover, see page 8.

### Replacing the Main Fuse Holder

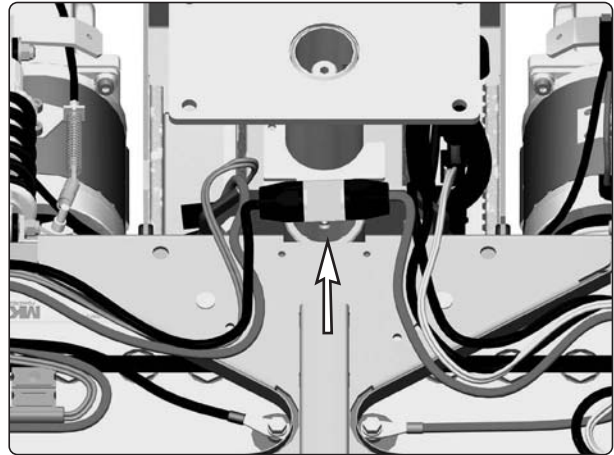
1. Switch off the main power switch on the control panel.
2. Remove the seat elevator cover and the chassis cover, see page 8.
3. Unscrew and disassemble the fuse holder.
4. Detach the cables from the fuse holder by unscrewing the screws. See fig.
5. Connect the cables to the new holder.
6. Fit the fuse and screw the holder together.



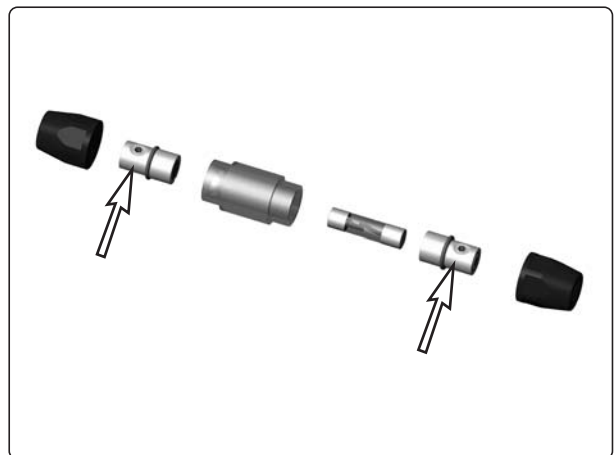
#### NOTE

Check that the cables are firmly attached.

7. Place the fuse holder in the intended place behind the seat elevator/fixed seat post.
8. Refit the seat elevator cover and the chassis cover, see page 8.



*The main fuse holder.*



*Main Fuse cable connection.*



## Circuit breaker and fuses

### Resetting the circuit breaker(Pilot+)

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(Pilot+)

1. Remove the seat elevator cover and the chassis cover, see page 8.
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

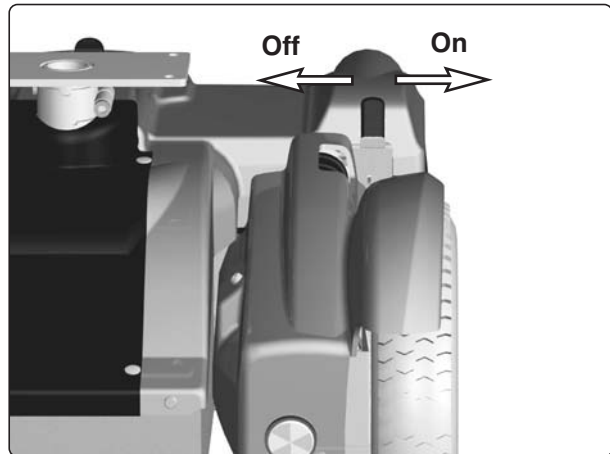
Check that the cables are firmly attached.

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

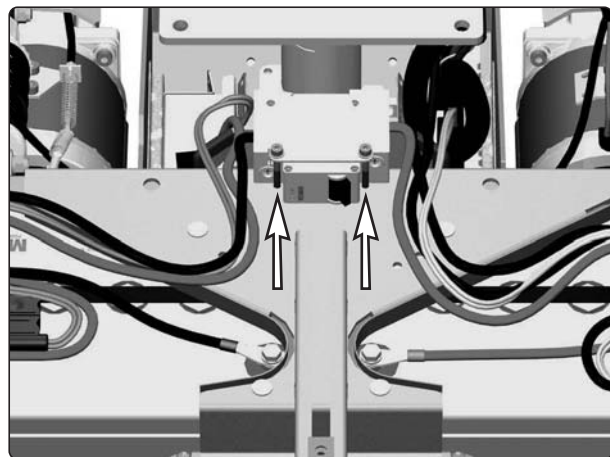
#### NOTE

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

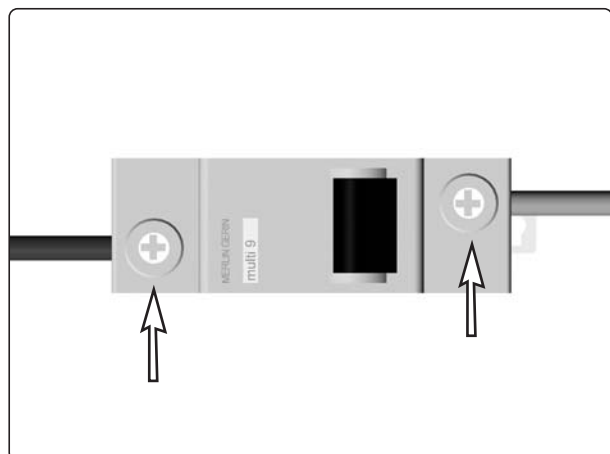
10. Reconnect the battery connection cables to the batteries.
11. Refit the seat elevator cover and the chassis cover, see page 8.
12. Put the circuit breaker in the "ON" position; see fig.



*Circuit breaker/Battery isolator.*



*Circuit breaker bracket.*



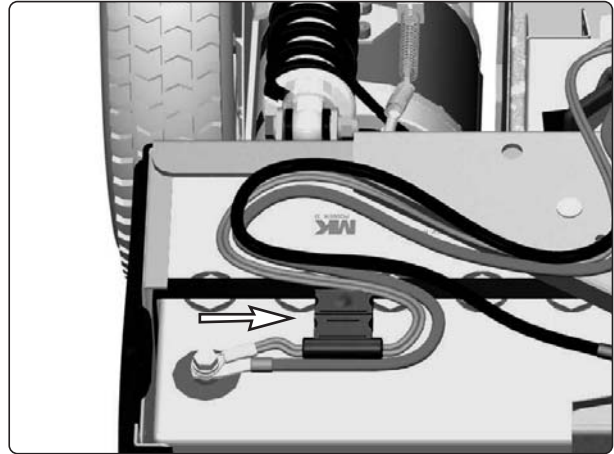
*Circuit breaker cable connection.*

## Circuit breaker and fuses

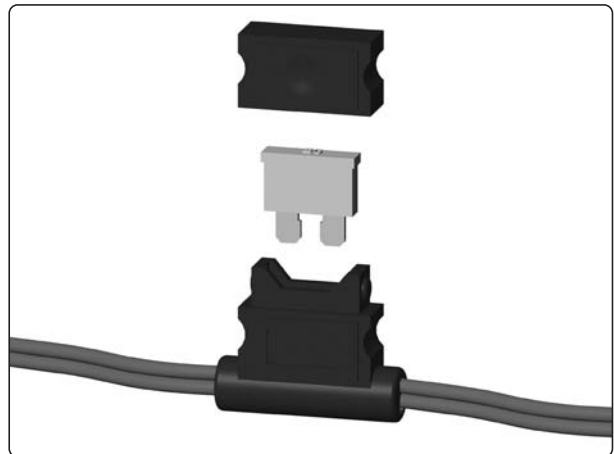
### Replacing the SLS Fuse (Pilot+ only)

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 41.
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 41.



*SLS-Fuse.*



*Replacing the SLS Fuse.*

### Replacing the Charging Fuse (Pilot+ only)

The charging fuse is located in its holder on the right side of 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 41.
3. Remove the seat elevator cover and the chassis cover, see page 8.
4. Replace the blown fuse.
5. Refit in the reverse order.



*Charging Fuse.*

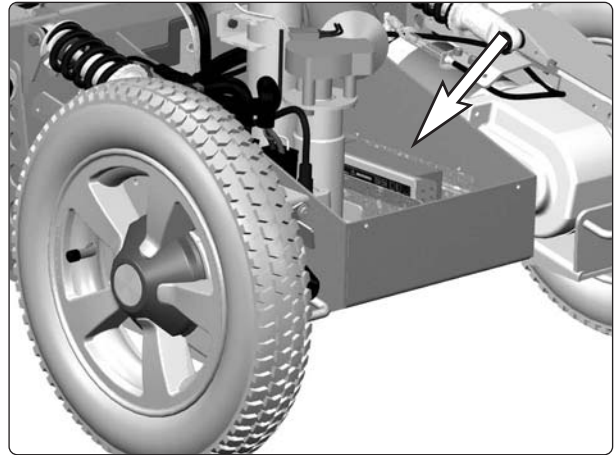
## Circuit breaker and fuses

### Replacing Fuses for the Seat/Lighting

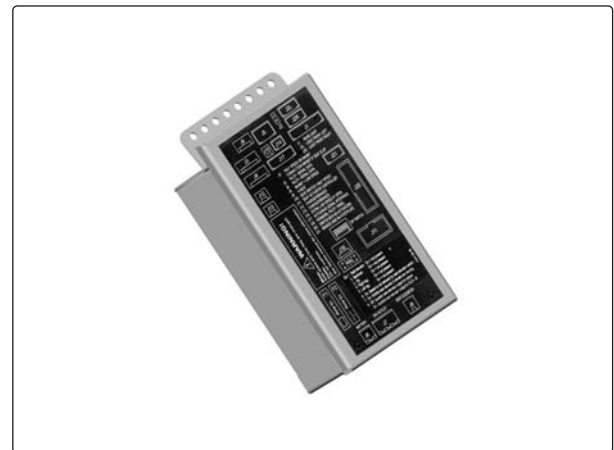
(Pilot+ only)

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.

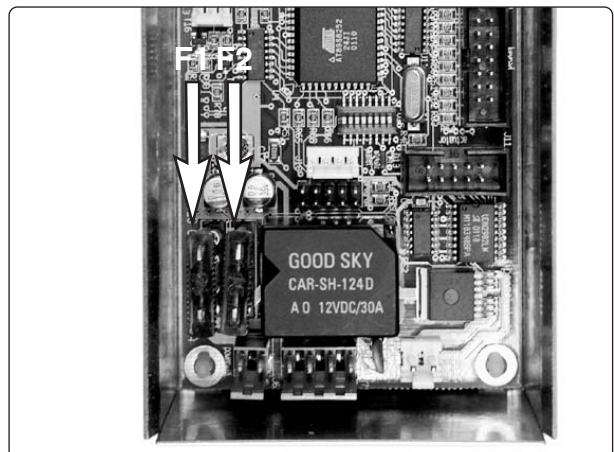
1. Raise the seat to the highest position. If the chassis is equipped with fixed seat post, see page 34. If the seat elevator does not work normally because the batteries are discharged or the actuator is defective, the seat can be raised/lowered manually, see page 30.
2. Switch off the main power switch 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 41.
4. Remove the seat elevator cover and the chassis cover, see page 8.
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 8.
11. Put the circuit breaker in the "ON" position. It is accessed through a hole in the chassis cover; see page 41.



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



*SLS-Drive Stage.*



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

## Lights (Accessories, Pilot+ only)

### 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 41.
3. Remove the seat elevator cover, chassis cover and the front fender on the side in question, see page 8-9.
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, Pilot+ only)

### Removing the rear lights

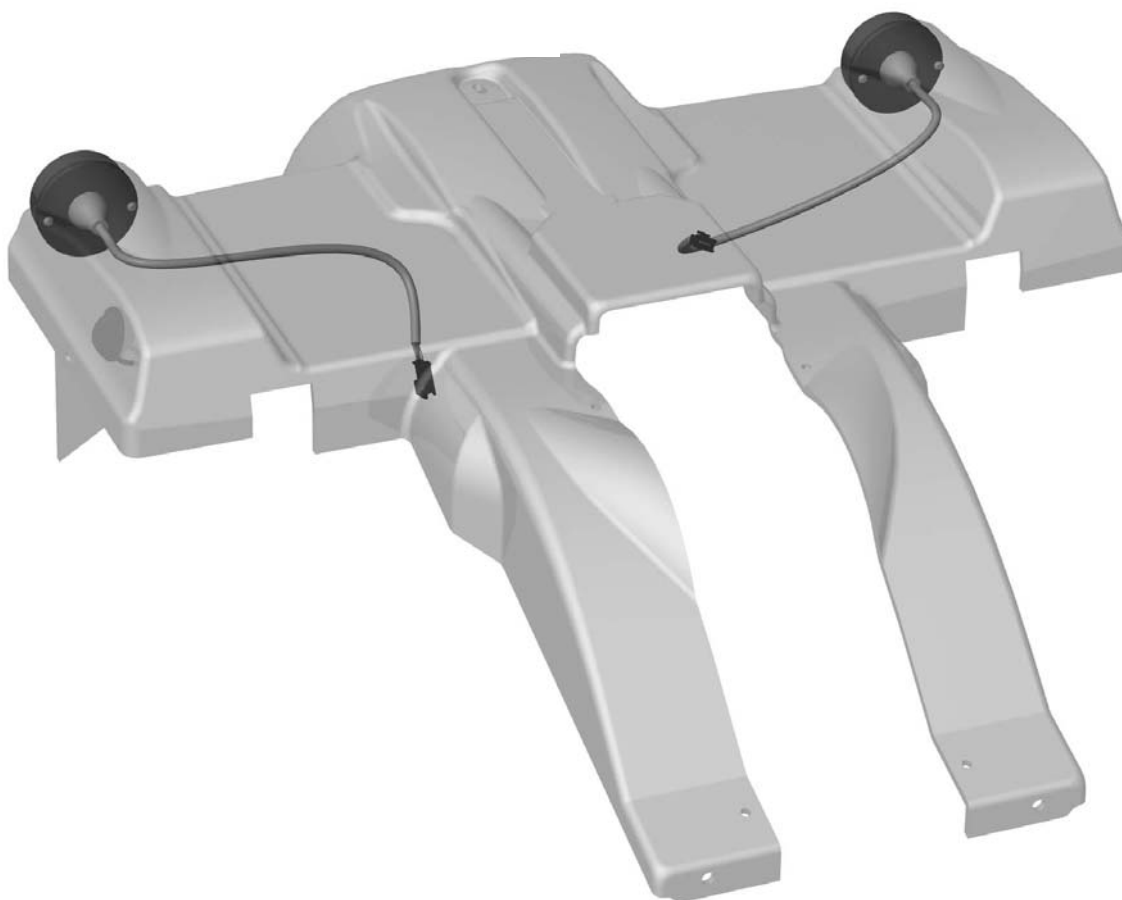
1. Switch off the main power switch on the control panel.
2. Put the circuit breaker in the "OFF" position. It is accessed through a hole in the chassis cover; see page 41.
3. Remove the seat elevator cover and the chassis cover, see page 8.
4. Disconnect the electrical connection of the rear light in 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
C400 Pilot+
C400 VSI Basic
C400 VSI Advanced

## 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.
	<b>Main fuse blown.</b>	<b>See page 40-41.</b>
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 48-49.
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 40-41.

## 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.

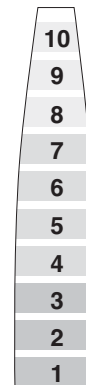
### Rapidly blinking, 1 - 10 lights

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.



*Pilot+ battery voltage indicator*



*VSI 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.
Charger connected	6 Orange	Remove the charge plug from the charge socket on the control panel.
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 left drive motor.
Low battery voltage	1 Red	Check the condition of the battery. Check the connection between the battery and the control unit.

**Example:**

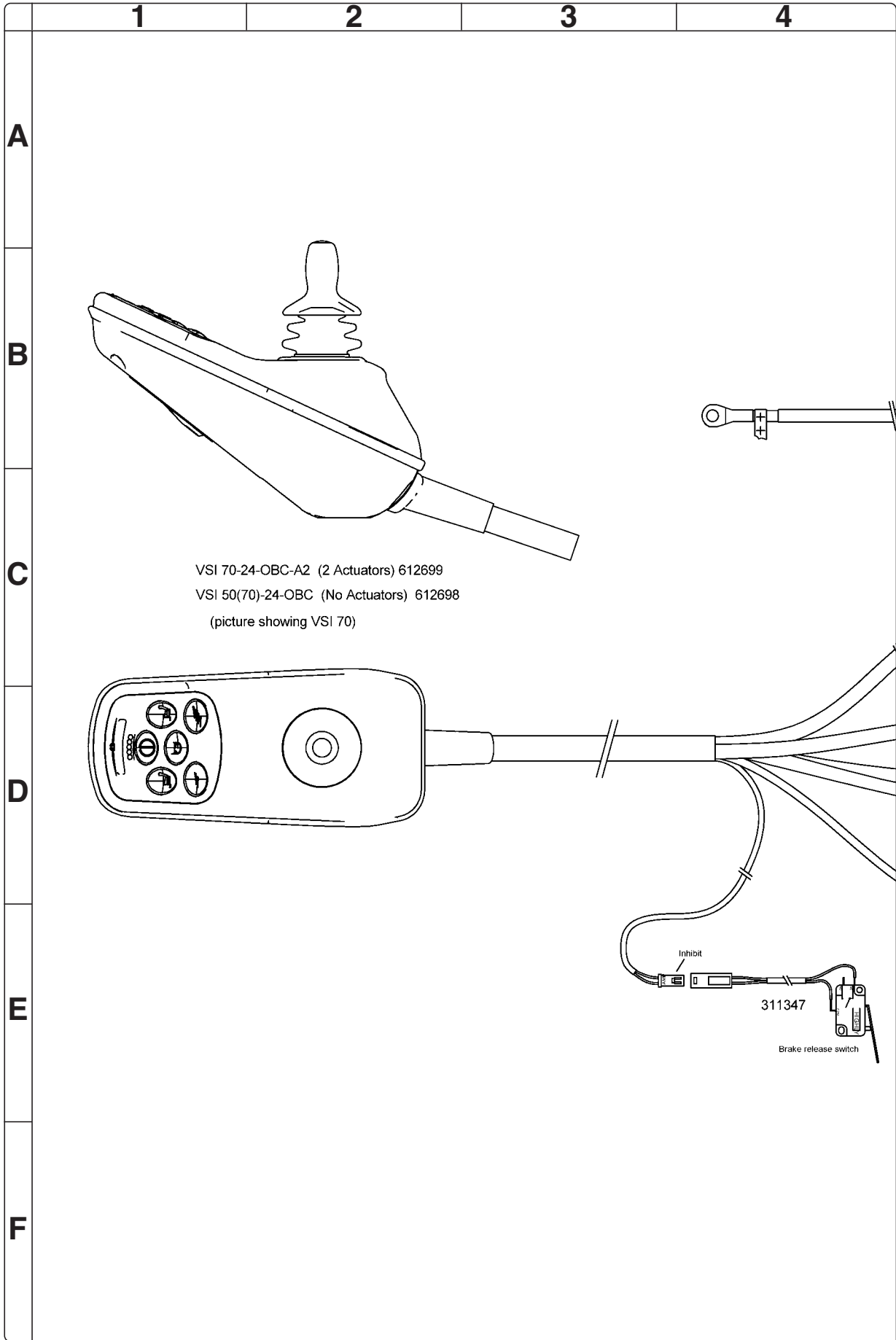
Lights 1-7, 3 red and 4 orange, blinking rapidly upon start-up and the wheelchair can not be driven.

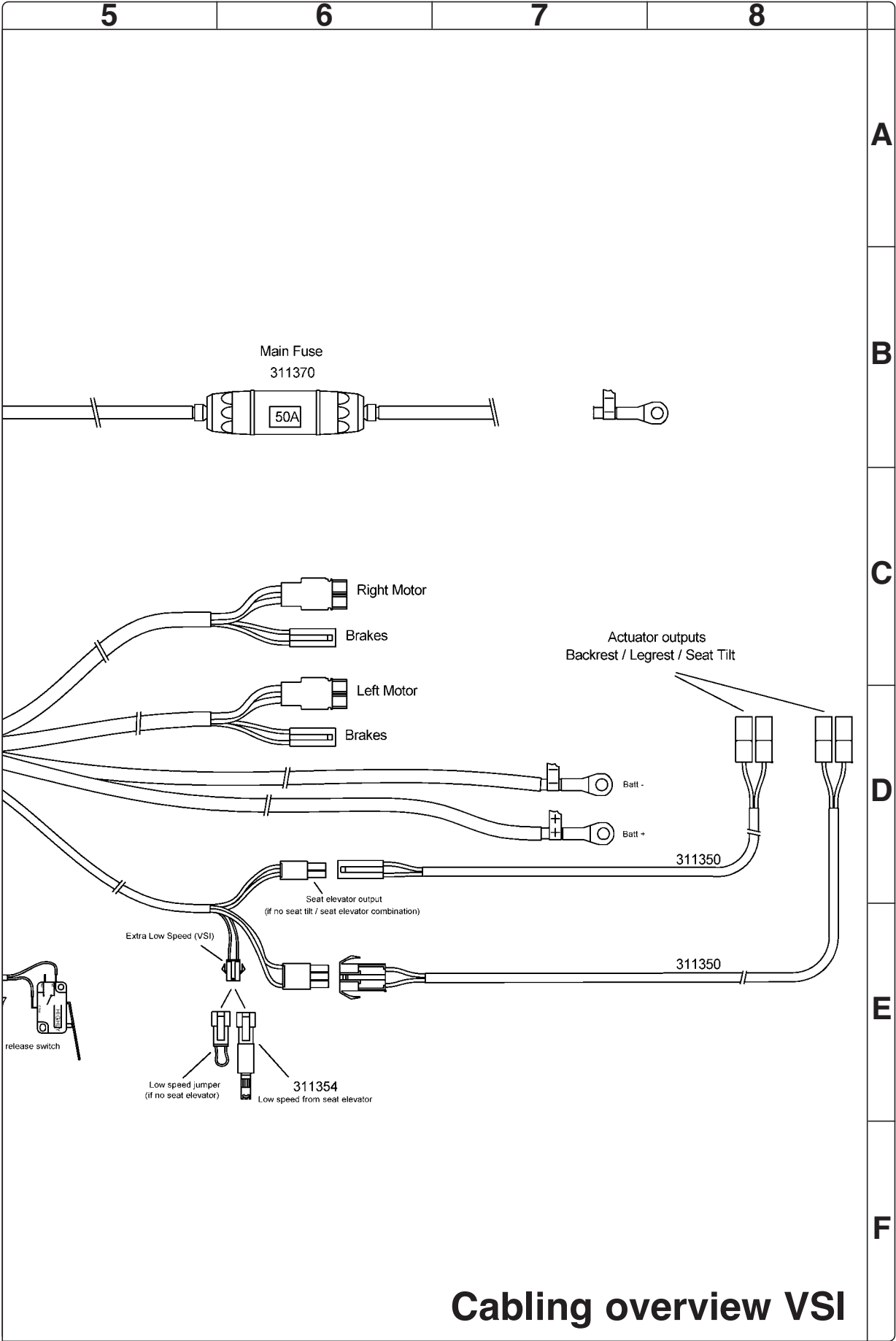
**Cause:**

Fault in the control panel.

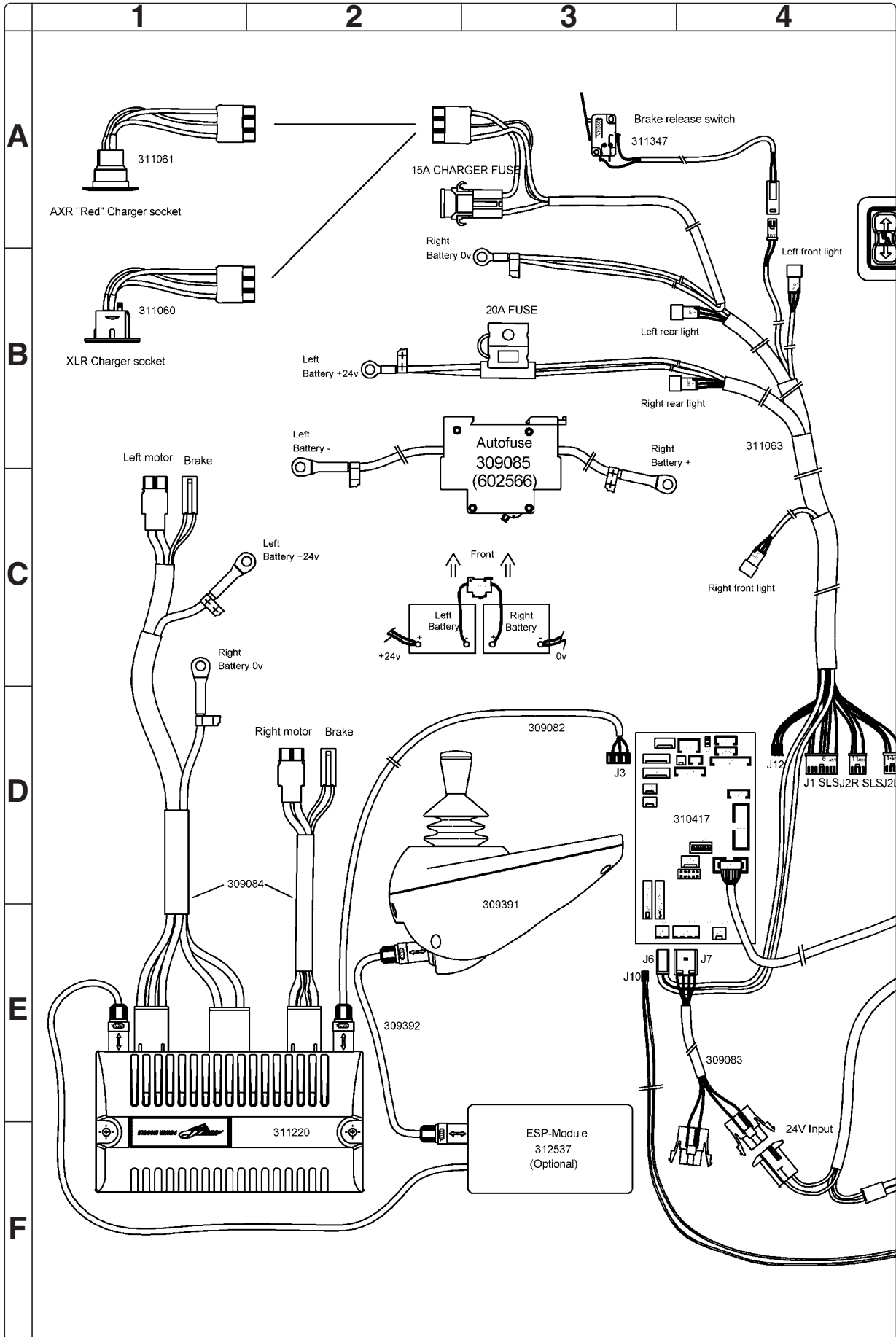
**Solution:**

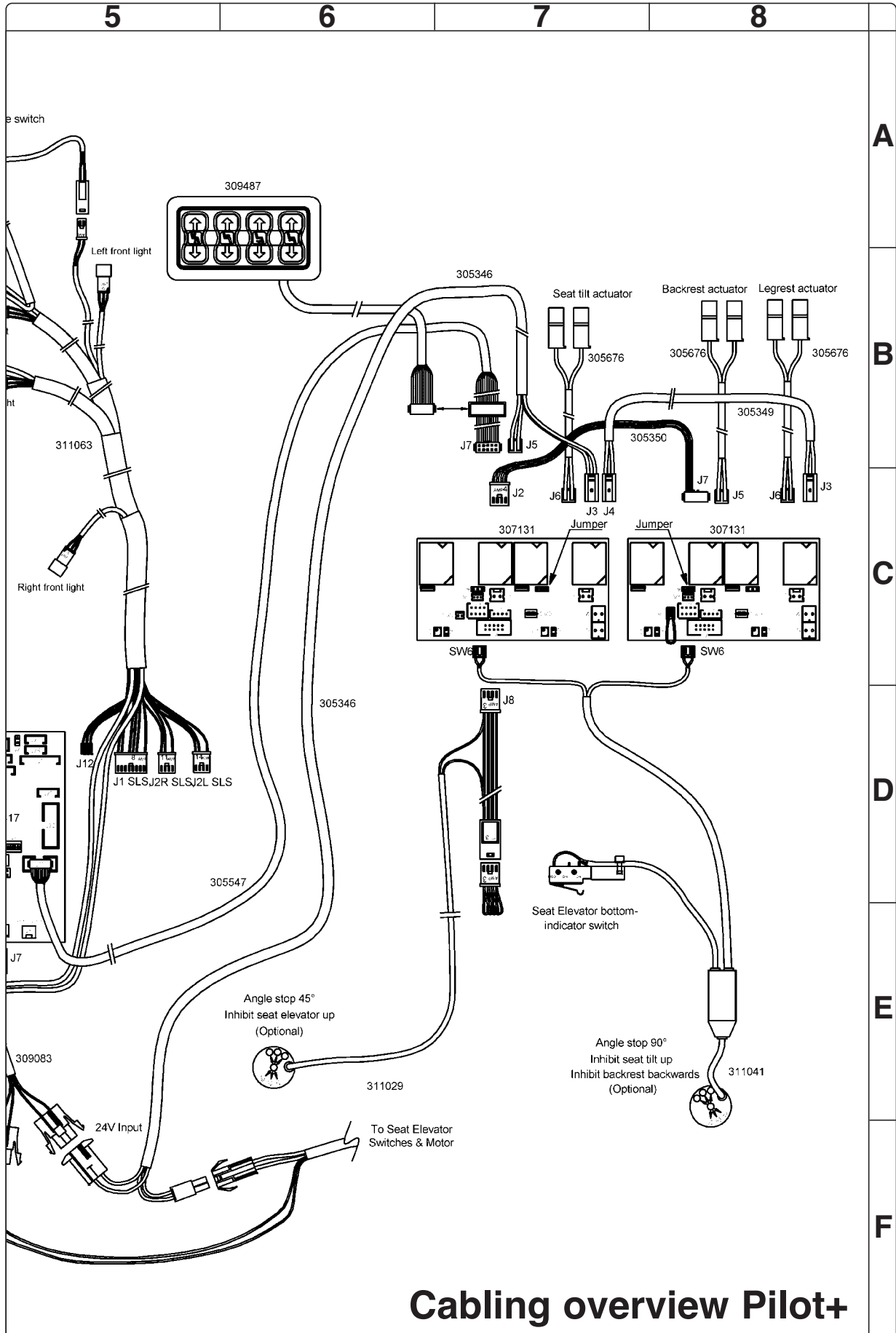
Make sure the joystick isn't actuated at switch-on, change the control panel.





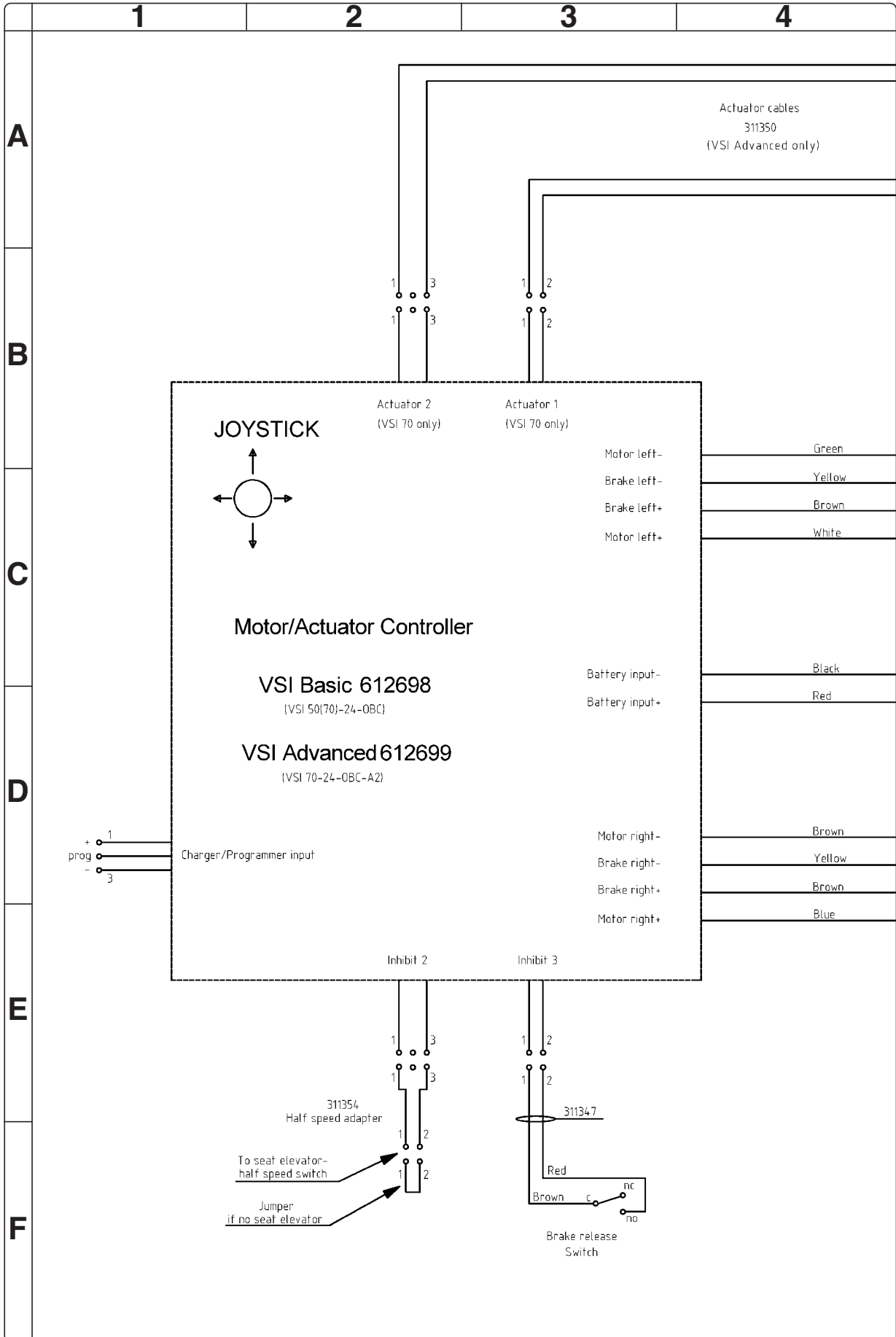
# Cabling overview

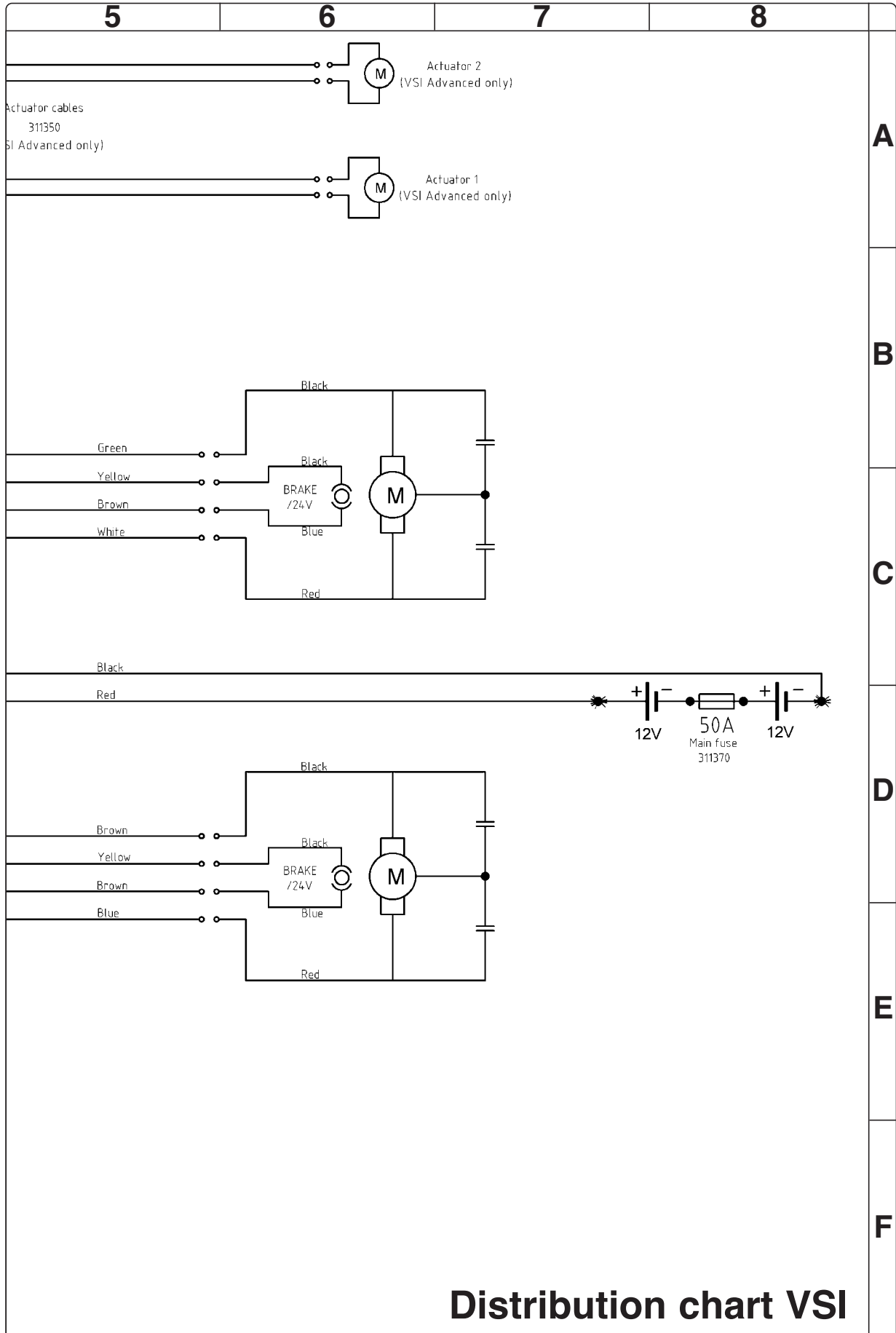




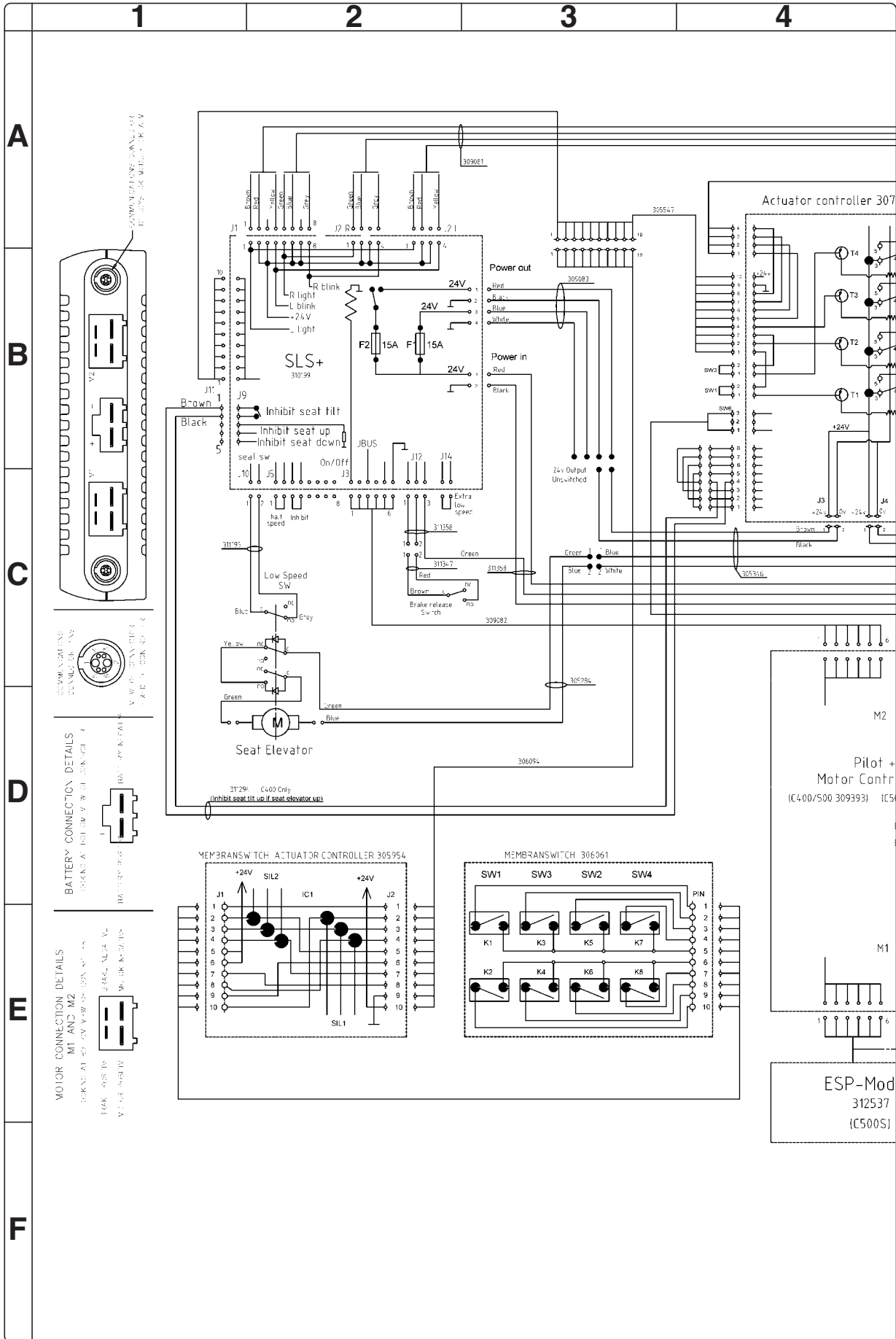
**Cabling overview Pilot+**

Distribution chart

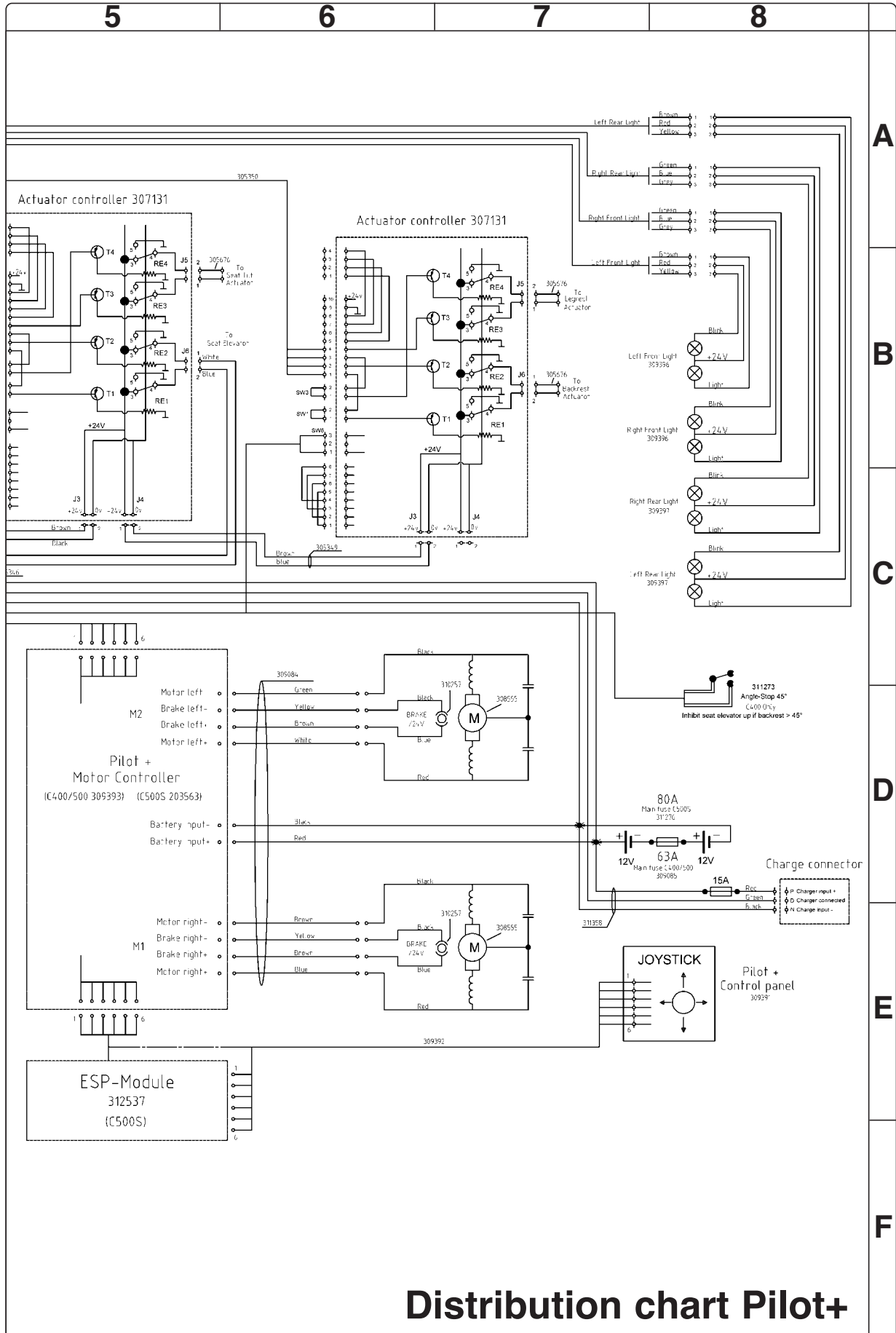




Distribution chart







Distribution chart Pilot+







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