

Maintenance

All the normal practices employed in looking after an electric wheelchair apply to the Smart Wheelchair.

General

1. The tyre pressure should be checked regularly. The recommended pressure is 35 p.s.i. If tyres are not correctly inflated, the performance and stability of the chair may be effected.
2. The battery charge should be checked before and after every session and if necessary, the batteries charged.
3. Any loose bolts or fasteners should be tightened.
4. The chair should be kept clean and free from grease and dirt.
5. Battery terminals must be kept clean, tight and coated with petroleum jelly (Vaseline).

Electronic components

1. The DX System and Smart Controller should be regularly checked for integrity. Loose, damaged or corroded connectors or terminals, or damaged cabling should be replaced.
2. All switchable functions on the DX System should be regularly tested to ensure they function correctly.
3. All system components should be kept free of dust, dirt and liquids. If necessary wipe with a cloth dampened with warm water or alcohol. Do not use solvents or abrasive cleaners.
4. Where any doubt exists, consult Smile Rehab.
5. There are no user-serviceable parts in any DX System or Smart Wheelchair component - do not attempt to open any case.
6. Warning : If any DX or Smart Wheelchair component is damaged in any way, or if internal damage may have occurred (for example by being dropped), have it checked by qualified personnel before operating the chair.

Safety warnings

You must read and understand all the warnings throughout this handbook and heed them - if in doubt ask Smile Rehab for advice.

Supervision

Most Smart Wheelchair users will not be able to fully control the chair independently and safely - if they could, they would not need a Smart Wheelchair. Although the bumpers, line follower and other systems will assist the user, **they cannot prevent collisions happening**. Therefore, the Smart Wheelchair pilot should always be supervised by a competent assistant who can stop the chair in potentially unsafe situations.

The Wheelchair must not be operated

- near ponds, lakes or other water masses.
- near roads.
- on steep or slippery slopes.
- near fires or similar hazards (such as chemical or electrical laboratories, or where heavy machinery is in use).

The Smart Wheelchair is an indoor chair. It may be also be used outside but **only** on flat, even and firm surfaces such as concrete or paved paths and patios. **Do not** attempt to use the chair outdoors on rough, uneven or inclined surfaces or on grass.

In case of fire

First Preference is to move the child and chair

The procedure is

- switch off
- unlock the rear wheels
- push the chair out of danger.

Second preference is to remove the child

Unstrapping might take longer, but there are situations when the chair could not be pushed over obstacles.

General use

Treat the chair driver as you would a very young child, thinking of all the hazards that might confront him or her

1. Make sure the driver is always securely strapped into the chair when s/he is using it.
2. Always fit the driver's seat securely to the chassis, with the locking catches engaged.
3. Do not let the driver operate the chair in the close vicinity of stairs either inside or out.
4. Do not allow the child to drive alone in a room with a fire, or to drive too close to a fire. Be careful too of wall heaters - the driver may have decreased sensation and not know when he is burning.
5. Be especially careful of the driver in the kitchen. Again, think of all the hazards that you would be wary of with a young child.
6. Do not encourage the child to use people to bump into, as the child may have little appreciation of pain.
7. Be careful of flexes - their height could be a potential hazard to a child in a wheelchair - you can duck, but they can't! Also, because the child driver could pull electrical things on top of them.
8. Be very careful of tables - the bumpers will only stop the chair if they make contact with the table leg, and the table is heavy or fixed to the floor or wall. Lightweight items of furniture will be pushed across the room without activating the bumpers.
9. Switch off the power and engage the rear wheels before entering or leaving the chair.
10. Do not stand on the foot plates or bumpers when entering or leaving the chair.
11. Do not hand heavy objects on the back of the seat that could cause the chair to become unstable, particularly when negotiating inclines.

Emergency stop

- Stopping/ Shutting down fast - use the OFF switch.

Weight and lifting

1. Do not try to lift the chair unless absolutely necessary - it is very heavy. If you must lift it, get help from other people.
2. Lift it by the steel bumper or bumper supports, not by the rubber bumper tubing. Do not try to lift the chair by holding on to the Smart Controller, joystick, switches, or any other electronic component. Do not lift the chair by cables or wires.
3. Do not lift the wheelchair with the child in it.

Transporting the chair

1. The best way to transport the chair is in a van with wheelchair ramp or lift, and special clamps or straps. Check with the clamp manufacturer that the clamps are strong enough to hold electric wheelchairs.

2. We recommend that the user does **not** sit in the Smart Wheelchair to travel - use an approved seat and restraint belt. If you wish to transport the user in the Smart Wheelchair, check that the clamps can hold the chair; and that the seat and seatbelts are approved for road transportation.
3. The chair can also be transported by car. With an estate, we recommend use of wheelchair ramps. You may have to remove the seat from the wheelchair.
4. You can also fit the Smart Wheelchair into most hatchbacks, provided the seating is removed first. Take care when lifting it in - use wheelchair ramps or lift the chair with three or more people.
5. Make sure the wheels are engaged with the motor as this acts as a braking mechanism to stop it moving around as you are driving.

Electronics and controls

1. Disconnect the charger before entering the chair.
2. Turn the speed to low before using the chair.
3. The DX Power Module, joystick and Smart Controller must not be used in any way other than in the manner described in this manual.
4. All programmable options on the DX Power Module, joystick and Smart Controller must be correctly adjusted for safe operation prior to use.
5. A warning must be conveyed to the wheelchair operator that the controller could cause the chair to come to a sudden stop. In situations where this may affect the safety of the user, this will require the fitting and wearing of a seat belt.
6. Performance adjustments to the DX Power Module should only be made by professionals of the health care field or persons fully conversant with this process and the drivers capabilities. Incorrect settings could cause injury to the driver or bystanders, or damage to the wheelchair or surrounding property.
7. Do not operate the wheelchair if it behaves erratically, or shows abnormal heating, smoke or arcing. Turn the system off at once and consult Smile Rehab.
8. Do not operate the wheelchair if the battery is nearly flat as a dangerous situation may result due to loss of power in an inopportune place.
9. Ensure the controller is turned off when not in use.
10. No connector pins should be touched, as contamination or damage due to electrostatic discharge may result.
11. Most electronic equipment is influenced by Radio Frequency Interference (RFI). The Smart Wheelchair has been designed and tested to meet current standards for immunity from RFI but caution should be exercised with regard to the use of portable communications equipment. If RFI causes erratic behaviour, shut the wheelchair off immediately. Leave off while transmission is in progress.
12. If the AC power lead on the battery charger becomes damaged, the charger should not be used.
13. Report any malfunctions immediately to Smile Rehab.

Troubleshooting

The chair will not switch on...

- Check the DX cables are securely connected to the joystick, Smart Controller and Power Module.
- Check the Safety Cut-Out button on the right side of the chassis. If it has popped out, press it back in and try switching on again.
- Try charging the batteries first, then switching on.
- If all else fails, contact Smile Rehab.

The green light on the Smart Controller flashes when you switch on...

- If the light is flashing **once** a second, the Smart Wheelchair is in programming mode - turn programming mode off with the *Program* switch on the ToolBox.
- Flashing **twice** a second indicates that a bumper is stuck on, which may mean the bumpers need adjustment (see bump tools section on bumper adjustment). The chair will still operate with stuck bumpers but you will not be able to use the Bump Tools and they should be turned off on the ToolBox. Both of the above conditions are reported by the Speech Synthesiser if you have it connected.

The chair stops and the red light on the Smart Controller comes on...

- means the Smart Controller has detected a fault and switched itself off. Try switching off and on again. If the fault repeats, contact Smile Rehab.

The chair drives in different directions when I press the forward switch...

You probably have Scanning Control switched on - switch it off.

The chair chats away as though it's stuck in a loop and behaves strangely when I switch on...

It has probably lost it's settings. Switch off, hold down *Back* and *Stop* switches, and power up. Then release the switches. The chair should say 'Resetting Tools and Default values', and behave normally. If the chair keeps losing the settings it may be because the backup battery is flat (if the chair has not been used for a very long time, the battery will go flat) and you should contact Smile Rehab for a replacement.

The green light on the joystick flashes when you switch on...

- the DX Power Module has detected a fault in the system. Switch the chair off, wait five seconds, and then switch on again.
- The light will flash one or more times, then pause, and then flash again. The number of times it flashes is called the Flash Code; different flash codes indicate different faults. The codes and what they mean are listed below. Faults which may effect safety will cause the chair to stop. Some faults are automatically cleared when the fault is fixed; others are 'latched' and must be cleared by switching off, waiting for two seconds, and then switching on again. If the fault is not safety-critical, the chair may go into 'Limp mode' where it can be driven, but only slowly. If a DX fault is shown, first switch the chair off, wait five seconds, and then switch on again. If it still flashes make a note of the flash code and then contact Smile Rehab.

No. of flashes	Fault	Chair stops?	Fault latched?	Limp Mode?
1	DX Module faulty	Depends on module	Depends on fault	If PM or Joystick
2	DX Accessory fault	Depends on fault	Depends on fault	No
3	Left M1 Motor fault	Yes	Yes	No
4	Right M2 Motor fault	Yes	Yes	No
5	Left (M1) Parkbrake fault	Yes	Yes	No
6	Right (M1) Parkbrake fault	Yes	Yes	No
7	Low battery fault	Yes	No	No
8	Over voltage fault	Yes	No	No
9	CANL fault	Yes	No	Yes
10	CANH fault	Yes	Yes	Yes
11	Stall Time Out	Yes	Yes	No
12	Module mismatch	Yes	Yes	No

When you want to turn the wheelchair off (whether or not the chair is running i.e. in an emergency or at the end of a session), just press the on/off button on the joystick.

The chair does not move when I press the switch...

There are several reason why this may be happening. Follow the table below to try and find the reason - if you can't, phone Smile Rehab.

OBSERVATION	SOLUTION
Is the wheelchair switched on?	Switch it on.
Are the wheels engaged?	Engage the wheels
Is the Joystick on Mode 1?	If not, set to Mode 1
Is the speed turned right down?	Turn it up
Is Scanning selected	Turn scanning off
Is Programme Mode on?	Turn Programme Mode off
Has the chair just hit a bump?	Back away from the bump and try again.
Has the chair just hit a bump particularly hard?	Check the Safety Cut-Out button has not popped out - press it in.
Has the speed been altered with the programming switch?	Check and if necessary adjust it
Switch on Motion Speech. Does the chair say 'I'm going' when the switch is pressed?	If yes, and the chair does not move, there is a fault with the Smart Controller or the DX Power Module. Contact Smile Rehab.
Is the switch light on the front panel coming on when the switch is pressed?	If yes, then the switch is OK. If not, either the switch is faulty or there is a fault in the Smart Controller.
Plug a different switch into the socket	If it works, the switch is duff. If it doesn't work, the Smart Controller may be faulty.
Plug the switch into a different socket	If it works, the first socket may be faulty. If not the switch or the Smart Controller is faulty

The chair does not follow the line properly...

OBSERVATION	SOLUTION
Is Line Following switched on on the toolbox?	Switch it on.
Is the Line Follower unit plugged into the front of the Smart Controller?	If not, plug it in
Wave some tape under the Line Follower. Do ALL the 'Line Sensor' lights light up on the Smart Controller front panel as the tape is	If yes, the line follower is working OK. If one light does not come on, one of the line sensors may be faulty - contact Smile Rehab. If no
The chair swings out at corners	Use wider, gentler corners.
The chair moves too slowly on the line	Try increasing the Line Following speed with the Programming Switch - but carefully.
The chair does not 'find line' when it goes across it	Approach the line more slowly
The chair does not 'lose line'	Have a straight piece of tape before the line stops
The chair does not detect junctions	Switch Line Junctions on. See Section 10 on laying line junctions.

Suppliers

If you need help with anything to do with the Smart Wheelchair, contact Smile Rehab in the first instance.

However, the chair is designed so that you can try out different switches, controls, training ideas and activities **without** having to always call in an engineer or technician, or occupational or physiotherapist. To help you with this, we have listed some suppliers of switches and controls below. It is worth obtaining their catalogues so you have a good idea of what is available.

CALL Centre, University of Edinburgh, Paterson's Land, Holyrood Road, Edinburgh, EH8 8AQ. Tel. 0131 651 6236. <http://callcentre.education.ed.ac.uk>. *Designers of the Smart Wheelchair.*

Controls Dynamic, Lisle Avenue, Kidderminster, Worcs.. Tel. 01562 820 055
www.DynamicMobility.co.nz. *Manufacturers of wheelchair controllers and joysticks.*

Dudley Controls Ltd., 10 Peverel Drive, Milton Keynes, Bucks MK1 1NL. Tel. 01908 640777. *Manufacturers of wheelchair controllers, joysticks and switches.*

Cambridge Adaptive Communication, The Mount, Toft, Cambridge CB3 7RL. Tel. 01223 264 244. www.camad.demon.co.uk. *Suppliers of switches and switch mounts, communication aids, access devices and software.*

CPC, Component House, Faraday Drive, Fulwood, Preston, Lancs. PR2 9PP. Tel. 01772 654455. <http://www.cpc.co.uk>. *Electronic components - good for cables, adapters, velcro and general components.*

Inclusive Technology, Saddleworth Business Centre, Huddersfield Road, Oldham OL3 5DF, Tel. 01457 819790. <http://www.inclusive.co.uk> *Switches and switch mounts, plus Mac and PC SEN software and hardware.*

QED 2000, 1 Prince Alfred Street, Gosport, Hampshire, PO12 1QH. Tel: 0870-78-78-850. *Suppliers of a very wide range of switches, switch mounts, interfaces and communication devices, including TASH switches and Mobilia switch mounts.*

SEMERC, Granada Learning, Granada Television, Quay Street, Manchester M60 9EA. Tel. 0161 827 2927. <http://www.semmerc.com>. *Switches, switch mounts, and Acorn and PC SEN software and hardware.*

Smile Rehab Ltd. 3 Bone Lane, Newbury RG14 5SH. Tel. 01635 42305
<http://www.smilerehab.com/> *Manufacturers of the Bobcat and Smart Wheelchairs.*

Techcess, Unit 12, Willow Park Industrial Estate, Upton Lane, Stoke Golding, Nuneaton, Warwickshire CV13 6EU. Tel. 01455 213708. *Suppliers of a wide range of switches, and other devices including TASH switches and Daessy mounts..*

