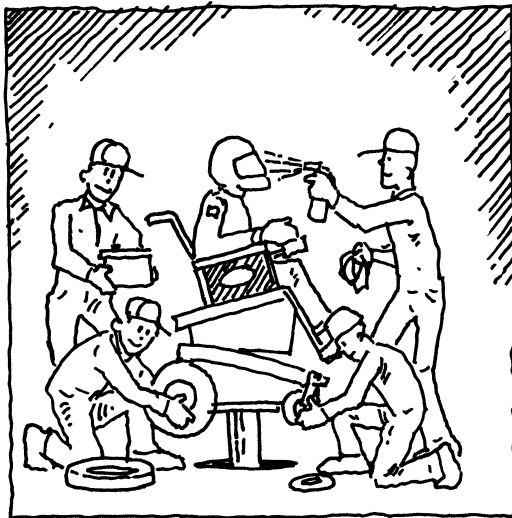


Section 1.4

Seating Setup and Wheel Adjustments



One change to your wheelchair usually affects the fit of all the other components, so be prepared to spend a fair amount of time setting up the seating and positioning within your wheelchair. Ideally, when adjusting your wheelchair, you should enlist the help of an assistive technology practitioner or supplier certified by RESNA (Rehabilitation Engineering and Assistive Technology Society of North America).

After each adjustment, test drive the wheelchair with assistance on ramps, different surfaces, and side slopes to make sure your mobility needs have been met. This can be done by driving the wheelchair onto a sloped surface or by physically tipping the wheelchair to its balance point in various directions. Extreme caution should be exercised using the help of multiple assistants. If your seating system is adjustable, the stability of your chair should also be checked with the seating system in all of its extreme positions.

Whenever you alter the setup of your wheelchair, check your forward, side-to-side, and rear stability with a spotter to make sure your wheelchair performs the way you would like.

The set up and adjustment of your wheelchair is a topic worthy of an entire book. There are many adjustments which you will probably refine over many years; others you will want to make throughout each day.

Seat Surface Angle Adjustment

The seat surface angle can be adjusted on some wheelchairs. A forward sloping seat might cause you to slide forward. Raising the front edge of the seat creates a “bucket” between the back support and seat and closes the seat-to-back angle. If the seat back is reclined at the same time the front of the seat is tipped upward, and the seat-to-back angle stays the same, this is called “tilt-in-space.”

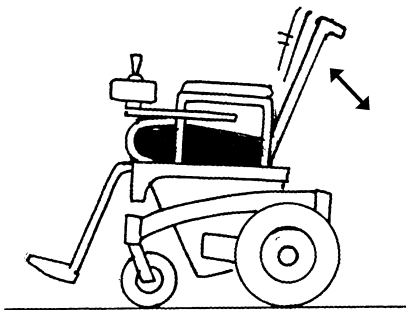
Several powered wheelchair frames allow seat angle adjustments. If the chair frame itself does not adjust, you can still adjust the seat surface angle by:

- Adding a wedge to the seat base beneath the seat cushion
- Purchasing a cushion that will angle the seat surface
- Adding a solid seat with angle adjustable hardware

Back Angle Adjustment

Your back support angle should provide a comfortable sitting posture while you are upright in the chair. The back angle should not cause you to curl your shoulders, hold your head forward for balance, or cause you to slide out of your seat.

The angle formed by the seat and the back support is called the seat-to-back angle. A seat-to-back angle greater than 90 degrees is often referred to as an “open angle,” while an angle smaller than 90 degrees is referred to as a “closed angle.” An open angle lets you use gravity to help balance your trunk. People with high spinal cord injuries who cannot flex well at the hips often use an open seat-to-back angle. However, an open angle can cause people to slide down in their chairs. If you have the flexibility, a closed angle cradles the body in the curve of the seat, holding you in place. A more open or closed angle can often reduce spasticity.



This powered wheelchair has an electrically powered reclining back support.

Drive Wheel Position Adjustment

Though less critical than on manual wheelchairs, the distribution of weight carried between the drive wheels and the casters on a powered chair will influence the driving performance of the chair. Due to the weight of a powered chair, when attempting to traverse soft terrain like gravel or sand, the chair will tend to sink and the casters will get stuck.

When negotiating low obstacles, for example small curbs, the location of the drive wheels (front, mid, or rear) can make a difference. On a few powered wheelchairs, the actual mounting position of the drive wheels on the frame can be adjusted.

Alternatively, some manufacturers allow for adjustment of the seat frame on the power base. Moving the entire seat forward or backward on the power base has the same effect as moving the drive wheel mounting position – to redistribute the weight between the drive wheels and the casters.

Front-Wheel Drive – For the most part, the drive wheels on front-wheel drive chairs have a fixed mounting position on the frame. Frequently, the batteries will be positioned on the chair in such a way as to evenly distribute the weight on the frame, getting as much weight forward as possible. Because the casters are in the rear, one advantage to front-wheel drive chairs is the ability for you to just drive forward over obstacles. The larger drive wheels mounted in the front will not get “hung up,” but rather will drive right up and over an obstacle.

Mid-Wheel Drive – This style of chair is available in a wide number of configurations. If you are interested in a mid-wheel drive style chair, it is important to test drive the particular wheelchair model to understand what effect the setup of drive wheels and casters will have on the drive performance of the chair. The first thing to look at is the actual position of the drive wheel on the frame. There is some variation among manufacturers as to where the drive wheels are mounted to the power base, relative to the seat:

- Directly under the seat
- Slightly behind the mid-point of the seat (though forward of the back posts)

Check with your supplier or the manufacturer to determine if the position of the seat or the drive wheel can be adjusted slightly forward or backward.

A “true” mid-wheel driving wheel location may increase the “rocking” of the chair when you rapidly speed-up or come to a quick

stop. If you look carefully, some mid-wheel drive chairs are actually six-wheeled chairs, with two drive wheels and four stabilizing wheels (usually two casters in front and two large anti-tip wheels in the rear).

Rear-Wheel Drive – Rear-wheel drive chairs most often have a fixed drive wheel mount. The position of the batteries and your weight when sitting in the chair naturally tend to increase the load on the rear wheels. In many rear-wheel drive chairs, the actual mounting of the drive wheels is behind the backpost of the seat (placing your center of gravity in front of the wheels). This rear placement of the drive wheel makes for a very stable configuration that is more difficult to “pop a wheelie” (lifting the front casters off the ground). A very stable configuration may give you security when negotiating ramps and inclines, but will make negotiating small obstacles very difficult.

Changing the drive wheel position or the position of the seat on the frame is a “heavy duty” adjustment and most often should be done by a qualified wheelchair service technician.

Arm Support Height Adjustment

The arm support should be adjusted so the arms are not pulling down on the shoulders. Your elbows should be slightly forward of your shoulders when your arms are resting on the arm supports. The front-to-back position of the arm supports should allow the upper arm to slope forward slightly. Some people like to be able to pull their elbows back for stability on non-level surfaces. If your joystick is mounted on the arm support of the wheelchair, make sure you can reach it easily. When adjusting the arm support height on a wheelchair with power recline, make sure the arm support does not interfere with moving the back support from the completely reclined to fully upright position.

Caster Adjustments

Mounting adjustments

Your casters should be mounted on the frame so they are perpendicular to the ground. If they are not, your front casters may become afflicted with “shopping cart syndrome” and flutter when you drive your chair. This may also make it difficult to turn your wheelchair or change direction. Use a carpenter’s square to verify that the caster housing is perpendicular to the ground.

Height and suspension adjustments

Due to the tendency of a mid-wheel drive chair to “rock,” there are smaller wheels mounted on the front and the back of the chair. Look carefully at these wheels. In most cases, one set will be allowed to swivel and will function as casters. The second set are fixed and will function as anti-tip devices. The position of the “caster wheels” and the “anti-tipper wheels” may be at the front or rear, depending on the specific wheelchair design.

Frequently, the “anti-tipper wheels” will have these adjustments:

- Height off the ground
- Tension of suspension

Height – The position of the anti-tip wheels off the ground will affect the amount of rocking you feel when you either accelerate rapidly or come to a quick stop. The closer the wheels are to the ground, the less rocking you will experience. However, the closer the wheels are to the ground, the greater the likelihood will be of getting “hung-up.” If the anti-tipper wheels are too close to the ground, when you drive off of a small threshold or through a curb ramp, you run the risk of having all the “little” wheels being on the ground, with the drive wheels being “suspended” in the air. With no drive wheels contacting the ground, you are stuck!

Suspension – In an attempt to reduce the likelihood of getting hung-up and to smooth out the “rocking” sensation, some models

have suspension in the anti-tipper wheels. The spring in the suspension may be adjustable to match your weight and driving style. Other power base wheelchairs have suspension on the casters and the main drive wheels.

Much like any adjustment to the drive wheel position, changing the height or tension of the anti-tipper wheels is a “heavy-duty” adjustment. Working with a trained wheelchair technician can facilitate getting the adjustments made to meet your driving style.

Foot Support Adjustment

Adjust your foot supports after you have your seat cushion, back support, and other positioning aids in place. Don’t forget to put your shoes on; sole height affects your leg positioning. Make sure you are seated upright against the back of the chair. When adjusting the foot supports, make sure you have:

- A minimum clearance of 2 inches underneath the foot plates
- Clearance for your knees under desks and tables

If you do not have enough foot or knee clearance, you might need to readjust your seat height. If your feet are supported at the correct height by your foot supports, your thighs should rest in a balanced manner on your cushion. Foot supports that are too high can lead to little or no weight under the thighs and excessive weight under your sitting bones, the ischial tuberosities. You might need to compromise on your knee height to get the desired weight distribution on the seat cushion.

If your knees will not fit under a table, you can slip coasters or wooden blocks under the table legs to raise the table up higher. At a restaurant, it is possible to turn small plates upside down and slide them underneath each of the table legs. Make sure the table is secure and will not slip off the leg props.

Seat Height Adjustment

To increase the foot support to ground clearance (raise yourself higher off the ground), you can adjust the seat up. Alternatively, you can increase the seat cushion thickness by adding a layer of stiff foam or a solid insert under the seat cushion. If all of the wheels are vertically adjustable it may be possible to move all of the wheels lower to raise the seat height, or to raise all of the wheels to lower the seat height.

To lower your knee height and decrease ground clearance (lower yourself closer to the ground), you could decrease the thickness of the seat cushion only if appropriate.

Sometimes you can push your knees down as you pull forward underneath the table and your knees can spring back up under the table. If you try this, be sure that there is not too much pressure on the top of your legs from the edge of the table.

Swing-away foot supports permit you to get under some obstacles because one or both foot supports can be removed, allowing the feet to dangle and the knees to drop lower for maneuvering in tight quarters. If you do this, you will need to be very careful backing up from underneath the table. The casters can swing around and catch on your feet, potentially causing injury.