

# All you need to know about Sports Chair Fitting and Maintenance

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SEATING & MOBILITY

# WHAT WE'LL COVER

- Common types of manual sports chairs
- Components of sports chairs
- Routine maintenance
- Proper fit- PERFORMANCE
- Classification
- Transfer- safety

# Common types of manual sports chairs

- Court chairs include: Basketball, tennis, softball, rugby, and football chairs,
- Performance chair: racing chair, and hand cycle.
- ALL of these type chairs are usually custom built, high performance sports wheelchairs. They are constructed from aluminum, titanium, carbon fiber or other various alloys. These chairs are rigid and measured by hand to the dimensions of the user. A range of chairs is available to suit high performance / sport applications. The chairs are fully customized to individual requirements and a range of options are available

# What do we have in Common?

- The session will cover common components of manual sport wheelchairs including options in cushions, backrests, wheels, camber, inner tubes and push rims.
- Maintenance
- Repair
- Transferring

# Features that are often not used on sports chairs

- Brakes / brake lever extensions
- Tipping Levers
- Seatbelts
- Push Handles
- Vinyl or standard Upholstery
- Armrests
- Accessories that add weight

# TYPES OF SPORTS CHAIRS FOR THE COURT

Basketball-



Tennis-



# MORE COURT CHAIRS

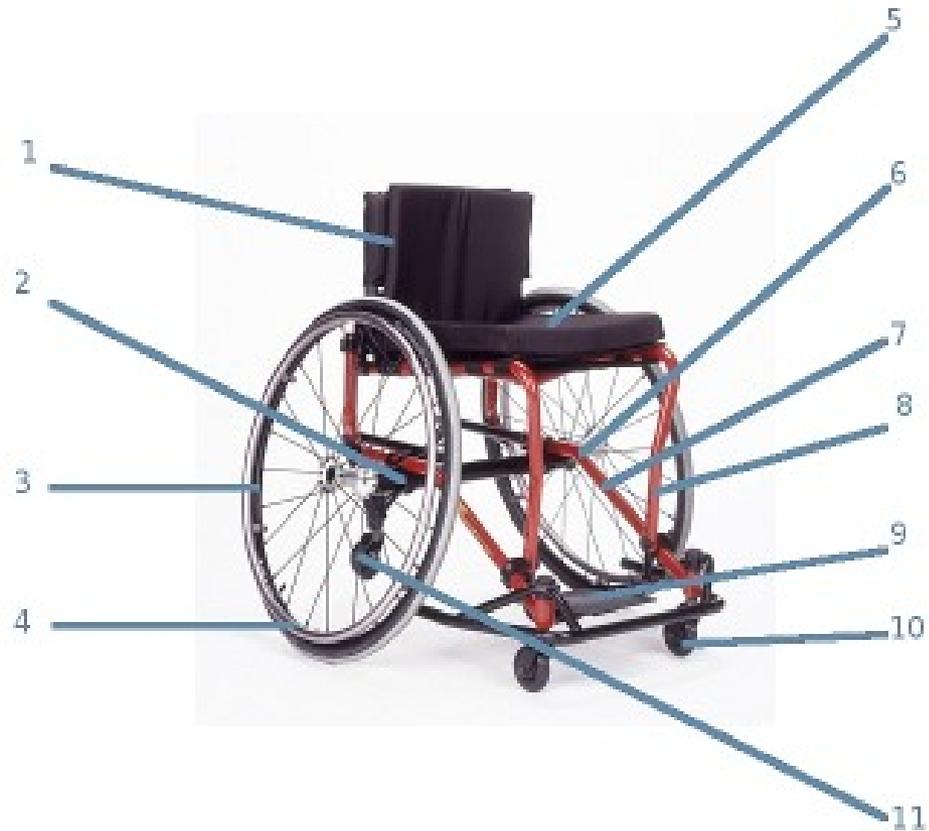
Rugby-

Football-



# Court chair basics

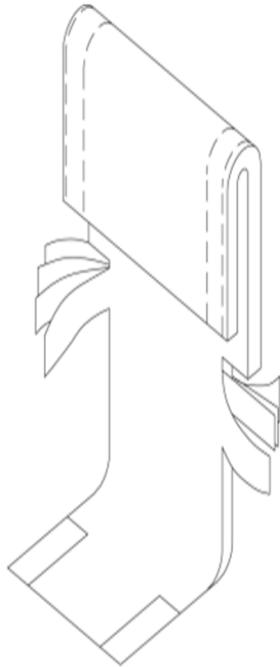
1. Backrest
2. Rear Axle
3. Rear Wheels
4. Hand rims
5. Seat
6. Frame
7. Traverse Bar
8. Front Rigging
9. Footrests
10. Front Casters
11. Anti-Tip Casters



# Backrests

- The backrest of a sports wheelchair is usually lower than a conventional wheelchair. Typically the backrest will be between 11" and 15". The backrest is also usually adjustable and models are also available that span 7" to 11" and 15" to 19". A lower backrest can allow for increased upper body movement.

# TYPES OF BACKRESTS



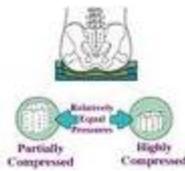
# Cushions

- The Sport Cushion gives wheelchair users pressure relief, reduced shearing and increases ventilation that allows for true heat and moisture control. Also adds or reduces seat to floor height and affects the ability to reach high up or down low.

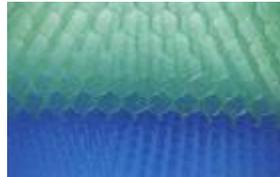
# Foam Cushions



# Air Cushions



# Various material



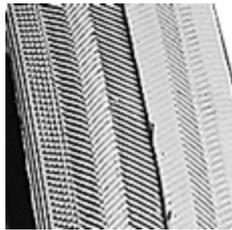
# REAR wheels

- The rear wheels are usually the same size as on conventional wheelchairs, but sometimes for racing larger wheels are used. They feature sealed precision bearings and are designed to be as lightweight as possible. This makes the wheelchair easier to move and reduces friction. They also usually feature a quick release button, so the axle can be moved or wheel replaced quickly and easily. Most use spoked wheels, although some sports wheelchairs have solid molded rims. Ceramic bearings are a new technology.

# Different court wheels



# Tires



# Quick release axles

- While on a conventional wheelchair, the axle is located directly below the backrest, many sports wheelchairs have adjustable axles. They can be positioned closer to the front of the chair, reducing the wheelbase and making the wheelchair more maneuverable. While typically much more maneuverable and easier to push, a smaller wheelbase also reduces the stability of the wheelchair. To increase stability, at the expense of maneuverability, the axle can be moved backwards towards the rear of the wheelchair. It also makes it a little harder to push, but increase the power of the stroke. Instead of a moving axle, some sports wheelchairs have a moving seat instead.

# Front Casters

- The front casters are typically made out of solid polyurethane, although some use pneumatic or solid rubber tires. The casters are smaller than those on a conventional wheelchair, usually only 4” to 5” in diameter. However, on racing wheelchairs larger front casters are often used.

# Anti -tipper

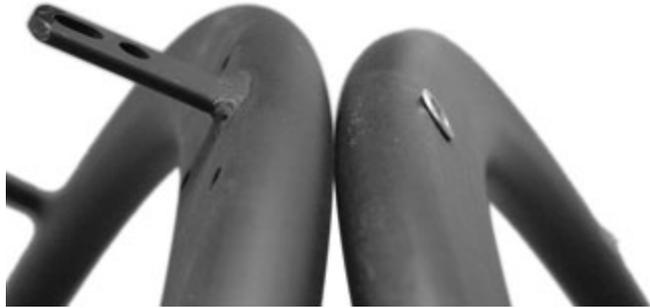
- Anti-Tip casters prevent the wheelchair from tipping backwards and are often not included. They can be removable device or is also designed as an integrated part of the sports chair. There are single and double, integrated or removable, anti-tipper from most manufacturers.

# Inner tubes

- Typically pneumatic tires are used, often allowing for a much higher pressure than traditional pneumatic tires. Pneumatic tires are great for outdoors, because they provide better shock absorption outdoors. Like racing bikes, the tires are often very narrow. There are standard “Schrader” air valves and also a French air valves requiring adapters called “presta valve adapters”

# Hand rim

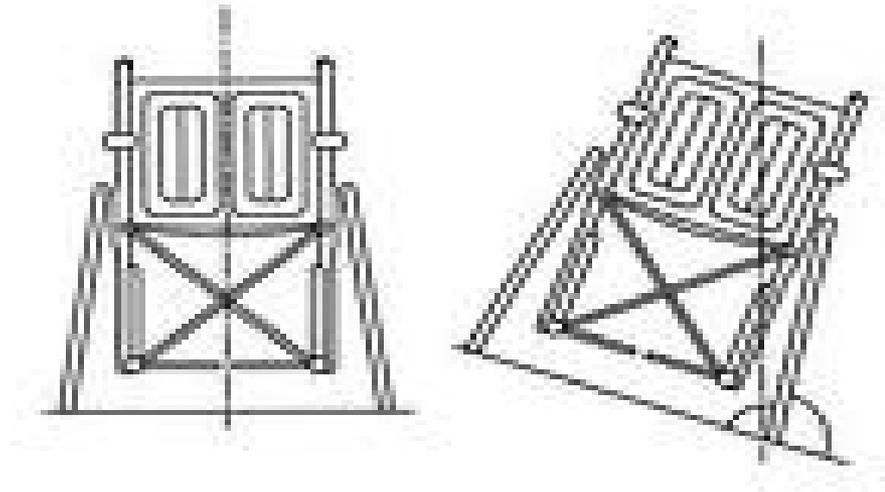
- The hand rims are typically coated in foam that is covered in vinyl, although the rim itself is made of metal. This makes it easier to grab, however the vinyl can be very slick and result in finger burns. More or less padding can also be added, to deliver a variety of grip sizes.
- Often smaller hand rims are used, which require more energy to get started, but allow for a higher top speed. The smaller hand rims also allow for the individual to maintain their speed easier. In many regards the size of the hand rim is much like the different gears on a bike.
- Sometimes for those with very limited upper body strength or mobility, small extensions are added to the handrail, which extend away from the wheelchair at an angle, making the wheels easier to turn.



# CAMBER

- Often, the camber of the wheel, its angle, is often adjusted, much like you would adjust a sports car, with the bottom of the wheel farther out than the top. This brings the wheels closer to the users body, allowing for more energy efficiency. A wider wheelbase also offers the advantage of a more stable wheelchair that is also easier to steer.
- This can pose a problem when indoors when dealing with narrow doorways and makes transporting the wheelchair more difficult. Some now allow the camber to be quickly adjusted to a “toe in” mode for indoor use though.

# Camber



# Item that are measured and adjusted to each athlete;

## **Standard Sports chair**

- Seat dimensions
- Back dimensions
- Positioning components
- Support for Limbs
- Position of wheels
  - Wheel access
  - Stability of chair
  - Controlling movement

# restraints

## CLICK STRAPS



# Basketball

**Center or "big" position**



**Ball handler- guard position**



# Tennis Chair

- tennis



# softball



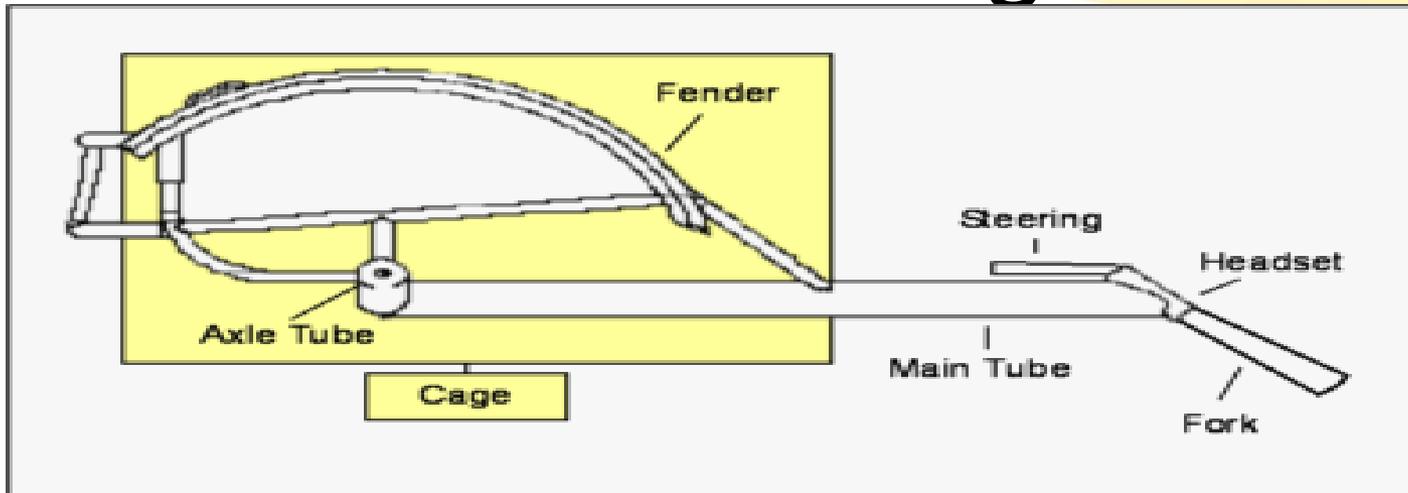
# football



# Racing chairs

- Wheelchairs that are used for racing are elongated to provide stability, so the front wheels often extend several feet from the wheelchairs seat.

# Parts of a racing chair



- **Cage:** The seating area of a racing chair. It is built according to an athlete's body dimensions.
- Main Tube:** The base of the racing chair that bridges the front wheel with the rear wheels.
- Axle Tube:** The tube running perpendicular to the main tube into which the rear wheels attach.
- Headset:** Attaches the steering and front wheel to the main tube.
- Steering:** Attached to the headset and allows the athlete to maneuver the front wheel.
- Fork:** Attached to the headset and serves to hold the front wheel.
- Hand ring:** A ring mounted onto the rear wheel used for propulsion.
- Hub:** Axle housing and center of wheel.
- Fenders:** Side guards that provide protection for the torso and arms from road debris and the rear wheels.

# Fitting a racing chair

- A racing chair that fits tightly around the athlete is critical for effective performance. Any extra space in the cage that allows the body to slide back and forth limits chair control and efficiency as the energy of each forward movement is absorbed by an opposing force; it's similar to trying to run in a pair of oversized boots. That said, it's important not to force too tight a fit. Because many athletes will have impaired sensation below the waist, areas of the skin that in which blood flow is restricted can go unnoticed, which can subsequently lead to skin ulcers and other health-related concerns.
- Getting the right fit is primarily a matter of correctly measuring the upper and lower hip width; these measurements will determine how wide the cage is at its widest and narrowest points. Racing chair manufacturers provide details on how to get these measurements – as well as all other necessary ones – on their racing chair order form.
- If it's possible, finding a used racing chair as a starter is a good idea. Whether it fits well or not, it will give you a benchmark to use when measuring for a new racing chair.
- Diagrams A, B, and C are typical diagrams found on a racing chair order form and display all of the key measurements.

# Measurements

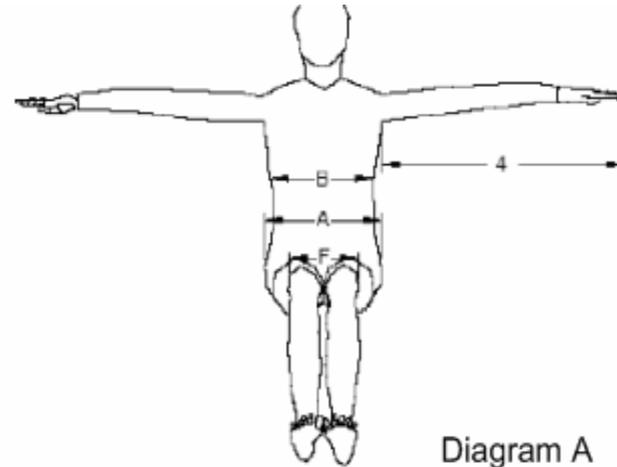
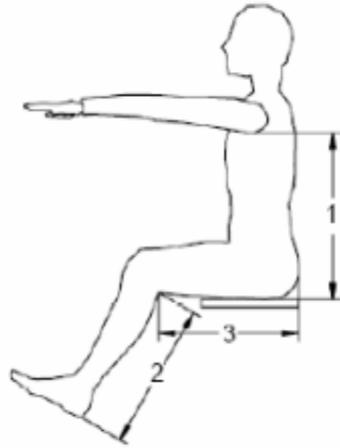


Diagram A

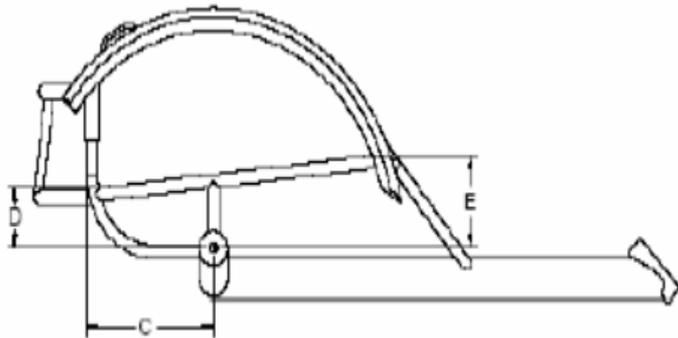


Diagram B

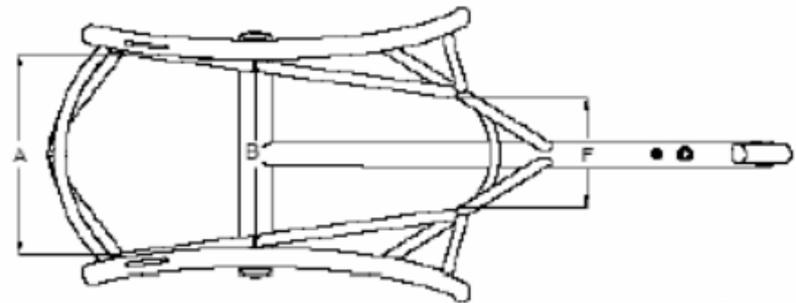
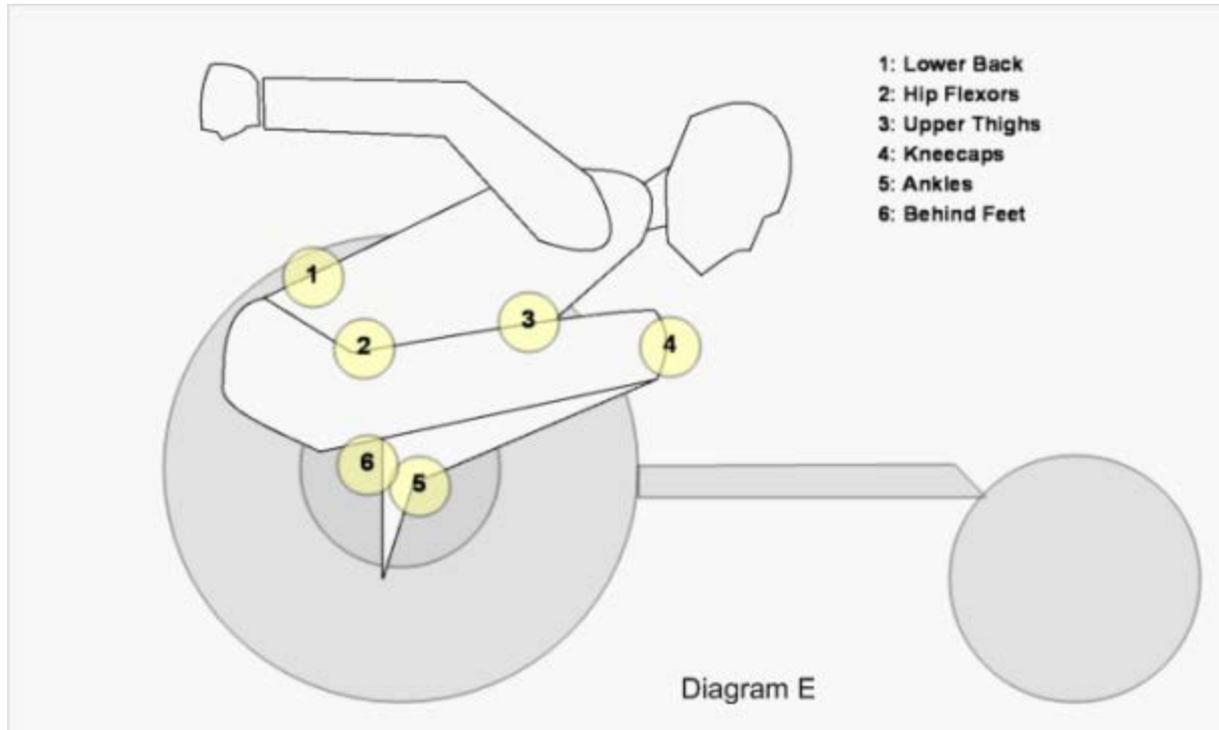


Diagram C

# The right Position

- **The Racing Chair – Finding the Correct Seating Position**
- The correct seating position in a racing chair gives an athlete optimal body stability and allows him to maximize the force being delivered into the hand ring. Finding this position takes a bit of experimentation and will vary based largely on two factors: body dimensions and disability level. The multitude of body dimensions and disability level combinations make it impossible to pinpoint a single correct position. The best strategy is to use a couple of general benchmarks (see Diagram D).



# Adjusting tensioner



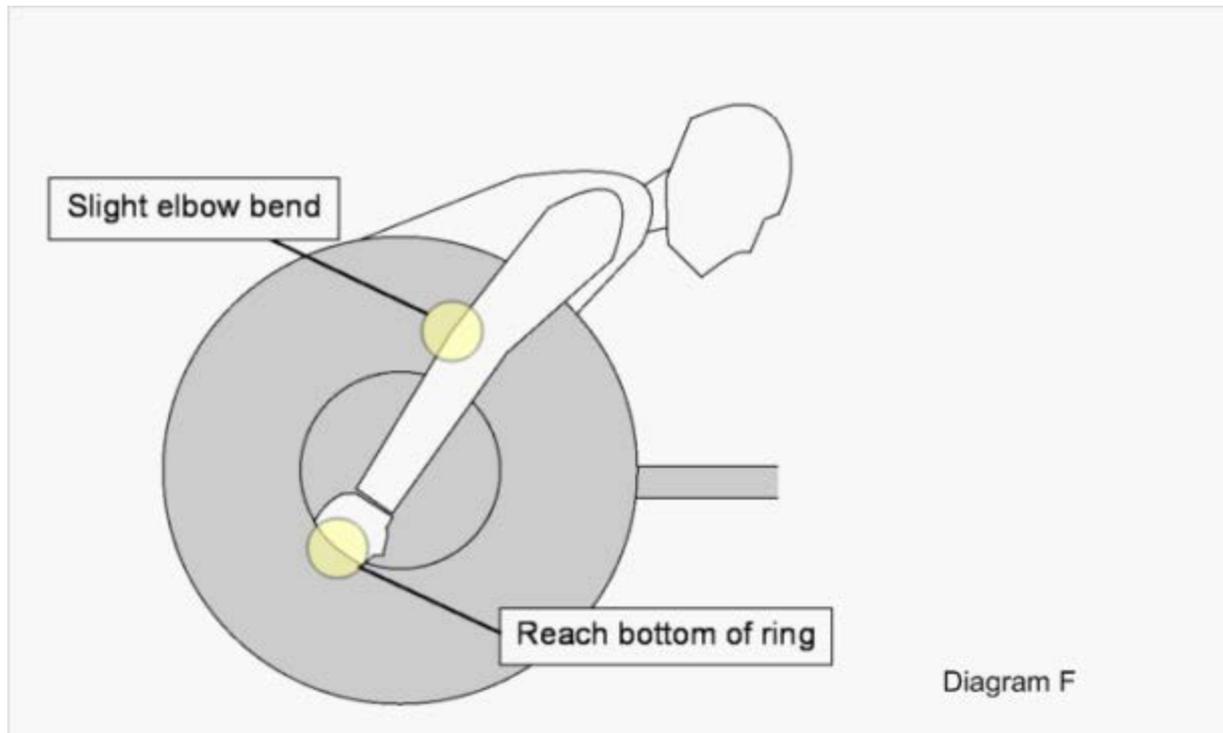


Diagram F

# Different hand cycles



# Hand cycle fitting

- Width of crank
- Height of crank
- Gears
- Road computer
- Important to keep slight bend in elbows and keep in your performance position for your level of your ability.

# Tool Bag

- **Tool bag Items**

- Here's a list of items to we keep in the master tool bag. The number of spare parts will vary according to the number people using the tool bag. The below figures are based on one athlete.

- Phillips Screwdriver  
Standard Screwdriver

Vice Grips

Crescent Wrench

Standard Allen Keys

Metric Allen Keys

Thread Seal Tape

Tape Measure

Cylinder

Super Glue

Allen Head Bolts – Front Wheel x 2

Allen Head Bolts – Steering Handles and Steering Collar x 2 each

Allen Head Bolts – Hand Ring Tab x 8

Allen Head Bolt Spacers – Hand Ring Tab x 16

# Tool Bag Cont

- Rear Wheel Axle
- Flat File
- CO2
- Headset Spacers
- Rear wheel spacers – x 5
- 3/8 Lock Nut x 4
- 3/4 Compensator Nut or 5/8 Compensator Nut x 2
- Presta Valve Adaptor x 2
- Valve Extender x 2
- 3/8" Wrench
- 7/16" Wrench
- 3/4" Wrench
- Packing Tape
- Athletic Tape
- Hockey Tape
- Glove Rubber
- Hand ring Rubber
- Tire Glue
- Cable Ties – 14"
- Klister
- Sandpaper

# Maintenance

- **Take charge of the care of your own wheelchair.**
- As the owner and operator of your wheelchair, you will usually be the first person to notice when your chair is not functioning properly. You may not be able to perform the basic daily and weekly cleaning and upkeep yourself, but you can set up a routine that can be followed by your caregivers, family members or others to monitor your chair for problems. To keep your equipment running smoothly you will need to take care of minor problems, as well as having your service dealer take care of major repairs.

- chair clean, checking tires for wear and air pressure, tightening screws, and monitoring for worn out cushions, pads, positioning equipment, and other parts. If you are unsure of performing a procedure or you encounter a problem, contact your service provider.
- **All Wheelchairs**
- Keeping your wheelchair clean will not only help keep you healthy and free of infections, but it will make it easier to identify equipment problems as they arise. To keep your wheelchair clean, you can wipe down the surfaces with a damp cloth. Use a mild detergent or a stronger cleaner for stains and sticky spots. Manufacturers often recommend using a car wax on the frame to make regular cleaning easier. Use a sharp tool or pick and carefully clean the wheel axle or caster bearing of any accumulation of hair, string, or other items that can interfere with the rotation of the wheels. Check the frame for any cracks or breaks in the metal. Any potential problems need to be reported to your

- Wheelchair Maintenance Checklist
- Read the owner's manual to learn about your wheelchair's systems and components and follow the
- recommended service schedules. Depending on how much you demand of your wheelchair will determine how
- often your maintenance routine should be performed. Regular maintenance can help extend the life of your chair
- and reduce the number and cost of repairs.
- If you are unsure of performing a procedure or you encounter a problem, contact your service provider.
- Here are **suggested maintenance tasks that every wheelchair owner should follow:**
- athletes

# Every day

## – Prior to Each Use Date Completed

- Check the tire pressure - Inflation guidelines are on the outside of the tire (usually 100
- psi). A quick check method is to pinch the outer walls of the tire – it should be firm.
- There are 2 different types of valves (Schrader and presta). The presta valve requires
- the use of an adapter screwed onto the high pressure valve.
- 
- Check nuts and bolts and tighten as needed. Use of allen keys or simple crescent
- wrench will be required. Only replace bolts with those of the same grade or
- strength
- rating.

# Every Week

- **Weekly Date Completed**
- Insect wheels - Ensure spokes from the axle to the rim are intact and tight, that rims are not bent, and that your wheels are parallel to one another.
- 
- Inspect front casters for wobbling, excessive play and alignment. Make sure both casters touch the ground at the same time. Make sure you check this problem on a flat surface. If caster nut is too tight it will flutter from side to side; if it is too loose, it will make the chair difficult to steer.
- 
- Clean axle housings of any debris – Remove wheels and wipe off the axles with a clean cloth that contains just a few drops of oil on it. Also, try and clean the axle housings and around the bearings.

# Every Month

- **Monthly Date Completed**
- Check your wheel alignment – toe in / toe out. If your wheelchair tends to veer to one
- side while coasting, it could very well be that your wheels are out of alignment or that
- your spokes have become loose or damaged.
- Inspect the chair frame and all critical components for cracks – these should be
- reported to dealer as they may require welding or the entire frame may need to be replaced.

# Other Maintenance

- **Other – as needed Date Completed**
- Wipe down your seat cushion or if the cover is removable wash separately.
- Check your upholstery for cracks or tears where the fabric holds or where there are screws in the fabric.
- 
- Flat tire - Tires with pneumatic rubber tubes as opposed to airless foam or solid inserts require more maintenance. A patch kit is an economical alternative to buying a new tube all the time.
- Replace tires when the tread becomes worn, cracked, loose or when the side walls begin to bulge out when pumped with air.
- Tools are a worthwhile investment that can save a lot of money in the long run. **A few must haves include:**
- **Allen wrench set (metric and imperial), adjustable wrench, multi-bit screwdriver, spoke wrench, tire**
- **irons, tape measure, adapter, and a tire repair kit. Spare parts such as tubes, bearings, spokes, and bolts**
- are important to keep in your tool kit for emergency repairs. A spare wheel is a must for higher level

# Every year or Season

- **Annually Date Completed**
- Lubricate all pivot points - use an all-purpose silicone lube spray to lubricate the flex points on your chair.
- Lubricate ball bearings
- Check your casters for cracks in the spokes that may eventually cause the caster to collapse

# Transferring into sports chair

- Safety
- Transfer to neutral surface
- Feet first into cages
- Always have someone trained to spot you to make sure you are safe.

# Classification in wheelchair sports

- Globally, the International Paralympic Committee is recognized as the leading organization, with direct governance of thirteen sports and responsibility over the Paralympic Games and other multi-sport, multi-disability events. Other international organizations, notably the [International Wheelchair and Amputee Sports Federation](#) (IWAS), the [International Blind Sports Federation](#) (IBSA), and the [Cerebral Palsy International Sports and Recreation Association](#) (CP-ISRA) govern some sports that are specific to certain disability groups. In addition, certain single-sport federations govern sports for athletes with a disability, either as part of an able-bodied sports federation such as the [International Federation for Equestrian Sports](#) (FEI), or as a disabled sports federation such as the [International Wheelchair Basketball Federation](#).
- At the national level, there are a wide range of organizations that take responsibility for Paralympic sport, including National Paralympic Committees, which are members of the IPC, and many others.
- **[edit] Disability categories**
- Cycling: [Karissa Whitsell](#) and [Mackenzie Woodring](#) ([pilot](#)) from the United States, compete in Beijing 2008.
- Biathlon: [Andy Soule](#) from the United States, at the 2010 Paralympics in Vancouver.
- Swimming at the 2008 Summer Paralympics
- Athletes who participate in Paralympic sport are grouped into six major categories, based on their type of disability:
- **Amputee:** Persons with a partial or total [amputation](#) of at least one limb.

# Classification continued

- **Cerebral palsy:** Persons who have a non-progressive neurological disorder resulting from [cerebral palsy](#), [traumatic brain injury](#), or [stroke](#), or similar disabilities affecting muscle control, balance or coordination.
- **Intellectual disability:** Persons who have a significant [impairment in intellectual functioning](#) with associated limitations in adaptive behavior.
- **Les autres:** From the [French](#) for *the others*, this includes persons with a mobility impairment or other loss of physical function that does not fall strictly into one of the other five categories. Participants include those with [dwarfism](#), [multiple sclerosis](#) or other disabilities.
- **Visually impaired:** Persons who have a non-correctable [vision impairment](#) ranging from partially sighted to total blindness.
- **Wheelchair:** Persons with a disability that requires them to compete using a [wheelchair](#). This includes most athletes with [spinal cord injuries](#) as well as other athletes who require wheelchairs, including some lower limb amputees, persons with [polio](#), and other disabilities.
- The disability category affects who athletes compete against and which sports they participate in. Some sports are open to multiple disability categories (e.g. [cycling](#)), while others are restricted to only one (e.g. [Five-a-side football](#)). In some sports athletes from multiple categories compete, but only within their category (e.g. [athletics](#)), while in others athletes from different categories compete against one another (e.g. [swimming](#)).
- **[edit] Classification**
- A major component of Paralympic sport is classification. Classification provides a structure for competition which allows athletes to compete against others with similar disabilities or similar levels of physical function. It is similar in aim to the weight classes or age categories used in some able-bodied sports.
- Athletes are classified through a variety of processes that depend on their disability group and the sport they are participating in. Evaluation may include a physical or medical examination, a technical evaluation of how the athlete performs certain sport-related physical functions, and observation in and out of competition. Each sport has its own specific classification system which forms part of the rules of the sport.

# In closing

- Wheelchair sport chair fitting has to consider the safety and performance of the athlete. Fitting the chair or cage close to you enables less friction and provides for best performance. Using straps to properly position your body while maintaining function and performance are key.

# Have fun!

- Stay active doing what you love. Becoming a paralympic level athlete takes training, experience, and a willingness to adapt and overcome.
- Keeping your equipment : your body and your chair in the best condition will make sure you can follow your dreams!