



Steve's Lift and Transfer Mechanism

stevepesto@knology.net

Warning: *The safety of this device is totally dependant on proper materials, construction, and use. The designer is not responsible for any injuries resulting from construction or use.*

Reason for design:

The only commonly available lifts for ALS patients are Hoyer lifts. Hoyer lifts are bulky, expensive, and difficult to use.

Design Goals:

- Transfer to and from wheelchair, bed, and bath
- Minimal caretaker effort
- Unobtrusive
- Inexpensive

Description:

The device consists of an electric hoist mounted on a carriage which travels on an overhead track. The track is an inverted "T" configuration mounted to the ceiling. Power is provided to the hoist via copper tape on the track and is picked up by rollers on the carriage. The harness consists of a detachable seat and back for easy placement on the patient.

Materials:

The design specifically uses commonly available, inexpensive components. For example the carriage is constructed using inline skate wheels and bearings. The track is constructed from laminated, high-grade plywood for strength yet it is readily available. The hoist is available by mail order or at Harbor Freight Tools. The harness is constructed using swing seats!

Construction:

See attached plans and photos. This section to be expanded in the future.

Safety:

The design is speced for 400 pounds providing a 2X safety factor for 200 pound patients. The switch is controlled via nylon cord providing electrical isolation for the caretaker. The harness is constructed of nylon rope providing electrical isolation for the patient.

Rough Costs:

Hoist:	\$80
Carriage:	\$45
Track:	\$135
Harness:	\$45

Total:	\$305
---------------	--------------

Suppliers

Hoist:

Available locally at Harbor Freight Tools.

It is cheaper online from Northern: www.northerntool.com



Northern Industrial Tools 440-lb_ Capacity Electric Hoist Northern Tool and Equipment.mht

Carriage Wheels and Roller Bearings:

Available at any skate shop. To get low profile 2" wheels ask for "aggressive" skate wheels. Get the hard urethane. This will have a higher number. I used the 90a hardness. Remember that you will need 2 bearings for each wheel, 2 bearings for the commutators, and 4 bearings for the carriage side rollers for a total of 14 bearings.

I found good deals online at: www.skate-buys.com



Yak ABEC-3 Bearings.mht



El Blanco 55mm X 90a Agressive Inline Wheel.mht

Copper Strip:

Ideally the design needs 1" wide strip approximately 5 mils thick. I have not found a good source for this. I initially tried some 1 mil tape but it only lasted about six months. The best replacement that I could find was 2" wide and 11 mils thick. This is overkill but it works.

It is available at: www.metal-cable.com



Copper Ground Strip.mht

Harness Bottom and Back:

These are standard swing seats available at many places. You can even choose your color!

I purchased mine online at: www.theparkstore.com



The Park Store s180 - Residential Polymer Swing Seat.mht

Everything else is available at Home Depot!

Construction Notes

Carriage Construction:

- Carriage axle bolts should be hardness grade 5 to provide proper strength.
- Use self-locking nuts on the axle bolts.
- We built a two foot long curved "test track" and mounted it to the workbench. This was very helpful during the carriage assembly.
- Remove all of the cable that is not needed. This will make the effective diameter smaller and thereby reduce the cable speed. Be sure to keep enough cable to pick someone up off of the floor!
- Note that the side rollers are closer together on one side to provide proper clearance on the curved track.

Track Construction:

- Plywood for track should be high quality with no voids. I used birch plywood.
- Cut the track horizontal pieces slightly oversize and glue and screw together.
 - Use a good quality wood glue such as Tightbond.
- Once dry you can cut to final width.
 - Track is slightly narrower than 5" to allow proper clearance.
- For the curved vertical section use four pieces of laminated plywood assembled using the same procedure as the horizontal lamination.
- For the straight sections of the vertical track I used high quality 2x4's.
- Pay attention to the joint detail during the construction phase.
- Once the horizontal and vertical track components are complete join them together using glue and screws.
- Repair any blemishes with Bondo and paint.
- Mark the locations of the lag bolts and drill and countersink.
 - Measure carefully and only countersink the needed amount; not more than 3/4".
- Remember to leave space at one end of the track to put the hoist on.
- Fasten removable stop blocks on the ends to keep the hoist from falling off the track.
- Smooth any joints with Bondo and touch up paint.