

# The Barley Harvest

## FOLDING

### Adult Adirondack / Muskoka Chair Plans

QTY	MATERIALS LIST
24' (6.1m)	3/4"x9 1/2" (1.9cmx24.1cm) redwood, cedar or pine boards. Should make one chair depending on knots.
6' (1.8m)	1 1/4" x 5 1/4" (3.2cm x 14cm x 2.36m) redwood, cedar or pine boards.
36" (91.4cm)	7/8" (1.98cm) hardwood dowel
8	3/8" x 3" (9.5mm x 7.5cm) carriage bolts, nuts, lock washers and flat washers.
1	4" x 24" x 1/4" (10.2cm x 61cm x 6.5mm) sheet of UHMW plastic available at Lee Valley Tools or Rockler
54	1 5/8" (4.2cm) # 6 exterior wood screws
24	2" (5.05cm) # 8 exterior wood screws
16"(40.64cm)	1/2"(13mm) outside diameter polyethylene clear water line with 3/8" (9.5mm) interior diameter.
1	1 5/8" (4cm) interior diameter hole saw
1	Gorilla glue or comparable waterproof exterior glue
1	Loctite bolt glue (to be added after final assembly and finishing)

**NOTE:** The chair can be assembled using 5/16" (8mm) or 3/8" (9.5mm) carriage bolts, nuts & washers....BUT....as time elapses & you fold your chairs more and more, the threads will rub and enlarge the holes making your chairs unstable. Using the 3/8" (9.5mm) bolts with the 1/2" (13mm) plastic tubing will save the chairs, especially cedar, from future wear. You can also use two 1 3/8" (3.5cm) regular galvanized steel washers between the moving parts, instead of the UHCW plastic, but they may eventually rust and bind. The plastic allows smooth movement and is water resistant. The instructions below utilize the 1/2" (13mm) drilled holes for the 3/8" (9.5mm) bolts inside the 1/2" (13mm) tubing. It is also very important for the longevity of the chair, to glue all parts of the arm assembly, since the arms and part **R**, support the chair in the reclined position.

#### Parts List - T = template supplied, S = straight cut

Part	Description	Qty		Size (standard)	Size (metric)
A	Side panel	2	T	37 3/4" x 5 3/4" x 3/4"	95.9cm x 14.6cm x 1.9cm
B	Rear dowel spreader	1	S	7/8" x 18"	1.9cm x 45.8cm
C	Front seat slat	1	S	19" x 2 5/8" x 3/4"	48.3cm x 6.6cm x 1.9cm
D	Front leg	2	T	20" x 4 3/4" x 3/4"	50.8cm x 12.1cm x 1.9cm
E	Back support	2	T	25"x 3 1/2" x 3/4"	63.5cm x 8.9cm x 1.9cm
F	Back support dowel speader	1	S	7/8" x 16 3/8"	1.9cm x 46.2cm
G	Rear arm support pivot	2	T	4 1/2" x 3" x 1 1/4"	11.4cm x 7.6cm x 3.2cm
H	Front arm support pivot	2	T	4 3/4" x 7" x 1 1/4"	12.1cm x 17.8cm x 3.2cm
I	Arm support	2	T	6 1/2" x 4 1/4" x 3/4"	16.5cm x 10.8cm x 1.9cm
J	Arm	2	T	31" x 8" x 3/4"	78.7cm x 20.3cm x 1.9cm
K	Top back support pivot	2	T	3 3/4" x 2 1/2" x 1/1/4"	9.5cm x 6.4cm x 3.2cm
L	Top back support	1	T	19" x 3 7/8" x 1/1/4"	48.3cm x 9.6cm x 3.2cm
M	Bottom back support	1	T	19" x 2 7/8" x 1 1/4"	48.3cm x 6.9cm x 3.2cm
N	Center back slat	1	T	35" x 2 3/4" x 3/4"	88.9cm x 7.0cm x 1.9cm
O	Second back slat	2	T	34 7/8" x 2 3/4" x 3/4"	88.3cm x 7.0cm x 1.9cm
P	Third back slat	2	T	34 1/4" x 2 3/4" x 3/4"	87cm x 7.0cm x 1.9cm
Q	Outer back slat	2	T	32 1/2" x 2 3/4" x 3/4"	82.6cm x 7.0cm x 1.9cm
R	Back seat slat	1	T	19" x 3 5/8" x 3/4"	48.3cm x 9.1cm x 1.9cm
S	Seat slats	10	S	19" x 1 5/8" x 3/4"	48.3cm x 4cm x 1.9cm

## Templates & Drilling



**1** - Cut out all templates, on the **outside** of the lines shown, and trace or spray glue onto 1/8" or 1/4" hardboard for permanent templates. Cut out, sand the edges smooth to the inside of the lines, & label all pieces. Your pencil line on the stock becomes the original size. Trace all templates onto the final stock of pine or cedar, and cut each one out with a sabre, table, or band saw. Double check the dimensions from the sizing chart. If you have a jointer/planer, you may want to clean up all straight edges. Any curved surfaces should be sanded with a drum sander before rounding over all outside edges, with a router or sandpaper.



**2** - A taper jig on the table saw, works best for the back slats and back supports E. A shop built sled is the quickest, easiest and safest taper jig. Use a scrap length of 6" (15.8 cm) wide plywood, longer than back slat **N**, and fasten clamps at each end. Line up the pattern line to the edge of the jig, using an adjustable square, and run it through the blade.



**3** - For all back slats, cut to the rough dimensions of part **N**, the longest slat. Then trace on template **N**, and taper the one side for all parts **N**, **O**, **P**, & **Q**. The templates for **O**, **P**, & **Q** can be traced onto the tapered stock, so all parts are the same width at the bottom. Only one template of each is necessary. Just flip each over for the opposite direction of the curve. When you have cut & planed or sanded all slats, assemble & clamp as shown, so you can sand the curve smooth and even.



**4** - For all drilled parts **A**, **D**, **E**, **G**, **H**, & **K**, be sure to double up & clamp if possible, while drilling the 1/2" (13mm) holes. It is **VERY** important that the holes are in the same position and level, otherwise the chair will not fold easily and square. For front legs part **D**, once the 2 holes are drilled, clamp or hold part **H**, the front arm pivot, **FLUSH** against the **TOP** of **D**. Use the top hole at the curve as the guide for drilling the hole in part **H**. You can see the parts assembled below in the assembly instructions step 6.



**5** - Using a 7/8" (2.2cm) spade or Forstner bit, drill the 1/4" (6.5mm) deep holes for the dowels in parts **A** & **E**. **NOTE:** Be sure to drill the holes on the **INSIDE** of each part. The back supports, parts **E**, are square at the front & angled at the back, so lay them together, then open like a book, and mark the hole locations on the inside.



**6** - Using the UHCW plastic, make 8 washers using the 1 5/8" (4 cm) hole saw. The Lee Valley plastic is already 1/4" ( 6.5mm), but if you buy 3/8" (9.5mm) plastic jig stock at Rockler, rip or plane it to size. Use a cutting blade to trim off the plastic burrs to make the washer smooth.



**7** - Using a woodturners center finder, mark the centres of all washers and drill the 1/2" (13mm) holes, holding the washers with vise grips, flush to the drill press table. Trim off the burrs so they run smooth against the wood surfaces.



**8** - Here you can see the final assembly of the bolt, plastic waterline and plastic washer ready for assembly.

Note: You can use the left over plastic to use as bottom protection against moisture under parts **A**, **D**, & **E**. Cut to size and attach with brass screws. Also, if you have purchased the folding footstool plans, which were designed before this chair, adapt the width of the leg spreaders, to utilize the new bolts & plastic washers. This will eliminate any problems with swelling.

If you are painting the chair, it is best to prime all surfaces first before assembly, to ensure longer life against moisture. Some assembled parts that are glued, like the arms with pivots attached and the back support with pivots, should be primed **AFTER** assembly, for better glue adhesion. Use an oil based paint like Varathane Colors, for the final coat.

You can either countersink and plug the screw holes before final painting, or use brass screws left exposed if staining.

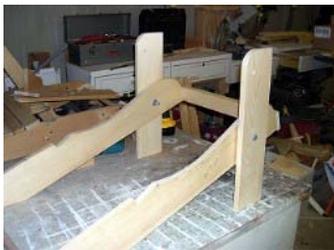
### Assembly:



**1** -Begin assembly by cutting the dowel part **B** to length and screwing in place between parts **A**, the side panels, with 2" (5.1cm) screws. Next attach the front slat **C**, with two 1/58" (4.2cm) screws on each side, to the front edges of parts **A**, flush with the bottom edge, or with a 1/4" overlap as I prefer. This will give you a carcass to work with. Check for square by measuring corner to corner, both ways. If the carcass is not square, the chair will not fold.



**2** - Next, bolt on the front legs **D**, on the **OUTSIDE** of parts **A**. Cut a piece of tubing to 1 5/8" (4.15cm) and slide it over the bolt to the square head under the crown. Push the bolt through the lower hole of part **D** being sure that the curve at the top faces the back of the chair. Add the plastic washer, then push the bolt through the front hole of part **A**. Double check the length of the tubing to be sure it doesn't protrude past the inside of part **A**.



**3** - Add a flat washer, then a lock washer and tighten the nut. Assemble the second leg to form the carcass seen at the left. Be sure the bottoms of the side panels **A**, rest flat at the back.



**4** - Mark the center lines on parts **H**, being sure that the pivot holes are in the correct location, since parts **H&I** are opposite under each arm. Be sure that the pivot holes are closer to the back of the chair and line up with the upper holes in parts **D**. **GLUE** and screw part **I** in place with three 2" (5.1cm) screws, being sure to drill pilot holes first.



**5** - Push the bolt and tubing from the inside of part **D**. Then add the washer in between and push the assembled part **H&I** in place. Add the flat washer, then lock washer and tighten the nut. The tops of parts **D & H&I** should be flush and square. If not, sand both sides of the chair, so they are exactly the same height.



**6** - Assemble the back supports parts **E** with the dowel **F**, cut to length. Screw the dowel in place with 2" (5.1cm) screws, being sure the back supports are square to each other. Place the assembled section in front of the rear dowel part **B**, being sure that the straight perpendicular front of the assembly, is facing the front of the chair.



**7** - Assemble the back arm pivot supports parts **G** into the lower holes of parts **E**, as you did with the front supports. Line up the arms parts **J**, so that they are 7/8" (2.2cm) from the inside edge of parts **D** and flush with the inside edges of the rear pivot supports **G**. The arms therefore should be about 18 1/2" (46.99cm) apart. Using the Gorilla glue or similar exterior waterproof glue, screw the arms in place with three 2" (5.05cm) screws into each of parts **G**, **H** and **I**. Be sure to pre-drill pilot holes so you don't split the wood.



**8** - Assemble the back support pivot parts **K** in the upper holes on the inside of back supports **E**. Be sure that the tops are angled towards the back of the chair. Center the back support part **L** on the pivots, drill pilot holes, **glue** and screw in place with two 2" (5.1cm) screws into each pivot.



**9** - After cutting out part **M**, you need to rabbet the ends so the part fits flush to the top of parts **A**. Cut out a 1/2" deep x 3/4" wide (1.25cm x 1.9cm) rabbet in the underside being sure that it also fits easily into place between the side panels **A**.



**10** - The back pieces can now be assembled, starting with the middle slat **N**, centered at the top on part **L**, and at the bottom, in the curve on part **M**. Overhang 5/8" (1.6cm) below the bottom of support **M**. Use one 1 5/8" (4.2cm) screw at the top and bottom of each slat, being sure not to set the screws too deep.



**11** - Next, screw on outer back slats **Q**, at the top only, overhanging 1/4" (6mm) from the ends of part **L**. Temporarily hold part **R**, the back seat slat in place so the edges of slats **Q** fit between the notches in part **R**. Screw the slats into part **M**. Then screw on slats **O** and **P**, fanned evenly between **N** and **Q**. You may want to pre-drill holes in each slat and put in place with a small nail temporarily, to balance the distance between slats, as well as the curve at the top, before screwing in place.



**12** - Being sure that the back is in the upright position, use an assembly square, to clamp part **R**, the back seat slat square and flush to the back slats as shown. You may have to adjust, trim or file the under side of the curve, so it fits flush to the curve of the back slats. It should be flush to the outside edges of parts **A**, the side panels. Screw in place with two 2" (5.05cm) # 8 screws on each side, after drilling pilot holes. The bottom ends of the back slats should curve lower to the outside edges of slats **Q**, so they can support against part **R** in the reclined position.



**13** - Rip all seat slats **S** to the size shown on the parts list. Attach all seat slats with one 1 5/8" (4.2cm) # 6 screw in each side being sure to drill pilot holes into the side panels **A**. Use the templates as spacers to evenly space the seat slats between the front and back slats parts **C** and **R**.



**14.** The chair is now assembled, and ready for finishing. If you are plugging the screw holes, I recommend a tapered plug cutter, like the Veritas Cutter from Lee Valley Tools or the hex shank tapered cutter from Rockler. Glue the plugs in place with exterior waterproof glue, let dry, then cut off the excess with a chisel or Japanese saw. The rest can be sanded smooth with a random orbital sander. Touch up the plugs with primer, if painting the chair.



**15** - To recline the back, sit in the chair, reach your arms back around the back slats, grab the back supports **E**, and pull forward. To put it back in the upright position, reverse the process. Check to be sure there is no binding at part **R**. The supports **E**, should fold against the back of part **M**. The front legs may tilt back slightly when you lean back. If you don't want the chair to recline without getting out of the chair, add another dowel in front of dowel



**16** - You can now fold your chair by pushing forward at the top of the back. The front legs should fold forward and the chair will collapse. To open again, put your foot on the back dowel and pull up on the back. The chair will lock into the slot in the side panels in the reclined position. Pull back on the top dowel or the back supports to put the chair in the regular position.



**17** - To finish the chair, disassemble it at the bolt positions. You will then be able to finish it much easier. After reassembling the chair, use locktite on the nuts, tighten and then back off slightly.

To hang in the gargage, screw a board between the 16" (40cm) studs, and hang the chair from the front seat slat part **C**.

**Enjoy!!!**

**Phil Barley**



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