A Few Remarks about the Baseball Bat Rack

Robert Penoyer

Copyright © 2018

A WARNING – PLEASE READ

Woodworking can be dangerous! It's up to you to determine if you can safely use the tools and perform the tasks needed to complete this and any other woodworking project. If you are unsure, STOP! Get advice from someone knowledgeable or do some careful studying on your own. Be safe!

Always wear at least an appropriate N95 dust mask or respirator when sanding or spraying paint. For advice about dust masks and respirators, visit this link:
https://woodworkingtoolkit.com/best-dust-masks-respirators/

READ, UNDERSTAND, AND FOLLOW ALL OF THE INSTRUCTIONS AND WARNINGS THAT CAME WITH YOUR TOOLS. BE CAREFUL!

This Is Not Standard Documentation – Fill In the Blanks

I generated the original material in this ZIP package just for me, not for a general audience. This gave me the freedom to create a minimal amount of written design documentation. And it allowed the documentation to be technically incomplete. I simply carried some ideas around in my head.

Please be aware that I might not have included every detail that you need to build this project. So I suggest that if you want to build it, carefully look things over and determine ahead of time if you have enough information to go forward.

It might be sufficient to simply guess at any needed information if you can't find it in the included files.

Please be aware that there might be mistakes in the documentation that I accounted for during the build but failed to note in the documentation.

Non-standard Dimensioning

My attitude toward dimensioning is to make it "good enough." Professional mechanical designers follow certain conventions regarding dimensioning. I'm not that careful. So understand this ahead of time when you find any dimensioning that is unconventional.

The Baseball Bat Rack

The Baseball Bat Rack is a convenient place to store up to 48 (24 on each disk) baseball or softball bats. It has a small footprint so it doesn't take up much floor space. You can easy see each bat. And, it's easy to place a bat into the rack or remove a bat from it.

Some of the rack's features:

- Total Bat Storage Capacity: 48 baseball or softball bats
- Total Height: 75 1/2"
- Footprint: 18" diameter circle
- Bat Support Disk Structure: Two 18" disks of 3/4" plywood
- Base Structure: One 12" disk of 3/4" plywood on top of one 18" disk of 3/4" plywood, on top of five feet fashioned from 3/4" x 3" x 4" plywood
- Main Post: 4" x 4" (measured at 3 1/2" x 3 1/2") Douglas fir
- Glue: Tite Bond II or equivalent
- Screws: As described below
- Finish: Paint (no paint on bottoms of feet)

It should be mentioned that a bat weighs roughly 32 ounces, give or take a few ounces. So estimate the weight to be 2 pounds for each bat. This means that 48 bats weigh roughly 100 pounds. So the Bat Rack has to be strong. The rack design presented here appears to meet that requirement.

A SketchUp File and an Equivalent PDF File

File *Bat_Rack_06.skp* is the SketchUp design for the rack. This file is useful since I think all of the necessary details are incorporated here. So, for example, if you find a dimension or other detail missing, it can be determined by examining this file. And, you can orbit and move the model around for a better look at everything.

File *Bat_Rack_06.pdf* contains all of the images and dimensions from the SketchUp file. Use this if you're not familiar with SketchUp.

Note that certain details are deliberately missing. For example, countersinks are not shown on the clearance holes for the disk supports, but they're noted in the drawing. Also, no screws or lag bolts are shown in the SketchUP or PDF drawings, but they're addressed in this file.

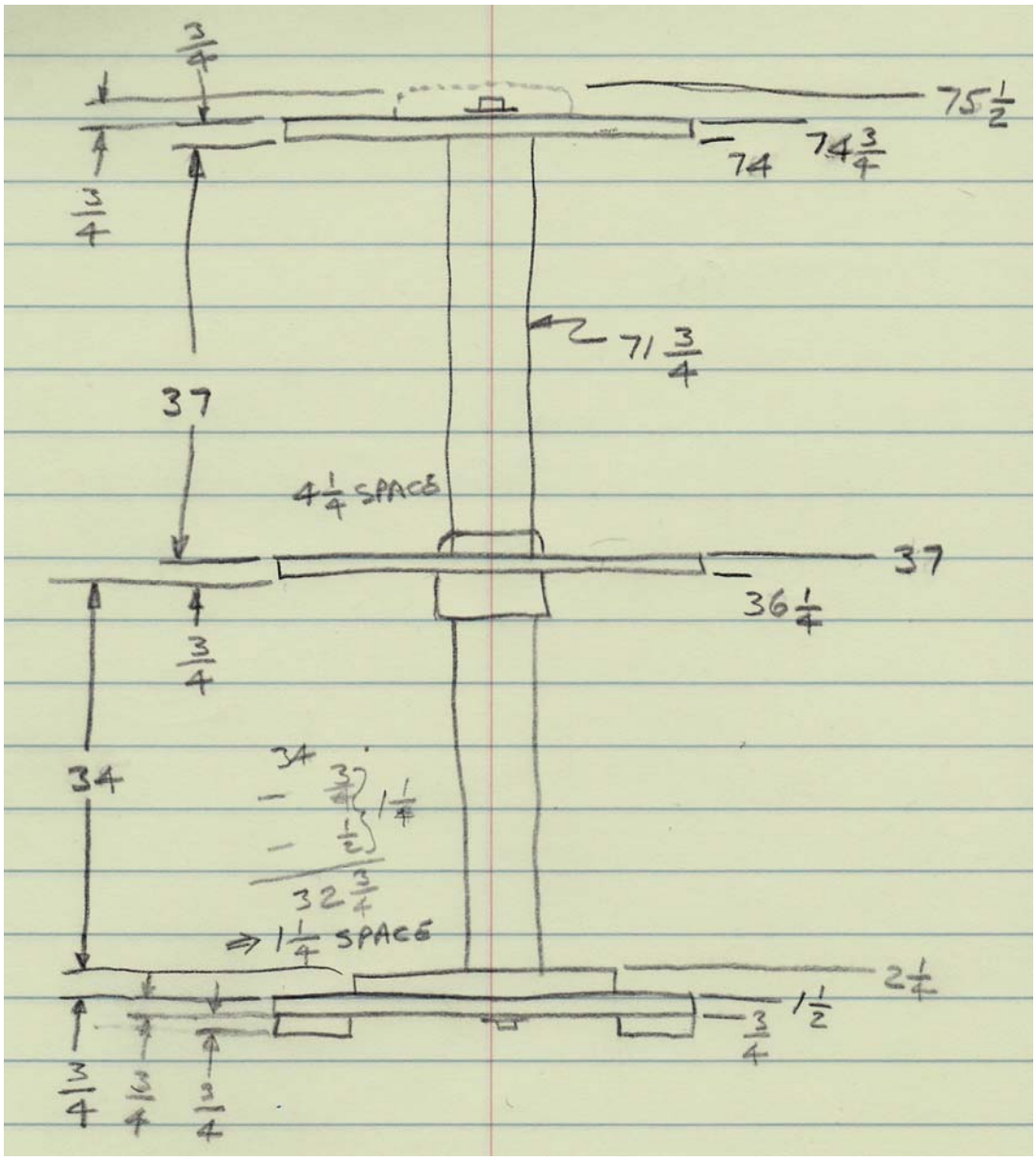

Figure 1. Original sketch

The drawing in Figure 1 is the original design sketch for the Bat Rack. This drawing was created before the current SketchUp design drawing. <u>You should use the SketchUp drawing or its counterpart, the PDF drawing, as the references for the design described here.</u>

Figure 1 is not proportional. For example, it shows that the feet are outside of the edge of the 12″ disk. As you will see below, the feet extend past the edge of the 12″ disk by 1″ to give the base added strength and rigidity.

Also, it appears that there is a small molding covering the joint between the bottom bat disk and the post. No molding was ultimately used. Instead, caulk is used here to clean up the joint's appearance.

Despite some of its misleading information, Figure 1 is a great reference to see the nature of the construction of the Bat Rack. The dimensions at the left are the individual lengths or thicknesses. The dimensions on the right are the cumulative distances from the floor.

Notice in Figure 1 that there is a 34" space for the bats hung from the bottom bat disk and a 37" inch space for the bats hung from the top bat disk. Why are these dimensions different? It's because extra space is needed above the bats in the bottom disk to lift a bat and remove it without bumping into the bats hanging from the top disk.

Note also the scribbling of 34 – 3/4 – 1/2 = 32 3/4. This is an analysis that shows that a bat with a length of 34" when hung from the bottom disk has 1 1/4" of space below the bat and above the 12" disk on the base. That is, starting with a bat 34" long, allow 1/2" for the knob which is above the bottom disk. Then allow 3/4" for the thickness of the bottom disk. Thus, 32 3/4" of the bat would hang below the bottom disk. Since 34" inches of space is provided by the rack's design, that leaves 1 1/4" of margin below the bat.

Since the top disk is high enough to provide a total space of 37", there are 3" more space than below the bottom disk, or 3" + 1 1/4" = 4 1/4" of space. This provides enough space to lift a bat from the bottom disk and remove it without bumping it into the bats hanging above it.

The Details

The information that follows will help to make clear the details of each component so that possible misunderstandings might be avoided. Each of the Baseball Bat Rack's components will be discussed. Use the included SketchUp or PDF file to follow along with these descriptions.

Bat Rack Assembly

Look at the Bat Rack Assembly page to see the overall configuration of the Bat Rack.

All of the circular disks are 3/4" plywood. (A true thickness of 23/32" was assumed for this design.) The top and bottom bat disks have a diameter of 18". The diameter of the bottom-most disk of the base is also 18". The smaller disk on top of the 18" disk of the base, immediately below the post, has a diameter of 12".

The edges of two of the rack's five feet can be seen below the base. The rack's five feet are 3/4" plywood. The main post is 4x4 (3 1/2" x 3 1/2" actual dimension) Douglass fir.

The small cap at the top is 3/4" plywood with a diameter of 4".

Disk Support Placement

Look at the Disk Support Placement page. Four pieces of hardwood 1 1/2" wide rest inside a 1 1/2" dado cut 3/16" deep around the post. Since the hardwood is 1/2" thick, it extends 5/16" out from the post to support the bottom bat disk. The disk support pieces are glued and screwed into place.

The 3/16" screw clearance holes are visible but <u>the needed countersinks are not shown in the drawing</u>.

Base Assembly

Look at the Base Assembly page. Three views of the base are shown.

The top-left image is the appearance of the base when looking directly down at it. There is a 1/2" clearance hole in the center.

The bottom-left image shows an edge view of the base. Here you can see the 12" disk on top, the 18" disk in the middle, and a somewhat muddled view of the five feet at the bottom.

It's easy to see the 3/8" round-over along the top edge of each disk.

The top-right view shows the bottom of the base with all five feet. The feet are distributed around the bottom of the base with an angular separation of 72° between the centers of each of the feet. DO NOT try to use just four feet since this would make the Bat Rack easier to tip over.

The feet are fashioned from 3/4" plywood cut to 3" x 4". The centerline of each foot is aligned along a radial line between the center of the base and the outside edge of the base. The outer edge of each foot is set flush with the edge of the 18" disk. When a rectangular foot is aligned this way, the corners of the foot extend beyond the edge of the base as shown in Figure 2. This material will be trimmed to the curved edge of the base later in this description so that the outer edge of each foot is flush with the base.

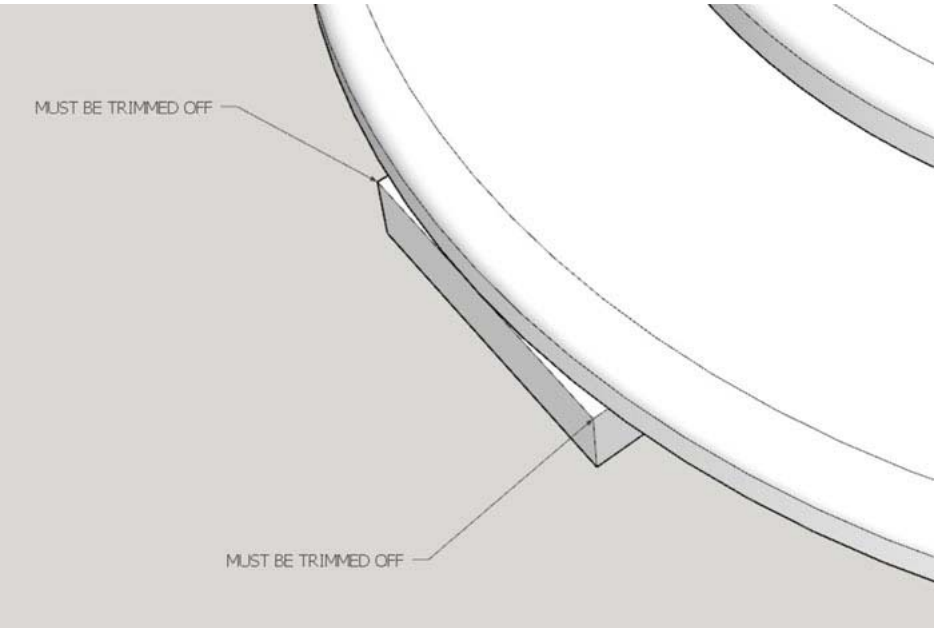

Figure 2. Trimming of Feet

All of the bottom edges of each foot should be rounded over using a 1/8" round-over bit to prevent the feet from splintering at the edges when the Bat Rack is moved along a floor.

DESIGNED FOR STRENGTH: When 48 bats are stored in the rack, the supported load will be about 100 pounds. Rather than support this much weight with a single disk of 3/4" plywood, the base was designed to be much stronger. So, the 12" disk was added on top of the 18" disk to provide 1 1/2" inches of plywood. The design of the feet makes the base assembly even stronger.

Each foot is 4" long. Since the base has a diameter of 18", or a radius of 9", the inside edge of each foot is 5" from the base's center. But the radius of the 12" disk is 6". So the outer edge of the 12" disk extends 1" past the inside edges of all the feet. This structure gives the base assembly more than enough strength to support the load.

The 12" disk is glued and screwed to the 18" disk. The screws pass through from the bottom of the base disk into both disks.

Feet

Look at the Feet page. Each of the five feet is fashioned from 3/4" plywood cut to 3" x 4". Five feet, not four, are necessary to make the Baseball Bat Rack as stable as reasonably possible. DO NOT use only four feet because the rack could tip over more easily with only four feet.

A counterbore and clearance hole is provided for each of the four screws that secure the feet to the 18" disk. The 3/8" diameter counterbores are given a depth of 1/4". A 3/16" clearance hole is centered in each counterbore. I recommend that you use a 1" Kreg pocket hole screw for this application. Note that a 1 1/4" screw could penetrate through the other side of the base disk.

The head of a 1" Kreg screw will fit into the counterbore such that it won't scrape against the floor when the Bat Rack is moved.

Disks

Look at the Disks page. The disks that hold the bats are by far the most complicated parts of the Bat Rack. Construction of the disks requires a very careful, labor-intensive effort.

Each disk has 24 holes for bats, each with a diameter of 1 1/2". Channels that are 1 1/16" wide are cut from the outside edge of the disk into the 16 holes nearest the outer edge. Channels of the same size are cut between holes to give access to the 8 holes farthest from the edge. So there are a total of 48 holes and 48 channels cut into the two disks.

A 1/4" chamfer is cut on all top edges of each disk. A 1/8" round-over is cut on all bottom edges of each disk.

CUTTING THE FOUR CIRCULAR DISKS:

Select and mark the desired center of each of the three pieces of 3/4" plywood that you've chosen to make the three 18" diameter disks. Make the marks clear because the center marks will be used repeatedly.

Carefully set a compass to a 9" radius and use it to draw a circle on each 18" piece. Use a band saw or jig saw to rough cut the circles by staying about 1/8" outside of the line.

Use a plunge router with a straight cutting bit and a circle cutting guide to route each disk to a uniform, smoothly cut circle.

Use a similar method to cut the 12" diameter base disk.

PRINTING THE HOLE PATTERN FOR THE BAT DISKS:

This section details how to create a full-size hole pattern from the Hole Pattern page of file *Bat_Rack_06.skp or Bat_Rack_06.pdf*.

If you **DON'T** have access to SketchUp or to someone who does, you still can create a full-size hole pattern but it will be more difficult. Follow these steps:

> Follow the details on the Hole Pattern page. Beginning with a sheet of paper big enough, use a compass to carefully draw a circle with a radius of 9". Then use the compass to carefully draw a circle with a radius of 7 5/8". Finally, carefully draw a circle with a radius of 5 7/32". The centers of the holes reside on the inner two circles.
>
> Now mark a straight line from the center outward past the 7 5/8" radius circle. Using a protractor, carefully mark similar lines every 22.5° until you've gone all the way around the circle. The centers of the 16 outer holes are identified by the points where the 7 5/8" circle and straight lines cross.
>
> Orient your paper so that the outer hole pattern that you've just constructed is arranged like the pattern on the Hole Pattern page. Notice on that page the hole marked HOLE A and the two holes marked HOLE B. Draw a straight line from the center between the two lines for each HOLE B so that the new line exactly divides

the angle formed by the other two lines. Let the new line cross the circle with the 5 7/32" radius. Now using a protractor, draw seven more similar lines around the circle by moving each new line 45° from the previous lines. When you finish, you will have identified the centers of all 24 holes.

Finally, carefully draw the 3 1/2" square so that it's positioned and oriented just as it is on the Hole Pattern page.

If you **DO** have access to SketchUp, use this procedure to create a full-size hole pattern. The procedure assumes that you're using a printer that prints on 8.5"x11" sheets:

Go to the Hole Pattern page in file *Bat_Rack_06.skp*. Select *File > Print…* or Ctrl-P to open the printer dialog box. Under *Print Size*, make sure that the *Fit to page* check box is not checked. Under Scale, enter 1 in the boxes next to *In the printout* and *In SketchUp*. Click *OK*. The printer will issue multiple pages.

Using the utmost care, align each sheet with the others to form the complete disk hole pattern. (You might want to use scissors to cut away unneeded material.) Use small pieces of tape to tack each sheet with the adjacent sheets as you progress. Once you're satisfied that the complete patchwork pattern is accurate, secure the pages together with long pieces of tape.

Once you have a satisfactory hole pattern, use a pair of scissors to carefully cut along the 18" diameter circle.

USING THE HOLE PATTERN:

Select one of the 18" diameter disks that you created. Carefully align and secure the hole pattern to the disk. Use a mild spray-on adhesive, tape, or other similar method to ensure that the pattern and plywood can't move relative to each other. Do this in such a way that the pattern can be easily removed when it's no longer needed.

Now use an awl or center punch to put a dent through the paper and into the plywood to identify the center of each circle. Be sure to do the same at the center of the pattern and at the four corners of the 3 1/2" square marked on the hole pattern. The next step is to remove the pattern from the plywood so, before that happens, make sure the marks that you've made will be clear when the pattern is removed.

Remove the pattern from the plywood.

DRILLING HOLES IN THE BAT SUPPORT DISKS:

Once you have the newly marked plywood disk, stack it on top of another 18" diameter plywood disk. Carefully ensure that the outer edges of both disks agree, then use a pin nailer to place several strategically located pin nails through the top disk and into the bottom disk. Four or six nails should be sufficient. Refer to the Disks page of file *Bat_Rack_06.skp or Bat_Rack_06.pdf* as a guide. Locate the nails so that they are positioned away from any place where the holes will be drilled or the channels will be cut.

Don't use too many nails because you will have to separate the two plywood disks once the following operations have been completed.

If you don't have a pin nailer, you can use small screws that are long enough to secure one disk to the other. Screws will deface the disks but filler or spackle can be used later to repair any damage.

With two disks secured to one another, use a 1 1/2" Forstner bit to drill each of the 24 bat holes. A drill press is best suited for this operation. Be sure to use scrap wood to back up the workpiece to limit tear-out when the bit comes through the other side.

DRILL ONE MORE SMALL HOLE:

After all of the bat holes have been drilled, one more hole is needed. Drill a small hole using a 1/16" bit through the center of both disks. If a 1/16" bit isn't long enough to penetrate both disks, a slightly larger diameter but longer bit might be used. (You'll want the hole to be small so that the point of a brad point drill bit will be secure when a larger hole is drilled at this location later.)

MAKE A JIG:

Make a jig from MDF (medium density fiberboard) or scrap wood with a channel exactly 1 1/16" wide like the one shown on the Channel Jig page of file *Bat_Rack_06.skp* or *Bat_Rack_06.pdf*. A similar drawing is shown in Figure 3.

The jig can be made from material 1/4" thick. Cut two pieces about 3 1/2" x 14" and two more pieces exactly 1 1/16" wide. The latter pieces can be maybe 4" long. Glue the pieces together as shown. Note that the jig is fairly large because you will need enough room to use clamps while at the same time keeping the clamps out of the way of a router.

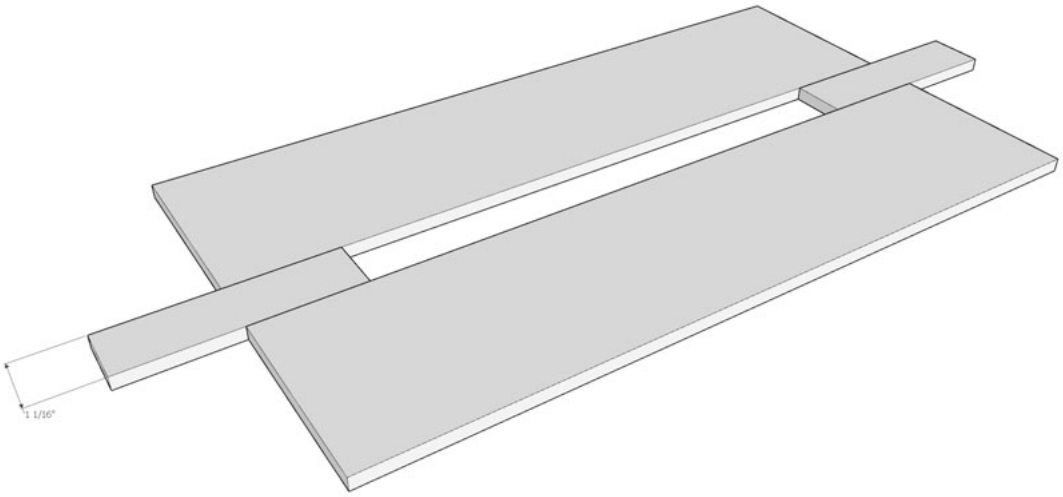

Figure 3. Channel Jig

MARK THE CHANNELS WITH A PENCIL:

Once the glue on the jig has cured, use the new jig to follow the pattern for the channels shown on the Disks page of file *Bat_Rack_06.skp* or *Bat_Rack_06.pdf*. That is, use your best judgement to carefully place the jig in the location of each channel on the Disks page. Be sure that the center of the slot is lined up with the center of the associated hole. Then hold the jig with one hand while marking the sides of the channel with a pencil held against the edges of the jig. Do this for all of the channels.

ROUGH CUT THE CHANNELS:

Once all of the channels are marked, use a band saw or jig saw to rough cut the channels into both disks while staying about 1/8" inside the lines.

FLUSH CUT THE SIDES OF THE CHANNELS:

Now carefully locate the jig so that it lines up with one of the set of pencil lines that you marked earlier. Clamp the jig in place so that you can flush cut the channel with a router and a flush-cutting bit. The bit must have a top bearing to use against the jig and be long enough to extend all the way through both pieces of plywood, about 1 1/2". Do this for every channel.

BREAK THE CORNERS:

After all of the channels have been flush cut using the router, look at the Disk Details page of file *Bat_Rack_06.skp* or *Bat_Rack_06.pdf*. Notice where it says BREAK ALL CORNERS. Use a band saw or jig saw to make those small cuts. These breaks smooth the corners and make it easier to place the bats into the channels.

ADD A FEW DETAILS:

It's useful to place a mark of some sort at the same location on the edges of both disks so that, once they're separated, the two disks can be realigned exactly as they are now. The mark should be able to survive sanding, routing, and other handling because it will be used during assembly.

Carefully separate the two disks.

Do the following as you separate the disks.

- Mark the disks to indicate the top of each disk
- Carefully remove all nails or screws

Both disks should have a small hole exactly in the center. One of the disks has four marks indicating the corners of the 3 1/2" x 3 1/2" square. This disk will be the bottom disk that slides over the 4x4 post.

Draw pencil lines between the four dots to form a square. Then drill a hole at each corner just inside the lines as shown in Figure 4. The holes should be large enough for a jig saw blade.

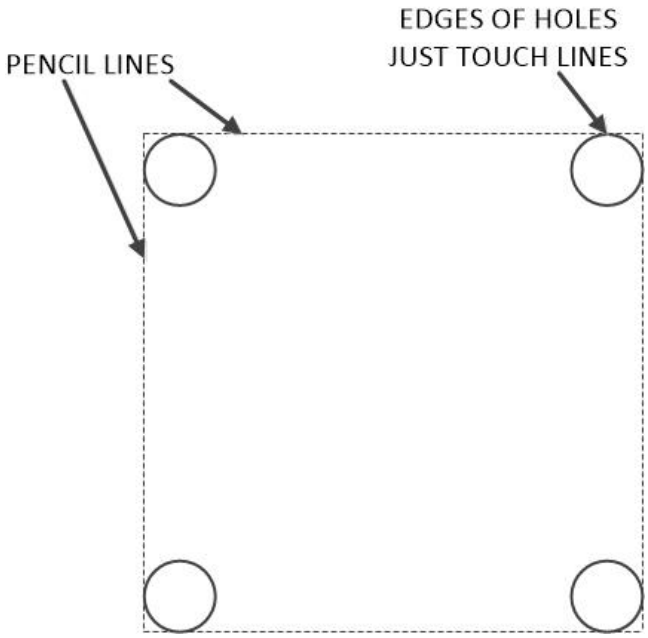

Figure 4. Drill holes for jig saw blade

CUT THE SQUARE HOLE:

Once the holes have been drilled at the corners of the square on the disk as shown in Figure 4, use a jig saw to cut out the hole. The hole should be square and 3 1/2" x 3 1/2". Don't be too concerned about the hole's exact size or shape at this time. It will be sized to the post later.

DRILL A HOLE IN THE TOP BAT DISK:

Place the point of a 1/2" brad point bit into the 1/16" hole at the center of the disk. Drill a vertical hole through the disk.

CHAMFER ALL OF THE TOP EDGES:

Look at the Disk Details page of file *Bat_Rack_06.skp* or *Bat_Rack_06.pdf*. Notice that a 1/4" chamfer is cut along all of the top edges of each disk. Don't chamfer the square hole.

ROUND-OVER ALL OF THE BOTTOM EDGES:

Cut a 1/8" round-over along all edges of the bottom of each disk. Don't round over the square hole.

Sand both bat disks to clean up any sharp edges and sharp corners and give them a nice appearance.

Base Assembly

Look at the Base Assembly page. It's assumed here that the feet have already been cut, countersunk, and drilled.

DRILL CENTER HOLES:

Drill a 1/16" diameter hole through the center of the 12" and 18" disks. This is best done using a drill press to ensure that each hole is perpendicular to each disk's surface.

ATTACH THE FEET TO THE LARGE DISK:

Use a pencil to mark one side of the 18" disk with five radial lines from the center of the disk to the outside edge. Use a protractor to ensure that each line is separated from the others by 72°.

Use a pencil to mark each of the feet with a centerline on each 3" edge. That is, the line should be cross from one face to the other along the center of each 3" edge.

Using 1" Kreg pocket hole screws and glue, attach each foot to the bottom 18" disk. Ensure that one 3" edge of the foot is flush with the outside edge of the disk and that its centerline is aligned with the radial line on the disk. Also ensure that the centerline on the opposite end of the foot is aligned with the radial line on the disk. Refer to Figure 2 to see how the outer corners of the feet should extend past the edge of the disk.

Use a router with a flush cutting bit to trim each foot so that its outside edge follows the curve of the disk.

If you haven't done so already, use a 1/8" round-over bit to round over all of the bottom edges of each foot.

ROUND OVER THE TOP EDGES OF THE BASE DISKS:

Use a 3/8" round-over bit with a router to round over the top edges of both the 12" and 18" disks.

Now is a good time to sand all surfaces of both disks.

JOIN THE TWO DISKS TOGETHER:

Use glue and 1 1/4" screws to join the 12" disk to the 18" disk as follows.

Put a 1/16" drill bit into the center hole of the 12" disk. With glue applied as needed, fit the drill bit into the center hole of the 18" disk. The drill bit ensures that the centers of the two disks are aligned. Using several 1 1/4" screws driven in from the bottom of the 18" disk, join the disks together.

Remove the drill bit.

Using a 1/2" brad point drill bit, lock the point into the 1/16" center hole and drill a hole vertically through the center of both disks. It's imperative that the hole is vertical. A drill press is best for this task.

Post

Look at the Post page. The 4x4 post is made of Douglas fir. The post must be very straight to give the Bat Rack stability and to give it a nice appearance.

CUT THE POST TO LENGTH:

Squarely cut the ends of the post for a total length of 71 3/4". It's critical that the end cuts are absolutely square so that the Bat Rack stands truly vertical.

CUT THE GROOVE:

Use a router to carefully cut a groove 1 1/2" wide and 3/16" deep all the way around the post spaced 32 1/2" from the bottom as shown in the image on the Post page. Carefully cut the groove so that its edges align all around the post. Figure 5 show the cut groove.

Figure 5. Groove cut around the post

DRILL THE BOTTOM END HOLE:

Use a 1/2" brad point drill bit to drill a hole 1 3/4" deep in the center of the bottom of the post. The hole must be aligned exactly with a centerline running directly down the center of the post. This is the clearance portion of the hole for the shank of a 1/2" x 8" lag bolt.

Use a 3/8" brad point drill bit centered in the 1/2" hole to drill 4 3/4" deeper for a total depth of 6 1/2". (See the dimensions on the Post page in file *Bat_Rack_06.skp* or *Bat_Rack_06.pdf*.) Again, the hole must be aligned exactly with a centerline running directly down the center of the post. This is a pilot hole for the threads of a 1/2" x 8" lag bolt.

DRILL THE TOP END HOLE:

Use a 1/2" brad point drill bit to drill a hole 2 1/2" deep in the center of the top of the post. The hole must be aligned exactly with a centerline running directly down the center of the post. This is the clearance portion of the hole for the shank of a 1/2" x 8" lag bolt.

Use a 3/8" brad point drill bit centered in the 1/2" hole to drill 4 3/4" deeper for a total depth of 7 1/4". (See the dimensions on the Post page in file *Bat_Rack_06.skp* or *Bat_Rack_06.pdf*.) Again, the hole must be aligned exactly with a centerline running directly down the center of the post. This is a pilot hole for the threads of a 1/2" x 8" lag bolt.

Sand the Post

Now is a good time to sand the post, before anything is attached to it.

Disk Supports

Look at the Disk Supports page. The disk supports should be made from hardwood. I think I used mahogany. These pieces provide support for the bottom bat disk as shown in the Disk Support Placement page of file *Bat_Rack_06.skp* or *Bat_Rack_06.pdf*.

CUSTOM CUT THE WIDTH:

It can be seen in the drawing that the supports comprise two pieces each of two different lengths. Each piece of the supports is 1 1/2" wide. However, all pieces should make a snug fit with the groove in the post. So, trim them to width as needed.

The 3/16" holes are clearance holes for countersunk screws. You must countersink each hole even though no countersinks are shown in the drawing.

MOUNT THE SUPPORT PIECES TO THE POST:

Use glue and 1" or longer countersunk screws to mount the support pieces to the post. First do a dry fit and predrill pilot holes for the screws into the post. Be sure

the disk support pieces fit snugly in the groove on the post. Ensure that the pieces don't interfere with each other so that each piece can be fully seated into the groove.

Once everything is prepared, apply glue and screw the pieces into place. Figure 6 shows the support pieces mounted in the groove in the post using only nails. You should use screws as described.

Figure 6. Support pieces mounted in the groove in the post

Assemble the base to the post

Use a 1/2" x 8" lag bolt with a 2" heavy fender washer under the head of the bolt to secure the base to the bottom of the post. Don't get the ends of the post mixed up! Make sure that you drive the bolt into the ***bottom*** end of the post. (The groove and disk supports are closest to the bottom of the post.)

Use your best judgment to determine the correct torque to apply to the bolt. You want the base to be very secure against the bottom of the post but you don't want to split the post.

Once assembled, stand the assembly on the base for the first time. If you are on a level floor, the post should be plumb, i.e., vertical. You might have to detach the post from the base and make adjustments to the bottom of the post if it's not vertical.

Assemble the bottom bat disk to the post

Now is the time to ensure that the square hole cut into the bottom bat disk is a good fit for the post. If it's too small, do any needed sanding or filing of the hole until it fits. Since the post might not be completely symmetrical, always try the same side of the hole on the same side of the post.

CUT POCKET HOLES:

The bottom bat disk is secured to the post using four pocket screws. Using the appropriate Kreg drilling jig, drill a pocket hole into the top of the disk (the side with the chamfers) at the center of each edge of the hole. By putting the pocket holes in the top of the disk, the disk is pulled against the disk supports as the pocket screws are tightened. This makes the disk rigid. Figure 7 shows the pocket holes on top of the disk with the pockets filled with wood filler.

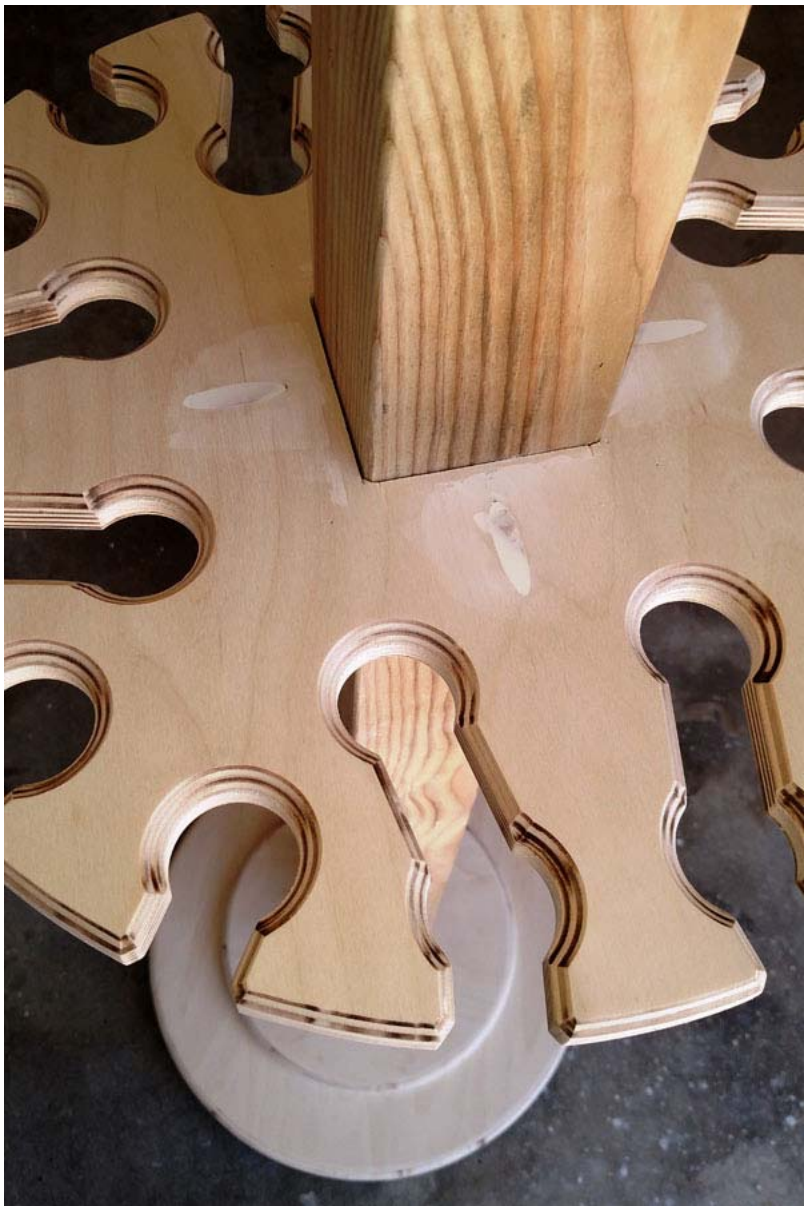

Figure 7. Pocket holes on top of disk filled with wood filler

MOUNT THE BOTTOM BAT DISK:

Slide the disk over the top of the post down to the supports.

Be sure to press the disk firmly down on the disk supports as you drive a 1 1/4" Kreg pocket hole screw into each of the four pocket holes. Drive each screw a little bit at a time along with the other screws so the disk is seated evenly. Carefully seat the screws so that the square hole in the disk is evenly located around the post. Figure 8 shows how the disk rests on the support pieces.

Figure 8. Disk resting on support pieces

Assemble the top bat disk to the post

Use a 1/2" x 8" lag bolt with a 2" heavy fender washer under the head of the bolt to secure the base to the top of the post. Be sure that the top side of the disk (the side with the chamfers) is located on top.

Look for the marks that you made on the edges of both bat support disks on page 13. Make sure that the corresponding marks are exactly vertically aligned with one another on the two disks. Continue to tighten the bolt once the marks are aligned.

Use your best judgment to determine the correct torque to apply to the bolt. You want the top disk to be very secure against the top of the post but you don't want to split the post.

Keep in mind that you will lose access to the bolt on the top disk because a cap will be glued over it. So make sure the bolt is tightened securely, that you're happy with the way things are held together, and that the marks on the edges of the two bat support disks are vertically aligned.

Cap

Look at the Cap page of file *Bat_Rack_06.skp* or *Bat_Rack_06.pdf*. The cap is a final touch that gives the Bat Rack a clean appearance.

Cut a circular piece of 3/4" plywood 4" in diameter. Use a router with a 1/4" round-over bit to round over one edge of the disk.

The drawing on the Cap page shows a 3" diameter hole cut at least 9/16" deep. In fact, the hole doesn't have to be a full 3" in diameter. You can use a "large enough" Forstner bit to remove material here and there until you have removed enough material to clear the heavy 2" fender washer and the height of the head of the lag bolt. Be careful that the point of the Forstner bit doesn't penetrate through the other side of the cap.

Once the space in the bottom of the cap is large enough to accommodate the washer and the top of the head of the bolt, apply glue to the bottom edge of the cap and glue it into place. Figure 9 shows the cap mounted on top.

Figure 9. Cap mounted on top

Other Considerations—Not Part of the Design

Figure 10 shows a set of 8 screws added to each end of the post on my version of the Baseball Bat Rack to prevent splitting. These 3" screws were added at the top and at the bottom because it appeared that the post might split. A split would mean that the 8" lag bolts might not remain secured. The holes were filled later with spackle.

Figure 10. Screws added to control splitting

Final Touches

A few final touches are needed.

ADD CAULK:

Apply caulk along the top of the joint where the bottom bat disk meets the post. This gives the joint a clean appearance.

FILL HOLES AND CRACKS:

Fill the pocket holes in the bottom bat disk with a suitable filler. Wood filler and spackle are good choices. Fill any other holes or cracks anywhere else with wood filler or spackle. Fill any nail or screw holes that were created when the bat disks were nailed or screwed together.

Allow enough time for the material in the filled holes and cracks to cure. Then reapply if you detect any shrinkage.

PAINT:

Paint the rack. A favorite team color is a good idea. <u>All surfaces should be painted with the exception of the bottoms of the feet.</u> By leaving the bottoms of the feet unpainted, you will avoid scraping paint onto any floor that the Bat Rack sits on.

<u>Putting the Baseball Bat Rack to Use</u>

Here are two additional pictures showing the Bat Rack loaded with bats. This rack was painted in New York Yankees blue.