

How to build a Nearing frame

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Contents

Introduction

The basics of a Nearing frame

Materials

Tools needed

Other parts needed

Cutting the plywood

Assembly

Attaching the hinges and plexiglass

Installing the hinges

Installing the plexiglass

Drilling the holes in the plexiglass

Congratulations!

First, a little background info:

Guy Nearing built the first Nearing frame to propagate Rhododendrons somewhere around 1950 while trying to root Rhododendron cuttings. Some species of Rhododendrons are extremely difficult to propagate from stem cuttings, so he devised a box that worked extremely well, and still does to this day. A Nearing frame is quite simple to build, and once constructed, is just as easy to maintain. With the discovery of intermittent misting systems and rooting hormones, it is much easier to propagate plants, but a propagator needs every little trick they can find to help them successfully root certain species. This Nearing frame may be the trick you are looking for you to be successful with those hard to root cuttings.

Before we begin, you need to understand the basics of a Nearing frame

A Nearing frame is essentially a modified cold frame, modified to not allow any direct sunlight into the frame. Only indirect sunlight is allowed to enter the frame, and this is accomplished by constructing the frame following specific criteria and situating it so the opening faces north. The reason for the North-facing opening is to eliminate the direct sunlight from entering and falling on the cuttings inside. Sunlight enters only by reflection; giving the cuttings all the light they need, but not too much to cause them harm.

The inside surfaces of the Nearing frame should ideally be white to reflect the sunlight down toward the cuttings. There are a few ways to accomplish this, the easiest and less expensive being paint. A good quality exterior paint inside and out will protect the structure for years to come. To be sure the paint adheres to the wood, be sure to prime everything first. Now let's get to building one huh?

Materials

There are many materials you can use to build a Nearing frame. You can use new pieces of plywood, used plywood, new lumber, old lumber, you get the idea. There is no right or wrong material as long as it is built correctly (Cedar boards are extremely long lasting and probably the best choice, but may be too expensive and difficult to locate). For this explanation, I will assume you are starting with a brand new piece of ¾" exterior or pressure treated plywood. If your materials differ, just modify these instructions to suit your needs. Remember, if you do settle on used wood; sand everything to make sure the primer and paint will stick to the surface. Old wood forms a type of seal that will not let the paint penetrate the fibers. This will cause the paint to fall off quickly and render the structure essentially useless as a Nearing frame. These instructions are for building a Nearing frame that is roughly 2' by 2' square and will hold hundreds of cuttings.

Tools needed:

The nearing frame can be built using basic hand tools, but power tools make it so much easier! I mean, really, can you imagine screwing all those screws in by hand? Me neither!

Be sure you follow the directions that came with your tools and know how to use them safely. Also be sure to wear safety glasses at all times.

- Circular saw for cutting the plywood sheet (a table saw makes things much easier!)
- Tape measure
- Pencil
- Straight edge. Can be a level or even a straight board
- Square to be sure all corners are square
- Drill with screwdriver bit to fit the screws
- ¼” drill bit for drilling the screw holes in the plexiglass (a small unibit works best, but is a bit pricey)
- Sandpaper, 80 or 100 grit
- Paint brushes, rollers, paint tray, etc.

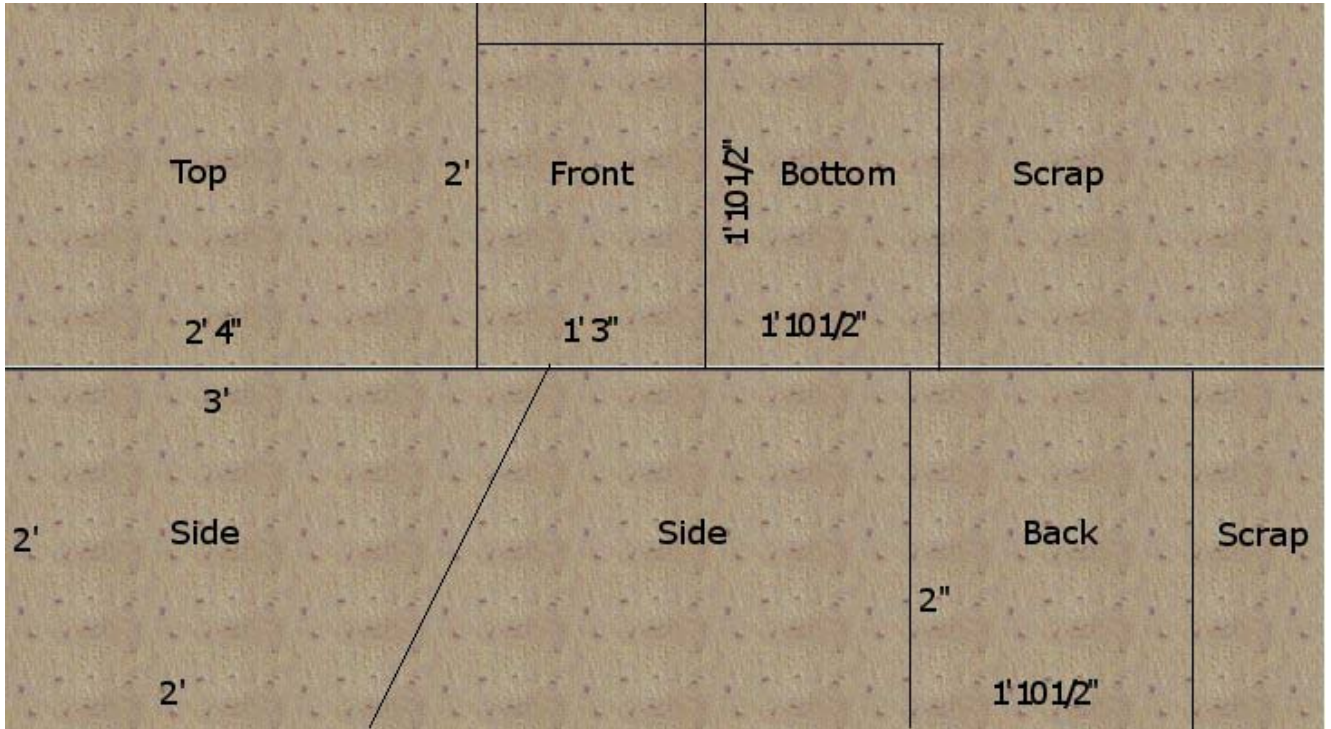
Parts needed:

- One (1) sheet of 3/4" exterior or pressure treated plywood. If you are not sure which grade is exterior or pressure treated, ask the salesman.
- One (1) Small box of exterior grade screws 1 1/4" long. Usually the easiest to find and work with are the "sheetrock" type, also known as deck screws. A small box usually has a hundred or so, which should be plenty to assemble the Nearing frame.
- Two (2) small box hinges. These can be new or used, but should be a matching pair to keep the lid from binding. Ideally they should also be exterior grade, but if not, simply paint them to help protect them. Box hinges are the rectangular type typically found on doors. The leaves should ideally be 3/4" wide.
- One (1) piece of plexiglass @3/16" thick. I purchased mine at Lowes. It was .220 thick and came in a 24"x48" sheet. It is also unfortunately the most expensive piece you will need. However, you can build two Nearing frames from one sheet.
- Two (2) pieces of 3/4" pine boards at least 2" wide and at least 30" long and one (1) piece of 3/4" pine 1" wide and at least 2' long
- Exterior primer white
- Exterior paint white
- Six (6) #8 screws 1/2" long with flat washers and lock nuts.
- Soil heating cable (Optional. If you will be using a soil warming cable, be sure to purchase one that is no more than 5' long to reduce the risk of fire. Also, a hole will need to be drilled in the Nearing frame to allow the cord through. This hole will need to be covered to keep light from entering the Nearing frame.)

Now that we have the materials on the list, let's dig in shall we?

Cutting the plywood

Using the diagram below, mark and cut your sheet of plywood.



Start by cutting it right down the middle so you end up with two pieces 2'x8', then just start cutting out the remaining pieces.

Now that all the pieces are cut, sand them down just a bit to roughen up all the surfaces and to remove any small splinters that may have formed during the cutting.

Paint all pieces front and back, with primer. When the primer is dry, scuff it up slightly with sandpaper (do not sand through the primer!) and paint everything with two coats of white paint. Once the paint dries, continue on to the assembly.

First, a dry run

Before you start driving screws to hold everything together, I would advise test fitting to be sure everything looks good. Read these directions all the way through at least once and test fit items as you go. Now is the time to find out if something was cut wrong. You still have a bit of scrap to cut a new one out if you need to. If everything looks good, go ahead and start holding the pieces together with screws.

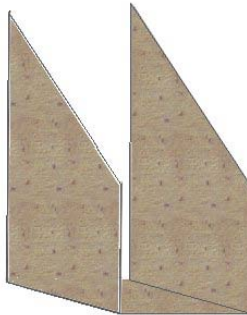
Assembly

Start by standing the bottom up on edge and attaching one side to it. It may be easier to also use the front to help hold the side up so you can drive the screws. Be sure the bottom piece is on the **INSIDE** of the side piece. Align all edges and screw it into place with about 4 screws. Flip the assembly over so the side you just attached is now flat on the floor and attach the remaining side.

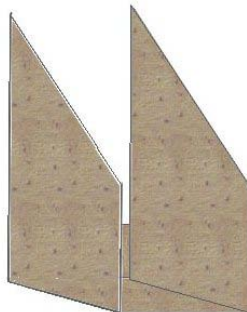
NOTE: Although these illustrations show bare wood, yours will be painted white at this point. (Try as I might, my white boards didn't want to show up on the white background...go figure!)



Carefully flip the assembly over so it is lying on its bottom.



Next, insert the front piece **INSIDE** the assembly and attach it with screws, being sure everything is flush.



(Note the front section installed)

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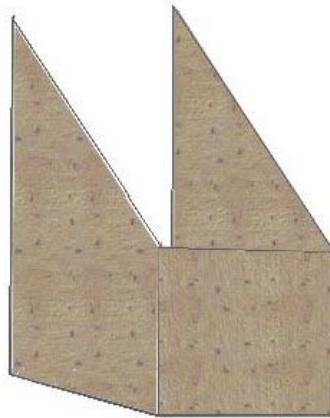
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Take the back piece and measure down the 2' long side, 1". Make a mark across the entire width of the board. This is the hinge line.

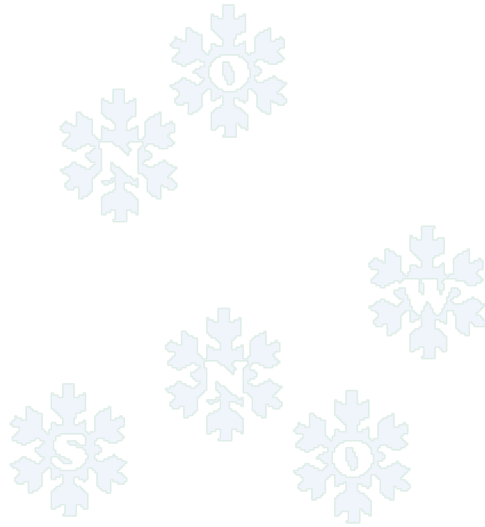


Now add the back piece, installing it **INSIDE** the assembly. Be sure your mark is facing the **INSIDE** of the assembly and is at the top. (You will see the reason why later)



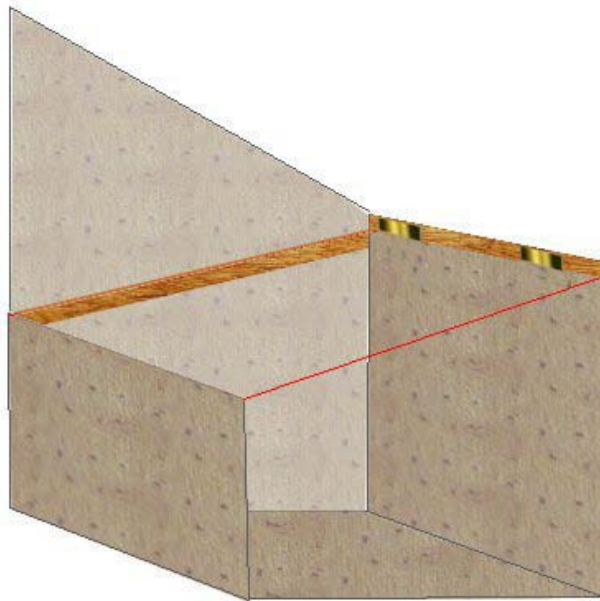
Now it is beginning to look like something huh?

Next item is the supports for the edges of the plexiglass. You will need to cut a 3/4" board to fit as shown in the following picture. The reason for the board is to help support the plexiglass in the winter when snow may lay on it. Screw them to the sides with the exterior screws.



Sorry, wishful thinking; it's snowing as I write this. I had better get back to work!

Here is the picture showing a support:



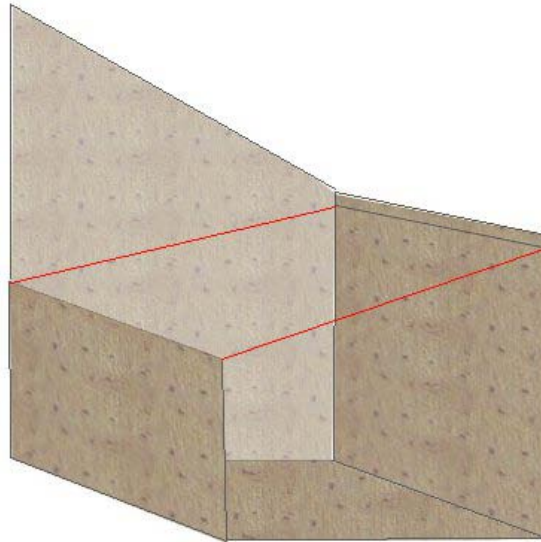
(Notice the support is even with the bottom of the hinge line we made on the back and even with the top edge of the front?)

Attaching the hinges and plexiglass

Hey, you are almost done! The only thing left is to attach the hinges and plexiglass and this thing is ready to be placed into service.

You need to figure out what size the plexiglass needs to be cut to fit in the opening, but not be too tight. First you will be measuring from side to side. You should have something close to 22 ½". Subtract ¼" and write down the measurement.

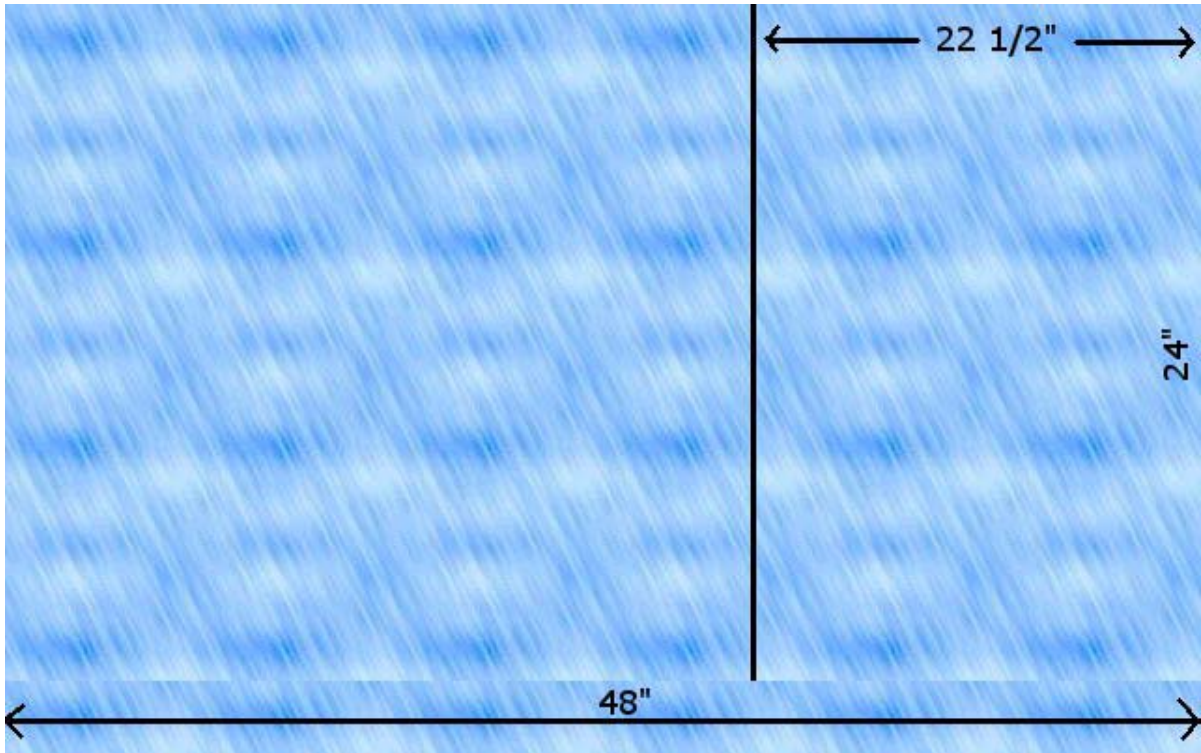
Next, measure from front to back, starting at the line on the back and ending at the front edge. Study the following picture to see how to measure this. I have removed one side and faded out the second for you to be able to get a good look at exactly where to measure. To be sure the plexiglass will hang over the front edge just a little, you will be adding 1" to this measurement. Add the inch and write this measurement down with the first.



(Notice the line on the inside of the back piece? AHA! That is why it had to face INSIDE!)

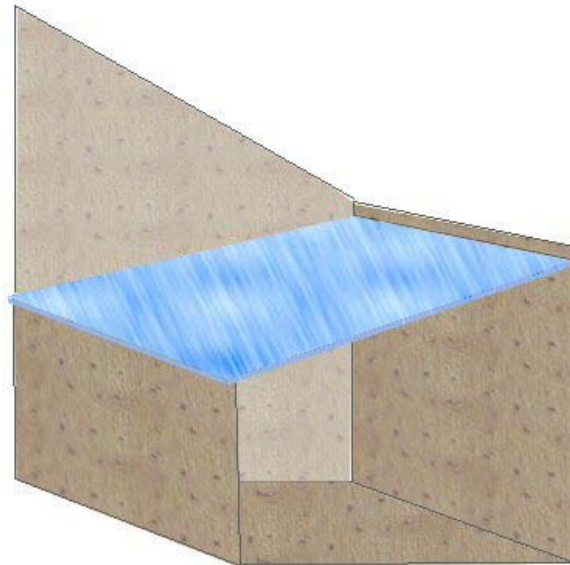
Now that you have two measurements, you will be cutting the plexiglass to fit. Plexiglass can be cut using the circular saw, but a table saw works much better if you have access to one.

Cut the plexiglass to size. You want to cut the plexiglass so you end up with a 24"x22 ½" piece. Study the following picture before cutting the plexiglass:



Caution! Be sure to cut the plexiglass properly. Cutting it improperly will waste the remaining piece and you will not be able to use it for a second Nearing frame.

Test fit it into the opening. If it rubs on the sides, trim it a little to clear. You want it to have a small amount of room side to side, but overhang the front slightly. (More on that later) See the following picture for clarification:

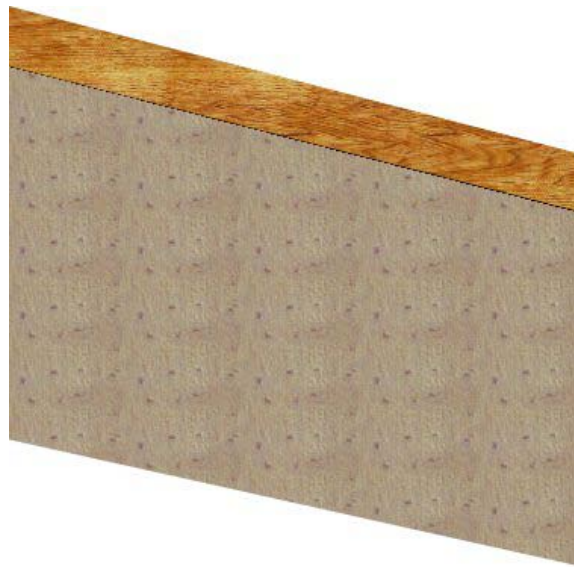


(Notice the slight overhang over the front?)

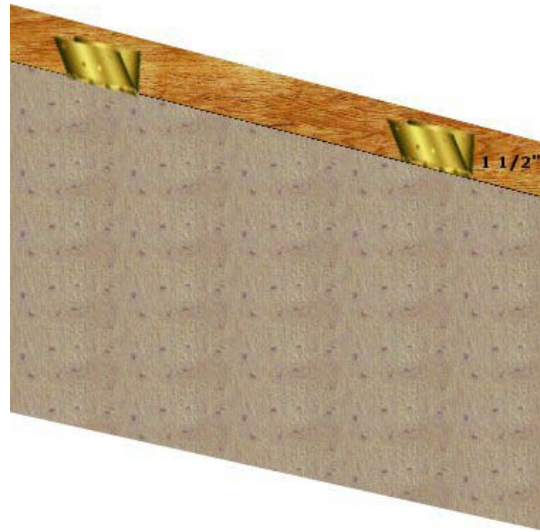
The only thing left is attaching the plexiglass to the hinges. This is actually the hardest part of the whole build. Well, not THAT hard.

Installing the hinges

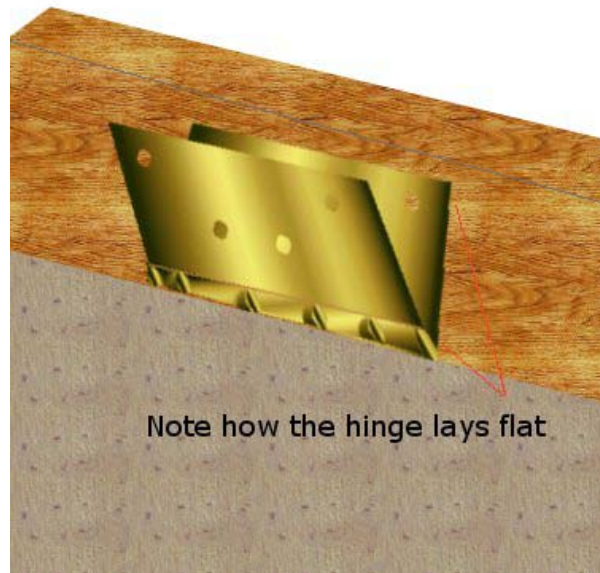
Using the following picture as a reference, install a 1” wide board above the line on the back. This is where you will install the hinges. This hinge board will actually set on the top of the two plexiglass supports you attached to the sides.



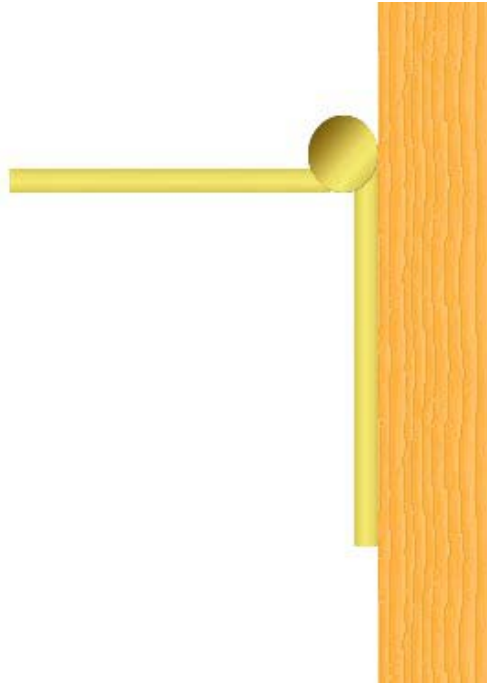
Measure 1 1/2” from each side. Attach the hinges to the board using the screws provided. Align them with the bottom edge of the board as shown. It is easier to do if you lay the plexiglass on the supports and lay the hinge leaf that will be attached to it, on it.



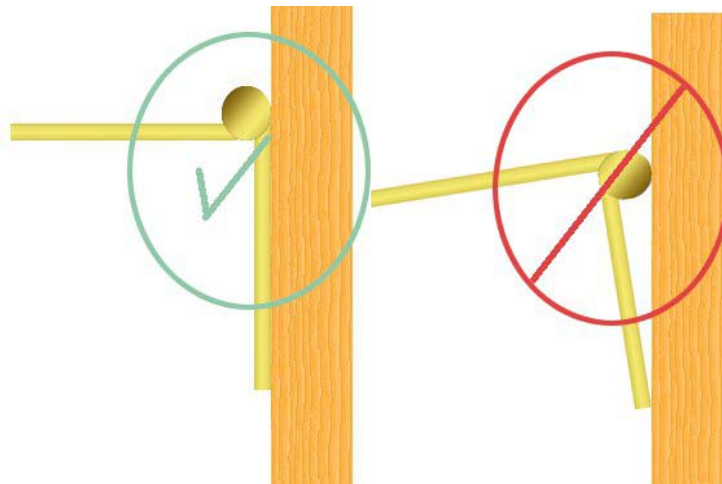
A word of caution: Be sure hinge lays flat against the back, and then attach it to the back with screws. You may need to get some shorter screws so they do not stick out the other side of the board. New hinges usually come with the correct length screws.



Most box type hinges have a flat leaf and a leaf that has the barrel on it. See the close-up pictures below. Be sure the flat side is against the board. If installed wrong, the hinge will not work correctly. (Please note that the hinges in the pictures are not installed the way your hinges are installed)



For comparison:

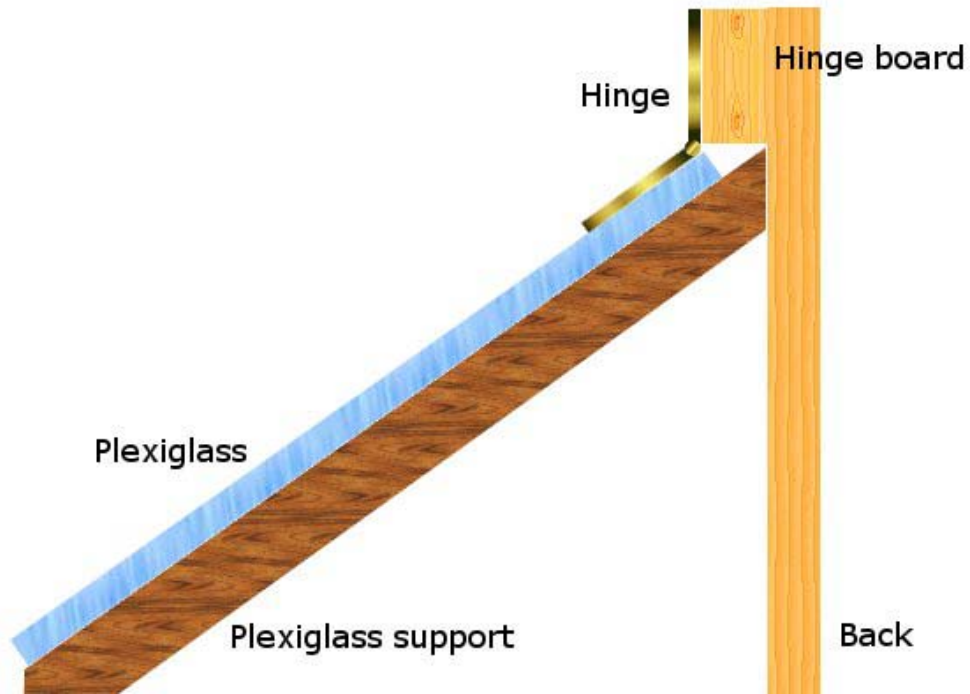


Right

Wrong

If your hinges differ from the ones shown, you may need to make some adjustments to keep them from binding.

For a better understanding of how the plexiglass supports, hinge board, plexiglass, and hinges all connected, reference this picture:



Installing the plexiglass

Drilling holes in plexiglass has always been a bit tough for many people. Here is why:

Standard drill bits that you purchase have an angle of 118 degrees. These are good for the average homeowner because the angle allows them to drill holes without the bit seeming dull or too aggressive. It is a fairly aggressive angle to accommodate the many different materials homeowners usually drill through.



A shallower angled drill bit has an angle of 150 degrees and is used to drill steel and tougher material. These drill bits require a starter hole in the material to cut properly. Without the starter hole, the bit would seem to be dull. They also require specific rates of feed to keep them sharp

Sharper angled drill bits have an angle of 90 degrees. These bits are used for drilling materials like soft plastic and other materials.

Using the standard drill bit that has an angle of 118 degrees causes the drill bit to dig into the plastic as it is being drilled. This causes the drill bit to seize in the hole. This sudden seizing causes stress around the hole you are trying to drill. This stress usually causes cracks to form. That is the best scenario you could ask for if this happens. The small cracks can usually be covered with a washer, which supports the weak area and spreads out any loads.

Worst-case scenario is the plexiglass actually breaking when the bit seizes. This happens quite frequently, especially if the holes are close to the edge.

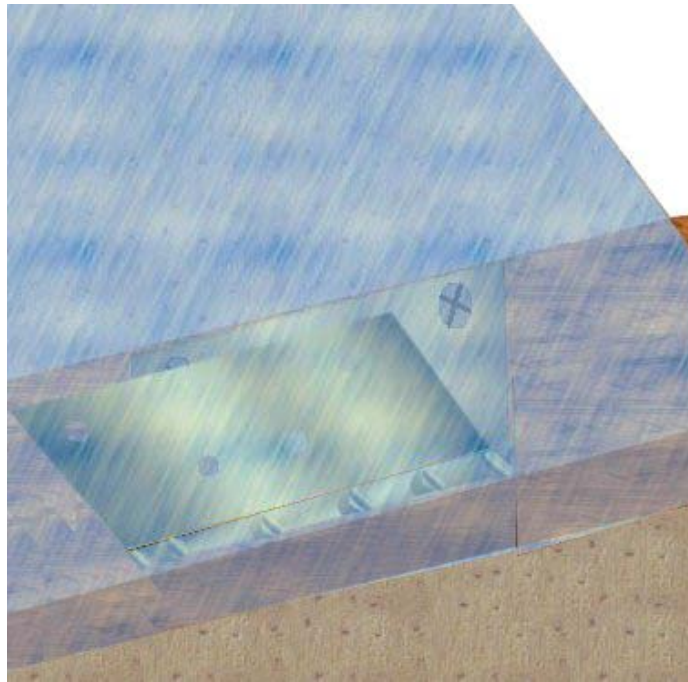
So which bit do you use? Well, a special 60-degree bit specially made for plexiglass of course! The problem is, where do you get one? You can order one online I guess, but I am sure you knew that. If you want to order the special bits that will drill through plastics, check out [Amazon](#) first. If they don't have one, try [Ridout Plastics](#). You need to purchase a bit that is larger than the screw or bolt you will be using. In this case, bolts. I would suggest the 3/16" or 1/4" size, but remember to buy the one that is a little larger than your bolt. I would hate for you to purchase a bit that is too small. I know you would be tempted to "just make it a little bigger" with a regular drill bit, but that is just asking for trouble.

If you don't want to purchase the special drill bit, you can use a unibit if you have one. Unibits are drill bits that have multiple drill sizes on one shaft. If you don't have a unibit, you would need to purchase the small narrow one. With that being said, if you are thinking about buying the unibit and not the special plastics bit, first compare the price. The special bit is a little over \$5 plus shipping. A unibit will run you \$20 or more! Now don't get me wrong, I love [unibits](#) and own 4 or 5, but don't run out and buy one unless you can definitely use it later.



The next picture shows how the plexiglass will actually be installed onto the hinges. Note that the plexiglass is **below** the hinges. The edge of the plexiglass will be even with the edge of the board holding the hinges.

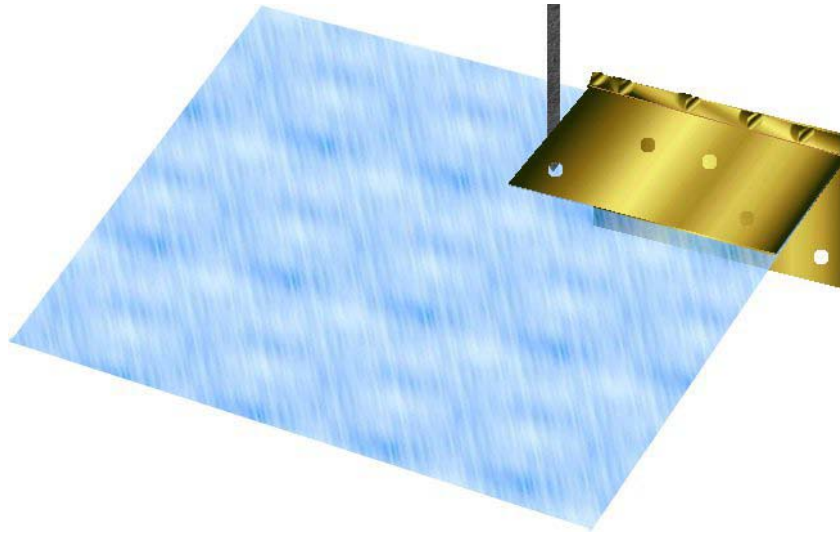
NOTE: This picture is a bit deceiving. The plexiglass *does not* go under the hinge board. It gets butted right up to it, but should not go under. If the plexiglass does get installed under the hinge board, the hinges will bind and they or the plexiglass may break.



Drilling the holes

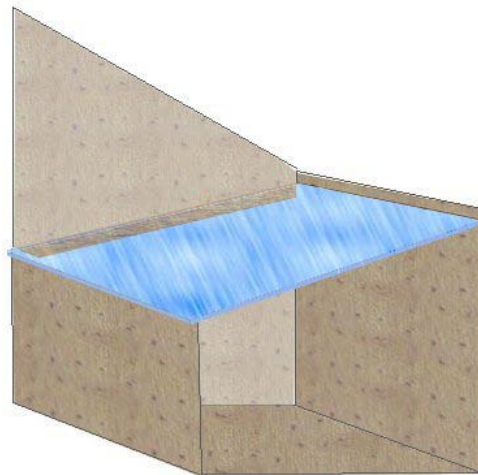
Now that we have the drill bit situation figured out, let's get to drilling the holes and wrapping this build up.

The simplest way to get the holes drilled where they need to be is to set the piece of plexiglass on the boards you installed on the sides and push it tight towards the back, but not under the hinge board. You will be drilling the holes through the holes in the hinges. It may take a bit of fiddling to get things lined up. Be sure it is lined up correctly before drilling your holes. Make sure the plexiglass is centered in the opening and has a bit of space between it and the sides to prevent binding.

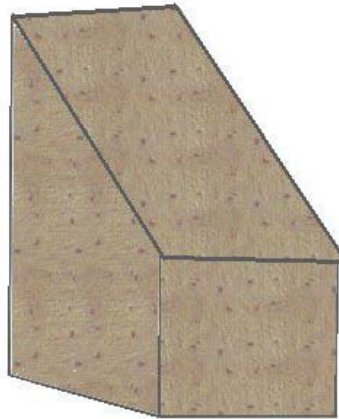


Drill all the holes, being careful not to put too much pressure on the plexiglass. Once the holes are drilled, install the nuts and bolts, being careful not to over tighten them

The following picture shows the plexiglass installed and sitting on the support strip. The hinges are not shown.



Finally, add the top piece, keeping it flush with the side and front. It should overhang the back by about an inch or so. Screw it to both sides and add a few screws to hold it to the back piece too.



The last thing you may want to do is to make a simple locking mechanism to help keep the plexiglass open for when you stick the cuttings in it. Holding the plexiglass and sticking cuttings at the same time can get quite frustrating!

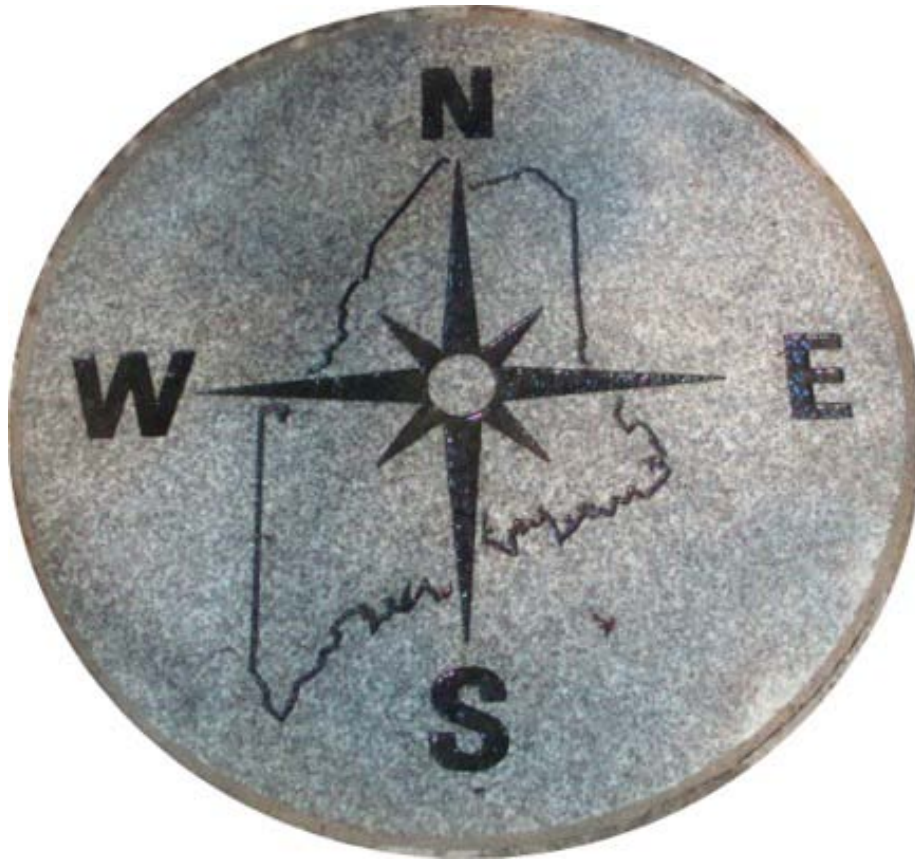
Simply open the plexiglass and hold it toward the top of the Nearing frame. Screw a small board about 2"x5" to the underside of the top piece, right next to the plexiglass. Be sure this piece of wood and the plexiglass do not contact each other. This may cause a bind and cause the plexiglass to break.

Next, get another small board about 4" long and drill a hole centered at about 3". Set this piece under the first and position it so the plexiglass can close. Drive a screw through this hole and into the piece you just installed onto the top. Do not tighten this screw too tight. This small board needs to pivot to hold the plexiglass up. See pictures:



Congratulations!

Your Nearing frame is now complete. The only thing left is to set it in its final location, align the opening to true north, and bury it in the soil about a foot or so and fill it. Remember, aligning the opening to true north is the key to success. You want no direct sunlight to enter the Nearing frame, only indirect light.



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After you have constructed your Nearing Frame, leveled it, and aligned it to true north, it is time to fill it. There are several layers.

1. Put down a two-inch layer of clean, washed sand.
2. On the leveled sand, place the soil warming cable if you are using one. Some have a built-in thermostat. Others require a separate thermostat box. Set the temperature about 72 degrees.
3. Over the heating cables, lay a piece of welded wire screen with half-inch squares. This will enable you to replace the upper layer of sand and the rooting medium without having to redo the cables. If you are not using the cables, you can eliminate the wire if desired.
4. Add another two inches of clean, washed sand.
5. Top it all off with three inches of rooting medium. There are many favorite rooting media. I use a mixture with equal parts of perlite and sand. Other combinations include peat moss and perlite in equal parts, measured by volume.
6. Soak the rooting media with a gentle spray until it is completely saturated and close the cover. Peat is notorious for not wetting. One trick is to add a small amount of dish detergent to your water. Another is to use warm water when wetting.
7. Turn the heating cables on and wait at least a day for the soil to warm before placing the first cuttings.