

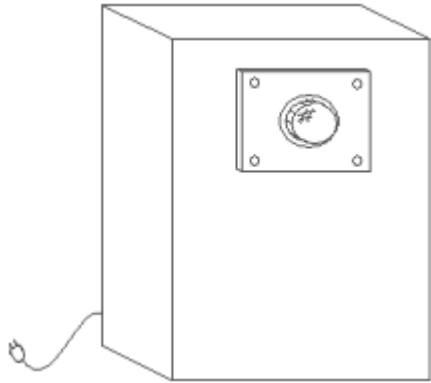
The MkIII LCD Projector Enclosure

Design Notes and Instructions

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DIY Projector MkIII

Size: 20"x15"x14"

Light Source: 250w or
400w MH

Panel Size Range: <15"

Image Quality:
Excellent

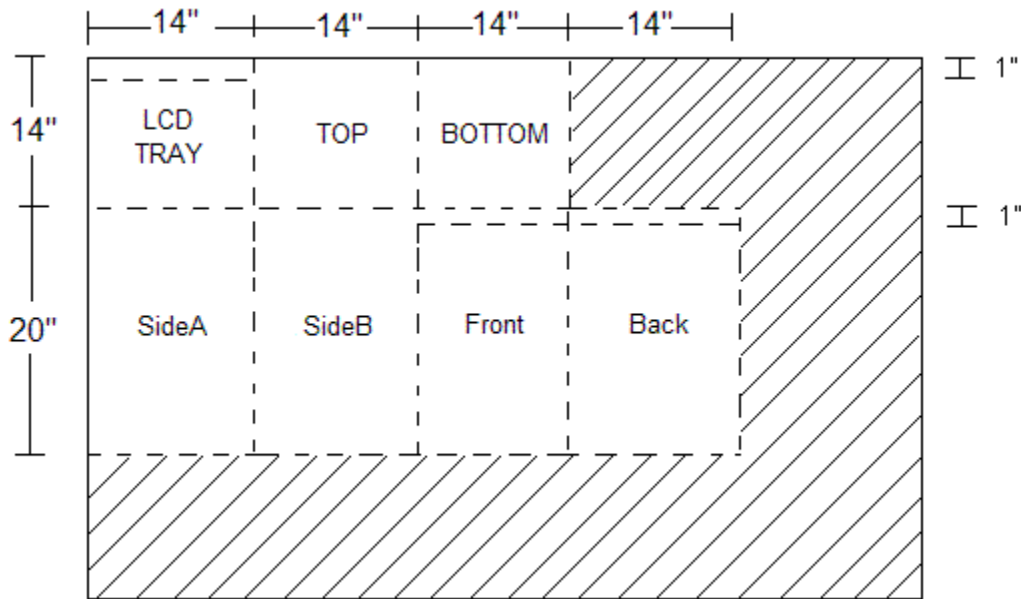
Construction of this projector design will require at least the following parts (for a complete projector):

- **MkIII Enclosure**
- **Projection Lens** – DPC “triplet-80” recommended
- **Fresnel Lens** – 220mm rear FL and 330mm front FL recommended
- **Light Source**
- **12"x12" or similar mirror**
- **1/2" or smaller dowel rod**
- **Cooling System** – 2 80mm PC cooling fans with 12v power supply

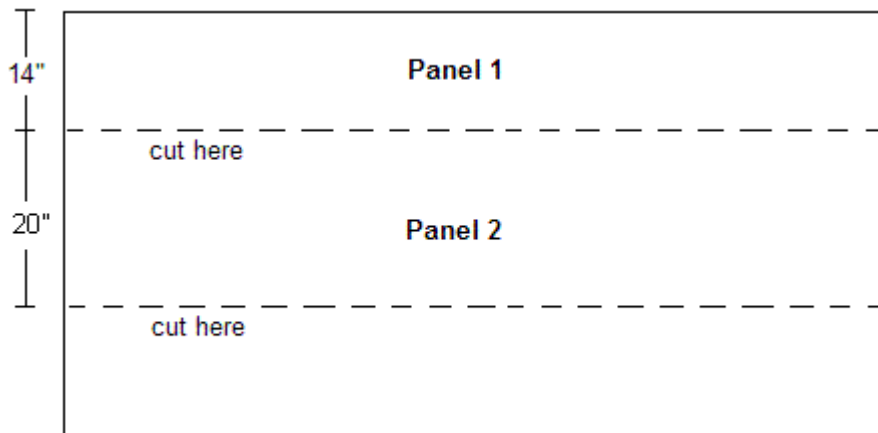
Note: The following instructions are our guide to building a type-MkIII projector. The design and instructions are able to be downloaded and printed for free by the public, but please do not copy, distribute, or attempt to profit in any way from these instructions - we hope to keep this design free for everyone. Please contact us if you require copies of these instructions.

Step 1: Cutting Panels

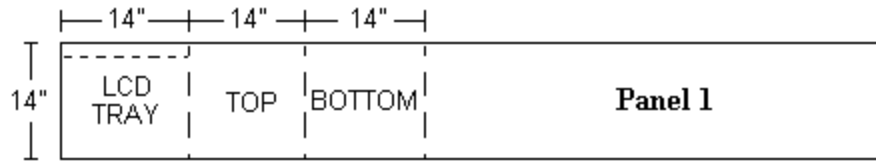
Here is the cutting layout for making each panel from 1/2" thick MDF or similar wood. Each of the Side panels may be cut from a thinner piece of wood or even be made from sheet metal if desired. If you are unable to make these panels for any reason, such as lack of tools or unavailability of materials, then you may purchase these panels pre-cut from our online store.



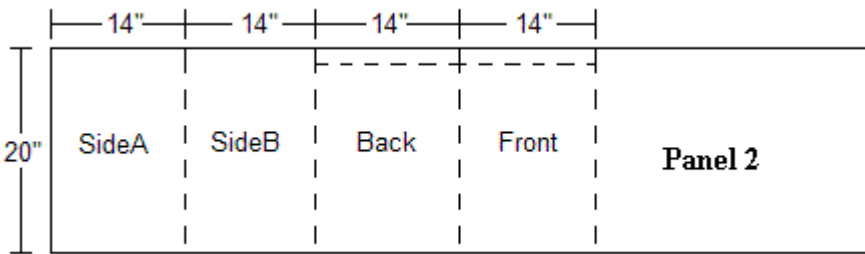
First, cut two long pieces from the larger piece of MDF.



Next, cut each of the following pieces from panel 1 (the 14" wide panel).

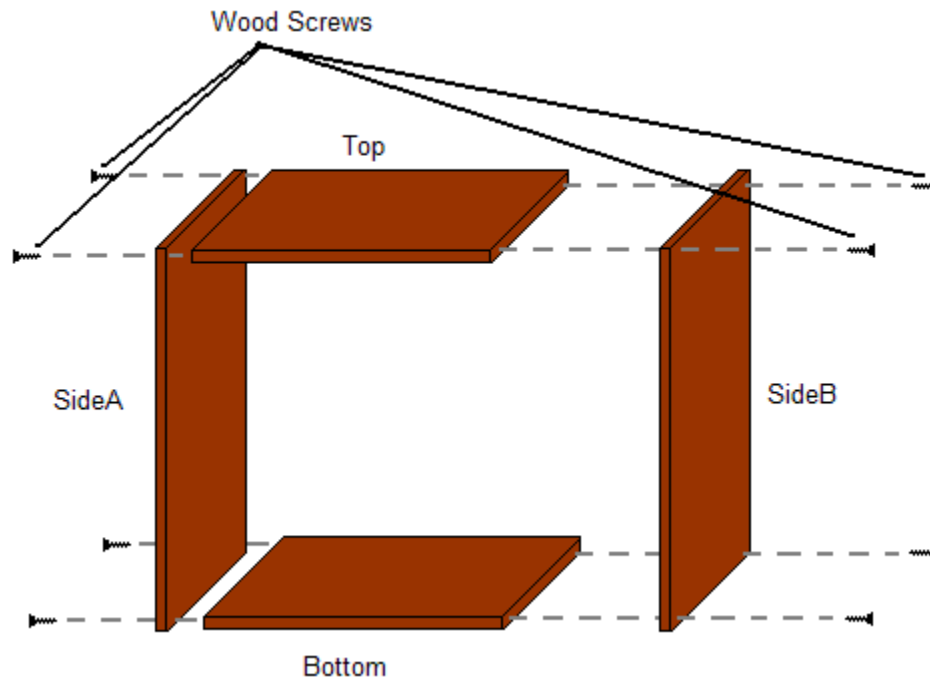


Then, cut each of the following pieces from panel 2 (the 20" wide panel).



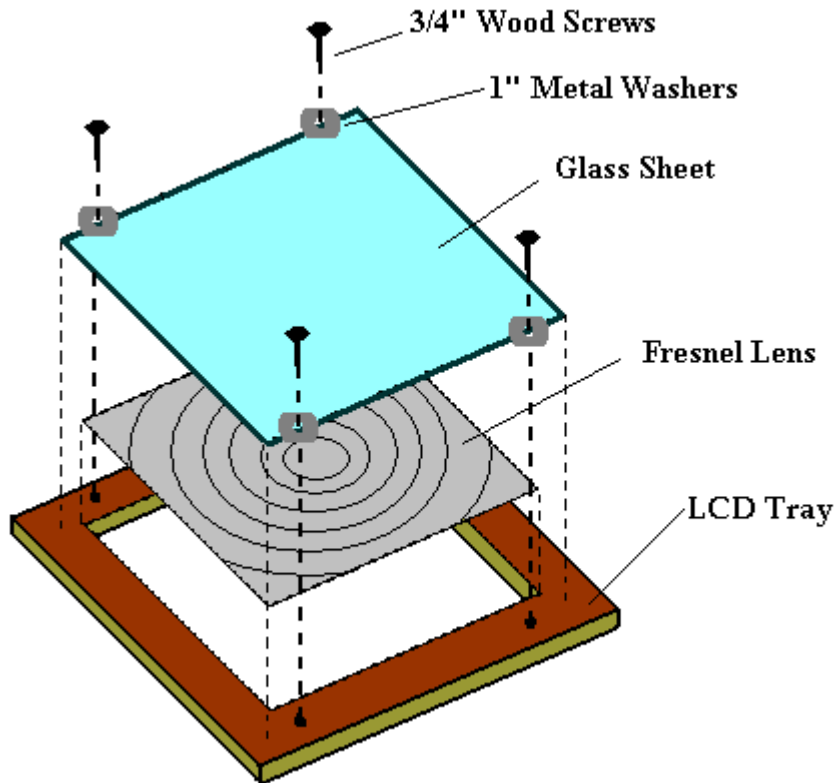
Step 2: Constructing a Partial Enclosure

Now that we have all of our major side panels cut, let's create a simple enclosure. First, we will put together the top, bottom, and both side panels to make a hollow box. Make sure to always pre-drill each hole before driving in a screw. If you try to put in a screw without drilling, you will most likely split the wood.

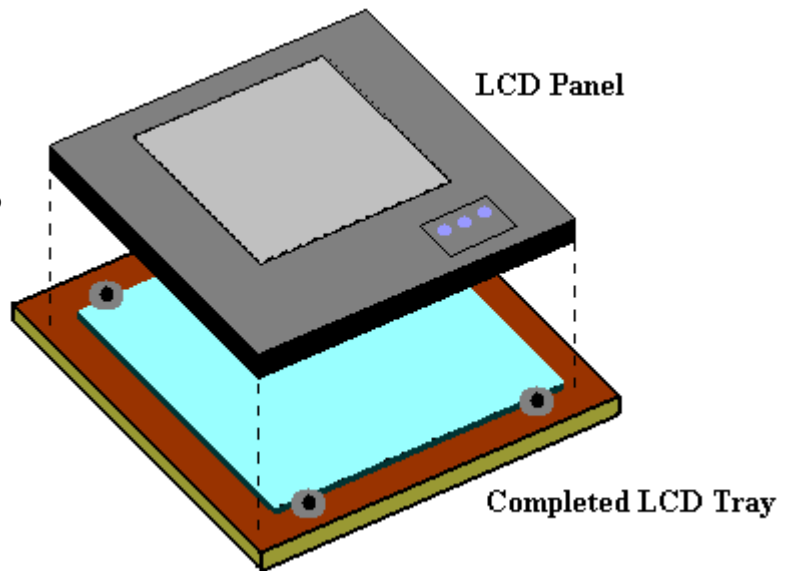


Step 3: Assembling the LCD Tray

1. Cut a square for the Fresnel lens that is just barely smaller than your fresnel lens (about 1" from each edge of the LCD tray for 12"x12" fresnel lenses).
2. Carefully sandwich the fresnel lens between the LCD tray and the sheet of glass.
3. Use your drill to make 4 holes that are spaced apart roughly as shown in the diagram below. Make sure that these holes are about 1-2mm from the edge of the glass.
4. Insert the screws and washers as shown in the diagram below. Tighten just enough to keep the glass from being able to slide around.



Now that we have that done, try putting your LCD on the finished LCD tray. You need to make sure that the LCD doesn't hang over any of the edges of the tray, otherwise it won't fit inside the MkIII. This is no problem though since you can easily remove the LCD panel from its frame by removing several sets of screws. Assuming that your LCD fits fine on the first try, it should look something like this (see diagram on following page).



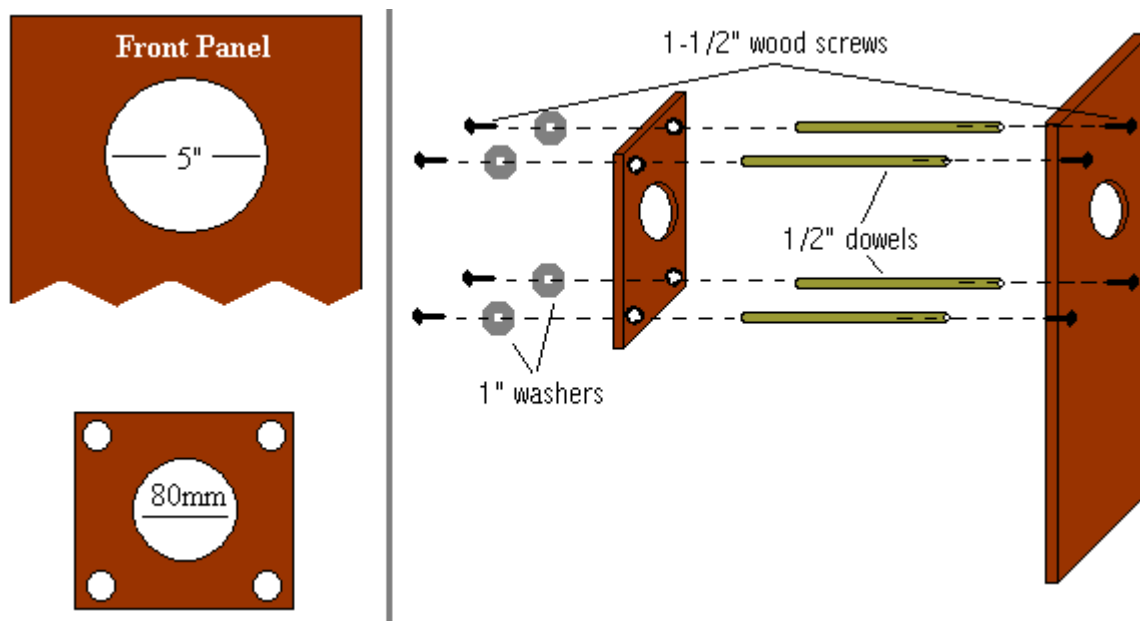
Once your LCD tray has been assembled, you can mount it inside of your projector enclosure. It should go approximately 9" from the bottom of the enclosure when using an HQI or other skinny metal halide light source. For larger lamps, you should put the LCD tray about 8.5" away from the center of the light source, though the MkIII enclosure may not supply you with enough room for the mirror if you are using a larger metal halide lamp.

Step 4: Focus Assembly

To create the focus assembly or lens mount, you will need to cut a hole in your front panel that is wide enough to let the image out of your projector without casting a shadow on it. A 5" round hole seems to work best, but if your projector is highly calibrated it may be possible to reduce the size of this hole. The center of this hole should be about 4" from the top of the front panel.

Now you will need to cut a 7"x7" panel from the rest of your MDF. This will be the panel that your lens is mounted on. Cut a 80mm circular hole in the center of this panel. Now drill 1/2" holes in each of the 4 corners. This is where your lens mount will slide.

Once you have both panels prepared, assemble the two panels along with 4 1/2" dowel rods as shown below. These rods may only need to be about 3" or less to work correctly, but we recommend cutting them at 8" long to start with and then scale them down from there. The length of these depends on how high your LCD panel will be from the fresnel lens.



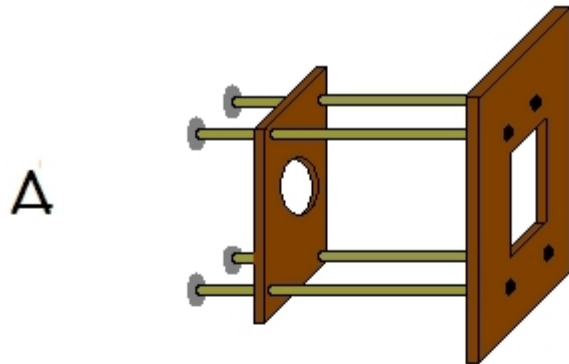
An optional enhancement for this design is that you can use a screw-based system to help you focus this panel. Focusing is normally achieved by manually sliding the lens mount towards or away from the projector until the image comes into focus. A more fine-tuned method, though also slower, is to add a screw-driven focuser.

C. Panel G is the lens mount, and panel F is the front panel of your projector. This is a side-view. Notice that the washer with extra holes has been securely fastened to the lens mount with wood screws. This keeps the nut it is over from moving when you adjust the focus knob.

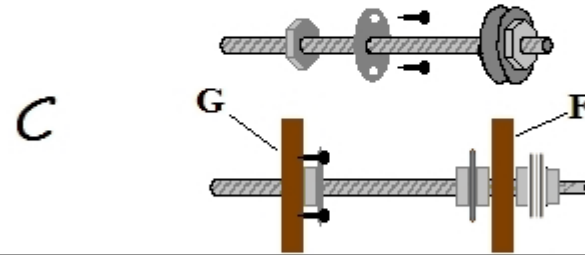
D. Here is the finished result. Turn the nut/washer combination on the outside of the projector to turn the entire rod. This will bring the inner panel closer or further from the front panel. All nuts and washers **except** for the nut fastened to the lens mount should be tightened to the screw rod firmly enough that they will not turn on the rod. Epoxy or a quick weld job will do this nicely.

To build this system, you will need a threaded steel rod (smaller diameter is better) that is about 8" long. You will also need a way to cut this down, like an angle grinder, chop saw, or hack saw. Additionally, you will need about a dozen fender washers and a dozen nuts that fit the steel rod.

A. This is a side-view of the focus assembly you have already constructed from above. Note that the panel on the right is your front panel. The lens mount may be on the inside or outside of your projector depending upon where your panel sits inside the projector, and how far from the wall your projector will be. If your lens mount is on the outside of the projector (recommended), then you probably do **not** want to build this extra assembly.

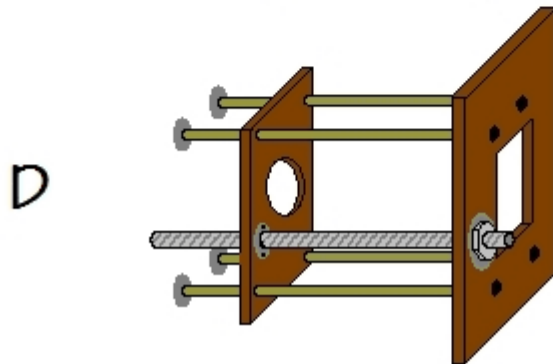


B. The first washer on the left has been drilled twice so that some small wood screws can fit through the outer holes.



C. Side view of the mechanism

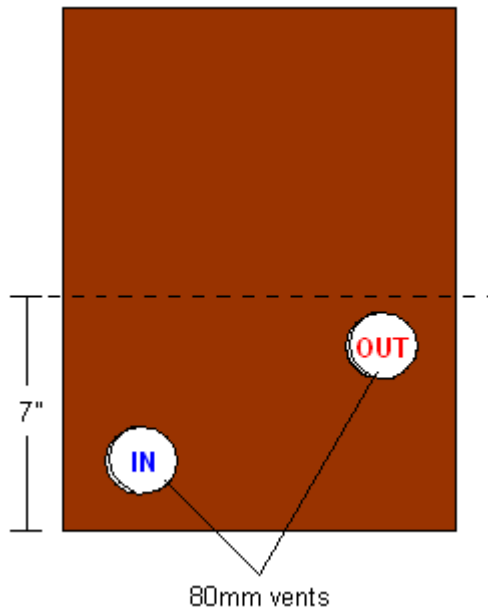
D. 3d view of completed mechanism installed on the front of the projector (front panel is cut away)



Step 5: Further Enclosure Assembly

Cut Air Vents for Cooling System

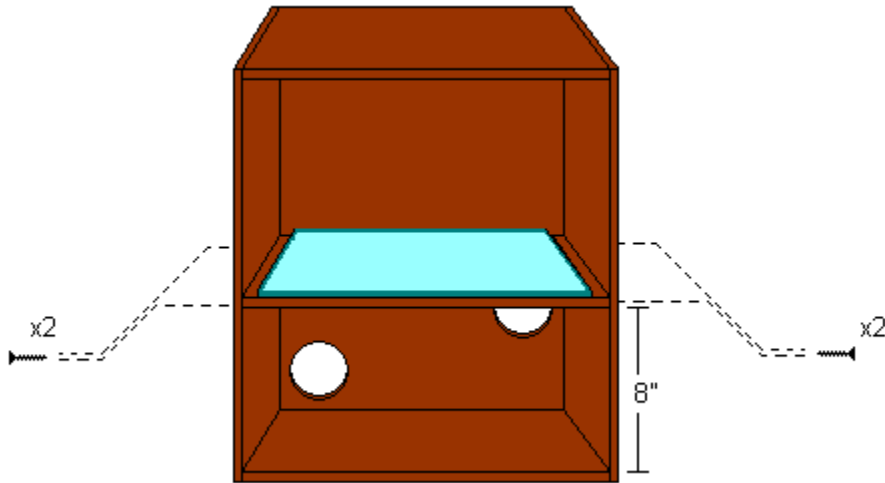
It is very important that your projector has at least some forced-air cooling, especially if you are using a light kit that has more than 250 watts dissipation. The placement of the vents does not need to be very specific as long as you have one fan pushing air in and another pushing air out. There are many ways you can configure your cooling system, but here is the way that I cut the 80mm vents for the Mk III enclosure kits.



After you have installed the rear panel of your enclosure, measure about 7" up from the base of the projector enclosure and draw a horizontal line across the rear panel. You should avoid cutting holes above this line since your LCD tray may close enough that a fan would not fit above this point. Now use a compass or the base of your projection lens triplet to draw two circles that are approximately 80mm in diameter (assuming you will be using 80mm fans). The exact placement of the fans does not have to be as shows in the picture to the left, but it is recommended that the input fan be placed lower than the output fan, preferably at opposite corners of the allowable region. After you draw the circles, use a circle-cutter or jigsaw to cut the holes. You can then install the fans from the inside of your enclosure. **Note:** each fan has an arrow printed on its side to indicate the direction of air flow. Wiring of the fans will be covered later.

Installing the LCD Tray

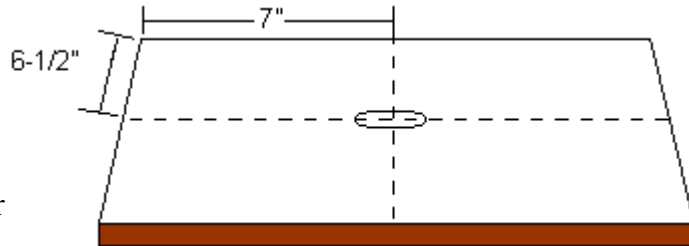
Now that you have the projector nearly assembled, it will be very easy to install the LCD tray. If you are using your fresnel lenses together instead of sandwiching your LCD between the two halves, then the LCD tray placement isn't very specific. Chose a height about 7"8" from the inside bottom of the enclosure to mount your LCD tray using a total of 4 wood screws. If you prefer to have your tray at a variable height (recommended when using the split fresnel method), then you can alternatively drill many pilot holes for different heights. Then use shelf mounting pegs on the inside of the enclosure instead of attaching your tray with screws. We have the shelf hardware available per request if you purchase the Mk III kit from us.



Step 6: Installing the Light Source

Installing Lamp Holders

You want to install your lamp so that the source of light comes from is centered exactly with the center of the fresnel lens. Since the fresnel lens is approximately centered on the LCD tray, we can assume that the center of the fresnel lines up exactly with the center of the bottom of the enclosure. Measure 6-1/2" from the back of the enclosure and make a mark. Now measure 7" from one of the sides of the enclosure and make a mark. If you draw lines from those marks as shown below, the intersection is where the center of your lamp should go.



Extra Step for 400w Light Sources Only

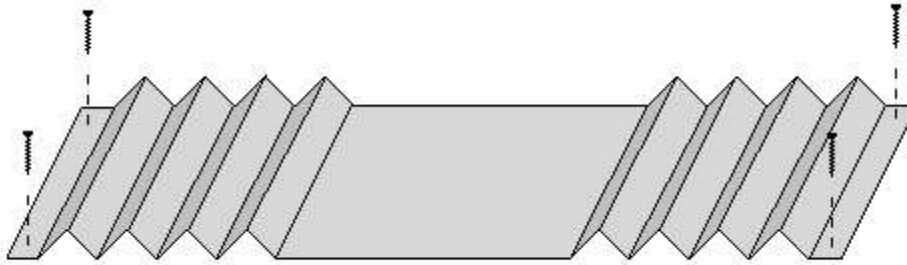
If you are using a 400w light source, you should put a piece of aluminum under your light source so that the wood will not scorch. Roofing material or other thicker-than-foil metal will work best, but foil seems to work fine if that is all you have. I recommend doubling it up though. The larger the piece of metal - the more protection you have (since metal dissipates heat with respect to surface area).

Continuing (for all light sources) ...

Next, install your metal halide lamp into the lamp holders, taking care not to touch the lamp excessively except at the ends. Place the assembly in the enclosure so that the lamp is centered correctly. Now stick a pencil through the mounting holes on the lamp holders to mark where you will need to drill in order to mount the lamp holders. Then drill your pilot holes and use 3/4" wood screws to mount the lamp holders while the lamp is still attached. **DO NOT OVER TIGHTEN:** using too much pressure to tighten the screws can crack the lamp holders!

Installing the Ballast

This step will vary depending upon what ballast you have. Both ballasts can be up to 5 feet of wire away from the lamp they are powering, but the 400w ballast we sell should be mounted to a piece of metal. The easiest way to do this is to use a sheet of aluminum roofing material and possibly fan fold it as in the graphic below (to allow for enhanced heat dissipation).



The ballast will be fixed to the enclosure by attaching to the smooth rectangle in the middle. The overall size of the metal sheet before crinkling should be at least 12"x15", though more will not adversely affect your setup. The folds can be as tall as you need them to be in order to fit into your enclosure. You may consider using heat sink compound between the ballast and metal, but this isn't required by the manufacturer of the ballasts.

Wiring

How to wire your light source depends on your specific ballast and lamp type. For installation instructions for any light kit purchased at DIY Projector Company, please go to the [ballast wiring page](#).

Reflector and Condenser Lens (optional)

You may choose to install a reflector and/or condenser lens in your system. A reflector is recommended for all systems (most useful with skinnier lamps such as either of our HQI light sources), though a condenser is most useful for 250w light source owners.

Reflector Installation

To install a reflector such as our spherical ladle reflector, simply remove your HQI or skinny metal halide lamp, install the reflector exactly under where the lamp center (light source) will be, and secure with a short woodscrew. Then you can reinsert the lamp. You should try to put the lamp as near to the center of the opening of the reflector as is possible. If your reflector is not perfectly spherical, then the lamp placement should be lower inside the reflector, but placement is not as important in this case.

Mounting the Condenser Lens

Note: The photos and concept that follow on the next page(s) are original creations by T. Doss (demannu@sbcglobal.net) that were generously donated for use on this website. Please do not copy them without his express permission.

First, obtain 2 80mm PC fan grilles.



Snip out as much of the center section of each fan grille as needed to allow the condenser lens to sit on the grille without falling through the hole.



You *can* snip off the mounting rings from your grille if you desire. It may be useful to leave them on depending on how you plan to affix the condenser lens mount to your projector. We suggest leaving this decision until after you've completed your lens mount.



Place the condenser lens well-centered on the grille, then slide the other grill over the 4 screws and on top of the condenser. Use matching washers and nuts to secure the assembly.



First, obtain 2 80mm PC fan grilles.



Finished Lens Mount (shown with optional spherical reflector)



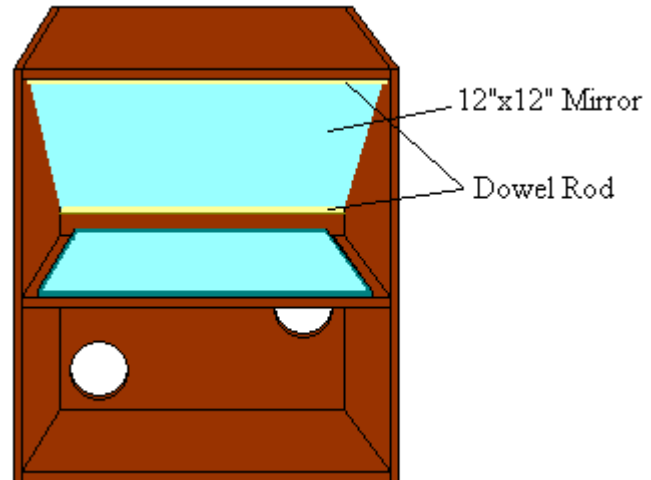
Finished Product (Installed with 250w HQI kit from DIY Projector Company)



Step 7: Finishing the MkIII Projector

We are just about ready to install the front panel and plug in our projector. First we need to put in the final component of our projector - the mirror. This 12x12 mirror will go above the LCD panel at a 45 degree angle to reflector the image onto the projection lens. For this step, you will need more of the dowel rod that you used to make your lens mount (anything from 4"-20" can be used). You will need to measure 8.5" down from the top inside of your projector and mark a line. Then you will want to drill your dowel rod, and screw it into the back of the projector enclosure on that line.

Next, you will need to rest the enclosure on its back (it is a good idea to remove the LCD first if it is installed). Now insert the mirror into the projector at a 45 degree angle between the top and back panels. The dowel you have installed will keep the mirror from sliding down from this angel. Now install another dowel at the top of the mirror as close to the edge as possible using the same method as before. Be careful not to drill or screw to close to the mirror - it will chip and break easiest on the edges.



Now you are ready to install the LCD panel, screw on the front panel, and plug in the projector! You may decide that the raw MDF or plywood your projector is made of is not the most attractive thing to have in your living room. You can paint your projector on the inside and out with lamp black paint. This will make your projector more aesthetically pleasing and also will eliminate any unwanted discolorations coming from the inside of your projector's lighting compartment.



Always make sure that your fans are running well and that the air coming out isn't too hot. It is normal to smell a faint burning odor from your projector for the first few times you use it because the glues that are in MDF and most plywood will burn a little from the heat of your light source. This is normal and should not be cause for concern as long as the lamp is at least 1" from the projector bottom and the fans are working. Still, keep an eye on your projector to make sure that it is breaking-in correctly.