

# LAMINAR FLOW HOOD CONSTRUCTION

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The laminar flow hood is an important piece of equipment in any plant tissue culture laboratory. It provides a nearly sterile environment in which to work. Laminar flow hoods function by passing room air through a HEPA (high efficiency particulate) filter that removes 99.99% of all airborne materials (dust, spores, mycelia) and delivers the filtered air into an enclosure open on one end.

The following description details how we made two laminar flow hoods connected to one blower by dryer vent hose. We started with a conceptual idea obtained from a paper published by Meyer in 1986 (HortScience 21(4):1064-1065). We describe here our construction details for the fan housing and laminar flow hoods along with a cost analysis. Our laminar flow hoods have proven (based on open petri plate contamination tests) to provide a sterile environment in which to conduct plant tissue culture work.

## FAN HOUSING - Construction Details

The construction could be assembled using the following instructions in sequential order.

1. The 3/4" thick 4'x 8' sheet of plywood should be cut into the pieces as diagramed in the Parts Layout sheet.
2. Cut all rabbets to 3/4" wide and 1/2" deep.
3. Cut out air passages in the END and END inside pieces.
4. Glue together and attach with screws or nails the SIDEs, ENDS and bottom. Careful attention to accuracy will make a perfectly square open top box.
5. Make the Fan hood (Fig. 1) with #2 pine. There are two views of it. One separate and one attached to the fan. It should fit tightly inside the large box already constructed. The bottom of the fan hood is attached to the fan outlet with #10 3/4" screws. When the fan and attached fan hood are set in the box with the fan holes facing the filters, the top of the fan hood should be aligned to the bottom of the

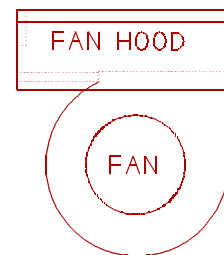
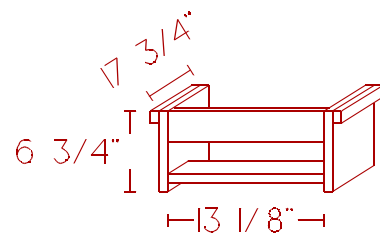


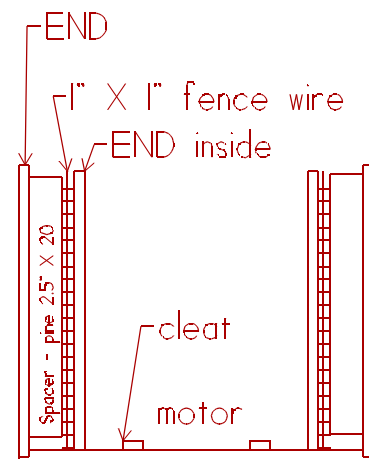
Figure 1: Fan Hood.

rabbet of the sides. Center the fan hood in the box and attach cleats on each side of the fan at the bottom of the box (Fig. 2). The fan or fan hood need not be attached to the fan housing box. Notice the strips of pine on the side of the fan hood. They are there for support of the filter lids and are not covered up by the "Top Center" piece with holes for air passage.

6. The "Top Center" has at least six 4" diameter holes in it. The hose attachments are made from 4" aluminum irrigation pipe 3" long. Tabs can be cut, bent out and a hole drilled for a 3/4" #10 screw. The hose attachments are then inserted into the "Top Center" with screws. This piece is then attached to the top of the "Fan Hood" with 2" screws. No glue was used in case later we want to replace the top with another unit with more outlets. This top piece could be made like a box and more hoses attached since the motor is capable of much more work than is allowed by only six holes.

7. The filter lids are made as a loose fit over the filters and a handle attached. No screws are necessary to attach the lids in place. Access is needed to change the filters.

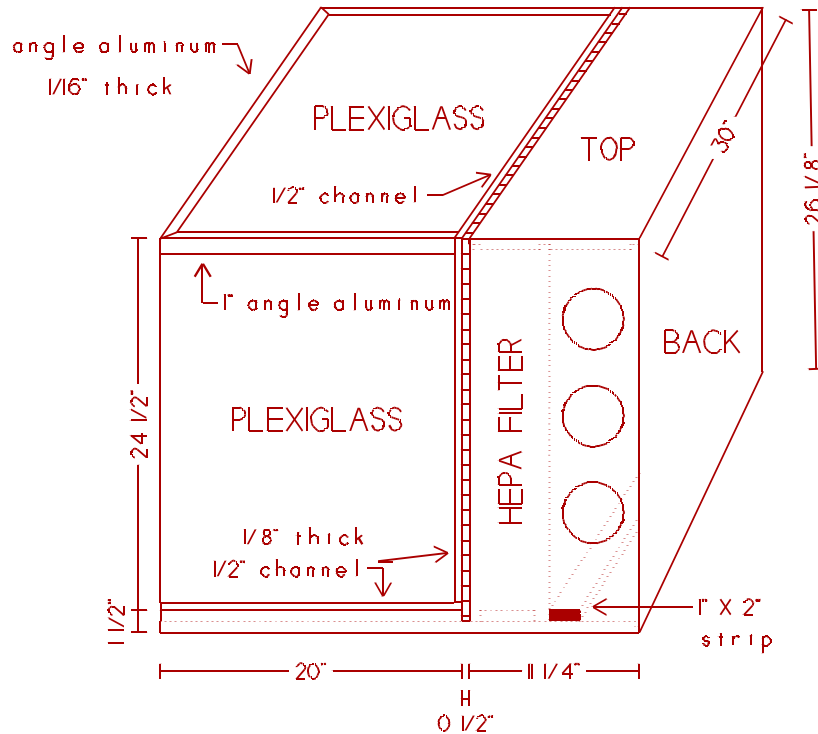
8. The next step (see Figure 2) is to attach the inside end to the spacer with 2" inch screws with the fence wire held between them. The inside ends should fit loosely inside the box allowing for paint and ease of removal, if needed. The spacers are attached to the inside ends with enough room between them to let a filter (16"x20"x2") slide between them. This construction is then attached to the end piece with screws and no glue.



**Figure 2: Side View.**

9. At this time the space for the switch can be located between the fan and the "END inside" piece that holds the filter in place. The switch did not have a long enough shaft to work without taking the switch apart and reversing the plate with the screw holes. Then if a hole was made that was large enough the switch would be recessed into the 3/4" plywood and the shaft will stick out far enough to attach a face plate to cover the hole. Then the switch knob can be attached.
10. A 1" hole is cut in the box below the switch position at least 2-1/4" from the bottom of the side. A grommet to protect the wire (14 gage) can be made from conduit end parts attached to a steel conduit coupler cut to the 3/4" thickness of the wood. Two 3/4" washers sandwiched the coupler and kept in place.

## LAMINAR FLOW HOOD - Construction Details



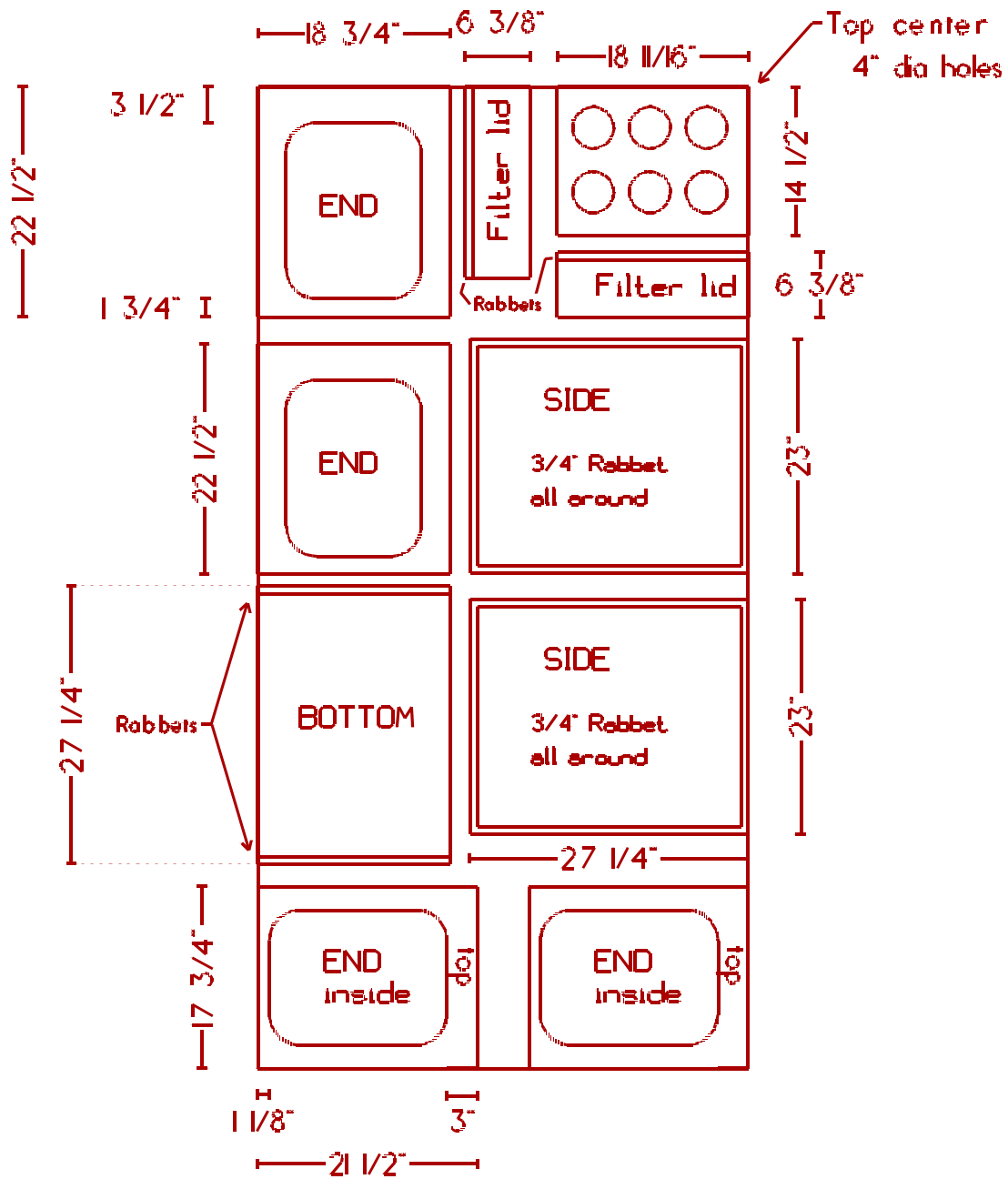
**Figure 3:** Side View of Hood.

1. The bottom and table area was made from 2 layers of 3/4" plywood (one 20"x31-3/4" and one 31-3/4"x31-3/4") glued and screwed together. The table area (2 layers thick) was laminated.
2. The HEPA filter was set back from the table the width of the egg crate white panel. The spacer blocks attached to the base with screws held the filter in place. The egg crate panel was held in place to the HEPA filter by machine screws through the 1/2" channel - plastic grid - foam insulation - into the aluminum filter frame.
3. The enclosure around the filter was made from 1"x12" pine dadoed to receive the filter edges to make a better seal and to hold the filter. The enclosure was screwed into the 3/4" base.
4. The back of the filter enclosure was covered with 1/4" plywood.
5. The 1" angle aluminum (1/16" thick) frame for the top of the plexiglass hood was made from one continuous piece of angle aluminum. The 90 degree bends were made after a triangle was cut out of the top side of the piece at the corners. The ends fit inside the 1/2" channel which secured them.

# PARTS LAYOUT FAN HOUSING

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Rabbets are 3/4" wide and 1/2" deep



## COST ANALYSIS FOR BUILDING TWO LAMINAR FLOW HOODS (ONE FAN)

### Hood

HEPA Filter (2), 24"x30"x6" (under Filters-Air & Gas - Yellow Pages)	220.00
Plywood, 4'x8'x3/4" A/B Int	34.00
Plywood, 4'x8'x1/4" Shop	10.00
1"x12"x16', #2 Common Pine	17.00
Formica laminate, white, 4'x4'	24.00
Laminating adhesive	6.00
Clear Plexiglass, 4'x8'x1/4"	110.00
Egg Crate White Lighting Panel, 2'x4', two of them	24.00
Aluminum channel, 1/2"x1/2"x16'	25.00
Paint	15.00
Angle aluminum 1"x1", 1/16" thick, 2 pieces 6'	10.00
Miscellaneous supplies	30.00
<b>TOTAL (Hood)</b>	<b>525.00</b>

### Fan Housing

Direct-drive blower, Dayton #5C094	185.00
Rotary switch*	40.00
Plywood, ABX, 3/4"	30.00
Molding, pine	18.00
Pre-filter**, 16"x20"x2", case of 6	24.00
Dryer vent hose and clamps	35.00
Miscellaneous supplies, screws, glue, paint, etc.	46.00
<b>TOTAL (Fan Housing)</b>	<b>378.00</b>

### **GRAND TOTAL**

**903.00**

\* Switch - ELECTROSWITCH part #21301A  
series 21, 1 deck, 4-hole, 1-7 throw  
From - ELECTRIC SWITCHES INC.  
National 800-421-8855  
CA. except (213);800-252-4640  
(213)-660-1310

\*\* Filter - Extended Surface Air Filter  
Mfg. - DAYTON  
Supplied by -  
Granger Industrial and Commercial Equipment and Supplies.