

"In the Beekeeper's Work Shop"

Building a Styrofoam® Nuc Box

©by Stephen E. Tilmann

A Styrofoam® Nuc Box

A "nuc" box, which is basically a small hive body traditionally used for queen rearing and making splits, has far more uses than the name implies. Use this handy piece of equipment to...

- temporarily hold frames while your sort through the super while harvesting honey,
- keep the old queen "just in case" when you queen a hive,
- provide a temporary hive when catching a swarm,
- a starter or even a finisher colony for small scale queen rearing operations.

This design for a Styrofoam® nuc box is easy to build, light weight, inexpensive and surprisingly durable. We run medium depth supers in our operation, so the plans presented are for a medium depth box. However, you can easily modify this plan for a full depth box - or even a shallow. By cutting the two end panels wider, you can also construct an 8-frame or 10-frame hive body (the bottom board and telescoping cover will also have to be modified accordingly).



We find this Styrofoam® box so handy that we have three or four of them always on hand. We use this Styrofoam® box most often in the bee yard when sorting through frames while harvesting honey.

Understanding the Concept of "Bee Space"

No discussion of building hive equipment would be complete with a word or two about "bee space". The magic number for "bee space" is 3/8 inch. Anything less is too small for the bees to get through and anything larger tends to promote bridge and burr comb. Understanding this idea of "bee space" was one of the great contributions of Langstroth.

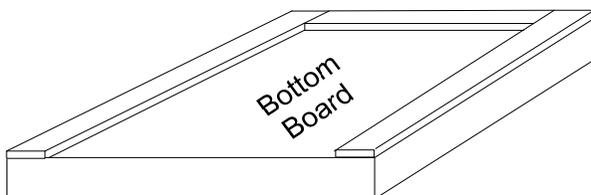
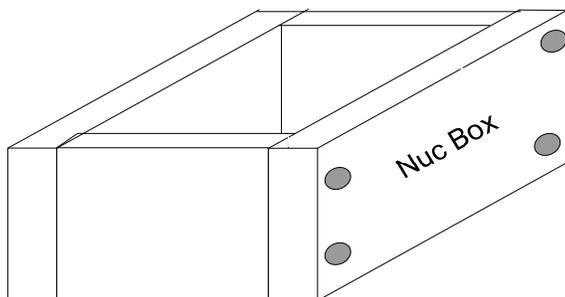
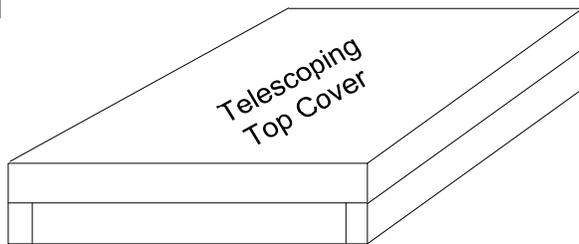
When building hive bodies, the idea is to keep a 3/8 inch space between all of the frames; this includes the sides, ends, top and bottom. Commercial frames all have tabs on the top bar that will maintain the 3/8 inch space between the fully drawn frames when they are pushed together.

The interior of the hive bottom should be such that this 3/8 inch spacing is also maintained at both ends of the frame, along the top of the frames and along the sides of the two outside frames.

Typically, hive bodies are constructed such that the bottom of the frames are flush with the bottom of the hive body. The bee space for the bottom is provided by having the top frames recessed 3/8 inch below the top of the hive body. So when hive bodies are stacked, the 3/8 inch bee space for the top of the lower hive body is also the bee space for the bottom of the upper hive body.

Unfortunately, many beekeepers have noticed that there is a *slight* variation in overall size of frames (of the same depth)

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A complete nuc box consists of a cover, the hive body and the bottom, although you will find many uses for just the hive body.

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among manufacturers. This may be particularly true between wood frames and plastic frames. Therefore, you may wish to confirm that the cut sizes presented in this project will maintain the proper “bee space” for the frames you use.

Basic Construction

The box is constructed out of a 2-inch thick 4'x8' insulation board available at your local lumber yard or home improvement store (Figure 1). Depending on the manufacturer, it is either blue or pink in color. Ask for the square edge board (as opposed to tongue-and-groove). Be sure to get an “extruded polystyrene” insulation board rather than the white “beaded foam” type of product.

The closed cell nature of extruded polystyrene resists water retention and is quite resistant to scuffs, cuts and breakage. Polystyrene, however, is subject to degradation from sunlight, so be sure to finish your project with several coats of a good grade latex paint.

A 4'x8' sheet of the insulation board is enough for 2 medium depth boxes, including top cover and bottom board, or around 10 boxes without the bottom board or top cover. So this might make a good project for your local bee club.

For the glue, we recommend Franklin’s exterior grade Titebond®. Whatever you use, be sure the glue is rated for use on polystyrene. The solvent in some glues will melt the foam and not hold.

If you want to make a full depth 5-frame nuc box, increase the height of the hive body from 6-3/4" as shown to 9-1/2" (see table at end of these plans). All other dimensions remain as the same.

Finally, it is important to have clean, square cuts. So resist the temptation to use a hand saw or a knife blade to “cut and snap” the panels (like might be done on a construction site). Use a table saw or radial arm to get the desired cut edges. Circular saws do not do as good a job, so we suggest you avoid them.

Before You Begin...

All of the dimensions shown in the drawings and cut list are for a 5-frame medium depth hive body. A table is provided at the back of this article with the sizes of the various components for an 8-frame and 10-frame hive body, for both medium and full depth frames.

The 5-, 8- and 10-frame hive body will require changes in the hive body, bottom board and top cover components. Changing the plans from medium frames to full depth frames will affect only the hive body components.

Construction Details

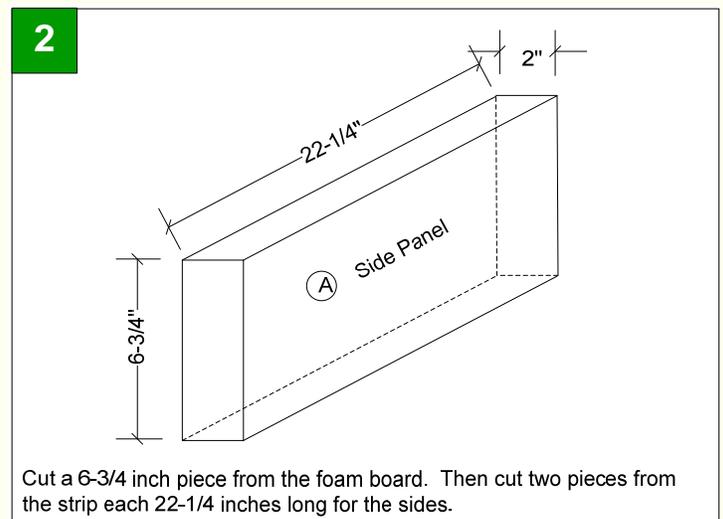
(For a 5-Frame, Medium Depth “Nuc” Box)

Step 1. Cut the Foam Panel For the Box

Cut a 6-3/4" wide strip out of a 4'x8' sheet of foam board either lengthwise or crosswise. If you cut lengthwise, you will need one strip. If you cut crosswise, you will need two strips.

Step 2. Cut the Hive Body Side Panels

From the strips cut in step 1, cut two 22-1/2" sides (Figure 2).



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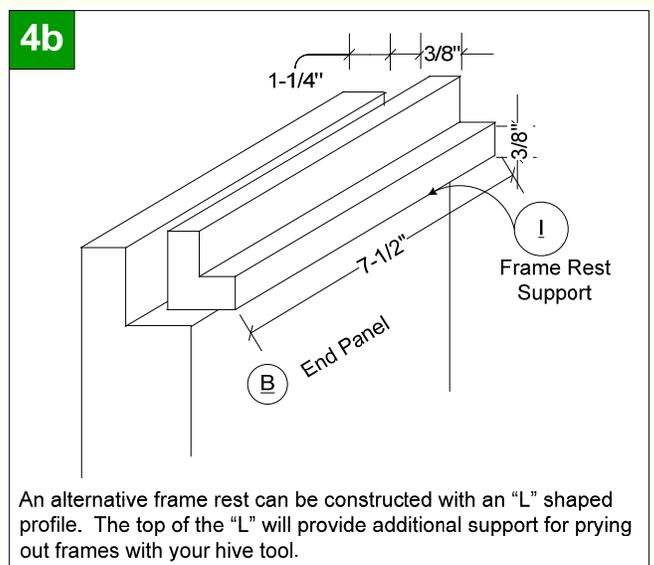
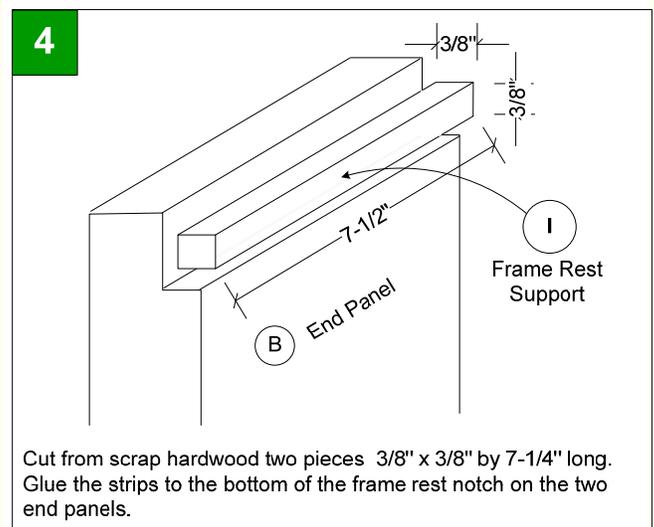
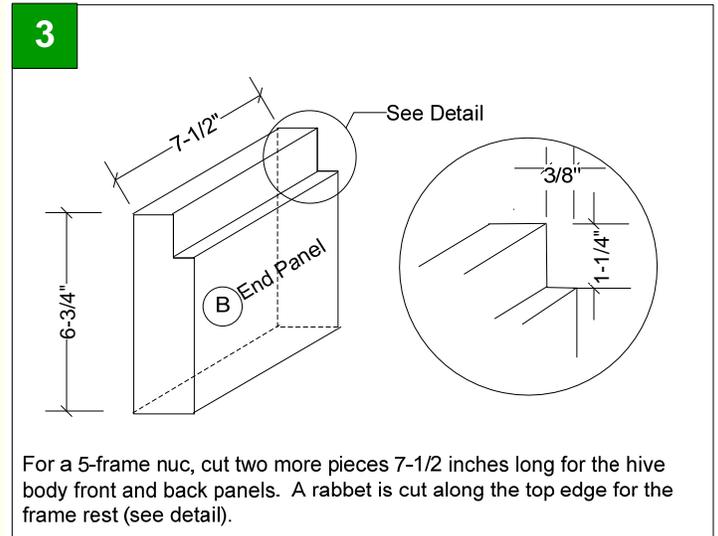
Step 3. Cut the Hive Body End Panels

From the strips cut in step 1, cut two 7-1/2" long end pieces. (Figure 3). On the top inside edge of each end panel, cut a 1-1/4" x 3/8" rabbet along the top edge. This cut will form the frame rest in the assembled box.

Step 4. Cut Reinforcing Frame Rest Wood Strips

From scrap pieces of hardwood (eg., oak), cut two 7-1/2" lengths each 3/8" x 3/8". Glue these strips to the bottom of the rabbet on the end panels (Figure 4). This feature will add considerable durability to the ledge upon which the frames will rest.

As an alternative, you can also make the frame rest with an "L" shaped profile. The will give you a reinforcing piece of wood on the side and back side of the frame rest. The wood is more durable (than the foam) and stands up much better to prying out frames with your hive tool. An "L" shaped profile frame rest can be cut from a 3/4" x 1-1/4" - 7-1/2" piece of scrap with a 3/8" x 7/8" notch along one edge. The notch in the foam board will also be 3/4" wide.



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Step 5. Assemble the Hive Body

Using an outdoor rated aliphatic resin glue (eg, Franklin's Titebond®), glue the side and end panels together as shown in Figure 5. Make sure the frame rests on the end panels are toward the inside. Use two 3-inch "drywall" screws on each end of the side panels to hold everything in place while the glue completely dries.

Be sure whatever glue you use is rated for use on foam; some glues will dissolve foam and not work.

Step 6. Construct the Bottom Board

Cut a 24" x 11-1/2" piece of foam for the bottom board. Also cut two 3/4" wide strips 24" long and one 7-1/2" long. Glue and clamp the strips to the bottom board (Figure 6). You can use 2-inch drywall screws to secure the strips though this is not really necessary.

You may also want to consider constructing the bottom board out of plywood and scrap 1x4s.

Step 7. Construct the Telescoping Cover

Cut a 24-3/4" x 14" piece of foam for the telescoping cover. Also cut two 1" wide strips 24-3/4" and two 12" long. Glue and clamp the strips along the bottom edge of the cover as shown (Figure 7). You can also secure the side rails by screwing them down with several 2-1/2-inch drywall screws while the glue sets. The width shown allows for a 1/4-inch gap between the inside of the side rails and the box.

You may also want to consider constructing the cover out of plywood and scrap 1x4s.

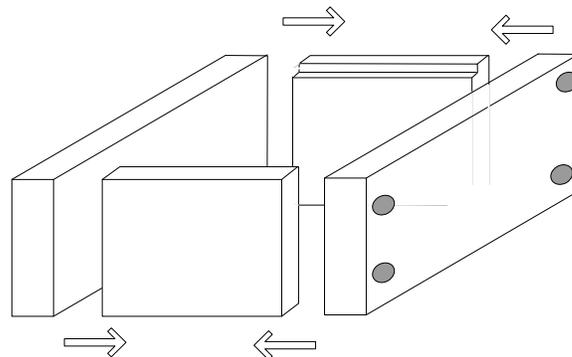
Step 8. Paint the Completed Box

Polystyrene will degrade in sunlight. Therefore, it is necessary to paint the complete nuc. You will only do this once, so don't skimp on quality of paint or coats applied. Use a latex primer base coat and two top coats. We suggest you paint all surfaces, including the inside (Figure 1). Most foam boards come from the factory with printing on the sides. The latex paint will probably not completely cover the printing, so don't worry about it.

Apiary Tip

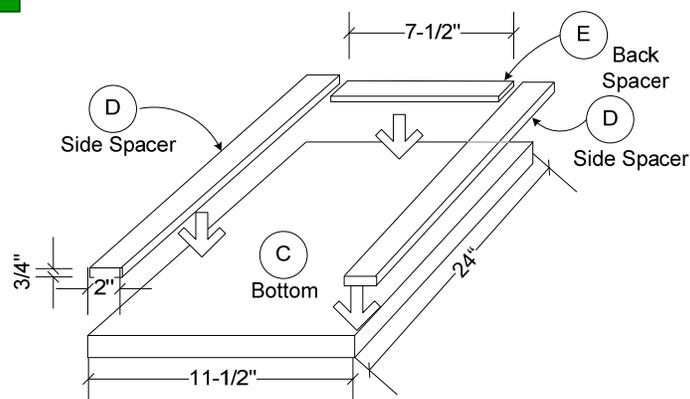
Consider laying an oversized piece of landscape fabric on top of the hive body and under the top cover. The fabric will help wick moisture away and prevent the top from sticking to the hive body.

5



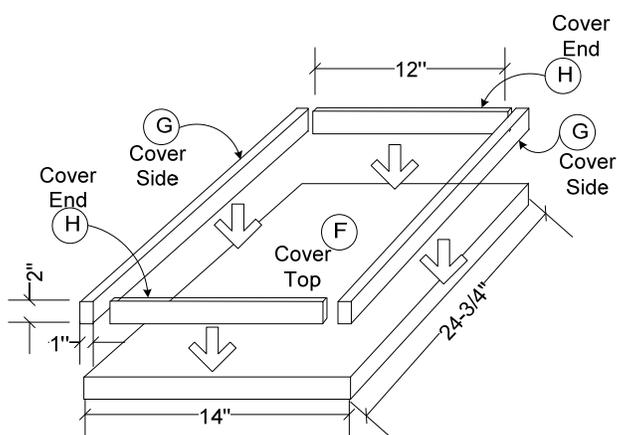
Assemble the four panels of the hive body. Use glue and two 3-inch drywall screws on each end, as shown.

6



From the foam board cut the pieces for the bottom board and assemble as shown. Glue the spacers to the bottom; screws are not necessary.

7



From the foam board cut the pieces for the telescoping top cover and assemble as shown. Glue the sides to the top; screws are not necessary. (Drawing shows the cover upside down.)

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List of Materials: Styrofoam® Nuc Box

2" STYROFOAM BOARD®

			Reference Figure
A	Hive Body Sides (2)	6-3/4 x 22-1/4	2
B	Hive Body Ends (2)	6-3/4 x 7-1/2	3
C	Bottom Board Bottom (1)	24 x 11-1/2	6
D	Bottom Board Side Spacers (2)	24 x 3/4	6
E	Bottom Board End Spacer (1)	7-1/2 x 3/4	6
F	Telescoping Cover Top (1)	24-3/4 x 14	7
G	Telescoping Cover Sides (2)	24-3/4 x 1	7
H	Telescoping Cover Ends (2)	12 x 1	7

OTHER

I	Frame Rest Support (2)	3/8 x 3/8 - 7-1/2 (scrap hardwood)	4
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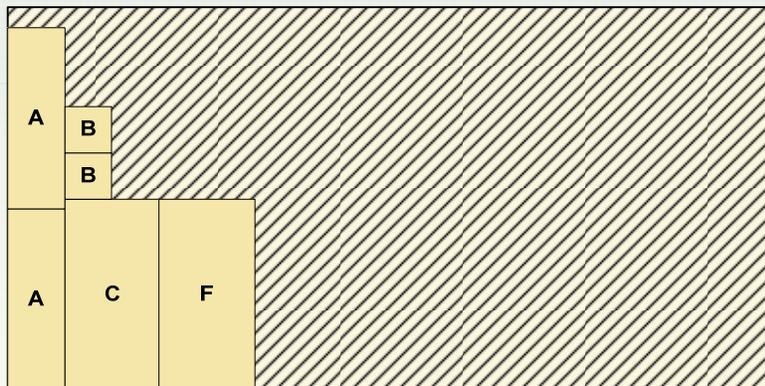
HARDWARE

AA	3" drywall screws (16, or as needed)
	Franklin's Exterior Titebond® glue
	Latex Paint (primer and top coat)

Note: Sizes shown are for a medium depth 5-frame hive body.

Cutting Diagram: Styrofoam® Nuc Box

1 Sheet (48" x 96" of 2"-Thick Styrofoam® Board)



ALSO NEED TWO 3/8 x 3/8 - 7-1/2" STRIPS CUT FROM SCRAP PIECE OF HARDWOOD.

CUT SPACERS FOR BOTTOM BOARD AND TELESCOPING COVER SIDES AND ENDS FROM SCRAP STYROFOAM® BOARD.

Cut Sizes for Styrofoam® "Nuc" Box Components

	Medium Depth		Full Deep		All these components are the same for medium and full depth frames.					
	A	B	A	B	C	D	E	F	G	H
	Body Side	Body End	Body Side	Body End	Bottom	Side Spacer	End Spacer	Top Cover	Cover Sides	Cover Ends
5-Frame	6-3/4 x 22-1/4	6-3/4 x 7-1/2	9-1/2 x 22-1/4	9-1/2 x 7-1/2	24 x 11-1/2	24 x 3/4	7-1/2 x 3/4	24-3/4 x 14	24-3/4 x 1	12 x 1
8-Frame	6-3/4 x 22-1/4	6-3/4 x 11-3/4	9-1/2 x 22-1/4	9-1/2 x 11-3/4	24 x 15-3/4	24 x 3/4	11-3/4 x 3/4	24-3/4 x 18-1/4	24-3/4 x 1	16-1/4 x 1
10-Frame	6-3/4 x 22-1/4	6-3/4 x 14-1/2	9-1/2 x 22-1/4	9-1/2 x 14-1/2	24 x 18-1/2	24 x 3/4	14-1/2 x 3/4	24-3/4 x 21	24-3/4 x 1	19 x 1

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Photo Gallery...



Photo Captions:

1. Installing the frame rest on the end of the nuc box.
2. Complete nuc box prior to painting.
3. Assembled nuc with bottom and cover.
4. Nuc bottom, only.
5. Nuc with cover raised.