

How To Build A Top Bar Hive

by Philip Chandler



Supplement to *The Barefoot Beekeeper*
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This publication is intended as a supplement to my book, *The Barefoot Beekeeper*, which sets out my reasons for using the horizontal top bar hive in preference to modern (Langstroth-style) bee hives.

My woodworking skills are little more than basic and I have written these instructions with fellow amateurs in mind. I doubt if I could follow a 'proper' woodwork plan myself, so this is a combination of written instructions and photographs, which I hope will prove easy to understand. I suggest you scan through the following pages more than once before starting work.

I have revised these instructions to suit a longer hive than originally conceived, as I have found the extra space to be well worth the small extra expense. You can build your hives to any size you desire, but I suggest you follow my dimensions for your first attempt, as they are proven to work in a range of climates.

MATERIALS

Traditionally, beehives are made from Western Red Cedar, which withstands adverse weather for years without treatment. However, it is not always easy to find and can be quite expensive, so Douglas Fir or any straight-grained, well-seasoned pine will do the job. It can be weather-proofed with raw linseed oil or a 20:1 linseed oil + beeswax mixture for extra waterproofing, although the oil can take weeks to fully dry.

Recycled/reclaimed timber may be used throughout, but ensure it has not had any insecticidal treatment. If you cannot find 12" wide boards locally, you can glue up 6" boards, which is how I have done it in the photographs that follow.

Here's what you will need for your first top bar hive:

Timber - sawn but not planed, untreated Western Red Cedar/Douglas Fir or similar

sides - 2 off – 44" x 12" x 1" or 1100mm x 300mm x 25mm (22mm is adequate in mild climates)

ends - 2 off – 18" x 12" x 1" or 450mm x 300mm x 25mm

legs – 4 off – 32" x 4" x 1½" or 800mm x 100mm x 38mm (anti-rot treatment near ground level advisable)

winter floor – 1 off – 44" x 7" x 1" or 1100mm x 180mm x 25mm (optional – see text)

roof frame – 2 off 47" x 3" x 1" or 1180mm x 75mm x 25mm (check on your hive before cutting to length)

roof frame – 2 off 21" x 6" x 1" or 530mm x 150mm x 25mm (check on your hive before cutting to length)

roof – 2 off - 48" x 12" x 3/8" or 1200mm x 300mm x 10mm external grade plywood or other sheet material, or thin offcuts from a sawmill (see text)

top bars – 30 off – 17" x 1 3/8" x 3/4" or 430mm x 34mm x 22mm (any straight-grained wood is OK)

shims – 20 off – 17" x 1/4" x 3/4" or 430mm x 22mm x 6mm (optional, for adding width to honey bars)

comb guides – 30 off – 12" x 1/2" or 300mm x 12mm half-round or triangular section dowel (see text)

You will also need at least 20x 2½" wood screws (preferably brass or stainless steel, but good quality galvanized screws will do) and 8x 3" coach bolts with washers and nuts to attach the legs. Depending on how you choose to build your roof, you will need some galvanized roofing nails or similar to attach the sheet material to the frame. For the mesh floor, you will need some plastic or wire mesh with holes of 2.5 – 3.5mm. Suitable plastic mesh can be found in many craft shops, intended for cross-stitch work.

All dimensions are approximate, except the width of the top bars, which should be 34mm +/- 1mm unless you have bees that are already adapted to natural comb, in which case 32mm may be better.

BUILDING YOUR HIVE

You will need a flat bench somewhat longer and wider than the hive you are building, along with some basic tools: carpenter's saw; plane; screwdriver; drill; square; cramps. A hand-held or bench-mounted circular saw and a power drill are handy if you have them.

Use a strong, waterproof, external grade glue for all permanent joints. You don't need to go as far as epoxy resin glues, but if in doubt, ask in your local hardware shop for advice.

Both long and short hives are built in exactly the same way - inside out and upside down - starting with the follower boards. The reason for this will become clear and hinges on the relative ease of making the sides fit the followers and the near impossibility – for the amateur woodworker – of making the followers fit retrospectively to the sides.

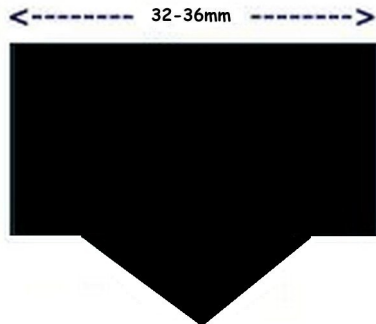
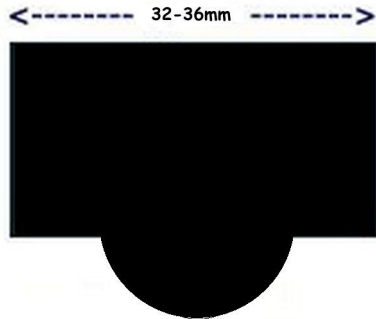
I would suggest that you spend some time studying the sequence of photographs and get a feel for how the hive looks and how it works.



You don't need a fully-equipped workshop: a flat surface and basic tools are the essentials. You can build the hive using only hand tools – and a circular saw is a bonus, whether hand-held or table mounted.

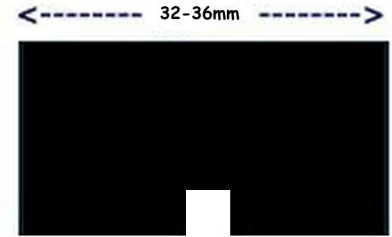
MAKING THE TOP BARS

The one critical dimension in this whole design is the width of the top bar, which should be $1\frac{3}{8}$ " or about 34mm for bees directly from conventional

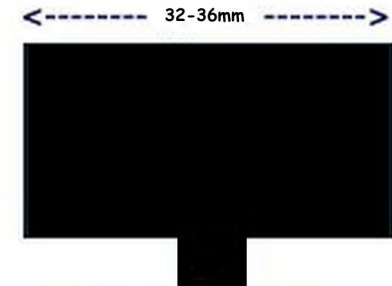


hives, or $1\frac{1}{4}$ " 32mm for bees acclimatized to natural comb. You will get more even and predictable results if you provide the bees with a comb-building guide of some kind. I have illustrated a number of ways to do this, perhaps the simplest being a saw kerf cut down the centre of the lower face of the bar, made with a circular saw. This does not have to extend to the ends, but it may be easier to cut longer lengths like this. The groove should be about $\frac{1}{8}$ " deep and the width of your saw blade. Fill it with molten wax and allow to cool.

The other diagrams show various designs, all of which work most of the time. My favourite is the half-round section. Rubbing the bottom edge of whichever cross-section you choose with beeswax is generally thought to be a good idea.



This bar has a saw kerf filled with beeswax as a comb guide. It may not be as reliable as others on this page



MAKING A JIG

If you intend building more than one hive, I strongly suggest you start by making yourself a simple jig, as shown here. This will make assembly easier and quicker, and is worthwhile even for one hive if you don't have any extra hands to call on.

The jig is quick and easy to make out of any old pieces of wood, as long as the base boards are the same thickness as your top bars – about $\frac{3}{4}$ " or 22mm.

As you can see from the illustrations, the jig comprises two identical U-shaped units, this internal length of each unit being the same as that of the top bars, i.e. 17" or 430mm.

The top photo shows how to arrange them on your bench, while the second shows them in use, with follower boards and one side panel in place (those shown are for a short hive, but the positioning is the same for any length of hive).



ASSEMBLY

The first step is to assemble your materials and, if you are using narrower boards for the sides and ends than specified, cut and glue the boards to their final sizes.

Make up the sides and ends as shown and while the glue is setting, make the all-important follower boards. These should be made as accurately as possible, as the smooth functioning of the hive depends on them being a good 'sliding fit' between the sides.



This 11" deep board, here made up from three pieces, will become the follower boards. 1/2" timber is adequate for this job: mark 15" across the top edge and halfway at 7 1/2".

You can make the followers from 3/8" or 1/2" plywood if you prefer. This will ensure stability and eliminate the tendency of solid timber to warp when placed in the warm, moist atmosphere of a working beehive.





Draw a centre line to the bottom edge



Mark 2.5 inches either side of centre on the bottom edge



(c) P J Chandler www.biobees.com

Extend the geometry to make an identical shape upside down, saving time and timber. I suggest you make three of these followers, as a spare is useful for some operations. When you have cut them out, check that they are all identical in size and shape.



Glue, pin (or screw) a top bar centred on the top edge of each follower board. Cramp and leave to set overnight.

A GEOMETRICAL FOOTNOTE

(only for the mathematically inclined)

You may have noticed that the trapezoidal shape of the follower boards comprises a rectangle, 5" wide by 11" tall, with a point-down, right-angled triangle on each side.

The height of each triangle is 11" and the base (or top) is 5", so from Pythagorus we can calculate the hypoteneuse (long side) as:

$$\sqrt{h} = 11^2 + 5^2 = 121 + 25 = \sqrt{146} = 12.08$$

In other words, A tiny bit over 12".

This means that, if your measuring and your sawing are accurate, you will need to shave a little wood off the bottom of the follower board so that it is a snug fit to the inner edge of the sides. Don't do this until you have the sides in place and you can see just how good your drawing and sawing really are!

This also gives us the volume of the hive:

$$11 \times (15+5)/2 \times 44 = 110 \times 44 = 4840 \text{ cu ins} = 79,313 \text{ cc} = \text{nearly } 80 \text{ litres}$$

According to Tom Seeley and others, bees look for a cavity of about 40 litres capacity when swarming, so this hive has plenty of room for even the most fecund queen!

LEGS

If you are making up your boards, you will need to let the glue set on the sides and ends overnight before you move on to the main assembly, but if you have time in hand today, you may as well cut and drill the legs.

You need four legs (obviously), each about 4" x 1½" (100mm x 38mm) and a length to suit your height. For example, man of average height will need the top of the hive to be around 30-31" for comfortable working, so the legs will need to be about 32-33" (810mm - 840mm) long. If you are a wheelchair user, you may want the top of the hive to be about 24" from the ground, so make the legs 26" (660mm). The rule of thumb: decide a working height for the top of the hive and add 2" (50mm) to arrive at the length of the legs. They will be trimmed a little to accommodate the roof – see below.

You do not *have* to use legs – you could put these hives on various types of stand as used by conventional hives – but this is a cheap and convenient way of achieving a stable, level, relatively rodent-proof and probably more-or-less badger and raccoon-proof hive.

The legs will be bolted to the end pieces, using galvanised or stainless steel nuts and 3" bolts. I advise you to put washers under the head of the bolts and the nuts to prevent them cutting into the wood. Do not be tempted to use wood screws to attach the legs: disaster will inevitably follow and you will regret not spending the extra few pence.

The lower ends of the legs can be left cut square for maximum stability on a turf or gravel/earth site, or cut level if you intend to keep your hives on hard standing.



Begin the main assembly by inverting the follower boards and squaring them up on your bench about 18"-24" apart. They should be parallel.



Position one of the side panels against the follower boards, resting on the top bars.



If you do not use a jig, a small nail tapped into the top bar attached to each follower prevents the side panels from slipping off.



Assembly using a jig. Place a follower board with its attached top bar just inside each jig unit. The vertical sides of the jigs hold the sides in place while you complete the assembly.



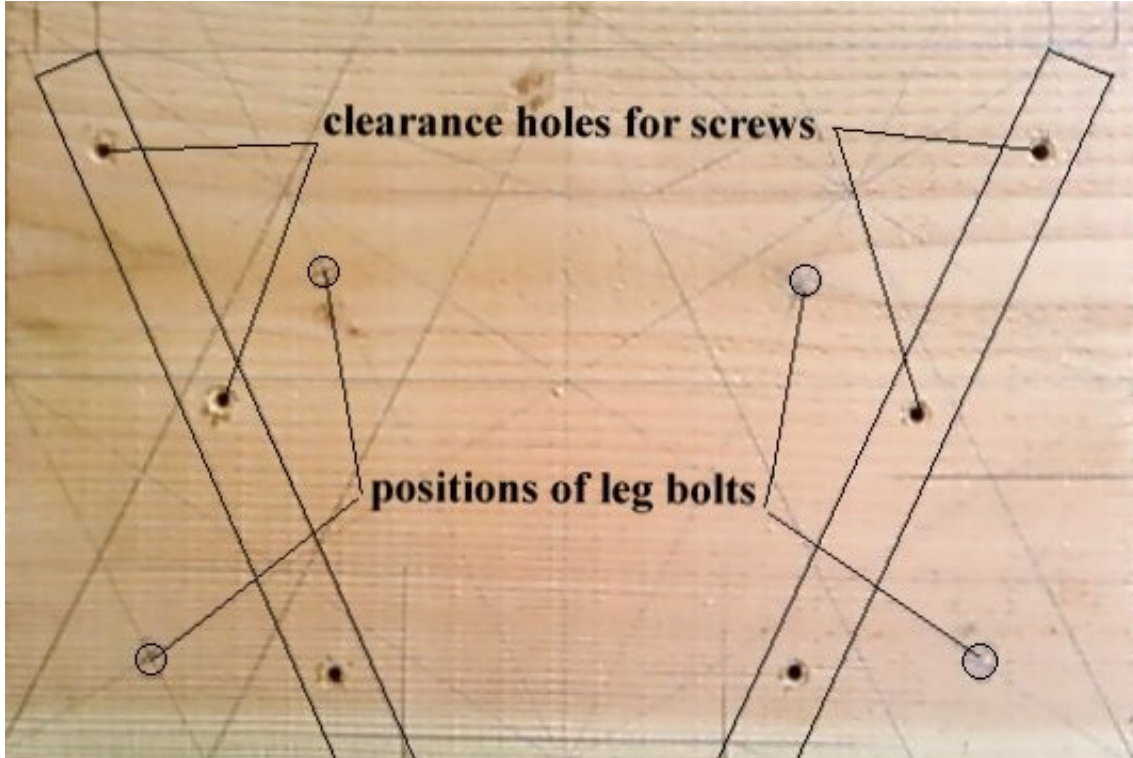
Place the other side in position and square up the structure, ready for the ends.



Showing the use of the jig to keep the sides in position.



Position end pieces centrally. The bottom edge (top edge in use) rests on the bench, giving clearance for top bars. (The plane is not necessary - I used it as a prop as I was photographing single-handed). Ends should be glued in place using strong, weatherproof glue and secured with screws.



A drilling template will save you having to work out the positions of screws and bolts more than once, and is a real boon when building more than one hive. Make it the same size as a hive end - 18" x 12"



Nails dropped into screw holes maintain positioning while drilling clearance and bolt holes.



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The roof frame will rest on the tops of the legs, so they need to be trimmed parallel to the top edge. Lining up the holes you already drilled, mark a straight line across the width of one end, 2" from the top edge. Don't fit legs yet.



Plastic, galvanized or stainless steel mesh may be used to cover the base of the hive. This is heavy duty plastic garden mesh, which has the advantage of forming a flexible, convex curve inside the hive, enabling the follower boards to form a bee-proof and moth-proof seal. It must be cut carefully to fit the ends and held in place with flat-headed pins or tacks.



A solid floor board is, I think, a necessity for winter in northern Europe, Canada and the northern states of the USA. This one is a length of 6" x 3/4" timber and can be fixed in place using brass snap-locks or some other method of your own devising. Corrugated plastic sheet (as may be used for the roof) is a lightweight and inexpensive alternative.



Glue and pin strips of thin wood inside at the ends, to ensure there are no gaps. Cut them to the shape of the lower ends of the follower boards.



The bees will need an entrance! Drill three 1" (25mm) diameter holes, 2" from the floor, with one in the centre and the other two about 3" either side. Champagne corks or the type (shown here) for closing 1 gal. jars will allow you to regulate the openings.



If you are building the longer (48") version, make another two entrances on the opposite side of the hive to the main entrances, about 4-5" from each end. This provides for making splits, nuclei and artificial swarming and is one of the unique features of this design.



This is what your hive should look like now. The follower boards are a good, sliding fit and the whole thing looks sturdy and almost ready for bees!



*You can see here how the roof frame is made - a simple, rectangular frame of 3" x 3/4" timber, glued and screwed at the corners. Be sure to leave about 1/4" slack in both directions to allow movement in the wood. Jamming roofs are a nuisance. Note: the frame is part of the roof and is **not** attached to the hive body – it is simply resting on the leg tops.*



A simple roof using corrugated plastic, available from DIY stores. This is not recommended, as you will create a potential melt-down unless you add insulation under the roof skin. An opaque material is preferable.



Adding triangular gables makes a more elegant roof that will shed water quickly and be hard even for strong winds to lift, but easy for the beekeeper. The roof covering is plastic sandwich sheeting - the type used by estate agents for their signs. You can get offcuts of this stuff for nothing at signmakers' shops. You could use a number of materials here, including thatch, but make sure you keep it reasonably light.



You can give your hive a rustic look by using thin, overlapping slices of cedar.



A very smart, shingled hive by Patrick Prag, USA



If you are feeling a little more adventurous, you could add an observation window - but be sure to incorporate a door to keep light out and heat in.



A hive built by the author and installed in Carol Klein's garden in North Devon, UK



Christy Hemenway of Maine, USA, with her interpretation of my hive design.



The author, preparing a hive for bees in North Devon, UK.



Hive building during a weekend course at Embercombe, Devon, UK.



One of the author's working hives, with bees in residence.

You have a top bar hive!

Your last job is to coat the outer surface of the hive with something to keep the weather out. Creosote, Cuprinol and various paints and varnishes will be suggested by old beekeeping hands, but I prefer not to put anything onto or into the hive that I would not be willing to put on my skin, so I use a bee-friendly coating made as follows:

To 1 litre linseed oil (raw for preference: so-called 'boiled' linseed oil usually contains heavy-metal driers)) add 50 ml melted beeswax (use 1:20 ratio with whatever units suit you). Heat in a double boiler (*bain marie*; or one saucepan inside another – the larger one containing a couple of inches of water). Get it as hot as boiling water will allow and stir for 10 minutes. Allow to cool and while still on the hottish side of warm, paint it on the outside of your hive, paying special attention to end grain, nail heads (underneath) and joints.

There is no need to coat the inside of the hive: the bees will do that for themselves with propolis.

You will also need some bees!

See *The Barefoot Beekeeper* for information on introducing bees and general hive management.

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A TOP BAR STAND

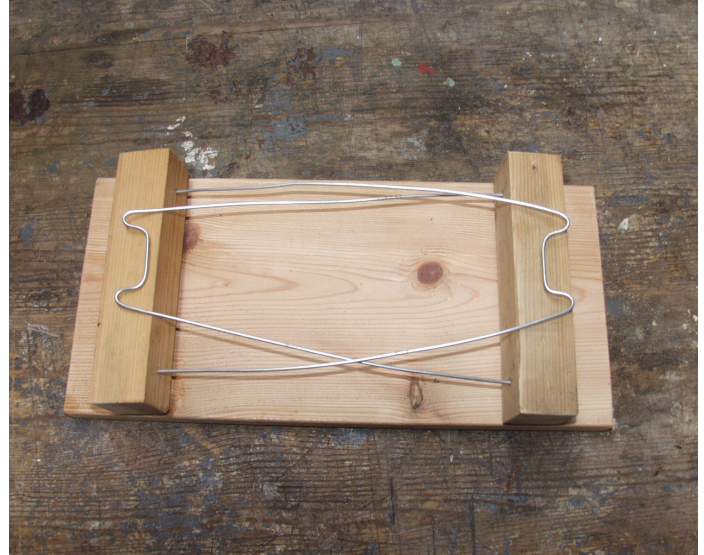
This device is easy to build and a very useful 'third hand' for examining comb, especially when you need to do more than just look at it. I dreamed it up in bed one Sunday morning and built it before lunch out of odd bits and pieces lying around in my workshop. No doubt you can think of other ways of building such a gadget.

The base is the same width as a top bar – 17" - and about 6" wide. The wire is about the same gauge used for coat hangers, bent to accommodate the width of a top bar. A slight inward 'spring' is an advantage, as this grips the comb and helps to keep the top bar in position.





Here is the top bar stand on the bench...



...and folded for transport

REFINEMENTS AND ADDITIONS

If you are of an inventive turn of mind, you may already have thought of some 'improvements' and extra bits for your hive. Don't let me stop you, but do bear in mind that the essence of 'barefoot beekeeping' is simplicity: resist the temptation to over-complicate!

Having said that, you might want to consider adding a 'landing board' for the bees, similar to those you may have seen on conventional hives. I suspect this idea originated with Victorian beekeepers, who were fond of designing hives that resembled Georgian buildings, sometimes even having Doric columns either side of the entrance - but some people like them, even if the bees couldn't care one way or the other. A landing board – say 6" wide by 2" deep and 3/4" thick – could be added just below the central entrance holes, using a thin piece of wood as a support.

Pollen collectors are a useful means of gathering surplus pollen, either for one's own use or for drying and storing for the bees in case of dearth. In my area (south west England) there is rarely any shortage of pollen in the spring when bees need it most, thanks to plentiful willow, hazel and dandelions, but in other areas this may not be the case. You can adapt a commercial pollen collector for use on a top bar hive, or you can design your own.

Please keep an eye on www.biobees.com for updates.

Happy beekeeping!

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This ebook is published as a supplement to *The Barefoot Beekeeper*, which contains the philosophy and management techniques appropriate for this hive. You can download this and other information about sustainable beekeeping from

www.biobees.com