VOX AC30 Clone Cabinet Design

Introduction

This is what we are going to build in this project.

It is a clone of the famous ***VOX AC30*** combo amplifier made famous by the Shadows and Beatles in the early 1960's

This cabinet is a faithful reproduction of the ***AC30/6 Topboost*** cabinet as that was the chassis that I had but it will also be ok for other AC30 models if you use commonsense in checking measurements from your chassis.

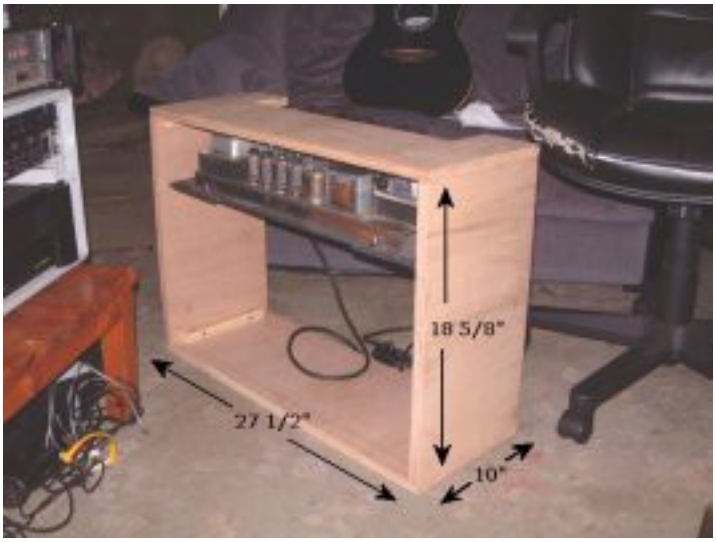
This article is in easy to follow steps so you should not have too much problem in creating this masterpiece.

IMPORTANT:

Read the instructions all the way through ensuring that you are familiar with all steps ***BEFORE*** commencing construction.



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Warning	**WARNING:** The author wishes to state that these plans work with the chassis that he has for a VOX AC30. You may need to adjust the measurements to fit your chassis. Power tools are a vital part of this project. The author advises the user ALWAYS to use safety equipment when operating these tools. There is no more important safety equipment than eye protectors. Always use these with power tools. The author accepts no responsibility whatsoever for the accuracy of these plans and does no accept responsibility for injury or loss whatsoever nor any incidental losses which occur as a result of following these plans or the improper use of power tools.		**Mandatory Equipment:** Drill Saw Screwdriver Router ½" radius roundover router bit ¼" straight router bit 1/8" (2mm) straight router bit tungsten. **Useful Equipment:** Bench Drill Bandsaw Tablesaw Power screwdriver
Step 1 **Building the cabinet shell**	In this part of the build we are looking to create the "shell" of the cabinet. The shell shown on the right consists of four pieces of ¾" thick birch plywood for the top and bottom which are joined to the two sides. There are many ways to joint the four pieces together but the simplest solution is to use butt joints and cleats. The cleats are made out of ¾" x ¾" softwood such as planed pine stock.		

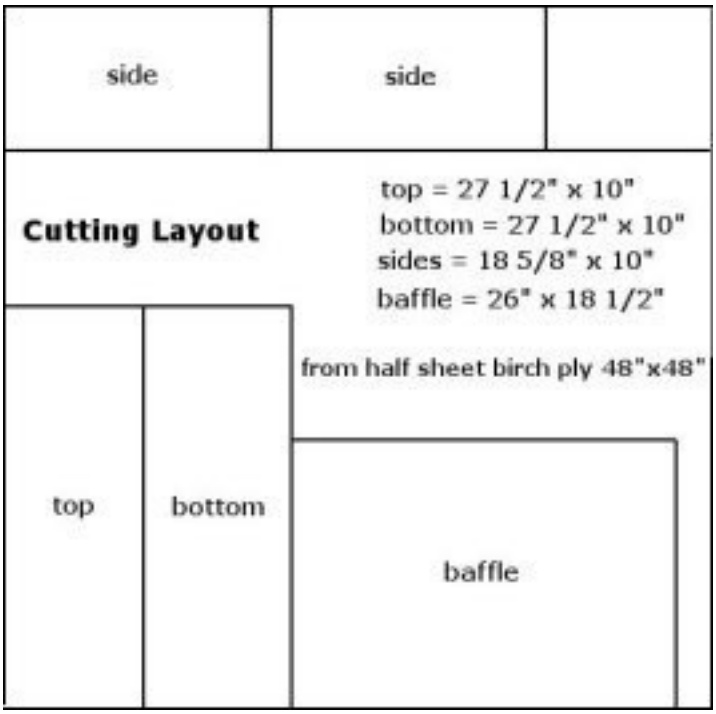
Step 2

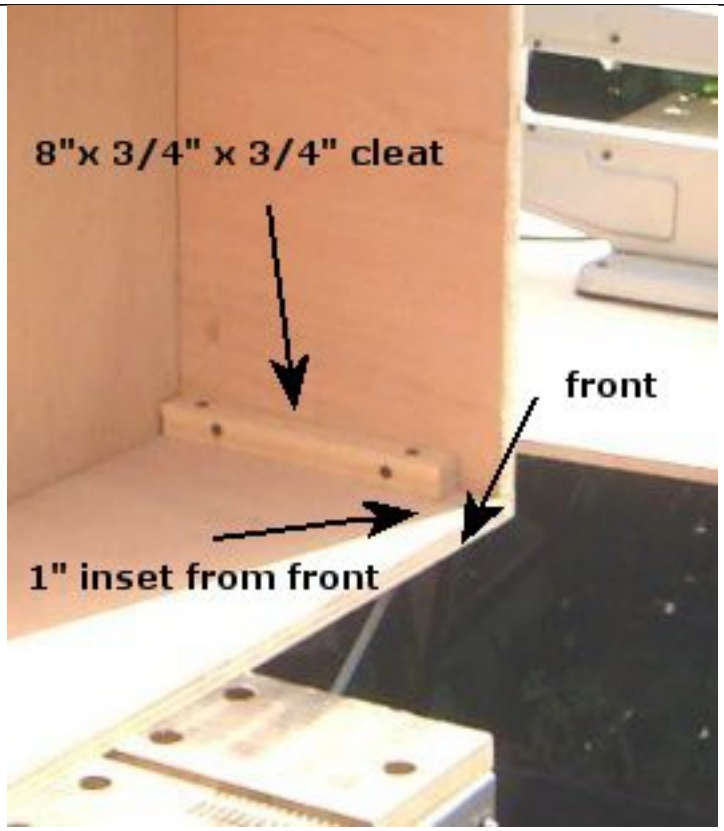
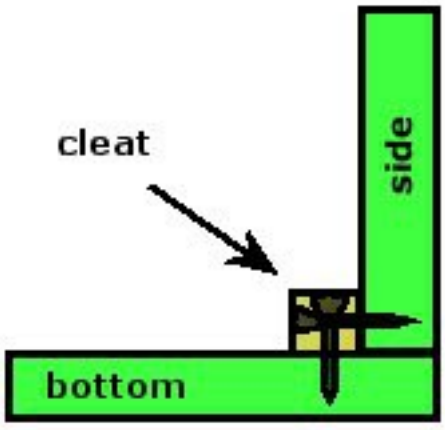
Cutting out the plywood

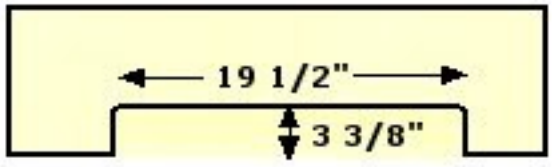
You will need a half sheet of ¾" birch plywood for the cabinet shell. Baltic birch plywood is the very best to use because of the lack of voids in the construction and the acoustic properties.

All original and current production cabinets are made of birch plywood which is considerably more expensive than standard construction grade but essential for cabinet making. There is plenty of material in a 48"x48" sheet as shown here. You may of course lay out the pieces in many ways – this is just my preferred method. Remember that when you cut the pieces to leave space for the cut itself.

You may find it better to have this cut at your supplier. Many wood suppliers will do this for a small fee.



Step 3 **Building the shell**	This is the first build stage. You are going to create a shell which consists of the two sides joined to the top and bottom by using cleats, screws and glue. The picture on the right shows the cleat in place. Only side cleats are important at the moment and these are: 8" x ¾" x ¾" placed 1" back from the front of the side. Drill countersunk holes in the cleats as shown on the right about 1" from the ends on the top and 1 ½" in from the ends for the sides. Screw the cleat to the sides only at each end first. Take care to ensure they ***EXACTLY*** butt up to the edge. ***DO NOT*** glue at this stage.	
	Now you can join the sides to the bottom and top by simply lining them up at right angles and screwing through the holes in the cleats into the bottom and top. The aim is to get an exact right angle with sides exactly flush with the ends of the top and bottom as shown. If you are going to err anywhere here you could have the bottom and top edges stick out proud a thou or two. You can then plane the whole joint flush later. If you do it the other way with the side proud you cannot correct for this error.	

Step 4 **The final shell revealed**	Here we have the final shell. It helps at this stage to take the baffle board which you cut from Step 2 and after first ensuring it is absolutely square, fit this in place at the front (as shown). You may need some small shims of cardboard here to take up the slack as the Vynide and grillecloth are not yet fitted. With the baffle fitted make sure that all four corners are perfectly square. You are now almost ready to glue up the shell but there is one thing that must be done first. It is FAR easier to create the cut-out in the top as a flat piece of wood BEFORE you glue the top to the sides.	
Step 5 **The top amplifier control cut-out**	This is the cut-out you will need for the amplifier controls in the top panel at the back. Cut to the dimensions shown but leave the inside corners slightly rounded. This is how the original would have been designed.	

Step 6 **Gluing up the shell**	You are now ready to glue the shell together. I highly recommend using *Titebond® Original Wood Glue* as this has very good characteristics but any PVA wood glue will do. Remember use the baffle inserted in the front to square the shell up while it dries. Glue each adjoining face and the back of the cleats and screw them all together tightly. Recheck the square on each corner and pack shims into the gap between the baffle and the shell as necessary to achieve exactly 90 deg. Allow the glue to cure overnight.	
Step 7 **Back panel - top and bottom**	We can now put the shell aside and make the two panels for the back. These are made from 5/8" thickness birch plywood. The large top piece is simply a rectangle 25 7/8" by 9". Cut this and put aside for later finishing. Now for the bottom piece shown on the right. Start out with a rectangle 25 7/8" by 7". Then make the cutout using the dimensions shown opposite. Firstly mark a point 3 5/8" from each side. Then draw a line 4 ¾" from and parallel with the bottom.	

	Measure in 4 ¾" from each side on this line. Join up the first top mark with these marks to give the slope inset sides. The remaining width of the slot should be around 16 ½" as shown. Remove the cutout using a bandsaw or hand saw. The edges here are sharp with no rounding. Take both panels and smooth edges with glasspaper.	
Step 8 **Fitting the chassis mounting slide cleat**	From the picture above you can see the slides that hold and support the chassis. These are made of ¾" by ¾" pine stock as before with cleats. In the original these were actually bolted onto studs in the sides – you can go to this length if you wish but I think that screw/glue is strong enough and is certainly easier. That is what I will describe. You will need someone to help you here as you are going to have to hold up the chassis while you mark the bottom of the chassis mount. As chassis can vary considerably I will tell you the principle only. You need to achieve the chassis position opposite. It has to mount inside the shell such that the top of	

the two gold bars on the panel are almost flush with the long side of the cutout. Make sure that your baffle is fixed to the front when doing this. You SHOULD get this position with the chassis flush against the baffle. If not you may need to trim down the chassis mounting board a bit (I had to!)

Notice then that the back of the chassis panel will have just over a 5/8" gap from the back. This is for the top panel to fit flush with the panel and about 1/16" in from the back when the Vynide is fitted. Use a scrap piece of Vynide to check this.

You may need to reduce the chassis mounting board at the back too to achieve this.

Now that you are confident that the chassis is where you need it mark the sides where the top of the slide cleat will go.

Cut two cleats ¾" by ¾" and 7" long and screw these into place with their top edges along the line you have marked – DO NOT GLUE YET!

Rest the chassis on the

You are trying to achieve the result shown opposite. If you don't go back and trim chassis mounting board again or adjust height of slide cleats until you do.





Step 9 **Roundover corners**	Now that the shell has set up we can move on to one of the difficult bits. The radius of this roundover is ¾". You can do this two ways depending on the equipment that you have but at the very minimum you will need a router with a ½" roundover bit. If you have a ¾" roundover bit (which I could not track down) simply round over the edges. If like me you only have a ½" roundover bit you should still use this but you have to finish the roundover with a plane. This takes skill so get someone else to do it if you can!!! You need to roundover all the sides, the front and the back but NOT the inside of the back panel cut-out.	
Step 11 **Rounding over the corners to fit the protector profiles**	You now must round over the corners otherwise the plastic corner protectors will not fit properly or be under undue stress. You must have the plastic corners to do this stage as checking fit with these is required. Do this with a rasp and follow this with very course grit glass paper. You need to keep checking that the radius in	

	all directions is correct by offering up the corner to the wood. If you have it right is will simply fit in place and stay there. If you have not it will need pushing and jump straight out again It is not sufficient to cut the corners off as this will leave a void which will cause the protector to break if hit hard, thus going against the very purpose of having them in the first place	
Step 12 **Making the speaker baffle**	Now we are ready to make the baffle. This is surprisingly easy if you use the right tools and jigs. This is what we are trying to achieve. As you can see the cut-outs for the speakers are two sets of two semi-circles with a piece of wood left in the middle to add strength. You must find the exact hole centres and this will depend on your speakers. First draw a line all the way around the edges exactly ¾" from the edge. Keep out of this area as this is where the cleats go!	

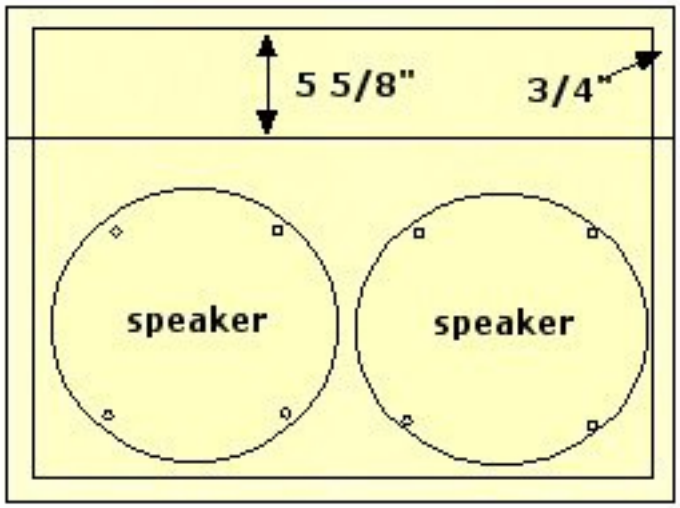
Draw a line 5 5/8” from the top where the trim will go. Keep out of the top area too!

Lay the speakers on the baffle and figure out where they best fit keeping away from each other and outside of the no go areas. If you can’t you should only go over the cleat area. If you have to do this don’t forget you will need to cut some material out of the bottom baffle cleat BEFORE you glue it in later!

Draw around each speaker. Line them up so that the mounting holes are at 10, 2, 4 and 8 o’clock. I did this by eye but you could use a set-square against the short edge.

Once you have done this draw diagonals between each pair of holes. Where they intersect will be where your rotation point for routing will be (see Step 11).

Now you will need to make a jig for your router.



Step 13 **Making a hole cutting jig for your router**	This is my homemade router jig. Take off the base plate on your router and lay flat on a sheet of thin plywood as close to the thickness as the original baseplate as possible. Draw around the baseplate exactly and mark where the fixing screws will go and the centre where router bit goes Then draw a line perpendicular with the router long edge from the centre hole point out at least 8". Draw a line from each router corner to that point (see picture) forming a point extension. Cut out the router jig. Then along the line mark holes every ½" or so. You must make sure that you have a hole at exactly half the diameter of the inside of the speakers you are going to use. For Celestions this is exactly 5 ½" Drill at least the 5 ½" hole just big enough to fit a pin. I used the stud from a pop rivet as a peg so drill a hole just big enough to fit this.	

Step 14

Cutting the speaker holes – the semi-circles

From Step 9 you have the baffle laid out on your workbench with circles drawn where the speaker cut-outs will go and centres at the diagonals.

Now lay a long set-square along the bottom edge of the baffle and draw lines in the circle ½" either side of the centre hole perpendicular to the bottom. This gives the 1" wide centre baffle strengthener.

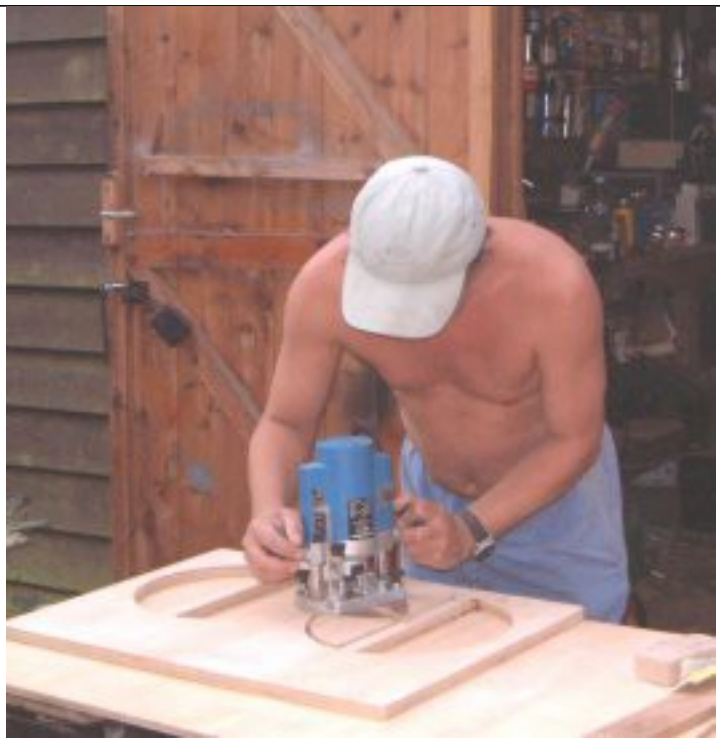
Drill ¼" holes at each point of the semicircles inside the semicircle itself so that when you use the router you know when you hit the end. This makes a nice rounded corner as well.

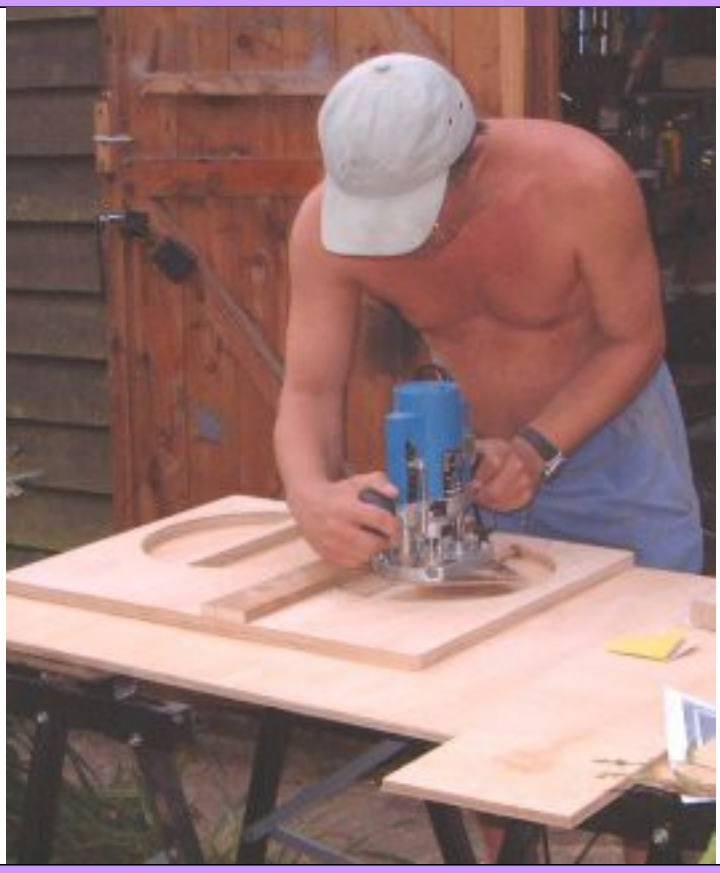
Now drill holes to fit your peg (pop rivet stud in my case) where you have determined the centre of each speaker to be (Step 9).

Lay your router with the jig on the baffle so that the 5 ½" hole in the jig fits over the hole in the centre of the speaker cut-outs. Fit a peg (or pop rivet stud in through the jig and into the baffle hole.

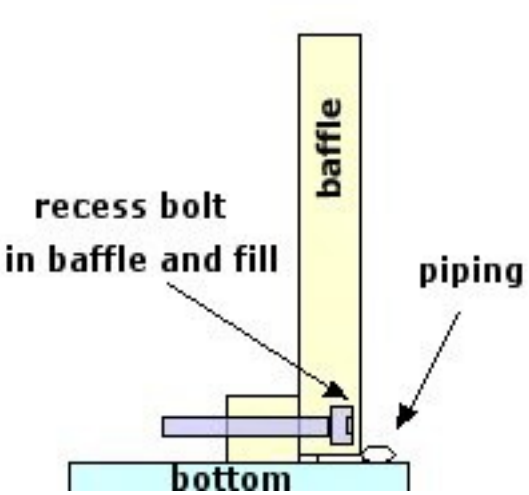
Fit a ¼" straight bit into the router and push down flush with the work surface. Now before turning on the router ensure that it rotates freely around the centre and that the edge of the cutter follows the edge of the pencil line you have drawn for the inner diameter of your speaker cut-outs.

Set the depth gauge on



	your router to cut about ¼" deep in one pass and switch on the router. Push down at the first hole and working anticlockwise cut the semicircle until you reach the end hole. Repeat for all four semi-circles. Then go a further ¼" in twice until you have cut all the way through. Placing another scrap board underneath will prevent breakout.	
Step 15 **Cutting the speaker holes – the straight part**	Now to cut the straight edges of the semi-circles. Fit a piece of straight stock wood to the baffle using screws so that it is perpendicular with the bottom and top and so that the router flat edge will run along it with the ¼" straight bit cutting just inside the marked line. Again do three ¼" depth increase passes so that you do not over stress the router, bit or wood. Work from one point hole to the other until the piece of scrap is free. Do this for all straight edges of the semi-circles.	

Step 16 **Speaker hole and baffle finishing**	You can now remove the scrap and you should have two perfectly circular baffle speaker cut-outs! Using a rasp and course glass paper round of the corners of the baffle very slightly so that the piping when fitted has a nice round edge to follow. Finish all sawn and routed edges of the baffle with fine to medium glass paper to remove any rough edges.	
Step 17 **Fitting the baffle**	You can now fit the cleats which will secure the baffle to the shell. I only fitted the cleats in the top and bottom but you can put cleats all around if you want. The cleats should be positioned just over 1” in from the front edge. This will vary depending on the absolute thickness of your baffle and the piping used. Take a piece of the piping about 1” long and staple this to the edge of the baffle either top or bottom. Fit the baffle with the piece of piping on it and line it up so that it fits	

	inside with about 1/16" recess from the piping edge to the front. This is where the cleat needs to be. Mark the inside on one edge with a pencil and take out the baffle. Fit both cleats with screws to top and bottom (or top, bottom and sides). Refit the baffle with piping piece and check that it fits properly again. Fitting the baffle to the cleats can be done in two ways. The way I used was to drill two holes in each so that I could screw fro the back into the baffle to hold it in place – this is the easiest way. The proper way would be to used bolts from the front of the baffle through the cleats and secure with nuts. Obviously you must do this BEFORE you fit the Vynide and Grillecloth to the baffle! These then act as studs.	
Step 18 **Routing out the vent holes.**	Now we can cut the vent holes. As you can see this can also be done at an earlier stage before you do the round-over. It really does not matter. I fitted three large plastic vents for a number of reasons. Firstly they are bigger than the original thin brass or plastic ones which makes for much better ventilation – particularly for the power valves. Secondly my mate Tim gave them to me so I went	

	for these! All three vents are positioned exactly 1 7/8" from the front. The centre one is positioned exactly centre. The outside ones are positioned so that their outer edges are in line with the back cutout edges as shown. Draw around the plastic vents to mark the holes for the vents. Use a straight edged piece of wood screwed temporarily to the top to guide the router or make up a template to route the holes. Always make smaller than you think and then keep routing the edges and checking the fit. You should as always take out about ¼" of wood each time until you break through. Tidy up holes with glass paper. Remember when the Vynide is fitted these holes will be tight!	

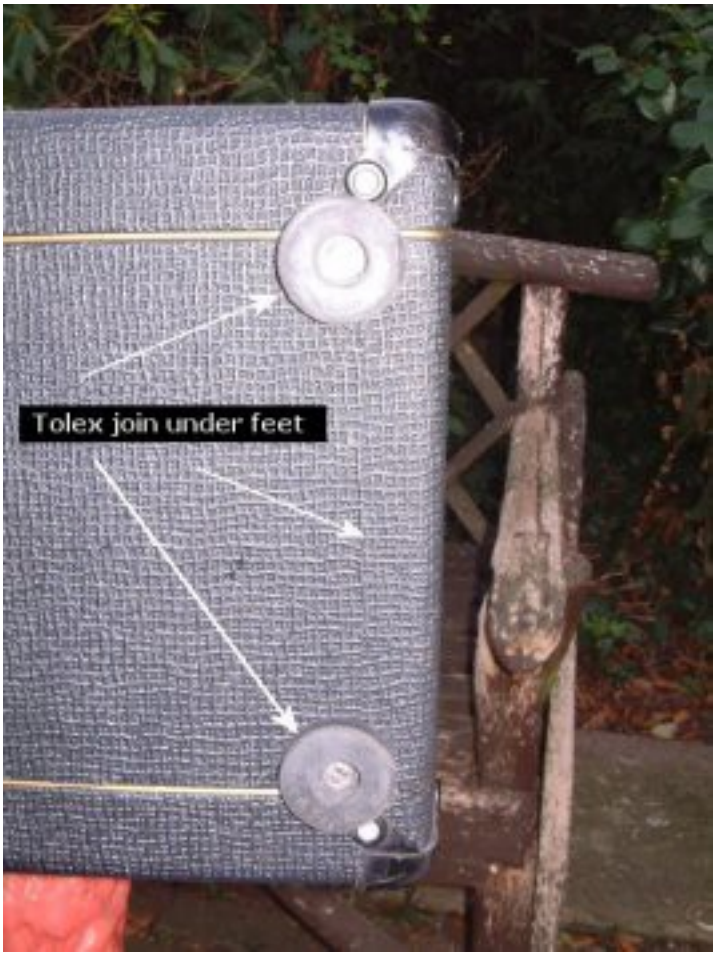
Step 19 **Routing the piping channels**	We now need to route the channel for the piping. This is done at the front and the back. You have to route the channel all the way around the top, bottom and sides. TAKE GREAT CARE at this stage as you could ruin all the good work you have done. The piping channel is exactly 1 ½" from the front and 1 ½" from the back. Mount another piece of straight stock on the side to be routed. Position it so that the cutter on the router is exactly in line with your pencil mark 1 ½" from the edge. Fit the 1/8" (2mm) tungsten tipped router bit in your router and slowly cut the channel to a depth of Make sure that you go smoothly and slowly and keeping the baseplate of your router level run right over the end. Repeat on all sides and back and front. You can then use a needle file to finish the channel as it goes around the end radius.	

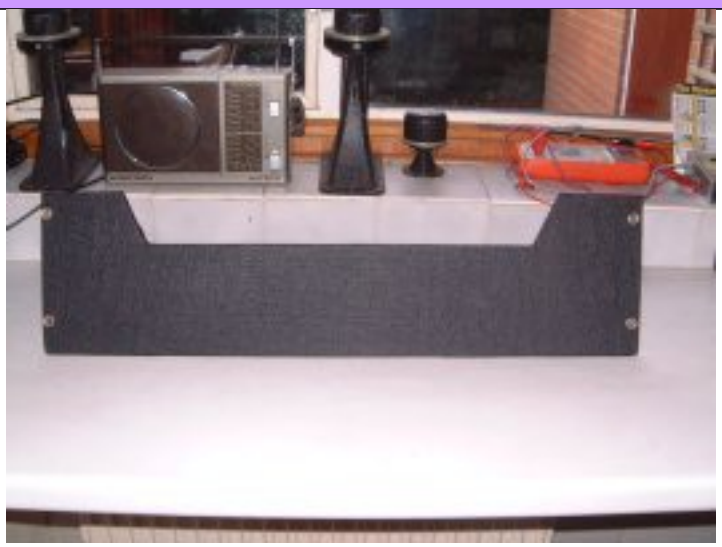
Step 20 **Finish gluing cleats**	Well that is the cabinet nearly all done! Take a break here and remove all cleats not yet glued in and glue into place. When you have finished your cabinet should now look like this opposite!	
Step 21 **The Vynide Stage – the material**	This is the bit that you have to concentrate on. To be accurate you must use the correct type of Vynide. The original is called Basketweave because of the texture. Here is a sample of the correct type. The Vynide is stuck to the shell in one piece starting at the bottom and ending at the bottom in a butt joint. I used Evostick Impact Adhesive to stick it down. Risky as there is no chance to make mistakes but MUCH more permanent than any other glue. **THIS GLUE SHOULD NOT BE INHALED – ALWAYS WORK OUTSIDE WITH A MASK.**	

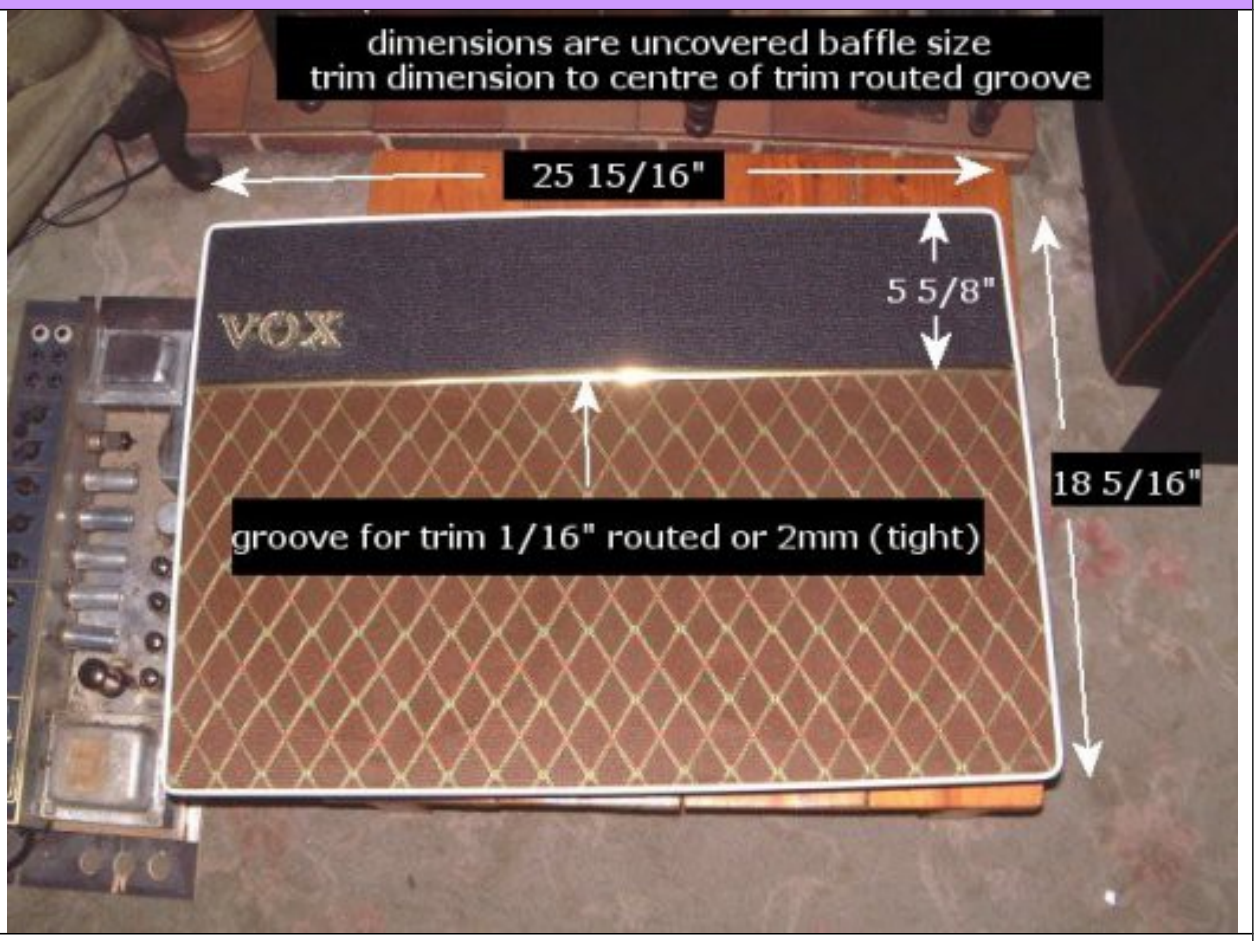
Step 22 **The Vynide wrap around**	**CRITICAL CRITICAL CRITICAL** here, and I CANNOT EMPHASISE this enough – you MUST use a wide enough piece to start with. The reason is that you are going to wrap this around in ONE GO and any error off square – and you will have some – magnifies as you go around and you will find you need the spare width at the end. You can always cut some off but you CANNOT add any! Start with a piece at least 20” wide by 108” Lay the Vynide out on a big sheet of wood and mark the exact width as shown with a white chinograph pencil. This will be your guide as you go around the shell. Also mark where the Vynide meets the top across the width The first glue anchor point is 2” from one end on the bottom and one complete side. You spread a THIN layer of glue on the wood first. Then you spread a thin layer of the glue on the Vynide up to the end of the marked top width as shown. Allow the glue to dry for 15 minutes. Keeping the shell and Vynide square lay it 2” in from the end at the bottom anchor point. You will DEFINITELY need help for the next bit from someone else as you are going to need to hold the Vynide away from the wood and smooth from the first corner along the side ensuring that you	

	keep it as square as possible. You must not get bubbles or wrinkles – take your time! Now you need to glue inside to about 2" and on the overlaps and again allow to dry. Fold over the flaps inside and stretch tight to ensure smooth corners BEFORE proceeding to the top.	
Step 23 **The Vynide keeps rolling!**	So you have done the first side! Take a break – this stuff is very nasty stuff to inhale so try to get fresh air. You can clearly see here the guideline for the top piece in white chinograph. Using the same plastic scraper technique again lay down a thin layer of the glue on both the wooden top and the Vynide. Again allow to dry for 15 minutes or dry to the touch whichever is longer. Flip the shell onto its base KEEPING THE VYNIDE AWAY FROM THE WOOD for now. With your assistant holding the end away from the wood slowly but surely smooth the Vynide to the top again making sure that you get no bubbles or wrinkles, until you reach the other end of the top. You will certainly see any error in square now…don't worry you started with enough width (didn't you!!)	

Step 24 **The Vynide nearly there!**	Oh one thing here – don't do what I did and start this at 4pm!!! As you can see I did and it suddenly got dark!! You need at LEAST 6 hours to do this so start on a warm dry day in the morning! Here we have got the top down and you will need to cut out the panel cutout. You will NOT be able to cover the inside of the slot entirely – this is not possible. You must cut square from back towards the front ask seen here leaving the sides of the slot uncovered. Try to mitre the corners but don't worry too much here as the corner protectors will over any gaps.	

Step 25 **Bottom and the join**	Well you now only have to stick the bottom down which should be a breeze. Repeat the glue instructions above on the bottom and ensure that the glue is right up to and 1” over the original 2” start overlap. Smooth down firmly. Now the cunning bit! You need a very sharp razor knife here and a metal ruler. At exactly 1 ½” inches in from the end cut from front to back cleanly through BOTH layers of the Vynide overlap. Remove the excess on wood (peel away carefully) and the end piece and then smooth the end piece down. You should now have a perfect butt joint which will not show at all as shown opposite exactly 1 ½” from the end which will be mostly under the feet when these are applied later!	

Step 26 **The Vynide Finished!**	Well there you go! The finished shell! You did it! It is starting to look like an AC30 now isn't it!? You just need to trim out the vents. I cut mine flush to the top and painted the inside wood black so you don't see it (as you can still here before painting. Lastly you need to stick small pieces of Vynide to the inside edges of the slot. Press very firmly and then using a very sharp razor knife trim to meet the edge of the top Vynide. This should be fairly neat anyway but I used a small amount of black plastic vinyl glue which slightly melts the Vynide and welds the edges together. This is not really that necessary but helps to keep the material together later in life.	
Step 27 **The Vynide backs**	Lastly cover the backs with the remaining Vynide. If you had purchased 3 yards 60" wide you should have plenty. The rectangular top piece is a walk in the park – especially after the shell. Just mitre the corners. The awkward bit is the bottom panel and the folds on the slanted inside edges can be a nightmare. You will need either to add strips as you did with the top or lay down small pieces near the inside corners and double lay the butt joint as you did with the bottom, cutting through with a	

	sharp knife as before.	
Step 28 **The Baffle - Finishing**	
	Here is what we are aiming for with the baffle. I have made this picture bigger so that you can see the detail and the dimensions. Your bare baffle has been made already (see above steps) so we now only need to cover the wood with the Vynide for the top, the grillecloth for the bottom and the scrim which fits underneath it. We then add the piping and the logo and we are done. So here goes.

Step 29	In this step we will fit the mounting bolts for the speakers. Make sure that the holes are drilled accurately corresponding with the speaker holes. You will need to recess the bolts in the wood as they will poke through the grillecloth when this is added. Countersink the heads to do this with a large router bit or drill. Insert the bolts into the holes and then fill in the countersunk holes with wood filler or epoxy. When hard rub down smooth.	
Step 30	You now need to cut the slot for the trim. I did not get a picture of this or the installation of the Vynide and cloth on the baffle as I was too excited and I forgot so I will have to talk you through it! Take the baffle out of the shell and lay flat on a board. Fit a 1/16” (2mm) tungsten straight router bit to your router. Screw a straight piece of scrap stock to the baffle such that the router bit exactly follows the line you have drawn 5 5/8” from the top of the baffle. Carefully route a channel about ¼” deep along this line.	

Step 31 **The Grille Vynide**	Sorry but again like I say I forgot to take pics of this bit so I will start by describing the Vynide bit. This is fairly easy. On the bare baffle, stick a piece of the Vynide using the glue techniques above. Ensure that you have enough overlap on top and edges and mitre the corners. Make sure the Vynide overlaps the slot about ½" below it. Again using a new blade in your razor knife cut the Vynide 1/16" from the bottom edge of the slot and using the tip of a screwdriver fold it over into the slot.	
Step 32 **The Scrim and the Grillecloth**		