

# ALTERNATOR STAIR

**Alternator** means to go from one to another, then back, alternating one sequence to another and then back to create a repetitive motion or means of motion in electrical (alternating current, ac) or construction.

Kind of a complicated statement for a carpenter but it is what we do when we build an alternator stair.



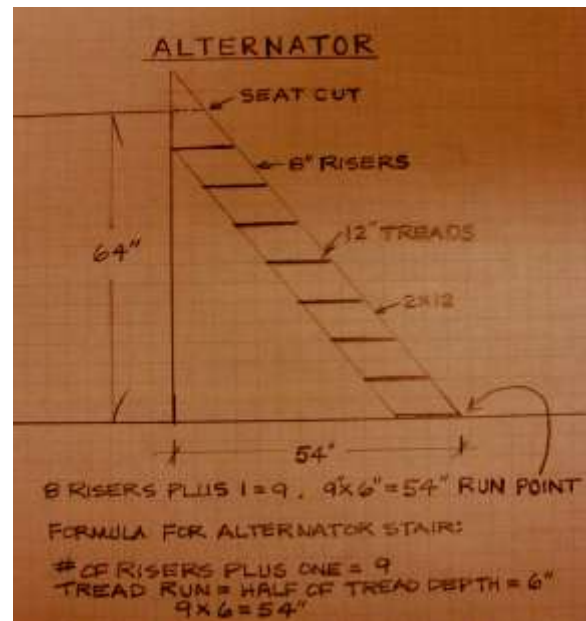
This is an alternator stair I and some Indian carpenters built recently in Iraq, where I am a construction safety and procedure instructor for the US Army, reconstruction of Iraq, and still, as always, a carpenter. Notice there is no landing post, no need for them.

Alternator stairs are not for everyone.

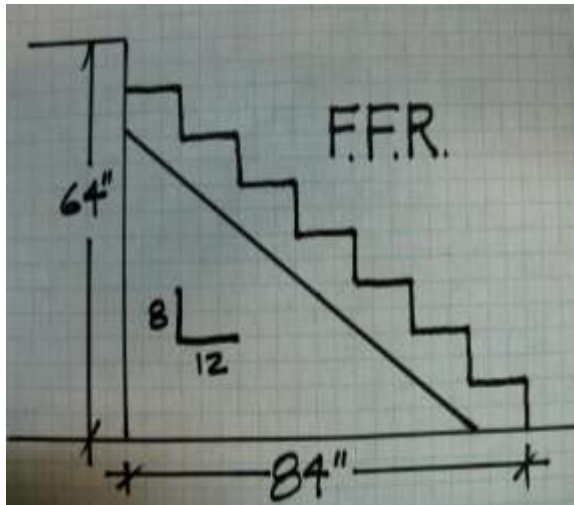
As I have said in time and again in the many books I have written, any stair, even the best one ever built, is dangerous. Any time you deviate from walking on a level and clear surface, even stepping on a 2" rock, you pose a threat to your body and you could be injured.

So we build staircases to ascend and descend different elevations. Alternator stairs are built because of the lack of footprint space in a construction area.

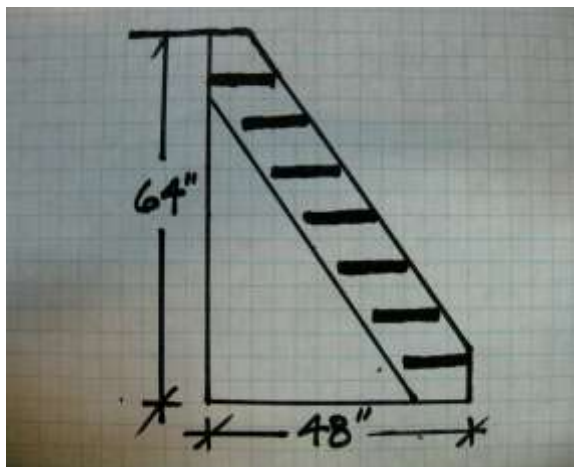
I built a 3 story house in the middle of a large ranch, built strictly for prestige and trying to impress the neighbors. I was not impressed but I enjoyed the work and the money.



This is the actual soft drawing I drew for this stair. Alternator run formula is number of risers plus one, times half the depth of your treads. Practice the formula and draw some alternators, only way you will ever learn is to do it. Then get you some lumber and build some 1/4, 1/2 or full scale alternators.



Drawing above is the same rise and drawn as a regular stair. So you have an 84" run for a regular stair verses a 48" run for an alternator.



Each grid equals 4". Simple to draw, simple to build, as you will see.

As I have said many times, use some 1x6's in place of the 2x12's, some 1x6's in place of the plywood treads and build a 4 step 1/2 scale model to begin with. Draw it and build it. You will be amazed how this will help.

If you have never built an alternator stair you need to expand and study that first drawing very closely, it has a lot of information in it.



This is a 16"x6" cut out.

This is the first 3/4" plywood tread part. I drill a hole in the corner and then cut to the hole to make the cutout tread, and I round the corner as you can see.

All I had to build these out of is some inferior plywood that barely had enough glue to keep it together until they got it delivered to Iraq. Worst plywood I have ever used.



We rolled a liberal coat of glue on the treads and laminated them together.

We used a few 1 1/4" finish staples to keep them from sliding when we clamped them.

Now we need to calculate the angles of the 2x12 stringer.

I've explained this many times in the articles I have written about calculating stairs. The calculation point of the stringer is not at the top landing elevation. If you look at the drawing the top point of the stringer is above the

top landing. This is why you need to draw the stair if you are not familiar with alternator stair calculations. If you cut a stringer that only goes to the top of the landing you would not have the material to attach the top tread.

The top of this stringer is 8" above the top of the landing because I am using the landing as the top of the stair; this is called FFR, finish floor riser. An FFE, finish floor extension would have a tread extending from the landing and the stringer would be even longer and create a 60" total run. This is all explained in the Carpenters Book I wrote.

The full stringer run point is 54", the full stringer rise point is 72". On your Casio fx260 calculator:

Enter run, 54 then push shift r-p, then enter rise, 72 then equals and you get 90" and this is your rake length (point to point) on the stringer, then push shift x-y and you get 53.1 degrees, your plumb cut on the stringer for the top, floor angle is 37°.



We then cut the 53° plumb cut on the top of the stringer. Then marked 90" length and marked the 37° floor cut and cut it.



Treads are 53° and the top of the first one is 6½" off the floor (to allow for the 1½" tread) then every 8" as shown.



Next we glued and screwed the cleats (I cut a 22½° bevel on each end) onto the stringers, backing the 1 1" cleats up 1" and the 5" cleats up 7" so they won't be sticking out in front of the treads. Study this picture closely. If you will shoot a couple of 2½" finish nails in the cleat when you get it positioned it will be a lot easier to install the 2½" screws and the cleat won't be moving on you. Pre-drill the screwholes in the cleat.



With panel adhesive we then installed the treads with finish nails and 3" screws.



As you can see we had to install 2x4s for bracing because of the weak plywood. I usually use laminated 3/4" plywood and 1x12 for treads, but we do not have any 1" lumber, only 2x's. Never use a 2x12 for an alternator tread. The nose of the tread will break in half and could cause a serious fall. Always laminate lumber for these treads, they are weak anyway after the large cutout.



This is an overhead view of the treads. If you have never climbed an alternator stair it is hard to explain. There are actually some people that can't do it. They get scared going down, and they have every right to be scared, all stairs are dangerous.



Now if you will look closely, you can see the tread on the top is above the midpoint of the tread below. Hard to understand but this is how you decrease the amount of run (floor space) you need for a stair.



I know you stair builders noticed but for some of you, you need to always install an anchor plate.

On this stair I installed two 12" concrete stakes into the ground. If this stair was permanent I would have poured a slab here like I explained in the Carpenters Book, which is free for you to download.

The Carpenters Book has a stair section that has been deemed by many top officials of construction as the best basic stair instructions they have ever seen in print.

The knowledge for the article and the Carpenters Book is from watching and learning from the over 100 carpenters teaching me about stairs and construction and over 40 years experience I gained building stairs and buildings.

If you pay attention the even the dumbest carpenter you ever worked with you will probably learn something.

<http://carpenterbooks.com>

Bob Johnston, carpenter