04 -VAWT Frame Construction Notes

Why are we doing this?

The purpose of the generator construction is to provide a stable structure to allow the rotation of the magnet module with a minimum of spacing between the magnet and coil modules. This requires a parallel relationship between the bottom of the magnet module and the top of the coils for a complete rotation of the magnet module.

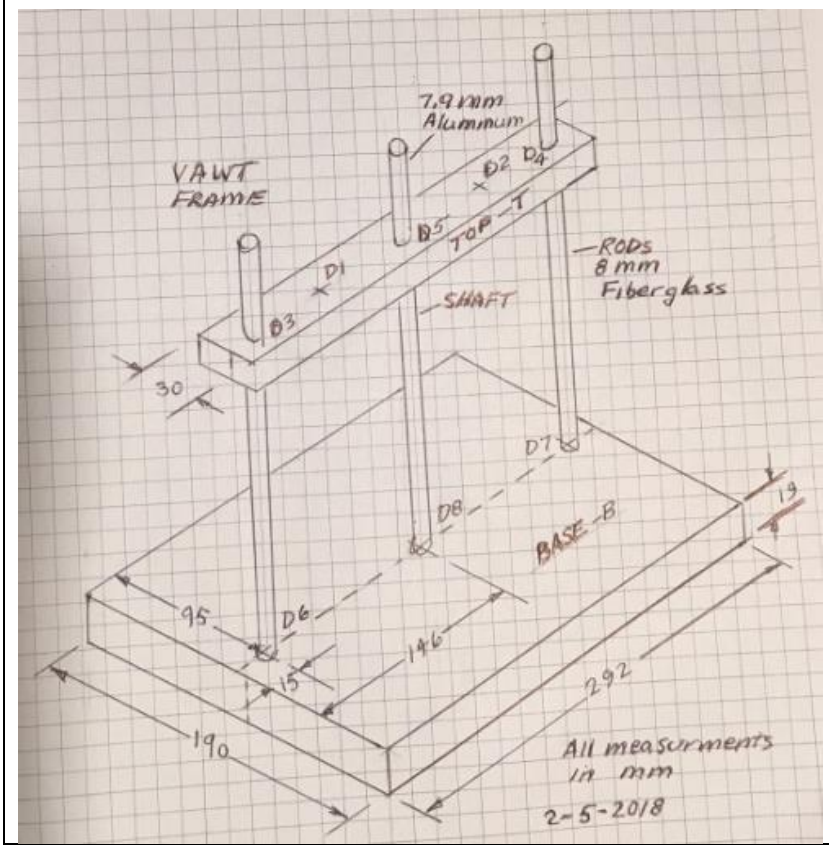
To achieve this the generator components must be carefully cut, holes drilled at right angles

Module Criteria

1. Layout centerline of TOP and BASE and locate drilling points
2. Align and screw TOP{ and BASE together and drill pilot holes
3. Drill required holes
4. Assemble frame and align SHAFT
5. Assemble magnet and coils modules
6. Carefully drill holes in parts as specified
7. Use wood screws to assemble all parts
8. Insert skate bearings to reduce shaft friction
9. Install the magnet and coil modules
10. Test Generator rotation
11. Test Generator construction tolerances

Components

1. BASE 292 mm x 190 mm x 19 mm
2. TOP 292 mm x 30 mm x 19 mm
3. Vertical Side Rods (fiberglass)- ROD (2) 8 mm dia. x 305 mm length
4. Generator/Blade Shaft (aluminum) –SHAFT 7.9 mm dia. X 298 mm length
5. (2) Skate bearings 22 mm x 8 mm x 8 mm
6. (10) #4 5/8 screws
7. (2) washers
8. (2) 1-5/8 screws



Notebook Sketch

VAWT Frame Construction
Figure-1

Drill Set

Procedure Overview

Drilling

Several holes must be drilled with accuracy to insure optimal generator operation. Many of the holes require multiple steps.

Step		D1	D2	D3	D4	D5	D6	D7	D8	D9
1	Layout the TOP (T) and BASE (B) centerlines and extend then to the sides									
2	Center punch the locations for drilling D1, D2, D3, D4 and D5 on the TOP									
3	Drill	11/64	11/64							
4	Align centerline edges and screw TOP and BASE									
5	Drill			3/32	3/32	3/32	3/32	3/32	3/32	
6	Drill				5/16	516	5/16	516		
7	Unscrew TOP and BASE									
8	Drill				P	P				
9	Drill			1/2						
10	Drill to depth of 8 mm								7/8	
11	Drill additional 2 mm								5/8	
12	Drill pilot holes on side of TOP and magnet unit									3/32

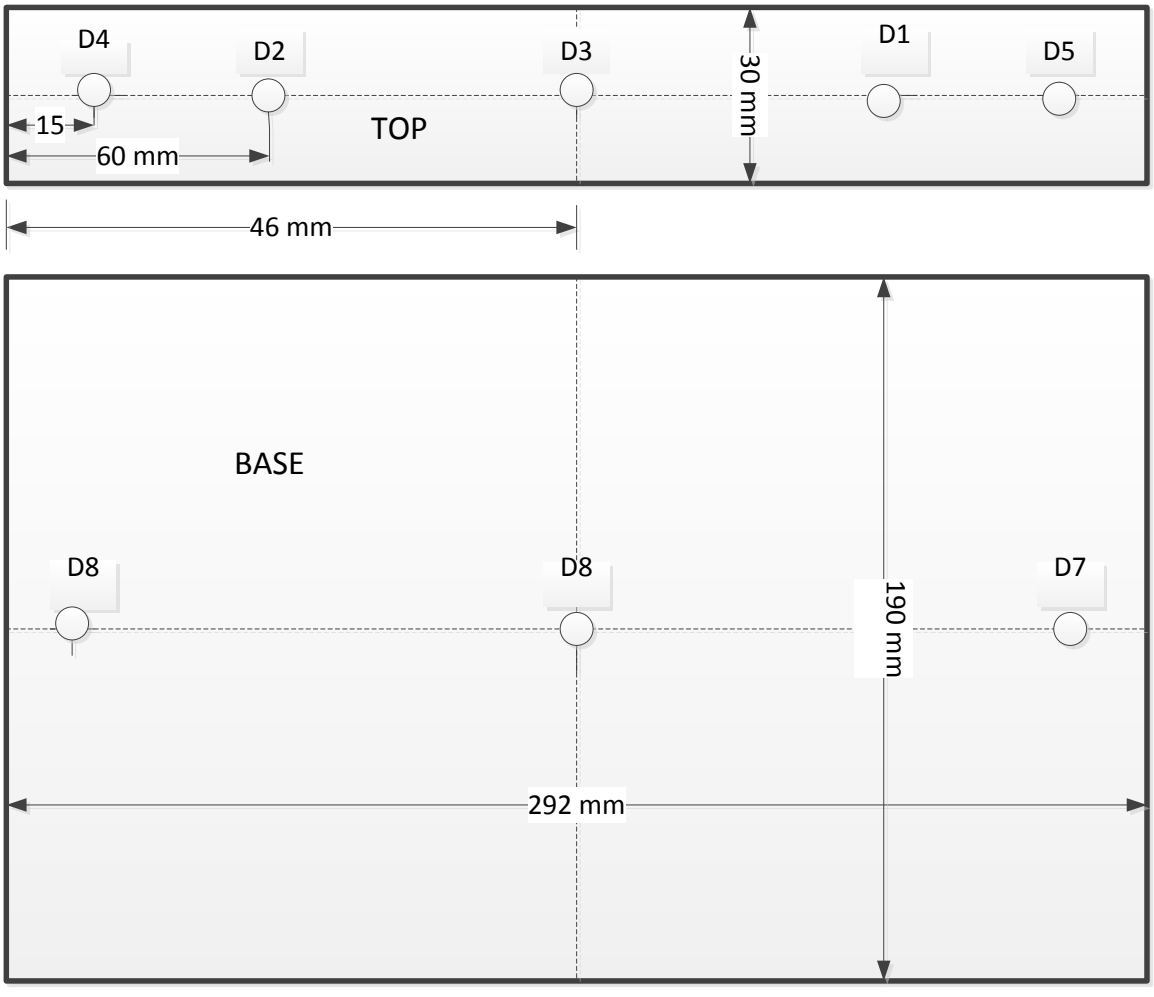


Figure-2

Prototype VAWT Frame Construction Procedures

1. Layout the TOP (T) and BASE (B) centerlines and extend then to the sides.
2. Mark and center punch the locations for drilling D1, D2, D3, D4 and D5 on the TOP.
3. With a hand-drill, drill holes D1 and D2 with a 11/63 drill bit
4. Align the centerline edges and used screws with washers to secure the alignment.
5. Using a drill press, drill D3, D4, D5, D6, D7 and D8 with a 3/32 drill bit through both TOP and BASE.
6. Using a drill press drill D4, D5, D6 and D7 with a 5/16 drill bit through both TOP and BASE.
7. Remove screws and washers in D1 and D2 holes.
8. Using a drill press, drill out D4 and D5 with a P-drill bit through only the TOP.
9. Using a drill press, drill out A with a ½ drill through only the TOP piece.
10. Using a drill press, drill out D8 with a 7/8 Forster drill through only the BASE to a depth of 8 mm.
11. Using a drill press, drill out A with a 5/8 Forster drill through only the BASE to an additional depth of 3 mm.
12. Using a hand-drill drill 3/32 the holes in the side of D4, D5 and the Magnet Unit Shaft locking plate.
13. Using the vertical fiberglass alignment block position the fiberglass rods over the BASE D6 and D7 holes and drive the rods into the BASE. The tops of the rods must be protected with a wooded block before striking.
14. Insert the skate bearing in BASE hole D8
15. Slide the TOP holes D4 and D5 down the two fiberglass rods to approximately 150 mm from the BASE.
16. Insert the aluminum shaft through the TOP D3 hole to the BASE bearing.
17. Place a press fitted bearing holder over the shaft on the TOP.
18. Align the shaft at right angles to the BASE and locate the securing holes for the bearing holder.
19. Secure the bearing holder with provided screws.
20. Check the shaft square alignment and make the necessary adjustment with the bearing holder position.
21. Slide the TOP off the rods.
22. Hot glue the BASE bearing on its edges, taking care not to get glue in the bearing.
23. Place coil assembly over the shaft on to the BASE and secure with hot glue on the edges.
24. Slide the magnet assembly over the shaft and position it above the coils.
25. Replace the TOP to 100 mm over the BASE and secure with screws.
26. Adjust the magnet unit to approximately 5 mm using a CD as a spacer and secure with screws.
27. Spin the shaft and check for a consistent spacing between the magnets and coils. Troubleshoot if it is not consistent.