Circular Halbach Array Kit

Warning: We have made these kits to be as simple to assemble as possible. It is much easier/stronger than gluing magnets together. But assembly still requires a person with good dexterity. Be careful as the magnets are strong and can pinch the skin or fly away from one another. These magnets are also quite brittle. Keep away from computer components and anything magnetic or electrically sensitive. Keep away from pacemakers. Do not let young children handle them.

This kit includes:
Aluminium magnet case
12 very strong rare earth magnets (cube shaped)
12 grub screws to hold magnets in place (in some cases a spare maybe provided)
Allen key to tighten grub screws
Magnetic field viewer card
These Instructions

What is a Halbach array?
A Halbach array is a special arrangement of magnets which increases the magnetic field on one side of the device while cancelling the field to near zero on the other side. It is the closest you can get to a one-pole/monopole magnet. With circular Halbach arrays there are a number of possible different configurations. With the supplied halbach array three possible configurations are possible (as seen in diagram 1). The first provides shielding to the centre. The second provides an upwards force in the centre of the halbach and the third provides three poles in the centre. Multi-pole configurations are often used in high-performance motors and generators, by maximising the strength of the fields in a confined space.

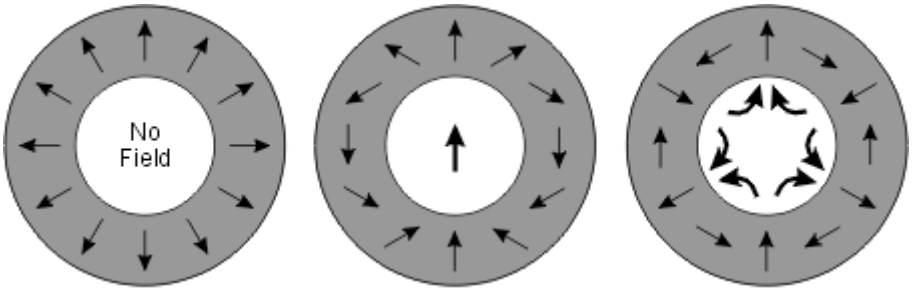


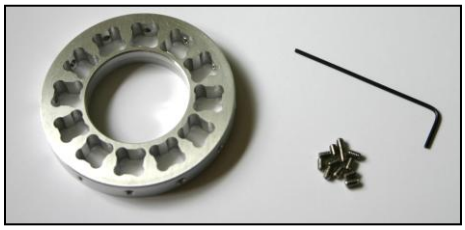
Diagram1 : the Aligment of the magents

History

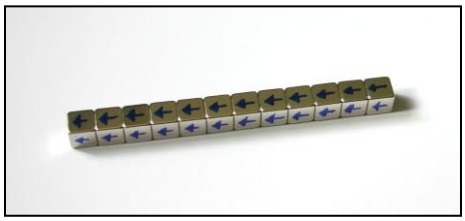
The effect was discovered by Mallinson in 1973, and these 'one-sided flux' structures were initially described by him as a 'curiosity', although he recognised at the time the potential for significant improvements in magnetic tape technology. In the 1980s, the late Klaus Halbach, a physicist at Lawrence Berkeley National Laboratory, invented the Halbach array to focus accelerator particle beams.

How to construct the Halbach array

1) Take the aluminium case and screw in the grub screws using the provided Allen key. To achieve this you may find it is easier to put the grub screws onto the Allen key first, before attempting to 'locate' it into the hole. Do this for all 12 screws but make sure they are not protruding out of the back (and hence stopping the magnets from going in). Some kits may come with a spare grub screw.



2) Mark the orientation of the magnets. The easiest way to do this is to allow the magnets to naturally align. Make a note of their alignment or mark them with a permanent marker (as shown in picture). Then split them up but making sure they are not too close together.



3) Place the case on a strong flat surface. Start putting in the magnets. The easiest way to do this is to put them in 3 groups of 4. The first group being top, bottom, left and right. As you put each magnet in, tighten the corresponding grub screw. The first 4 magnets should be quite easy to fit. The last 4 I found harder to put into place correctly. NOTE: make sure the magnet does not flip over and have change orientation as you are putting it in place.

4) Make sure you tighten the grub screws to stop the magnets dropping out.