

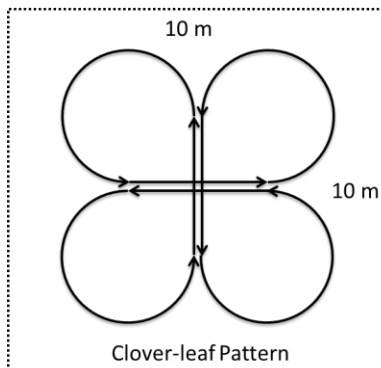
MagArrow Heading Error Compensation Flight Instruction

- **Required Equipment:**

1. MagArrow
2. Base-station with GPS

- **Compensation Flight Steps:**

1. Find a location with low magnetic field gradient:
 - i. Choose a location far away from cars/equipment/roads/buildings/powerlines.
 - ii. Turn on MagArrow or Base-station and record the reading B_0 (if 50/60 Hz signal > 20 nT, field readings need to be averaged).
 - iii. Keep MagArrow/Base-station pointed in one direction and move it forward, backward, left and right by 10 feet and record four readings B_1 , B_2 , B_3 , B_4 , at four locations, respectively (make sure the person moving the instrument is magnetically clean).
 - iv. Calculate $|B_1 - B_0|$, $|B_2 - B_0|$, $|B_3 - B_0|$ and $|B_4 - B_0|$. Make sure that they are all less than 100 nT. Otherwise, choose a new location and repeat from step ii.
 - v. If such a location cannot be found, choose the location with the least gradient. However, a large gradient will affect the compensation result negatively.
2. Set up the base-station:
 - i. Make sure all equipment at least 20 m away from the low gradient area.
 - ii. Turn on the Base-station and make sure that it works and has GPS time stamps.
 - iii. Start data logging.
3. Fly the MagArrow:
 - i. Attach the MagArrow to the drone, start the MagArrow and make sure that it is working. Start data logging.
 - ii. Fly the MagArrow to the low gradient area and elevate it as high as possible (check your local regulations about the maximum drone height as well). We recommend > 60 m elevation for 100 nT gradient on the ground. In general, if the gradient is a factor of 8 smaller, the flight height can be a factor of 2 lower.
 - iii. Rotate the drone slowly so that one full rotation takes more than 10 seconds. Do at least one full rotation. Two full rotations are preferred.
 - iv. Fly a clover-leaf pattern at the same height. Ideally, the pattern is contained within 10m x 10m centered on the low gradient area.



- v. If time permits, repeat step iii and iv a couple of more times.
- vi. Fly the drone back, stop the MagArrow data logging and download the compensation flight data.