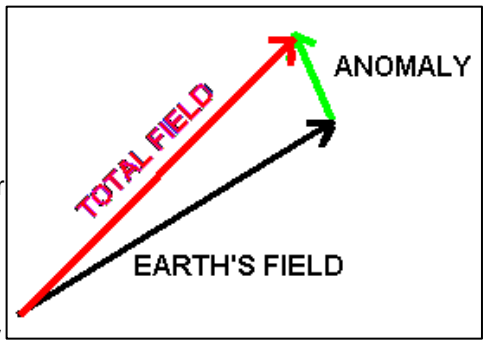
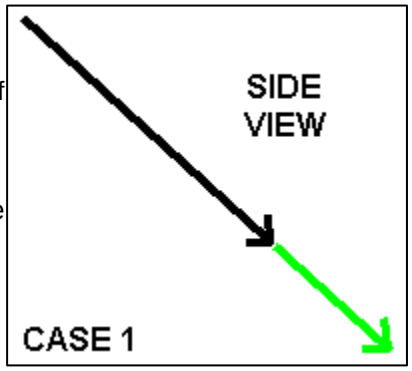
ICEFIELD TOOLS
Icefield Tools Corporation
PO Box 30085
Whitehorse, Yukon
CANADA, Y1A 5M2
tel: 867-633-4264 / 877-ICEFIELD
fax: +1-867-633-4217
e-mail: info@icefieldtools.com
web: http://www.icefieldtools.com

KB002: Interpretation of magnetic field strength and magnetic dip diagnostic parameters.



Unfortunately, there are no hard-and-fast rules on how to interpret the magnetic diagnostic parameters. It is possible to have abnormal diagnostic parameters with no error in azimuth; conversely, the azimuth may be in error even though the diagnostic parameters appear OK.

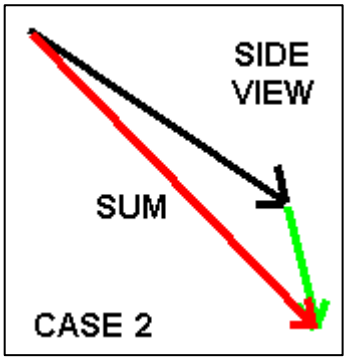
Imagine that the Earth's magnetic field is a vector (or arrow) poised in space. The length of the vector indicates the magnitude of the field. Any additional magnetic field created by the drill rods or magnetic body can be represented by a second such vector (hopefully a lot smaller than the Earth's field vector!) The tool magnetometer will see the **sum** of these two magnetic vectors. To add two vectors, place the "tail" of the second vector to the "head" of the first vector. The vector sum will then be the vector from the tail of the first vector to the head of the second, as shown at the right.



Keep in mind that this vector addition is happening in three dimensions. The computed azimuth of the tool is relative to the **horizontal** component of the **total** field.

Generally-speaking, if the magnetic dip and/or field strength are different from what is expected at the site, then there are likely magnetic interference issues to deal with. The reported azimuths may not be reliable. But, the story is not that simple.

Let us consider a number of situations. These are all worst-case scenarios – in real applications, you are unlikely to encounter these exact situations, but hopefully this will give you a sense for what the diagnostics are able to tell you. We will assume a survey in the northern hemisphere where the magnetic field dips into the ground. All these examples have corollaries in the southern hemisphere.

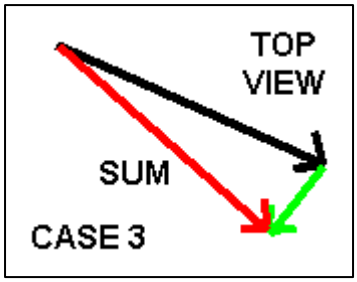


CASE 1: Anomaly has same azimuth and dip as Earth's field.

In this case, the reported azimuth and magnetic dip will be correct, although the field strength will be greater than the normal value.

CASE 2: Anomaly is horizontal and at right angles to the Earth's field.

In this case, the reported azimuth will be incorrect, although the magnetic dip and field strength will appear fine.



CASE 3: Anomaly has the same azimuth as the Earth's field, but a different dip.

In this case, the reported azimuth will be correct, although both the field strength and magnetic dip will appear incorrect.