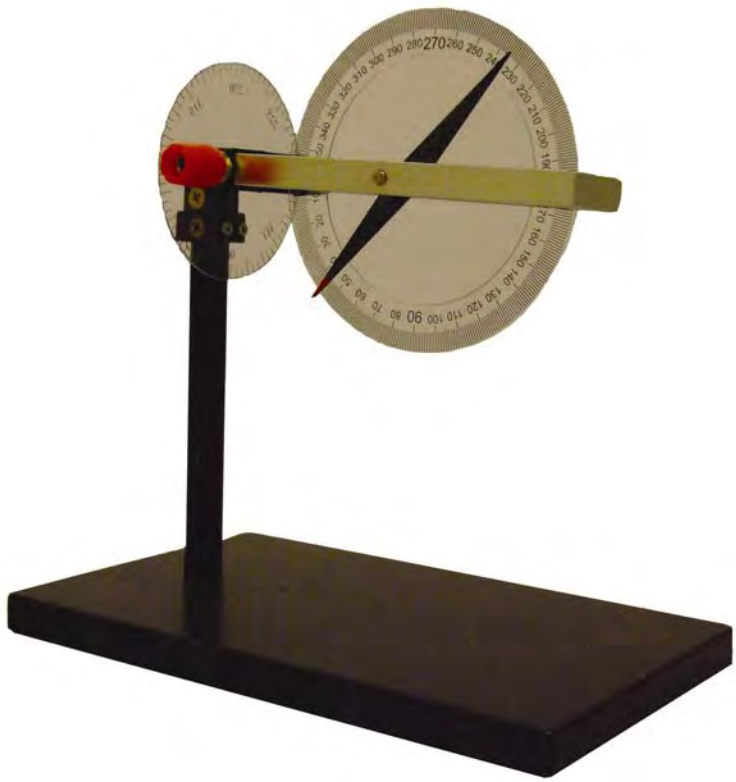
615-0185 (20-010) Instructions for Dip Needle



Introduction: Dip needles, also commonly known as dip circles, measure magnetic dip. When a magnetic needle is suspended vertically, it will form an angle with a horizontal plane. In effect, the needle represents the exact angle the earth's magnetic field makes at the latitude of the user.

Earth's magnetic field is three-dimensional. It is most concentrated at the magnetic poles, and more diffuse at the equator. This is why compass always point directly at the magnetic poles, and not some other part of the magnetic field. However, if a compass needle is prevented from pointing toward the poles, it will point towards any magnetic field it can find. This is the principle of magnetic dip.

The principle use of a dip needle is to determine latitude. While it is more difficult to compute latitude using this method instead of the sun, the dip needle can be used in Polar Regions where the sun is often difficult to observe.

Operation: Your dip needle is mounted in gimbals that can be rotated in three axes. The most useful orientations are perfectly vertical or horizontal. A horizontal position allows you to use the dip needle as an ordinary compass. You will notice a scale along the edge that conforms to azimuth reading of a compass. The movement of the needle to point towards magnetic north is known as *declination*.

To use the unit in dip needle form, position it such that the housing, which holds the needle and the scale, is perpendicular to the upright shaft. You will notice that the needle will deflect by a certain amount, which can be read on the scale. This deflection is known as *inclination*.

Unfortunately, the earth's magnetic field is not constant. There are localized regions with entirely different magnetic properties, sometime having an opposite orientation than the surrounding field! Iron deposits, the fact that the earth's surface is not regular, basaltic rocks on the seafloor, and other factors cause the earth's magnetic field to be slightly disordered. This defeats sensitive dip needles, since they respond to the local magnetic field, not the earth's magnetic field as a whole. For this reason, they have limited use in navigation.

Dip needles do have some use in the mining and prospecting industries. Iron is one of the few materials that naturally emit a magnetic field, along with nickel, cobalt, neodymium, and a few others. The magnetic properties of Iron, if enough iron is present, can mask the earth's magnetic field in localized areas. This property can cause large iron deposits to deflect a dip needle beyond what the earth can. This makes dip needles a very useful tool in iron prospecting. Today this method is not as accurate as computer modeling and high tech scanners, but in early years it was indispensable.

Your dip needle is equipped with banana jacks on the gimbal. If you connect a low voltage source to these, the gimbal will become electrified, which in turn will interfere with the magnetic field. You can cause the needle to deflect by an inappropriate amount using this method. This is an easy way to show your students the relationship between electricity and magnetism.

Warranty and Parts:
We replace all defective or missing parts free of charge. Additional replacement parts may be ordered toll-free. We accept MasterCard, Visa, checks and School P.O.s. All products warranted to be free from defect for 90 days. Does not apply to accident, misuse or normal wear and tear. Intended for children 13 years of age and up. This item is not a toy. It may contain small parts that can be choking hazards. Adult supervision is required.

615-0170 Magnet, Natural Lodestone: A natural rock that contains traces of iron ore with natural magnetic properties. Show the natural magnetic field by deflecting a compass. Measures approximately 2 long.

653-9015 Magnetic Earth Field Model: This is a great demonstration of the earth's magnetic field. Use it as is, or place it on an overhead projector to show the whole class. Iron filings are suspended in oil to allow the included magnet to align them to its field.

615-0095 Magnet Field 2 Halves: Three-dimensional magnetic fields are an open and shut case with our new folding magnetic field apparatus.