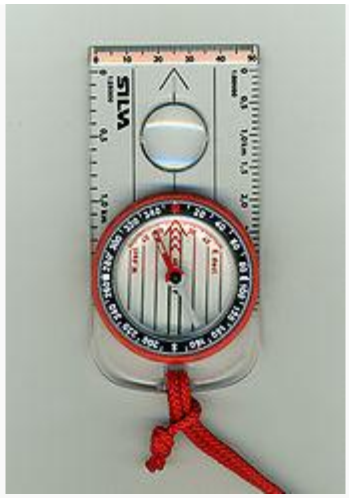
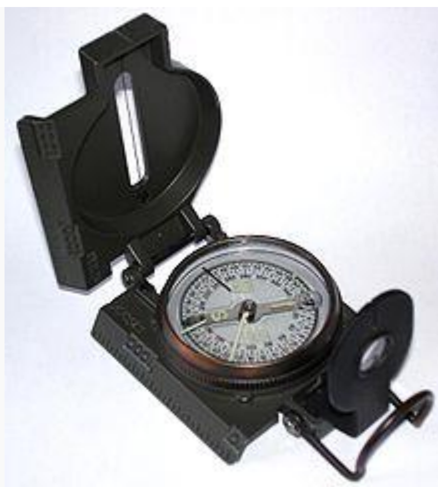
MODERN COMPASSES



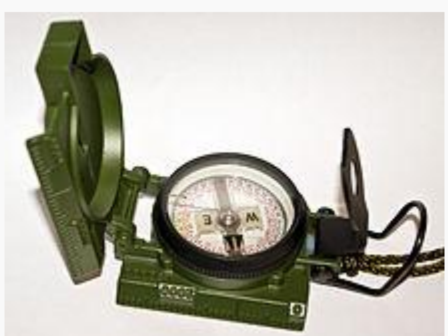
A walker's liquid-filled compass, with a lanyard for the neck

Modern compasses usually use a magnetized needle or dial inside a capsule completely filled with fluid (oil, kerosene, or alcohol is common). While older designs commonly incorporated a flexible diaphragm or airspace inside the capsule to allow for volume changes caused by temperature or altitude, modern liquid compasses utilize smaller housings and/or flexible materials for the capsule itself to accomplish the same result. The fluid dampens the movement of the needle and causes the needle to stabilize quickly rather than oscillate back and forth around magnetic north. North on the needle or dial, as well as other key points are often marked withphosphorescent, photoluminescent, or self-luminous materials[4] to enable the compass to be read at night or in poor light.

Many modern recreational and military compasses integrate a protractor with the compass, using a separate magnetized needle. In this design the rotating capsule containing the needle has a transparent base containing map orienting lines as well as an orienting 'box' or outline for the needle.[5] The capsule is then mounted in a transparent baseplate containing a direction-of-travel (DOT) indicator for use in taking bearings directly from a map.[5]



Liquid filled lensatic compass



Cammenga air filled lensatic compass

Other features found on some modern compasses are map and romer scales for measuring distances and plotting positions on maps, luminous markings on the face or bezels, various sighting mechanisms (mirror, prism, etc.) for taking bearings of distant objects with greater precision, "global" needles for use in differing hemispheres, adjustable declination for obtaining instant true bearings without resort to arithmetic, and devices such as inclinometers for measuring gradients.[5]

The military forces of a few nations, notably the United States Army, continue to utilize lensatic field compasses with magnetized compass dials or cards instead of needles. A lensatic-card compass permits reading the bearing off the compass card with only a slight downward glance from the sights (see photo), but may require a separate protractor for use with a map.[5][6] The official U.S. military lensatic compass does not use fluid to damp needle swing, but rather electromagnetic induction to damp the needle. A "deep-well" design is used to allow the compass to be used globally with little or no effect in accuracy caused by a tilting compass dial. As induction forces provide less damping than fluid-filled designs, a needle lock is fitted to the compass to reduce wear, operated by the folding action of the rear sight/lens holder. The use of air-filled induction compasses has declined over the years, as they may become inoperative or inaccurate in freezing temperatures or humid environments.[7]

Some military compasses, like the U.S. SY-183 ('SandY-183') military lensatic compass, the Silva 4b Militaire, and the Suunto M-5N(T) contain the radioactive material tritium (3H) and a combination of phosphors.[8] The U.S. military compass, made by Stocker & Yale (later, Cammenga) contained 120mCi (millicuries) of tritium. The purpose of the tritium and phosphors is to provide illumination for the compass, via radioluminescent tritium illumination, which does not require the compass to be "recharged" by sunlight or artificial light.[9]

Mariner's compasses can have two or more magnetic needles permanently attached to a compass card. These move freely on a pivot. A lubber line, which can be a marking on the compass bowl or a small fixed needle indicates the ship's heading on the compass card. Traditionally the card is divided into thirty-two points (known as rhumbs), although modern compasses are marked in degrees rather than cardinal points. The glass-covered box (or bowl) contains a suspended gimbal within a binnacle. This preserves the horizontal position.

Source: http://web.ua.es/docivis/magnet/compass.html