Barometers: The Science and the Market

By Roland Head

Aneroid barometers are rarely as valuable as their older, mecury-filled counterparts, but this 19thC white marble chronometer and barometer by E Bourdon and Richards of Paris is an exception, and sold for £1,918 in July 2013.

Left: *A Victorian rosewood stick barometer signed by I. B. & L Ronchetti of Manchester. Features adjustable vernier (scale) and exposed mercury tube, 89.5cm high. Sold for £408 in March 2014.*

Right: *Regency (1811-1820) stick barometer by Troughton of London, 3 feet long. Note the brass casing around the mercury reservoir at the base of the barometer. Sold for £2,637 in December 2013.*

Gilt-cased mountain or pocket aneroid barometer: weather forecasting function, plus an altitude scale which could be used to measure altitude up to 10,000 feet by comparing the difference in readings at two heights (air pressure falls as altitude rises). This barometer is also marked as 'compensated', meaning its accuracy is unaffected by temperature. Sold for £114 in May 2014.

Negretti & Zambra barograph in a mahogany case. This company were noted British instrument makers and this example sold for £539 in August 2013.

Regency period mahogany wheel barometer, measuring 3ft 10in, by Jackson of Knightsbridge. This model also has a thermometer above the barometer dial. Sold for £719 in December 2013.

Attractive travel set by Ross, London: a chronometer timepiece, a compensated pocket barometer, a mercury thermometer and a pocket compass - ideal for the adventurous 19thC traveller. Sold for £623 in March 2014.

Despite significant damage, this 18thC stick barometer by makers Dolland of London fetched £1,918 at an auction sale in October 2013, highlighting the value of early barometers.

How do barometers work?

In 1643, Italian Evangelista Torricelli invented what we now know as the stick barometer. A tube is filled with mercury before being placed, with the open end down, in an open reservoir containing more mercury. The mercury in the tube then drops into the reservoir, leaving a vacuum at the top of the tube. When air pressure rises, the pressure on the mercury in the reservoir increases, pushing the mercury further up the tube. Alongside the tube is a calibrated scale that enables you to measure the ambient air pressure in inches of mercury. Mercury was used due to its exceptionally high density, which means that a tube measuring 84cm is long enough to measure the full range of air pressure variation we experience. Early experiments by seventeenth century scientists did use water, but this required a 'tube' of around 10m in height, due to water's much lower density.

The Stick Barometer

The design described above is the basis of the stick barometer, generally the oldest and most highly-valued type of antique barometer. These were made in the eighteenth and nineteenth centuries, typically with mahogany cases. Better examples were embellished with elaborate carving, while additions such as a clock, or thermometer, were also popular, and add to the value today.

The Wheel or Banjo Barometer

Wheel or 'banjo' barometers measure air pressure in essentially the same way as stick thermometers, but display it differently, thanks to a pulley and counterweight arrangement, which rotates the needle on the barometer's dial as the mercury rises and falls. These barometers tend to be slightly later than stick barometers, but are similarly constructed, with ornamental wooden cases and decorative additions.

The Aneroid Barometer

Leaving aside the health risks posed by mercury, they were delicate and hard to transport. Essentially, they need to be kept upright, and protected from excessive shocks and vibration. Mercury barometers were invaluable to mariners, but needed elaborate gimbal mountings and precautions to protect them from damage. You can imagine the enthusiasm with which the first liquid-free barometers were adopted. Aneroid barometers were invented by Frenchman Lucien Vidie in 1843. Instead of mercury, they use a series of hollow metal disks, inside which is a vacuum. The two sides of the disk are held apart by a spring, which expands or compresses when air pressure changes. This is used to alter the position of a needle on the dial. This is the type you are most likely to own: all modern barometers are aneroid, and their compact design means they can be made much smaller than mercury barometers, and are generally quite affordable and robust. A second type is the barograph, which is essentially an aneroid barometer whose reading is marked onto a rotating, paper-covered cylinder. The whole device is usually enclosed within a glass case, making it attractive and easy to display in the home.

Using a Barometer

Barometer dials are generally marked with words such as 'Rain' and 'Fair', along with an air pressure scale. Although it's tempting to simply read the dial, the correct method is to monitor the rate and direction of change. For example, a rapid, fast drop usually indicates a short but potentially severe bout of bad weather, typically wind and rain. In contrast, settled fair weather is indicated by a gradual rise to a stable, high reading.

Buying a Barometer

I've already touched on the difficulties of transporting a mercury barometer, and I won't expand on this except to say that there are measures which can be taken to prepare barometers for transport: you should get specialist advice before doing this. The ideal scenario is to buy your barometer from a dealer who will deliver and setup your barometer in your home. When buying, you may find that judging the quality and condition of a barometer's casing may be not too difficult if you are familiar with antiques. However, specialist knowledge is required to assess the condition and originality of a mercury barometer's internal workings. For this reason alone, buying from a reputable dealer is often the best approach.