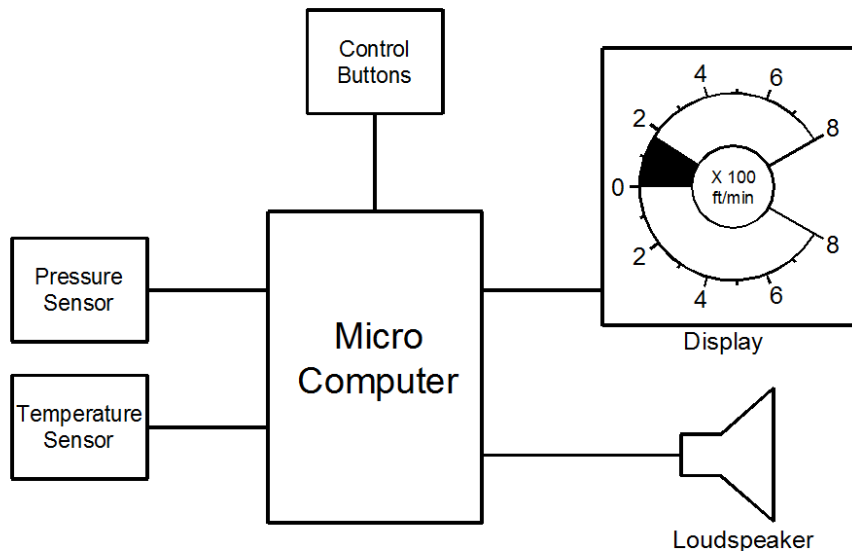


## Basic Instruments 3 - Variometers

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Variometers assist our thermalling and can help us to optimise our glide by indicating how fast we are climbing or sinking. The inside of an electronic vario is something like this.



This is very similar to our altimeter and usually instruments are integrated as an alti-vario.

### Averagers

For many pilots the most important number to come out of the vario is the average rate of climb. This is usually a selectable display for which the pilot can choose a period over which his climb rate is averaged. 20 to 25 seconds is a normal setting for this. Average rate of climb is useful for making decisions about when to leave weakening thermals and communicating the strength of thermals to other pilots.

### Vario Audio

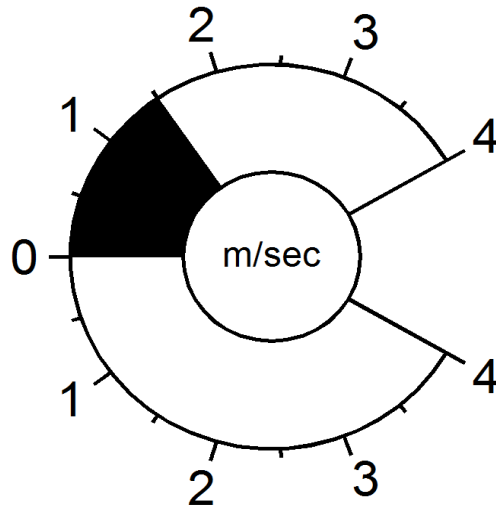
Audio is essential for safety when thermalling with others and most of us find it much more important than the visual display. There can be a large number of setting parameters for vario audio. Make sure the vario you choose has an adequate volume for you. Audio only varios designed to be worn on helmets are sometimes inadequate if used on a flight deck. I find I need a louder vario than most pilots.

Let's have a look at why we might want the wide range of audio adjustments from the point of view of different lift conditions. Pilot preferences are very

personal in this area.

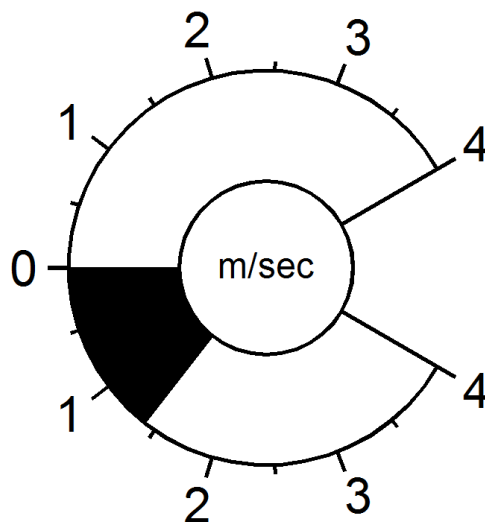
For simplicity we are going to assume our glider has a sink rate of about 1 metre per second in still air.

### Definite Climb



If we see this on our vario we are happy! We are in a definite climb and we expect our audio to be indicating how fast we are climbing. Audio for climb is usually made bright and chirpy!

### Definite Sink



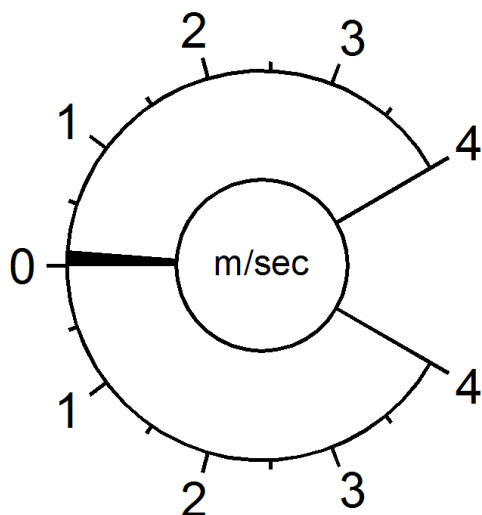
If we see this and our glider has a sink rate of about 1 m/s in still air we are in sinking air and probably rather less happy. Audio for indicating sink is often made rather rough and raucous. Many pilots prefer to turn the sink tone off altogether because they find it annoying. It is possible to find varicos which have sink tones which are relatively pleasant.

I have wondered whether it might be a good idea to have separate volume level controls for lift and sink so the sink tone can be made less intrusive but as far as I am aware no commercial vario has this facility.

### Sink Alarm

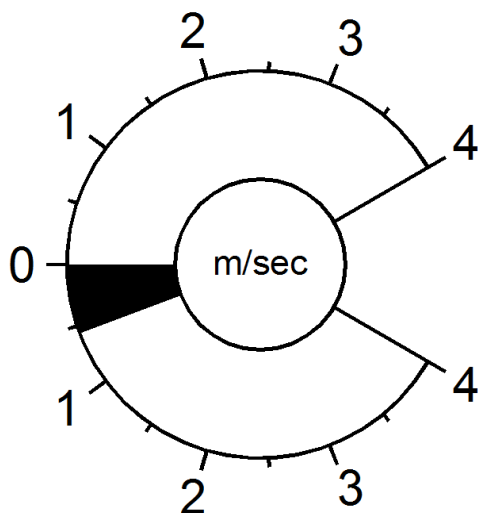
If we adjust the sink threshold to sink rate of more than about 1.1 m/s, just over the sink rate of our glider, it will only sound in sinking air. Setting in this way is sometimes referred to as a “sink alarm”. Pilots may choose to set it much lower than this. Remember that turning or using speed bar will increase the sink rate of the glider significantly. We may wish to set the threshold to an even higher rate of sink to avoid it sounding when we manouvre still air. I set mine to about 2m/second.

### Around Zero



We are in lift of about 1 m/s, approximately equal to the sink rate of our glider. Our vario may be “burbling” or sort of dithering between a lift and sink tones which may also occur whilst stationary at take off. Lift or sink threshold adjustments can be used to create a silent “gap” in the audio to reduce or eliminate this. A setting of about 0.1 to 0.15 m/s is usually about right and ensures that the lift or sink tones are definitely indicating climbing or sinking.

## Light Lift



We are in lift which is strong enough to reduce our sink rate but not give us a climb. If our sink audio is off or set as a sink alarm we will hear nothing.

“Light lift” can be just a weak thermal or other area of weak lift which we might want to ignore. However it may indicate the presence of a stronger thermal or area of lift nearby in which case we may want to explore it and try to find its' core. If we have our sink tone set up to sound in this region we may be able to listen to it to find the stronger lift.

## Growlers And Buzzers

Nothing to do with bears or bees! Some manufacturers now have a third type of tone described as a “buzzer”, “growler” or “near-thermal tone” specifically intended to be used in this “light lift” region. This tone will be different from the lift and sink tones and is intended to help us feel our way into the stronger area of a weak thermal. After some experimentation I have my Bluefly vario with this system (Bluefly call it the “Buzzer”) and the sink tone set as an alarm. It has taken me some time to adjust and get used to but seems to work well.

A down side of “growlers” and “buzzers” is that they make a noise at take off while waiting to launch. This discourages many pilots from trying them even though they only sound in the region for which they are designed when airborne. As with all new developments we should try to keep an open mind.

## Total Energy Variometers

If we dive an efficient glider in still air to gain airspeed and then pull (or in the case of a HG push!) it into a climb our variometer will briefly indicate a climb which can sometimes be confused with a thermal. To overcome this some

variometers have an airspeed probe which enables the micro-computer to compensate for interchanges of height and airspeed to give a better indication of lifting or sinking air. Airspeed probes are quite awkward to arrange on a paraglider, but until recently total energy variometers have not been particularly useful for them because of their high drag and limited speed range. However the performance of paragliders is improving rapidly and some pilots are now regularly flying with speed probes. There is also some development of systems which utilise inertial information to further enhance vario performance.

### Airmass Variometers

An airmass variometer is a bit like a total energy variometer but calibrated to indicate the rate at which the air is going up or down rather than the glider. As far as I am aware the only relevance to PG and HG pilots is that there is currently a question about it in the BHPA Pilot exam (unless you know better!)

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