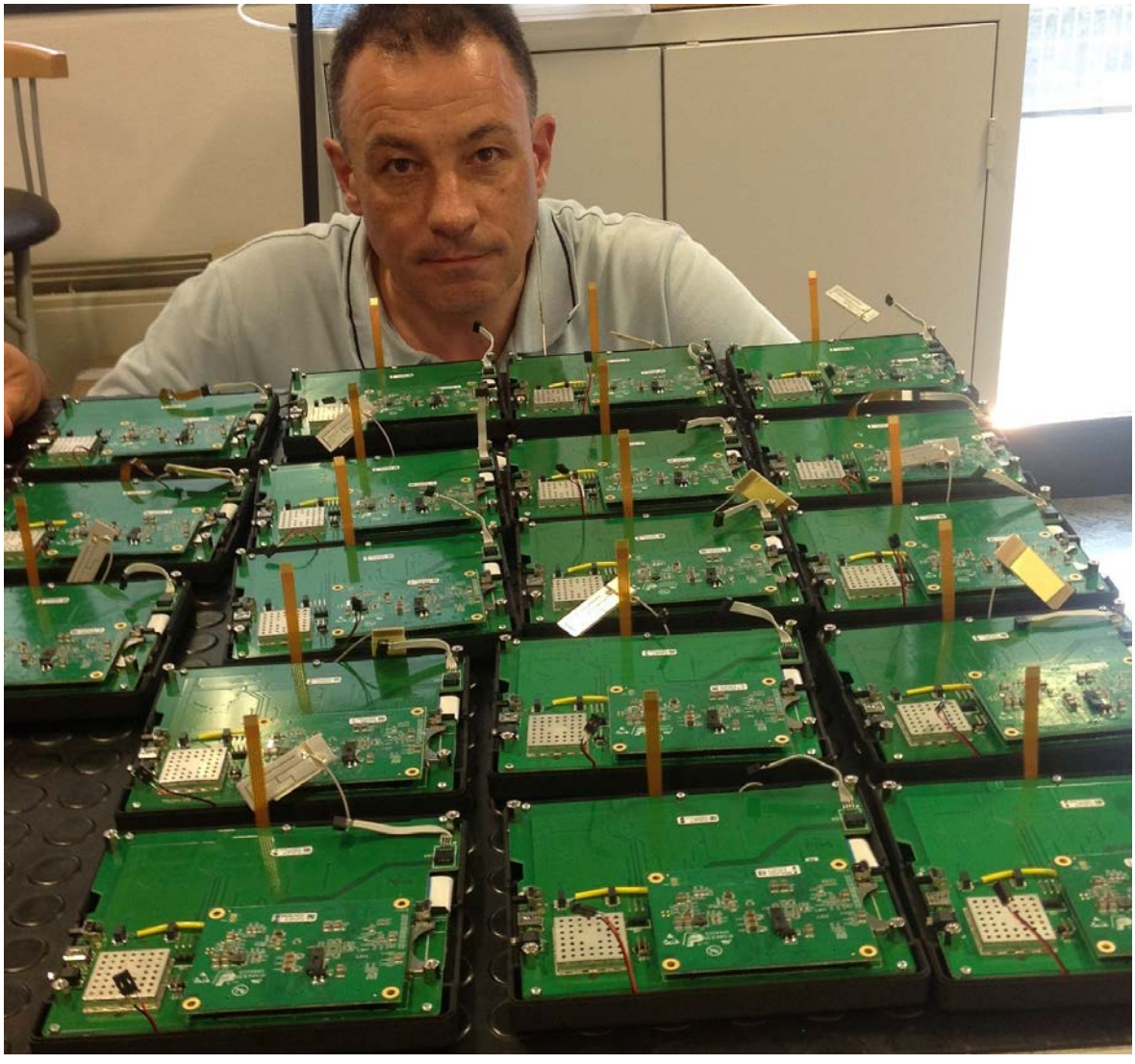
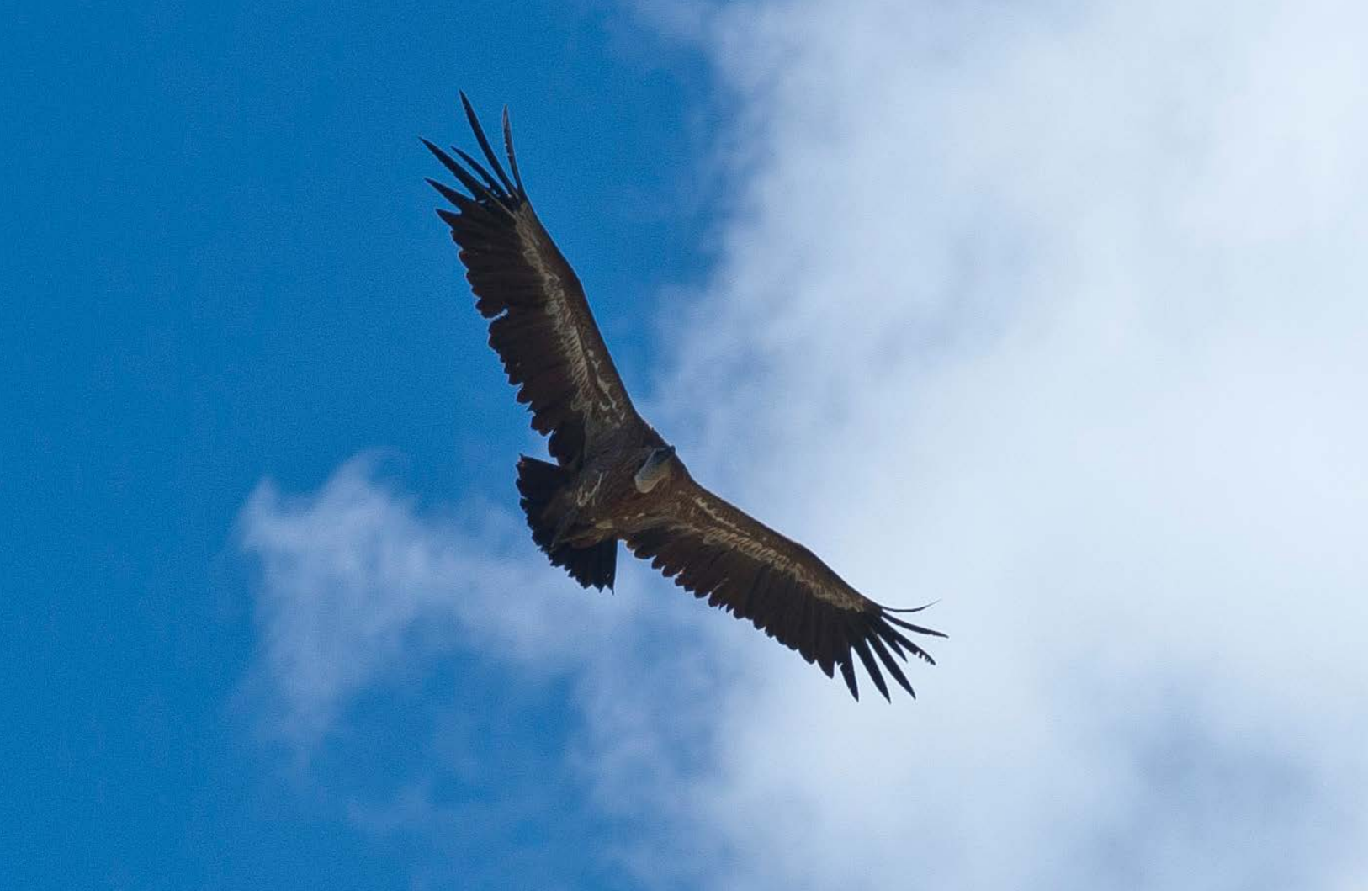
LUCA BASSO (COMPASS ITALY INSTRUMENTS).

WHY I DO NOT AGREE WITH TRADITIONAL APPROACH TO INSTRUMENTS ?

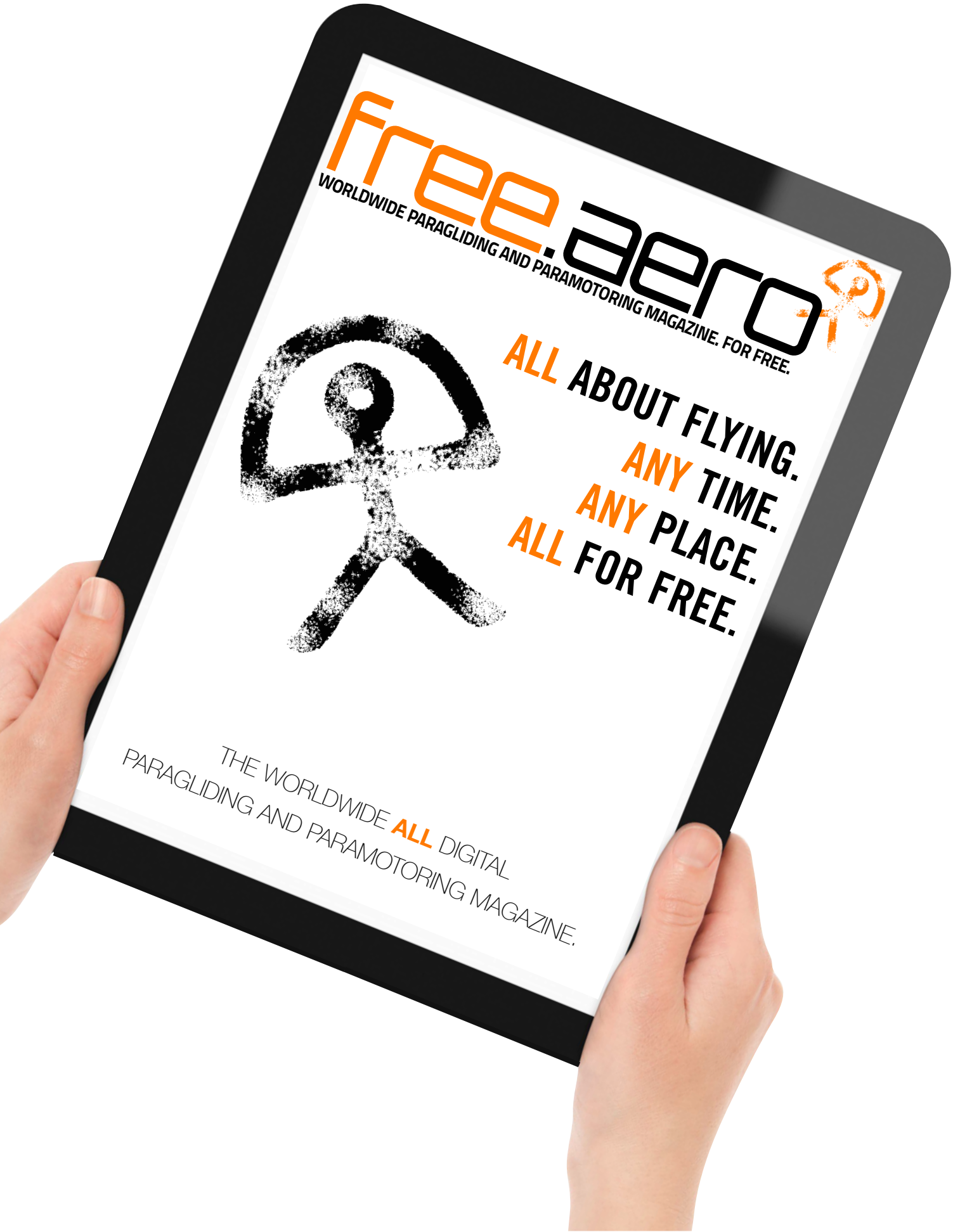
The common thought about flight instruments is that if you're starting out, you do not need a good and complete instrument. Good instruments are for experienced pilots and useful only for long Xc or competitions. Many pilots – including Bruce Goldsmith – suggest you learn to thermal without any.





We think that flying with vario or just with a basic instrument is the way that further develops the instinct and the sensitivity of the pilot ,and teaches him to fly as a bird: it's pure, "ecological", cooler, no doubt. But does it really work? Absolutely not! I surprisingly discovered that a man is very different from a bird. Not only this is clearly visible in front of a mirror, where I did not found any bird's feather on my skin, but if we study the "details of construction" of both, the human and the bird, it turns out that the human sensory organs are very different if compared to the ones of any bird. As Mr. Darwin has confirmed, the human vestibular apparatus was not created and has not evolved to fly. The crucial question is: can the human sensory organs be adapted or trained to fly through his life's flying experience? If the answer is positive, we can throw away the instruments and start learning to use only our body, in spite of Charles Darwing's theory. Unfortunately, if we deeply study science, we discover that there's no way to train our flight vestibular apparatus, because you cannot train something that does not exist. The human perception of spatial location is a very complex function that simultaneously involves three elements: the vision, the vestibular system and the sense of touch. The visual, tactile and vestibular sensations are sent to the mind, which processes them, after having mediated the different stimuli perceived. In particular, one of these three sensory elements is crucial, in order to balance the partial sensations received from the other two: the view. See where we are and where we are going makes a big difference. If the view is missing, or can not locate a horizon with accuracy, the coordination of mind fails and we start to fell sensory illusions. Therefore, if you fly close to the slope, and especially in the vicinity of the ridge, it will not be difficult to get the visual cues that allow us to coordinate the view with other vestibular sensations. As soon as we are not strictly close to the ridge, our mind starts to fail. We must consider that, not only we are in the air, but in a paraglider we continuously move in a pendulum (even if we perceive we are straight). il is impossible, to our mind and senses, to understand and calculate the air speed, the ground speed, the glide ratio, the wind direction and speed, the climb or sink in free air, the sink rate, the true pitch movements ... and many other data. In the open air, things are not so simple, because the visual references are no longer certain and, indeed, sometimes they are illusory. At this point, we must entrust the tactile sensations and, essentially, the accelerations perceived. It would take a long digression to explain how our vestibular organs works. We are content to know that the accelerations are perceived by the otoliths, that are content in the saccule and in the uticolo. We can imagine them as clappers of a bell hanging from a bungee cord, immersed in a sort of gel or oil. When we are subjected to an acceleration, they move and, moving, they touch and stimulate the tiny cilia, which send information to the brain. Entering the thermal, we suffer an acceleration upwards. Consequently, the otoliths move downward, touch that specific group of cilia and our brain understands that we have entered in vertical acceleration. This happens in a few instants, even before the vario starts to play. Up to here the variometer is useless, but then what happens? When our vestibular system is stabilized in a more or less neutral (we are climbing but we have not a significative

acceleration) we need our view to know whether we are going up or down. But if the visual references are not certain, because we are on free air, the body begins to feel different sensations from reality. Even the best and most talented pilots will fail in at least two cases: 1. In understanding when the thermal's core is well centered, because the fluctuations become 1. In understanding when the thermal's core is well centered, because the fluctuations become almost zero acceleration (constant +2, is perceived as worse than the climb at rates varying between 0 and +1); 2. In understanding how things really are when he is thermalling by half a turn inside and in and half out (for example, if the climb fluctuates between 0.5 m / s and 2 m / s, 0.5 could easily be interpreted by our sensory organs as sink) Our body, if it undergoes a leveling or decrease in speed after a strong vertical climb (such as a good thermal), perceives this as a strong sink, because in the climb the "system" had come back into balance and inertia otolith tricks . In contrast, if it undergoes a leveling after a sink, perceives the leveling as a climb. In both cases, the human perception fails miserably. Further, the tricky sensations are amplified by the fact that in paragliding the body is tilted back and in hang gliding, on the contrary, is tilted forward, and then in no case the otolith working in their natural position as with the body perfectly erect. Another fact complicates the picture even more: up to now we have reasoned as if the ascent and descent were along a straight axis. We know, however, that in a thermal the pilot turns. The vestibular system is then subjected to angular accelerations, which further complicate our ability to correct perception when we are in free air. As with the linear ones, even the angular accelerations, when they become constant, are no longer perceived by our vestibular system as a "curve" or a "turn", because the sensory system stabilizes. In this case the view, fortunately, gives us most reliable references. The fact remains that the vestibular system does not perceive perfectly, especially if the turn is accompanied by the inclination of the head, certain situations such as the change of radius of turn and the variation of the angular acceleration, and this also affects the perception of the rate of climb or descent. This significantly affects the assessment of the thermal because, for example, an angular deceleration accompanied by a smaller steering angle is perceived as descent when, instead, it is not said that this is due to a lower rate of climb. Once you realize that the feelings may be more illusory than a show of David Copperfield, we can ask ourselves if we have big chances for improvement or learning in flight without a good instrument ... I'm convinced that our mind is able to learn something only if it clearly understands what's happening: we do not understand something which is not clear or is completely unknown. As consequence, our mind understands (and learns or improve in a fast way) only it owns the data that are necessary to interpret what's happening. In flight, some data are impossible to be perceived by the pilot's mind without an instrument: glide ratio, sink rate, climb rate, air speed, wind speed, ground speed, altitude, height over ground ... and many others. Now, if I'm not in possession of all these data, my information about the flight will be very deficient. But I know that deficient informations does not le me understand the situation and, as consequence, prevent me from learning! I do consider very stupid for the pilot to loose concentration trying hopelessly to understand and perceive what his mind and his body are not able to perceive. This loss of concentration is much more than give a watch to the instrument's display. And we have to add that, if the pilot (beginner or not experienced) does not fully understand the situation, he is even more distracted by thoughts and worries causing anxiety, such as: "Will I arrive at landing or not?" ... "Am I sinking or not?" ... "What's my speed? will I go out of this valley?" ... "where the wind is coming from? Am I going in a lee side?" ... "Does this line work well or not'" ... "Am i in the core?" ... "is this a thermal or just turbulence?" ... and many, many others. An experienced pilot is able to give and answer to all these questions, but a beginner pilot isn't. So, why should he loose much time for learning and earning experience, when a good instrument can furnish all the informations useful to understand, perceive and, as consequence learn much more fast? Flying without a variometer or with a minimal instrument is much more annoying for an experienced pilot than a beginner. That's the simple truth.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