Do you fly hightech or stone age?

AOPA
AIRCRAFT OWNERS AND PILOTS ASSOCIATION
SWITZERLAND

Eye protection in the cockpit

Hjk – Recently, I was invited to a private flight from Zurich to Milan. I had the privilege of sitting on the right side in the comparatively narrow cockpit of a Citation. On our flight, the pilot's sunglasses attracted my attention. On the center bar, where the glasses rest on the root of the nose, I saw the Armani logo. However, I also noticed that – in all evidence – near to the right spectacle lens a screw was missing because there was a small gap between the frame and the glass. „Isn't it astonishing" I asked the pilot „that such expensive glasses are disintegrating by themselves?" The pilot grinned and explained to me in a jovial manner that these Armani glasses, contrary to his Breitling watch, were a falsification and that he had paid fort hem as little as three dollars on a market in Malaysia. It could therefore very well happen that such cheap glasses would go to pieces earlier than the original which would cost a hundred times more.

This episode preoccupied me for quite some time. I studied the subject more intensively and focussed my attention – in addition to the sight – also on the hearing, during and after the flight. I was looking around and heard most astonishing things from my fellow pilots. I had to find out that many pilots allow to themselves the best and most modern which can be found on the market. But only, if this all about equipment for the cockpit, instruments and aeronautical accessories. As far as the eye and ear protection is concerned, very often third class products are still good enough. And this – in view of the consequences to be expected – seems to me rather risky. Read more about this in our bipartite report. In this edition, we are talking about the increased eye protection in the cockpit.

Years ago, my pilot instructor insisted again and again that a correct eye protection in the cockpit is even more important than on the ski slope. I have taken this advice to heart right from the beginning and have always ensured that my eyes get what they deserve: the best. In all evidence, Mickey-Mouse-Glasses for a couple of frances give you some glare shield. And an Armani falsification looks much better than its price. But, for how long can this go on without any problems? We wanted to know better and questioned a specialist.

On the occasion of this year's AERO in Friedrichshafen, the editor of the Position Report visited the booth of our longtime sponsor – the manufacturer of aviator sunglasses, Caruso-Freeland. His business is booming, and his booth is surrounded by many interested people. Most obviously, the high-teck aviator glasses of the swiss manufacturer Giuseppe Caruso are in demand. We took the opportunity for a short interview.

Giuseppe Caruso, your company develops high-quality, professional sunglasses for many years. Which kind of eye protection to you recommend to pilots?

Caruso:
No compromises are allowed as far as the eye protection is concerned, and the best is just good enough. The science is raising an alarm, our eyes get too much UV rays, blue light and infrared. Pilots are particularly endangered. Without going into details about the complexity of the climate change and the decomposition of the ozone layer in the stratosphere, it is a fact that the radiation intensity has increased over the past decades. It is therefore not astonishing that the World Health Organization WHO has published a worldwide radiation index which is updated on a daily basis. In our latitudes, we have a very high UV index of 8. This figure takes shape if we remember that the WHO recommends to retreat into a save refuge as from index 11. Therefore it is indispensable particularly in the cockpit that pilots make sure that the major part of these rays do not reach the eyes at all. Medical doctors recommend to assure a sufficient eye protection even at a marginal light incidence – this means also at twilight.

Which ist the basis for the recommendation of WHO and eye specialists?

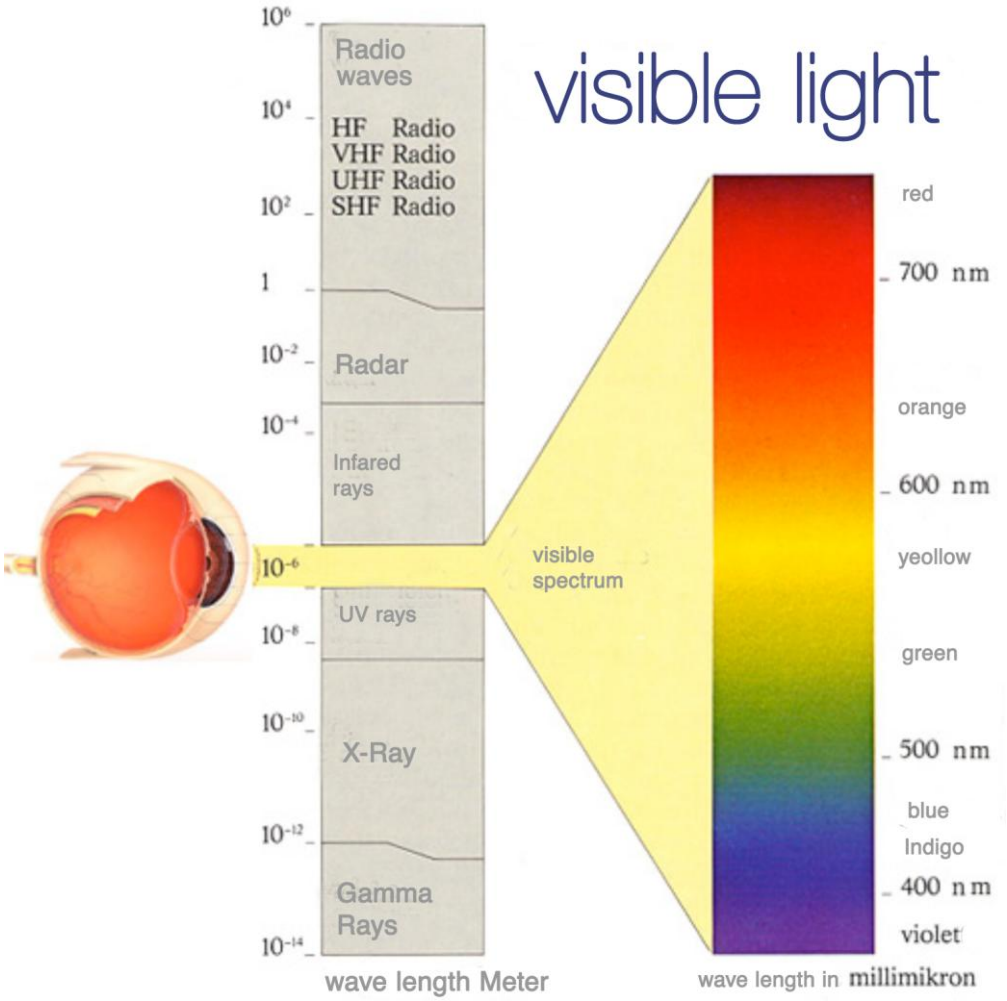
Caruso:
The science has researched enormously over the past years. Thanks to our cooperation with scientists and specialists in the aviation area we have been able to transfer the results of these researches on our products and to improve them decisively once more. According to WHO, cataract - better known as glaucoma – is the most frequent eye disease created by UV radiation. As far as the ultraviolet light is concerned, it is the UV-A as well as the UV-B radiation which is responsible for the damages to the lens.

Are UV-A and UV-B rays also responsible for damages of the retina?

Caruso:
Contrary to the common conception, these rays do not represent any danger for the delicate retina due to the fact that only approx. one percent of the radiation reaches the retina. By far more dangerous is the visible light. The corresponding research was undertaken by Robert A. Millikan almost 100 years ago. As suggested by Albert Einstein, he examined in 1915 the energy which emanates from the pigment contents of the light. Contrary to the common perception, it is not the share of red and yellow in the visible light. The strongest quantity lies in the shares of violet and blue. These harm the retina with an amount of energy of 1.7 volt. According to oculists, these shares of light, rich in energy, are at least jointly responsible for the detachment of the retina. The degeneration of the macula due to age can in these cases occur more frequently and also at an earlier stage. The assumption of the scientists goes even to the point that a relation between flying altitutde and radiation plays a role. Secured findings exist as far as the ultraviolet area is concerned. Every 1000 feet, the radiation intensity increases by 4 percent. Clouds can – by their reflection – increase the UV values by 70 to 80 percent.

Which damages can be created by blue light?

Caruso:
The light, visible for humans consists of 7 colours (see graphic). The share of blue light reaches the unprotected retina to 100%, or more exactly, the macula. There, it is possible that the radiation damages the macula on medium or longterm. This, obviously facilitates also the degeneration of the macula due to age, the so-called AMD from which more and more people over 50 years suffer. There, we are not talking anymore about a cataract which can be corrected in a comparatively simple manner, but about a damage in the depth of the eye. This damage – in extreme cases – can lead to blindness. AMD is in the meantime ranking number three on the WHO statistic about eye damages.



Is the cockpit vitrification filtering at least a part of the radiation?

Caruso:
Without going into details, I have to reply with a clear „no“ to this question. Glass panels in the cockpit – even on the most modern aircraft – do not dispose of a blue light filters. These would make little sense during night flights or would even be counterproductive. Police stations in Germany have performed measurings on window glasses of helicopters and found out that the protection in the UVA area is insufficient. Pilots without eye protection encounter high exposure doses. This calls for an increased eye protection in the cockpit. Our aviator glasses filter 100 percent UVA as well as more than 99 percent of bluelight and also more than 92 percent of the infrared rays. Being so, we offer the highest eye protection available worldwide which in addition fulfills and even exceeds the norm EN-1836 (EU eye protection norm).

How can an individual find out that his macula is possibly damaged?

Caruso:
The damage of the macula does not occur from one day to the other. This is a sneaking process by a cumulation of the damaging rays. This – at a certain given stage – leads to a diminution of the acuteness of vision and by this of the reading efficiency. The colour vision and the sensation of contrasts decrease, as well as the adaptiveness to changing lighting conditions, the so-called adaptation. This is a most irritating effect, particularly in the cockpit because – most of the time – such effects are coupled with blinding responsiveness. And occasionnally, one has even to expect central deficiencies of the visual field. For this purpose, there is a wellknown and considerably simple examination method, the so-called Amsler-grid. This method can facilitate the early detection of AMD. If the grid is deformed, then you should consult an oculist immediately in order to carry out further examinations.

What do you recommend to pilots who study maps and manuals during the flight and who have to use reading glasses?

Caruso:
Here, you touch a subject for which – for a long time – there was no reasonable solution. One could not avoid to fold up the sunglasses and to use for a short period of time the reading glasses. During this time, radiation which has nothing to do there, reaches the eyes. We have taken this problem at hand four years ago, and today, we are in a position to offer a solution: We can integrate reading glasses in all CARUSO sunglasses. If the pilots need corrected sunglasses, then there is the new Caruso CR747 Optical Line. These glasses offer the highest possible protection for UVC, B, A plus blue light, plus infrared plus improved 3D-sight. Furthermore, they dispose of a perfect lateral protection to prevent diffused light of entering into the eye. A wide angle sight is important for every pilot. The CR747 offers a modular system which meets all individual needs. The correction is located in the rear area of the glasses and is thus protected better. The sun protection or night glasses can be exchanged in accordance with the application area. This is a big advantage for everyone who wears already glasses because the glasses can be easily adapted at low costs.

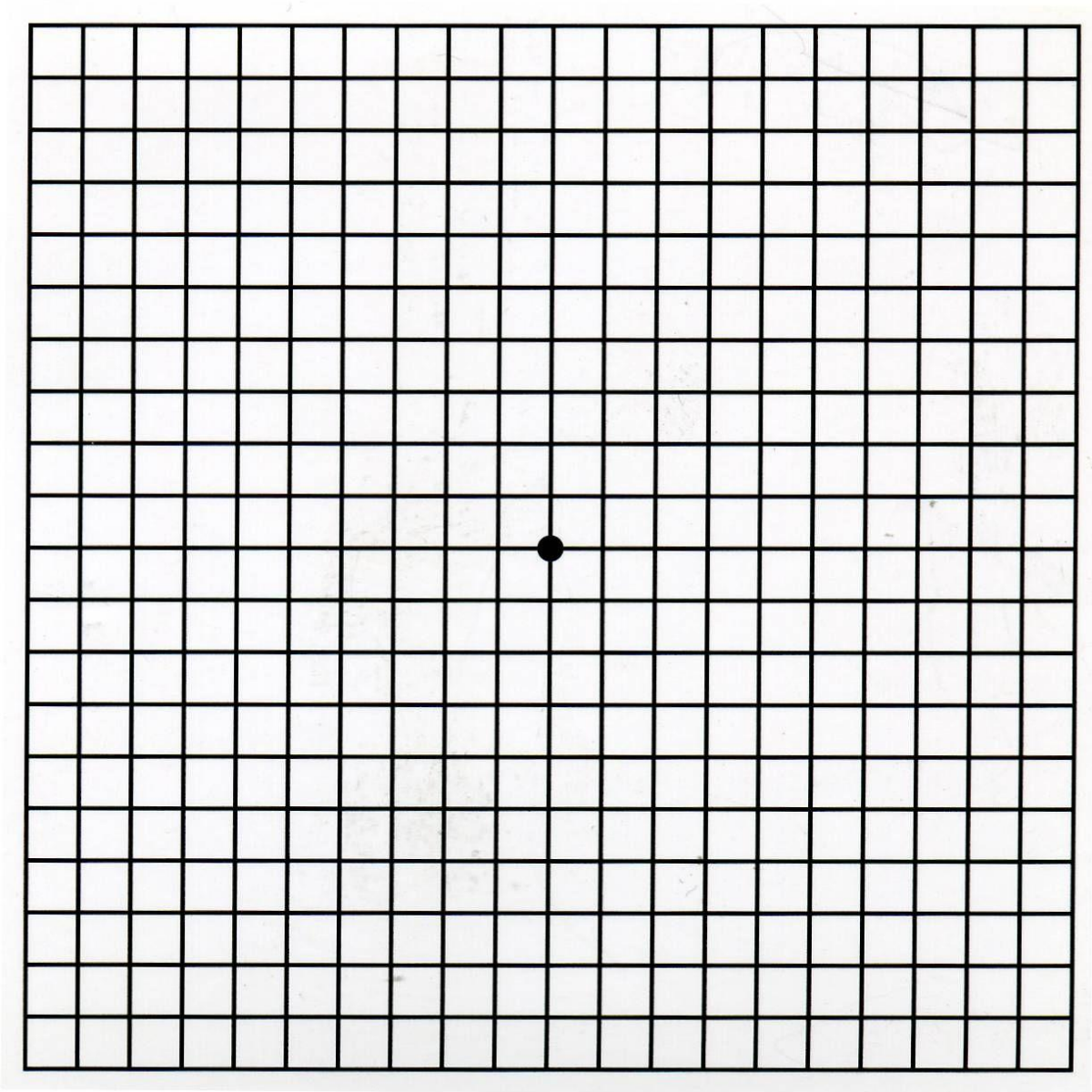
Find more information under www.carusofreeland.com

Criteria which influence the intensity of UV radiation

Position of the sun:	The higher the position of the sun is, the stronger is the UV radiation. In our latitudes, we have the highest values between May and August, above all between 11.00 and 16.00 hours. This also means that the season plays an important role.
Latitude:	The nearer to the equator a country is located, the higher the sun stands in the sky. By this, the path of the rays through the atmosphere is shorter, with the result that from the poles towards the equator the UV index increases. This also means that the values rapidly are moving within extreme bands.
Cloudiness:	The cirrostratus reduces the UV radiation only a little; compact cloudiness lowers the UV index significantly, whereas – above the clouds – the UV radiation is being reflected back into the cockpit.
Altitude above sea level:	Per 1000 m of altitude, the UV radiation increases by 10-15 percent. Strongly reflecting surfaces like snow, water or sand increase the UV radiation by 20 – 80 percent.

Source: MeteoSchweiz – find more informationn under www.meteoschweiz.admin.ch

Visual test by means of the Amsler grid



1. Hold the test picture at normal reading distance, i.e. at approx. 30 – 40 cm from the eye. In case you wear reading glasses, use them also for this test.
2. Cover the right eye.
3. Fix with the left eye the point in the center of the grid. Are the lines straight? Do all the squares have the same size? Do you see all 4 corners? Are empty, distorted, blurred spots visible? Can you reply to all questions by „yes“? Congratulations!
4. Repeat the test with the left eye. Can you reply to all questions by „yes“ as well? Good so. However, should you discover one of the described irregularities, consult your oculist as soon as possible.

Radiation record in Bolivia

Hjk – The fact that shafts of sunlight can reach record-breaking values is demonstrated by an alarming report from Bolivia. There, the government issued in December 2009 a country-wide warning because of the permanent high values of the UV radiation. In vast areas of the country, the radiation was extremely higher than the international standards. He who does not protect himself risks eye or skin damages.

The bolivian ministry of health informed that in the capital La Paz – in the highlands of the Andes – the 18 UVI (UV radiation index) had been reached. In the german speaking zone, during the months of May until August, indexes between five and eight are customary around noon. Around 10 and 16 hours, the values are typically approx. fity percent lower. An exceedance of 11 UVI is internationally considered as „extreme“. In La Paz and the highlands, values of over 11 UVI have frequently been registrated in the past. Values which exceed 17 UVI over several days are uncommon even for these altitudes. La Paz is located at approx 3'600 meters above sea level, whereas the altitude of the plateau is mounting up to over 4'000 meters. As a rule, it is in this region that the UV radiation is reaching the highest values. The ministry of health recommended insitently to the inhabitants of Bolivia not to expose themselves to solar radiation for more than eight minutes.

At this point one could be tempted to relax and to presume that the problem is far away, on the other side of the Atlantic. Totally wrong. Radiation has increased massively here as well. Ozon holes for example do not exist only in the Southern Hemisphere but also above Europe. According to Thilo Erbertseder of the European Space Agency ESA, who analises the data at the german center for aviation and aerospace, some „mini ozon holes“ have already been detected above Spain, France and Germany. This means: keep your eyes open – but protected!

About the author of this article
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