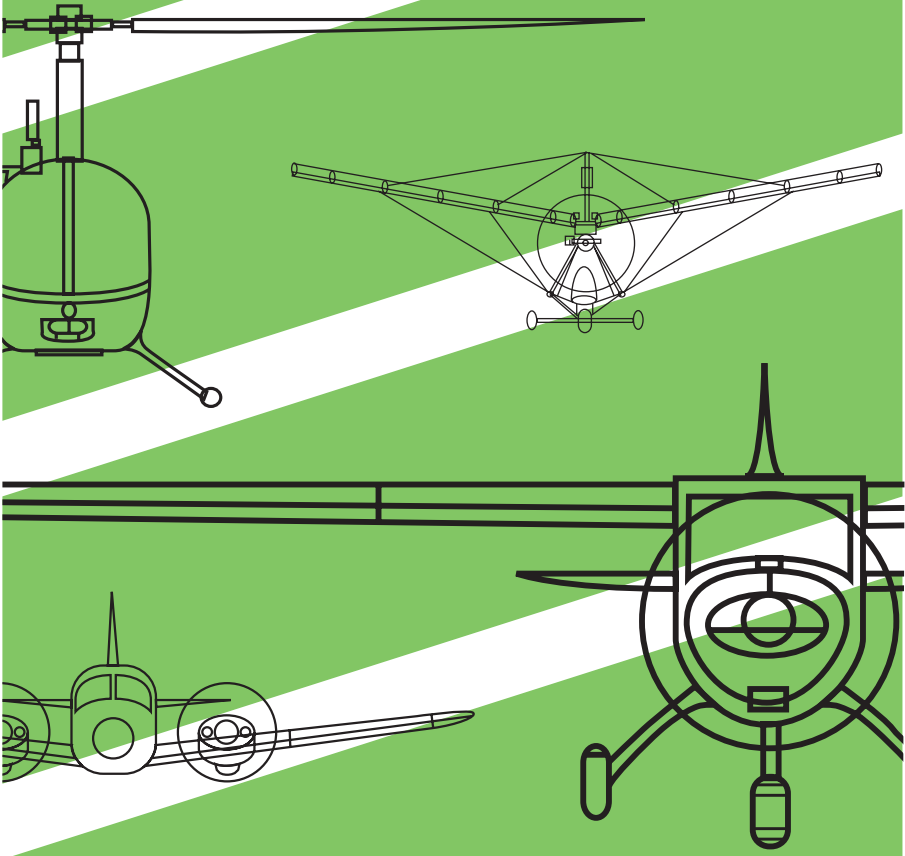




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## PILOT HEALTH



# PILOT HEALTH



## 1. INTRODUCTION

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**a** The CAA requires pilots of all aircraft, other than microlights, balloons or gliders, to hold a medical certificate indicating that you, the pilot, are medically fit to perform the tasks associated with the privileges of your licence. The medical assessment leading to the issue of a certificate, is primarily intended to reduce the risk of incapacitation which may, at the controls of an aircraft, be critical.

**b** A network of Authorised Medical Examiners (AMEs) across the country are approved and supported by the CAA's Medical Department to carry

out the appropriate medical examination for the certificate. The AME has received training in aeromedicine and may also be a pilot, so if you have any questions about a health problem which could affect flight safety, do consult him or her, **they will make every effort to maintain both your flying status and your general health.**

**c** Microlight and balloon pilots are asked to complete a declaration that they are physically fit, with that statement countersigned by their regular family doctor or an AME. Naturally, if the individual has not consulted their doctor for a number of years, they may be asked to

undergo an examination to confirm all is well – this is a little easier than finding an AME. If there is any doubt about your fitness, speak to the CAA Medical Department or make an appointment with an AME, because any marginal condition will require a full examination by a doctor with aviation medical training and be reviewed by the CAA Medical Department. Glider pilots have a similar system except that their marginal cases are reviewed by one of the British Gliding Association's medical referees (many of whom are also AMEs). The aim of self certification is to minimise the risk of incapacitation in flight and so **it is in the pilot's own interest to declare any conditions** – insurance companies may reject an accident claim if they don't.

## 2 THE MEDICAL EXAMINATION

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a It is important that everyone pays attention to their health. The body is capable of a great deal of regeneration and repair. However, what may seem quite minor symptoms to you or your family physician, can be of quite major importance in flying. **It is therefore essential to keep your AME fully informed of any changes in your health since your last medical.**

b Your AME will run through the first part of the medical examination form with you and check whether any of the declared conditions are present. Obviously any minor physical conditions will be reviewed when he carries out his examination but it is important to answer all the questions as completely as you can. Many aspects of aviation depend upon trust, **including truthful answers to medical questions.** Good general health is necessary to fly but

you do not have to be a perfect physical specimen.

c The examination will pay particular attention to the eyes, lungs, heart, ears, the muscular and nervous systems. All will be assessed against the required certification standards but corrected vision and hearing can be accepted. The examiner is primarily looking for physical conditions which could threaten flight safety, such as diabetes, heart trouble, epilepsy or high blood pressure.

d When you have completed the medical examination and received your medical certificate, do remember that you are expected to be at that standard every time you fly. The Air Navigation Order makes it **your responsibility to ensure your fitness to fly.** Therefore if you have some minor illness or are taking any medication please, before flying, check with your Authorised Medical Examiner whether it will affect your fitness.

## 3 ENVIRONMENT

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The earth's atmosphere consists of a mixture of gases, primarily oxygen and nitrogen, with the former being essential for human existence. As an unpressurised aircraft climbs through the atmosphere the cockpit pressure reduces and at 18,000 ft the pilot experiences half the pressure of sea level. Associated with this reduction in pressure is a significant drop in temperature which only adds to the problems of the aviator.

## 4 THE BIOLOGICAL ENGINE

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a The human body, like all living entities, converts the substances it absorbs such as food and oxygen into energy by a burning process called

oxidation. The body varies its consumption of foods and oxygen according to its degree of activity, just like any other engine. When resting we require very little oxygen; under a high work load this increases and at maximum effort, oxygen use can be more than 15 times the resting value.

**b** Air is passed through the lungs where its oxygen combines with the haemoglobin in the red cells of the blood and is circulated to those tissues where energy is needed, such as the brain or muscle. The by-product of that oxidation process is carbon dioxide, which is returned to the lungs and exhaled.

**c** Oxygen is only one fifth of the air breathed in and its absorption and transport through the body is pressure dependant. At sea level and up to about 10,000 ft altitude, the body has natural mechanisms to deal with pressure change within that range which enables virtually normal functions. Of course if there is any abnormality of the respiratory and cardiovascular system, the individual may be sensitive to even quite minor changes of pressure below 10,000 ft.

**d** Reducing the capacity of your oxygen transport system by donating blood does increase your sensitivity to altitude, although this is quickly remedied by the body's reserves. A pilot should **NOT** fly for at least 24 hours after giving blood.

**e** When an individual climbs beyond 10,000 ft in an aircraft or on a mountain, the reduction in oxygen pressure reduces the efficiency of the biological engine, with the brain being the most sensitive of the body's systems. These changes take time and vary according to the actual altitude experienced and even a healthy pilot will experience symptoms which may be totally

unrecognised and which can lead to hazardous actions, such as forgetting to change fuel tanks or flying off course. Smokers have a small amount of their haemoglobin, less than 10%, blocked by carbon monoxide, so are more sensitive to increasing altitude. At 18,000 ft and above, however, breathing atmospheric air will quickly cause total collapse and loss of consciousness. The mountaineer is able to gradually adapt to such altitudes but at a rate which is of no help to the aviator!

## 5 HYPOXIA

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**a** When the biological engine of our body is starved of oxygen at altitude, its efficiency reduces and the condition is called hypoxia. The first signs are experienced by the brain but these are often unnoticed due to the associated dulling of judgement. The signs and symptoms can be likened to those of alcohol which produces its effects by a cellular process which is not dissimilar. As hypoxia proceeds the individual becomes clumsy, drowsy, develops a false sense of security and becomes increasingly error prone. The extent of the symptoms is dependant upon the actual altitude but even short periods above 10,000 ft will produce symptoms.



**b** The possible solutions for hypoxic symptoms are: to use supplementary oxygen, a pressurised cabin or to descend below 10,000ft. Each of these options will restore the equivalent of a normal functioning environment to the pilot.

## 6 HYPERVENTILATION

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**a** The respiratory system is automatic in function and adapts to changes in demand caused by exercise. Unfortunately although there is a slight increase in respiration with altitude, voluntarily increasing the rate of respiration can only upset the body's mechanism and reduces rather than increases the individual tolerance to altitude.

**b** The tissues produce carbon dioxide, a by-product of the oxidation process, dissolving carbon dioxide in the blood. Plasma assists in maintaining a stable environment in which the biochemical process can work. Increasing the rate and depth of expiration speeds up the removal of carbon dioxide, disturbing the chemical balance and produces symptoms similar to hypoxia.

**c** The most common cause of hyperventilation is stress and anxiety (not infrequently noted during first solo flights), however, it is easily controlled by returning to a normal rate of respiration. Just talking to yourself, singing or counting aloud can assist in controlling the breathing but if you do experience symptoms at altitude, ensure that hypoxia is not the problem before considering hyperventilation.

## 7 VISION

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**a** Our sight is something we all take for granted and generally, if your AME has found it acceptable, there should be no change from one examination to another. There are, however, a couple of things pilots should be aware of.

**b** Firstly, those using contact lenses must keep them clean and wear them only for the recommended time. Those who don't, may find themselves unable to read the fine print of a map, or experience acute discomfort during a flight, such that their lenses have to be taken out immediately. This is why those approved to wear contact lenses **must** have a pair of spectacles immediately available, which can be worn instead of the lenses.

**c** Secondly, all of us will require reading glasses at some point – the lenses in the eye stiffen and can't adjust to the full range of distances obtainable when younger. Generally this starts about age forty with the first sign being an inability to read in poor light. Don't ignore this – it will not improve with exercise! After the first set of reading glasses you will need slightly stronger ones each two or three years until they stabilise about age sixty. Do make sure that

your reading glasses are suitable for flying, you still need to see at distance and so you should use bi-focal lenses or the half frame, look-over type so that you can be comfortable looking at a map, your instruments, or at the horizon while maintaining a good look-out.

**d** There are a number of surgical procedures available which reduce, or even eliminate, the need for spectacles. All involve a reshaping of the clear part at the front of the eye, called the cornea. Although the methods vary, some using lasers, others diamond knives, none can be guaranteed and all will require a period of grounding with a specialist assessment before being considered fit for flying – if at all. The long term effects of this surgery are not fully known and the risks are not minor. Any pilot considering such surgery should, well beforehand, read AIC 135/1997 (Pink 155) 'Pilots and Spectacles', containing the details for flight crew.

## **8 STRESS AND FATIGUE**

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**a** All of us at some time will find our lives affected by stress, fatigue, illness or injury – the important thing is to recognise how each can affect our flying skills and to proceed in a sensible fashion.

**b** Stress is considered a modern day ailment, but without some sort of stress we would be hard pressed to wake up never mind get out of bed! It is the individual reaction to excessive stress that may be a problem. Sleep disturbance, poor appetite and indigestion can all be signs of excessive stress, whether at home or at work. Although most consider flying to be a relief from such pressures, it is not a good idea when you are experiencing symptoms

or ruminating over your problems. Any preoccupation will detract from the continuing mental activity needed for safe flying. Take medical advice and when you have fully recovered you will find your flying has improved too, a relaxed pilot is a good pilot.

**c** Short term fatigue is what we experience after strenuous physical or mental exercise. It may be associated with sleepiness, especially after a meal but can also be the cause of slips and lapses of concentration. Medium to long term fatigue is more often associated with shift work, time zone crossings (jet lag) or just regularly cutting back on sleep and is the sort of thing that causes drivers to fall asleep at the wheel. Either way there is no instant cure. The only means of dealing with fatigue is to recognise when it is likely to occur, what can happen and to make sure you get adequate rest before flying.

## **9 ILLNESS AND INJURY**

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**a** Any illness can be debilitating and recovery can take longer than you think. Most pilots would think that returning to work means they are fit to fly – not always. Any condition requiring medical certification that you are unfit for work should normally require at least an equivalent time back at full employment, without treatment, before flying. However, your AME may be prepared to give you a special OK. This particularly applies to some of the modern out-patient surgery or investigations which have been addressed in AIC 20/1997 (Pink 137) 'Modern Medical Practice and Flight Safety'. Your Consultant may reassure you that these procedures are minor but their effects in the air can be major – talk to your AME.

**b** Flying after an injury is another difficult area. It is pretty self evident that a plaster cast limits movement such that flying is unsafe but what about a pulled muscle in the back? After all, flying is only sitting down. Unfortunately the restricted movement and vibration in an aircraft can exacerbate a back problem and if a sudden rudder input is needed .....? Any injury which limits your movement can be a problem and should be fully resolved before flying again.

## 10 ALCOHOL

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**a** As stated previously the consumption of alcohol produces symptoms and signs similar to hypoxia. Unfortunately inhaling oxygen does not reverse or cure the symptoms. Not only that but altitude increases the effects of alcohol. It is therefore essential for pilots to separate their flying from alcohol consumption. Since it takes an extended period of time to remove even low levels of alcohol from the blood, pilots should not fly for at least eight hours after consuming even modest amounts of alcohol and up to 24 hours following a major celebration!



**b** Since one of the more subtle effects of alcohol acts on the inner ear which is associated with disorientation, and takes much longer to dissipate, pilots should always be moderate in consumption. This is reflected in the most recent JAR-OPS blood alcohol limitation for flight crew, of 0.2 mg promille (per thousand mls), which is a very small fraction of the UK driving limit!

## 11 EXPANSION OF BODY GASES

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**a** If you take a balloon from sea level to 18,000 ft, the volume will double due to the decrease in pressure. Gas in the cavities of your body will do exactly the same thing. None of the body cavities are completely closed but expansion of gas bubbles in the intestine can cause abdominal discomfort, depending upon the rate of change of pressure. Similar problems can be experienced with air trapped in the sinuses or behind the eardrum as both of these cavities have narrow entrances which can easily be affected by the inflammation from a common cold. The important things to avoid are gas producing food (eg cabbage, beans or carbonated drinks) and flying with minor respiratory tract infections (colds).

**b** It is also possible for the nitrogen gas which is dissolved in our body fluids to come out of solution if exposed to very low pressure. This type of decompression sickness or 'bends' is rarely experienced at an altitude below 25,000 ft, however, going diving immediately before flying exposes the body to increased pressure and dissolves more nitrogen in the system which may cause decompression sickness at a very much lower altitude. Most divers are aware of this problem and will not

fly, even in a pressurised aircraft, immediately after diving. If you intend to scuba dive within 24 hours before flying, seek expert advice about the time interval between the two activities.

## 12 MEDICATION AND FLYING

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a Doctors can choose from a wide range of medications when treating an illness. There are also a wide range of 'over the counter' treatments which people may use frequently. Unfortunately most doctors are unaware of the effects of their prescriptions upon a pilot's flying capability. Some may cause drowsiness, nausea or fatigue and others may reduce resistance to even minor levels of 'g'-force.



b Some quite simple 'over the counter' products carry warnings not to operate machinery and may react strongly with another medication, even if prescribed. The only way to be sure is to avoid using any medication until you have consulted your AME.

## 13 CARBON MONOXIDE

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a An aircraft engine is rather less efficient than your body in that some of its fuel oxidation is incomplete

and carbon monoxide rather than dioxide is produced. This would be of academic importance if it were not that many aircraft use their engine exhaust gas heat, through an exchanger, to warm the cabin. Add to that the fact that carbon monoxide bonds to the blood and blocks its oxygen carrying capacity then it becomes necessary to consider the symptoms of carbon monoxide (CO) poisoning.

b As a gas, CO is colourless, tasteless and lethal! It can usually only be recognised in an aircraft by associated engine exhaust smells. Symptoms are subtle, similar to hypoxia but perhaps with a more obvious headache and it doesn't respond so promptly to oxygen – although using an oxygen mask is likely to restrict further exposure.

c The only way to deal with CO poisoning is to avoid it. Increase ventilation, land and try and get an engineer to trace any sources. There are CO monitors on the market but the paper sensors do need to be changed fairly frequently to be of value.

## 14 I'M SAFE

**a** This acronym gives all pilots a basic checklist for their fitness to fly. The items on that checklist are covered in this leaflet – plus a few others that seem appropriate! The bottom line is that a pilot's fitness is not set in stone the moment a medical certificate is issued, it can change quickly and sometimes without apparent cause.

Use this personal checklist before setting off for the airfield, just as you would look at the weather or do a pre-flight check. It is available as a free sticker from Safety Promotion, General Aviation Department, address below (please send SAE).

**b** If in doubt about any of the items, then take advice – that is what the Authority's medical examiners are approved for.

Illness  
Medication  
Stress  
Alcohol  
Fatigue  
Eating



**I'M SAFE**

Safety Promotion, GAD, Gatwick

## Cartoons via FAA

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- 1C *Good Airmanship Guide*
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- 3C *Winter Flying*
- 5D *VFR Navigation*
- 6C *Aerodrome Sense*
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