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Part I

MANUAL OF CIVIL AVIATION MEDICINE
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International Civil Aviation Organization

PART I. LICENSING PRACTICES

*Approved by the Secretary General
and published under his authority*

INTERNATIONAL CIVIL AVIATION ORGANIZATION

PART I

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INTRODUCTION

The Chicago Convention

The Convention on International Civil Aviation, which was signed in Chicago on 7 December 1944, includes several articles which call for adoption of international regulations in all fields where uniformity facilitates and improves air navigation.

These regulations, known as Standards and Recommended Practices (SARPs) have been promulgated in Annexes to the Convention which are amended from time to time when necessary. Each Annex deals with a specific aspect of international civil aviation. Aviation medicine is included mainly in Annex 1 (Personnel Licensing) and to some degree in Annex 2 (Rules of the Air), Annex 6 (Operation of Aircraft) and Annex 9 (Facilitation). Issues involving Annex 9, preparedness planning for a communicable disease of public health concern, are not considered in this manual.

Standards and Recommended Practices are defined as follows:

Standard. Any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation, and to which Contracting States will conform in accordance with the Convention. In the event that a State finds it impracticable to comply in all respects with any such international standard but allows a less stringent practice, immediate notification to ICAO is compulsory under Article 38 of the Convention. In case a more stringent regulation is adopted, notification to ICAO is compulsory only when such regulation is applied also on foreign licence holders and aircraft. However, in a Resolution of 5 February 1999, the ICAO Council made it clear that, in principle, national requirements “more exacting” than the SARPs would be detrimental to the framework of the Chicago system within which international civil aviation has developed and continues to develop. In this Resolution the Council also called upon each Contracting State to utilize the multilateral mechanism of ICAO where it believes that changes to the content or level of implementation of the Standards and Recommended Practices in the Annexes to the Chicago Convention are necessary or desirable.

Recommended Practice. Any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States will endeavour to conform in accordance with the Convention.

Although the purpose of SARPs is to provide provisions only for *international* air navigation, they have greatly influenced national regulations governing domestic aviation in most Contracting States.

ICAO also originates guidance material which is intended to assist States in the implementation of SARPs, but places no regulatory responsibility upon States for compliance. The ICAO *Manual of Civil Aviation Medicine* (Doc 8984) falls into this category since it offers guidance on the implementation of the SARPs contained in Annex 1.

PERSONNEL LICENSING

General

Civil aviation includes different types of operations which, for convenience, can be divided into three major categories.

Commercial air transport (airlines). This category includes all operations conducted with large and sophisticated aircraft which used to be piloted by several crew members. In recent years the need for more efficiency has produced some dramatic technological changes which directly involve flight personnel:

- In the early 1960's, the typical crew on the flight deck of an airliner consisted of five members (two pilots, a flight engineer, a flight navigator and a flight radio operator). It now consists of two or three members, depending on the type of aircraft.
- The tasks of the flight crew are changing. On modern aeroplanes, computers are handling the systems and the pilot is becoming more and more of a systems manager and decision maker rather than a control operator.

Aerial work and small air transport. All professional flying except airlines is included in this category. Typical operations are flying instruction, crop spraying, aerial surveying, small commuter operations, air taxi and corporate flying. This category has not faced such important changes as has airline transport. It must be noted that helicopters now perform a significant part of these operations.

Private air transport and pleasure flight. The majority of the world's pilots belong to this category. The operations are not conducted for remuneration and generally involve small aircraft. In this category, glider pilots form an important subgroup. During the last two decades, a new dimension has been added to this category with the fast-growing popularity of the ultralight aircraft. (Presently Annex 1 does not include provisions for ultralight licensing).

Very different operating situations result from these various activities. There is a real gap between the bush pilot flying a rugged aircraft solo in a deserted area and the pilot-in-command of a complex aeroplane on one of the major air routes with comprehensive ground support. This difference, which also affects licensed ground personnel, used to increase as technological progress became more involved in airline operations than in other categories, but is now decreasing as advanced and sophisticated electronics and computer-based equipment are becoming available even to the private pilot. The medical examiner, when making an assessment, must be familiar with the various operating environments.

The concept of licensing

Since the early days of aviation, States have recognized the necessity to check the competency of personnel who perform activities which, unless performed properly, could jeopardize aviation safety. The recognition of this competency was generally made by issuing a licence. This concept has remained valid throughout the years, and the whole of Annex 1 may be considered as an evolution of this basic idea.

However, civil aviation is very different today from what it was when the first licences were issued, and the provisions of Annex 1 have been established and then regularly updated to manage the increasing complexity of civil aviation. The personnel licensing system, as implemented in Annex 1, is now built on the following principles:

- The licence is the authorization which allows the holder to perform specific activities,

which otherwise would be prohibited.

- A licence is issued by a State when the applicant has demonstrated an acceptable degree of competency. The right to issue a licence is reserved to States either directly or through a body with delegated authority. When the term “ICAO licence” is used, it indicates that the licence is issued by a Contracting State in compliance with the provisions in Annex 1. ICAO does not itself issue licences.
- There are different types of licences. Each one grants specific privileges to the holder. Ratings can be added to the licence to extend the basic privileges.

Annex 1 has provisions for other licences than those listed below (aircraft maintenance mechanic, aeronautical station operator and flight operations officer). However, these licences have no medical fitness requirements due to the nature of duties.

Different types of licences

Some licence types are described below. Detailed descriptions can be found in Annex 1, Chapter 2.

Pilot’s licences

- a) *Student pilot*. While it is not formally a licence, many Contracting States issue an authorization for a student pilot, allowing such a pilot to fly solo before licensing as long as the applicant is medically fit. In some States, the Medical Assessment itself, when issued as a certificate, functions as the student pilot’s licence. The medical fitness required is the least restrictive of all pilot licences (Class 2). Therefore the medical examiner should be prepared to counsel the applicant against further time and expense in pursuance of piloting ambitions if a medical condition is established which might prevent his acquisition of a more senior pilot licence, if this is his ambition.
- b) *Private pilot licence – aeroplane (PPL - aeroplane)*. The most commonly held licence permitting the holder to fly an aeroplane other than professionally. Private pilots usually fly small aeroplanes in visual meteorological conditions (VMC). It is, however, not unusual to add an instrument rating to a PPL.
- c) *Private pilot licence – helicopter (PPL - helicopter)*. This is the helicopter licence equivalent to the PPL – aeroplane.
- d) *Glider pilot licence* permits the holder to act as pilot-in-command of any glider.
- e) *Free balloon pilot licence*. The holder of this licence is permitted to act as pilot-in-command of any free balloon.
- f) *Commercial pilot licence – aeroplane (CPL - aeroplane)*. The CPL is the junior licence permitting the holder to perform professional duties either as a pilot-in-command of an aeroplane certificated for single pilot operations or as co-pilot of any aircraft.
- g) *Commercial pilot licence – helicopter (CPL - helicopter)*. This licence is the helicopter equivalent to the CPL – aeroplane.
- h) *Airline transport pilot licence – aeroplane (ATPL – aeroplane)*. The senior pilot licence, permitting the holder to operate any aircraft either as pilot-in-command or co-pilot. The privileges of the instrument rating are included in the ATPL – aeroplane.
- i) *Airline transport pilot licence – helicopter (ATPL – helicopter)*. The helicopter equivalent of the

ATPL – aeroplane. The instrument rating privileges, however, are not included in the licence.

- j) *Multi-crew pilot licence – appropriate to the aeroplane category (MPL – aeroplane)*. The equivalent to an ATPL but with restriction to multi-crew operations. The MPL, CPL and ATPL are often referred to as “professional licences”.

Ratings for pilot licences

- a) *Type and class ratings*. Each pilot licence must be endorsed with a rating specifying the type of aircraft the holder is authorized to fly. The larger aircraft (usually those with a maximum take-off mass of more than 5 700 kg) need a specific rating. The smallest aircraft are grouped into classes (single-engine and multi-engine) and the holder of a licence endorsed with a class rating is permitted to fly all the aircraft of the relevant class.
- b) *Instrument rating*. This rating can be endorsed on a PPL, CPL, and ATPL - helicopter. It permits the holder to fly in other than visual meteorological conditions.
- c) *Instructor rating*. This rating permits the holder to act as a flight instructor.

Licences for flight crew members other than pilot

- a) *Flight engineer*. The licence permitting the holder to perform the duty of a flight engineer when required by aircraft certification or operational regulation.
- b) *Flight navigator*.
- c) *Flight radio operator*.

These licences, especially the latter two, are becoming obsolete and are seldom issued.

Licences for personnel other than flight crew members

Air traffic controller licence. The licence in itself carries no privileges. These are conferred with additional ratings to the licence which characterizes the duty of an air traffic controller.

The basic ratings for this licence are:

- a) *Aerodrome control rating*, permitting the holder to provide or to supervise the provision of aerodrome control service for the aerodrome for which he is rated. Aerodrome control handles traffic on ground and in flight at the vicinity of the runway.
- b) *Approach control rating*, permitting the holder to provide or to supervise the provision of approach control service for the aerodrome or aerodromes for which he is rated. Approach control handles traffic in flight during departure and during descent on arrival.
- c) *Area control rating*, permitting the holder to provide or to supervise the provision of area control service within the control area for which he is rated. Area control handles traffic during the cruise, the last part of climb and the initial part of descent.

When a radar is used to perform the duty, the air traffic controller must hold a radar rating in addition to the relevant rating.

Medical certification

The process of establishing and issuing evidence that guarantees that a licence holder meets the medical requirements is called “medical certification”. None of the aviation licences listed above can be used for carrying out aviation duties without evidence that the holder of the licence meets the medical requirements for fitness. Many Contracting States issue medical certificates, valid for a limited period only, and designed to be kept together with the licence. The licence itself has usually a longer period of validity, sometimes lifelong or one which expires when the licence holder reaches the upper age limit specified for the type of licence held. Other States endorse aviation licences with the date of the medical examination and the word “passed”, thus rendering the licence valid again for a limited period until the next medical examination is due. And some States issue aviation licences only to applicants who have passed the medical examination and with a validity period that corresponds to that of the medical examination. The evidence of meeting the medical requirements is then the licence itself. When such a licence expires, a new one is issued, provided the holder still meets the medical requirements.

ICAO has solved the obvious terminology problem, created by the different administrative methods in use by the Licensing Authorities in Contracting States, by choosing a different term, Medical Assessment, which is defined as “the evidence issued by a Contracting State that the licence holder meets specific requirements of medical fitness”. To avoid confusion and mistakes, the term “licence” is used solely about the document that guarantees the professional competency of the holder, and the term “Medical Assessment” is used about the medical certificate (in cases where such a document is issued), about endorsement of a licence to the effect that the holder meets the medical requirements, or about the aviation licence when medical fitness is implied in holding a valid licence (see also Note 2 to 1.2.4 below).

The issue of a licence

An applicant who seeks a licence must complete a multi-step process which can be divided into three major parts: prerequisites, training and demonstration of competency.

Prerequisites

- a) *Age*. A minimum age is specified for each licence.
- b) *Experience*. A minimum level of experience depending on the licence is required for all personnel to be licensed. The unit of measurement of experience is flight hours for flight crew, and years of duty for ground personnel. For pilots, experience requirements range from 40 flight hours for PPL to 1 500 flight hours for ATPL.
- c) *Medical fitness*. Most of the licences require compliance with medical fitness standards. Complete guidance on this matter is provided in this manual.

Training

Training is obviously one of the most important parts of the licensing system. For several licences, an applicant may choose to take an approved training course instead of a regular course and thus be eligible for reduced experience requirements. It is expected that even more emphasis will be placed on training in the future. The advent of the multi-crew pilot licence has provided a new method of training of individuals intending to operate only multi-pilot aircraft.

Demonstration of competency

Each licence has its specific skill and knowledge requirements, and each applicant must demonstrate compliance with the requirements pursuant to the licence he seeks. Contracting States generally use a written examination and a practical test to check the competency of an applicant. Some other methods are also used concurrently, such as acceptance of a military licence.

Currency of licences

As outlined above, basically two different types of licences can be found, depending on the issuing State. Some licences (expiring type) have a period of currency which is limited to a defined period. At each renewal, the holder must give evidence of his competency and his medical fitness. Competency is usually judged by considering the recent flight experience and sometimes by an examination. The other type of licence (continuous type) is not limited to a defined period of currency. The holder is allowed to exercise licence privileges as long as he holds a current Medical Assessment and complies with the regulations detailing the actions necessary to ensure maintenance of competency.

Medical provisions for licensing

The detailed medical requirements appear in Chapter 6 of Annex 1. Other chapters of the Annex, mainly Chapter 1, contain a number of general administrative provisions which are important for the organization and conduct of the medical examination and medical certification. These are given in the following extracts from Chapter 1 of the Annex, together with explanatory remarks.

The designated medical examiner

1.2.4.4 Contracting States shall designate medical examiners, qualified and licensed in the practice of medicine, to conduct medical examinations of fitness of applicants for the issue or renewal of the licences or ratings specified in Chapters 2 and 3, and of the appropriate licences specified in Chapter 4.

1.2.4.4.1 Medical examiners shall have received training in aviation medicine and shall receive refresher training at regular intervals. Before designation, medical examiners shall demonstrate adequate competency in aviation medicine.

1.2.4.4.2 Medical examiners shall have practical knowledge and experience of the conditions in which the holders of licences and ratings carry out their duties.

Note.— Examples of practical knowledge and experience are flight experience, simulator experience, on-site observation or any other hands-on experience deemed by the Licensing Authority to meet this requirement

As stated in 1.2.4.4.2, designated medical examiners must be familiar with – “have practical knowledge and experience of” - the operating environments of the various licence holders. Such practical knowledge and experience should include, whenever possible, actual flight deck experience in aircraft engaged in commercial operation as well as experience in the operational working conditions of air traffic controllers. This is an effective way to promote the medical examiner’s understanding of the practical demands, both physiological and psychological, that the licence holder’s task and duties impose. An accumulated total of at least ten hours per year of flight deck time might be considered desirable. Practical difficulties may be encountered in the implementation of this recommendation for all designated examiners, but it is desirable that, as a minimum, medical assessors (physicians evaluating the medical reports submitted to the Licensing Authority) be afforded the opportunity of attaining such experience.

The medical assessor

1.2.4.7 Contracting States shall use the services of medical assessors to evaluate reports submitted to the Licensing Authorities by medical examiners.

1.2.4.7.1 The medical examiner shall be required to submit sufficient medical information to the Licensing Authority to enable the Authority to audit Medical Assessments.

Note.— The purpose of such auditing is to ensure that medical examiners meet applicable standards for good practice.

Medical assessors, because of their functions as employees of or consultants for the Licensing Authorities and as supervisors for the designated medical examiners, will normally have advanced training in the specialty of aviation medicine and extensive experience in regulatory and clinical civil aviation medicine. In addition to evaluating medical reports submitted to the Licensing Authority and making final assessments in border-line cases, the medical assessor will normally be in charge of Accredited Medical Conclusions (see 1.2.4.8 below). An important duty of the medical assessor is the safeguarding of medical confidentiality, although pertinent medical information may be presented by the medical assessor to other officials of the Licensing Authority when justified by operational concerns or when an Accredited Medical Conclusion is sought. Also the audit of medical reports by designated medical examiners and refresher training of medical examiners will usually fall within the remit of the medical assessor.

Applicant's medical history

1.2.4.5 Applicants for licences or ratings for which medical fitness is prescribed shall sign and furnish to the medical examiner a declaration stating whether they have previously undergone such an examination and, if so, the date, place and result of the last examination. They shall indicate to the examiner whether a Medical Assessment has previously been refused or suspended and, if so, the reason for such refusal or suspension.

1.2.4.5.1 Any false declaration to a medical examiner made by an applicant for a licence or rating shall be reported to the Licensing Authority of the issuing State for such action as may be considered appropriate.

It is desirable that such declaration be incorporated in the medical examination form or be a part of the national regulations, as a reminder to the applicant of the consequences of any false declaration. The examiner should be aware that deception may be a problem in aviation medical certification and the potentially serious consequences of any false declaration should be stressed to the applicant.

The medical examination

1.2.4.6 Having completed the medical examination of an applicant in accordance with Chapter 6, the medical examiner shall submit a signed report, or equivalent, to the Licensing Authority, in accordance with its requirements, detailing the results of the examination.

Note.— The medical report may be submitted to the Licensing Authority in electronic format, provided adequate identification of the examiner is established.

1.2.4.6.1 If the medical examination is carried out by two or more medical examiners, Contracting States shall appoint one of these to be responsible for coordinating the results of the examination, evaluating the findings with regard to medical fitness, and signing the report.

Medical confidentiality

1.2.4.9 Medical confidentiality shall be respected at all times.

1.2.4.9.1 All medical reports shall be securely held with accessibility restricted to authorized personnel.

1.2.4.9.2.1 When justified by operational considerations, the medical assessor shall determine to what extent pertinent medical information is presented to relevant officials of the Licensing Authority.

It is important that medical confidentiality is respected at all times. Medical information is of a sensitive nature and a person who has undergone a medical examination for issuance or renewal of his licence has a right to expect that such information is kept confidential and disclosed only to medical officials. In many States a separate medical section is established, either within the authority or attached to it. Medical confidentiality is best assured when this medical section, where the reports from the medical examiners are received and evaluated, is headed by a physician and has its own staff, its own channels of communication, its own filing system, etc. If the medical section is a sub-part of another non-medical section and thus shares office space, office staff, and files with that section, medical confidentiality becomes untenable.

Flexibility

1.2.4.8 If the medical standards prescribed in Chapter 6 for a particular licence are not met, a Contracting State shall not issue or renew the appropriate Medical Assessment unless the following conditions are fulfilled:

- a) Accredited medical conclusion indicates that in special circumstances the applicant's failure to meet any requirement, whether numerical or otherwise, is such that exercise of the privileges of the licence applied for is not likely to jeopardize flight safety.
- b) Relevant ability, skill and experience of the applicant and operational conditions have been given due consideration.
- c) The licence is endorsed with any special limitation or limitations when the safe performance of the licence-holder's duties is dependent on compliance with such limitation or limitations.

Guidance on the application of 1.2.4.8, is detailed in Part I, Chapter 2 of this manual.

Evidence of medical fitness

In Note 2 to 1.2.4, the various ways in which Contracting States provide licence holders with evidence that they meet the medical requirements are outlined as follows:

Note 2.— To satisfy the licensing requirements of medical fitness for the issue of various types of licences, the applicant must meet certain appropriate medical requirements which are specified as three classes of Medical Assessment. Details are given in 6.2, 6.3, 6.4 and 6.5. To provide the necessary evidence to satisfy the requirements of 1.2.4.1, the Licensing Authority issues the licence holder with the appropriate Medical Assessment, Class 1, Class 2 or Class 3. This can be done in several ways such as a suitably titled separate certificate, a statement on the licence, a national regulation stipulating that the Medical Assessment is an integral part of the licence, etc.

Validity periods of Medical Assessments

1.2.4.2 The period of validity of a Medical Assessment shall begin on the day the medical examination is performed. The duration of the period of validity shall be in accordance with the provisions of 1.2.5.2.

1.2.4.2.1 The period of validity of a Medical Assessment may be extended, at the discretion of the Licensing Authority, up to 45 days.

Note.— It is advisable to let the calendar day on which the Medical Assessment expires remain constant year after year by allowing the expiry date of the current Medical Assessment to be the beginning of the new validity period under the proviso that the medical examination takes place during the period of validity of the current Medical Assessment but no more than 45 days before it expires.

The Medical Assessment is valid from the day on which the regulatory medical examination has been carried out. Sometimes the issue of the Medical Assessment has to be postponed until the result of laboratory tests or perhaps a specialist evaluation is known, but this does not change the date for the beginning of the validity period. Many Contracting States allow licence holders to undergo the medical examination for renewal of their Medical Assessment on a convenient date up to 45 days before their current Medical Assessment expires without changing the dates for the new validity period correspondingly, thus extending the validity period by up to 45 days. This is primarily done to accommodate the work schedules of licence holders and medical examiners, but also serves to allow the expiry date of the Medical Assessment to remain the same year after year.

The predictive power of even a very thorough and comprehensive medical examination is limited. This is true for all age groups, but increases in importance with age. Studies in two Contracting States have shown that older licence holders have a significantly increased incidence of medical conditions of importance for flight safety. Consequently, the validity periods are shorter for older licence holders. The periods of validity of the Medical Assessment for various categories of licence holders are as follows:

1.2.5.2 Except as provided in 1.2.5.2.1, 1.2.5.2.2, 1.2.5.2.3, 1.2.5.2.4, 1.2.5.2.5 and 1.2.5.2.6, a Medical Assessment issued in accordance with 1.2.4.5 and 1.2.4.6 shall be valid from the date of the medical examination for a period not greater than:

- 60 months for the private pilot licence – aeroplane, airship, helicopter and powered-lift;
- 12 months for the commercial pilot licence – aeroplane, airship, helicopter and powered-lift;
- 12 months for the multi-crew pilot licence – aeroplane;
- 12 months for the airline transport pilot licence – aeroplane, helicopter and powered-lift;
- 60 months for the glider pilot licence;
- 60 months for the free balloon pilot licence;
- 12 months for the flight navigator licence;
- 12 months for the flight engineer licence;
- 48 months for the air traffic controller licence.

Note 1.— The periods of validity listed above may be extended by up to 45 days in accordance with 1.2.4.2.1.

Note 2.— When calculated in accordance with 1.2.5.2 and its sub-paragraphs, the period of validity will, for the last month counted, include the day that has the same calendar number as the date of the medical examination or, if that month has no day with that number, the last day of that month.

As the age of the licence holder increases, these validity periods are shortened:

1.2.5.2.2 When the holders of airline transport pilot licences – aeroplane, helicopter and powered-lift, and commercial pilot licences – aeroplane, airship, helicopter and powered-lift, who are engaged in single-crew commercial air transport operations carrying passengers, have passed their 40th birthday, the period of validity specified in 1.2.5.2 shall be reduced to six months.

1.2.5.2.3 When the holders of airline transport pilot licences – aeroplane, helicopter and powered-lift, commercial pilot licences – aeroplane, airship, helicopter and powered-lift, and multi-crew pilot licences – aeroplane, who are engaged in commercial air transport operations, have passed their 60th birthday, the period of validity specified in 1.2.5.2 shall be reduced to six months.

1.2.5.2.4 When the holders of private pilot licences – aeroplane, airship, helicopter and powered-lift, free balloon pilot licences, glider pilot licences and air traffic controller licences have passed their 40th birthday, the period of validity specified in 1.2.5.2 shall be reduced to 24 months.

1.2.5.2.5 **Recommendation.**— *When the holders of private pilot licences – aeroplane, airship, helicopter and powered-lift, free balloon pilot licences, glider pilot licences and air traffic controller licences have passed their 50th birthday, the period of validity specified in 1.2.5.2 should be further reduced to 12 months.*

Note.— The periods of validity listed above are based on the age of the applicant at the time of undergoing the medical examination.

Regardless of the validity periods stated above, the medical assessor may in an individual case require this period to be shortened.

1.2.5.2.1 The period of validity of a Medical Assessment may be reduced when clinically indicated.

A medical condition, although compatible with licensing, may be of a nature where frequent medical check-ups are required. In such cases the period of validity of the Medical Assessment may be reduced so as to ensure adequate monitoring of the condition in question.

Decrease in medical fitness

1.2.6.1 Holders of licences provided for in this Annex shall not exercise the privileges of their licences and related ratings at any time when they are aware of any decrease in their medical fitness which might render them unable to safely and properly exercise these privileges.

1.2.6.1.1 **Recommendation.**— *Licence holders should inform the Licensing Authority of confirmed pregnancy or any decrease in medical fitness of a duration of more than 20 days or*

which requires continued treatment with prescribed medication or which has required hospital treatment.

1.2.6.1.2 Recommendation. — *Each Contracting State should, as far as practicable, ensure that licence holders do not exercise the privileges of their licences and related ratings during any period in which their medical fitness has, from any cause, decreased to an extent that would have prevented the issue or renewal of their Medical Assessment.*

The provisions of Annex 1, 1.2.6.1, would apply if there is a decrease in medical fitness attributable to the effects of intercurrent disease, injury, alcohol or other psychoactive substances, medication, fatigue, sleep disturbances due to time zone changes, adverse climatic conditions and disrupted regular work/rest schedules which might render the holder of a licence or rating incapable of meeting the medical requirements of his licence or rating.

Use of psychoactive substances

In the context of aviation, any use of psychoactive substances, even when prescribed in accordance with best medical practice for a medical condition and used in amounts that allow normal daily activities to be carried out as usual, is likely to jeopardize flight safety. The term “problematic use”, which is employed in regulatory aviation medicine, is defined in Annex 1:

Problematic use of substances. The use of one or more psychoactive substances by aviation personnel in a way that:

- a) constitutes a direct hazard to the user or endangers the lives, health or welfare of others; and/or
- b) causes or worsens an occupational, social, mental or physical problem or disorder.

It is important to distinguish between the terms “under the influence of any psychoactive substance” (1.2.7.1) and “engage in problematic use of substances” (1.2.7.2). The former relates to any person who has recently taken a psychoactive substance (such as a glass of wine) and for that reason is temporarily unsafe, whereas the latter relates to a person who is a habitual user of psychoactive substances and consequently is unsafe, also between uses.

1.2.7.1 Holders of licences provided for in this Annex shall not exercise the privileges of their licences and related ratings while under the influence of any psychoactive substance which might render them unable to safely and properly exercise these privileges.

1.2.7.2 Holders of licences provided for in this Annex shall not engage in any problematic use of substances.

1.2.7.3 **Recommendation.**— *Contracting States should ensure, as far as practicable, that all licence holders who engage in any kind of problematic use of substances are identified and removed from their safety critical functions. Return to the safety-critical functions may be considered after successful treatment or, in cases where no treatment is necessary, after cessation of the problematic use of substances and upon determination that the person’s continued performance of the function is unlikely to jeopardize safety.*

Note.— *Guidance on suitable methods of identification (which may include biochemical testing on such occasions as pre-employment, upon reasonable suspicion, after accidents/incidents, at intervals, and at random) and on other prevention topics is contained in the Manual on Prevention of Problematic Use of Substances in the Aviation Workplace (Doc 9654).*

A definition of psychoactive substances is given in Chapter 1 of Annex 1:

Psychoactive substances. Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

OTHER MEDICAL PROVISIONS IN THE ANNEXES

Some other medical provisions exist in Annexes 2 (Rules of the Air) and 6 (Operation of Aircraft) and are given in the following extracts.

Use of psychoactive substances

A Standard restricting the use of psychoactive substances (such as alcohol, narcotics and certain drugs) is provided in Annex 2, 2.5, as follows:

2.5 Use of psychoactive substances

2.5.1 No person whose function is critical to the safety of aviation (safety-sensitive personnel) shall undertake that function while under the influence of any psychoactive substance, which might render him unable to safely and properly exercise that function.

2.5.2 No such person shall engage in any kind of problematic use of substances.

It is important to note that 2.5.1 relates to any person who has recently taken a psychoactive substance and for that reason is temporarily unsafe, whereas 2.5.2 relates to a person who is a habitual user of psychoactive substances.

Flight crew fatigue and fitness

Annex 6 has two parts. Part I covers International Commercial Air Transport, and specifies limitations on flight time to ensure that fatigue does not endanger the safety of a flight as follows:

4.2.9.3 An operator shall formulate rules limiting the flight time and flight duty periods of flight crew members. These rules shall also make provision for adequate rest periods and shall be such as to ensure that fatigue occurring either in a flight or successive flights or accumulated over a period of time due to these and other tasks, does not endanger the safety of a flight. These rules shall be approved by the State of the Operator and included in the Operations Manual.

Note.— This Standard does not preclude a State from establishing regulations specifying the limitations applicable to flight crew members of aeroplanes registered in that State. Guidance on the establishment of limitations is given in Attachment A.

ICAO Circular 52 - *Flight Crew Fatigue and Flight Time Limitations* - contains a compendium of States' actions to implement Annex 6, Part I, 4.2.9.3. It must be noted that "flight time" is only one of several factors which can contribute to fatigue. Other important factors to be considered are the type of aircraft flown, the size of the crew, the nature of the route, the general operating conditions encountered, in particular the weather, the number of landings, the time of day or night, and the crossing of time zones.

Part II of Annex 6 covers international general aviation, and has less stringent provisions which give the responsibility of flight crew fitness to the pilot-in-command as follows:

4.12. Fitness of Flight Crew Members

The pilot-in-command shall be responsible for ensuring that a flight:

- a) will not be commenced if any flight crew member is incapacitated from performing his duties by any cause such as injury, sickness, fatigue, the effects of alcohol or drugs;
- b) will not be continued beyond the nearest suitable aerodrome when flight crew members' capacity to perform functions is significantly reduced by impairment of faculties from causes such as fatigue, sickness, lack of oxygen.

Use of oxygen in flight

Measures to reduce the possibilities of hypoxia which would affect flight safety are specified in Annex 6, Part I:

4.3.8 Oxygen supply

Note.- Approximate altitudes in the Standard Atmosphere corresponding to the values of absolute pressure used in the text are as follows:

Absolute Pressure	Metres	Feet
700 hPa (700 mb)	3 000	10 000
620 hPa (620 mb)	4 000	13 000
376 hPa (376 mb)	7 600	25 000

4.3.8.1 A flight to be operated at altitudes at which the atmospheric pressure in personnel compartments will be less than 700 hPa (700 mb) shall not be commenced unless sufficient stored breathing oxygen is carried to supply:

- a) all crew members and 10 per cent of the passengers for any period in excess of 30 minutes that the pressure in compartments occupied by them will be between 700 hPa (700 mb) and 620 hPa (620 mb);
- b) the crew and passengers for any period that the atmospheric pressure in compartments occupied by them will be less than 620 hPa (620 mb).

4.3.8.2 A flight to be operated with a pressurized aeroplane shall not be commenced unless a sufficient quantity of stored breathing oxygen is carried to supply all the crew members and a proportion of the passengers, as is appropriate to the circumstances of the flight being undertaken, in the event of loss of pressurization, for any period that the atmospheric pressure in any compartment occupied by them would be less than 700 hPa (700 mb).

Annex 6, Part I, further specifies in 4.4.5.1 that all flight crew members shall use breathing oxygen continuously whenever circumstances prevail as specified in 4.3.8.1 and 4.3.8.2 above. Paragraph 4.4.5.2 specifies:

4.4.5.2 All flight crew members of pressurized aeroplanes operating above an altitude where the atmospheric pressure is less than 376 hPa (376 mb) shall have available at the flight duty station a

quick donning type of oxygen mask which will readily supply oxygen upon demand.

Recommendation 4.4.6 of Annex 6 details procedures to ensure the safety of cabin attendants and passengers in pressurized aircraft in the event of pressurization loss.

DEFINITIONS

The following is a selection of definitions pertinent to the responsibilities of an aviation medical examiner. Definitions of terms used in the SARPs and which are not self-explanatory are provided in each Annex. A definition does not have independent status but is an essential part of each Standard or Recommended Practice in which the defined term is used, since a change in the meaning of the term would affect the specification. When the following terms (from Annexes 1, 2 and 6) are used in the SARPs they have the following meaning:

Accredited medical conclusion. The conclusion reached by one or more medical experts acceptable to the Licensing Authority for the purposes of the case concerned, in consultation with flight operations or other experts as necessary.

Co-pilot. A licensed pilot serving in any piloting capacity other than as pilot-in-command but excluding a pilot who is on board the aircraft for the sole purpose of receiving flight instruction.

Crew member. A person assigned by an operator to duty on an aircraft during flight time.

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during flight time.

Flight duty period. The total time from the moment a flight crew member commences duty, immediately subsequent to a rest period and prior to making a flight or a series of flights, to the moment he is relieved of all duties having completed such flight or series of flights.

Flight time — aeroplanes. The total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.

Note. — Flight time as here defined is synonymous with the term “block to block” time or “chock to chock” time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight.

Flight time — helicopters. The total time from the moment a helicopter’s rotor blades start turning until the moment the helicopter finally comes to rest at the end of the flight, and the rotor blades are stopped.

General aviation. All civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire.

Human performance. Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

Licensing Authority. The authority designated by a Contracting State as responsible for the licensing of personnel.

Note.— In the provisions of this Annex, the Licensing Authority is deemed to have been given

the following responsibilities by the Contracting State:

- a) assessment of an applicant's qualifications to hold a licence or rating;*
- b) issue and endorsement of licences and ratings;*
- c) designation and authorization of approved persons;*
- d) approval of training courses;*
- e) approval of the use of synthetic flight trainers and authorization for their use in gaining the experience or in demonstrating the skill required for the issue of a licence or rating; and*
- f) validation of licences issued by other Contracting States.*

Likely. In the context of the medical provisions in Chapter 6, **likely** means with a probability of occurring that is unacceptable to the Medical Assessor.

Medical Assessment. The evidence issued by a Contracting State that the licence holder meets specific requirements of medical fitness.

Medical assessor. A physician qualified and experienced in the practice of aviation medicine who evaluates medical reports submitted to the Licensing Authority by designated medical examiners.

Medical examiner. A physician with training in aviation medicine and practical knowledge and experience of the aviation environment, who is designated by the Licensing Authority to conduct medical examinations of fitness of applicants for licences or ratings for which medical requirements are prescribed.

Pilot-in-command. The pilot responsible for the operation and safety of the aircraft during flight time.

Problematic use of substances. The use of one or more psychoactive substances by aviation personnel in a way that:

- a) constitutes a direct hazard to the user or endangers the lives, health or welfare of others; and/or
- b) causes or worsens an occupational, social, mental or physical problem or disorder.

Psychoactive substances. Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

Rated air traffic controller. An air traffic controller holding a licence and valid ratings appropriate to the privileges exercised by him.

Rating. An authorization entered on or associated with a licence and forming part thereof, stating special conditions, privileges or limitations pertaining to such licence.

Rest period. Any period of time on the ground during which a flight crew member is relieved of all duties by the operator.

Safety-sensitive personnel. Persons who might endanger aviation safety if they perform their duties and functions improperly. This definition includes, but is not limited to, flight crew, cabin crew, aircraft maintenance personnel and air traffic controllers.

Significant. In the context of the medical provisions in Chapter 6, **significant** means to a degree or of a nature that is likely to jeopardize flight safety.

Chapter 2. MEDICAL REQUIREMENTS

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INTRODUCTION

Two basic principles are essential when assessing an applicant's medical fitness for aviation duties as specified in Annex 1, Chapter 6, Medical Provisions for Licensing, namely:

- a) The applicant shall be physically and mentally capable of performing the duties of the licence or rating applied for or held.
- b) There shall be no medical reasons which make the applicant liable to incapacitation¹ while performing duties.

The main objective of the *Manual of Civil Aviation Medicine* is to provide guidance material and present concepts on how to achieve these principles by assessing symptoms and signs that occur commonly in medical examinations for the aviation licences but which have not been or cannot be included in detail in Annex 1.

It is also envisaged that the guidance material will help ensure international uniformity in the implementation of the SARPs.

The foregoing two basic principles are explicitly detailed in the general, all-embracing paragraph 6.2.2 of Annex 1, Chapter 6:

6.2.2 Physical and mental requirements

An applicant for any class of Medical Assessment shall be required to be free from:

- a) any abnormality, congenital or acquired; or
- b) any active, latent, acute or chronic disability; or
- c) any wound, injury or sequelae from operation; or
- d) any effect or side-effect of any prescribed or non-prescribed therapeutic, diagnostic or preventive medication taken;

such as would entail a degree of functional incapacity which is likely to interfere with the safe operation of an aircraft or with the safe performance of duties.

Note.— Use of herbal medication and alternative treatment modalities requires particular attention to possible side-effects.”

This paragraph outlines the basic general concept of medical assessment and makes reference to any abnormality, disability, wound, sequelae from operations, and effects and side-effects of medication which “would entail a degree of functional incapacity which is likely to interfere with the safe operation of an aircraft or with the safe performance of duties.

The requirements for medical assessments in Annex 1, Chapter 6, are listed under sub-headings as follows:

Sections 6.2.1 – General and 6.2.2 – Physical and mental requirements, covering matters of a general medical certification nature which apply to all types of licences².

¹ Incapacitation: In this manual the term ‘incapacitation’ means any reduction in medical fitness to a degree or of a nature that is likely to jeopardize flight safety

² In this Manual, the term ‘licence’ means any aviation licence for which medical requirements have been established.

Section 6.2.3 – Visual acuity test requirements for licences, detailing general visual acuity test requirements applicable to all categories of licences.

Section 6.2.4 – Colour perception requirements, detailing general colour perception requirements applicable to all categories of licences.

Section 6.2.5 – Hearing test requirements, detailing general hearing requirements applicable for all categories of licences.

Section 6.3 – Class 1 Medical Assessment, covering matters applicable to applicants for a “professional licence” such as a commercial pilot licence - aeroplane or helicopter, an airline transport pilot licence, aeroplane or helicopter, multi-crew pilot licence, a flight engineer or a flight navigator licence.

Section 6.4 – Class 2 Medical Assessment, covering matters applicable to applicants for a private pilot licence - aeroplane or helicopter, a glider pilot licence, a free balloon pilot licence or a flight radio operator licence.

Section 6.5 – Class 3 Medical Assessment, covering matters applicable to applicants for an air traffic controller licence.

GENERAL MEDICAL REQUIREMENTS

The introductory paragraphs of Annex 1, Chapter 6, contain medical certification requirements of a general nature and apply to all types of licences, as given in the following extracts from the Annex:

Note 1.— The Standards and Recommended Practices established in this chapter cannot, on their own, be sufficiently detailed to cover all possible individual situations. Of necessity, many decisions relating to the evaluation of medical fitness must be left to the judgement of the individual medical examiner. The evaluation must, therefore, be based on a medical examination conducted throughout in accordance with the highest standards of medical practice.

Note 2.— Predisposing factors for disease, such as obesity and smoking, may be important for determining whether further evaluation or investigation is necessary in an individual case.

Note 3.— In cases where the applicant does not fully meet the medical requirements and in complicated and unusual cases, the evaluation may have to be deferred and the case submitted to the medical assessor of the Licensing Authority for final evaluation. In such cases due regard must be given to the privileges granted by the licence applied for or held by the applicant for the Medical Assessment, and the conditions under which the licence holder is going to exercise those privileges in carrying out assigned duties.

Note 4.— Attention is called to the administrative clause in 1.2.4.8 dealing with accredited medical conclusion.

Note 5.— Guidance material to assist Licensing Authorities and medical examiners is published separately in the Manual of Civil Aviation Medicine (Doc 8984). This guidance material also contains a discussion of the terms ‘likely’ and ‘significant’ as used in the context of the medical provisions in Chapter 6.

While the Standards and Recommended Practices lay down as precisely as possible the minimum levels considered acceptable, it is understood that a degree of interpretation must often be exercised at the discretion of the medical examiner or medical assessor. The important non-medical factors which should be taken into consideration in such cases are the age and experience of the applicant, the privileges of the particular licence or rating applied for or held, and the environmental conditions in which these are to be exercised:

6.1.2 The applicant for a Medical Assessment shall provide the medical examiner with a personally certified statement of medical facts concerning personal, familial and hereditary history. The applicant shall be made aware of the necessity for giving a statement that is as complete and accurate as the applicant's knowledge permits, and any false statement shall be dealt with in accordance with 1.2.4.5.1.

6.1.3 The medical examiner shall report to the Licensing Authority any individual case where, in the examiner's judgement, an applicant's failure to meet any requirement, whether numerical or otherwise, is such that exercise of the privileges of the licence being applied for or held, is not likely to jeopardize flight safety (1.2.4.8).

6.1.4 The requirements to be met for the renewal of a Medical Assessment are the same as those for the initial assessment except where otherwise specifically stated.

Note.— The intervals between routine medical examinations for the purpose of renewing Medical Assessments are specified in 1.2.5.2.

The purpose of the medical examination is to determine that no condition exists which may reduce the applicant's medical fitness to a significant degree during the period of validity of the Medical Assessment. The medical requirements of Annex 1 are not concerned with social considerations or medical conditions of importance for employment. Nevertheless, on initial issue of a Medical Assessment, it would be poor medical practice to encourage an applicant to pursue flight training if the minimum requirements of Annex 1 are barely met, especially in cases where further deterioration might be expected or is likely to occur. Likewise, it would be poor practice to disregard the preventive aspects of the regulatory examination for renewal.

Upon subsequent examination, Licensing Authorities are often able to give consideration to such factors as skill and experience which are not present on initial application. However, in keeping with the provisions of Annex 1, continued fitness for flying upon subsequent medical examination is not guaranteed by success at meeting the medical requirements in the previous examination. Medical information related to decrease in medical fitness, or any information that would provide clarification concerning a previously noted condition, must be made a part of the periodic reassessment for renewal of a Medical Assessment as provided for in Annex 1, Chapter 6.

FLEXIBILITY IN THE APPLICATION OF ANNEX 1 MEDICAL REQUIREMENTS

The range of variation between individuals is such that if medical Standards are laid down in rigid terms, they will inevitably exclude a number of applicants who, though not meeting the Standards in all respects, might nevertheless be considered capable of performing duties safely in the aviation environment. Since the Chicago Convention lays on Contracting States the duty to promote efficient and safe aviation as well as to regulate it, provision has been made in Annex 1 for the exercise of a degree of flexibility in the application of medical Standards, thus avoiding the hardship and injustice which might otherwise occur. It is essential for the maintenance of flight safety that the manner in which flexibility is exercised should be reasonably uniform throughout the Contracting States if international acceptance of licences is to be maintained. In the past, flexibility has been used in widely differing ways by States. The application of the principles set out in this chapter will assist in achieving uniformity.

The exercise of flexibility

1.2.4.8 If the medical Standards prescribed in Chapter 6 for a particular licence are not met, the appropriate Medical Assessment shall not be issued or renewed unless the following conditions are fulfilled:

- a) accredited medical conclusion indicates that in special circumstances the applicant's failure to meet any requirement, whether numerical or otherwise, is such that exercise of the privileges of the licence applied for is not likely to jeopardize flight safety;
- b) relevant ability, skill and experience of the applicant and operational conditions have been given due consideration; and
- c) the licence is endorsed with any special limitation or limitations when the safe performance of the licence holder's duties is dependent on compliance with such limitation or limitations.

The provision of a degree of flexibility must not lead to a situation where its use becomes the rule rather than the exception. Annex 1, 1.2.4.8 has been worded to make it clear that flexibility may be exercised only in the exceptional case. Failure to observe this requirement could result in routine approval of individuals not meeting specific medical requirements, such as visual standards, thus creating an abuse of the primary object of flexibility. When evidence accumulates that flexibility is being utilized repeatedly in a particular respect, then the appropriateness of regulations defining the medical requirements comes into question and the suspicion is raised that the regulations define a requirement which is not in keeping with the demands of flight safety. However, when decisions to exercise flexibility are backed by an accredited medical conclusion, it indicates that these decisions have not been regarded as a routine measure but that they have been taken following close examination and assessment of all the medical facts and their relationship to occupational demands and personal performance. The degree and intensity of investigation lying behind each decision accurately measures compliance with the principles behind the flexibility Standard.

The just and safe exercise of flexibility should be confined to the exceptional case and it ought to be considered in relation to the expertise of those concerned in applying Annex 1, 1.2.4.8. As a consequence "accredited medical conclusion" is a basic concept and has been specifically defined in Annex 1 as "the conclusion reached by one or more medical experts acceptable to the Licensing Authority for the purposes of the case concerned, in consultation with flight operations or other experts as necessary". The estimation of risk imposed by the individual upon flight safety is a most difficult task and one often requiring experts in a number of aspects of both medicine and aviation. Decisions should recognize that public interest and safety is the statutory basis for personnel licensing.

Medical deficiency compensation and flight safety

Where a medical deficiency exists, the extent to which flight safety is affected is the vital factor, rather than the extent to which failure to attain the medical requirements is capable of being compensated. In some cases the question of compensation for a deficiency will be irrelevant, for example where the risk is one of sudden incapacitation rather than inability to physically carry out a required task. In other cases, the ability to compensate, for example, for an orthopaedic dysfunction may be an important factor in the over-all assessment of the effect on flight safety. Previously acquired skill and experience may similarly be irrelevant or important to the over-all assessment of the safety risk.

Society and the individual

Many societies have a concept of individual rights such that if the exercise of those rights does not involve public safety, the individual may decide whether or not to incur a personal risk. In the context of flight, the right of an individual to incur a personal risk can rarely be accepted because of possible effects on flight or public safety. A possible exception may be the private pilot who carries no passengers, flying in an isolated area.

Knowledge and techniques are advancing rapidly in both medicine and aviation. The medical assessor and his advisers must be aware of these advances in reaching their decisions but must avoid the

appearance of gathering experience through trial and error in the exercise of the flexibility Standard. Annex 1 Standards and Recommended Practices are not irrevocably permanent and can be amended by constitutional means in ICAO when it is clearly necessary to do so. While they are in force they must be adhered to unless it is demonstrably safe to exercise flexibility and where serious injustice to an individual would otherwise result.

The provisions of Annex 1 show that differing assessments are permissible and possible by defining different requirements dependent upon anticipated duties and the category of aviation involved. Society's concern in flight safety varies according to each individual's contact with air transportation. Those who travel as fare-paying passengers in aircraft of commercial air transport operators, those who travel by private aircraft, those whose main duty is the ground control and movement of aircraft, and those over whose property aircraft operate, all show different concern. The accident rate in commercial aircraft operations, although of a low order, invariably elicits public concern quite out of proportion to the apparent lack of dismay at the record of road traffic accidents. The public adopts an attitude towards the commercial air transport operator that automatically demands and expects the highest possible standard of care and efficiency towards those who pay for their service as air carriers. This is understandable when it is remembered that individual passengers generally have no choice or bargaining power in selecting their aircraft, flight crew or flight path. Air transport operators have accepted the duty of performing all their services with the highest possible degree of safety and the public does not overlook apparent lapses in the exercise of this duty. For this reason, if for no other, the regulations applied by Contracting States must be shown to attain the object for which they were devised and the making of exceptions under a clause such as 1.2.4.8 of Annex 1 can only be done by bearing in mind fully the flight safety aspect in its widest context.

The terms “waiver” and “flexibility”

Annex 1, 1.2.4.8 is a Standard but is frequently referred to as the “waiver clause”, and the term “medical waiver” in connection with medical certification and licensing is generally accepted. The use of the term “waiver”, which in legal usage means “an act of dispensing with a requirement”, and the verb “to waive” which is defined as “not to insist upon”, “to ignore, neglect or disregard”, “to refrain from applying or enforcing (a rule etc.) or “to make an exception”, is unfortunate.

In fact the correct exercise of “flexibility” as described in 1.2.4.8 is quite the opposite of “waiver” because the decision to apply the clause is only reached after subjecting the individual involved to a critical analysis, possibly involving detailed personal examination together with deliberations by those who formulate the “accredited medical conclusion” and the decision of the Licensing Authority. What Annex 1, 1.2.4.8, sets out to achieve is not the dismissal of a deficiency or discrepancy, but establishment of the fact that allowing a particular individual to exercise the privileges of a licence with or without the imposition of certain limitations on his activities will not be incompatible with the requirements of flight safety. Consequently, the issuance of a licence based on a Medical Assessment following an accredited medical conclusion under the provisions of paragraph 1.2.4.8 does not constitute a departure from the international Standards and Recommended Practices, and no endorsement of the license is required under article 39 b) of the *Convention on International Civil Aviation*.

The Licensing Authority and accredited medical conclusion

1.2.4.4 Contracting States shall designate medical examiners, qualified and licensed in the practice of medicine, to conduct medical examinations of fitness of applicants for the issue or renewal of the licences or ratings specified in Chapters 2 and 3, and of the appropriate licences specified in Chapter 4.

1.2.4.4.1 Medical examiners shall have received training in aviation medicine and shall receive refresher training at regular intervals. Before designation, medical examiners shall demonstrate adequate competency in

aviation medicine.

1.2.4.4.2 Medical examiners shall have practical knowledge and experience of the conditions in which the holders of licences and ratings carry out their duties.

Note.— Examples of practical knowledge and experience are flight experience, simulator experience, on-site observation or any other hands-on experience deemed by the Licensing Authority to meet this requirement.

...

1.2.4.7 Contracting States shall use the services of medical assessors to evaluate reports submitted to the Licensing Authorities by medical examiners.

1.2.4.7.1 The medical examiner shall be required to submit sufficient medical information to the Licensing Authority to enable the Authority to audit Medical Assessments.

Note.— The purpose of such auditing is to ensure that medical examiners meet applicable standards for good practice.

Medical examiners designated by Contracting States are authorized to conduct examinations for the assessment of medical fitness. When the medical requirements are not met, it is the duty of the Licensing Authority concerned to take any necessary steps. The medical examiner is called upon to exercise clinical judgement based upon a careful review of the medical history and a thorough examination of the applicant. The examiner shall report to the Licensing Authority any individual case where, in the examiner's judgement, an applicant's failure to meet the medical requirements does not adversely affect safety, with due consideration given to any relevant ability, skill and experience. The final decision must be left with the Licensing Authority which is ultimately responsible for flight safety. This authority either has an aviation medical section with permanent medical advisers – medical assessors – or an administrative machinery for obtaining expert aviation medical advice on individual cases from external medical assessors. Either method meets the requirements of paragraph 1.2.4.7 of Annex 1 and provides the “accredited medical conclusion” as defined in paragraph 1.2.4.8 of Annex 1. The decision of a Licensing Authority to exercise the “flexibility” clause of Annex 1 should be documented in each individual case and it should show how a particular decision was arrived at by means of the accredited medical conclusion.

Steps should be taken to gather information on the number of instances where flexibility is exercised and on the clinical conditions to which the clause is applied. Contracting States have been encouraged to furnish ICAO with information, periodically, on the application of the “flexibility” clause to applicants for initial issue and renewal of a licence, with particular reference to the paragraph in Annex 1 to which the provisions of 1.2.4.8 have been applied and the reason for such a decision.

In the course of decision making, it is frequently necessary to resort to other sources of information, such as contributions from flight managers, employers, the family physician and, occasionally, members of the family.

Whereas the standard medical examination procedures will normally provide all of the data required by the medical examiner or the medical assessor of the Licensing Authority to take a decision on the applicant's fitness, occasionally more sophisticated tests will be required to enable an informed decision to be made. The content of individual special examinations may very largely be determined by the specialist who is carrying out the investigation, usually in consultation with the medical assessor of the Licensing Authority.

Whenever possible, the risk of in-flight incapacitation, caused by an existing and diagnosed medical condition, should be estimated as an annual percentage risk. This is particularly important when expert

medical advice is sought from medical specialists without aviation medicine training and experience. In such cases, every effort should be made to have the specialist evaluation expressed as an annual percentage risk of recurrence, exacerbation, etc.

Whilst the expression of risk of in-flight incapacitation in numerical terms is not always easy to determine, particularly for conditions that are uncommon, for a number of conditions such as certain cardiovascular diseases, good data exist concerning the risk of a future related event. Many States have determined that an acceptable risk of incapacitation for a professional pilot operating a multi-pilot aircraft is one per cent per annum; some States even accept two per cent per annum. Where possible, ICAO encourages the use of objective risk assessment for aeromedical fitness decisions as this acknowledges the fact that zero risk is unattainable and provides a benchmark that protects flight safety and at the same time is fair and transparent to the affected pilot. An acceptable level of risk can be developed by a regulatory authority together with pilot representative bodies, thus providing the flying community with some input into the decision-making process. The widespread adoption of such an approach would improve global harmonization of aeromedical decisions. In this manual, an incapacitation risk of no greater than 1% per annum has been taken as the basis for providing guidance on aeromedical fitness for professional pilots operating multi-pilot aircraft. This is a relatively conservative figure and States that are familiar with such risk assessments may wish to use a higher figure as their benchmark. However, for States not used to such an approach, the “1% Rule” is reasonable. Further discussion of the “1% Rule” is in Part I Chapter 3.

Demonstration of the existence of a functional reserve would be an index of its importance in the prognosis when the medical deficiency is considered to be relatively static and not subject to sudden or insidious adverse changes.

The Licensing Authority should have resources or should have arrangements to permit special practical testing. One example is the medical flight test to allow an amputee to demonstrate his skill and competence in adapting to the use of a prosthesis. If such an applicant has previously held a licence, it is advantageous to conduct the subsequent flight test in an aircraft type with which the applicant is familiar. It may be necessary, when flight competence has been demonstrated, to restrict the applicant to operating the type of aircraft in which the applicant has demonstrated competence.

Medical flights or other practical tests can be utilized in a number of fields such as with applicants having certain vision deficiencies (e.g. monocularity) or defective hearing. In these cases, the presence of a medically qualified pilot on the check flight can add greatly to the value of the subsequent reports.

Licence limitations

It should be noted that Annex 1 does allow for medical Standards to relate to the specific duties that may be undertaken by an individual licence-holder. This is indicated by relevant statements that appear in the Annex text referring to safe operation of an aircraft or to safe performance of duties while exercising the privileges of the licence. It follows that an applicant who has been assessed as unfit for one duty may be found fit for another and it is possible to envisage a Licensing Authority deciding that an individual would be precluded from flying as a pilot while being judged capable of safely exercising the privileges of a flight engineer’s licence.

It is evident that many such possible operational restrictions exist but they should only be established after consultation with flight operations experts. An applicant may be found fit to operate an aircraft as a pilot under supervision or as a co-pilot but not as a pilot-in-command. In cases where prognosis cannot be given with the necessary degree of certainty, any potential risk to flight safety may, in general aviation where two pilots are not normally required, be mitigated by a restriction to fly without passengers or outside controlled airspace only or neutralized by the carriage of a “safety pilot”. Such a pilot should receive adequate information about the medical condition which has led to the restriction “with safety

pilot only”. In addition, he must be capable of acting as pilot-in-command in case of an emergency. In commercial aviation, a restriction to multi-crew operations only may serve a similar purpose. In such a manner it is often possible to fit individuals into aviation by restricting their licence or limiting their duties and thus mitigating the risk to flight safety while retaining the experience of individuals who would otherwise be denied a licence.

1.2.5.2.1 The period of validity of a Medical Assessment may be reduced when clinically indicated.

Annex 1, 1.2.5.2, sets out a table listing the normal maximum time intervals between medical examinations for continued validity of a range of licences. The following Standard 1.2.5.2.1 allows the Licensing Authority to require an individual to be medically re-examined at more frequent intervals. In many cases, however, progress reports on an individual at intervals during the period of validity of his licence will suffice, thus making a complete medical certification examination unnecessary. Sometimes it may be relevant to observe the applicant on the flight deck or in a synthetic flight trainer. In such cases, it is important to obtain the co-operation of operators and qualified flying instructors. It is entirely possible, by utilizing advice from experienced specialists and/or accredited medical conclusion, to introduce some flexibility into the process without degrading the intent of the medical standards in Annex 1. While this would require an additional effort from the Licensing Authority, it could provide a continuing and critical analysis of the existing medical requirements and could show whether they achieve their purpose. Moreover, it will extend the careers of those who are professionally employed and enable an increasing number of motivated individuals to achieve their ambition to fly while, at the same time, avoiding any compromise of flight safety.

SAMPLE PROCEDURES FOR EVALUATION OF BORDERLINE CERTIFICATION CASES

Sample medical flight tests

Borderline medical conditions should first be referred to a specialist for a thorough investigation as outlined in the following chapters of this manual. This should include an evaluation of whether or not the condition is progressive, to what extent function is impaired, and whether there is any risk of future deterioration or sudden incapacitation. If the applicant fails to meet the medical requirements but the condition, in the examiner’s opinion, does not affect the regular and safe performance of duties, the Licensing Authority might wish additionally to assess any skill and experience demonstrated during practical flight tests, in order to make certain that the applicant is capable of performing duties without endangering flight safety.

Special medical flight testing, appropriate to the applicant’s deficiencies, is conducted to help the Licensing Authority estimate the applicant’s ability to perform under normal as well as adverse flight conditions. Therefore, testing of the applicant could include marginal or simulated marginal conditions such as might be encountered in emergency operations, in adverse weather, in twilight or at night, in haze or cloudiness, and in flight towards the sun as appropriate to the condition being assessed.

The flight test report should comment on the conditions under which tests were given.

Reasonable simultaneous tasks should be introduced during medical flight testing (such as map reading and navigation, operation of flight equipment, maintenance of communications, and even equipment or engine malfunction) to estimate the applicant’s ability to perform more than one task simultaneously.

Specifications for such special medical flight tests provide guidelines to help in determining the applicant's abilities and limitations. Where the applicant's abilities are compared to those of the flight examiner, it is assumed that the relevant flight examiner's physical attributes are normal. If not, the applicant should be reassigned to another flight examiner.

All of the medical flight test items should be observed and assessed by the flight examiner, but additional tests may be added as deemed necessary at the time of the testing. A medical flight test should be conducted when assessing borderline cases described below. The descriptions apply mainly to general aviation pilots but the same principles are relevant to professional pilot operations.

Deformity or absence of extremities

An applicant might be assessed as fit if able to demonstrate:

- a) Ability to reach readily and operate effectively all controls that would normally require use of the deficient extremity (or extremities), noting any unusual body position required to compensate for the defect.
- b) Ability to perform satisfactorily emergency procedures in flight, such as recovery from stalls and power-off control, as well as on the ground, including evacuation of the aircraft.

Defective hearing

Defects in hearing would not normally necessitate tests under actual flight conditions since all pertinent factors may be readily simulated. Whether conducted on the ground or in flight conditions, the main considerations to be assessed in such cases are:

- a) Ability to hear radio voice and signal communications.
- b) Ability to understand ordinary conversational voice on the ground, in the cockpit with engine on and engine off. (The examiner should guard against the applicant lip-reading.)

Speech defects – stammering, stuttering

An applicant might be assessed as fit, if able to demonstrate ability to converse and be clearly understood in direct conversation and over the radio.

Visual deficiencies

The following circumstances represent some of the typical conditions defining the visual abilities required of a general aviation pilot. Possession of these abilities by an applicant or the applicant's inability to meet the required level of proficiency may be established by simulation or, more realistically, in actual flight conditions. In either case, the ability of an applicant to perform specified tasks is a practical requirement which is not easily established by a conventional test. Suggested testing procedures may determine the following:

- a) Ability to select emergency landing fields from a distance, preferably over unfamiliar terrain and from high altitude.
- b) Ability to undertake simulated forced landings in difficult fields. Note the manner of approach, rate of descent, and comparative distance at which obstructions (stumps, boulders, ditches) are recognized.

- c) Ability to recognize other aircraft approaching on a collision course (possibly by pre-arrangement), especially aircraft approaching from the far right or far left.
- d) Ability to judge distances (compared with the examiner's judgement), such as distance from other aircraft and from the ground, and to recognize landmarks at the limit of the examiner's vision.
- e) Manner in which landings are made, including crosswind landings.
- f) Ability to read aeronautical maps in flight and to tune the radio on a predetermined station accurately and quickly.
- g) Ability to read instrument panels quickly and correctly (including overhead panel, if any).

Additional colour perception tests

An applicant failing to obtain a satisfactory score when tested with pseudo-isochromatic plates may nevertheless be assessed as fit, as specified in Annex 1, 6.2.4.4, provided the applicant is able to readily distinguish the colours used in air navigation and correctly identify aviation coloured lights. This can be tested, usually for aviation red, green and white light, by means of a colour perception lantern recognized by the Licensing Authority. Failure of the applicant to name each colour correctly *within the time during which the light is being shown* (usually about four seconds) shall indicate failure of the test. Several such lanterns are in use in States.

Additional diagnostic testing may be carried out by anomaloscopy.

Medical flight test reports

All results of special medical flight tests should be reported to the Licensing Authority. The report should include information about:

- a) deficiency, test and recommendations;
- b) any additional procedures deemed necessary by the examiner;
- c) any physical attributes of the examiner relevant to comparison of the examiner's abilities with those of the applicant;
- d) marginal or simulated marginal conditions for the test;
- e) the applicant's susceptibility to distraction caused by simultaneous tasks; and
- f) any recommended operating limitations for the licence concerned or, alternatively, the fact that no limitations are required.

ATTACHMENT A
ANNEX 1 - PERSONNEL LICENSING,
CHAPTER 6 (tenth edition)

CHAPTER 6. MEDICAL PROVISIONS FOR LICENSING

Note 1.— The Standards and Recommended Practices established in this chapter cannot, on their own, be sufficiently detailed to cover all possible individual situations. Of necessity, many decisions relating to the evaluation of medical fitness must be left to the judgement of the individual medical examiner. The evaluation must, therefore, be based on a medical examination conducted throughout in accordance with the highest standards of medical practice.

Note 2.— Predisposing factors for disease, such as obesity and smoking, may be important for determining whether further evaluation or investigation is necessary in an individual case.

Note 3.— In cases where the applicant does not fully meet the medical requirements and in complicated and unusual cases, the evaluation may have to be deferred and the case submitted to the medical assessor of the Licensing Authority for final evaluation. In such cases due regard must be given to the privileges granted by the licence applied for or held by the applicant for the Medical Assessment, and the conditions under which the licence holder is going to exercise those privileges in carrying out assigned duties.

Note 4.— Attention is called to the administrative clause in 1.2.4.8 dealing with accredited medical conclusion.

Note 5.— Guidance material to assist Licensing Authorities and medical examiners is published separately in the Manual of Civil Aviation Medicine (Doc 8984). This guidance material also contains a discussion of the terms “likely” and “significant” as used in the context of the medical provisions in Chapter 6.

6.1 Medical Assessments — General

6.1.1 Classes of Medical Assessment

Three classes of Medical Assessment shall be established as follows:

a) Class 1 Medical Assessment;

applies to applicants for, and holders of:

- commercial pilot licences — aeroplane, airship, helicopter and powered-lift
- multi-crew pilot licences — aeroplane
- airline transport pilot licences — aeroplane, helicopter and powered-lift

b) Class 2 Medical Assessment;

applies to applicants for, and holders of:

- flight navigator licences
- flight engineer licences
- private pilot licences — aeroplane, airship, helicopter and powered-lift
- glider pilot licences
- free balloon pilot licences

c) Class 3 Medical Assessment;

applies to applicants for, and holders of:

- air traffic controller licences.

6.1.2 The applicant for a Medical Assessment shall provide the medical examiner with a personally certified statement of medical facts concerning personal, familial and hereditary history. The applicant shall be made aware of the necessity for giving a statement that is as complete and accurate as the applicant’s knowledge permits, and any false statement shall be dealt with in accordance with 1.2.4.5.1.

6.1.3 The medical examiner shall report to the Licensing Authority any individual case where, in the examiner’s judgement, an applicant’s failure to meet any requirement, whether numerical or otherwise, is such that exercise of the privileges of the licence being applied for, or held, is not likely to jeopardize flight safety (1.2.4.8).

6.1.4 The requirements to be met for the renewal of a Medical Assessment are the same as those for the initial assessment except where otherwise specifically stated.

Note.— The intervals between routine medical examinations for the purpose of renewing Medical Assessments are specified in 1.2.5.2.

6.2 Requirements for Medical Assessments

6.2.1 General

An applicant for a Medical Assessment issued in accordance with the terms of 1.2.4.1 shall undergo a medical examination based on the following requirements:

- a) physical and mental;
- b) visual and colour perception; and
- c) hearing.

6.2.2 Physical and mental requirements

An applicant for any class of Medical Assessment shall be required to be free from:

- a) any abnormality, congenital or acquired; or
- b) any active, latent, acute or chronic disability; or
- c) any wound, injury or sequelae from operation; or
- d) any effect or side-effect of any prescribed or non-prescribed therapeutic, diagnostic or preventive medication taken;

such as would entail a degree of functional incapacity which is likely to interfere with the safe operation of an aircraft or with the safe performance of duties.

Note.— Use of herbal medication and alternative treatment modalities requires particular attention to possible side-effects.

6.2.3 Visual acuity test requirements

6.2.3.1 The methods in use for the measurement of visual acuity are likely to lead to differing evaluations. To achieve uniformity, therefore, Contracting States shall ensure that equivalence in the methods of evaluation be obtained.

6.2.3.2 **Recommendation.**— *The following should be adopted for tests of visual acuity:*

- a) *Visual acuity tests should be conducted in an environment with a level of illumination that corresponds to ordinary office illumination (30-60 cd/m²).*
- b) *Visual acuity should be measured by means of a series of Landolt rings or similar optotypes, placed at a distance from the applicant appropriate to the method of testing adopted.*

6.2.4 Colour perception requirements

6.2.4.1 Contracting States shall use such methods of examination as will guarantee reliable testing of colour perception.

6.2.4.2 The applicant shall be required to demonstrate the ability to perceive readily those colours the perception of which is necessary for the safe performance of duties.

6.2.4.3 The applicant shall be tested for the ability to correctly identify a series of pseudoisochromatic plates in daylight or in artificial light of the same colour temperature such as that provided by CIE standard illuminants C or D₆₅ as specified by the International Commission on Illumination (CIE).

6.2.4.4 An applicant obtaining a satisfactory result as prescribed by the Licensing Authority shall be assessed as fit. An applicant failing to obtain a satisfactory result in such a test shall be assessed as unfit unless able to readily distinguish the colours used in air navigation and correctly identify aviation coloured lights. Applicants who fail to meet these criteria shall be assessed as unfit except for Class 2 assessment with the following restriction: valid daytime only.

Note.— Guidance on suitable methods of assessing colour vision is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.2.4.4.1 **Recommendation.**— *Sunglasses worn during the exercise of the privileges of the licence or rating held should be non-polarizing and of a neutral grey tint.*

6.2.5 Hearing test requirements

6.2.5.1 Contracting States shall use such methods of examination as will guarantee reliable testing of hearing.

6.2.5.2 Applicants shall be required to demonstrate a hearing performance sufficient for the safe exercise of their licence and rating privileges.

6.2.5.3 Applicants for Class 1 Medical Assessments shall be tested by pure-tone audiometry at first issue of the Assessment, not less than once every five years up to the age of 40 years, and thereafter not less than once every two years.

6.2.5.3.1 Alternatively, other methods providing equivalent results may be used.

6.2.5.4 Applicants for Class 3 Medical Assessments shall be tested by pure-tone audiometry at first issue of the Assessment, not less than once every four years up to the age of 40 years, and thereafter not less than once every two years.

6.2.5.4.1 Alternatively, other methods providing equivalent results may be used.

6.2.5.5 **Recommendation.**— *Applicants for Class 2 Medical Assessment should be tested by pure-tone audiometry at first issue of the Assessment and, after the age of 50 years, not less than once every two years.*

6.2.5.6 At medical examinations, other than those mentioned in 6.2.5.3, 6.2.5.4 and 6.2.5.5, where audiometry is not performed, applicants shall be tested in a quiet room by whispered and spoken voice tests.

Note 1.— The reference zero for calibration of pure-tone audiometers is that of the pertinent Standards of the current edition of the Audiometric Test Methods, published by the International Organization for Standardization (ISO).

Note 2.— For the purpose of testing hearing in accordance with the requirements, a quiet room is a room in which the intensity of the background noise is less than 35 dB(A).

Note 3.— For the purpose of testing hearing in accordance with the requirements, the sound level of an average conversational voice at 1 m from the point of output (lower lip of the speaker) is c. 60 dB(A) and that of a whispered voice c. 45dB(A). At 2 m from the speaker, the sound level is 6 dB(A) lower.

Note 4.— Guidance on assessment of applicants who use hearing aids is contained in the Manual of Civil Aviation Medicine (Doc 8984).

Note 5.— Attention is called to 2.7.1.3.1 on requirements for the issue of instrument rating to applicants who hold a private pilot licence.

6.3 Class 1 Medical Assessment

6.3.1 Assessment issue and renewal

6.3.1.1 An applicant for a commercial pilot licence — aeroplane, airship, helicopter or powered-lift, a multi-crew pilot licence — aeroplane, or an airline transport pilot licence — aeroplane, helicopter or powered-lift shall undergo an initial medical examination for the issue of a Class 1 Medical Assessment.

6.3.1.2 Except where otherwise stated in this section, holders of commercial pilot licences — aeroplane, airship, helicopter or powered-lift, multi-crew pilot licences — aeroplane, or airline transport pilot licences — aeroplane, helicopter or powered-lift shall have their Class 1 Medical Assessments renewed at intervals not exceeding those specified in 1.2.5.2.

6.3.1.3 When the Licensing Authority is satisfied that the requirements of this section and the general provisions of 6.1 and 6.2 have been met, a Class 1 Medical Assessment shall be issued to the applicant.

6.3.2 Physical and mental requirements

6.3.2.1 The applicant shall not suffer from any disease or disability which could render that applicant likely to become suddenly unable either to operate an aircraft safely or to perform assigned duties safely.

6.3.2.2 The applicant shall have no established medical history or clinical diagnosis of:

- a) an organic mental disorder;
- b) a mental or behavioural disorder due to use of psychoactive substances; this includes dependence syndrome induced by alcohol or other psychoactive substances;
- c) schizophrenia or a schizotypal or delusional disorder;
- d) a mood (affective) disorder;
- e) a neurotic, stress-related or somatoform disorder;
- f) a behavioural syndrome associated with physiological disturbances or physical factors;
- g) a disorder of adult personality or behaviour, particularly if manifested by repeated overt acts;
- h) mental retardation;
- i) a disorder of psychological development;
- j) a behavioural or emotional disorder, with onset in childhood or adolescence; or
- k) a mental disorder not otherwise specified;

such as might render the applicant unable to safely exercise the privileges of the licence applied for or held.

Note.— Mental and behavioural disorders are defined in accordance with the clinical descriptions and diagnostic guidelines of the World Health Organization as given in the International Statistical Classification of Diseases and Related Health Problems, 10th Edition — Classification of Mental and Behavioural Disorders, WHO 1992. This document contains detailed descriptions of the diagnostic requirements, which may be useful for their application to medical assessment.

6.3.2.3 The applicant shall have no established medical history or clinical diagnosis of any of the following:

- a) a progressive or non-progressive disease of the nervous system, the effects of which are likely to interfere with the safe exercise of the applicant's licence and rating privileges;
- b) epilepsy; or
- c) any disturbance of consciousness without satisfactory medical explanation of cause.

6.3.2.4 The applicant shall not have suffered any head injury, the effects of which are likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.3.2.5 The applicant shall not possess any abnormality of the heart, congenital or acquired, which is likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.3.2.5.1 An applicant who has undergone coronary bypass grafting or angioplasty (with or without stenting) or other cardiac intervention or who has a history of myocardial infarction or who suffers from any other potentially incapacitating cardiac condition shall be assessed as unfit unless the applicant's cardiac condition has been investigated and evaluated in accordance with best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

6.3.2.5.2 An applicant with an abnormal cardiac rhythm shall be assessed as unfit unless the cardiac arrhythmia has been investigated and evaluated in accordance with best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

Note.— *Guidance on cardiovascular evaluation is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.3.2.6 Electrocardiography shall form part of the heart examination for the first issue of a Medical Assessment.

6.3.2.6.1 Electrocardiography shall be included in re-examinations of applicants over the age of 50 no less frequently than annually.

6.3.2.6.2 **Recommendation.**— *Electrocardiography should be included in re-examinations of applicants between the ages of 30 and 50 no less frequently than every two years.*

Note 1.— *The purpose of routine electrocardiography is case finding. It does not provide sufficient evidence to justify disqualification without further thorough cardiovascular investigation.*

Note 2.— *Guidance on resting and exercise electrocardiography is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.3.2.7 The systolic and diastolic blood pressures shall be within normal limits.

6.3.2.7.1 The use of drugs for control of high blood pressure shall be disqualifying except for those drugs, the use of which is compatible with the safe exercise of the applicant's licence and rating privileges.

Note.— *Guidance on the subject is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.3.2.8 There shall be no significant functional nor structural abnormality of the circulatory system.

6.3.2.9 There shall be no acute disability of the lungs nor any active disease of the structures of the lungs, mediastinum or pleurae likely to result in incapacitating symptoms during normal or emergency operations.

6.3.2.9.1 **Recommendation.**— *Chest radiography should form part of the initial examination.*

Note.— *Periodic chest radiography is usually not necessary but may be a necessity in situations where asymptomatic pulmonary disease can be expected.*

6.3.2.10 Applicants with chronic obstructive pulmonary disease shall be assessed as unfit unless the applicant's condition has been investigated and evaluated in accordance with best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

6.3.2.11 Applicants with asthma causing significant symptoms or likely to cause incapacitating symptoms during normal or emergency operations shall be assessed as unfit.

6.3.2.11.1 The use of drugs for control of asthma shall be disqualifying except for those drugs, the use of which is compatible with the safe exercise of the applicant's licence and rating privileges.

Note.— *Guidance on hazards of medication and drugs is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.3.2.12 Applicants with active pulmonary tuberculosis shall be assessed as unfit.

6.3.2.12.1 Applicants with quiescent or healed lesions which are known to be tuberculous, or are presumably tuberculous in origin, may be assessed as fit.

Note 1.— *Guidance on assessment of respiratory diseases is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

Note 2.— *Guidance on hazards of medications and drugs is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.3.2.13 Applicants with significant impairment of function of the gastrointestinal tract or its adnexa shall be assessed as unfit.

6.3.2.13.1 Applicants shall be completely free from those hernias that might give rise to incapacitating symptoms.

6.3.2.14 Applicants with sequelae of disease of, or surgical intervention on, any part of the digestive tract or its adnexa, likely to cause incapacitation in flight, in particular any obstruction due to stricture or compression, shall be assessed as unfit.

6.3.2.14.1 **Recommendation.**— *An applicant who has undergone a major surgical operation on the biliary passages or the digestive tract or its adnexa with a total or partial excision or a diversion of any of these organs should be assessed as unfit until such time as the medical assessor, having access to the details of the operation concerned, considers that the effects of the operation are not likely to cause incapacitation in flight.*

6.3.2.15 Applicants with metabolic, nutritional or endocrine disorders that are likely to interfere with the safe exercise of their licence and rating privileges shall be assessed as unfit.

6.3.2.16 Applicants with insulin-treated diabetes mellitus shall be assessed as unfit.

6.3.2.16.1 Applicants with non-insulin-treated diabetes mellitus shall be assessed as unfit unless the condition is shown to be satisfactorily controlled by diet alone or by diet combined with oral anti-diabetic medication, the use of which is compatible with the safe exercise of the applicant's licence and rating privileges.

Note.— Guidance on assessment of diabetic applicants is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.3.2.17 Applicants with diseases of the blood and/or the lymphatic system shall be assessed as unfit unless adequately investigated and their condition found unlikely to interfere with the safe exercise of their licence and rating privileges.

Note.— Sickle cell trait or other haemoglobinopathic traits are usually compatible with a fit assessment.

6.3.2.18 Applicants with renal or genito-urinary disease shall be assessed as unfit, unless adequately investigated and their condition found unlikely to interfere with the safe exercise of their licence and rating privileges.

6.3.2.18.1 Urine examination shall form part of the medical examination and abnormalities shall be adequately investigated.

Note.— Guidance on urine examination and evaluation of abnormalities is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.3.2.19 Applicants with sequelae of disease of or surgical procedures on the kidneys or the genito-urinary tract, in particular obstructions due to stricture or compression, shall be assessed as unfit unless the applicant's condition has been investigated and evaluated in accordance with best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

6.3.2.19.1 Applicants who have undergone nephrectomy shall be assessed as unfit unless the condition is well compensated.

6.3.2.20 Applicants with acquired immunodeficiency syndrome (AIDS) shall be assessed as unfit.

6.3.2.20.1 Applicants who are seropositive for human immunodeficiency virus (HIV) shall be assessed as unfit unless full investigation provides no evidence of clinical disease.

Note 1.— Evaluation of applicants who are seropositive for human immunodeficiency virus (HIV) requires particular attention to their mental state, including the psychological effects of the diagnosis.

Note 2.— Guidance on the assessment of applicants who are seropositive for human immunodeficiency virus (HIV) is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.3.2.21 Applicants with gynaecological disorders that are likely to interfere with the safe exercise of their licence and rating privileges shall be assessed as unfit.

6.3.2.22 Applicants who are pregnant shall be assessed as unfit unless obstetrical evaluation and continued medical supervision indicate a low-risk uncomplicated pregnancy.

6.3.2.22.1 **Recommendation.**— *For applicants with a low-risk uncomplicated pregnancy, evaluated and supervised in accordance with 6.3.2.22, the fit assessment should be limited to the period from the end of the 12th week until the end of the 26th week of gestation.*

6.3.2.23 Following confinement or termination of pregnancy, the applicant shall not be permitted to exercise the privileges of her licence until she has undergone re-evaluation in accordance with best medical practice and it has been determined that she is able to safely exercise the privileges of her licence and ratings.

6.3.2.24 The applicant shall not possess any abnormality of the bones, joints, muscles, tendons or related structures which is likely to interfere with the safe exercise of the applicant's licence and rating privileges.

Note.— Any sequelae after lesions affecting the bones, joints, muscles or tendons, and certain anatomical defects will normally require functional assessment to determine fitness.

6.3.2.25 The applicant shall not possess any abnormality or disease of the ear or related structures which is likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.3.2.26 There shall be:

- a) no disturbance of vestibular function;
- b) no significant dysfunction of the Eustachian tubes; and
- c) no unhealed perforation of the tympanic membranes.

6.3.2.26.1 A single dry perforation of the tympanic membrane need not render the applicant unfit.

Note.— Guidance on testing of the vestibular function is contained in Manual of Civil Aviation Medicine (Doc 8984).

6.3.2.27 There shall be:

- a) no nasal obstruction; and
- b) no malformation nor any disease of the buccal cavity or upper respiratory tract

which is likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.3.2.28 Applicants with stuttering or other speech defects sufficiently severe to cause impairment of speech communication shall be assessed as unfit.

6.3.3 Visual requirements

The medical examination shall be based on the following requirements.

6.3.3.1 The function of the eyes and their adnexa shall be normal. There shall be no active pathological condition, acute or chronic, nor any sequelae of surgery or trauma of the eyes or their adnexa likely to reduce proper visual function to an extent that would interfere with the safe exercise of the applicant's licence and rating privileges.

6.3.3.2 Distant visual acuity with or without correction shall be 6/9 or better in each eye separately, and binocular visual acuity shall be 6/6 or better. No limits apply to uncorrected visual acuity. Where this standard of visual acuity can be obtained only with correcting lenses, the applicant may be assessed as fit provided that:

- a) such correcting lenses are worn during the exercise of the privileges of the licence or rating applied for or held; and
- b) in addition, a pair of suitable correcting spectacles is kept readily available during the exercise of the privileges of the applicant's licence.

Note 1.— 6.3.3.2 b) is the subject of Standards in Annex 6, Part I.

Note 2.— An applicant accepted as meeting these provisions is deemed to continue to do so unless there is reason to suspect otherwise, in which case an ophthalmic report is required at the discretion of the Licensing Authority. Both uncorrected and corrected visual acuity are normally measured and recorded at each re-examination. Conditions which indicate a need to obtain an ophthalmic report include: a substantial decrease in the uncorrected visual acuity, any decrease in best corrected visual acuity, and the occurrence of eye disease, eye injury or eye surgery.

6.3.3.2.1 Applicants may use contact lenses to meet this requirement provided that:

- a) the lenses are monofocal and non-tinted;
- b) the lenses are well tolerated; and
- c) a pair of suitable correcting spectacles is kept readily available during the exercise of the licence privileges.

Note.— Applicants who use contact lenses may not need to have their uncorrected visual acuity measured at each re-examination provided the history of their contact lens prescription is known.

6.3.3.2.2 Applicants with a large refractive error shall use contact lenses or high-index spectacle lenses.

Note.— If spectacles are used, high-index lenses are needed to minimize peripheral field distortion.

6.3.3.2.3 Applicants whose uncorrected distant visual acuity in either eye is worse than 6/60 shall be required to provide a full ophthalmic report prior to initial Medical Assessment and every five years thereafter.

Note 1.— The purpose of the required ophthalmic examination is (1) to ascertain normal visual performance, and (2) to identify any significant pathology.

Note 2.— Guidance on the assessment of monocular applicants under the provisions of 1.2.4.8 is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.3.3.3 Applicants who have undergone surgery affecting the refractive status of the eye shall be assessed as unfit unless they are free from those sequelae which are likely to interfere with the safe exercise of their licence and rating privileges.

6.3.3.4 The applicant shall have the ability to read, while wearing the correcting lenses, if any, required by 6.3.3.2, the N5 chart or its equivalent at a distance selected by that applicant in the range of 30 to 50 cm and the ability to read the N14 chart or its equivalent at a distance of 100 cm. If this requirement is met only by the use of near correction, the applicant may be assessed as fit provided that this near correction is added to the spectacle correction already prescribed in accordance with 6.3.3.2; if no such correction is prescribed, a pair of spectacles for near use shall be kept readily available during the exercise of the privileges of the licence. When near correction is required, the applicant shall demonstrate that one pair of spectacles is sufficient to meet both distant and near visual requirements.

Note 1.— N5 and N14 refer to the size of typeface used. For further details, see the Manual of Civil Aviation Medicine (Doc 8984).

Note 2.— An applicant who needs near correction to meet this requirement will require “look-over”, bifocal or perhaps multifocal lenses in order to read the instruments and a chart or manual held in the hand, and also to make use of distant vision, through the windscreen, without removing the lenses. Single-vision near correction (full lenses of one power only, appropriate for reading) significantly reduces distant visual acuity and is therefore not acceptable.

Note 3.— Whenever there is a requirement to obtain or renew correcting lenses, an applicant is expected to advise the refractionist of reading distances for the visual flight deck tasks relevant to the types of aircraft in which the applicant is likely to function.

6.3.3.4.1 When near correction is required in accordance with this paragraph, a second pair of near-correction spectacles shall be kept available for immediate use.

6.3.3.5 The applicant shall be required to have normal fields of vision.

6.3.3.6 The applicant shall be required to have normal binocular function.

6.3.3.6.1 Reduced stereopsis, abnormal convergence not interfering with near vision, and ocular misalignment where the fusional reserves are sufficient to prevent asthenopia and diplopia need not be disqualifying.

6.3.4 Hearing requirements

6.3.4.1 The applicant, when tested on a pure-tone audiometer, shall not have a hearing loss, in either ear separately, of more than 35 dB at any of the frequencies 500, 1 000 or 2 000 Hz, or more than 50 dB at 3 000 Hz.

6.3.4.1.1 An applicant with a hearing loss greater than the above may be declared fit provided that the applicant has normal hearing performance against a background noise that reproduces or simulates the masking properties of flight deck noise upon speech and beacon signals.

Note 1.— It is important that the background noise be representative of the noise in the cockpit of the type of aircraft for which the applicant's licence and ratings are valid.

Note 2.— In the speech material for discrimination testing, both aviation-relevant phrases and phonetically balanced words are normally used.

6.3.4.1.2 Alternatively, a practical hearing test conducted in flight in the cockpit of an aircraft of the type for which the applicant's licence and ratings are valid may be used.

6.4 Class 2 Medical Assessment

6.4.1 Assessment issue and renewal

6.4.1.1 An applicant for a private pilot licence — aeroplane, airship, helicopter or powered-lift, a glider pilot licence, a free balloon pilot licence, a flight engineer licence or a flight navigator licence shall undergo an initial medical examination for the issue of a Class 2 Medical Assessment.

6.4.1.2 Except where otherwise stated in this section, holders of private pilot licences — aeroplane, airship, helicopter or powered-lift, glider pilot licences, free balloon pilot licences, flight engineer licences or flight navigator

licences shall have their Class 2 Medical Assessments renewed at intervals not exceeding those specified in 1.2.5.2.

6.4.1.3 When the Licensing Authority is satisfied that the requirements of this section and the general provisions of 6.1 and 6.2 have been met, a Class 2 Medical Assessment shall be issued to the applicant.

6.4.2 Physical and mental requirements

The medical examination shall be based on the following requirements.

6.4.2.1 The applicant shall not suffer from any disease or disability which could render that applicant likely to become suddenly unable either to operate an aircraft safely or to perform assigned duties safely.

6.4.2.2 The applicant shall have no established medical history or clinical diagnosis of:

- a) an organic mental disorder;
- b) a mental or behavioural disorder due to psychoactive substance use; this includes dependence syndrome induced by alcohol or other psychoactive substances;
- c) schizophrenia or a schizotypal or delusional disorder;
- d) a mood (affective) disorder;
- e) a neurotic, stress-related or somatoform disorder;
- f) a behavioural syndrome associated with physiological disturbances or physical factors;
- g) a disorder of adult personality or behaviour, particularly if manifested by repeated overt acts;
- h) mental retardation;
- i) a disorder of psychological development;
- j) a behavioural or emotional disorder, with onset in childhood or adolescence; or
- k) a mental disorder not otherwise specified;

such as might render the applicant unable to safely exercise the privileges of the licence applied for or held.

Note.— Mental and behavioural disorders are defined in accordance with the clinical descriptions and diagnostic guidelines of the World Health Organization as given in the International Statistical Classification of Diseases and Related Health Problems, 10th Edition — Classification of Mental and Behavioural Disorders, WHO 1992. This document contains detailed descriptions of the diagnostic requirements, which may be useful for their application to medical assessment.

6.4.2.3 The applicant shall have no established medical history or clinical diagnosis of any of the following:

- a) a progressive or non-progressive disease of the nervous system, the effects of which are likely to interfere with the safe exercise of the applicant's licence and rating privileges;
- b) epilepsy;
- c) any disturbance of consciousness without satisfactory medical explanation of cause.

6.4.2.4 The applicant shall not have suffered any head injury, the effects of which are likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.4.2.5 The applicant shall not possess any abnormality of the heart, congenital or acquired, which is likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.4.2.5.1 An applicant who has undergone coronary by-pass grafting or angioplasty (with or without stenting) or other cardiac intervention or who has a history of myocardial infarction or who suffers from any other potentially incapacitating cardiac condition shall be assessed as unfit unless the applicant's cardiac condition has been investigated and evaluated in accordance with best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

6.4.2.5.2 An applicant with an abnormal cardiac rhythm shall be assessed as unfit unless the cardiac arrhythmia has been investigated and evaluated in accordance with best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

Note.— *Guidance on cardiovascular evaluation is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.4.2.6 Electrocardiography shall form part of the heart examination for the first issue of a Medical Assessment after the age of 40.

6.4.2.6.1 Electrocardiography shall be included in re-examinations of applicants after the age of 50 no less than every two years.

6.4.2.6.2 **Recommendation.**— *Electrocardiography should form part of the heart examination for the first issue of a Medical Assessment.*

Note 1.— *The purpose of routine electrocardiography is case finding. It does not provide sufficient evidence to justify disqualification without further thorough cardiovascular investigation.*

Note 2.— *Guidance on resting and exercise electrocardiography is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.4.2.7 The systolic and diastolic blood pressures shall be within normal limits.

6.4.2.7.1 The use of drugs for control of high blood pressure shall be disqualifying except for those drugs, the use of which is compatible with the safe exercise of the applicant's licence and rating privileges.

Note.— *Guidance on the subject is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.4.2.8 There shall be no significant functional nor structural abnormality of the circulatory system.

6.4.2.9 There shall be no disability of the lungs nor any active disease of the structures of the lungs, mediastinum or pleura likely to result in incapacitating symptoms during normal or emergency operations.

6.4.2.9.1 **Recommendation.**— *Chest radiography should form part of the initial and periodic examinations in cases where asymptomatic pulmonary disease can be expected.*

6.4.2.10 Applicants with chronic obstructive pulmonary disease shall be assessed as unfit unless the applicant's condition has been investigated and evaluated in accordance with best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

6.4.2.11 Applicants with asthma causing significant symptoms or likely to cause incapacitating symptoms during normal or emergency operations shall be assessed as unfit.

6.4.2.11.1 The use of drugs for control of asthma shall be disqualifying except for those drugs, the use of which is compatible with the safe exercise of the applicant's licence and rating privileges.

Note.— *Guidance on hazards of medication and drugs is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.4.2.12 Applicants with active pulmonary tuberculosis shall be assessed as unfit.

6.4.2.12.1 Applicants with quiescent or healed lesions, known to be tuberculous or presumably tuberculous in origin, may be assessed as fit.

Note 1.— *Guidance on assessment of respiratory diseases is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

Note 2.— *Guidance on hazards of medication and drugs is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.4.2.13 Applicants shall be completely free from those hernias that might give rise to incapacitating symptoms.

6.4.2.13.1 Applicants with significant impairment of the function of the gastrointestinal tract or its adnexa shall be assessed as unfit.

6.4.2.14 Applicants with sequelae of disease of or surgical intervention on any part of the digestive tract or its adnexa, likely to cause incapacitation in flight, in particular any obstruction due to stricture or compression, shall be assessed as unfit.

6.4.2.14.1 **Recommendation.**— *An applicant who has undergone a major surgical operation on the biliary passages or the digestive tract or its adnexa with a total or partial excision or a diversion of any of these organs should be assessed as unfit until such time as the medical assessor, having access to the details of the operation concerned, considers that the effects of the operation are not likely to cause incapacitation in flight.*

6.4.2.15 Applicants with metabolic, nutritional or endocrine disorders that are likely to interfere with the safe exercise of their licence and rating privileges shall be assessed as unfit.

6.4.2.16 Applicants with insulin-treated diabetes mellitus shall be assessed as unfit.

6.4.2.16.1 Applicants with non-insulin-treated diabetes mellitus shall be assessed as unfit unless the condition is shown to be satisfactorily controlled by diet alone or by diet combined with oral anti-diabetic medication, the use of which is compatible with the safe exercise of the applicant's licence and rating privileges.

Note.— *Guidance on assessment of diabetic applicants is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.4.2.17 Applicants with diseases of the blood and/or the lymphatic system shall be assessed as unfit unless adequately investigated and their condition found unlikely to interfere with the safe exercise of their licence and rating privileges.

Note.— *Sickle cell trait and other haemoglobinopathic traits are usually compatible with fit assessment.*

6.4.2.18 Applicants with renal or genito-urinary disease shall be assessed as unfit unless adequately investigated and their condition found unlikely to interfere with the safe exercise of their licence and rating privileges.

6.4.2.18.1 Urine examination shall form part of the medical examination and abnormalities shall be adequately investigated.

Note.— *Guidance on urine examination and evaluation of abnormalities is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.4.2.19 Applicants with sequelae of disease of, or surgical procedures on, the kidneys or the genito-urinary tract, in particular obstructions due to stricture or compression, shall be assessed as unfit unless the applicant's condition has been investigated and evaluated in accordance with best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

6.4.2.19.1 Applicants who have undergone nephrectomy shall be assessed as unfit unless the condition is well compensated.

6.4.2.20 Applicants with acquired immunodeficiency syndrome (AIDS) shall be assessed as unfit.

6.4.2.20.1 Applicants who are seropositive for human immunodeficiency virus (HIV) shall be assessed as unfit unless full investigation provides no evidence of clinical disease.

Note 1.— *Evaluation of applicants who are seropositive for human immunodeficiency virus (HIV) requires particular attention to their mental state, including the psychological effects of the diagnosis.*

Note 2.— *Guidance on the assessment of applicants who are seropositive for human immunodeficiency virus (HIV) is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.4.2.21 Applicants with gynaecological disorders that are likely to interfere with the safe exercise of their licence and rating privileges shall be assessed as unfit.

6.4.2.22 Applicants who are pregnant shall be assessed as unfit unless obstetrical evaluation and continued medical supervision indicate a low-risk uncomplicated pregnancy.

6.4.2.22.1 **Recommendation.**— *For applicants with a low-risk uncomplicated pregnancy, evaluated and supervised in accordance with 6.4.2.22, the fit assessment should be limited to the period from the end of the 12th week until the end of the 26th week of gestation.*

6.4.2.23 Following confinement or termination of pregnancy, the applicant shall not be permitted to exercise the privileges of her licence until she has undergone re-evaluation in accordance with best medical practice and it has been determined that she is able to safely exercise the privileges of her licence and ratings.

6.4.2.24 The applicant shall not possess any abnormality of the bones, joints, muscles, tendons or related structures which is likely to interfere with the safe exercise of the applicant's licence and rating privileges.

Note.— *Any sequelae after lesions affecting the bones, joints, muscles or tendons, and certain anatomical defects will normally require functional assessment to determine fitness.*

6.4.2.25 The applicant shall not possess any abnormality or disease of the ear or related structures which is likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.4.2.26 There shall be:

- a) no disturbance of the vestibular function;
- b) no significant dysfunction of the Eustachian tubes; and
- c) no unhealed perforation of the tympanic membranes.

6.4.2.26.1 A single dry perforation of the tympanic membrane need not render the applicant unfit.

Note.—Guidance on testing of the vestibular function is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.4.2.27 There shall be:

- a) no nasal obstruction; and
- b) no malformation nor any disease of the buccal cavity or upper respiratory tract;

which is likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.4.2.28 Applicants with stuttering and other speech defects sufficiently severe to cause impairment of speech communication shall be assessed as unfit.

6.4.3 Visual requirements

The medical examination shall be based on the following requirements.

6.4.3.1 The function of the eyes and their adnexa shall be normal. There shall be no active pathological condition, acute or chronic, nor any sequelae of surgery or trauma of the eyes or their adnexa likely to reduce proper visual function to an extent that would interfere with the safe exercise of the applicant's licence and rating privileges.

6.4.3.2 Distant visual acuity with or without correction shall be 6/12 or better in each eye separately, and binocular visual acuity shall be 6/9 or better. No limits apply to uncorrected visual acuity. Where this standard of visual acuity can be obtained only with correcting lenses, the applicant may be assessed as fit provided that:

- a) such correcting lenses are worn during the exercise of the privileges of the licence or rating applied for or held; and
- b) in addition, a pair of suitable correcting spectacles is kept readily available during the exercise of the privileges of the applicant's licence.

Note.— An applicant accepted as meeting these provisions is deemed to continue to do so unless there is reason to suspect otherwise, in which case an ophthalmic report is required at the discretion of the Licensing Authority. Both uncorrected and corrected visual acuity are normally measured and recorded at each re-examination. Conditions which indicate a need to obtain an ophthalmic report include: a substantial decrease in the uncorrected visual acuity, any decrease in best corrected visual acuity, and the occurrence of eye disease, eye injury or eye surgery.

6.4.3.2.1 Applicants may use contact lenses to meet this requirement provided that:

- a) the lenses are monofocal and non-tinted;
- b) the lenses are well tolerated; and
- c) a pair of suitable correcting spectacles is kept readily available during the exercise of the licence privileges.

Note.— Applicants who use contact lenses may not need to have their uncorrected visual acuity measured at each re-examination provided the history of their contact lens prescription is known.

6.4.3.2.2 Applicants with a large refractive error shall use contact lenses or high-index spectacle lenses.

Note.— If spectacles are used, high-index lenses are needed to minimize peripheral field distortion.

6.4.3.2.3 **Recommendation.**— Applicants whose uncorrected distant visual acuity in either eye is worse than 6/60 should be required to provide a full ophthalmic report prior to initial Medical Assessment and every five years thereafter.

Note 1.— The purpose of the required ophthalmic examination is (1) to ascertain normal visual performance, and (2) to identify any significant pathology.

Note 2.— Guidance on the assessment of monocular applicants under the provisions of 1.2.4.8 is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.4.3.3 Applicants who have undergone surgery affecting the refractive status of the eye shall be assessed as unfit unless they are free from those sequelae which are likely to interfere with the safe exercise of their licence and rating privileges.

6.4.3.4 The applicant shall have the ability to read, while wearing the correcting lenses, if any, required by 6.4.3.2, the N5 chart or its equivalent at a distance selected by that applicant in the range of 30 to 50 cm. If this requirement is met only by the use of near correction, the applicant may be assessed as fit provided that this near correction is added to the spectacle correction already prescribed in accordance with 6.4.3.2; if no such correction is prescribed, a pair of spectacles for near use shall be kept readily available during the exercise

of the privileges of the licence. When near correction is required, the applicant shall demonstrate that one pair of spectacles is sufficient to meet both distant and near visual requirements.

Note 1.— N5 refers to the size of typeface used. For further details, see the Manual of Civil Aviation Medicine (Doc 8984).

Note 2.— An applicant who needs near correction to meet the requirement will require “look-over”, bifocal or perhaps multifocal lenses in order to read the instruments and a chart or manual held in the hand, and also to make use of distant vision, through the windscreen, without removing the lenses. Single-vision near correction (full lenses of one power only, appropriate for reading) significantly reduces distant visual acuity and is therefore not acceptable.

Note 3.— Whenever there is a requirement to obtain or renew correcting lenses, an applicant is expected to advise the refractionist of the reading distances for the visual flight deck tasks relevant to the types of aircraft in which the applicant is likely to function.

6.4.3.4.1 When near correction is required in accordance with this paragraph, a second pair of near-correction spectacles shall be kept available for immediate use.

6.4.3.5 The applicant shall be required to have normal fields of vision.

6.4.3.6 The applicant shall be required to have normal binocular function.

6.4.3.6.1 Reduced stereopsis, abnormal convergence not interfering with near vision, and ocular misalignment where the fusional reserves are sufficient to prevent asthenopia and diplopia need not be disqualifying.

6.4.4 Hearing requirements

Note.— Attention is called to 2.7.1.3.1 on requirements for the issue of instrument rating to applicants who hold a private pilot licence.

6.4.4.1 Applicants who are unable to hear an average conversational voice in a quiet room, using both ears, at a distance of 2 m from the examiner and with the back turned to the examiner, shall be assessed as unfit.

6.4.4.2 When tested by pure-tone audiometry, an applicant with a hearing loss, in either ear separately, of more than 35 dB at any of the frequencies 500, 1 000 or 2 000 Hz, or more than 50 dB at 3 000 Hz, shall be assessed as unfit.

6.4.4.3 **Recommendation.**— *An applicant who does not meet the requirements in 6.4.4.1 or 6.4.4.2 should undergo further testing in accordance with 6.3.4.1.1.*

6.5 Class 3 Medical Assessment

6.5.1 Assessment issue and renewal

6.5.1.1 An applicant for an air traffic controller licence shall undergo an initial medical examination for the issue of a Class 3 Medical Assessment.

6.5.1.2 Except where otherwise stated in this section, holders of air traffic controller licences shall have their Class 3 Medical Assessments renewed at intervals not exceeding those specified in 1.2.5.2.

6.5.1.3 When the Licensing Authority is satisfied that the requirements of this section and the general provisions of 6.1 and 6.2 have been met, a Class 3 Medical Assessment shall be issued to the applicant.

6.5.2 Physical and mental requirements

6.5.2.1 The applicant shall not suffer from any disease or disability which could render that applicant likely to become suddenly unable to perform duties safely.

6.5.2.2 The applicant shall have no established medical history or clinical diagnosis of:

- a) an organic mental disorder;
- b) a mental or behavioural disorder due to psychoactive substance use; this includes dependence syndrome induced by alcohol or other psychoactive substances;
- c) schizophrenia or a schizotypal or delusional disorder;
- d) a mood (affective) disorder;
- e) a neurotic, stress-related or somatoform disorder;
- f) a behavioural syndrome associated with physiological disturbances or physical factors;
- g) a disorder of adult personality or behaviour, particularly if manifested by repeated overt acts;
- h) mental retardation;
- i) a disorder of psychological development;
- j) a behavioural or emotional disorder, with onset in childhood or adolescence; or
- k) a mental disorder not otherwise specified;

such as might render the applicant unable to safely exercise the privileges of the licence applied for or held.

Note.— Mental and behavioural disorders are defined in accordance with the clinical descriptions and diagnostic

guidelines of the World Health Organization as given in the International Statistical Classification of Diseases and Related Health Problems, 10th Edition — Classification of Mental and Behavioural Disorders, WHO 1992. This document contains detailed descriptions of the diagnostic requirements which may be useful for their application to medical assessment.

6.5.2.3 The applicant shall have no established medical history or clinical diagnosis of any of the following:

- a) a progressive or non-progressive disease of the nervous system, the effects of which are likely to interfere with the safe exercise of the applicant's licence and rating privileges;
- b) epilepsy; or
- c) any disturbance of consciousness without satisfactory medical explanation of cause.

6.5.2.4 The applicant shall not have suffered any head injury, the effects of which are likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.5.2.5 The applicant shall not possess any abnormality of the heart, congenital or acquired, which is likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.5.2.5.1 An applicant who has undergone coronary bypass grafting or angioplasty (with or without stenting) or other cardiac intervention or who has a history of myocardial infarction or who suffers from any other potentially incapacitating cardiac condition shall be assessed as unfit unless the applicant's cardiac condition has been investigated and evaluated in accordance with best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.5.2.5.2 An applicant with an abnormal cardiac rhythm shall be assessed as unfit unless the cardiac arrhythmia has been investigated and evaluated in accordance with best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence and rating privileges.

Note.— Guidance on cardiovascular evaluation is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.5.2.6 Electrocardiography shall form part of the heart examination for the first issue of a Medical Assessment.

6.5.2.6.1 Electrocardiography shall be included in re-examinations of applicants after the age of 50 no less frequently than every two years.

Note 1.— The purpose of routine electrocardiography is case finding. It does not provide sufficient evidence to justify disqualification without further thorough cardiovascular investigation.

Note 2.— Guidance on resting and exercise electrocardiography is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.5.2.7 The systolic and diastolic blood pressures shall be within normal limits.

6.5.2.7.1 The use of drugs for control of high blood pressure is disqualifying except for those drugs, the use of which is compatible with the safe exercise of the applicant's licence privileges.

Note.— Guidance on this subject is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.5.2.8 There shall be no significant functional nor structural abnormality of the circulatory system.

6.5.2.9 There shall be no disability of the lungs nor any active disease of the structures of the lungs, mediastinum or pleurae likely to result in incapacitating symptoms.

Note.— Chest radiography is usually not necessary but may be indicated in cases where asymptomatic pulmonary disease can be expected.

6.5.2.10 Applicants with chronic obstructive pulmonary disease shall be assessed as unfit unless the applicant's condition has been investigated and evaluated in accordance with best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

6.5.2.11 Applicants with asthma causing significant symptoms or likely to cause incapacitating symptoms shall be assessed as unfit.

6.5.2.11.1 The use of drugs for control of asthma shall be disqualifying except for those drugs, the use of which is compatible with the safe exercise of the applicant's licence and rating privileges.

Note.— Guidance on hazards of medications is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.5.2.12 Applicants with active pulmonary tuberculosis shall be assessed as unfit.

6.5.2.12.1 Applicants with quiescent or healed lesions, known to be tuberculous or presumably tuberculous in origin, may be assessed as fit.

Note 1.— Guidance on assessment of respiratory diseases is contained in the Manual of Civil Aviation Medicine (Doc 8984).

Note 2.— Guidance on hazards of medication and drugs is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.5.2.13 Applicants with significant impairment of the function of the gastrointestinal tract or its adnexae shall be assessed as unfit.

6.5.2.14 Applicants with sequelae of disease of or surgical intervention on any part of the digestive tract or its adnexa, likely to cause incapacitation, in particular any obstructions due to stricture or compression, shall be assessed as unfit.

6.5.2.14.1 **Recommendation.**— *An applicant who has undergone a major surgical operation on the biliary passages or the digestive tract or its adnexa, with a total or partial excision or a diversion of any of these organs should be assessed as unfit until such time as the medical assessor, having access to the details of the operation concerned, considers that the effects of the operation are not likely to cause incapacitation.*

6.5.2.15 Applicants with metabolic, nutritional or endocrine disorders that are likely to interfere with the safe exercise of their licence and rating privileges shall be assessed as unfit.

6.5.2.16 Applicants with insulin-treated diabetes mellitus shall be assessed as unfit.

6.5.2.16.1 Applicants with non-insulin-treated diabetes shall be assessed as unfit unless the condition is shown to be satisfactorily controlled by diet alone or by diet combined with oral anti-diabetic medication, the use of which is compatible with the safe exercise of the applicant's licence and rating privileges.

Note.— *Guidance on assessment of diabetic applicants is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.5.2.17 Applicants with diseases of the blood and/or the lymphatic system shall be assessed as unfit, unless adequately investigated and their condition found unlikely to interfere with the safe exercise of their licence and rating privileges.

6.5.2.18 Applicants with renal or genito-urinary disease shall be assessed as unfit unless adequately investigated and their condition found unlikely to interfere with the safe exercise of their licence and rating privileges.

6.5.2.18.1 Urine examination shall form part of the medical examination and abnormalities shall be adequately investigated.

Note.— *Guidance on urine examination and evaluation of abnormalities is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.5.2.19 Applicants with sequelae of disease of, or surgical procedures on the kidneys or the genito-urinary tract, in particular obstructions due to stricture or compression, shall be assessed as unfit unless the applicant's condition has been investigated and evaluated in accordance with best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

6.5.2.19.1 Applicants who have undergone nephrectomy shall be assessed as unfit unless the condition is well compensated.

6.5.2.20 Applicants with acquired immunodeficiency syndrome (AIDS) shall be assessed as unfit.

6.5.2.20.1 Applicants who are seropositive for human immunodeficiency virus (HIV) shall be assessed as unfit unless full investigation provides no evidence of clinical disease.

Note 1.— *Evaluation of applicants who are seropositive for human immunodeficiency virus (HIV) requires particular attention to their mental state, including the psychological effects of the diagnosis.*

Note 2.— *Guidance on the assessment of applicants who are seropositive for human immunodeficiency virus (HIV) is contained in the Manual of Civil Aviation Medicine (Doc 8984).*

6.5.2.21 Applicants with gynaecological disorders that are likely to interfere with the safe exercise of their licence and rating privileges shall be assessed as unfit.

6.5.2.22 Applicants who are pregnant shall be assessed as unfit unless obstetrical evaluation and continued medical supervision indicate a low-risk uncomplicated pregnancy.

6.5.2.22.1 **Recommendation.**— *During the gestational period, precautions should be taken for the timely relief of an air traffic controller in the event of early onset of labour or other complications.*

6.5.2.22.2 **Recommendation.**— *For applicants with a low-risk uncomplicated pregnancy, evaluated and supervised in accordance with 6.5.2.22, the fit assessment should be limited to the period until the end of the 34th week of gestation.*

6.5.2.23 Following confinement or termination of pregnancy the applicant shall not be permitted to exercise the privileges of her licence until she has undergone re-evaluation in accordance with best medical practice and it has been determined that she is able to safely exercise the privileges of her licence and ratings.

6.5.2.24 The applicant shall not possess any abnormality of the bones, joints, muscles, tendons or related structures which is likely to interfere with the safe exercise of the applicant's licence and rating privileges.

Note.— *Any sequelae after lesions affecting the bones, joints, muscles or tendons, and certain anatomical defects will normally require functional assessment to determine fitness.*

6.5.2.25 The applicant shall not possess any abnormality or disease of the ear or related structures which is likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.5.2.26 There shall be no malformation nor any disease of the nose, buccal cavity or upper respiratory tract which is likely to interfere with the safe exercise of the applicant's licence and rating privileges.

6.5.2.27 Applicants with stuttering or other speech defects sufficiently severe to cause impairment of speech communication shall be assessed as unfit.

6.5.3 Visual requirements

The medical examination shall be based on the following requirements.

6.5.3.1 The function of the eyes and their adnexa shall be normal. There shall be no active pathological condition, acute or chronic, nor any sequelae of surgery or trauma of the eyes or their adnexa likely to reduce proper visual function to an extent that would interfere with the safe exercise of the applicant's licence and rating privileges.

6.5.3.2 Distant visual acuity with or without correction shall be 6/9 or better in each eye separately, and binocular visual acuity shall be 6/6 or better. No limits apply to uncorrected visual acuity. Where this standard of visual acuity can be obtained only with correcting lenses, the applicant may be assessed as fit provided that:

- a) such correcting lenses are worn during the exercise of the privileges of the licence or rating applied for or held; and
- b) in addition, a pair of suitable correcting spectacles is kept readily available during the exercise of the privileges of the applicant's licence.

Note.— An applicant accepted as meeting these provisions is deemed to continue to do so unless there is reason to suspect otherwise, in which case an ophthalmic report is required at the discretion of the Licensing Authority. Both uncorrected and corrected visual acuity are normally measured and recorded at each re-examination. Conditions which indicate a need to obtain an ophthalmic report include: a substantial decrease in the uncorrected visual acuity, any decrease in best corrected visual acuity, and the occurrence of eye disease, eye injury or eye surgery.

6.5.3.2.1 Applicants may use contact lenses to meet this requirement provided that:

- a) the lenses are monofocal and non-tinted;
- b) the lenses are well tolerated; and
- c) a pair of suitable correcting spectacles is kept readily available during the exercise of the licence privileges.

Note.— Applicants who use contact lenses may not need to have their uncorrected visual acuity measured at each re-examination provided the history of their contact lens prescription is known.

6.5.3.2.2 Applicants with a large refractive error shall use contact lenses or high-index spectacle lenses.

Note.— If spectacles are used, high-index lenses are needed to minimize peripheral field distortion.

6.5.3.2.3 Applicants whose uncorrected distant visual acuity in either eye is worse than 6/60 shall be required to provide a full ophthalmic report prior to initial Medical Assessment and every five years thereafter.

Note 1.— The purpose of the required ophthalmic examination is (1) to ascertain normal vision performance, and (2) to identify any significant pathology.

Note 2.— Guidance on the assessment of monocular applicants under the provisions of 1.2.4.8 is contained in the Manual of Civil Aviation Medicine (Doc 8984).

6.5.3.3 Applicants who have undergone surgery affecting the refractive status of the eye shall be assessed as unfit unless they are free from those sequelae which are likely to interfere with the safe exercise of their licence and rating privileges.

6.5.3.4 The applicant shall have the ability to read, while wearing the correcting lenses, if any, required by 6.5.3.2, the N5 chart or its equivalent at a distance selected by that applicant in the range of 30 to 50 cm and the ability to read the N14 chart or its equivalent at a distance of 100 cm. If this requirement is met only by the use of near correction, the applicant may be assessed as fit provided that this near correction is added to the spectacle correction already prescribed in accordance with 6.5.3.2; if no such correction is prescribed, a pair of spectacles for near use shall be kept readily available during the exercise of the privileges of the licence. When near correction is required, the applicant shall demonstrate that one pair of spectacles is sufficient to meet both distant and near visual requirements.

Note 1.— N5 and N14 refer to the size of typeface used. For further details, see the Manual of Civil Aviation Medicine (Doc 8984).

Note 2.— An applicant who needs near correction to meet the requirement will require “look-over”, bifocal or perhaps multi-focal lenses in order to read radar screens, visual displays and written or printed material and also to make use of distant vision, through the windows, without removing the lenses. Single-vision near correction (full lenses of one power only, appropriate for reading) may be acceptable for certain air traffic control duties. However, it should be realized that single-vision near correction significantly reduces distant visual acuity.

Note 3.— Whenever there is a requirement to obtain or renew correcting lenses, an applicant is expected to advise the refractionist of reading distances for the air traffic control duties the applicant is likely to perform.

6.5.3.4.1 When near correction is required in accordance with this paragraph, a second pair of near-correction spectacles shall be kept available for immediate use.

6.5.3.5 The applicant shall be required to have normal fields of vision.

6.5.3.6 The applicant shall be required to have normal binocular function.

6.5.3.6.1 Reduced stereopsis, abnormal convergence not interfering with near vision, and ocular misalignment where the fusional reserves are sufficient to prevent asthenopia and diplopia need not be disqualifying.

6.5.4 Hearing requirements

6.5.4.1 The applicant, when tested on a pure-tone audiometer shall not have a hearing loss, in either ear separately, of more than 35 dB at any of the frequencies 500, 1 000 or 2 000 Hz, or more than 50 dB at 3 000 Hz.

6.5.4.1.1 An applicant with a hearing loss greater than the above may be declared fit provided that the applicant has normal hearing performance against a background noise that reproduces or simulates that experienced in a typical air traffic control working environment.

Note 1.— The frequency composition of the background noise is defined only to the extent that the frequency range 600 to 4 800 Hz (speech frequency range) is adequately represented.

Note 2.— In the speech material for discrimination testing, both aviation-relevant phrases and phonetically balanced words are normally used.

6.5.4.1.2 Alternatively, a practical hearing test conducted in an air traffic control environment representative of the one for which the applicant's licence and ratings are valid may be used.

CIVIL AVIATION AUTHORITY

MEDICAL IN CONFIDENCE

MEDICAL EXAMINATION REPORT

(13) Reference/Licence number:

(201) Examination Category Initial <input type="checkbox"/> Renewal <input type="checkbox"/> Special Referral <input type="checkbox"/>	(202) Height cm	(203) Weight kg	(204) Eye Colour	(205) Hair Colour	(206) Blood Pressure – seated mmHg Systolic Diastolic	(207) Pulse – resting Rate(bpm) Rhythm Reg <input type="checkbox"/> Irreg <input type="checkbox"/>	
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Clinical examination: Check each item		Normal	Abnormal	Normal	Abnormal
(208) Head, face, neck, scalp				(218) Abdomen, hernia, liver, spleen	
(209) Mouth, throat, teeth				(219) Anus, rectum	
(210) Nose, sinuses				(220) Genito-urinary system	
(211) Ears, drums, eardrum motility				(221) Endocrine system	
(212) Eyes – orbit and adnexa; visual fields				(222) Upper and lower limbs, joints	
(213) Eyes – pupils and optic fundi				(223) Spine, other musculoskeletal	
(214) Eyes – ocular motility; nystagmus				(224) Neurologic – reflexes, etc.	
(215) Lungs, chest, breasts				(225) Psychiatric	
(216) Heart				(226) Skin, identifying marks and lymphatics	
(217) Vascular system				(227) General systemic	
(228) Notes: Describe every abnormal finding. Enter applicable item number before each comment.				(226a) Identifying marks, scars etc	

Visual acuity

(229) Distant vision at 6 m Glasses Contact lenses

	Uncorrected	Corrected to		
Right eye				
Left eye				
Both eyes				

(230) Intermediate vision Uncorrected Corrected

N14 at 100 cm Yes No Yes No

Right eye				
Left eye				
Both eyes				

(231) Near vision Uncorrected Corrected

N5 at 30–50 cm Yes No Yes No

Right eye				
Left eye				
Both eyes				

(232) Glasses (233) Contact lenses

Yes No Yes No

Type: _____ Type: _____

(313) Colour perception Normal Abnormal

Pseudo-isochromatic plates Type: _____

No of plates: _____ No of errors _____

(234) Hearing (when 241 not performed)

	Right ear	Left ear
Conversational voice test at 2 m back turned to examiner	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>

Audiometry

Hz	500	1000	2000	3000
Right				
Left				

(235) Urinalysis Normal Abnormal

Glucose	Protein	Blood	Other
---------	---------	-------	-------

(248) **Comments, restrictions, limitations:**

(249) **Medical examiner's declaration:**
I hereby certify that I/my AME group have personally examined the applicant named on this medical examination report and that this report with any attachment embodies my findings completely and correctly.

(250) Place and date:	Examiner's Name and Address: (Block Capitals)	Examiner's Stamp and number:
Medical Examiner's signature:	E-mail: Telephone No.: Telefax No.:	

Accompanying Reports	Normal	Abnormal/Comment
(238) ECG		
(239) Audiogram		
(246) Other		

(247) **Aviation medical examiner's recommendation:**

Name of applicant: _____ Date of birth: _____

Fit class _____

Medical certificate issued by undersigned (copy attached)

Signature: _____

Unfit class _____ **State reason:** _____

Deferred for further evaluation. If yes, why and to whom?

MEDICAL EXAMINER INSTRUCTIONS FOR COMPLETION OF THE MEDICAL EXAMINATION REPORT FORM

All questions (boxes) on the Medical Examination Report Form must be completed in full.

Writing must be in BLOCK CAPITALS using a ball-point pen and be legible. Exert sufficient pressure to make legible copies. Completion of this form by typing/printing is both acceptable and preferable. If more space is required to answer any question, write on a plain sheet of paper the applicant's name, the information, your signature and the date signed. The following instructions apply to the same numbered headings on the Medical Examination Report Form.

NOTICE – Failure to complete the medical examination report form in full as required or to write legibly may result in non-acceptance of the application in total and may lead to withdrawal of any medical certificate issued. The making of False or Misleading statements or the withholding of relevant information by an AME may result in criminal prosecution, denial of an application or withdrawal of any medical certificate granted.

201 EXAMINATION CATEGORY – Tick appropriate box.

Initial – Initial examination for either Class 1, 2 or 3; also initial examination for upgrading from Class 2 to 1 (notate 'upgrading' in Section 248).

Renewal: Subsequent ROUTINE examinations.

202 HEIGHT – Measure height without shoes in centimetres to nearest cm.

203 WEIGHT – Measure weight in indoor clothes in kilograms to nearest kg.

204 EYE COLOUR – State colour of applicants eyes from the following list: brown, blue, green, hazel, grey, multi.

205 HAIR COLOUR – State colour of applicants hair from the following list: brown, black, red, fair, bald.

206 BLOOD PRESSURE – Blood Pressure readings should be recorded as Phase 1 for Systolic pressure and Phase 5 for Diastolic pressure. The applicant should be seated and rested. Recordings in mm Hg.

207 PULSE (RESTING) – The pulse rate should be recorded in beats per minute and the rhythm should be recorded as regular or irregular. Further comments if necessary may be written in Section 228, 248 or separately.

SECTION 208 – 227 inclusive constitute the general clinical examination and each of the sections must be checked as Normal or Abnormal.

208 HEAD, FACE, NECK, SCALP – To include appearance, range of neck and facial movements, symmetry, etc.

209 MOUTH, THROAT, TEETH – To include appearance of buccal cavity, palate motility, tonsillar area, pharynx and also gums, teeth and tongue.

210 NOSE, SINUSES – To include appearance and any evidence of nasal obstruction or sinus tenderness on palpation.

211 EARS, DRUMS, EARDRUM MOTILITY – To include otoscopy of external ear, canal, tympanic membrane. Eardrum motility by valsalva manoeuvre or by pneumatic otoscopy.

212 EYES – ORBIT AND ADNEXA, VISUAL FIELDS – To include appearance, position and movement of eyes and their surrounding structures in general, including eyelids and conjunctiva. Visual fields check by campimetry, perimetry or confrontation.

213 EYES – PUPILS AND OPTIC FUNDI – To include appearance, size, reflexes, red reflex and fundoscopy. Special note of corneal scars.

214 EYES – OCULAR MOTILITY, NYSTAGMUS – To include range of movement of eyes in all directions; symmetry of movement of both eyes; ocular muscle balance; convergence; accommodation; signs of nystagmus.

215 LUNGS, CHEST, BREAST – To include inspection of chest for deformities, operation scars, abnormality of respiratory movement, auscultation of breath sounds. Physical examination of female applicants breasts should only be performed with informed consent.

216 HEART – To include apical heart beat, position, auscultation for murmurs, carotid bruits, palpation for thrills.

217 VASCULAR SYSTEM – To include examination for varicose veins, character and feel of pulse, peripheral pulses, evidence of peripheral circulatory disease.

218 ABDOMEN, HERNIA, LIVER, SPLEEN – To include inspection of abdomen; palpation of internal organs; check for inguinal hernias in particular.

- 219 ANUS, RECTUM** – Examination only with informed consent.
- 220 GENITO-URINARY SYSTEM** – To include renal palpation; inspection palpation male/female reproductive organs only with informed consent.
- 221 ENDOCRINE SYSTEM** – To include inspection, palpation for evidence of hormonal abnormalities/imbalance; thyroid gland.
- 222 UPPER AND LOWER LIMBS, JOINTS** – To include full range of movements of joints and limbs, any deformities, weakness or loss. Evidence of arthritis.
- 223 SPINE, OTHER MUSCULOSKELETAL** – To include range of movements, abnormalities of joints.
- 224 NEUROLOGIC – REFLEXES ETC.** To include reflexes, sensation, power, vestibular system – balance, romberg test, etc.
- 225 PSYCHIATRIC** – To include appearance, appropriate mood/thought, unusual behaviour.
- 226 SKIN, LYMPHATICS, IDENTIFYING MARKS** – To include inspection of skin; inspection, palpation for lymphadenopathy, etc. Briefly describe scars, tattoos, birthmarks, etc. which could be used for identification purposes.
- 227 GENERAL SYSTEMIC** – All other areas, systems and nutritional status.
- 228 NOTES** – Any notes, comments or abnormalities to be described – extra notes if required on paper, signed and dated.
- 229 DISTANT VISION AT 6 METRES** – Each eye to be examined separately and then both together. First without correction, then with spectacles (if used) and lastly with contact lenses, if used. Record visual acuity in appropriate boxes. Visual acuity to be tested at either 6 metres with the appropriate chart for the distance.
- 230 INTERMEDIATE VISION AT 1 METRE** – Each eye to be examined separately and then both together. First without correction, then with spectacles if used and lastly with contact lenses if used. Record visual acuity in appropriate boxes as ability to read N14 at 100 cm (Yes/No).
- 231 NEAR VISION AT 30–50 CMS.** – Each eye to be examined separately and then both together. First without correction, then with spectacles if used and lastly with contact lenses, if used. Record visual acuity in appropriate boxes as ability to read N5 at 30–50 cm (Yes/No).
- Note: Bifocal contact lenses and contact lenses correcting for near vision only are not acceptable.
- 232 SPECTACLES** – Tick appropriate box signifying if spectacles are or are not worn by applicant. If used, state whether unifocal, bifocal, varifocal or look-over.
- 233 CONTACT LENSES** – Tick appropriate box signifying if contact lenses are or are not worn. If worn, state type from the following list; hard, soft, gas-permeable or disposable.
- 313 COLOUR PERCEPTION** - Tick appropriate box signifying if colour perception is normal or not. State which pseudoisochromatic plates are used e.g. Ishihara 24 plate. If abnormal state number of plates used in the test the number that have not been read correctly.
- 234 HEARING** – Tick appropriate box to indicate hearing level ability as tested separately in each ear at 2 m.
- 235 URINALYSIS** – State whether result of urinalysis is normal or not by ticking appropriate box. If no abnormal constituents, state NIL in each appropriate box.
- 238–246 ACCOMPANYING REPORTS** – One box opposite each of these sections must be ticked. If the test is not required and has not been performed, then tick the NOT PERFORMED box. If the test has been performed (whether required or on indication) complete the normal or abnormal box as appropriate. In the case of question 246, the number of other accompanying reports must be stated.
- 247 MEDICAL EXAMINER'S RECOMMENDATION** – Enter name of applicant in Block Capitals and then tick appropriate box with applicable class of Medical Certificate. If a fit assessment is recommended, please indicate whether a Medical Certificate has been issued or not. An applicant may be recommended as Fit for Class 2 but also deferred or recommended as Unfit for Class I. If an Unfit recommendation is made, the reason must be stated. If an applicant is deferred for further evaluation, indicate the reason and the doctor to whom the applicant is referred.

248 COMMENTS, RESTRICTIONS, LIMITATIONS, ETC. – Enter here your findings and assessment of any abnormality in the history or examination. State also any limitation required.

249 MEDICAL EXAMINERS DETAILS – In this section the AME must sign the declaration, complete his name and address in block capitals, contact telephone number (and fax if available) and lastly stamp the relevant box with his designated medical examiner's stamp incorporating his examiner's number.

250 PLACE AND DATE – Enter the place (town or city) and the date of examination. The date of examination is the date of the general examination and not the date of finalisation of form. If the medical examination report is finalised on a different date, enter date of finalisation in Section 248 as "Report finalised on"

CIVIL AVIATION AUTHORITY

APPLICATION FORM FOR AN AVIATION MEDICAL CERTIFICATE

Complete this page fully using a black ball point pen and in block capitals – Refer to instructions pages for details

MEDICAL IN CONFIDENCE

(3) Surname:		(4) Previous surname(s):		Title:		(13) Reference/Licence number:							
(5) Forenames:			(6) Date of birth:		Age:		(7) Sex Male <input type="checkbox"/> Female <input type="checkbox"/>	(12) Application Initial <input type="checkbox"/> Renewal <input type="checkbox"/>					
(1) State of licence issue:		(2) Class of medical certificate applied for 1 st <input type="checkbox"/> 2 nd <input type="checkbox"/> 3 rd <input type="checkbox"/> Others <input type="checkbox"/>				(14) Type of licence applied for:							
(8) Place and country of birth:				(9) Nationality:		(15) Occupation (principal)							
(10) Permanent address: Postcode: Country: Telephone No: Mobile No: E-mail: @				(11) Postal address (if different) Postcode: Country: Telephone No:		(16) Employer							
						(17) Last medical examination Date: Place:							
						(18) Aviation licence(s) held (type): Licence number: State of issue:							
(500) General Practitioner Name: Address: Tel No:						(19) Any Limitations on Licence/Medical Certificate No <input type="checkbox"/> Yes <input type="checkbox"/> Details:							
(20) Have you ever had an aviation medical certificate denied, suspended or revoked by any licensing authority? If yes, discuss with medical examiner No <input type="checkbox"/> Yes <input type="checkbox"/> Date: Place: Details:						(21) Total flight time hours:		(22) Flight time hours since last medical:					
						(23) Aircraft presently flown (eg 737, C150 etc):							
(24) Any aircraft accident or reported incident since last medical? No <input type="checkbox"/> Yes <input type="checkbox"/> Date: Place: Details:						(25) Type of flying intended:							
						(26) Present flying activity Single pilot <input type="checkbox"/> Multi pilot <input type="checkbox"/>							
(27) Do you drink alcohol – state average weekly intake in units:				(28) Do you currently use any medication. Yes <input type="checkbox"/> No <input type="checkbox"/> If YES, state drug, dose, date started and why				M	M	Y	Y	Y	Y
(29) Do you smoke tobacco? Never <input type="checkbox"/> No <input type="checkbox"/> Date stopped: Yes <input type="checkbox"/> State type, amount & number of years:													

General and medical history: Do you have, or have you ever had, any of the following? YES or NO (or as indicated) must be ticked after each question. Elaborate YES answers in the remarks section.

Yes		No		Yes		No		Yes		No					
101 Eye trouble/eye operation				112 Nose, throat or speech disorder				123 Malaria or other tropical disease				Family history of:			
102 Spectacles and/or contact lenses ever worn				113 Head injury or concussion				124 A positive HIV test				170 Heart disease			
103 Spectacle/contact lens prescriptions/change since last medical exam				114 Frequent or severe headaches				125 Sexually transmitted disease				171 High blood pressure			
104 Hay fever, other allergy				115 Dizziness or fainting spells				126 Admission to hospital				172 High cholesterol level			
105 Asthma, lung disease				116 Unconsciousness for any reason				127 Any other illness or injury				173 Epilepsy			
106 Heart or vascular trouble				117 Neurological disorders; stroke, epilepsy, seizure, paralysis, etc				128 Visit to medical practitioner since last medical examination				174 Mental illness			
107 High or low blood pressure				118 Psychological/psychiatric trouble of any sort				129 Refusal of life insurance				175 Diabetes			
108 Kidney stone or blood in urine				119 Alcohol/drug/substance abuse				130 Refusal of flying licence				176 Tuberculosis			
109 Diabetes, hormone disorder				120 Attempted suicide								177 Allergy/asthma/eczema			
110 Stomach, liver or intestinal trouble				121 Motion sickness requiring medication								178 Inherited disorders			
111 Deafness, ear disorder				122 Anaemia/Sickle cell trait/other blood disorders				132 Medical rejection from or for military service				179 Glaucoma			
												Females only:			
												150 Gynaecological, menstrual			
												151 Are you pregnant?			

(30) **Remarks:** If previously reported and no change since, so state.

(31) **Declaration:** I hereby declare that I have carefully considered the statements made above and that to the best of my belief they are complete and correct and that I have not withheld any relevant information or made any misleading statement. I understand that if I have made any false or misleading statement in connection with this application, or fail to release the supporting medical information, the Authority may refuse to grant me a medical certificate or may withdraw any medical certificate granted, without prejudice to any other action applicable under national law. **CONSENT TO RELEASE OF MEDICAL INFORMATION:** [Insert appropriate statement concerning release of medical information, in accordance with national requirements]
Medical confidentiality will be respected at all times.

..... Date Signature of applicant Signature of medical examiner (Witness)

INSTRUCTION PAGE FOR COMPLETION OF THE APPLICATION FORM FOR AN AVIATION MEDICAL CERTIFICATE

This Application Form, all attached Report Forms and Reports are required in accordance with ICAO Instructions and will be transmitted to the Aeromedical Section. Medical Confidentiality shall be respected at all times.

The Applicant must personally complete in full all questions (boxes) on the Application Form. Writing must be in Block Capitals using a ball-point pen and be legible. Exert sufficient pressure to make legible copies. If more space is required to answer any question, use a plain sheet of paper bearing the information, your signature and the date signed. The following numbered instructions apply to the numbered headings on the application form.

NOTICE: Failure to complete the application form in full or to write legibly will result in non-acceptance of the application form. The making of False or Misleading statements or the Withholding of relevant information in respect of this application may result in criminal prosecution, denial of this application and/or withdrawal of any medical certificate(s) granted.

<p>1. STATE APPLIED TO: State name of Country this application is to be forwarded to.</p>	<p>17. LAST MEDICAL APPLICATION: State date (day, month, year) and place (town, country). Initial applicants state 'NONE'.</p>
<p>2. CLASS OF MEDICAL CERTIFICATE: Tick appropriate box. Class 1: Professional Pilot Class 2: Private Pilot Class 3: Air Traffic Controller Others: All other uses, e.g. Cabin Crew</p>	<p>18. AVIATION LICENCE HELD: State type of licences held as answered in Question 14. Enter licence number and State of issue for each licence. If no licences are held, state 'NONE'. 500. General Practitioner NAME: Completion of this area is optional</p>
<p>3. SURNAME: State Surname/ Family name.</p>	<p>19. ANY LIMITATIONS ON THE LICENCE / MEDICAL CERTIFICATE: Tick appropriate box and give details of any limitations on your licences / medical certificates, e.g. vision, colour vision, safety pilot, etc.</p>
<p>4. PREVIOUS SURNAME(S): If your surname or family name has changed for any reason, state previous name(s).</p>	<p>20. MEDICAL CERTIFICATE DENIAL OR REVOCATION: Tick 'YES' box if you have ever had a medical certificate denied or revoked even if only temporary. If 'YES', state date (DD/MM/YYYY) and Country where occurred.</p>
<p>5. FORENAMES: State first and middle names (maximum three).</p>	<p>21. PILOT FLIGHT TIME TOTAL: State total number of hours flown.</p>
<p>6. DATE OF BIRTH: Specify in order Day(DD), Month(MM), Year(YYYY) in numerals, e.g. 22-08-1950.</p>	<p>22. PILOT FLIGHT TIME SINCE LAST MEDICAL: State number of hours flown since your last medical examination.</p>
<p>7. SEX: Tick appropriate box.</p>	<p>23. AIRCRAFT PRESENTLY FLOWN: State name of principal aircraft flown, e.g. Boeing 737, Cessna 150, etc.</p>
<p>8. PLACE OF BIRTH: State Town and Country of birth.</p>	<p>24. AIRCRAFT ACCIDENT/INCIDENT: If 'YES' box ticked, state Date (DD/MM/YYYY) and Country of Accident/Incident.</p>
<p>9. NATIONALITY: State name of country of Citizenship.</p>	<p>25. TYPE OF FLYING INTENDED: State whether airline, charter, single-pilot commercial air transport carrying passengers, agriculture, pleasure, etc.</p>
<p>10. PERMANENT ADDRESS:. State permanent postal address and country. Enter telephone area code as well as number.</p>	<p>26. PRESENT FLYING ACTIVITY: Tick appropriate box to indicate whether you fly as the SOLE pilot or not.</p>
<p>11. POSTAL ADDRESS: If different from permanent address, state full current postal address including telephone number and area code. If the same, enter 'SAME'.</p>	<p>27. DO YOU DRINK ALCOHOL: Tick applicable box. If yes, state weekly alcohol consumption e.g. 2 litres beer.</p>
<p>12. APPLICATION: Tick appropriate box.</p>	<p>28. DO YOU CURRENTLY USE ANY MEDICATION: If 'YES', give full details - name, how much you take and when, etc. Include any non-prescription medication.</p>
<p>13. REFERENCE/LICENCE NUMBER: State Reference/Licence Number allocated to you by your National Aviation Authority. Initial Applicants enter 'NONE'.</p>	<p>29. DO YOU SMOKE TOBACCO? Tick applicable box. Current smokers state type (cigarettes, cigars, pipe) and amount (e.g. 2 cigars daily; pipe - 1 oz. weekly)</p>
<p>14. TYPE OF LICENCE APPLIED FOR (OR INTENDED): State type of licence applied for from the following list: Aeroplane Transport Pilot Licence Commercial Pilot Licence/Instrument Rating Commercial Pilot Licence Private Pilot Licence/Instrument Rating Private Pilot Student Pilot And whether Fixed Wing / Rotary Wing / Both Air Traffic Other – Please specify</p>	<p>GENERAL AND MEDICAL HISTORY All items under this heading from number 101 to 179 inclusive must have the answer 'YES' or 'NO' ticked. You MUST tick 'YES' if you have ever had the condition in your life and describe the condition and approximate date in the REMARKS box. All questions asked are medically important even though this may not be readily apparent. Items numbered 170 to 179 relate to immediate family history whereas items numbered 150 to 151 must be answered by female applicants only. If information has been reported on a previous application form and there has been no change in your condition, you may state 'Previously Reported, No Change Since'. However, you must still tick 'YES' to the condition. Do not report occasional common illnesses such as colds.</p>
<p>15. OCCUPATION:</p>	<p>31. DECLARATION AND CONSENT TO OBTAINING AND RELEASING INFORMATION: Do not sign or date these declarations until indicated to do so by the medical examiner who will act as witness and sign accordingly.</p>
<p>16. EMPLOYER: If principal occupation is pilot, then state employer's name or if self-employed, state 'self'.</p>	

AN APPLICANT HAS THE RIGHT TO REFUSE ANY TEST AND TO REQUEST REFERRAL TO THE AUTHORITY.

HOWEVER, THIS MAY RESULT IN TEMPORARY DENIAL OF MEDICAL CERTIFICATION.

PART I

Chapter 3. FLIGHT CREW INCAPACITATION

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Chapter 3. FLIGHT CREW INCAPACITATION

INTRODUCTION

The impressive growth of international civil aviation during the past decades has been accompanied by a continued concern for safety in air travel. The number of air carrier accidents per year will increase if industry growth continues and accident rates remain unchanged. It is, therefore, essential to continue to examine all areas which have an impact on flight safety. One such area is that of in-flight pilot incapacitation, which can be defined as *any reduction in medical fitness to a degree or of a nature that is likely to jeopardize flight safety*.

This might be regarded as a “medical definition” focusing as it does on medical fitness. Note however, that incapacitation can also occur in a medically fit individual, e.g. smoke inhalation or effects of a laser beam on vision. A doctor practicing aviation medicine should be familiar with the relevant operational environment and of the wide variety of possible causes of incapacitation.

Minor degrees of reduced medical fitness may go undetected by other crew members during normal flight operations and lowered levels of proficiency may be rationalized, e.g. poor handling may be attributed to turbulence or lack of recent handling experience. However, when abnormal conditions or an emergency occurs, flight crew may have to perform complex physical and mental tasks under time constraints, and in such circumstances even a minor deficiency in performance could be operationally significant.

Some effects of mild incapacitation include a reduced state of alertness, a mental preoccupation which may result in a lack of appreciation of significant factors, increased reaction time, and impaired judgement.

Controlling the risk of pilot incapacitation

Pilot incapacitation has been of concern for as long as powered flight has existed. It represents an operational risk, and it can therefore be defined operationally as “any physiological or psychological state or situation that adversely affects performance.”

There are sound reasons for considering an operational definition. From the operational standpoint, it is irrelevant whether degraded performance is caused by a petit mal episode, preoccupation with a serious personal problem, fatigue, problematic use of psychoactive substances or a disordered cardiac function. The effects may be similar, and often other crew members will not know the difference.

A great deal about pilot incapacitation has been learned over the past decades. One of the most important things is that the risk to aviation safety in situations where a pilot is incapacitated can be virtually eliminated in air transport (multi-crew) operations by training the pilots to cope with such events.

In 1984 the medical director of a major British airline reported the results of a study of pilot incapacitation that remains the most comprehensive to date (see Chapman, 1984). It included over 1300 “subtle” incapacitations which were simulated to occur at critical phases of flight during routine competency checks in a simulator.

Five hundred of these incapacitations were deliberately planned to occur with other major failures in a “worst case” scenario. Major failures were not included in the remaining 800 incapacitations so that “the simulation was of a subtle incapacitation, still taking place at a critical phase of flight, but as an event in

itself and not complicated by other major failures.” This latter scenario is the more realistic, since the risk of an incapacitation occurring simultaneously with a major technical failure is extremely remote.

In the simulator it was found that only 1 in 400 “uncomplicated” incapacitations resulted in a simulator “crash”, because the second pilot successfully took control on the 399 other occasions. If certain assumptions about a typical multi-crew flight are made, this knowledge can be used to calculate an acceptable risk of incapacitation for an individual pilot. These assumptions (see Figure 1) are:

1. Each flight lasts one hour.
2. Only 10% of the flight time is critical, viz. take-off and initial climb, approach and landing (in a one hour flight this comprises the first and last three minutes).
3. Pilot incapacitations occur randomly during a flight.
4. 1 in 100 real life incapacitations occurring in the critical periods would result in a fatal accident, a more pessimistic view than that suggested by the simulator studies mentioned above (1 in 400), where simulated incapacitations could be anticipated by the flight crew.

Based on these four assumptions, the so-called 1% rule has been developed.

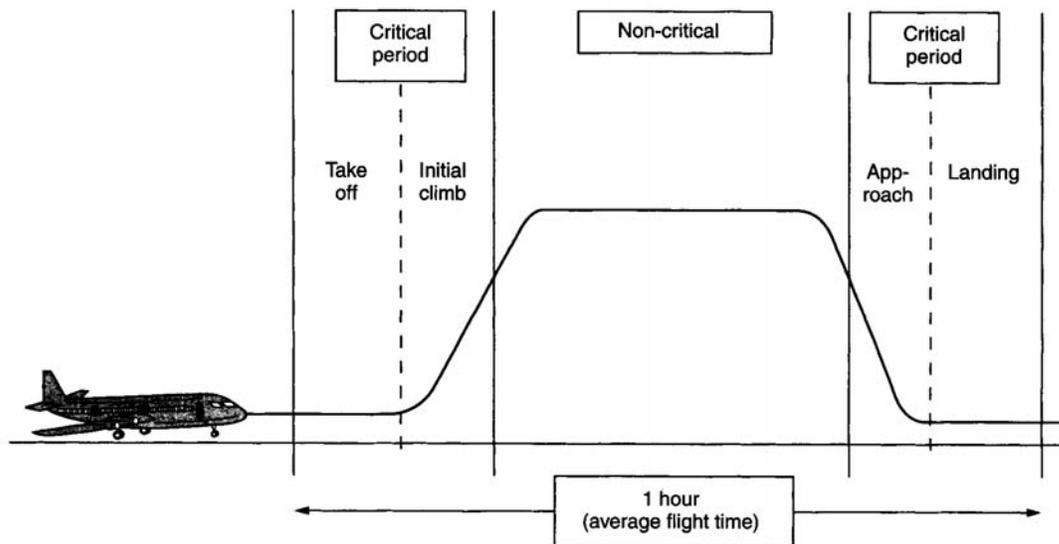


Figure 1.— Critical and non-critical phases of flight in a flight of one hour¹

The 1% rule

During the last decades of the 20th century, a number of Contracting States were approaching a fatal accident² rate of one in 10⁷ flying hours. Some Contracting States therefore set as their target *all cause* maximum fatal accident rate a figure of one in 10⁷ flying hours, with human “failure” constituting one tenth of the risk and human failure caused by medical incapacitation comprising one tenth of the human failure risk, or one hundredth of the total risk, i.e. medical incapacitation should not result in a fatal

¹ From Rainford, D.J., Gradwell, D.P. eds. *Ernsting’s Aviation Medicine*, Hodder Arnold, 2006

² A fatal accident is an accident in which one or more persons are fatally injured as a result of being in the aircraft, or being struck by an aircraft or its parts.

accident more often than one in 10^9 hours. Based on the assumptions stated above, a pilot flying a two-pilot aircraft can have an incapacitation risk of no more than one in 10^6 hours and the operation will achieve the target medical cause fatal accident rate of no more than one in 10^9 hours, since the presence of a second pilot reduces the risk by a factor of 1000. This is because:

- In a multi-pilot aircraft only 10% of flight time is critical (risk reduced by a factor of 10) as incapacitations are assumed to occur randomly. Therefore only one in ten in-flight incapacitations will occur during a critical stage of flight and thus pose a flight safety risk
- Only one in 100 incapacitations occurring at a critical stage of flight is likely to result in a fatal accident (risk further reduced, by a factor of 100)
- Therefore the total risk reduction with the addition of a second pilot is $1/10 \times 1/100 = 1/1000$, i.e. the risk is one 1000th of the risk of single pilot operations
- For a pilot with an incapacitation risk of one in 10^6 hours, a second pilot therefore reduces the risk of a fatal accident from pilot incapacitation from one in 10^6 hours to one in 10^9 hours.

In other words, only one fatal accident in one thousand in-flight pilot incapacitations would be expected to result in a fatal accident, because the other pilot would take over safely in the other 999 times. For an individual pilot flying a multi-crew aircraft the acceptable risk of incapacitation may therefore be increased by a factor of 1000 from one in 10^9 to one in 10^6 hours.

An incapacitation rate of one in 10^6 hours approximates to a rate of 1% (or one in 10^2) per annum (since there are 8760 - close to 10 000 (or 10^4) - hours in one year). More explicitly:

- 1 in 10^6 hours = 0.01 in 10^4 hours (dividing both figures by 100)
- 0.01 in 10^4 hours = 1% in 10^4 hours
- 1% in 10^4 hours approximates to 1% in one year (because there are 8760 hours per year)

The acceptable maximum incapacitation rate of 1% p.a. outlined above has become known as the “1% rule”. This rule specifies a predicted annual medical incapacitation rate which, if exceeded, would exclude a pilot from flying in a multi-crew aircraft. This is widely regarded as an acceptable risk level and has been adopted by the European Joint Aviation Authorities as the basis of aeromedical risk assessment.

The 1% rule cannot apply to solo pilot flying in public transport operations, because it is derived from two pilot operations and the availability of a second pilot to take over in the event of one pilot becoming incapacitated. However, the 1% rule has also been applied to the private pilot population by some States, on a pragmatic basis, such that a private pilot who develops a medical problem may be permitted to continue to fly as a solo pilot if his risk of an incapacitation is 1% per annum or less. This acceptance of an increased risk of incapacitation in a private pilot seems reasonable since the overall level of safety demanded of private operations is less than that of commercial operations and it would therefore be out of place to demand a professional pilot medical standard for private pilot operations.

The “1% rule” provides a rational, objective method of assessing the fitness of applicants. However, other limits of acceptable incapacitation risk, such as 2% per annum, have been suggested. The important point is that States should endeavour to define objective fitness criteria to encourage consistency in decision-making and to assist in improving global harmonization of medical standards.

Causes of incapacitation

A dramatic form of pilot incapacitation, although not necessarily its most hazardous, is death in the cockpit. A survey (1993 - 1998) of flight crew incapacitation on United States scheduled airlines recorded five deaths in the cockpit, all owing to cardiovascular diseases. The youngest pilot was 48 years of age

when he died. No case resulted in aircraft damage or operational incident. It should be noted that ICAO introduced the requirement for incapacitation training in two-pilot operations in the 1970s and this has undoubtedly reduced the risk to flight safety from pilot incapacitation.

Incapacitations from self-limiting illness may be less dramatic but are considerably more frequent. In two studies of airline pilots, in 1968 and again in 1988, more than 3000 airline pilots completed an anonymous questionnaire survey including questions about whether they had ever experienced an incapacitation during a flight. In both studies, which revealed remarkably consistent results, about 30% answered “yes”. However, only about 4% considered their incapacitation a direct threat to flight safety. In both studies the most frequently cited cause of incapacitation was acute gastroenteritis (see Table 1).

Table 1. Causes of incapacitation in airline pilots, in order of frequency.
(Adapted from Buley, 1969; Green and James, 1991)

1.	Uncontrollable bowel action (21%) and “other” gastrointestinal symptoms (54%)	75%
2.	Earache/blocked ear	8%
3.	Faintness/general weakness	7%
4.	Headache, including migraine	6%
5.	Vertigo/disorientation	4%

As can be seen, most of these incapacitations are caused by gastrointestinal upsets which are usually impossible to predict. Whilst they may represent little more than varying degrees of discomfort and inconvenience, they can also be completely incapacitating. Here is an example taken from a pilot’s report:

Trip was normal up to time of incident. Approximately half-way between LAS and LAX, shortly after reaching cruise, I experienced severe abdominal pains which soon rendered me incapable of operating a safe flight. I turned command over to the First Officer and put the Second Officer in the First Officer’s seat while I lay in great pain on the cockpit floor.

Trip landed safety at LAX with First Officer . . . at the controls. An ambulance was requested by the crew...

I was taken to the Daniel Freeman Hospital in LAX where . . . (I was given) . . . a diagnosis of gastroenteritis. I think that spells food poisoning in our language. After some medication I felt wonderfully relieved and was released from the hospital.

Fortunately, gastroenteritis rarely occurs so suddenly as to prevent a planned handover of control, thereby minimizing the flight safety risk.

Pilot incapacitation is clearly both a traditional aeromedical problem and a straightforward training problem. As long ago as 1970, a past Chief of ICAO’s Aviation Medicine Section, wrote:

“ . . . It is suggested that acknowledgement of pilot on-duty incapacitation . . . as a permanent part of the air transport industry scene in the foreseeable future constitutes a constructive rather than a defeatist medical position. Further, it appears essential that the design, management, operational, training, and licensing disciplines should recognize that pilot incapacitation must be given due weight . . . in the overall judgement of what level of safety is practically available.”

Medical screening, by itself, cannot be relied upon to reduce the hazard of incapacitation to an acceptable minimum level, even if significantly more rigorous medical standards were to be

applied. Other important aspects, over which medical examiners have little direct control, include pilot education in the causes of incapacitation, pilot training for safe handover of controls in such an event and, especially, good food hygiene and low-risk, separate meals for the flight crew. From the operational/training viewpoint, the maxim that “any pilot can become incapacitated at any time” is relevant.

Pilot incapacitation training

Pilot training in the early recognition of incapacitation and in safe handover of controls, pioneered in the United States, has been highly effective in preventing accidents from physical incapacitation. It seems less effective in the case of mental incapacitation. Because the majority of accidents result from human failure of some sort, degradation of performance from commonly occurring sub-clinical conditions such as mild anxiety and depression, sleep loss and circadian rhythm disturbance is an important factor in this area of relative incapacitation. Although mostly a small problem amongst flight crew, the problematic use of psychoactive substances is likely to become more important as their general use in society increases.

Incapacitations can be divided into two operational classifications: “obvious” and “subtle”. Obvious incapacitations are those immediately apparent to the other crew members. The time course of onset can be “sudden” or “insidious” and complete loss of function can occur. Subtle incapacitations are frequently partial in nature and can be insidious because the affected pilot may look well and continue to operate but at a less than optimum level of performance. The pilot may not be aware of the problem or capable of rationally evaluating it. Subtle incapacitations can create significant operational problems.

A series of 81 simulated obvious and subtle incapacitations showed that pilots needed help in two areas: their first need was for a method of detecting subtle incapacitations before they became operationally critical; their second need was for an organized method of handling the incapacitations once they were recognized. It was learned that all pilot incapacitations create three basic problems for the remaining crew. This is true whether the incapacitation is obvious or subtle and whether there is a two- (or more) member crew. Although this study was carried out many years ago, its recommendations are still valid. If an in-flight incapacitation occurs, the remaining flight crew has to:

- a) maintain control of the aircraft
- b) take care of the incapacitated crew member
(An incapacitated pilot can become a flight deck hazard and, in any case, is a major distraction to the remaining crew. For this reason, responsibility for the incapacitated pilot, who should preferably be removed from the flight deck, should be given to the cabin crew)
- c) reorganize the cockpit and bring the aircraft to a safe landing.

These three steps became the organized plan for handling in-flight incapacitation. They should be taken separately and in order.

“Two communication” rule

The “two communication” rule was developed to meet the need for a method of detecting subtle incapacitations before they become operationally critical. The rule states: “Flight crew members should have a high index of suspicion of a “subtle” incapacitation any time a crew member does not respond appropriately to two verbal communications, or any time a crew member does not respond appropriately to any verbal communication associated with a significant deviation from a standard operating procedure or a standard flight profile.” This rule is easy, straightforward, and effective.

Cognitive incapacitation

A particular category of incapacitations has been identified as “cognitive.” The problem created by these incapacitations is how to deal with a pilot who is “mentally disoriented, mentally incapacitated or obstinate, while physically able and vocally responsive.” In this category, the captain presents the most difficult case.

While cognitive incapacitations may seem to be psychologically based, in some cases the underlying causes are pathological, as with a brain tumour, causing an erratic performance. Retrospectively, there often seems to have been ample warning of an impending problem. In most cases of cognitive incapacitation, the pilot demonstrates manifestly inappropriate behaviour involving action or inaction, and the inappropriate behaviour is associated with failures of comprehension, perception, or judgement.

These kinds of incidents seldom occur in isolation because, in most cases, they represent a pattern of behaviour. Two excerpts from reports to NASA’s ASRS (National Aeronautics and Space Administration Aviation Safety Reporting System) illustrate the repetitive nature - or pattern - of what may be examples of this grey, but important, problem area.

- a) “On two occasions we descended through our assigned altitude. I was the non-flying pilot and made all the call-outs . . . On both occasions, in addition to the required call-outs, I informed the flying pilot that we were descending through our assigned altitude. His corrections were slow and on one occasion we went 400 feet below, and on the other, 500 feet below the assigned altitude. In addition, his airspeed and heading control were not precise . . .”

The reporter elaborated further in a telephone call:

“. . . Captain reacted almost catatonically to his altitude call-outs and the additional call-outs that they were descending through the cleared altitudes. Definitely very delayed reactions. Other aspects of the trip were reasonably normal except that Captain missed several radio transmissions. ‘It was as if he simply didn’t hear them’ . . .”

- b) From a telephone call to a pilot reporting a different incident:

“Reporter believes Captain has serious and persistent ‘subtle’ incapacitation problem. Reported incident (which included successive altitude deviations) . . . happened on first trip of the month . . . Remainder of month with Captain has had same pattern with many cases of very poor performance . . . Seems to be increasingly slow thinker in the aeroplane. Has to be reminded of things several times, even including getting his signature on required papers . . .”

The deliberate failure to follow established rules and procedures is a very old problem and the “maverick” pilot is by no means a new phenomenon. One Chief Medical Officer commented on the difficulties with dealing with aberrant behaviour in the medical context. The following paragraph is taken from his paper given at an aeromedical examiner symposium in the 1980s:

Psychiatric disturbances giving rise to unusual behaviour are . . . like alcoholism . . . often covered up. There is, however, genuine difficulty here, for aviation attracts eccentrics - indeed, aviation has only reached its present state because of eccentrics. It is often very difficult to define the boundaries between normality, eccentricity, and psychiatric disorder, and individuals, not uncommonly, cross over these boundaries from day to day. The ICAO definition - ‘manifested by repeated overt acts’ - is a useful indicator of the need for, at least, investigation.

The nature of air transport operations is such that the individuals in the best position to observe repeated overt acts and, from a practical standpoint, the only ones situated to do so, are other crew members. This creates a different sort of resource management problem. It is an obvious challenge for management. It is

also a challenge for pilot-representative organizations.

Control of the incapacitation risk is dependent upon effective operational monitoring. A basic requirement for that monitoring is that all flight crew members must know what should be happening with and to the aeroplane at all times. This is one of the most important reasons for following standard operating procedures (SOPs) and flying standard flight profiles. The real importance of SOPs lies as much in the area of information transfer as it does with respect to the issue of the proper way to fly the aircraft. Routine adherence to SOPs helps to maximize information transfer in much the same way that the use of standard phraseology does in air traffic control communications.

Detection of subtle incapacitation may be indirect, i.e. as a result of a pilot not taking some anticipated action. If, for example, the pilot conducting the approach to land silently loses consciousness and his body position is maintained, the other pilot may not be aware of his colleague's predicament until the expected order of events becomes interrupted. Regular verbal communication, built into standard operating procedures, and use of the "two communication rule" are helpful to detect subtle incapacitation, especially when physical control inputs are unnecessary, e.g. automatic approach.

Fail-safe crew

The object of "fail-safe crewing" is to provide an adequate number of crew members to cope with flight crew workloads, and to make it possible fully to integrate the flight crew members into a flight crew team so as to establish a crew in which there is always at least one fully competent pilot at the controls. Ideally the actions of each crew member should continuously be monitored by his fellow crew member(s). The concept aims at achieving maximum safety in the operation of the aircraft and equitable distribution of cockpit workload so as to ensure the crew can cope with all requirements including peak demands in adverse weather or under emergency conditions – such as in-flight pilot incapacitation.

The "fail-safe crew" concept is the key ingredient for successfully dealing with any form of pilot incapacitation. Support at all levels of management and pilot representation is needed for the "fail-safe crew" to, in practice, do justice to the concept. Meaningful simulator training, reinforced with a suitable education programme, is a requirement.

The story of controlling the incapacitation risk in air transport is the story of a progress made in a series of small but important steps. Learning to manage the cognitive incapacitation risk remains an important goal.

Crew resource management

In modern flight operations, line-oriented flight training (LOFT) emphasizes that resource management is making a substantial contribution to flight safety.

A captain representing a pilots association explained the concept as follows:

“. . . One of the basic fundamentals of this philosophy is that it is the inherent responsibility of every crew member, if he be unsure, unhappy or whatever, to question the pilot in command as to the nature of his concern. Indeed, it would not be going too far to say that if a pilot in command were to create an atmosphere whereby one of his crew members would be hesitant to comment on any action, then he would be failing in his duty as pilot in command . . .”

Training in crew cooperation, called crew resource management (CRM), is now provided by most major airlines but frequently not to the same extent by smaller operators. In smaller companies, procedures are less standardized and a greater degree of individuality is tolerated, so behavioural problems can be expected to be more common, and experience has shown that this is the case. In recent years CRM has been expanded to include the interaction between flight and cabin crew in recognition of the fact that cabin crew members can sometimes have operationally relevant knowledge that flight crew do not have. This was dramatically demonstrated in the United Kingdom in 1989 when a flight crew shut down the wrong engine of a Boeing 737. Although the pilots believed their action was correct, the cabin crew had seen flames issuing from the other engine, but unfortunately this information was not communicated to the flight crew. In the ensuing crash several passengers and crew members were killed or severely injured.

While most would agree that CRM training is helpful in promoting flight safety, its assessment is more controversial. Interpersonal relationships are not particularly amenable to measurement and there is much suspicion among pilots about any process which attempts, or seems to attempt, to measure personality.

Medical standards and prevention of pilot incapacitation

One of the major purposes of medical examinations and determination of medical fitness of an applicant is to assess the probability of a medical condition resulting in in-flight incapacitation. Based only on such an assessment can the authority objectively consider certification that is compatible with generally accepted flight safety standards. In this context a discussion of the 1% rule can be found above.

The medical examiner is in many cases handicapped in making such an assessment, because adequate predictive epidemiological data are not available for the condition itself or, if they are, they cannot be readily applied to the flight environment. This situation is, however, improving. Figures for the risk of a future cardiac event in an individual recovering from a common cardiac problem such as myocardial infarction are available. Figures may also be available for certain other relatively common diseases, such as the risk of a cerebral metastasis from a recurrence of a surgically removed malignant melanoma, or the recurrence of an epileptic seizure after a first fit. It should be remembered that a medical condition in a pilot that might potentially result in only a loss of efficiency or a moderate decrease in safety in a multi-pilot aircraft might incur great risk in single-pilot operations.

However, more demanding medical requirements cannot alone adequately control the flight safety risk posed by the possibility of an in-flight incapacitation. Grounding older pilots who have medical problems may incur a high price in terms of sacrifice of pilot expertise. This might, paradoxically, have the opposite effect of that desired because it is possible that flight safety would suffer if older experienced pilots with minor health problems were replaced by younger and healthier, but less experienced pilots. At the same time, it seems reasonable to assume that uneventful flying experience may breed complacency and also that experience, obtained many years ago in aircraft types no longer flown and with navigational systems and other equipment no longer in use, may be of little value today. Unfortunately, the data relating pilot experience to risk of accident are sparse, although there is little evidence to suggest that the risk changes much between 60 and 65 years of age, the latter limit becoming applicable (increased from 60 years) in multi-crew aircraft in 2006. This is, however, not to say that refinements in aeromedical examination and certification techniques should not be pursued.

It should also be mentioned that very demanding medical standards, at least ones that are perceived as unjust by licence holders, may result in applicants withholding important medical information from the medical examiner with a consequent decrease of flight safety. Since the medical history is more important than the medical examination in eliciting conditions of flight safety concern, it is important that an applicant believes he will be treated fairly, should he volunteer that he has a particular medical problem. In cooperation with all stakeholders, including representative bodies of licence holders, States

should strive to develop a “just culture” to minimize this risk.

Evidence-based decision making

A continued assessment of in-flight crew incapacitation as a flight safety hazard requires collection of related data. Reporting of incapacitation incidents to ICAO is an integral part of an accident/incident reporting system on a world-wide basis, but suffers from two major difficulties: firstly, the data are incomplete as not all Contracting States send information on accidents and incidents, and secondly, the data are rarely assessed and classified by personnel who understand the medical implications. Moreover, Contracting States which have their own reporting system are often hampered by the confidential nature of the information supplied. For example, a report following an incapacitation is often filed by another crew member who does not reveal the name of the incapacitated person, making follow-up difficult.

Further, incapacitation data classified by means of a layman’s diagnosis may be incorrect or misleading: a pilot who collapses with abdominal pain may be suffering from one of a number of medical problems, but is likely to be diagnosed by other crew members as having a gastrointestinal upset. The diagnosis might not be relevant at the time of incapacitation, but is important for monitoring medical standards and in determining where the maximum benefit for a given effort is achieved with respect to reducing the incidence of in-flight incapacitation. Attention needs to be given to devising a more accurate, preferably international, method of recording and classifying data on in-flight incapacitations. In recent years ICAO has taken the initiative to require a Safety Management System (SMS) to be incorporated into the routine management of aerodromes, air traffic and airlines. An integral part of SMS is that of measuring and recording safety events, and of setting targets. It is to be hoped that this development will provide the stimulus towards a more evidence-based application of aeromedical standards.

CONCLUSIONS

In-flight pilot incapacitation is an air safety hazard and is known to have caused accidents. Such incapacitation occurs more frequently than many other emergencies that are routinely trained for, such as sudden decompression. Incapacitation can occur in many forms, ranging from sudden death to a not easily detectable partial loss of function, and has occurred in all pilot age groups and during all phases of flight.

It is important to recognize the operational ramifications of pilot incapacitation. Medical officers working for regulatory bodies should be fully aware of the operational aspects.

Instruction and training of flight crew concerning action in the event of in-flight pilot incapacitation should include early recognition of incapacitation as well as the appropriate action to be taken by other flight crew members.

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