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Government Notice

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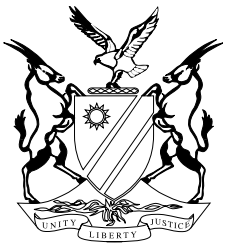
No. 186 2003

NAMIBIA CIVIL AVIATION TECHNICAL STANDARDS:
NAM-CATS-OPS 91 "GENERAL OPERATING AND FLIGHT RULES"

The Director: Civil Aviation has under regulation 11.03.5 of the Namibian Civil Aviation Regulations, 2001 and in consultation with the Civil Aviation Regulations Committee issued the technical standards in the Schedule. These technical standards shall come into operation on 1 September 2003.



REPUBLIC OF NAMIBIA

CIVIL AVIATION

DOCUMENT NAM-CATS-OPS 91
(GENERAL OPERATING AND FLIGHT RULES)

NAMIBIAN CIVIL AVIATION TECHNICAL STANDARDS RELATING TO GENERAL OPERATING AND FLIGHT RULES

1. GENERAL

Section 22A of the Aviation Act, 1962 (as amended by section 5 of the Aviation Amendment Act, 1998) empowers the Director: Civil Aviation to issue technical standards for civil aviation on the matters which are prescribed by regulation.

The Director: Civil Aviation has pursuant to the empowerment mentioned above, on 1 August 2003 issued technical standards relating to general operating and flight rules to be known as Document NAM-CATS-OPS 91.

2. PURPOSE

Document NAM-CATS-OPS 91 contains the standards, rules, requirements, methods, specifications, characteristics and procedures which are applicable in respect of general operating and flight rules.

Each reference to a technical standard in this document, is a reference to the corresponding regulation in the Namibian Civil Aviation Regulations, 2001, for example, technical standard 91.02.8 refers to regulation 8 of Subpart 02 of Part 91 of the Regulations.

The abbreviation "CAR" is used throughout this document when referring to any regulation.

The abbreviation "TS" refers to any technical standard.

3. SCHEDULES AND NOTES

Guidelines and recommendations in support of any particular technical standard, are contained in schedules to, and/or notes inserted throughout the technical standards.

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91.01.6 INFORMATION ON EMERGENCY AND SURVIVAL EQUIPMENT CARRIED

1. Emergency and survival list

An owner or operator must have a list containing the following minimum information regarding the emergency and survival equipment carried on board:

(1) The number, colour and type of life rafts and pyrotechnics;

(2) details of emergency medical supplies;

(3) water supplies; and

(4) type and frequencies of emergency portable radio equipment.

91.01.10 ELECTRONIC DEVICES

1. Operation of electronic devices on board an aircraft during flight time

Electronic devices which are not intentional transmitters of radio signals, may, with the prior permission of the pilot-in-command, be operated on board an aircraft, but only in the cruise phase of flight.

Examples of such devices are -

(1) laptop computers;

(2) video cameras;

(3) tape recorders;

(4) electronic entertainment devices; and

(5) hand held calculators.

91.02.4 REGENCY

2. Cellular Telephone

Cellular telephones may not be used at any time during flight.

91.02.7 DUTIES OF PILOT-IN-COMMAND REGARDING FLIGHT PREPARATION

1. Category II approach

A Category II approach is an ILS approach procedure which provides for an approach to a decision height lower than 200 feet but not lower than 100 feet and a RVR of not less than 350 m, in the case of a manual landing, or 300 m, in the case of an automatic landing.

2. Category III approach

A Category III approach is divided into a -

(1) Category III A approach, which is an ILS approach procedure which provides for an approach with either a decision height lower than 100 feet or with no decision height and with a RVR of not less than 200 m;

(2) Category III B approach, which is an ILS approach procedure which provides for an approach with either a decision height lower than 50 feet or with no decision height and with a RVR of less than 200 m but not less than 75 m; and

(3) Category III C approach, which is an ILS approach procedure which provides for an approach with no decision height and no RVR limitations.

91.03.4 FLIGHTPLAN

1. Form of a flight plan

(1) A flight plan filed prior to departure must contain the following items:

(a) Aircraft identification and transponder data;

(b) flight rules and type of flight;

(c) number and type(s) of aircraft and wake turbulence category;

(d) radio communication, navigation and approach-aid equipment;

(e) aerodrome of departure and time;

(f) flight information region boundaries and estimated times;

(g) cruising speed and flight level;

(h) route to be followed;

(i) aerodrome of destination and estimated times of arrival;

(j) alternate aerodrome(s);

(k) alerting action required;

(l) fuel endurance;

(m) total number of persons on board;

(n) emergency and survival equipment and colour of aircraft;

(o) other pertinent information; and

(p) name, postal address, telephone and telefax number of the owner or operator of the aircraft which must be completed in field 18 of the standard flight plan form.

(2) A flight plan filed in flight to comply with CAR 91.03.4(6) must contain the following items:

(a) Aircraft registration;

(b) flight rules;

(c) type of aircraft;

(d) aerodrome of departure;

(e) cruising speed and flight level;

(f) route to be followed and estimates as applicable;

(g) aerodrome of destination and estimated time of arrival;

(h) alternate aerodrome for IFR flights;

(i) alerting action required;

(j) fuel endurance if alerting action required;

(k) total number of persons on board; and

(l) name, postal address, telephone and telefax number of the owner or operator of the aircraft.

91.03.5 TECHNICAL LOG

1. Information to be contained in a technical log

(1) The following information for each flight must be retained in the form of a technical log:

(a) Aircraft registration;

(b) date;

(c) name(s) of crew member(s);

(d) duty assignment of crew member(s);

(e) place of departure;

(f) place of arrival;

(g) time of departure (off-block time);

(h) time of arrival (on-block time);

(i) hours of flight;

(j) nature of flight;

(k) incidents, observations (if any);

(l) signature of pilot-in-command;

(m) the current maintenance statement giving the aeroplane maintenance status of what maintenance, scheduled or out of phase, is next due;

(n) all outstanding deferred defects which affect the operation of the aeroplane;

(o) fuel used; and

(p) fuel uplift.

(2) The owner or operator need not keep a technical log or part thereof, if the relevant information is available in other documentation.

(3) The owner, operator or pilot-in-command must ensure that all entries are made concurrently and that they are permanent in nature.

91.04.10 FLIGHT RECORDER

1. Flight recorder specifications

All digital flight recorders must comply with one of the following specifications as applicable:

(1) ARINC 542A

(2) ARINC 573-717

(3) ARINC 717

(4) ICAO.

91.04.12 COCKPIT VOICE RECORDER

1. Types of aircraft

(1) An aeroplane with a maximum certificated mass exceeding 5 700 kilograms, classified for operation in the transport category, and to which an individual certificate of airworthiness was first issued on or after 1 January 1987.

(2) An aeroplane with a maximum certificated mass exceeding 27 000 kilograms, to which an individual certificate of airworthiness was first issued on or after 1 January 1987.

(3) A turbo-engine aeroplane to which an individual certificate of airworthiness was first issued before 1 January 1987, which is an aeroplane with a maximum certificated mass exceeding 27 000 kilograms, and is of a type of which the prototype was certified by an appropriate authority after 30 September 1969.

(4) A helicopter with a maximum certificated mass exceeding 7 000 kilograms, to which an individual certificate of airworthiness was first issued on or after 1 January 1987.

91.04.13 FLIGHT DATA RECORDER

1. Types of aircraft

(1) An aeroplane or helicopter in respect of which an individual certificate of airworthiness was issued on or after 1 January 1989 which -

(a) is an aeroplane with a MCM exceeding 27 000 kg;

(b) is an aeroplane with a MCM exceeding 5 700 kg, up to and including 27 000 kg, classified in the public transport or transport of cargo category; or

(c) is a helicopter with a MCM exceeding 7 000 kg and is engaged in international operations,

may not be operated unless such aeroplane or helicopter is equipped with the appropriate flight data recorder prescribed in subparagraph (3).

(2) A turbine-engine aeroplane with a MCM exceeding 27 000 kg of which the prototype was certified by an appropriate authority after 30 September 1969, may not be operated unless such aeroplane is equipped with the appropriate flight data recorder prescribed in subparagraph (3).

(3) (a) An aeroplane referred to in subparagraph (1)(a) must be equipped with a Type I flight data recorder prescribed in Table 1.

(b) An aeroplane referred to in subparagraph (1)(b) must be equipped with a Type II flight data recorder prescribed in Table 1.

(c) A helicopter referred to in subparagraph (1)(c) must be equipped with a Type IV flight data recorder prescribed in Table 2.

(d) A turbine-engine aeroplane referred to in subparagraph (2) must be equipped with a Type II flight data recorder prescribed in Table 1.

(4) A turbine-engine aeroplane with a MCM exceeding 5 700 kg which is classified for operation in the public transport or transport of cargo category, and -

(a) in respect of which an individual certificate of airworthiness was first issued on or after 1 January 1987, but before 1 January 1989; or

(b) in respect of which an individual certificate of airworthiness was first issued before 1 January 1987,

may not be operated unless such aeroplane is equipped with a flight data recorder which records -

(i) time;
(ii) altitude;
(iii) airspeed;
(iv) normal acceleration;
(v) heading; and
(vi) pitch.

(5) In the case of an aeroplane or helicopter referred to in subparagraph (1), in respect of which an individual certificate of airworthiness was first issued before 1 January 1987, the flight data recorder may be combined with the cockpit voice recorder.

91.04.14 SEATS, SEAT SAFETY BELTS, HARNESSES AND RESTRAINT DEVICES

Reserved

91.04.16 STANDARD FIRST AID KIT

1. Standard first aid kits

(1) The following must be included in the first aid kit:

(a) Bandage (unspecified);

(b) burns dressings (unspecified);

(c) wound dressings, large and small;

(d) adhesive tape, safety pins and scissors;

(e) small adhesive dressings;

(f) antiseptic wound cleaner;

(g) adhesive wound closures;

(h) adhesive tape;

(i) disposable resuscitation aid;

(j) simple analgesic e.g. paracetamol;

(k) antiemetic e.g. cinnarizine;

(l) nasal decongestant;

(m) first aid handbook;

(n) splints, suitable for upper and lower limbs;

(o) gastrointestinal antacid +;

(p) anti-diarrhoeal medication e.g. loperamide +;

(q) ground/air visual signal code for use by survivors;

(r) disposable glove; and

(s) a list of contents. This should include information on the effects and side effects of drugs carried.

Note: 1. An eye irrigator whilst not required to be carried in the first aid kit should, where possible, be available for use on the ground.

2. + indicates aircraft with more than 9 passenger seats installed.

(2) Unless the standard first aid kit is clearly visible, its location must be indicated by a placard or sign, and appropriate symbols may be used to supplement the placard or sign.

(3) An owner or operator must ensure that the standard first aid kit is readily accessible for use.

(4) An aircraft must be equipped with the following number of standard first aid kits:

Number of passenger seats installed	Number of standard first aid kits required
0 to 99	1
100 to 199	2
200 to 299	3
300 and more	4

91.04.17 FIRST AID OXYGEN

1. Supply of first aid oxygen

(1) The amount of oxygen must be calculated using an average flow rate of at least 3 litres Standard Temperature Pressure Dry (STPD)/minute/person and provided for the entire flight after cabin depressurisation at cabin altitudes of more than 8 000 ft for at least 2% of the passengers carried, but in no case for less than one person. There must be a sufficient number of dispensing units, but in no case less than two, with a means for cabin crew to use the supply.

(2) The amount of first aid oxygen required for a particular operation must be determined on the basis of cabin pressure altitudes and flight duration, consistent with the operating procedures established for each operation and route.

2. Oxygen equipment

(1) The oxygen equipment provided must be capable of generating a mass flow to each user of at least four litres per minute, STPD. Means may be provided to decrease the flow to not less than two litres per minute, STPD, at any altitude.

(2) The dispensing units may be of a portable type.

91.04.18 SUPPLEMENTAL OXYGEN IN THE CASE OF PRESSURISED AIRCRAFT

1. General

(1) An owner, operator or pilot-in-command may not operate a pressurised aircraft above 10 000 feet unless supplemental oxygen equipment, capable of storing and dispensing the oxygen supplies required by this technical standard, is provided.

(2) The amount of supplemental oxygen required must be determined on the basis of cabin altitude, flight duration and the assumption that a cabin pressurisation failure will occur at the altitude or point of flight that is most critical from the standpoint of oxygen need, and that, after the failure, the aircraft will descend in accordance with emergency procedures specified in the aircraft flight manual to a safe altitude for the route to be flown that will allow continued safe flight and landing.

(3) Following a cabin pressurisation failure, the cabin altitude must be considered the same as the aircraft altitude, unless it is demonstrated to the Director that no probable failure of the cabin or pressurisation system will result in a

cabin pressure altitude equal to the aircraft altitude. Under these circumstances, this lower cabin pressure altitude may be used as a basis for determination of oxygen supply.

2. Oxygen equipment and supply requirements

(1) Flight crew members

(a) Each flight crew member on flight deck duty must be supplied with supplemental oxygen in accordance with paragraph 3. If all occupants of flight deck seats are supplied from the flight crew source of oxygen supply then they must be considered as flight crew members on flight deck duty for the purpose of oxygen supply. Flight deck seat occupants, not supplied by the flight crew source, are to be considered as passengers for the purpose of oxygen supply.

(b) Flight crew members, not covered by subparagraph (1)(a) above, are to be considered as passengers for the purpose of oxygen supply.

(c) Oxygen masks must be located so as to be within the immediate reach of flight crew members whilst at their assigned duty station.

(d) Oxygen masks for use by flight crew members in pressurised aeroplanes operating above 25 000 ft must be a quick donning type of mask.

(2) Cabin crew members, additional crew members and passengers

(a) Cabin crew members and passengers must be supplied with supplemental oxygen in accordance with paragraph 3. Cabin crew members carried in addition to the minimum number of cabin crew members required, and additional flight crew members, are to be considered as passengers for the purpose of oxygen supply.

(b) When operating above 25 000 feet there must be provided sufficient spare outlets and/or portable oxygen units are to be distributed evenly throughout the cabin to ensure immediate availability of oxygen to each required cabin crew member regardless of his or her location at the time of cabin pressurisation failure.

(c) When operating above 25 000 feet there must be an oxygen dis-pensing unit connected to oxygen supply terminals immediately avail-able to each occupant, wherever seated. The total number of dispensing units and outlets must exceed the number of sets by at least 10%. The extra units are to be evenly distributed throughout the cabin.

(d) The oxygen supply requirements, as specified in paragraph 3 for aircraft not certificated to fly at altitudes above 25 000 feet, may be reduced to the entire flight time between 10 000 feet and 14 000 feet cabin pressure altitudes for all required cabin crew members and for at least 10% of the passengers if, at all points along the route to be flown, the aircraft is able to descend safely within 4 minutes to a cabin pressure altitude of 14 000 feet.

91.04.18 SUPPLEMENTAL OXYGEN IN THE CASE OF PRESSURISED AIRCRAFT

3. Minimum requirements for supplemental oxygen for pressurised aircraft

SUPPLY FOR	DURATION AND CABIN PRESSURE ALTITUDE
1. All occupants of flight deck seats on flight deck duty	Entire flight time when the cabin pressure altitude exceeds 13 000 feet and entire flight time when the cabin pressure altitude exceeds 10 000 feet but does not exceed 13 000 feet after the first 30 minute at those altitudes, but in no case less than: (i) 30 minutes for aircraft certificated to fly at altitudes not exceeding 25 000 feet (Note 2) (ii) 2 hours for aircraft certificated to fly at altitudes more then 25 000 feet (Note 3)
2. All required cabin crew members	Entire flight time when cabin pressure altitude exceeds 13 000 feet but not less than 30 minutes (Note 2), and entire flight time when cabin pressure altitude is greater than 10 000 feet but does not exceed 13 000 feet after the 30 minutes at these altitudes.
3. 100% of passengers (Note 5)	10 minutes or the entire flight time when the cabin pressure altitude exceeds 15 000 feet whichever is the greater (Note 4).
4. 30% of passengers (Note 5)	Entire flight time when the cabin pressure altitude exceeds 14 000 feet but does not exceed 15 000 feet.
5. 10% of passengers (Note 5)	Entire flight time when the cabin pressure altitude exceeds 10 000 feet but does not exceed 14 000 feet after the first 30 minutes at these altitudes.

Note 1: ***The supply provided must take account of the cabin pressure altitude and descent profile for the routes concerned.***

Note 2: ***The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft's maximum certificated operating altitude to 10 000 feet in 10 minutes and followed by 20 minutes at 10 000 feet.***

Note 3: ***The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft's maximum certificated operating altitude to 10 000 feet in 10 minutes and followed by 110 minutes at 10 000 feet.***

Note 4: ***The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft's maximum certificated operating altitude to 15 000 feet.***

Note 5: ***For the purpose of this table 'passengers' means passengers actually carried and includes infants.***

4. Quick donning mask

A quick donning mask is the type of mask that -

(1) can be placed on the face from its ready position, properly secured, sealed, and supplying oxygen upon demand, with one hand and within 5 seconds and will thereafter remain in position, both hands being free;

(2) can be put on without disturbing eye glasses and without delaying the crew member from proceeding with assigned emergency duties;

(3) after being put on, does not prevent immediate communication between the flight crew members and other crew members over the aeroplane intercommunication system;

(4) does not inhibit radio communications.

91.04.19 SUPPLEMENTAL OXYGEN IN THE CASE OF NON-PRESSURISED AIRCRAFT

1. General

(1) An owner, operator or pilot-in-command may not operate a non-pressurised aircraft at altitudes above 10 000 feet and up to 12 000 feet for longer than 60 minutes, or above 12 000 feet unless supplemental oxygen equipment, capable of storing and dispensing the oxygen supplies required, is provided.

(2) The amount of supplemental oxygen for sustenance required for a particular operation must be determined on the basis of flight altitudes and flight duration, consistent with the operating procedures established for each operation and with the routes to be flown, and with the emergency procedures, if applicable.

2. Oxygen supply requirements

(1) Flight crew members

Each flight crew member on flight deck duty must be supplied with supplemental oxygen in accordance with paragraph 3. If all occupants of flight deck seats are supplied from the flight crew source of oxygen supply, then they are to be considered as flight crew members on flight deck duty for the purpose of oxygen supply.

(2) Cabin crew members, additional flight crew members and passengers

Cabin crew members and passengers must be supplied with oxygen in accordance with paragraph 3. Cabin crew members carried in addition to the minimum number of cabin crew members required, and additional flight crew members, are to be considered as passengers for the purpose of oxygen supply.

3. Minimum requirements for supplemental oxygen for non-pressurised aeroplanes

SUPPLY FOR	DURATION AND CABIN PRESSURE ALTITUDE
1. All occupants of flight deck seats on flight deck duty	Entire flight time at pressure altitudes above 12 000 feet and for any period exceeding 60 minutes at pressure altitudes above 10 000 feet but not exceeding 12 000 feet.
2. All required cabin crew members	Entire flight time at pressure altitudes above 12 000 feet and for any period exceeding 60 minutes at pressure altitudes above 10 000 feet but not exceeding 12 000 feet.
3. 100% of passengers (See Note)	Entire flight time at pressure altitudes above 12 000 feet.
4. 10% of passengers (See note)	Entire flight time after 60 minutes at pressure altitudes great than 10 000 feet but not exceeding 12 000 feet.

Note: For the purpose of this table 'passengers' means passengers actually carried and includes infants.

91.04.21 HAND FIRE EXTINGUISHERS

1. Definitions

Any word or expression to which a meaning has been assigned in the Aviation Act, 1962, and the Civil Aviation Regulations, 2001, bears, when used in this technical standard, the same meaning unless the context indicates otherwise, and -

(1) "Class A cargo or baggage compartment" means a cargo or baggage compartment in which -

(a) the presence of a fire would be easily discovered by a crew member while at his or her station; and

(b) each part of the compartment is easily accessible in flight;

(2) "Class B cargo or baggage compartment" means a cargo or baggage compartment in which -

(a) there is sufficient access in flight to enable a crew member to effectively reach any part of the compartment with the contents of a hand fire extinguisher;

(b) when the access provisions are being used, no hazardous quantity of smoke, flames or extinguishing agent will enter any compartment occupied by the crew or passengers; and

(c) there is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station;

(3) "Class E cargo compartment" means a cargo compartment used only for the carriage of cargo and in which -

(a) there is a separate approved smoke or fire detector system to give warning at the pilot or flight engineer station;

(b) there are means of shutting off the ventilating airflow to or within the compartment, and the controls for these means are accessible to the flight crew in the flight crew compartment;

(c) there are means of excluding hazardous quantities of smoke, flames, or noxious gases, from the flight crew compartment; and

(d) the required crew emergency exits are accessible under any cargo loading conditions.

2. Hand fire extinguishers

An owner, operator or pilot-in-command may not operate an aircraft unless hand fire extinguishers are provided for use in flight crew, passenger and, as applicable, cargo compartments and galleys in accordance with the following:

(1) The type and quantity of extinguishing agent must be suitable for the kinds of fires likely to occur in the compartment where the extinguisher is intended to be used and, for personnel compartments, must minimise the hazard of toxic gas concentration.

(2) At least one hand fire extinguisher, con-taining Halon 1211 (bromochlorodifluoromethane, $CBrClF_2$), or equivalent as the extinguishing agent, must be conveniently located on the flight deck for use by the flight crew.

(3) At least one hand fire extinguisher must be located in, or readily accessible for use in, each galley not located on the main passenger deck.

(4) At least one readily accessible hand fire extinguisher must be available for use in each Class A or Class B cargo or baggage compartment and in each Class E cargo compartment that is accessible to flight crew members in flight.

(5) At least the following number of hand fire extinguishers must be conveniently located in the passenger compartment(s):

Maximum approved passenger seating configuration	
7 to 30	1
31 to 60	2
61 to 200	3
201 to 300	4
301 to 400	5
401 to 500	6
501 to 600	7
601 or more	8

When two or more extinguishers are required, they must be evenly distributed in the passenger compartment.

(6) At least one of the required fire extinguishers located in the passenger compartment of an aircraft with a maximum approved passenger seating configuration of at least 31, and not more than 60, and at least two of the fire extinguishers located in the passenger compartment of an aircraft with a maximum approved passenger seating configuration of 61 or more must contain Halon 1211, equivalent as the extinguishing agent.

(7) The number and location of hand fire extinguishers must be such as to provide adequate availability for use, account being taken of the number and size of the passenger compartments, the need to minimise the hazard of toxic gas concentrations and the location of toilets, galleys, etc. These considerations may result in the number being greater than the minimum prescribed.

(8) There must be at least one fire extinguisher suitable for both flammable fluid and electrical equipment fires installed on the flight deck. Additional extinguishers may be required for the protection of other compartments accessible to the flight crew in flight. Dry chemical fire extinguishers should not be used on the flight deck, or in any compartment not separated by a partition from the flight deck, because of the adverse effect on vision during discharge and, if non-conductive, interference with electrical contacts by the chemical residues.

(9) Where only one hand fire extinguisher is required in the passenger compartments it must be located near the cabin crew member's station, where provided.

(10) Where two or more hand fire extinguishers are required in the passenger compartments and their location is not otherwise dictated by consideration of subparagraph (7) above, an extinguisher must be located near each end of the cabin with the remainder distributed through the cabin as evenly as is practicable.

(11) Unless an extinguisher is clearly visible, its location must be indicated by a placard or sign, and appropriate symbols may be used to supplement such a placard or sign.

91.04.24 MEGAPHONES

1. Megaphones

(1) An owner, operator or pilot-in-command may not operate an aircraft with a maximum approved passenger seating configuration of more than 60 seats and carrying one or more passengers unless it is equipped with portable battery-powered megaphones readily accessible for use by crew members during an emergency evacuation, to the following scales:

(a) For each passenger deck:

Passenger seating configuration	Number of megaphones required
61 to 99	1
100 or mores	2

(b) For aircraft with more than one passenger deck, in all cases when the total passenger seating configuration is more than 60 seats, at least 1 megaphone is required.

(2) When one megaphone is required, it must be readily accessible from a cabin crew member's assigned seat. Where two or more megaphones are required, they must be suitably distributed in the passenger cabin(s) and readily accessible to cabin crew members assigned to direct emergency evacuations. This does not necessarily require megaphones to be positioned such that they can be reached by a cabin crew member when strapped in a cabin crew member's seat.

(3) Unless the megaphone is clearly visible, its location must be indicated by a placard or sign, and appropriate symbols may be used to supplement the placard or sign.

91.04.25 EMERGENCY LIGHTING

1. Emergency lighting

(1) An owner, operator or pilot-in-command may not operate an aircraft which, in accordance with its individual certificate of airworthiness, has a maximum approved passenger seating configuration of more than nine seats unless it is provided with an emergency lighting system having an independent power supply to facilitate the evacuation of the aircraft. The emergency lighting system must include -

(a) for aircraft which, in accordance with their individual certificate of airworthiness, have a maximum approved passenger seating configuration of more than 19 seats:

(i) Sources of general cabin illumination;

(ii) internal lighting in floor level emergency exit areas;

(iii) illuminated emergency exit marking and locating signs;

(iv) when flying by night, exterior emergency lighting at all overwing exits, and at exits where descent assist means are required or aircraft for which an application for the issuing of a type certificate was made before 1 May 1972;

(v) floor proximity emergency escape path marking system in the passenger compartments for aircraft in respect of which a type certificate was first issued on or after 1 January 1958;

(b) for aircraft which, in accordance with their individual certificate of airworthiness have a maximum approved passenger seating configuration of less than 20 seats or are certificated to TS 21.02.3(3) and (4):

(i) Sources of general cabin illumination;

(ii) internal lighting in emer-gency exit areas;

(iii) illuminated emergency exit marking and locating signs;

(c) for aircraft which in accordance with their individual certificate of airworthiness have a maximum approved passenger seating configuration of less than 20 seats and are not certificated to TS 21.02.3(3) and (4):

(i) Sources of general cabin illumination.

(2) An owner, operator or pilot-in-command may not operate an aircraft which, in accordance with its individual certificate of airworthiness, has a maximum approved passenger seating configuration of less than ten seats, when flying by night, unless it is provided with a source of internal cabin illumination to facilitate the evacuation of the aircraft. The system may use dome lights or other sources of illumination already fitted on the aircraft and which are capable of remaining operative after the battery has been switched off.

91.04.26 AUTOMATIC EMERGENCY LOCATOR TRANSMITTER

1. Distress frequencies

An owner, operator or pilot-in-command must ensure that the automatic emergency locator transmitter (ELT) is capable of transmitting on the distress frequencies 121,5 MHz and 243 MHz, except that, where the whole of a proposed flight is within an area where, for search and rescue purposes, only one of these frequencies is required, the use of that single frequency may be specifically authorised, if so agreed by the authority responsible for search and rescue in the area concerned.

2. Types of ELTs

Types of ELTs are defined as follows:

2.1 **Automatic Fixed (ELT (AF))**

This type of ELT is intended to be permanently attached to the aircraft before and after a crash and is designed to aid search and rescue teams in locating a crash site;

2.2 **Automatic Portable (ELT (AP))**

This type of ELT is intended to be rigidly attached to the aircraft before a crash, but readily removable from the aircraft after a crash. It functions as an ELT during the crash sequence. If the ELT does not employ an integral antenna, the aircraft-mounted antenna may be disconnected and an auxiliary antenna (stores on the ELT case) attached to the ELT. The ELT can be tethered to a survivor or a life-raft. This type of ELT is intended to aid search and rescue teams in locating the crash site or survivor(s);

2.3 **Automatic Deployable (ELT (AD))**

This type of ELT is intended to be rigidly attached to the aircraft before the crash and automatically ejected and deployed after the crash sensor has determined that a crash has occurred. This type of ELT should float in water and is intended to aid search and rescue teams in locating the crash site.

3. Installation

To minimise the possibility of damage in the event of crash impact, the ELT should be rigidly fixed to the aircraft structure as far aft as practicable with its antenna and connections so arranged as to maximise the probability of the signal being radiated after a crash.

91.04.28 LIFE RAFTS AND SURVIVAL RADIO EQUIPMENT FOR EXTENDED OVER-WATER FLIGHTS

1. Equipment

(1) An owner, operator or pilot-in-command must ensure that the aircraft is equipped with sufficient life rafts to carry all persons on board. Unless excess rafts or enough capacity are provided, the buoyancy and seating capacity beyond the rated capacity of the rafts must accommodate all occupants of the aircraft in the event of a loss of one raft of the largest rated capacity.

(2) The life rafts must be equipped with -

(a) a survivor locator light; and

(b) life saving equipment including means of sustaining life as appropriate to the flight to be undertaken.

(3) The following should be included in each life raft :

(a) Means for maintaining buoyancy;

(b) a sea anchor;

(c) life-lines and means of attaching one life raft to another;

(d) paddles for life rafts with a capacity of 6 or less;

(e) means of protecting the occupants from the elements;

(f) a water resistant torch;

(g) signalling equipment to make the pyrotechnical distress signals prescribed in CAR 91.06.13;

(h) for each 4, or fraction of 4, persons which the life raft is designed to carry:

- 100 g glucose tablets;

- 500 ml of water. This water may be provided in durable containers or by means of making seawater drinkable or a combination of both; and

(i) first aid equipment.

Note: ***Items (g) - (i) inclusive, should be contained in a pack.***

(4) An aircraft must be equipped with at least two sets of survival radio equipment capable of transmitting on 121,5 MHz and 243 MHz.

(5) Unless the life rafts and survival radio equipment are clearly visible, its location must be indicated by a placard or sign, and appropriate symbols may be used to supplement the placard or sign.

91.04.29 SURVIVAL EQUIPMENT

1. Survival equipment

An owner, operator or pilot-in-command may not operate an aircraft across areas in which search and rescue would be especially difficult unless it is equipped with the following:

(1) Signalling equipment to make the pyrotechnical distress signals prescribed in CAR 91.06.13;

(2) at least one ELT; and

(3) additional survival equipment for the route to be flown taking account of the number of persons on board as prescribed in paragraph 3: Provided that the additional equipment need not be carried when the aircraft either -

(a) remains within a distance from an area where search and rescue is not especially difficult corresponding to:

- 120 minutes at the one engine inoperative cruising speed for aircraft capable of continuing the flight to an aerodrome with the critical power unit(s) becoming inoperative at any point along the route or planned diversions; or

- 30 minutes at cruising speed for all other aircraft; or

(b) for aircraft certificated to TS 21.02.3(4), no greater distance than that corresponding to 90 minutes at cruising speed from an area suitable for making an emergency landing.

2. Interpretation

For the purposes of this technical standard, the expression “area in which search and rescue would be especially difficult” means -

(1) an area so designated by the State responsible for managing search and rescue; or

(2) an area which is largely uninhabited and where -

(a) the State responsible for managing search and rescue has not published any information to confirm that search and rescue would not be especially difficult; and

(b) the State referred to in (a) does not, as a matter of policy, designate areas as being especially difficult for search and rescue.

3. Additional survival equipment

(1) The following additional survival equipment should be carried when required:

(a) 500 ml of water for each 4, or fraction of 4, persons on board;

(b) one knife;

(c) first aid equipment;

(d) one set of air/ground codes.

(2) In addition, when polar conditions are expected, the following should be carried:

(a) A means for melting snow;

(b) one snow shovel and one ice saw;

(c) sleeping bags for use by one third of all persons on board and space blankets for the remainder or space blankets for all passengers on board; and

(d) one Arctic/polar suit for each crew member carried.

4. Duplicates

If any item of equipment contained in the above list is already carried on board the aircraft in accordance with another requirement, there is no need for this to be duplicated.

5. Location

Unless the survival equipment is clearly visible, its location must be indicated by a placard or sign, and appropriate symbols may be used to supplement the placard or sign.

91.05.1 COMMUNICATION EQUIPMENT

1. General

(1) An owner, operator or pilot-in-command must ensure that a flight does not commence unless the communication and navigation equipment required under Subpart 5 of Part 91 of the CARs is -

(a) approved and installed in accordance with the requirements applicable to them, including the minimum performance standard and the operational and airworthiness requirements;

(b) installed in such manner that the failure of any single unit required for either communication or navigation purposes, or both, will not result in the inability to communicate and/or navigate safely on the route being flown;

(c) in an operable condition for the kind of operation being conducted except as provided in the MEL; and

(d) so arranged that if equipment is to be used by one flight crew member at his or her station during flight, it must be readily operable from his or her station. When a single item of equipment is required to be operated by more than one flight crew member, it must be installed so that the equipment is readily operable from any station at which the equipment is required to be operated.

(2) Communication and navigation equipment minimum performance standards are those prescribed in the applicable NAM-TSO as listed in the NAM-TSO, unless different performance standards are prescribed. Communication and navigation equipment complying with design and performance specifications other than NAM-TSO on the date of commencement of the

CARs may remain in service, or be installed, unless additional requirements are prescribed in Subpart 5.

2. Radio equipment

(1) An owner, operator or pilot-in-command may not operate an aircraft unless it is equipped with radio equipment required for the kind of operation being conducted.

(2) Where two independent (separate and complete) radio systems are required under Subpart 5, each system must have an independent antenna installation except that, where rigidly supported non-wire antennae or other antenna installations or equivalent reliability are used, only one antenna is required.

3. Audio selector panel

An owner, operator or pilot-in-command may not operate an aircraft under IFR unless it is equipped with an audio selector panel accessible to each required flight crew member.

4. Radio equipment for operations under VFR over routes navigated by reference to visual landmarks

An owner, operator or pilot-in-command may not operate an aircraft under VFR over routes than can be navigated by reference to visual landmarks, unless it is equipped with the radio equipment (communication and SSR transponder equipment) necessary under normal operating conditions to fulfil the following:

(1) Communicate with appropriate ground stations;

(2) communicate with appropriate air traffic service facilities from any point in controlled airspace within which flights are intended;

(3) receive meteorological information; and

(4) reply to SSR interrogations as required for the route being flown.

5. Communication and navigation equip-ment for operations under IFR, or under VFR over routes not navigated by reference to visual landmarks

(1) An owner, operator or pilot-in-command may not operate an aircraft under IFR, or under VFR over routes that cannot be navigated by reference to visual landmarks, unless the aircraft is equipped with communication and navigation equipment in accordance with the requirements of air traffic services in the area(s) of operation, but not less than -

(a) two independent radio communi-cation systems necessary under normal operating conditions to communicate with an appropriate ground station from any point on the route including diversions;

(b) one VOR receiving system, one ADF system, one DME and one Marker Beacon receiving system;

(c) one ILS or MLS where ILS or MLS is required for approach navigation purposes;

(d) an area navigation system when area navigation is required for the route being flown;

(e) an additional VOR receiving system on any route, or part thereof, where navigation is based only on VOR signals;

(f) an additional ADF system on any route, or part thereof, where navigation is based only on NDB signals; and

(g) SSR transponder equipment as required for the route being flown.

(2) An owner, operator or pilot-in-command may operate an aircraft that is not equipped with the navigation equipment specified in subparagraph (1)(e) or (f), provided that it is equipped with alternative equipment authorised, for the route being flown, by the Director. The reliability and the accuracy of alternative equipment must allow safe navigation for the intended route.

6. Communication and navigation equipment using the Global Positioning System

6.1 Definitions

Any word or expression to which a meaning has been assigned in the Aviation Act, 1962, and the Civil Aviation Regulations, 2001, bears, when used in this technical standard, the same meaning unless the context indicates otherwise, and -

"sole means navigation system" means a navigation system that, for a given phase of flight, must allow the aircraft to meet all four navigation system performance requirements, accuracy, integrity, availability and continuity of service;

"primary means navigation system" means a navigation system that, for a given operation or phase of flight, must meet accuracy and integrity requirements, but need not meet full availability and continuity of service requirements. Safety is achieved by either limiting flights to specific time periods, or through appropriate procedural restrictions and operational requirements;

"supplemental means navigation system" means a navigation system that must be used in conjunction with a sole means navigation system;

"integrity" means that quality which relates to the trust which can be placed in the correctness of information supplied by a system. It includes the ability of a system to provide timely warnings to users when the system should not be used for navigation;

"receiver autonomous integrity monitoring" means a technique whereby an airborne GPS receiver/processor autonomously monitors the integrity of the navigation signals from GPS satellites, and where reference to RAIM occurs, it includes other approved equivalent integrity monitoring systems.

6.2 Purpose

(1) This paragraph prescribes the requirements for the use of a GPS within Namibian airspace, for the purpose of -

(a) position fixing;

(b) long range navigation including operations on designated RNAV routes;

(c) deriving distance information, for en route navigation, traffic information and ATC separation; and

(d) application of RNAV based separation.

(2) GPS must not be used as a sole means navigation system or for instrument approaches.

(3) GPS may continue to be used as an en route supplemental navigation aid.

6.3 **GPS signal integrity**

(1) System integrity is an essential element of the approval for use of GPS as a primary means navigation system. GPS receivers certified to TSO-C129 provide integrity through the use of RAIM, or an approved equivalent integrity system. When RAIM is lost or not available, the accuracy of the system cannot be assumed to meet the required standard for navigation, or for the application of ATC separation standards.

(2) GPS integrity is also dependent on the number of operational satellites in view, or available for use. Loss of one or more satellites can result in degraded system availability (see paragraph 6.4).

(3) RAIM availability is greatly improved through the use of barometric aiding.

(4) Except as provided in this paragraph, GPS must not be used to fix position, provide distance information or provide primary navigation, unless RAIM is available.

6.4 **GPS satellite constellation**

(1) The approvals contained in this paragraph are based on the availability of the US DoD GPS standard positioning service (SPS) operating to its defined full operational capability (FOC). This service does not meet the requirements of a sole means navigation system.

(2) Disruption to the GPS may result in degradation in GPS service to such a level that some or all of the operational approvals for the IFR primary use of GPS contained in the technical standards may need to be withdrawn. When known, these changes or restrictions will be advised by NOTAM.

(3) Prior knowledge of RAIM availability will enable operators to use the system more efficiently, by allowing operations to be planned around gaps in RAIM coverage (RAIM holes). To achieve these efficiencies, appropriate RAIM prediction capabilities should be available at dispatch locations. Flights should be planned to ensure the safe completion of flight in the event of loss of GPS integrity.

6.5 **Airworthiness requirements**

The following airworthiness requirements must be satisfied:

(1) GPS navigation equipment must have US FAA Technical Standard Order (TSO) C-129 (approved equivalent) authorisation;

(2) if the GPS is installed in such a way that it is integrated with the aircraft's autopilot and navigation system, the GPS must be de-energised when ILS is selected;

(3) the aircraft must be placarded that the GPS is not approved as a sole navigation and/or approach aid; and

(4) automatic barometric aiding function, as provided by TSO C-129, must be connected.

Notes: ***1. Owners, operators and pilots-in-command should be aware that not all TSO C-129 receivers will meet the requirements for future non-precision approaches, other than AGPS Arrivals, and ADME or GPS Arrivals.***

2. ***Owners, operators and pilots-in-command should also be aware that TSO C-129 receivers may not be able to take advantage of future enhanced GPS capabilities, such as wide area or local area augmentation systems (WAAS or LAAS).***

3. ***Owners, operators and pilots-in-command should ensure that receivers are upgradable to accommodate future augmentation which will be required in terminal areas and for approaches.***

6.6 **Pilot training**

The following pilot training requirements must be satisfied:

(1) Prior to using GPS in IFR operations for any of the purposes specified in this paragraph, the holder of a valid instrument rating must, unless exempted by the Director, have completed a course of ground training based on the syllabus contained in Table 3. The course must be conducted by an aviation training organisation approved in terms of Part 141 of the CARs; and

(2) the course must cover both general information and procedures applicable to all types of GPS equipment, as well as the essential operating procedures for a specific type of aircraft equipment. Pilots who have completed the course and who wish to use a different type of GPS aircraft equipment, must ensure that they are familiar with, and competent in, the operating procedures required for that type of equipment, before using it in flight for any of the purposes approved in this paragraph.

6.7 **Operational requirements**

The following operational requirements must be satisfied:

(1) Operating instructions for GPS navigation equipment must be carried on board;

(2) GPS navigation equipment must be operated in accordance with the operating instructions and any additional requirements specified in the aircraft flight manual or flight manual supplement;

(3) in addition to GPS, aircraft must be equipped with serviceable radio navigation systems as prescribed in paragraphs 1 to 5 of this technical standard;

(4) when within rated coverage of ground based navigation aids, pilots must monitor the ground based system, and maintain track as defined by the most accurate ground based radio navigation aid (VOR or NDB) available. If there is a discrepancy between the GPS and ground based system information, pilots must use the information provided by the ground based navigation system;

(5) ATS may require GPS equipped aircraft to establish on, and track with reference to, a particular VOR radial or NDB track for the application of separation;

(6) GPS must not be used as a navigation reference for flight below the MSA, except as otherwise authorised by the Director.

6.8 **Operations without RAIM**

(1) GPS systems normally provide three modes of operation:

(a) Navigation (Nav) Solution with RAIM;

(b) 2D or 3D Nav Solution without RAIM; and

(c) Dead Reckoning (DR), or Loss of Nav Solution.

(2) ATS services, and in particular ATC separation standards, are dependent on accurate navigation and position fixing. If RAIM is lost, the accuracy of the system is assumed not to meet the required standard for both navigation and application of ATC separation. Accordingly, when RAIM is lost, the following procedures must be adopted:

(a) Aircraft tracking must be closely monitored against other on board systems;

(b) in controlled airspace, the ATS unit must be advised if:

(i) RAIM is lost for periods greater than ten minutes, even if GPS is still providing positional information;

(ii) RAIM is not available when the ATS unit requests GPS distance, or if an ATC clearance or requirement based on GPS distance is imposed;

(iii) the GPS receiver is in DR mode, or experiences loss of navigation function, for more than one minute; or

(iv) indicated displacement from track centreline is found to exceed 2 nm, and

ATS may then adjust separation;

(c) if valid position information is lost (2D and DR Mode), or non-RAIM operation exceeds ten minutes, the GPS information is to be considered unreliable, and another means of navigation should be used until RAIM is restored and the aircraft is re-established on track;

(d) following re-establishment of RAIM, the appropriate ATS unit should be notified of RAIM restoration, prior to using GPS information. This will allow the ATS unit to reassess the appropriate separation standards;

(e) when advising the ATS unit of the status of GPS the phrases ARAIM FAILURE or ARAIM RESTORED must be used.

6.9 **GPS distance information to air traffic service units**

(1) When a DME distance is requested by an ATS unit, DME derived distance information should normally be provided. Alternatively, GPS derived distance information may be provided to an ATS unit, unless RAIM is currently unavailable, and has been unavailable for the preceding ten minutes.

(2) Notwithstanding subparagraph (1), if an ATS unit has issued a clearance or requirement based upon GPS distance (e.g. a requirement to reach a certain level by a GPS distance), pilots must inform the ATS unit if RAIM is not available.

(3) When a DME distance is not specifically requested, or when the provision of a DME distance is not possible, distance information based on GPS derived information may be provided. When providing GPS distance, transmission of distance information must include the source and point of reference - eg 115 nm GPS JSV, 80 nm GPS VAL NDB, 267 nm GPS ORNAD etc.

(4) If a GPS distance is provided to an ATS unit, and RAIM is not currently available, but has been available in the preceding 10 minutes, the distance report should be suffixed ANEGATIVE RAIM - eg 26 nm GPS BLV NEGATIVE RAIM.

(5) Databases sometimes contain waypoint information which is not shown on published AIP charts and maps. Distance information must only be provided in relation to published waypoints unless specifically requested by an ATS unit.

(6) Where GPS distance is requested or provided from an NDB, VOR, DME, or published waypoint, the latitude and longitude of the navigation air or waypoint must be derived from a validated database which cannot be modified by the operator or flight crew (see paragraph 6.10).

6.10 **Data integrity**

(1) As a significant number of data errors, in general applications, occur as a result of manual data entry errors, navigation aid and waypoint latitude and longitude data should be derived from a database, if available, which cannot be modified by the owner, operator or flight crew.

(2) When data is entered manually, data entries must be cross-checked by at least two flight crew members for accuracy and reasonableness, or, for single pilot operations, an independent check (eg. GPS computed tracks and distances against current chart data) must be made.

(3) Both manually entered and database derived position and tracking information should be checked for reasonableness (confidence check) in the following cases:

(a) Prior to each compulsory reporting point;

(b) at or prior to arrival at each en route waypoint;

(c) at hourly intervals during area type operations when operating off established routes; and

(d) after insertion of new data - eg creation of new flight plan.

6.11 **Integrity and interference data sheets**

Co-incident with the approvals contained in this technical standard, and in order to build up the data base on GPS integrity in Namibia, a system validation period has been established to verify operationally the availability of RAIM, and the quality of navigation provided by GPS at other times.

Note: ***Owners, operators or pilots using GPS for the purposes of this technical standard are requested to submit information on GPS interference as it occurs.***

Pilots should particularly note cases of GPS degradation/interference around aerodromes, over populated areas, near radio or television transmission towers, and during radio or SATCOM transmissions.

Information about the additional types of data required as detailed on the data sheet. This data will be used to verify the predicted integrity of the GPS system in Namibian airspace, and will, in part, form the basis for future extension of GPS approvals and revisions to ATC separation minima.

Data should be entered on the System Verification Data Sheet contained in Annexure A.

6.12 **Flight plan notification**

Pilots of aircraft equipped with GPS systems, that comply with the requirements of this technical standard, should insert the following in addition to other indicators in the flight plans.

7. Operational standards for inertial navigation and reference systems

7.1 **General**

Inertial navigation may be used by approved operators only. For approved operators of Namibian registered aircraft, inertial navigation may be used to satisfy the requirements of the Director. The inertial navigation system (INS) or inertial reference system (IRS) and its installation must be certified by the State of registry as meeting the airworthiness standards prescribed in Part 21.

Notes: ***1. Airworthiness requirements will be satisfied provided that:***

- ***it meets the manufacturer's requirements;***
- ***the installation is listed in the aircraft type certificate or has a supplemental type certificate for the specific aircraft type;***
- ***there is a flight manual supplement covering any system limitations; and***
- ***the system is included in the operator's maintenance programme.***

2. Outside Namibia (for example, in Europe and over the North Atlantic) other State authorities might require navigation performance different to that required by these standards.

7.2 **Minimum performance for operational approval**

(1) An INS/IRS must meet the following criteria for operational approval and must be maintained to ensure performance in accordance with the criteria:

(a) With a 95% probability to radial error rate is not to exceed 2 nm per hour for flights up to 10 hours duration;

(b) with a 95% probability the cross-track error is not to exceed " 20 nm and along track error is not to exceed " 25 nm at the conclusion of a flight in excess of 10 hours.

(2) The INS/IRS should have the capability for coupling to the aircraft's autopilot to provide steering guidance.

(3) The navigation system should have the capability for updating the displayed present position.

7.3 **Serviceability requirements**

(1) An INS/IRS may be considered as serviceable for navigation purposes until such time as its radial error exceeds 3 + 3t nm (t being the hours of operation in the navigation mode).

(2) Maintenance corrective action must also be taken when an INS/IRS is consistently providing radial error rates in excess of 2 nm per hour and/or track and along track errors in excess of the tolerances given at subparagraph (1) on more than 5% of the sectors flown.

7.4 **System performance monitoring**

The owner, operator or pilot-in-command is to monitor and record the performance of INS/IRS and may be required to provide details of the system accuracies and reliabilities from time to time.

7.5 **Navigation criteria**

(1) Navigation using INS/IRS as the primary navigation means is permitted in accordance with the following conditions:

(a) Initial confidence check. The INS/IRS must be checked for reasonable navigation accuracy by comparison with ground-referenced radio navigation aids (which may include ATC radar) before proceeding outside the coverage of the short range radio navigation aids system;

(b) maximum time.

(2) Single INS/IRS:

(a) The maximum operating time since the last ground alignment is not to exceed 10 hours.

(b) On flights of more than 5 hours, any route sector may be planned for navigation by INS/IRS within the appropriate time limits (given in (c) below) but contingency navigation procedures must be available in the event of an INS/IRS inflight unserviceability which would preclude the aircraft's operation on a subsequent route sector for which area navigation is specified.

(c) INS/IRS may be used as a sole source of tracking information for continuous period not exceeding -

(i) 3 hours in controlled airspace other than oceanic control area (OCA); or

(ii) 5 hours in OCA or outside controlled airspace (OCTA).

(3) Two or more INS/IRS

(a) If, during a flight, 10 hours elapsed time since the last ground alignment will be exceeded, ground alignment is to be included in the pre-flight flight deck procedures prior to pushback/taxi for departure.

(b) INS/IRS may be used as the sole source of tracking information for continuous periods not exceeding -

(i) 5 hours in controlled airspace other than OCA; or

(ii) 12 hours in OCA or OCTA.

Notes: ***1. Provided that the use of INS/IRS as the sole means of navigation does not exceed the time limit, the aircraft may be operated for longer periods using the INS/IRS with either manual or automatic updating.***

2. The 5 hour limit on single INS/IRS ensures 99.74% (3 sigma) probability that loss of satisfactory navigation capa-bility will not occur with equipment mean time between failures (MTBF) of approximately 1900 hours. If the demonstrated MTBF exceeds 2000 hours, the maximum time may be increased.

(c) Updating present position. Updating inertial present position in flight is permitted in the following instances only:

(i) Manually:

X Overhead a VOR beacon.

X Within 25 nm of a co-located VOR/DME beacon.

X Over a visual fix when at a height not more than 5 000 ft above the feature.

(ii) Automatically:

X Within 200 nautical miles of a DME site when the aircraft's track will pass within 140 nm of the site.

X Within 200 nm of both DME sites for a DME/DME Fix.

X From a co-located VOR/DME beacon provided that updates from a receding beacon are not accepted when the beacon is more than 25 nm from the aircraft.

Notes: ***1. En route VOR and DME sites separated by not more than 500 metres are considered to be co-located.***

2. DME slant range error correc-tion might be necessary in some circumstances.

3. Updating a present position from a visual fix may not be planned for IFR flights.

4. A receding beacon is one from which the distance to the aircraft is increasing.

5. Updating in other circum-stances (for example, over a NDB) will not provide sufficient accuracy to ensure that the INS/IRS operates within the prescribed tolerances for navigation.

6. Because INS/IRS are essentially accurate and reliable, and ground alignment is more accurate than in-flight updating, updating of present position is usually not warranted especially during the initial few hours of operation. However, INS/IRS errors generally increase with

time and are not self-correcting. Unless the error is fairly significant (for example, more than 4 nm or 2 nm/hr) it may be preferable to retain the error rather than manually update.

(d) Limitation on use. Wherever track guidance is provided by radio navigation aids, the pilot-in-command must ensure that the aircraft remains within the appropriate track-keeping tolerances of the radio navigation aids. INS/IRS is not to be used as a primary navigation reference during IFR flight below lowest safe altitude (LSALT).

(e) Pre-flight and en route procedures. The following practices are required:

(i) New data entries are to be cross-checked between at least two flight crew members for accuracy and reasonableness, or, for single pilot operations, an independent check (for example, of INS/IRS-computed tracks and distances against the flight plan) must be made.

(ii) As a minimum, position and tracking information is to be checked for reasonableness (confidence check) in the following cases:

X Prior to each com-pulsory reporting point.

X At or prior to arrival at each en route way point during RNAV operation along RNAV routes.

X At hourly intervals during area type operation off established RNAV routes.

X After insertion of new data.

7.6 **Operating criteria**

(1) Two or more INS/IRS installations

For two or more INS/IRS installations:

(a) If one INS/IRS fails or can be determined to have exceeded a radial error of 3+3t nm, operations may continue on area navigation routes using the serviceable system(s) in accordance with the navigation criteria applicable to the number of INS/IRS units remaining serviceable.

(b) If -

(i) the difference of pure inertial readouts between each pair of INS/IRS is less than 1.4 (3+3t) nm, no action is required;

(ii) the difference of pure inertial readouts between any pair of INS/IRS exceeds 1.4 (3+3t) nm and it is possible to confirm that one INS/IRS has an excessive drift error, that system should be disregarded and/or isolated from the other systems) and the apparently serviceable system(s) should be used for navigation;

Note: This check and its isolation action are unnecessary if a multiple INS/IRS installation is protected by a serviceability self-test algorithm

(iii) if neither condition (i) or (ii) can be satisfied, another means of navigation should be used, and the pilot-in-command must advise the appropriate ATS unit.

(2) Single INS/IRS installations

For single INS/IRS installations, if the INS/IRS fails or exceeds the serviceability tolerance:

(a) The pilot-in-command must advise the appropriate ATS unit of INS/IRS failure;

(b) another means of navigation is to be used; and

(c) the aircraft is not to begin a route sector for which area navigation is specified unless it is equipped with an alternative, serviceable, approved area navigation system.

(3) Autopilot coupling

Autopilot coupling to the INS/IRS should be used, whenever practicable, if this feature is available. If for any reason the aircraft is flown without autopilot coupling, the aircraft is to be flown within an indicated cross-track tolerance of " 2 nm. In controlled airspace the ATS unit is to be advised if this tolerance is exceeded.

7.7 **Navigation tolerances**

(1) The maximum drift rate expected from INS/IRS is 2 nm per hour (2 sigma probability). For the purposes of navigation and determining aircraft separation, the 3 sigma figure of 3 nm is allowed so that the maximum radial error with 3 sigma confidence equals 3+3t nm where t equals the time in hours since the INS/IRS was switched into the navigation mode.

(2) DME and other inputs can automatically influence the INS/IRS to improve the accuracy of its computed position. The pilot may also insert known position co-ordinates to update the INS/IRS. Therefore, if the system is updated with known position information the position error is reduced and the INS/IRS can be assumed to operate within the radial error tolerance of 3+3T nm where T is the time (hours elapsed since the last position update).

(3) The accuracy of the data used for updating must be considered. The navigation aid positions used for updating inertial present position are accurate to within 0.1 nm. However, the aircraft in flight cannot be fixed to the same order of magnitude. The accuracy of the position fix is taken as∇ 3nm radial error.

(4) Because the INS/IRS error, the navigation aid position accuracy and the position fix errors are independent of each other, the total radial error is determined by the root-sum-square method:

$$Total\ error = \sqrt{3 + 3T^2 + 0.1^2 + 3^3 mm}$$

(5) The effect of navigation aid position accuracy on the total error is negligible, and so,

$$Total\ error = \sqrt{3 + 3T^2 + 0.1^2 + 3^3 mm}$$

$$= \sqrt{3 + 3T^2 + 0.1^2 + 3^3 mm}$$

Substituting values for T

at time of update, total
radial error = 4,2 nm
after 1 hour = 6,7 nm
after 2 hours = 9,5 nm
after 3 hours = 12,4 nm
after 4 hours = 15,3 nm
after 5 hours = 18,2 nm
after 6 hours = 21,2 nm

(6) Dual installation

If two INS/IRS are installed and the aircraft is navigated by averaging, the inertial present position formula for the total radial error given in subparagraph (4) is modified by multiplying by:

$\frac{1}{\sqrt{2}}$ *(= 0.7)*

(7) Triple installations

If three INS/IRS are installed and Atriple mix is used, the total radial error is further reduced, For simplicity for navigation and aircraft separation the tolerances applicable to dual installations apply and the third system provides redundancy.

91.05.2 NAVIGATION EQUIPMENT

1. MNP specifications

An owner, operator or pilot-in-command may not operate an aircraft in MNPS airspace unless it is equipped with navigation equipment that complies with minimum navigation performance specifications prescribed in ICAO Doc 7030 in the form of Regional Supplementary Procedures.

91.06.10 LIGHTS TO BE DISPLAYED BY AIRCRAFT

1. Aircraft

At night all aircraft in flight or operating on the manoeuvring area of an aerodrome must display the lights prescribed in paragraph 2, unless otherwise instructed by the Director or by an air traffic service unit: Provided that such aircraft must display no other lights if these are likely to be mistaken for the lights prescribed in paragraph 2.

2. Aeroplane operating lights

2.1 **Definitions**

Any word or expression to which a meaning has been assigned in the Aviation Act, 1962, and the Civil Aviation Regulations, 2001, bears, when used in this technical standard, the same meaning unless the context indicates otherwise, and -

“angles of coverage means” -

(1) Angle of coverage A is formed by two intersecting vertical planes making angles of 70 degrees to the right and 70 degrees to the left respectively, looking aft along the longitudinal axis to a vertical plane passing through the longitudinal axis.

(2) Angle of coverage F is formed by two intersecting vertical planes making angles of 110 degrees to the right and 110 degrees to the left respectively, looking forward along the longitudinal axis to a vertical plane passing through the longitudinal axis.

(3) Angle of coverage L is formed by two intersecting vertical planes one parallel to the longitudinal axis of the aeroplane, and the other 110 degrees to the right of the first, when looking forward along the longitudinal axis.

(4) Angle of coverage R is formed by two intersecting vertical planes one parallel to the longitudinal axis of the aeroplane, and the other 110 degrees to the right of the first, when looking forward along the longitudinal axis;

"horizontal plane" means the plane containing the longitudinal axis and perpendicular to the plane of symmetry of the aeroplane;

"longitudinal axis of the aeroplane" means a selected axis parallel to the direction of flight at a normal cruising speed, and passing through the centre of gravity of the aeroplane;

"making way" means that an aeroplane on the surface of the water is under way and has a velocity relative to the water;

"under command" means that an aeroplane on the surface of the water is able to execute manoeuvres as required by the International Regulations for Preventing Collisions at Sea for the purpose of avoiding other vessels;

"under way" means that an aeroplane on the surface of the water is not aground or moored to the ground or to any fixed object on the land or in the water;

"vertical planes" means planes perpendicular to the horizontal plane; and

"visible" means visible on a dark night with a clear atmosphere.

2.2 **Navigation lights to be displayed in the air**

As illustrated in Figure 1, the following unobstructed navigation lights must be displayed:

(1) A red light projected above and below the plane through angle of coverage L;

(2) a green light projected above and below the horizontal plane through angle of coverage R;

(3) a white light projected above and below the horizontal plane rearward through angle of coverage A.

2.3 **Lights to be displayed on the water**

Figure 1

(1) General

(a) The International Regulations for Preventing Collisions at Sea require different lights to be displayed in each of the following circumstances:

(i) When under way;

(ii) when towing another vessel or aeroplane;

(iii) when being towed;

(i) when not under command and not making way;

(ii) when making way but not under command;

(iii) when at anchor;

(iv) when aground.

(a) The lights required by aeroplanes in each case are described below.

(1) When under way

(a) As illustrated in Figure 2, the following appearing as steady unobstructed lights:

(i) A red light projected above and below the plane through angle of coverage L;

(ii) a green light projected above and below the horizontal plane through angle of coverage R;

(iii) a white light projected above and below the horizontal plane rearward through angle of coverage A; and

(iv) a white light projected through angle of coverage F.

(b) The lights described in the first three items should be visible at a distance of at least 3.7 km (2 nm). The light described in the fourth item should be visible at a distance of 9.3 km (5 nm) when fitted to an aeroplane of 20 m or more in length or visible at a distance of 5.6 km (3 nm) when fitted to an aeroplane of less than 20 m in length.

Figure 2

(2) When towing another vessel or aeroplane

As illustrated in Figure 3, the following appearing as steady, unobstructed lights:

(a) the lights described in subparagraph (2);

(b) a second light having the same characteristics as the light described in the fourth item of subparagraph (2) and mounted in a vertical line at least 2 m above or below it; and

(c) a yellow light having otherwise the same characteristics as the light described in the third item of subparagraph (2) and mounted in a vertical line at least 2 m above it.

Figure 3

(3) When being towed

The lights described in the first three items of subparagraph (2) appearing as steady unobstructed lights.

(4) When not under command and not making way

As illustrated in Figure 4, two steady red lights placed where they can best be seen, one vertically over the other and not less than 1 m apart, and of such a character as to be visible all around the horizon at a distance of at least 3,7 km (2 nm).

(5) When making way but not under command

Figure 4

As illustrated in Figure 5, the lights described in subparagraph (5) and the first three items of subparagraph (2).

Figure 5

Note: ***The display of lights prescribed in subparagraphs (5) and (6) above is to be taken by other aircraft as signals that the aeroplane showing them is not under command cannot therefore get out of the way. They are not signals of aeroplanes in distress and requiring assistance.***

(7) When at anchor

(a) If less than 50 m in length, where it can best be seen, a steady white light (Figure 6), visible all around the horizon at a distance of at least 3.7 km (2 nm).

Figure 6

(b) If 50 m or more in length, where they can best be seen, a steady white forward light and a steady white rear light (Figure 7) both visible all around the horizon at a distance of at least 5.6 km (3 nm).

Figure 7

(c) If 50 m or more in span a steady white light on each side (Figures 8 and 9) to indicate the maximum span and visible, so far as practicable, all around the horizon at a distance of at least 1.9 km (1 nm).

(8) When aground

The lights prescribed in paragraph (7) and in addition two steady red lights in vertical line, at least 1 m apart so placed as to be visible all around the horizon.

91.06.13 SIGNALS

1. Distress signals

(1) The following signals, used either together or separately, mean that grave and imminent danger threatens, and immediate assistance is requested:

(a) A signal made by radiotelegraphy or by any other signalling method consisting of the group SOS (... _ _ _ ... in the Morse Code);

(b) a signal sent by radiotelephony consisting of the spoken word MAYDAY;

(c) rockets or shells throwing red lights, fired one at a time at short intervals;

(d) a parachute flare showing a red light.

(2) Alarm signals for actuating radiotelegraph and radiotelephone auto-alarm systems:

(a) 3268 The radiotelegraph alarm signal consists of a series of twelve dashes sent in one minute, the duration of each dash being four seconds and the duration of the interval between consecutive dashes one second. It may be transmitted by hand but its transmission by means of an automatic instrument is recommended.

(b) 3270 The radiotelephone alarm signal consists of two substantially sinusoidal audio frequency tones transmitted alternately. One tone has a frequency of 2 200 Hz and the other a frequency of 1 300 Hz, the duration of each tone being 250 milliseconds.

(c) 3271 The radiotelephone alarm signal, when generated by automatic means, must be sent continuously for a period of at least thirty seconds but not exceeding one minute; when generated by other means, the signal must be sent as continuously as practicable over a period of approximately one minute.

(3) None of the provisions in this paragraph prevent the use, by an aircraft in distress, of any means at its disposal to attract attention, make known its position and obtain help.

2. Urgency signals

(1) The following signals, used either together or separately, mean that an aircraft wishes to give notice of difficulties which compel it to land without requiring immediate assistance:

(a) The repeated switching on and off of the landing lights; or

(b) the repeated switching on and off of the navigation lights in such manner as to be distinct from flashing navigation lights.

(2) The following signals, used either together or separately, mean that an aircraft has a very urgent message to transmit concerning the safety of a ship, aircraft or other vehicle, or of some person on board or within sight:

(a) A signal made by radiotelegraphy or by any other signalling method consisting of the group XXX;

(b) a signal sent by radiotelephony consisting of the spoken words PAN, PAN.

(3) None of the provisions in this paragraph prevent the use, by an aircraft in distress, of any means as its disposal to attract attention, make known its position and obtain help.

3. Visual signals used to warn an unauthorised aircraft flying in, or about to enter a restricted, prohibited or danger area.

By day and by night, a series of projectiles discharged from the ground at intervals of 10 seconds, each showing, on bursting, red and green lights or stars will indicate to an authorised aircraft that it is flying in or about to enter a restricted, prohibited or danger area, and that the aircraft is to take such remedial action as may be necessary.

4. Signals for aerodrome traffic

(1) Light and pyrotechnic signals

(a) Instructions

Light		**From aerodrome control to**	
		Aircraft in flight	**Aircraft on the ground**
Directed towards aircraft concerned (see Figure 1.1)	Steady green	Cleared to land	Cleared for take-off
	Steady red	Give way	Stop
	Series of green flashes	Return for landing*	Cleared to taxi
	Series of red flashes	Aerodrome at this acrodrome and proceed to apron*	Taxi clear of landing area in use
	Series of white flashes	Notwithstanding any previous instructions, do not land for the time being	Return to starting point on the aerodrome
	Steady red on final approach	Notwithstanding any previous instructions, do not land for the time being.	
* Clearance to land and to taxi will be given in due course.			

(b) Acknowledges

(i) When in flight:

X During the hours of daylight:

by rocking the aircraft's wings;

Note: This signal should not be expected on the base and final legs of the approach

X during the hours of darkness:

by flashing on and off twice the aircraft's landing lights, or if not so equipped, by switching on and off twice its navigation lights;

(ii) when on the ground:

X During the hours of daylight:

by moving the aircraft's ailerons or rudder;

X during the hours of darkness:

by flashing on and off twice the aircraft's landing lights or, if not so equipped, by switching on and off twice its navigation lights.

(2) Visual ground signals

(a) Prohibition of landing

A horizontal red square panel with yellow diagonals (Figure 1.2) when displayed in a signal area indicates that landings are prohibited and that the prohibition is liable to be prolonged.

(b) Need for special precautions while approaching or landing

A horizontal red square panel with one yellow diagonal (Figure 1.3) when displayed in a signal area indicates that owing to the bad state of the manoeuvring area, or for any other reason, special precautions must be observed in approaching to land or in landing.

Figure 1.3

(c) Use of runways and taxiways

X A horizontal white dumb-bell (Figure 1.4) when displayed in a signal area indicates that aircraft are required to land, take off and taxi on runways and taxiways only.

Figure 1.4

X The same horizontal white dumb-bell as in Figure 1.4 but with a black bar placed perpendicular to the shaft across each circular portion of the dumb-bell (Figure 1.5) when displayed in a signal area indicates that aircraft are required to land and take off on runways only, but other manoeuvres need not be confined to runways and taxiways.

Figure 1.5

(d) Closed runways or taxiways

Crosses of a single contrasting colour, yellow or white (Figure 1.6), displayed horizontally on runways and taxiways or parts thereof indicate an area unfit for movement of aircraft

Figure 1.6

(e) Directions for landing or take-off

X A horizontal white or orange landing T (Figure 1.7) indicates the direction to be used by aircraft for landing and take-off, which must be in a direction parallel to the shaft of the T towards the cross arm.

Note: When used at night, the landing T is either illuminated or outlined in white coloured lights

Figure 1.7

X A set of two digits (Figure 1.8) displayed vertically at or near the aerodrome control tower indicates to aircraft on the manoeuvring area the direction for take-off, expressed in units of 10 degrees to the nearest 10 degrees of the magnetic compass.

Figure 1.8

(i) Agricultural flights in operation

A figure A (figure 1.12) in the signal area indicates that the aerodrome is being used for agricultural flights.

(f) Right-hand traffic

When displayed in a signal area, or horizontally at the end of the runway or strip in use, a right-hand arrow of conspicuous colour (Figure 1.9) indicates that turns are to be made to the right before landing and after take-off.

Figure 1.9

(g) Air traffic services reporting office

The letter C displayed vertically in black against a yellow background (Figure 1.10) indicates the location of the air traffic services reporting office.

Figure 1.10

(h) Glider flights in operation

A double white cross displayed horizontally (Figure 1.11) in the signal area indicates that the aerodrome is being used by gliders and that glider flights are being performed.

Figure 1.11

being used for agricultural flights.

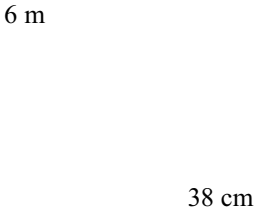

Figure 1.12

(1) From a signalman to an aircraft

Prior to using the following signals, the signalman must ascertain that the area within which an aircraft is to be guided is clear of objects which the aircraft, in complying with this technical standard, might otherwise strike.

Note: ***The design of many aircraft is such that the path of the wing tips, engines and other extremities cannot always be monitored visually from the flight deck while the aircraft is being manoeuvred on the ground.***

5. Marshalling signals

1. Proceed under further guidance by signalman

Signalman directs pilot if traffic conditions on aerodrome require this action.

2. This bay

Arms above head in vertical position with palms facing inward.

3. Proceed to next signalman

Right or left arm down, other arm moved across the body and extended to indicate direction of next signalman.

4. Move ahead

Arms a little aside, palms facing backward and repeatedly moved upward-backward from shoulder height.

5. Turn

(a) Turn to your left: right arm downward, left are repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.

(b) Turn to your right: left arm downward, right arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.

6. Stop

Arms repeatedly crossed above head (the rapidity of the arm movement should be related to the urgency of the stop, i.e. the faster the movement the quicker the stop).

7. Brakes

(a) Engage brakes: raise arm and hand, with fingers extended, horizontally in front of body, then clench fist.

(b) Release brakes: raise arm, with fist clenched, horizontally in front of body, then extend fingers.

8. Chocks

(a) Chocks inserted: arms down, palms facing inwards, move arms from extended position inwards.

(b) Chocks removed: arms down, plams facing outwards, move arms outwards.

9. Start engine(s)

Left hand overhead with appropriate number of fingers extended, to indicate the number of the engine to be started, and circular motion of right hand at head level.

10. Cut engines

Either arm and hand level with shoulder, hand across throat, palm downward. The hand is moved sideways with the arm remaining bent.

11. Slow down

Arms down with palms toward ground, then moved up and down several times.

12. Slow down engine(s) on indicated side

Arms down with plams toward ground, then either right or left hand waved up and down indicating the left or right side engine(s) respectively should be slowed down.

13. Move back

arms by sides, palms facing forward, swept forward and upward repeatedly to shoulder height.

14. Turns while backing

(a) For tail to starboard: point left arm down, and right arm brought from overhead, vertical position to horizontal forward position, repeating right arm movement.

(b) For tail to port: point right arm down, and left arm brought from overhead, vertical position to horizontal forward position, repeating left arm movement.

15. All clear

Right arm raised at elbow with thumb erect.

16. Hover*

Arms extended horizontally sidways.

17. Move upwards*

Arms extended horizontally to the side beckoning upwards, with palms turned up. Speed of movement indicates rate of ascent.

18. Move downwards*

Arms extended horizontally to the side beckoning downwards, with palms turned down. Speed of movement indicates rate of descent.

19. Move horizontally*

Appropriate arm extended horizontally sideways in direction of movement and other arm moved in front of body in same direction, in a repeating movement.

20. Land*

Arms crossed and extended downwards in front of the body.

Notes: ***1. These signals are designed for use by the signalman, with hands illuminated as necessary to facilitate observation by the pilot, and facing the aircraft in a position:***

(a) For fixed-wing aircraft, forward of the left-wing tip within view of the pilot; and

(b) for helicopters, where the signalman can best be seen by the pilot.

2. The meaning of the relevant signals remains the same if bats, illuminated wands or torchlights are held.

3. The aircraft engines are numbered, for the signalman facing the aircraft, from right to left (i.e. No. 1 engine being the port outer engine).

4. Signals marked with an asterisk are designed for use to hovering helicopter.

(2) From the pilot of an aircraft to a signal-man

(a) Brakes

Note: The moment the fist is clenched or the fingers are extended indicates, respectively, the moment of brake engagement or release.

X Brakes engaged

Raise arm and hand, with fingers extended, horizon-tally in front of face, then clench fist.

X Brakes released

Raise arm, with fist clenched, horizontally in front of face, then extend fingers.

(b) Chocks

X Insert chocks

Arms extended, palms out-wards, move hands inwards to cross in front of face.

X Remove chocks

Hands crossed in front of face, palms outwards, move arms outwards.

(c) Ready to start engine

Raise the appropriate number of fingers on one hand indicating the number of the engine to be started.

Note: 1. These signals are designed for use by a pilot in the cockpit with hands plainly visible signalman, and illuminated as necessary to facilitate observation by the signalman.

2. The aircraft engines are numbered in relation to the signalman facing the aircraft, from right to left (i.e. No. 1 engine being the port outer engine).

91.06.16 MANDATORY RADIO COMMUNICATION IN CONTROLLED AIRSPACE

1. Radio communication failure procedures

The radio communication failure procedures referred to in CAR 91.06.16 are the procedures contained in Chapter 5 of ICAO Annex 10, Volume II.

91.06.17 MANDATORY RADIO COMMUNICATION IN ADVISORY AIRSPACE

1. Radio communication failure procedures

The radio communication failure procedures referred to in CAR 91.06.17 are the radio communication failure procedures contemplated in CAR.91.06.16.

91.06.22 VISIBILITY AND DISTANCE FROM CLOUD

1. Visibility and distance from cloud

Airspace class	**B**	**C D E**	**F G**	
			ABOVE 900m (3 000 ft) AMSL or above 300 m (1 000 ft) above terrain, whichever is the higher.	At and below 900 m (3 000ft) AMSL or 300 m (1 000 ft) above terrain, whichever is the higher.
Distance from cloud	Clear of cloud	1 500 m horizontally 300 m (1 000 ft) vertically		Clear of cloud and in sight of the surface
Flight visibility	8 km at and above 3 050 m (10 000 ft) AMSL 5 km below 3 050 m (10 000 ft) ASML			5 km

Signal by intercepting aircraft	Meaning	Response by intercepted aircraft
Day	**First series**	
(a) Rocking wings while in front and to left of intercepted aircraft	Follow me away from a prohibited area	Rocking wings
(b) Rocking wings while in front and to right of intercepted aircraft	Follow me to a landing terrain	Rocking wings
(c) When (a) and (b) have been acknowledged, making a slow level turn into desired course	-	Follow intercepting aircraft
Night		
(a) As for day, and in addition flashing navigation and, if available, landing lights at irregular intervals	Follow me away from a prohibited or restricted area	Rocking wings if considered safe and showing steady landing light if carried
(b) As for day, and in addition flshing navigation and, if available, landing lights at irregular intervals	Follow me to a landing terrain	Rocking wings if considered safe and showing steady landing light if carried
(c) As for day, and in addition flashing navigation and, if available, landing lights at irregular intervals when (a) and (b) have been acknowledged.	-	Follow intercepting aircraft

Weather conditions or the terrain may require the intercepting aircraft to take up a position in front and to the right of the intercepted aircraft to complete the successive turn to the right.

Signal by intercepting aircraft	Meaning	Response by intercepted aircraft
Day or night	**Second series**	
An abrupt break away of 90^0 or more without crossing the line of flight of the intercepted aircraft	You may proceed	Rocking wings if considered safe, at night showing steady landing light if carrried
Day	**Third series**	
Circling landing area, lowering landing gear and overflying the direction of landing	Land on this landing area	Same as interceptor and proceed to land (where applicable) if considered safe, at night showing steady landing light if carried
Night		
As for day and showing steady landing light	-	-
Day	**Fourth series**	
First or Second series dependent on what further action intercepting aircraft requires to be taken either: (a) Follow me; or (b) “You may proceed”	Landing terrain unsuitable	Rocking wings (if fixed landing gear) or raising gear (whichever applicable) while passing over landing terrain at a height exceeding 1 000 feet but not exceeding 2 000 feet

91.06.30 IDENTIFICATION AND INTERCEPTION OF AIRCRAFT

The visual signals must be used as follows:

1. When an aircraft has been intercepted for identification only, the intercepting aircraft will use the second series to show that the aircraft may proceed;

2. when an aircraft is to be led away from a prohibited or restricted area the appropriate part of the first series will be used and the second series when the purpose has been achieved and the aircraft is released;

3. when an aircraft is required to land, the appropriate part of the first series will initially be used, followed by the third series when in the vicinity of the designated landing area;

4. when the pilot of the intercepted aircraft considers the landing area designated as unsuitable for his or her aircraft type, he or she will use the fourth series to indicate this and new instructions will then be given by the intercepting aircraft;

5. when an intercepted aircraft is in distress the distress signals should be used, where practical

91.06.34 SEMI-CIRCULAR RULE

1. Semi-circular rule

MAGNETIC TRACK			
Flight level			
From 000^0 to 179^0		From 180^0 to 359^0	
IFR	VFR	IFR	VFR
30	15	20	24
50	35	40	45
70	55	60	65
90	75	80	85
110	95	100	105
130	115	120	125
150	135	140	145
170	155	160	165
190	175	180	185
210	195	200	
230		220	
250		240	
270		260	
290		280	
330		310	
370		350	
410		390	
450		430	
490		470	
etc.		510	
		etc.	

91.07.2 MINIMUM FLIGHT ALTITUDES

1. Minimum flight altitude formula

The following method must be used to calculate minimum flight altitudes:

MORA is a minimum flight altitude computed from current ONC or WAC charts.

(1) Two types of MORAs are charted which are:

(a) Route MORAs e.g. 9800a; and

(b) Grid MORAs e.g. 98.

(2) Route MORA values are computed on the basis of an area extending 10 nm to either side of route centreline and including a 10 nm radius beyond the radio fix/reporting point or mileage break defining the route segment.

(3) MORA values clear all terrain and man-made obstacles by 1 000 feet in areas where the highest terrain elevation or obstacles are up to 5 000 feet. A clearance of 2 000 feet is provided above all terrain or obstacles which are 5 001 feet and above.

(4) A grid MORA is an altitude computed by the formula and the values are shown within each grid formed by charted lines of altitude and longitude. Figures are shown in thousands and hundreds of feet (omitting the last two digits so as to avoid chart congestion). Values followed by v are believed not to exceed the altitudes shown. The same clearance criteria as explained in subparagraph (3) above apply.

91.07.8 PLANNING MINIMA FOR IFR FLIGHTS

1. Planning minima for destination alternate aerodromes

(1) An operator or pilot-in-command may only select the destination aerodrome and/or destination aerodrome when the appropriate weather reports or forecasts, or any combination thereof, indicate that, during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the applicable planning minima as follows:

(a) Planning minima for the destination aerodrome

(i) RVR/visibility must be in accordance with that specified in CAR 91.07.7; and

(ii) for a non-precision approach or a circling approach, the ceiling at or above MDH;

(b) Planning minima for destination alternate aerodrome must be in accordance with Table 1.

Table 1: Planning minima - En route and destination alternates

Type of approach	Planning minima
Cat II and III	Cat I minima with RVR in accordance with Ts 91-07-7
Cat I	Non-precision minima and ceiling must be above the MDh
Non-precision	Non-precision minima plus 200 ft added to MBH and 1 000, added to RVR / Visibility. Ceiling must be above the MDH + 200 ft.
Circling	Circling

Note: Only operators approved for Cat II and III operations may use planning minima based on a Cat II and III approach in Table 1.

2. Planning minima for en route alternate aerodromes (Non-ETOPS Flights)

An operator or pilot-in-command may not select an aerodrome as an en route alternate aerodrome unless the appropriate weather reports or forecasts, or any combination thereof, indicate that, during a period commencing 1 hour before and ending 1 hour after the expected time of arrival at the aerodrome, the weather conditions will be at or above the planning minima prescribed in Table 1 above.

3. Planning minima for an ETOPS en route alternate aerodrome

An operator or pilot-in-command may not select an aerodrome as an ETOPS en route alternate aerodrome unless the appropriate weather reports or forecasts, or any combination thereof, indicate that, during a period commencing 1 hour before and ending 1 hour after the expected time of arrival at the aerodrome, the weather conditions will be at or above the planning minima prescribed in Table 2 below, and in accordance with the operator's ETOPS approval.

91.07.8 PLANNING MINIMA FOR IFR FLIGHTS

Table 2: Planning minima - ETOPS

Type of approach	**Planning minima** (RVR/visibility required and ceiling if applicable)		
	Aerodrome with		
	at least 2 separate approach procedures based on 2 separate aids serving 2 separate runways	at least 2 separate approach procedures based on 2 separate aids serving 1 runway	at least 1 approach procedure based on 1 aid serving 1 runway
Precision approach Cat II, III (ILS MLS)	Precision approach Cat I minima	Non-precision approach minima	
Precision approach Cat I (ILS MLS)	Non-precision approach minima	Circling minima or, if not available, non-precision approach minima plus 200 ft / 1 000 m	
Non-precision approach	The lower of non-precision approach minima plus 200 ft / 1 000 m or circling	The higher of circling minima or non-precision approach minima plus 200 ft / 1 000 m	
	Minima		
Circling approach		Circling minima	

Notes:

1. "Tempo" and "Inter" conditions published in the forecast are not limiting unless these conditions are forecast to be below published planning minima. Where a condition is forecast as "Prob", provided the probability percent factor is less than 40%, it is not limiting. However the pilot-in-command will be expected to exercise good aviation judgement in assessing the overall "Prob" conditions.

2. Runways on the same aerodrome are considered to be separate runways when -

(a) they are separate landing surfaces which may overlay or cross such that if one of the runways is blocked, it will not prevent the planned type of operations on the other runway; and

(b) each of the landing surfaces has a separate approach procedure based on a separate aid.

3. Only operators approved for Category II or III operations may use the planning minima applicable to Categories II and III in Table 2 and then only if the aeroplane is certificated for a one engine inoperative Category II or III approach as applicable.

4. The JAA Information Leaflet No. 20, IL20, may be used by an operator to conduct an ETOPS operation, together with the ETOPS alternate weather criteria determined in this technical standard.

91.07.11 MASS AND BALANCE

1. Definitions

Any word or expression to which a meaning has been assigned in the Aviation Act, 1962, and the Namibian Civil Aviation Regulations, 2001, bears, when used in this technical standard, the same meaning unless the context indicates otherwise, and -

"maximum structural landing mass" means the maximum permissible total aircraft mass upon landing under normal circumstances;

"maximum structural take off mass" means the maximum permissible total aircraft mass at the start of the take-off run or lift-off; and

"maximum zero fuel mass" means the maximum permissible mass of an aircraft with no usable fuel. The mass of the fuel contained in particular tanks must be included in the zero fuel mass when it is explicitly mentioned in the aircraft flight manual limitations;

"traffic load" means the total mass of passengers, baggage and cargo, including any non-revenue load.

2. Mass values for crew

(1) An operator or pilot-in-command must use the following mass values to determine the dry operating mass:

(a) Actual masses including any crew baggage; or

(b) standard masses, including hand baggage, of 85 kg for flight crew members and 75 kg for cabin crew members.

(2) An operator or pilot-in-command must correct the dry operating mass to account for any additional baggage. The position of this additional baggage must be accounted for when establishing the centre of gravity of the aircraft.

3. Mass values for passengers and baggage

(1) An operator or pilot-in-command must compute the mass of passengers and checked baggage using either the actual weighed mass of each person and the actual weighed mass of baggage or the standard mass values specified in Tables 1 to 3 below except where the number of passenger seats available is less than 6, when the passenger mass may be established by a verbal statement by or on behalf of each passenger or by estimation. The procedure specifying when to select actual or standard masses must be included in the operations manual.

(2) If determining the actual mass by weighing, an operator or pilot-in-command must ensure that passengers' personal belongings and hand baggage are included. Such weighing must be conducted immediately prior to boarding and at an adjacent location.

(3) If determining the mass of passengers using standards mass values, the standard mass values in Tables 1 and 2 below must be used. The standard masses include hand baggage and the mass of any infant carried by an adult on one passenger seat. Infants occupying separate passenger seats are to be considered as children for the purpose of this paragraph.

(4) Mass values for passengers - 20 seats or more

(a) Where the total number of passenger seats available on an aircraft is 20 or more, the standard masses of male and female in Table 1 are applicable. As an alternative, in cases where the total number of passenger seats available is 30 or more, the 'All Adult' mass values in Table 1 are applicable.

(b) For the purpose of Table 1, holiday charter means a charter flight solely intended as an element of a holiday travel package.

Table 1

Passenger seats	**20 and more**		**30 and more**
	Male	**Female**	**All adult**
All flights except holiday charters	88 kg	70 kg	88 kg
Holiday charters	83 kg	69 kg	83 kg
Children	35 kg	35 kg	35 kg

(5) Mass values for passengers - 19 seats or less

Table 2

Passenger seats	1-9	10-19
Male	96 kg	92 kg
Female	78 kg	74 kg
Children	35 kg	35 kg

(a) Where the total number of passenger seats available on an aircraft is 19 or less, the standard masses in Table 2 are applicable.

(b) On flights where no hand baggage is carried in the cabin or where hand baggage is accounted for separately, 6 kg may be deducted from the above male and female masses. Articles such as an overcoat, an umbrella, a small handbag or purse, reading material or a small camera are not considered as hand baggage for the purpose of this paragraph.

(6) Mass values for baggage

Where the total number of passenger seats available on the aircraft is 20 or more, the standard mass values given in Table 3 are applicable for each piece of checked baggage. For aircraft with 19 passenger seats or less, the actual mass of the checked baggage, determined by weighing, must be used.

Table 3:20 or more seats

Type of flight	Baggage standard mass
Domestic	11 kg
International	15 kg

(7) If an operator or pilot-in-command wishes to use standard mass values other than those contained in Tables 1 to 3 above, he or she must advise the Director of his or her reasons and gain such approval in advance. After verification and approval by the Director of the results of the weighing survey, the revised standard mass values are only applicable to that operator. The revised standard mass values can only be used in circumstances consistent with those under which the survey was conducted. Where revised standard masses exceed those in Tables 1 to 3, then such higher values must be used.

(8) On any flight identified as carrying a significant number of passengers whose masses, including hand baggage, are expected to exceed the standard passenger mass, an operator or pilot-in-command must determine the actual mass of such passengers by weighing or by adding an adequate mass increment.

(9) If standard mass values for checked baggage are used and a significant number of passengers check-in baggage that is expected to exceed the standard baggage mass, an operator or pilot-in-command must determine the actual mass of such baggage by weighing or by adding an adequate mass increment.

(10) An operator must ensure that a pilot-in-command is advised when a non-standard method has been used for determining the mass of the load and that this method is stated in the mass and balance documentation.

4. Mass and balance documentation

(1) The operator must establish mass and balance documentation prior to each flight specifying the load and its distribution.

The mass and balance documentation must enable the pilot-in-command to determine by inspection that the load and its distribution is such that the mass and balance limits of the aircraft are not exceeded.

The person supervising the loading of the aircraft must confirm by signature that the load and its distribution are in accordance with the mass and balance documentation.

Acceptance of the loading of the aircraft by the pilot-in-command, must be indicated by countersignature or equivalent.

(2) The mass and balance documentation must contain the following information:

(a) The aircraft registration and type;

(b) the flight identification number and date;

(c) the identity of the pilot-in-command;

(d) the identity of the person who prepared the document;

(e) the dry operating mass and the corresponding centre of gravity of the aircraft;

(f) the mass of the fuel at take-off and the mass of trip fuel;

(g) the mass of consumables other than fuel;

(h) the components of the load including passengers, baggage, cargo and ballast;

(i) the take-off mass, landing mass and zero fuel mass;

(j) the load distribution;

(k) the applicable aircraft centre of gravity positions; and

(l) the limiting mass and centre of gravity values.

91.07.12 FUEL AND OIL SUPPLY

1. Aeroplanes

For a flight in accordance with IFR, the pilot-in-command of an aeroplane may not commence the flight unless he or she is satisfied that the aeroplane carries sufficient fuel and oil to fly to the aerodrome to which the flight is planned -

(1) if a destination alternate aerodrome is not required, and thereafter for a period of 45 minutes; or

(2) if a destination alternate aerodrome is required, hence to an alternate aerodrome and thereafter for a period of 45 minutes.

2. Helicopters

2.1 For a flight in accordance with VFR, the pilot-in-command of a helicopter may not commence the flight unless he or she is satisfied that the helicopter carries sufficient fuel and oil to allow the helicopter to -

(1) fly to the aerodrome to which the flight is planned;

(2) fly thereafter for a period of 20 minutes at best-range speed plus 10 per cent of the planned flight time; and

(3) have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of potential contingencies.

2.2 For a flight in accordance with IFR, the pilot-in-command of a helicopter may not commence the flight unless he or she is satisfied that the helicopter carries sufficient fuel and oil to allow the helicopter to -

(1) if a destination alternate aerodrome is not required, fly to the aerodrome to which the flight is planned and thereafter -

(a) to fly 30 minutes at holding speed at 450 m (1 500 ft) above the destination aerodrome under standard temperature conditions and approach and land; and

(b) to have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of potential contingencies;

(2) if a destination alternate aerodrome is required, fly to and execute an approach, and a missed approach, at the aerodrome to which the flight is planned, and thereafter:

(a) to fly to the destination alternate aerodrome specified in the flight plan; and then

(b) to fly for 30 minutes at holding speed at 450 m (1 500 ft) above the destination alternate aerodrome under standard temperature conditions, and approach and land; and

(c) to have an additional amount of fuel sufficient to provide for the increased consumption on the occurrence of potential contingencies.

(3) if no suitable destination alternate aerodrome is available, to fly to the aerodrome to which the flight is planned and thereafter for a period of two hours at holding speed.

3. General considerations

In computing the fuel and oil required in terms of this regulation, the pilot-in-command must consider -

(1) meteorological conditions forecast;

(2) expected air traffic control routings and traffic delays;

(3) for IFR flight, one instrument approach at the destination aerodrome, including a missed approach;

(4) the procedures for loss of pressurisation, where applicable, or failure of one power-unit while en route; and

(5) any other conditions that may delay the landing of the aircraft or increase fuel or oil consumption.

91.07.25 COMMENCEMENT AND CONTINUATION OF APPROACH

1. Conversion of reported visibility

(1) The pilot-in-command must ensure that a meteorological visibility to RVR conversion is not used for calculating take-off minima, Category II or III minima or when a reported RVR is available.

(2) When converting meteorological visibility to RVR in all other circumstances than those in subparagraph (1) above, the pilot-in-command must ensure that the following table is used:

Conversion of visibility to RVR

Lighting elements in operation	RVR = Reported Met. Visibility multiplied by	
	Day	Night
HI approach and runway/touchdown and lift-off area lighting	1.5	2
Any type of lighting installation other than above	1	1.5
No lighting	1	Not applicable

91.08.4 TRAINING AND QUALIFICATIONS FOR LOW-VISIBILITY OPERATIONS

1. General

(1) An owner or operator must ensure that flight crew member training programmes for low-visibility operations include structured courses of ground, simulator and/or flight training. The owner or operator may abbreviate the course content as prescribed by subparagraphs (2), (3) and (4) below provided the content of the abbreviated course is acceptable to the Director.

(2) Flight crew members with no Category II or Category III experience must complete the full training programme prescribed in paragraphs 2, 3 and 4 below.

(3) Flight crew members with Category II or Category III experience with another owner or operator may undertake an abbreviated ground training course.

(4) Flight deck crew members with Category II or Category III experience with the owner or operator may undertake an abbreviated ground simulator and/or flight training course. The abbreviated course is to include at least the requirements of paragraph 4(1) or 4(4)(a) or (b) as appropriate.

2. Ground training

An owner or operator must ensure that the initial ground training course for low-visibility operations covers at least -

(1) the characteristics and limitations of the ILS and/or MLS;

(2) the characteristics of the visual aids;

(3) the characteristics of fog;

(4) the operational capabilities and limitations of the particular airborne system;

(5) the effects of precipitation, ice accretion, low level wind shear and turbulence;

(6) the effect of specific aircraft malfunctions;

(7) the use and limitations of RVR assessment systems;

(8) the principles of obstacle clearance requirements;

(9) recognition of and action to be taken in the event of failure of ground equipment;

(10) the procedures and precautions to be followed with regard to surface movement during operations when the RVR is 400 m or less and any additional procedures required for take-off in conditions below 150 m (200 m for Category D aeroplanes) or with visibility less than 225 m;

(11) the significance of decision heights based upon radio altimeters and the effect of terrain profile in the approach area on radio altimeter readings and on the automatic approach/landing systems;

(12) the importance and significance of alert height, if applicable, and the action in the event of any failure above and below the alert height;

(13) the qualification requirements for pilots to obtain and retain approval to conduct low-visibility take-offs and Category II or III operations; and

(14) the importance of correct seating and eye position.

3. Simulator training and/or flight training

(1) An owner or operator must ensure that simulator and/or flight training for low-visibility operations includes -

(a) checks of satisfactory functioning of equipment, both on the ground and in flight;

(b) effect on minima caused by changes in the status of ground installations;

(c) monitoring of automatic flights control systems and Autoland status annunciators with emphasis on the action to be taken in the event of failures of such systems;

(d) actions to be taken in the event of failures such as engines, electrical systems, hydraulics or flight control systems;

(e) the effect of known unserviceabilities and use of minimum equipment lists;

(f) operating limitations resulting from airworthiness certification;

(g) guidance on the visual cues required at decision height together with information on maximum deviation allowed from glidepath or localiser; and

(h) the importance and significance of alert height, if applicable, and the action in the event of any failure above and below the alert height.

(2) An owner or operator must ensure that each flight crew member is trained to carry out his or her duties and instructed on the coordination required with other flight crew members. Maximum use must be made of suitably equipped flight simulators for this purpose.

(3) Training must be divided into phases covering normal operation with no aircraft or equipment failures but including all weather conditions which may be encountered and detailed scenarios of aircraft and equipment failure which could affect Category II or III operations. If the aircraft system involves the use of hybrid or other special systems (such as head up displays or enhanced vision equipment) then flight crew members must practise the use of these systems in normal and abnormal modes during the simulator phase of training.

(4) Incapacitation procedures appropriate to low-visibility take-offs and Category II and III operations must be practised.

(5) For aircraft with no type specific simulator, owners or operators must ensure that the flight training phase specific to the visual scenarios of Category II operations is conducted in a simulator approved for that purpose by the Director. Such training must include a minimum of 4 approaches. The training and procedures that are type specific must be practised in the aircraft.

(6) Category II and III training must include at least the following exercises:

(a) Approach, using the appropriate flight guidance, autopilots and control systems installed in the aircraft, to the appropriate decision height and to include transition to visual flight and landing;

(b) approach with all engines operating using the appropriate flight guidance systems, autopilots and control systems installed in the aircraft down to the appropriate decision height followed by missed approach, all without external visual reference;

(c) where appropriate, approaches utilising automatic flight systems to provide automatic flare, landing and roll-out; and

(d) normal operation of the applicable system both with and without acquisition of visual cues at decision height.

(7) Subsequent phases of training must include at least -

(a) approaches with engine failure at various stages on the approach;

(b) approaches with critical equipment failures (e.g. electrical systems, autoflight systems, ground and/or airborne ILS/MLS systems and status monitors);

(c) approaches where failures of autoflight equipment at low level require either -

(i) reversion to manual flight to control flare, landing and roll out or missed approach; or

(ii) reversion to manual flight or a downgraded automatic mode to control missed approaches from, at or below decision height including those which may result in a touchdown on the runway;

(d) failures of the system which will result in excessive localiser and/or glideslope deviation, both above and below decision height, in the

minimum visual conditions authorised for the operation. In addition, a continuation to a manual landing must be practised if a head-up display forms a downgraded mode of the automatic system or the head-up display forms the only flare mode; and

(e) failures and procedures specific to aircraft type or variant.

(8) The training programme must provide practice in handling faults which require a reversion to higher minima.

(9) The training programme must include the handling of the aircraft when, during a fail passive Category III approach, the fault causes the autopilot to disconnect at or below decision height when the last reported RVR is 300 m or less.

(10) Where take-offs are conducted in RVRs of 400 m and below, training must be established to cover systems failures and engine failure resulting in continued as well as rejected take-offs.

4. Conversion training requirements to conduct low-visibility take-off and Category II and III operations

An owner or operator must ensure that each flight crew member completes the following low-visibility procedures training if converting to a new type or variant of aircraft in which low-visibility take-off and Category II and III operations will be conducted. The flight crew member experience requirements to undertake an abbreviated course are prescribed in paragraphs 1(3) and (4).

(1) Ground training

The appropriate requirements prescribed in paragraph 2 above, taking into account the flight crew member's Category II and Category III training and experience.

(2) Simulator training and/or flight training

(a) A minimum of 8 approaches and/or landings in a simulator approved for the purpose.

(b) Where no type-specific simulator is available, a minimum of 3 approaches including at least 1 go-around is required on the aircraft.

(c) Appropriate additional training if any special equipment is required such as head-up displays or enhanced vision equipment.

(3) Flight crew qualification

The flight crew qualification requirements are specific to the owner or operator and the type of aircraft operated.

(a) The operator must ensure that each flight crew member completes a check before conducting Category II or III operations.

(b) The check prescribed in item (a) above may be replaced by successful completion of the simulator and/or flight training prescribed in paragraph 4(2).

(4) Line flying under supervision

An owner or operator must ensure that each flight crew member undergoes the following line flying under supervision -

(a) For Category II when a manual landing is required, a minimum of 3 landings from autopilot disconnect; and

(b) for Category III, a minimum of 3 autolands except that only 1 autoland is required when the training required in paragraph 4(2) above has been carried out in a full flight simulator usable for zero flight time training.

5. Type and command experience

The following additional requirements are applicable to pilots-in-command who are new to the aircraft type:

(1) 50 hours or 20 sectors as pilot-in-command on the type before performing any Category II or Category III operations; and

(2) 100 hours or 40 sectors as pilot-in-command on the type. 100 m must be added to the applicable Category II or Category III RVR minima unless he or she has previously qualified for Category II or III operations with another owner or operator.

(3) The Director may authorise a reduction in the above command experience requirements for flight crew members who have Category II or Category III command experience.

6. Low-visibility take-off with RVR less than 150/200 m or visibility less than 225 m

(1) An owner or operator must ensure that prior to authorisation to conduct take-offs in RVRs below 150 m (below 200 m for Category D aeroplanes) or with visibility less than 225 m the following training is carried out:

(a) Normal take-off in minimum authorised conditions or RVR conditions;

(b) take-off in minimum authorised conditions or RVR conditions with an engine failure between V_1 and V_2, or as soon as safety considerations permit; and

(c) take-off in minimum authorised conditions or RVR conditions with an engine failure before V_1 resulting in a rejected take-off.

(2) An owner or operator must ensure that the training required by subparagraph (1) above is carried out in an approved simulator. This training must include the use of any special procedures and equipment. Where no approved simulator exists, the Director may approve such training in an aircraft without the requirement for minimum conditions or RVR conditions.

(3) An owner or operator must ensure that a flight crew member has completed a check before conducting low-visibility take-offs in RVRs of less than 150 m (less than 200 m for Category D aeroplanes) or in visibility less than 225 m if applicable. The check may only be replaced by successful completion of the simulator and/or flight training prescribed in subparagraph (1) on initial conversion to an aircraft type.

7. Recurrent training and checking - Low-Visibility Operations

(1) An owner or operator must ensure that, in conjunction with the normal recurrent training and proficiency checks, a pilot's knowledge and ability to perform the tasks associated with the particular category of operation, including LVTO, for which he or she is authorised, is checked. The required number of approaches to be conducted during such recurrent training is to be a minimum of two, one of which is to be a missed approach and at least one low-visibility take-off to the lowest applicable minima. The period of validity for this check is 6 months including the remainder of the month of issue.

(2) For Category III operations an owner or operator must use a flight simulator approved for Category III training.

(3) An owner or operator must ensure that, for Category III operations on aeroplanes with a fail passive flight control system, a missed approach is completed at least once every 18 months as the result of an autopilot failure at or below decision height when the last reported RVR was 300 m or less.

(4) The Director may authorise recurrent training for Category II operations in an aircraft type where no approved simulator is available.

8. LVTO and Category II or III recency requirements

(1) An owner or operator must ensure that, in order for pilots to maintain a Category II and Category III qualification, they have conducted a minimum of 3 approaches and landings using approved Category II or III procedures during the previous six month period, at least one of which must be conducted in the aircraft.

(2) Recency for LVTO is maintained by retaining the Category II or III qualification prescribed in subparagraph (1) above.

(3) An owner or operator may not substitute this recency requirement for recurrent training.

91.09.3 HELICOPTER PERFORMANCE CLASSIFICATION

(Reserved).

91.09.4 AEROPLANCE PERFORMANCE CLASSIFICATION

1. Classification

For the purposes of CAR 91.09.4, the Cessna Caravan is classified as a Class B aeroplane.

91.11.2 MANUAL OF PROCEDURE

1. Structure and contents

(1) The manual of procedure must contain specific policies and procedures regarding aircraft operations in the following areas -

(a) patient loading and unloading procedures;

(b) protocols for hot loading and unloading, if practised;

(c) refuelling with the rotors or propellers turning (not recommended);

(d) refuelling with medical personnel and/or patient on board (not recommended);

(e) methods of dealing with combative patients;

(f) hearing protection for medical personnel;

(g) use of safety equipment, such as flame retardant clothing;

(h) use of seat belts and shoulder harnesses by medical personnel;

(i) infection control; and

(j) records of personnel health or immunisation status.

(2) The manual of procedure must contain a recurrent training programme for flight crew members and medical personnel.

TABLE 1

PARAMETERS FOR AEROPLANE FLIGHT DATA RECORDERS

Serial Number	Parameter	Measurement range	Recording interval (seconds)	Accuracy limits (Sensor input compared to FDR reads-out)
1	Time(UTC when available, otherwise elapsed time)	24 hours	4	∀ 0.125% per hour
2	Pressure altitude	-300 m (-1000 ft) to maximum certificated altitude of aircraft + 1 500 m (+ 5 000ft)	1	∀ 30 m to ∀200 m (∀ 100 ft to ∀ 700 ft)
3	Indicated airspeed	95km/h (50 kt) to max Vso (Note 1) Vso to 1.2 V_D(Note 2)	1	∀5% ∀3 %
4	Heading	360°	1	∀2°
5	Normal acceleration	-3g to + 6 g	0.125	∀1% of maximum range excluding datum error of 5%
6	Pitch attitude	∀ 75°	1	∀ 2°
7	Roll attitude	∀ 180°	1	∀ 2°
8	Radio transmission keying	On-off (one discrete)	1	
9	Power on each engine (Note 3)	Full range	1 (per engine)	∀ 2°
10	Trailing edge flap or cockpit control section	Full range on each discrete position	2	∀5% or as pilot's indicator
11	Leading edge flap or cockpit control section	Full range on discrete position	2	∀5% or as pilot's indicator
12	Thrust reverser position	Stowed, in transit, and reverse	1 (per engine)	
13	Ground spoiler/speed brake selection	Full range or each discrete position	1	∀2% unless higher accuracy uniquely required
14	Outside air temperature	Sensor range	2	∀2°C
15	Autopilot/autho throttle/AFCS mode and engagement status	A suitable combination of discretes	1	
Note: The preceding 15 parameters satisfy the requirements for a Type II FDR				
16	Longitudinal acceleration	∀1g	0.25	∀1.5% max range excluding datum error of 5%
17	Lateral acceleration	∀1g	0.25	∀1.5% max range including datum erorr of 1.5%
18	Pilot input and/or control surface position - primary controls (pitch, roll, yaw) (Note 4)	Full range	1	∀2° unless higher accuracy uniquely required.
19	Pitch trim position	Full range	1	∀3% unless higher accuracy uniquely required
20	Radio altitude	-6m to 750m (-20 ft to 2 500 ft)	1	∀ 0.6 m (∀2ft) or 3% whichever is greater below 150m (500 ft) and 5% above 150 m (500 ft)
21	Glide parth deviation	Signal range	1	∀3%
22	Localiser deviation	Signal range	1	∀3%
23	Marker beacon passage	Discrete	1	
24	Master warning	Discrete	1	
25	NAV1 and 2 frequency selection (Note 5)	Full Range	4	As installed
26	DME 1 and 2 distance (Notes 5 and 6)	0-370 km	4	As installed
27	Landing gear squat switch status	Discrete	1	
28	GPWS (ground proximity warning system)	Discrete		
29	Angle of attack	Full range	0.5	As installed
30	Hydraulics, each system (low pressure)	Discrete	2	
31	Navigation data (latitude / longitude, ground speed and drift angle) (Note 7)	As installed	1	As installed
32	Landing gear or gear selector position	Discrete	4	As installed
Note: The preceding 32 parameters satisfy the requirements for a Type I FDR				

Notes:

1. *Vso stalling speed or minimum steady flight speed in the landing configuration.*

2. *V_D design diving speed.*

3. *Record sufficient inputs to determine power.*

4. *For aeroplanes with conventional control systems Aor" applies. For aeroplanes with non-mechanical control systems A and applies. In aeroplanes with split surfaces, a suitable combination of inputs is acceptable in lieu of recording each surface separately.*

5. *If signal available in digital form.*

6. *If signals readily available.*

7. *Recording of latitude and longitude from INS or other navigation system is a preferred alternative.*

TABLE 2

PARAMETERS FOR HELICOPTER FLIGHT DATA RECORDERS

Serial Number	Parameter	Measurement range	Recording interval (seconds)	Accuracy limits (Sensor input compared to FDR reads-out)
1	Time(UTC when available, otherwise elapsed time)	24 hours	4	∀ 0.125% per hour
2	Pressure altitude	-300 m (-1000 ft) to maximum certificated altitude of aircraft + 1 500 m (+ 5 000ft)	1	∀ 30 m to ∀200 m (∀200 ft to 700 ft)
3	Indicated airspeed	As the installed measuring system	1	∀ 3%
4	Heading	360°	1	∀ 2 %
5	Normal acceleration	- 3 g to + 6 g	0.125	∀ 1%
6	Pitch attitude	∀75°	0.5	∀ 2°%
7	Roll attitude	∀180°	0.5	∀ 2°
8	Radio transmission keying	On-off (one discrete)	1	
9	Power on each engine (Note 1)	Full range	1 (per engine)	∀ 2°
10	Main rotor speed	50-130%	0.5	∀ 2%
11	Pilot input and/or control surface position - primary controls (collective pitch, longitudinal cyclic pitch, lateral cyclic pitch, tail rotor pedal) (Note 2)	Full range	1	∀ 2% unless higher accuracy uniquely required
12	Hydraulics, each system (low pressure)	Discrete	2	
13	Outside air temperature	Sensor range	2	∀ 2°C
14	Autopilot/autho throttle/AFCS mode and engagement status	A suitable combination of discretes		
15	Stability augmentation system engagement	Discrete	1	
Note: The preceding 15 parameters satisfy the requirements for a Type VFDR				
16	Main gearbox oil pressure	As installed	1	As installed
17	Main gearbox oil temperature	As installed	2	As installed
18	Yaw acceleration (or yaw rate) Sling road force	∀1 g	0.25	∀1.5% max range excluding datum error of∀5%
19	Sling load force	0 - 200% of certified load	0.5	∀3% of max range
20	Longitudinal acceleration	∀1g	0.25	∀1.5% max range excluding datum error of∀5%
21	Lateral accelleration	∀1g	0.25	∀1.5% max range excluding datum error of∀5%
22	Radio altitude	-6m to 750m (-20 ft to 2 500 ft)	1	∀ 0.6m (∀ 2 ft) or∀3% whichever is greater below 150 m (500 ft) and∀5% above 150 m 500 ft)

Serial Number	Parameter	Measurement range	Recording interval (seconds)	Accuracy limits (Sensor input compared to FDR reads-out)
23	Landing gear squat switch status	Signal range	1	∀ 3%
24	Localiser deviation	Signal range	1	∀ 3%
25	Marker beacon passage	Discrete	1	
26	Master warning	Discrete	1	
27	NAV1 and 2 frequency selection (Note 5)	Full range	4	As installed
28	DME 1 and 2 distance (Notes 3 and 4)	0-370 km	4	As installed
29	Navigation data (latitude / longitude, ground speed and drift angle) (Note 5)	As installed	2	As installed
30	Landing gear or gear selector position	Discrete	4	As installed
Note: The preceding 30 parameters satisfy the requirements for a Type VFDR				

Note: ***1. Record sufficient inputs to determine power.***

2. For helicopters with conventional control systems A or applies. For helicopters with non-mechanical control systems A and applies.

3. If signal available in digital form.

4. Recording of latitude and longitude from INS or other navigation system is a preferred alternative.

5. If signals readily available.

TABLE 3

GPS TRAINING SYLLABUS

1. GPS system components and principle of operation

Demonstrate an understanding of the GPS system and its principles of operation:

X GPS system components, constellation, control and user

X Aircraft equipment requirements

X GPS satellite signal and pseudo random code

X Principle of position fixing

X Method of minimising receiver clock error

X Minimum satellites required for navigation functions

X Masking function

X Performance limitations of various equipment types

X GPS use of WGS84 coordinate system.

2. Navigation system performance requirements

Define the following terms in relation to a navigation system and recall to what extent the GPS system meets the associated requirements:

X Accuracy

X Integrity

Means of providing GPS integrity; RAIM; procedural systems integration

X Availability

X Continuity of service.

3. Authorisation and documentation

Recall the requirements applicable to pilots and equipment for GPS operations:

X Pilot training requirements

X Logbook certification

X Aircraft equipment requirements

X GPS NOTAM.

4. GPS errors and limitations

Recall the cause and magnitude of typical GPS errors:

X Ephemeris

X Clock

X Receiver

X Atmospheric / ionospheric

X Multipath

X SA (Selected availability)

X Typical total error associated with C/A code

X Effect of PDOP / GDOP on position accuracy

X Susceptibility to interference

X Comparison of vertical and horizontal errors

X Tracking accuracy and collision avoidance.

5. Human factors and GPS

Be aware of the human factors limitations associated with the use of GPS equipment. Apply GPS operating procedures which provide safeguards against navigation errors and loss of situational awareness due to these causes:

X Mode errors

X Data entry errors

X Data validation and checking including independent cross-checking procedures

X Automation induced complacency

X Non-standardisation of the GPS - pilot interface

X Human information processing and situational awareness.

6. GPS equipment - Specific navigation procedures

Recall and apply knowledge of appropriate GPS operating procedures to typical navigation tasks using a specific type of aircraft equipment:

X Select appropriate operational modes

X Recall categories of information contained in the navigation database

X Predict RAIM availability

X Enter and check user defined waypoints

X Enter / retrieve and check flight plan data

X Interpret typical GPS navigation displays LAT / LONG, distance and bearing to waypoint, CDI

X Intercept and maintain GPS defined tracks

X Determine TMG, GS, ETA, time and distance to WPT, WV in flight

X Indications of waypoint passage

X Use of direct to function

X Use of nearest aerodrome function

X Use of GPS in GPS and VOR/DME/GPS arrival procedures.

7. GPS equipment checks

For the specific type of aircraft equipment, carry out the following GPS operational and serviceability checks at appropriate times:

X TSO status

X Satellites acquired

X RAIM status

X PDOP / GDOP status

X IFR database currency

X Receiver serviceability

X CDI sensitivity

X Position indication

8. GPS warning and messages

For the specific type of aircraft equipment, recognise and take appropriate action for GPS warnings and messages, including the following:

X Loss of RAIM

X 2D navigation

X in Dear Reckoning mode

X Database out of date

X Database missing

X GPS fail

X Barometric input fail

X Power / battery fail

X Parallel offset on

X Satellite fail.

ANNEXURE A

GLOBAL POSITIONING SYSTEM

VERIFICATION DATA SHEET

A. GENERAL

Name : ..... Company : .....

Telephone / Facsimile : .....

(Address is only used in the event of clarification. Please report each occurrence separately)

Make and type of receiver and any special features in use at the time that may have affected its performance:

B. INTERFERENCE REPORT

Purpose for which GPS was being used (survey, navigation, etc) and its mode of use (eg. Stationary, In flight, OCA, over land, etc.):

.....

Location of receiver antenna (eg. remote mounted on A/C)

.....

Date, time and nature of GPS malfunction and variation with time / distance travelled:

.....

.....

C. INTEGRITY / RAIM LOSS REPORT

RAIM mode: En route	Date and time	Period of loss	Location

Comments:

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Please forward completed forms to: DCA Namibia