Advisory Circular
AC171-1

Aeronautical telecommunication service organisations — Certification

Initial Issue

01 July 2002

GENERAL

Civil Aviation Authority Advisory Circulars (AC) contain information about standards, practices and procedures that the Director has found to be an Acceptable Means of Compliance (AMC) with the associated rule.

An AMC is not intended to be the only means of compliance with a rule, and consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices or procedures are found to be acceptable, they will be added to the appropriate Advisory Circular.

PURPOSE

This Advisory Circular provides methods, acceptable to the Director, for showing compliance with the cretification requirements of Part 171 and explanatory material to assist in showing compliance.

RELATED CAR

This AC relates specifically to Civil Aviation Rule Part 171.

CHANGE NOTICE

There was no previous issue of this AC, consequently no change is in effect.

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Subpart A — General

171.1   Applicability

Part 171 applies to any person or organisation who wishes to provide an aeronautical telecommunication service (operation of a facility) to support an IFR flight or an air traffic service.

171.3   Definitions

The definitions section contains only those definitions that have a specified meaning relevant to Part 171. Other generally used definitions can be found in Part 1 (Definitions and Abbreviations).

Annex 10 to the Convention on International Civil Aviation has been used as the basis for defining "Aeronautical Telecommunication Service", and "Facility" which includes those equipments and systems that support an aeronautical telecommunication service.

171.5   Requirement for Certificate

Under Part 171, every person who wishes to provide an aeronautical telecommunication service or operate a facility to support an air traffic service or IFR flight must have a telecommunication service certificate.

A certificate may be granted to cover a single private facility or several facilities that support the Papua New Guinea air navigation system.

The rule also sets out the conditions for the operation of a facility without a telecommunication service certificate. This is intended to cover private facilities operating on an aeronautical radio frequency but not in support of an air traffic service or IFR flight. Such facilities must not interfere with any other aeronautical telecommunication service or facility and they must comply with relevant radio apparatus licensing requirements prescribed by the PNG Aeronautical Telecommunication Authority. Any identification code or a call sign that may be required for the operation of these private facilities must be obtained from the Director. Form CAA 24IDA is to be used when applying for such identification codes or call signs.

171.9   Scope of Certificate

The telecommunication service certificate will specify the types of facilities that the certificate holder is authorised to operate. The types of facilities that may be listed on the certificate are:

ILS	Instrument Landing System
MLS	Microwave Landing System
VOR	VHF Omnidirectional Radio Range
DME	Distance Measuring Equipment
NDB	Non-directional Radio Beacon
PAR	Precision Approach Radar
SSR	Secondary Surveillance Radar
PSR	Primary Surveillance Radar
HF A-G	HF Air-ground communications
VHF A-G	VHF Air-ground communications
UHF A-G	UHF Air-ground communications
SELCAL	Selective calling system

VOLMET	Routine broadcast of meteorological information for aircraft in flight
ATIS	Automatic terminal information service
Direct Speech	ATS direct speech circuits
A-G DATA	Air-ground data link
G-G DATA	Ground-ground data link
FDPS	Flight data processing system
RDPS	Radar data processing system
RFDPS	Radar & flight data processing system
AFTN	Aeronautical fixed telecommunication network

171.13   Duration of Certificate

Telecommunication service certificates will be issued or renewed for such periods as the Director sees fit depending upon the circumstances of the application and issue. In no case will the period be more than 5 years.

Factors to be considered for the issue or renewal of a certificate include:

- the Director's previous knowledge of the applicant;

- whether the applicant is an existing certificate holder;

- if the application is in respect of a new type of aeronautical telecommunication service where approval has not previously been given.

Expired or revoked certificates must be returned to the Director and should be returned within 7 days of their ceasing to be effective. Suspended certificates must be produced to the Director for endorsement.

171.15   Renewal of Certificate

The certificate holder is required to apply for renewal in sufficient time to allow for the renewal process to be accomplished before the certificate expires. The certificate will normally be endorsed at the time of issue with an application renewal date. This date may vary significantly, depending upon the extent of the aeronautical telecommunication services provided and the period for which the certificate has been in force.

Where the certificate has been in force for the full five year period, the application will be subjected to an "entry level" audit. The scope of such an audit would be dependent on a review of the conduct of the certificate holder and on the safety audit programme findings over the preceding period of validity.

Subpart B — Certification Requirements

171.51(a)(1) Personnel Require-ments (Chief Executive)

The applicant for a telecommunication service certificate is required to nominate a person to be identified as the Chief Executive. This person must have the overall authority within the organisation, including financial authority, to ensure that the necessary resources are available to operate the facilities listed in their exposition. The Chief Executive must ensure that the organisation's activities are carried out in accordance with the procedures contained in their exposition.

Some large organisations that have developed several independent business units as part of their operating structure may wish these units to apply independently for certification. The independent business unit would have to nominate a senior person within that unit to be identified as the "Chief Executive" for certification under Part 171. This senior person may, however, have another designation within the overall structure of the organisation, but the Director needs to be satisfied that the person meets the criteria of 171.51(a)(1).

171.51(a)(2) Personnel Require-ments (Senior Persons)

The person or persons nominated in the exposition represent the management structure of the aeronautical telecommunication service organisation. They should be suitably qualified for the position held and must be responsible for the provision, operation, and maintenance of the facilities listed in the organisation's exposition.

Titles and responsibilities of the nominated senior persons will vary from organisation to organisation depending on the size of the organisation and the scope of the facilities operated. Responsibilities may be subdivided under individual persons or combined in any number of ways.

Irrespective of the titles used or the number of senior persons nominated, the following areas of responsibility are expected to be addressed where they are applicable to the organisation's activities —

Technical Support

- Responsibility for ensuring that engineering, installation and commissioning activities relating to the provision of facilities are carried out in accordance with the procedures specified in the organisation's exposition.

- Responsibility for ensuring the implementation of actions to correct deficiencies in the provision of facilities that are detected during internal quality assurance reviews, safety audits, or inspections of the organisation's activities.

Maintenance Support

- Responsibility for the ongoing maintenance of each facility to ensure that they continue to meet the applicable operational requirements, are maintained in accordance with the procedures specified in the organisation's exposition and continue to meet the applicable performance specifications.

- Responsibility for ensuring the implementation of actions to correct deficiencies in the operation and maintenance of facilities that are detected during internal quality assurance reviews, safety audits, or inspections of the organisation's facilities.

Some organisations may have a number of people at a location which operates as a semi-autonomous unit with responsibility for the operation and maintenance of numerous facilities in specified areas. Such organisations are expected to nominate a senior person or persons for each of these locations.

Internal Quality Assurance

- Responsibility for the organisation's internal quality assurance procedures.

- Responsibility for monitoring of the organisation's compliance with Part 171 and with its exposition.

- Responsibility for ensuring the adequacy of the organisation's exposition and associated procedures in meeting the requirements specified in Part 171 and in reflecting the organisation's activities.

- Responsibility for ensuring the implementation of actions to correct deficiencies in the organisation's documentation and procedures that are detected during internal quality assurance reviews, audits, or inspections of the organisation's activities.

- Responsibility for ensuring that conditions attached to the certificate or to an exemption are complied with.

The person who assumes these responsibilities on quality assurance must have direct access to the Chief Executive on the matters that affect the operation and performance of facilities.

171.51(a) Personnel Require-ments — General

The aeronautical telecommunication service organisations may choose to appoint senior persons for all or any combination of the above areas of responsibility but the exposition must make it clear to whom the responsibilities devolve. It is expected that these nominated senior persons will be ultimately responsible to the Chief Executive.

The senior persons nominated, including the Chief Executive, must be identified on form CAA 24FPP and credentials supplied with the application. To be accepted, such nominated persons should have adequate knowledge and experience relative to their position and responsibilities.

All persons exercising privileges under the authority of the telecommunication service certificate are required under section 49 of the Civil Aviation Act 2000 to meet the criteria in section 50 of the Act in respect of being a fit and proper person. This includes the Chief Executive and at least the nominated senior persons.

These persons must provide the Director with the biographical details required on form CAA 24FPP at the time of application.

171.51(a)(3) Personnel Requirements

The organisation needs to have sufficient personnel to inspect, supervise and maintain the facilities listed in their exposition. The number of personnel needed is likely to depend on the types of facility, their location, their proven reliability and their role in the air navigation system.

Where a certificate holder engages a third party to operate and maintain any facility covered by the certificate, the certificate holder remains responsible for those facilities. This includes compliance with the procedures, including personnel competence, as detailed in the certificate holder's exposition.

171.51(b) Personnel Require-ments (Competency Assessment)

It is necessary for the certificated organisation to have procedures for assessing the competency of personnel who are authorised by the certificate holder to place facilities into operational service. These procedures should include the levels of training, qualification, and experience that is necessary to ensure the safe operation of the organisation's facilities.

It is expected that the maintenance personnel will have a basic qualification for servicing telecommunication equipment. The certificate holder's initial training programme should cover the procedures to be followed for the operation and maintenance of aeronautical telecommunication facilities.

To be acceptable, maintenance personnel intended to be authorised to return specified facilities to operational service should be given specialised training on the facility type followed by an "on-the-job" evaluation of their competence for the particular facility and its location. The specialised training should include an examination to assess the person's knowledge of the facility type. The "on-the-job" evaluation must establish that the person complies with the procedures for the operation and maintenance of the facility and fully understands —

- the role of the facility within the air navigation system;

- the functions, limitations and use of any built in executive monitor or self-check system;

- the use of special test equipment for checking critical parameters;

- the types of maintenance activity that require detailed safety, specification and parameter checks to be made before the facility is placed into operational service;

- the requirement for and the extent of any site protection areas; and

- any local peculiarities about the particular facility.

The competency check must establish that the person can satisfactorily carry out the necessary checks for the facility and complete the documentation for placing the facility into operational service.

It is essential that supervisors and authorised staff have an adequate knowledge of the organisation's procedures relevant to their role in the organisation.

It is expected that on the job competency checks would be carried out at regular intervals with appropriate continuation training to maintain the competence level of those persons authorised by the certificate holder to place facilities into operational service.

Continuation training should include instruction on changes in regulatory requirements and standards, changes to the organisation's procedures and exposition and changes to the operating requirements of applicable facilities.

To help in the assessment of a person's competence it is recommended that job descriptions be formulated for all positions within the certificate holder's organisation. The job descriptions for all personnel who carry out, verify and manage any work that can affect the safe performance of a facility should define their responsibilities, authority and their inter-relationships. This is particularly important for personnel who need the organisational freedom and authority to —

- initiate action to prevent unsafe situations developing;

- identify and record problems that may affect safety;

- initiate, recommend or provide solutions through designated channels;

- verify the implementation of solutions; and

- control further activities following the detection of unsafe situations until deficiencies have been corrected.

The written documentation provided to each person who is authorised to place facilities into operational service should be in a style that clearly identifies the types of facilities and the locations that the authorisation covers.

171.53   Facility Requirements

The procedures required under this rule are to ensure that any of the facilities listed in the certificate holder's exposition meet the applicable operational requirements for the facility. The performance of the facility must conform with the applicable system characteristics and specification standards prescribed in Annex 10.

It is expected that the procedures will be established to cover —

(1)   the engineering design of facilities to ensure that they meet the applicable operational requirements and specified standards;

(2)   the installation of facilities to ensure that they are installed in accordance with applicable standards; and

(3)   the commissioning of facilities to ensure that —

- the necessary tests (ground and flight tests as appropriate) have been carried out to verify the performance of the facility;

- documentation is complete;

- operational information is provided for publication; and

- resources are available to operate and maintain the facility.

These procedures should reflect the applicant's objectives, policies and practices in providing safe aeronautical telecommunication services and facilities. It is essential that these objectives, polices and practices are understood, carried out and maintained at all levels.

Each facility is required to conform with the applicable system characteristics and specification standards prescribed in Annex 10 "Aeronautical Telecommunications". The paragraphs in Annex 10 that contain "shall" statements are to be read as requirements to be complied with for the particular facility.

The recommendations contained in Annex 10 should be complied with wherever possible. Where a recommendation cannot be met the certificate holder should advise the Director so that a difference can be notified to ICAO if the difference is important for the safety of air navigation.

In complying with the relevant specification standards and recommended practices contained in Annex 10, the following interpretations to the specified paragraphs in Annex 10 should be applied:

Non-directional Beacon (NDB)

The specification standards and recommended practices for NDB are contained in Annex 10, Volume 1, Part 1, Chapter 3, section 3.4.

The numbers below are the paragraph numbers in section 3.4 of Annex 10 —

3.4.2.1

The rated coverage of all NDB should be based on a field strength of 70 microvolts per metre.

3.4.2.3

"Materially different" should be taken to mean a variation of more than 25 percent in the rated coverage in significant sectors.

3.4.4.1

The portion of the spectrum available for NDB frequencies is 190 to 415 KHz. However, where an applicant for a frequency can show that a frequency in this band cannot fulfil the operational requirement, a frequency between 1605.5 and 1632 KHz may be approved.

3.4.4.4

Locators that serve the opposite ends of a single runway are to be assigned separate frequencies.

3.4.5.1

NDB for general use will normally be assigned a two-letter identifica-tion code. Those restricted on operational grounds to specific users will be assigned a three-letter identification code.

An NDB that is restricted by its owner to a specific user or group of users on commercial grounds will be regarded as a general use facility for assigning an identification code.

A transmission rate of seven words per minute corresponds to a dot length of 180 milliseconds.

3.4.5.2 and 3.4.2.1

The on/off keying of the carrier for beacon identification is not acceptable. Refer rule 171.53(a)(2)(i).

3.4.5.4

A modulating tone of 400 Hz is not acceptable. Refer rule 171.53(a)(2)(i).

3.4.6.1.1

Paragraph is not applicable as on/ off keying of the carrier is not acceptable.

3.4.6.6

To meet the requirements of the ITU Radio Regulations, the level of spurious emissions should be at least 40 dB below the mean power level and not more than 40 milliwatts.

UHF Distance Measuring Equipment (DME)

The specification standards and recommended practices for DME are contained in Annex 10, Volume 1, Part 1, Chapter 3, section 3.5. Reference should also be made to Annex 10, Volume 1, Part 1, Chapter 2, paragraphs 2.2.2.1 and 2.2.2.2 which require additional standards for DME/N equipment first installed after 1 January 1989.

The numbers below are the paragraph numbers in section 3.5 of Annex 10:

3.5.3.3.3.1

DME operating channels bearing the suffix 'Y' in Table A will not be approved.

3.5.3.6.3(a)

To avoid possible decoding errors in the aircraft interrogator, the beacon code identity signal should not to be transmitted more than twice every 40 seconds.

3.5.3.6.3(b)

A dot length of between 100 and 160 milliseconds corresponds to a sending speed of between 12 and 8 words per minute respectively.

3.5.4.1.4.1

Table B for the spacing of pulse pairs is shown on page 36 of Annex 10 immediately following paragraphs 3.5.4.4.1.

3.5.4.7.2.3

This recommendation is included as a standard requirement for DME to avoid potential system errors with airborne equipment using second pulse timing.

VHF Omnidirectional Radio Range (VOR)

The specification standards and recommended practices for VOR are contained in Annex 10, Volume 1, Part 1, Chapter 3, section 3.3.

The numbers below are the paragraph numbers in section 3.3 of Annex 10:

3.3.2.1

Frequencies in the band 108.0 MHz to 111.975 MHz will not be approved for VOR use. A channel spacing of 100 KHz is to be used for all installations.

3.3.5.7

This paragraph is not applicable to 50 Khz channel spacing will not be used.

3.3.6.5 and 3.3.6.5.1

VOR will be assigned a two-letter identification code which should be transmitted at least three times every thirty seconds, spaced equally within that period and at a speed corresponding to, approxi-mately, seven words per minute.

Voice identification will not be acceptable.

A sending speed of seven words per minute corresponds to a dot length of 180 milliseconds.

The note references of "3.5.2.5 below" and "3.5.3.6.4 below" in paragraph 3.3.6.5.1 refer to those paragraphs in section 3.5 of the Annex 10 standard for DME.

The implementation of 3.5.3.6.4 for the identification requirements of an associated DME increases the VOR identification rate to between 8 and 12 words per minute, "160 to 100 millisecond dot length", and introduces a break in the VOR identification sequence once every 40 seconds to accommodate the DME identification.

3.3.6.8

This paragraph does not apply to VOR ground equipment.

3.3.8

This section does not apply to VOR ground equipment.

Instrument Landing System (ILS)

The specification standards and recommended practices for ILS are contained in Annex 10, Volume 1, Part 1, Chapter 3, section 3.1.

The numbers below are the paragraph numbers in section 3.1 of Annex 10:

3.1.3.9.3

Identification codes for ILS will be two Morse code letters preceded by the letter "I".

3.1.4

This section does not apply to ILS ground equipment, but operators of ILS ground equipment should be aware of the possible interference from VHF FM broadcast signals.

171.55   Airways Security Programme

The security programme is required to specify the physical security requirements, practices and procedures that may be necessary to minimise the risk of destruction, damage, or interference to the operation of any of the certificate holder's facilities where the destruction, damage or interference of those facilities is likely to endanger the safety of an aircraft in flight.

The security programme must include the physical security requirements, practices and procedures that may be necessary —

- to ensure that all entrances to the certificate holder's facilities are subject to positive access control at all times so as to prevent unauthorised intrusion;

- to protect duty personnel working in any critical area of a facility.

- for personnel to follow in the event of a bomb threat or other threat of violence against a facility; and

- to monitor unattended facilities to detect unauthorised intrusion or interference where that facility may be critical to air navigation and could give erroneous information if tampered with.

171.57   Documentation

Each certificated organisation is required to hold relevant copies of manufacturers equipment manuals, ICAO documents, technical standards and instructions, and any other documentation that may be necessary to ensure that their facilities are installed and operated so that they will be safe for operational use. The organisation would need to hold copies of the relevant information contained in Annex 10 for their facilities.

Depending on the types of facilities operated, the organisation may need to hold copies of the following documents.

ICAO Doc 8071	Manual on Testing of Radio Navigation Aids Volumes I and II
ICAO Doc 8259	Manual on Planning and Engineering of AFTN
ICAO Doc 9578	Manual of the Aeronautical Tele-communication Network (ATN)
ICAO Doc 9294	ICAO Lexicon
ICAO Circular 165	Microwave Landing System (MLS)
ICAO Circular 183	ATS Speech Circuits
ICAO Circular 212	Secondary Surveillance Radar Mode S Data Link ITU Radio Regulations Papua New Guinea Radio Regulations

The manuals, standards, instructions and other documentation required under 171.57(a) to be held by the organisation must be controlled by the procedures required under 171.57(b). When changes are made to any of this documentation, in particular those documents generated by the organisation, the relevant background informa-tion and reasons for the change should be documented and retained for possible audit purposes. Changes to documents must be reviewed and approved by the same functional positions or personnel who carried out the original review and approval unless specifically designated otherwise. Access to the background information is an important part of the review and approval process. Where practical, the nature of the change should be identified in the document or in appropriate attachments.

It is acceptable for computer based systems to be used in place of paper for documents provided sufficient controls are established to maintain the integrity of the information held, and to provide a level of traceability equivalent to that required for paper documents.

171.59   Periodic Inspection and Testing

Each facility that a certificated organisation operates is required to be subjected to periodic inspections and tests to confirm that the facility is meeting the applicable operational requirements and performance specifications.

The procedures established and the programme of periodic inspections and tests must show that each facility not only meets the applicable operational requirements and performance specifications but, that the facility will, with a high probability, continue to meet those requirements and specifications.

The periodic inspection of each facility must be carried out in accordance with the programme established under 171.59(c). Aspects to be assessed during an inspection should include:

- security of the facility and site;

- adherence to the approved maintenance programme;

- upkeep of the equipment, building, site and site services; and

- adequacy of facility records and documentation.

The periodic testing of each facility must include ground tests, and where necessary flight tests. They are to be carried out in accordance with the programmes established under 171.59(c). The procedures and equipment used for these tests must be capable of confirming that the facility is operating within the allowable tolerances.

Periodic tests are particularly relevant to radio navigation facilities. They must, in accordance with the requirement of Annex 10, Volume 1, Part 1, Section 2.7, be the subject of periodic ground and flight tests. However, some radio navigation facilities may not need to be subjected to periodic flight tests if the certificate holder can show, with documented evidence, that periodic ground tests can replace the periodic flight tests without affecting the safe operational performance of the facility.

The Director must be notified of any radio navigation facility that is not subjected to periodic flight tests. He requires this information to file a difference with ICAO.

The procedures for the tests, and in particular the flight tests, of radio navigation aid facilities must be able to confirm that the facility continues to meet the operational requirements for the facility and that any IFR procedures based on the facility remain within the allowable tolerances.

Attachment C to Annex 10, Part 1, and ICAO document 8071 provides guidance information on the ground and flight testing of radio navigation facilities.

The period between the periodic ground and flight tests of radio navigation facilities is to be based on —

- information published by ICAO;

- information provided by any other aeronautical authority;

- the proven reliable performance of the facility;

- the proven performance of any other similar facility; and

- the stability of the facility's operating environment.

Unless proven otherwise by reliability data and the capability of the ground test procedures for a facility, the maximum period between flight tests for radio navigation facilities should be:

VHF omnirange (VOR)

- 12 months

Distance measuring equipment (DME) and Tactical Air Navigation (TACAN)

- As for associated VOR, ILS or MLS;or

- 24 months if installed with NDB only, provided the periodic ground tests verify the operational performance and stability of the DME.

Non-directional beacon (NDB)

- 12 months; or

- as required provided the periodic ground tests verify the operational performance and stability of the NDB.

Instrument landing system (ILS) (including localiser, glide path, markers, and DME when installed)

- 6 months

Microwave landing system (MLS)

- 6 months

Secondary surveillance radar (SSR)

- 12 months

A longer period between flight tests may be justifiable if, after a period of operation, the certificate holder can show that the periodic ground tests for the facility provide a reliable correlation with the flight tests and the facility's operating environment is stable. Any change to the period between tests must be fully documented with the supporting information and justifications for the change.

If a certificate holder has existing radio navigation facilities that have had the period between flight tests increased beyond the periods recommended above then any new facility of the same type may be operated at that increased period provided —

- the equipment and installation are the same as the existing facilities;

- the new facility is subject to the same operation and maintenance regime as the existing facilities; and

- two successive flight tests at the initial period listed above confirm the same performance as the existing facilities.

171.61   Certification of Facility Performance

The procedures form part of the certificate holder's quality control system. They are required to ensure that all the necessary checks and measurements have been carried out by a competent person before a facility is placed into operational service. The users must have the assurance that the facility is safe to use. To complete the quality process and to provide a traceable history, the facility record must be completed as required by 171.71.

171.63   Inspection Measuring and Test Equipment

The certificate holder is required to ensure that appropriate inspection, measuring, and test equipment is available for personnel to verify the safe operation of each facility.

Operating and maintenance instructions for a facility should detail the inspection, measuring, and test equipment that is required to check the parameters of the facility.

Operating and maintenance instructions for a facility should detail the inspection, measuring, and test equipment that is required to check the parameters of the facility. The detail should include any specific items of equipment required and instructions for its use to ensure that any measurement uncertainty is known and is consistent with the required measurement capability.

Procedures are required to control, calibrate, and maintain the inspection, measuring and test equipment to ensure that it remains suitable for use in the continuing maintenance of the facility.

Some facilities, in particular radio navigation facilities, have critical performance parameters that must be set to specified tolerances. The test equipment used to se these parameters must have the precision and known accuracy that is necessary for such measurements. This is particularly important for those radio navigation facilities where periodic flight tests. This test equipment must be identified, controlled and calibrated to a known standard in order to achieve the confidence that the critical parameters are set to within the allowable tolerances.

The operating and maintenance instructions for a facility are required to list the critical performance parameters, the measurements to be made, and the accuracy required.

In meeting the requirement to control, calibrate and maintain inspection, measuring and test equipment, the certificate holder should —

- ensure that the measuring and test equipment required for the maintenance of each facility is identified, particularly the test equipment required for the measurement of the critical performance parameters of a facility;

- ensure that there are instructions for checking, and where necessary a programme for the calibration of the measuring and test equipment. In particular the test equipment required for the measurement of critical performance parameters must be calibrated before use or at prescribed intervals. The instructions for checking and calibrating measurement and test equipment should include details of equipment type, identification number, location, frequency of checks, check method, acceptance criteria and the action to be taken when the calibration results are unsatisfactory;

- ensure that there are calibration records for each item of measuring and test equipment;

- assess and document the validity of previous test and measurement results when any item of measuring and test equipment is found to be out of calibration;

- ensure that the environmental conditions are suitable for the calibration, inspections and measurements being carried out; and

- ensure that the handling, preservation and storage of inspection, measuring and test equipment is such that the accuracy and fitness for its use is maintained.

171.65   Notification of Facility Information

Aircraft operators and pilots require information on the radio communication and navigation facilities that are available to them to allow proper planning for their flights. Certificate holders must therefore have a procedure to convey this information to the users of their facilities.

Information on those facilities that support air traffic services or the New Zealand air navigation system is required to be published by the Aeronautical Information Service (AIS) in the Papua New Guinea Aeronautical Information Publication (PNGAIP). Significant changes to that information must also be promulgated by NOTAM when the change can have an immediate effect on the safety of air navigation.

Telecommunication service certificate holders, who operate radio communication and navigation facilities in support of air traffic services or the air navigation system, are required to have a procedure for forwarding the applicable information to the AIS. The certificate holder is responsible for the adequacy, accuracy and timeliness of that information and therefore needs to identify at least one named senior person [171.51(a)(2)] as having this responsibility. Certificate holders should consult with the AIS when establishing their procedures.

Annex 15, Appendix 1, section 3 lists the information that needs to be published in the PNGAIP Communications (COM) section.

Information that the AIS requires from applicable certificate holders includes —

- the name of the senior person authorised by the certificate holder to approve information forwarded to AIS for publication. If more than one person is authorised to approve such information, all the names must be listed;

- the postal and telegraphic addresses, and telephone and facsimile numbers as applicable for the certificate holder;

- the scope of the aeronautical telecommunication services provided by the certificate holder;

- a summary description of the main types of aeronautical telecommunication services and facilities provided by the certificate holder; and

- the general conditions of use and availability of those aeronautical telecommunication services and facilities.

- for radio communication and navigation facilities the specific information required by AIS includes —

- the geographic name of the facility;

- the type of facility, and where applicable, the type of service supported by the facility;

- the call sign or identification code of the facility;

- the type of emission for each frequency;

- the frequency or channel number for ground-to-air and air-to-ground transmissions;

- the hours of operation;

- the latitude and longitude of the transmitting antenna for each radio navigation facility to the nearest second;

- the average radius of rated coverage for each NDB; and

- details of any known abnormalities or limitations associated with the coverage or navigation information of a radio navigation facility.

Other operational information about the use of a radio navigation facility will be promulgated by AIS as part of the instrument procedures based on the facility.

Aircraft operators, pilots and air traffic services must also be advised of any change in the operational status of any radio communication or navigation facility that is normally available to them. For those facilities published in the PNGAIP, the means for notifying any operationally significant change at short notice is a NOTAM issued by the NOTAM office. A telecommunication service certificate holder's procedures must therefore include the means and responsibilities for passing such information to the NOTAM office. Certificate holders should consult with the NOTAM office when establishing their procedures.

Changes in the operational status of an aeronautical telecommunication service or facility that require the issue of a NOTAM include —

- the establishment or withdrawal of a facility;

- the interruption or return to normal operation of a facility;

- a change to the published information of a facility (frequency, notified hours of service, identification, location, orientation in the case of directional aids, broadcast schedules or broadcast contents);

- a change of 50% or more in the power output of a radio transmitter;

- any irregularity or unreliability of a facility. (Operating without reliable power supply, operating without normal monitoring functions, subject to possible interference because of site infringement or other possible cause).

The certificate holder is responsible for the issue of the NOTAM. This information is to include an estimate on the duration of any outage. The certificate holder is also responsible for reviewing the NOTAM to ensure that it is cancelled, amended or converted into permanent or long-term temporary information as applicable.

Telecommunication service certificate holders operating private facilities that are not promulgated in the PNGAIP must establish other procedures for informing their users of the operational information and of the operational status of their facilities.

171.76   Facility Check After Accident or Incident

The investigation of accidents and incidents to determine the contributing factors is an important component of aviation safety. Where a telecommunication facility may have contributed to or been associated with an accident or incident, it is essential that the facility is checked without delay. The check is to determine the operational status of the facility and its performance at the time of the accident or incident. If the facility is found to be operating outside the allowable tolerance, it must be removed from operational service.

Procedures for checking a facility after the notification of an accident or incident should establish who is responsible for co-ordinating the check and what actions are required to determine and record the operational status and performance parameters. Any check of the performance parameters should be made without disturbing the operational adjustments of the facility.

All information, including the facility record, relating to the status and performance of the facility at the time of the accident or incident and the history of its performance prior to the accident or incident is to be preserved and held in a secure place. This information may be required by the Authority or the Transport Accident Investigation Commission (TAIC) for their investigation of the accident or incident.

It is preferable that the persons carrying out the above checks should not include anyone who was the last person to work on the facility.

The requirement under the Act for the Authority to investigate all accidents and incidents should not prevent the certificate holder from conducting their own investigation into the performance of the facility.

171.69   Facility Malfunctions

Facility malfunction reports and their investigation are important components of aviation safety. To be effective, they require both prompt action and the wholehearted co-operation of all parties involved.

A reported malfunction of a facility would normally come from a user of that facility. Pilots are required to report any malfunction or suspected malfunction of a radio navigation facility or an air-ground communication facility to the ATS unit or air-ground radio station that they are in communication with at the time. After landing, the pilot is required to provide the following details regarding the malfunction report to the nearest ATS unit —

- aircraft type;

- registration letters and flight number;

- name of aircraft operator;

- name of pilot-in-command;

- facility being used;

- date and time when malfunction (or suspected malfunction) was first noticed;

- route sector;

- position of aircraft at the time of the malfunction;

- altitude of aircraft at the time of the malfunction;

- details of the apparent malfunction.

The ATS unit will advise the operator of the facility of the malfunction report and pass on the details.

As facility malfunctions or suspected malfunctions can be caused by problems in various areas, the certificate holder's procedures for investigating reported malfunctions needs to involve the appropriate people. In addition to the actual facility performance, other areas that can contribute to a facility performance, other areas that can contribute to a malfunction or a suspected malfunction may include flight procedures, air traffic services, aircraft operations and airworthiness. The procedures need to ensure that there is a rapid investigation of the problem with information input from each affected area so that immediate action can be taken to remedy any deficiency.

The record for each reported malfunction must include sufficient detail to show the nature of the malfunction or suspected malfunction, the conclusions of the investigations carried out by the various areas involved, and the actions taken to remove or correct the malfunction to prevent a recurrence.

Detected malfunctions would normally be those malfunctions (abnormal operation of the facility) detected by maintenance personnel during their maintenance inspections. Detected malfunctions would include instances where a facility is found to be providing erroneous information or has the potential to provide erroneous information. Erroneous information is information that is outside the allowable tolerance for that information.

In the case of navigation aid facilities, the potential to provide erroneous information would include the following circumstances:

- the executive monitor system not being in control of the facility (monitor switched to bypass mode);

- incorrect adjustment of the monitor system that could allow the facility to operate outside the allowable tolerances;

- the executive monitor system not designed for failsafe operation such that a fault in the monitor system may render it incapable of detecting out of tolerance navigation information.

The certificate holder is required to forward a report to the Director when the malfunction investigation reveals that the information provided by the facility has been outside the allowable tolerances, or that there was the potential for the information to be outside the allowable tolerances.

The certificate holder is also required to provide a report to the Director whenever the malfunction investigation reveals that there appears to be a recurring cause for the malfunction reports. Such recurring causes could arise from the way that users are trying to use the facility (that is an operational procedure may need to be changed). There could be a problem associated with a particular aircraft type or avionic package. In these cases, where the problem is not directly associated with the telecommunication facility, the Authority needs to be involved to follow the matter further.

A certificate holder should also inform the Director of any other occurrence associated with the operation of a facility if the person responsible for that facility considers that the occurrence should, in the interests of aviation safety, be investigated.

171.71   Records

Under 171.71 a certificate holder is required to maintain records covering —

- the performance and maintenance history of each facility;

- the establishment of the periodic test programmes for each facility;

- each item of test equipment required for the measurement of critical performance parameters;

- each reported or detected facility malfunction;

- each internal quality assurance review; and

- each person who is authorised to place facilities into operational service.

Adequate and accurate records are an essential element in the safety of air navigation. The records must be able to show that the prescribed procedures have been followed and that the required level of performance for the facility has been achieved.

Properly executed and retained records can provide the certificate holder with information essential for the safe and efficient operation of facilities.

Facility records are required to provide a traceable history for each facility. They provide information that is essential for scheduling maintenance, inspections and tests, and for establishing the reliability of a facility.

Each record should provide a complete history of events in chronological order for the facility. Each entry must be clearly distinguishable from any previous entry and should include details of —

- the date, time and identity of any person carrying out any inspection, test or work on the facility;

- the status of the facility at the time of a person's arrival and departure from the facility;

- the times that the facility was withdrawn from or placed into operational service; and

- full details of any work done on the facility, including routine maintenance and fault repairs, and the results of any subsequent inspections and tests.

The facility records must be retained for at least 3 years. Three years should provide a sufficient number of periodic tests on the facility to establish a reliable history of its performance. Some facilities, because of less frequent tests, may require the records to be held for a longer period to establish an adequate history.

Records are also required for those personnel who are authorised by the certificate holder to place facilities into operational service. The records need to include the following information:

- name;

- date of birth;

- position held within the organisation;

- relevant qualifications;

- experience;

- special equipment training;

- facilities covered by the Authorisation;

- details of competency checks.

Records may be kept in any format but need to be controlled by a responsible senior person. Access to the record system needs to be controlled to ensure that the integrity of the records are maintained. The Authority may require access to any of the records for certification or safety audit purposes.

As covered under 171.67, records may be required by the Authority or TAIC for the investigation of an aircraft accident or incident.

171.73   Internal Quality Assurance

A telecommunication service certificate holder is required to have internal quality assurance procedures to carry out regular reviews of the holder's activities. These procedures form part of the quality management system. They provide the internal checking and correction procedures that are necessary to ensure compliance with, and the adequacy of, the procedures, practices and standards required by Part 171.

The Authority considers that the Quality Systems approach to management is the optimum means of promoting aviation safety. A Quality System is defined in ISO 8402 as: "the organisation structure, responsibilities, procedures, processes and resources for implementing quality management".

The quality system in terms of Part 171, is the whole system of management that is required to ensure that facilities are installed, operated, and maintained to the required standards.

Quality assurance is one element of the quality system. When properly implemented, the quality assurance procedures should provide the certificate holder with the confidence that the organisation is providing a safe and reliable aeronautical telecommunication service to its users.

Quality Assurance is defined in ISO 8402 as: "all those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality".

Advisory Circular AC10 – 1, Internal Quality Assuance contains information about standards and practices that are applicable to organisations required to establish internal quality assurance systems and should be referred to for compliance with this rule.

171.75   Exposition

The purpose of the organisation's exposition is to set forth the procedures, means and methods of the organisation. The exposition will only be accepted if it meets the requirements of Part 171. Its acceptance is a prerequisite for the issuance of a telecommunication service certificate.

The exposition is the means by which the certificate holder defines his or her operation. It shows both the employees and the Authority how the certificate holder will conduct his or her day-to-day business. The exposition is intended to be a tool to assist management in the operation of the business.

Paragraphs 171.75(a)(1) to (a)(7) provide the management part of the exposition and should normally be contained within one document. It should commence with the corporate commitment by the Chief Executive. The remaining parts of the exposition may be produced as any number of separate manuals. Any separate documents must be cross-referenced in the management part of the exposition and must be controlled by the procedures listed under 171.75(a)(11).

Senior persons should hold copies of those parts or manuals that affect their areas of responsibility and staff should be familiar with the parts of the exposition that affect their activities.

The following paragraphs address the individual requirements of the exposition —

(a)(1)   Under the new rules system, each certificate holder has the responsibility to ensure that their operation is planned, organised, carried out, maintained, developed and documented according to applicable regulatory requirements, standards and operating specifications.

As part of their quality system of management, each certificate holder should establish goals and objectives for their operation, including safety standards equal to or above the level prescribed by the Authority.

The statement by the Chief Executive required by 171.75(a)(1) is accepted by the Authority as a Corporate commitment by the certificate holder. The statement should clearly address the goals and objectives of the certificate holder in respect of the safety requirements prescribed by Part 171. The statement may also contain the certificate holder's goals and objectives in respect of their commercial activities. The exposition should be a tool of management to present the certificate holder's operation to their staff, customers and to the Authority.

(a)(2) and (3)   are expanded in the comments made against paragraph 171.51 "Personnel Requirements".

(a)(4)   The certificate holder needs to show the lines of responsibility and communication between the Chief Executive and the work front. The chart should show the relationship between any satellite locations where staff are permanently based and the central body of the organisation.

(a)(5)   The summary of staff employed by an organisation, and their location, provides the Authority with an indication of the size of the organisation for assessing the application and establishing an audit programme.

(a)(6)   The applicant is to specify the facility types that the application is to cover.

The facility types that may be listed on the certificate are shown under paragraph 171.9 of this AC.

If an applicant's proposed facility is not covered in this list the applicant must provide details of its characteristics and compatibility with the air navigation system.

(a)(7)   The applicant should provide information about the scope of work covered by each location where staff are based to provide and maintain the organisation's facilities. The information should include the types of facilities to be maintained, the operational services that they will support and the level of the maintenance support for those facilities.

(a)(8)   The exposition must include the following information for each facility that is listed —

- type of facility (NDB, ILS, VHF A-G, and so on);

- location. The location of navigation aid facilities is to be by latitude and longitude to the nearest second.

- The location is to include any associated components, such as those for ILS and should include their location in relation to airport layout and associated runway in the case of instrument approach   facilities.

  The location of other facilities to be by latitude and longitude to the nearest second, map grid reference to nearest 100 metres, or location name;

- identification code or call sign; and

- operating frequency or channel number.

Each facility operated by the certificate holder must be listed in the exposition.

(a)(9)   The airways security programme holder must be listed in the exposition.

(a)(10) These procedures are required as part of the exposition as they provide the working documents for controlling the certificate holder's activities that can directly affect the safe operation of facilities. They may be separate manuals and should provide a concise description of the means to control the technical standards and practices that may affect the design, installation, commissioning and maintenance of facilities. The procedures may include references to other internal technical instructions and must include the quality assurance procedures which are an essential element of the quality management system.

The headings are generally self-explanatory and must be addressed by all applicants to the extent that they apply to the particular scope of intended activity. More detailed information will be found under the paragraphs that call for the procedure.

(a)(11) These procedures must show how the certificate holder plans to control, amend and distribute the exposition. The procedures should be similar to those required in 171.57 for controlling, amending and distributing the certificate holder's documentation.

171.75(b)   The acceptance of the applicant's exposition by the Director is the final step in the authorisation process for a person to operate a facility in support of an air traffic service or IFR flight. Such acceptance will be followed by the issue of a Telecommunication Service Certificate.

Subpart C — Operating Requirements

171.101   Continued Compliance

After obtaining a telecommunication service certificate, it is the responsibility of the certificate holder to ensure that the organisation continues to meet the requirements for certification. The means of meeting these requirements are contained in the exposition. Therefore a copy of the exposition, or at least each applicable part of it must be available to all personnel who need access to the information to carry out their work. A complete copy of the exposition needs to be held at each major location covered by the exposition. Smaller satellite locations may however only need those parts that directly apply to their scope of activities.

171.103   Identification Codes and Call Signs

The Authority will allocate identification codes for radio navigation facilities and call signs for communication facilities in accordance with the ICAO procedures. Applications for identification codes or call signs are to be forwarded to the Director on application form CAA 24IDA.

171.105   Communication Procedures

The operating procedures for facilities must be in accordance with the applicable procedures prescribed in Annex 10, Volume II (Communication Procedures). This is to ensure that the operation of a facility does not create a potential safety hazard by interfering with other legitimate users.

171.107   Operating and Maintenance Instructions

Operating and maintenance instructions are to be provided for each facility listed in the certificate holder's exposition. Instructions must be available at each site for ready use by personnel working on the facility. The instructions may be hard copy or computer based.

Maintenance instructions are to set out the requirements for the operation and maintenance of the facility. They must include —

- the critical performance parameters and their associated minimum performance levels for the facility;

- the test equipment required for the measurement of those parameters;

- the mandatory check procedures for placing the facility into operational service; and

- the mandatory inspection and test procedures for the facility.

Operating and maintenance instructions may include references to other documentation and should include the following —

- the name of the facility (for instance Wellington VOR);

- the function of the facility in relation to associated air navigation services;

- the hours of operation of the facility;

- the facility identification code or call sign;

- the operating frequency and power output of any radio equipment;

- the standard operating conditions for the facility;

- the location of the facility. The location of navigation aid facilities should be by latitude and longitude to the nearest second and should include any associated components, such as for ILS, and their location in relation to airport layout and runway for instrument approach facilities.

- The location of other facilities should be by latitude and longitude to the nearest second, map grid reference to nearest 100 metres, or location name.

- instructions on the security programme requirements for the facility;

- details of any critical site protection areas where the presence of metallic objects such as wire fences, power or telephone lines and the movement of machines, vehicles, and aircraft must be controlled or prevented to protect the integrity of the facility;

- an explanation of the kinds of activity such as construction or grading near the facility that may require shutdown or certification checks;

- details of any licensing requirements for the facility and maintenance personnel;

- instructions on the posting of licences and signs;

- instructions on keeping the facility and other technical records;

- procedures for the operational monitoring of the facility to ensure that it continues to meet the

minimum performance levels;

- the names, addresses, and telephone numbers of persons to be notified in an emergency;

- procedures to be followed to determine the performance of the facility and the preservation of information in the event of an accident or incident investigation;

- procedures to be followed to obtain the release of the facility from operational service for maintenance. This should include, where applicable, the coordination of the release with Air Traffic Control and the issuance of an appropriate NOTAM;

- the detailed and specific maintenance procedures for the facility including:

  (1)   frequency of inspections and tests;

  (2)   limitations on the scope of maintenance work permitted where performance checks are limited to the capabilities of an executive monitor system;

  (3)   detailed performance check procedures to be carried out before the facility is returned to operational service where the scope of maintenance work has exceeded the limitations in the item immediately above.

The maintenance procedures must identify, and set tolerances for the parameters (critical performance parameters) that can directly affect the safety of the facility.

Any specialised and calibrated test equipment required for the measurement of these critical performance parameters should also be listed with details of accuracy, certification, and recalibration requirements;

- procedures for conducting and recording any applicable ground inspections and tests of the facility;

- procedures for conducting and recording any applicable flight tests of the facility; and

- a description of any critical parts of the facility that may not be changed, adjusted, or repaired without an approved certification check to confirm that the facility performance meets the operational requirements.

171.109   Deviations

There may be occasions when a certificate holder can assist during an aircraft emergency by operating a facility that does not comply with the requirements of Part 171. Rule 171.109 allows such a deviation from the normal requirements, provided the person operating the facility can be satisfied that there is no reason to suspect the integrity of the information provided by the facility. The emergency must require immediate action to be taken for the protection of life or property involving carriage by air. A report on the deviation must be forwarded to the Director within 14 days.

The operation of a navigation aid that does not have the required monitor system in operation could be a deviation under 171.109 provided the operation was to assist an aircraft in distress.

171.111   Privileges of Certificate Holder

A telecommunication service certificate holder is entitled to operate any of the facility types listed on their certificate provided each facility is listed in their exposition and meets the applicable requirements of Part 171. Additional facilities of the types covered by the certificate may be added as an amendment to the exposition. A certificate holder must apply to the Director (on form CAA 24AMM) for an amendment to their certificate if they wish to operate a facility type that is not covered by their certificate.

171.113   Limitations on Certificate Holder

(1)   Facilities may not be operated if the certificate holder has any reason to suspect the integrity of the information being provided by the facility. Although the monitoring system of a navigation aid may indicate that the facility is operating normally, other external influences may be causing or may have the potential to cause interference to the information being received by the user. Such external influences could be the infringement of the critical site area of the facility or the construction of a power line or a building that could cause reflections of the radiated signal. If any such conditions exist, the performance of the facility must be checked, with a flight check if necessary, to verify the integrity of the information provided.

(2)   ==PNG Radio Regulations== (check this!) prohibit the installation, operation and use of apparatus for the transmission of radiocommunication without the authority of a written radio apparatus licence. The PNG Aeronautical Telcommunication Authority manages the assignment of aeronautical radio frequencies and issues all radio apparatus licences The allocation of frequencies in the aeronautical frequency bands will be made in accordance with Annex 10 and the applicable ICAO national and international allotments as detailed in Appendix 1.

(3)   Although a certificate holder may be authorised to operate various types of facilities, any individual facility may not be operated unless the requirements of Rule 171.113(c) are met. The applicable published information for a facility also includes any information promulgated in a NOTAM.

The requirement in Rule 171.113(c)(5) of the rule for the periodic tests to be completed in accordance with the prescribed programme for the facility includes periodic ground tests, as well as any applicable periodic flight tests. Past practice has been that such a limitation would only apply to overdue flight tests on radio navigation facilities. However in many cases, ground tests have significantly extended the period between flight tests, and in some cases have replaced them completely, and therefore the periodic ground tests are an essential element in maintaining the operational integrity of a facility.

171.115   Changes to Certificate Holder's Organisation

The certificate holder's exposition is intended to be a living document to reflect the organisation's activities and its means to carry out those activities. Therefore, as the organisation's activities, means, methods and facilities change, the exposition must be changed accordingly. The Authority must be kept informed of these changes and therefore a copy of each amendment to the exposition must be forwarded to the Director.

Any changes to the organisation's procedures or standards that may effect the safe operation of facilities need to be properly documented with background information and reasons for the change. Such documentation should be retained for possible audit trail purposes.

Rule 171.115(d) specifies the changes to the exposition that require the prior approval of the Director. This includes the senior personnel where the fit and proper person criteria must be met, the airways security programme which must be acceptable to the Director, and changes that require a change to the certificate. The Director may also prescribe conditions that may be necessary because of a change in these items. The conditions may be transitional to allow the certificate holder to continue to operate while arrangements are made to incorporate permanent changes.

Rule 171.115(f) allows the Director to require changes to be made to a certificate holder's exposition if the Director considers such changes are necessary in the interests of aviation safety. Such a change could include a temporary change to the certificate holder's airways security programme where the Director considers that a change is necessary to deal with a known or suspected threat to the holder's facilities and the associated airways services.

APPENDIX 1 —Assignment of aeronautical radio frequencies (Check this for PNG!)

The PNG Aeronautical Telecommunication Authority (PNGTEL) manages the assignment of frequencies in the aeronautical radio frequency bands. Frequency assignments in the aeronautical radio frequency bands will be in accordance with the requirements contained in Annex 10 to the Convention on International Civil Aviation, the ITU Radio Regulations, and agreements between the Civil Aviation Authority and PNGTEL.

The utilisation of aeronautical frequencies below 30 MHz is to be in accordance with the requirements in Annex 10, Volume I, Part II, Chapter 3.

The utilisation of aeronautical frequencies above 30 MHz is to be in accordance with the requirements in Annex 10, Volume I, Part II, Chapter 4 except that where options are available, the assignments are to be in accordance with the applicable notes below.

The following frequency bands are to be used for the applicable aeronautical services.

Service	Frequency Band	Annex 10 Reference
ILS Localiser ILS Glide Path	108 –111.975 MHz 382.6 – 33.5.4 MHz	Vol 1, Part 1, 3.1.3.2.1 Vol I, Part 1, 3.1.5.2.1

1. As there are only a few ILS installations in Papua New Guinea, localiser frequencies and the paired glide path frequencies are to be selected sequentially for each aerodrome from the list given in Annex 10, Vol 1, Part 1, paragraph 3.1.6.1.1.

2. Where separate ILS installations serve the opposite ends of a single runway, or different runways at the same aerodrome, separate frequency pairs are to be assigned to each installation.

Service	Frequency Band	Annex 10 Reference
VHF Marker Beacon	75 MHz	Vol 1, Part 1, 3.1.7.2.1 Vol 1, Part 1, 3.6.1
VOR	108 – 111.975 MHz	Vol 1, Part 1, 3.1.3.2.1

1. Frequencies for VOR are to be selected in accordance with Annex 10, Vol 1, Part II, paragraph 4.2.3(a) and (b).

2. Criteria for the geographical separation of VOR on the same and adjacent frequencies is given in Annex 10, Vol 1, Part II, paragraph 4.2.5.

Service	Frequency Band	Annex 10 Reference
NDB	190 – 415 Khz 1606.5 – 1632 Khz	Vol 1, Part 1, 3.4.4.1

Although Annex 10 allocates the band 190 to 1750 Khz to NDB, ITU Radio Regulations (RR8) and agreement between the CAA and the Radio Frequency Service restrict the use of the band to 190 – 415 Khz, except that when a frequency in this band cannot fulfil an operational requirement, a frequency between 1606.5 – 1632 Khz may be assigned.

Service	Frequency Band	Annex 10 Reference
DME	960 – 1215 MHz	Vol 1, Part 1, 3.5.3.2

1. Interrogate and reply frequencies for DME operating Channels are to be selected from the "X" channels listed in Table A at the end of Section 3, Annex 10, Vol 1, Part 1. (Reference Annex 10, Vol 1, Part 1, paragraph 3.5.3.3.3).

2.   The pairing of DME Channels for operation with ILS, VOR, or ILS/MLS is to be in accordance with Table A of Annex 10, Vol 1, Part 1, Section 3. (Reference Annex 10, Vol 1, Part 1, paragraph 3.5.3.3.5).

SSR	Interrogation frequency Reply frequency	1030 MHz 1090 MHz	Vol 1, Part 1, 3.8.1.1.1 Vol 1, Part 1, 3.8.1.2.1
MLS	Angle and data Channel pairing with DME	5000 – 5250 MHz 1090 MHz	Vol 1, Part 1, 3.11.4.1.1 Vol 1, Part 1, 3.11.4.1.2
VHF	Air-ground	117.975 – 136 MHz 136 – 137 MHz	Vol 1, Part 1, 4.5.1.3 Vol 1, Part 1, 4.5.1.3

1. Frequencies for the Aeronautical Mobile (R) Service are to be selected from those listed in Group A, Annex 10, Vol 1, Part II, paragraph 4.1.8.1.2. When the number of frequencies exceeds those listed in Group A, assignments will be made from Group B. (Reference Annex 10, Vol 1, Part II, paragraph 4.1.8.1.1). Where possible, frequencies should be selected to follow the general allotments in the VHF Frequency Utilisation Plan given in Appendix E to ICAO Doc. 9404 ASIA/PAC/2 Regional Air Navigation Plan.

2. Frequencies for other air-ground services are to be selected from those listed in Group C or Group D, Annex 10, Vol 1, Part II, paragraph 4.1.8.1.2.

3. Frequencies in the band 136 to 137 MHz are not currently assigned to aeronautical services but frequencies 136.9000, 136.9250, 136.9500 and 136.9750 MHz have been reserved for Future Air Navigation Systems (FANS) air-ground data link communications.

HF SSB Aero Mobile	2.8 MHz – 22 MHz	Vol 1, Part 1, 4.11.1.11 Vol 1, Part 1, 4.11.1.3.2

Frequency assignments will be in accordance with the requirements and allotments of the ITU Radio Regulations and Annex 10, Vol 1, Part II, section 3.1.

Survival Radio equipment	121.5 and 243 MHz	Vol 1, Part 1, 5.1.1.1
Aircraft ELBA	121.5 and 243 MHz	Vol 1, Part 1, 6.1.1.1
Search and Rescue	3023 and 5680 MHz	Vol 1, Part II, 2.2.1