

CIVIL AVIATION SAFETY AUTHORITY AUSTRALIA

MOS Part 171—Aeronautical Telecommunication and Radio Navigation Services

VERSION 1.1: MARCH 2003

UNCONTROLLED VERSION

Federal Register of Legislative Instruments F2005B02601

MOS Part 171—Aeronautical Telecommunication and Radio Navigation Services

This is a CASA policy manual. It contains specifications (standards) prescribed by CASA, of uniform application, determined to be necessary for the safety of air navigation.

This manual is incorporated in the Civil Aviation Safety Regulations Part 171 – Aeronautical Telecommunication and Radio Navigation Services by reference.

Copies of this manual are available from:

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or by mail from

Document Control Officer Civil Aviation Safety Authority GPO Box 2005 CANBERRA CITY, ACT 2601

The current manual can be viewed at any time via CASA's website at www.casa.gov.au.

This manual may be amended from time to time. Such amendment service will be provided by the Document Control Unit, Civil Aviation Safety Authority.

Any comments about the content or requests for clarification should be directed to:

Branch Head, Airspace, Air Traffic and Aerodrome Standards Branch, Aviation Safety Standards, CASA.

Version 1.1: March 2003

TABLE OF CONTENTS

| LIST OF EFFECTIVE PAGES | iii |
|-------------------------------------------------------------------------------------------|--------------------------|
| AMENDMENT RECORD | v |
| FOREWORD | .vii |
| CHAPTER 1: INTRODUCTION | 1-1 |
| Section 1.1: General | 1-1 |
| 1.1.1 Background | 1-1 1-2 1-2 1-2 |
| Section 1.2: Definitions | 1-3 |
| CHAPTER 2: AERONAUTICAL TELECOMMUNICATION AND RADIO NAVIGATION SERVICES AND FACILITIES | |
| Section 2.1: Aeronautical Telecommunication Services | 2-1 |
| 2.1.1 Classification of Services | 2-1 |
| Section 2.2: Aeronautical Radio Navigation services | 2-3 |
| 2.2.1 Classification of Services | |
| Section 2.3: Aeronautical Telecommunication and Radio Navigation Facilities | 52-5 |
| 2.3.1 Classification of Facilities | 2-5 |
| CHAPTER 3: SAFETY MANAGEMENT SYSTEM | 3-1 |
| Section 3.1: Standards for the Safety Management System | 3-1 |
| 3.1.1 General 3.1.2 Features of Safety Management System | |
| Section 3.2: Standards for Safety Case Preparation | 3-3 |
| 3.2.1 Standards | 3-3 |
| CHAPTER 4: INTERFACE AGREEMENTS | 4-1 |
| Section 4.1: Standards | 4-1 |
| 4.1.1 ATS Provider Agreement | |



| 4.1.3 Aerodrome Operator Agreement |
|--------------------------------------------------------------------------------------------------------|
| CHAPTER 5: TECHNICIAN QUALIFICATIONS, TRAINING AND CERTIFICATION . 5-1 |
| Section 5.1: Technician Qualifications 5-1 |
| 5.1.1 Minimum Academic Qualifications 5-1 |
| Section 5.2: Technician Training and Certification |
| 5.2.1 Authorising Certificate5-35.2.2 Refresher Training and Recency Checking Procedure5-3 |
| CHAPTER 6: TEST EQUIPMENT AND TEST FACILITIES |
| Section 6.1: Test Facilities for Aeronautical Telecommunication or Radio |
| Navigation Services and Facilities6-1 |
| 6.1.1 Standards6-1 |
| CHAPTER 7: DOCUMENT DATA AVAILABILITY AND CONTROL |
| Section 7.1: Documents to be Held by the Provider |
| 7.1.1 Standards7-1 |
| Section 7.2: Document and Data Control Processes |
| 7.2.1 Standards7-3 |
| CHAPTER 8: RECORDS |
| Section 8.1: Records System and Procedures |
| 8.1.1 General |
| Section 8.2: Site Logs |
| 8.2.1 Standards for Site Logs |
| CHAPTER 9: SECURITY |
| Section 9.1: Security Program for Aeronautical Telecommunication and Radio Navigation Facilities9-1 |
| 9.1.1 Purpose |
| REVISION HISTORY |



LIST OF EFFECTIVE PAGES

| Part | No. of Pages | Version | Date of Issue |
|----------------------------------------------------------------------------------------------|-----------------|---------|------------------|
| Cover and verso | 2 | 1.1 | March 2003 |
| Table of Contents | 2 | 1.1 | March 2003 |
| List of Effective Pages | 2 | 1.1 | March 2003 |
| Amendment Record | 2 | 1.0 | June 2002 |
| Foreword | 2 | 1.1 | March 2003 |
| Chapter 1. Introduction | 4 | 1.1 | March 2003 |
| Chapter 2. Aeronautical Telecommunication and Radio Navigation Services and Facilities | 6 | 1.1 | March 2003 |
| Chapter 3. Safety Management System | 4 | 1.1 | March 2003 |
| Chapter 4. Interface Agreements | 2 | 1.1 | March 2003 |
| Chapter 5. Technician Qualifications, Training and Certification | 4 | 1.1 | March 2003 |
| Chapter 6. Test Equipment and Test Facilities | 2 | 1.0 | June 2002 |
| Chapter 7. Document Data Availability and Control | 4 | 1.0 | June 2002 |
| Chapter 8. Records | 4 | 1.0 | June 2002 |
| Chapter 9. Security | 2 | 1.0 | June 2002 |
| Revision History | 2 | 1.1 | March 2003 |





AMENDMENT RECORD

The amendments listed below have been incorporated into this copy of MOS Part 171—Aeronautical Telecommunication and Radio Navigation Services.

| Version Number | Chapter Affected | Pages Replaced | Signature | Date |
|-------------------|---------------------|-------------------|-----------|------|
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Federal Register of Legislative Instruments F2005B02601

FOREWORD

The Civil Aviation Safety Authority is responsible under section 9(1)(c) of the Civil Aviation Act 1988 for developing and promulgating appropriate, clear and concise aviation safety standards.

CASA is also responsible under section 9(2)(b) and section 16 of the Act for promoting full and effective consultation and communication with all interested parties on aviation safety issues, and must, in performing its functions and exercising its powers, where appropriate, consult with government, commercial, industrial, consumer and other relevant bodies and organisations.

The Manual of Standards (MOS) is the means CASA uses to meet its responsibilities under the Act for promulgating aviation safety standards. The MOS prescribes the detailed technical material (aviation safety standards) that is determined to be necessary for the safety of air navigation.

The MOS is referenced in the particular regulation. You should refer to the applicable provisions of the Civil Aviation Act and Civil Aviation Safety Regulations, together with this manual, to ascertain the requirements of, and the obligations imposed by or under, the civil aviation legislation.

Amendments to the manual are the responsibility of the Branch Head, Airspace, Air Traffic and Aerodrome Standards Branch. Readers should forward advice of errors, inconsistencies or suggestions for improvement to that officer.

Jim Shirley Head Airspace, Air Traffic and Aerodrome Standards Branch



Version 1.1: March 2003

CHAPTER 1: INTRODUCTION

Section 1.1: General

1.1.1 Background

1.1.1.1 The standards pertaining to the regulation of Aeronautical Telecommunication and Radio Navigation service providers in this Manual are established by the Civil Aviation Safety Regulations Part 171 – Approved Aeronautical Telecommunication and Radionavigation Service Providers. Part 171 has its basis in the Standards and Recommended Practices in Annex 10 to the Convention on International Civil Aviation.

1.1.2 Document Set

- 1.1.2.1 The document hierarchy consists of:
 - relevant Civil Aviation Safety Regulations (CASRs);
 - the Manual of Standards (MOS); and
 - Advisory Circulars (ACs).
- 1.1.2.2 The regulatory documents establish, for service providers, a comprehensive description of system requirements and the means of meeting them.
- 1.1.2.3 **CASRs** establish the regulatory framework (*Regulations*) within which all service providers must operate.
- 1.1.2.4 The **MOS** comprises specifications (Standards) prescribed by CASA, of uniform application, determined to be necessary for the safety of air navigation. In those parts of the MOS where it is necessary to establish the context of standards to assist in their comprehension, the sense of parent regulations has been reiterated. The MOS is a disallowable instrument. This means that it is a legislative instrument that becomes effective on publication in the Government Gazette and it must be tabled in Parliament within fifteen sitting days from when it was made and is subject to scrutiny by Parliament.
- 1.1.2.5 Readers should understand that in the circumstance of any perceived disparity of meaning between MOS and CASRs, primacy of intent rest with the CASR. Where there is any inconsistency between the regulations and the MOS, the regulations prevail.
- 1.1.2.6 Service providers must document internal actions (*Rules*) in their own Operational Manuals, to ensure compliance with the standards.
- 1.1.2.7 **ACs** provide recommendations and guidance material to illustrate a means, but not necessarily the only means, of complying with the Regulations. ACs may explain certain regulatory requirements by providing interpretive and explanatory material. It is expected that service providers will document internal actions in their own Operational Manuals, to put into effect those, or similarly adequate, practices.



1.1.3 Differences between ICAO Standards and those in MOS

1.1.3.1 Notwithstanding the above, where there is a difference between a standard prescribed in ICAO Annexes and the Manual of Standards (MOS), the MOS standard shall prevail.

1.1.4 Differences Published in AIP

1.1.4.1 Australian differences to the ICAO Standards and Recommended Practices are published in AIP GEN 1.7.

1.1.5 MOS Documentation Change Management

- 1.1.5.1 Responsibility for the approval of the publication and amendment of the Manual of Standards (MOS) resides with the Branch Head, Airspace, Air Traffic and Aerodrome Standards Branch, of the Aviation Safety Standards Division, Civil Aviation Safety Authority.
- 1.1.5.2 This document is issued and amended under the authority of the Branch Head, Airspace, Air Traffic and Aerodrome Standards Branch.
- 1.1.5.3 Requests for **any change** to the content of the MOS may be initiated by:
 - technical specialist areas within CASA;
 - Aeronautical Telecommunication and Radio Navigation service providers;
 - ATS service providers.
- 1.1.5.4 The need to **change standards** in the MOS may be generated by a number of causes. These may be to:
 - ensure safety;
 - ensure standardisation;
 - respond to changed CASA standards;
 - respond to amendments to the ICAO Annexes;
 - accommodate new initiatives or technologies.

1.1.6 Related Documents

1.1.6.1 These standards should be read in conjunction with ICAO Annex 10 Volumes I to V inclusive, and ICAO Doc 8071 Volume I – Testing of Ground-Based Radio Navigation Systems.



Section 1.2: Definitions

| Definition | Meaning | | |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| Aerodrome operator agreement | An agreement that is made between a service provider and an aerodrome operator under which the service provider provides an aeronautical telecommunication service or radionavigation service at the aerodrome. | | |
| Aeronautical telecommunication service | An aeronautical broadcast service, or an aeronautical fixed service, or an aeronautical mobile service that supports an ATS, or any system that processes or displays air traffic control data. | | |
| Aeronautical radio navigation service | A radio navigation service intended for the benefit and for the safe operation of aircraft. | | |
| AIS agreement | An agreement that is made between a service provider and AIS under which the service provider gives information to AIS. | | |
| ATS | Air Traffic Service as defined in Annex 11 to the Convention on International Civil Aviation. | | |
| ATS provider | A person or organisation approved as an ATS provider under CASR Part 172. | | |
| ATS provider agreement | An agreement to provide an aeronautical telecommunication or radio navigation service that is essential to an ATS provider's operation. | | |
| Facility | One or more items of equipment, at one or more locations, that provide an aeronautical telecommunication or radio navigation service. | | |
| Safety Management System (SMS) | An SMS defines the policies, procedures and practices for managing the safety of the provision of aeronautical telecommunication or radio navigation services. | | |



Federal Register of Legislative Instruments F2005B02601

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CHAPTER 2: AERONAUTICAL TELECOMMUNICATION AND RADIO NAVIGATION SERVICES AND FACILITIES

CASR Reference: CASR Part 171.020 (2)(d) - List of aeronautical telecommunication and radio-navigation services

Section 2.1: Aeronautical Telecommunication Services

2.1.1 Classification of Services

- 2.1.1.1 Aeronautical telecommunication services are the ground-based stations of those services defined hereunder supporting an Air Traffic Service provided under Part 172. Airborne stations are not included.
 - (a) Aeronautical Broadcasting Service. A broadcasting service intended for the transmission of information relating to air navigation.

Note: AWIB stations are not included.

- (b) Aeronautical Fixed Service. A telecommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air services.
- (c) Aeronautical Fixed Telecommunication Network Service. A worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages and/or digital data between aeronautical fixed stations having the same or compatible communication characteristics.
- (d) Aeronautical Telecommunication Network Service. An inter-network that allows ground, air-ground and avionics data sub-networks to interoperate by adopting common interface services and protocols based on the International Organisation for Standardization (ISO) Open Systems Interconnect (OSI) reference model.
- (e) Aeronautical Mobile Service. A mobile service between aeronautical ground stations and aircraft stations, in which survival craft stations may participate; emergency position-indicating radio-beacon stations may also participate in this service on distress and emergency frequencies. This service does not include ground stations that are provided for other than ATS purposes.
 - **Note:** UNICOM, Certified Air/Ground Radio Services (CAGRS), Pilot Activated Lighting (PAL) and Aerodrome Frequency Response Unit (AFRU) stations are not included.



- (f) Any telecommunication service which processes or displays air traffic control data (including aviation meteorological data) for use by an ATS provider under Part 172.
- (g) Electronic briefing and flight plan lodgement service for the use of pilots.



Federal Register of Legislative Instruments F2005B02601

Section 2.2: Aeronautical Radio Navigation services

2.2.1 **Classification of Services**

- 2.2.1.1 A radio navigation service intended for the benefit, and for the safe operation of aircraft.
- 2.2.1.2 Radio navigation services include radio determination (radar surveillance services) supporting ATS.





Section 2.3: Aeronautical Telecommunication and Radio Navigation Facilities

2.3.1 Classification of Facilities

- 2.3.1.1 The following list classifies the kinds of facilities used for the provision of aeronautical telecommunication and radio navigation services:
 - (a) VHF air/ground voice communication facilities;
 - (b) HF air/ground voice communication facilities;
 - (c) UHF air/ground voice communication facilities;
 - (d) Precision approach radio navigation aids;
 - (e) Instrument Landing System facilities;
 - (f) Non-precision radio navigation aids;
 - (g) Distance Measuring Equipment;
 - (h) VHF Omni-range (VOR) facilities;
 - (i) Non-directional beacons (NDB);
 - (j) Flight data processing facilities;
 - (k) Flight information facilities;
 - (I) Radar data processing facilities;
 - (m) Primary surveillance radar facilities;
 - (n) Secondary surveillance radar facilities;
 - (o) Surface movement radar facilities;
 - (p) Precision runway monitor facilities;
 - (q) Automatic dependent surveillance system facilities;
 - (r) Voice switching and control facilities;
 - (s) ATS point to point communication facilities;
 - (t) Air/ground data links;
 - (u) Ground to ground data interchange networks;
 - Human Machine Interface systems, including Tower Consoles, ATS Work Stations, and Display facilities;
 - (w) Uninterruptable and emergency power supplies;
 - Essential services in buildings and in equipment shelters housing facilities (electrical power supplies, air-conditioning, and security facilities);



- (y) Global Navigation Satellite System ground based augmentation stations or facilities;
- (z) Aeronautical databases used in or by a facility;
- (aa) Meteorological Display Systems used for ATS;
- (bb) Voice and Data Recording facilities;
- (cc) Any other facilities supporting ATS provided under Part 172.



Federal Register of Legislative Instruments F2005B02601

CHAPTER 3: SAFETY MANAGEMENT SYSTEM

Section 3.1: Standards for the Safety Management System

3.1.1 General

3.1.1.1 A Safety Management System defines the policies, procedures, and practices for managing the safety of the provision of services, and managing any changes in their provision.

3.1.2 Features of Safety Management System

- 3.1.2.1 A safety management system:
 - (a) is issued under the authority of the chief executive of the organisation;
 - (b) is kept under review for effectiveness by key personnel of the organisation;
 - (c) is available to, and is complied with, by key persons and technicians of the organisation;
 - (d) defines the organisation's safety objectives;
 - (e) defines the safety responsibilities of key personnel and technicians;
 - (f) establishes processes for quality assurance;
 - (g) establishes procedures for the communication and processing of safety concerns within the organisation;
 - (h) defines the interface arrangements between internal groups of the organisation; and
 - (i) defines the method(s) and standards for safety case preparation, including safety hazard identification and risk assessment.





Section 3.2: Standards for Safety Case Preparation

3.2.1 Standards

- 3.2.1.1 Safety cases provide evidence and argument that a service or facility, or a proposed change to the design of a service or facility, meet safety objectives for the service.
- 3.2.1.2 Safety cases are to be based on a recognised methodology for safety risk assessment.
- 3.2.1.3 The safety risk assessment in a safety case:
 - (a) identifies all potential safety hazards associated with the operation of each service, in normal and abnormal modes of operation;
 - (b) assesses the safety risk of each hazard;
 - (c) identifies the means of mitigation of unacceptable safety risks.
 - **Note:** Guidelines for the preparation of safety cases, and for design and support of software used in safety critical systems, have been published by CASA in Civil Aviation Advisory Publications (CAAP) Airways No 1 and 2 respectively. Safety Management System processes meeting those guidelines will satisfy CASA requirements for safety cases and software design and support.
- 3.2.1.4 Existing ATEL/ANAV services and/or facilities having a demonstrated history of safe operation for more than two years at the date of initial certification do not need to be covered by a baseline safety case.
- 3.2.1.5 Safety cases submitted to CASA under 171.035 are prepared to support new services, and changes to the technical specification of existing services that result in a change of service noticeable to the users—ATS or pilots.
- 3.2.1.6 Internal safety assessments for changes under 171.040 are undertaken in accordance with an approved provider's Safety Management System.





Federal Register of Legislative Instruments F2005B02601

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CHAPTER 4: INTERFACE AGREEMENTS

CASR Reference: CASR Part 171.130

Section 4.1: Standards

4.1.1 **ATS Provider Agreement**

4.1.1.1 The ATS provider agreement is an agreement for the provision of the service with an applicant or an organisation approved under Part 172. The agreement identifies interface responsibilities and arrangements.

4.1.2 **Agreements with Organisations Providing Support Services**

- 4.1.2.1 These are agreements with other organisations providing (sub-contracting) a support service, facility, or data, which interconnects or interfaces with an aeronautical telecommunication or radionavigation service. Support services include terrestrial or satellite bearers carrying voice or data communications, radar data provided by another organisation's radar surveillance systems, and other electronic data sources of operational information. The interface agreements include:
 - a functional specification for the support service; and (a)
 - the values or characteristics of availability, reliability, accuracy, integrity, (b) and recovery time, as relevant, of the support service; and
 - (C) the monitoring and reporting of the operational status of the support service, facility, or data, provided by the other organisation; and
 - interface arrangements and management processes which will support (d) the services provided.
- 4.1.2.2 Support service agreements are not required if the applicant can demonstrate or provide evidence that it has suitable interruption recovery contingency arrangements in place, which will provide continued safe operation of a service during any interruption to, or failure of, any support service.

4.1.3 **Aerodrome Operator Agreement**

- The Aerodrome Operator Agreement is an agreement with the aerodrome 4.1.3.1 operator or owner, to operate and maintain those facilities if the telecommunication or radionavigation facilities are owned by, or located at or near, the aerodrome.
- 4.1.3.2 The agreement should include the respective responsibilities of the aerodrome operator and the approved provider for aerodrome infrastructure and aerodrome works that are associated with, or may affect, any Part 171 service. In this regard, the agreement should cover, as relevant:
 - (a) provision of mains and stand-by electrical power;



- (b) the management of aerodrome cabling that connects with Part 171 services;
- (c) interfaces between airport and obstacle lighting, beacons and other visaids, with the control tower,
- (d) fault reporting of outages,
- (e) staff access, and physical security of facilities.

4.1.4 Aeronautical Information Service (AIS) Agreement

- 4.1.4.1 The Aeronautical Information Service (AIS) Agreement is an agreement which sets out:
 - (a) the procedure by which the service provider notifies AIS of a new service, or changes to services published in AIP, or the intention to carry out a test transmission;
 - (b) the period of time within which the notification will be made.



Federal Register of Legislative Instruments F2005B02601

CHAPTER 5: TECHNICIAN QUALIFICATIONS, TRAINING AND CERTIFICATION

CASR Reference: CASR Part 171.050

Section 5.1: Technician Qualifications

5.1.1 Minimum Academic Qualifications

- 5.1.1.1 The minimum academic qualification for technicians performing operation and maintenance functions associated with aeronautical telecommunication facilities and/or radionavigation facilities is a diploma of technology in one of the following:
 - (a) radio engineering;
 - (b) communications engineering;
 - (c) electrical engineering;
 - (d) electronic engineering;
 - (e) computer science;
 - (f) information technology; or
 - (g) qualifications equivalent to the above qualifications.
- 5.1.1.2 For those technicians that carry out or supervise electrical and mechanical trades work only, the minimum qualification is an electrical or mechanical trades qualification, as relevant.
- 5.1.1.3 Where an organisation considers, and CASA agrees, that the operation and maintenance of a particular type of facility is not technically complex, lesser qualifications may be acceptable for those technicians who operate and maintain that type of facility.





Section 5.2: Technician Training and Certification

5.2.1 Authorising Certificate

- 5.2.1.1 Approved organisations provide technicians with an authorising certificate which:
 - (a) establishes the identity of the technician;
 - (b) details the scope of the authorisation granted to the technician by listing the facilities, or types of facilities, which the technician is authorised to operate and/or maintain; and
 - (c) includes a date of effect, and the period of time for which each of the authorisations remain current.
- 5.2.1.2 An organisation must not grant a technician an authorising certificate in respect to a particular facility or a class of facility unless it has established that the technician:
 - (a) has undergone a competency based course of instruction or on-the-job training specific to that facility or that class of facility; and
 - (b) has been assessed to be competent in the operation and maintenance of the facility or the class of facility by an assessor who:
 - has been trained and accredited in the Assessment Units of Certificate IV in Assessment and Workplace Training as developed under the auspices of the Australian National Training Authority; and
 - (ii) holds formal recognition of competency in the unit being assessed, at or above the level being assessed; and has current knowledge of the workplace and job/role of the person being assessed.
 - (c) However, if an assessor does not have all the competencies at (b) (i) and (b) (ii), one person with the competencies in (b) (i) and one or more persons with the competencies in (b) (ii) may work together to conduct assessments.

5.2.2 Refresher Training and Recency Checking Procedure

5.2.2.1 Approved organisations must also have a process for refresher training and recency checking of technicians to ensure the on-going retention of technician's competency on the facility types for which an authorising certificate has been granted.





CHAPTER 6: TEST EQUIPMENT AND TEST FACILITIES

CASR Reference: CASR Part 171.070

Section 6.1: Test Facilities for Aeronautical Telecommunication or Radio Navigation Services and Facilities

6.1.1 Standards

- 6.1.1.1 An organisation has available the necessary test facilities for use in the operation and maintenance of services and facilities.
- 6.1.1.2 Organisations use documented procedures to control, calibrate, and maintain test equipment.
- 6.1.1.3 Calibrated test equipment is used in maintenance of a service or facility.
- 6.1.1.4 Calibration is carried out at prescribed intervals for each type of test equipment and the calibration is traceable to national measurement standards.
- 6.1.1.5 Records of the calibration status of each item of test equipment are retained.
- 6.1.1.6 Each item of test equipment carries a visual identification of its calibration status, the date that the equipment was last calibrated, and the prescribed calibration periodicity.
- 6.1.1.7 An organisation is to assess the validity of previous test results whenever an item of test equipment is found to be out of calibration.





CHAPTER 7: DOCUMENT DATA AVAILABILITY AND CONTROL

CASR Reference: CASR Part 171.075

Section 7.1: Documents to be Held by the Provider

7.1.1 Standards

- 7.1.1.1 Documentation that is essential for the provision of services under the certificate are:
 - (a) Annex 10 Volumes I to V inclusive, and Annex 11;
 - (b) the functional specification and technical specification of services and facilities;
 - (c) records of the configuration of facilities;
 - (d) facility operation and maintenance plans;
 - (e) interface agreements with other organisations;
 - (f) facility technical manuals or instructions;
 - (g) local instructions and technical procedures; and
 - (h) safety cases.





Section 7.2: Document and Data Control Processes

7.2.1 Standards

- 7.2.1.1 Document and data control processes are those which control the authorisation, publication, distribution, and amendment, of all documentation issued, or required, by the organisation.
- 7.2.1.2 These processes are to ensure that:
 - (a) documents are authorised by a designated authority;
 - (b) the currency of documentation can be readily determined;
 - (c) documents are available at locations where needed by staff;
 - (d) only current versions of documents are available; and
 - (e) a master copy of all documentation is securely held.
- 7.2.1.3 All documents that are related to and referenced in the Operations Manual are to be indexed in the Operations Manual.





CHAPTER 8: RECORDS

CASR Reference: CASR Part 171.080

Section 8.1: Records System and Procedures

8.1.1 General

8.1.1.1 The records system and procedures identify, collect, index, store, and maintain records necessary for the safe provision of services.

8.1.2 Standards

- 8.1.2.1 The procedures must ensure that legible and permanent records are kept which provide a traceable history over the lifecycle of services. Records kept include:
 - (a) records of design, manufacturing, procurement, installation, testing, commissioning, modification, and decommissioning;
 - (b) records of the designated authorities for the design, operation and maintenance for each system;
 - (c) records of hazard analysis and risk assessments;
 - (d) records of facility performance and facility maintenance history including performance parameter values, test facilities utilised, identity of authorised technicians conducting operation and maintenance, changes to maintenance procedures;
 - (e) records of facility failures and faults
 - (f) records of defect reports and associated defect investigations;
 - (g) records of technician's competencies, including details of experience, qualifications, training, competency assessments, and facility authorisations.





Federal Register of Legislative Instruments F2005B02601

Section 8.2: Site Logs

8.2.1 Standards for Site Logs

- 8.2.1.1 Site logs are kept for all facilities used to provide an aeronautical telecommunication service or a radionavigation service.
- 8.2.1.2 The site log records all occurrences and actions relating to operation, maintenance, modification, failure, faults, and removal from and restoration to service.
- 8.2.1.3 Entries in site logs include the date/time of the entry and the occurrence and are signed by the technician or other person making the entry.
- 8.2.1.4 Site log records are retained for at least five years.





Federal Register of Legislative Instruments F2005B02601

CHAPTER 9: SECURITY

CASR Reference: CASR Part 171.085

Section 9.1: Security Program for Aeronautical Telecommunication and Radio Navigation Facilities

9.1.1 Purpose

9.1.1.1 The purpose of a security program is to minimise the risk of unauthorised access, entry by animals, or malicious damage to a service or facilities.

9.1.2 Standards

- 9.1.2.1 The security program includes the physical security measures, and the procedures to be followed, for:
 - (a) preventing and detecting intentional or unintentional damage to any facility or equipment used for providing an aeronautical telecommunication or radionavigation service;
 - (b) responding to a threat of intentional damage to a facility or equipment;
 - (c) preventing unauthorised people from having access to any facility or equipment used by the provider in providing an aeronautical telecommunication or radionavigation service.





Federal Register of Legislative Instruments F2005B02601

REVISION HISTORY

| Version | Date | Chapter Section Paragraph | Details |
|---------|------------|---------------------------------|----------------------------------------------------------|
| 1.1 | March 2003 | Section 1.2 | Definition of 'Safety case' in Ver 1.0 deleted. |
| | | 2.1.1.1 | Subparagraph (f) changed and new subparagraph (g) added. |
| | | 2.2.1.2 | 'surveillance' inserted in 'radar services'. |
| | | 3.2.1.3 | Deleted and following paragraphs renumbered. |
| | | 3.2.1.4 to | New paragraphs added. |
| | | 3.2.1.6 | |
| | | 4.1.1.1, | Changed. |
| | | 4.1.2.1 and 4.1.2.1 (b) | |
| | | 4.1.2.2 | New paragraph inserted. |
| | | 4.1.3.1 | Changed. |
| | | 4.1.3.2 | New paragraph inserted. |
| | | 4.1.4.1 | Changed. |
| | | 5.2.1.2 (c) | New subparagraph inserted. |
| 1.0 | June 2002 | All | First issue of MOS Part 171 |



