Egyptian Air Navigation Circular

EAC No. 171_01

CONFORMITY

WITH ECAR PART 171

REQUIREMENTS AND STANDARDS

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Conformity with ECAR Part 171 Requirements and Standards.

1. RELATED REFERENCES:

- ECAR Part 171 – Certification of <u>CNS</u> facilities.
- ICAO Doc 8071

2. PURPOSE OF THIS EAC:

This EAC provides explanation of ECAA requirements and where necessary, methods acceptable to ECAA for prospective and approved service providers to comply with the requirements of ECAR Part 171 for the provision, operation and maintenance of <u>Communication, Navigation and Surveillance (CNS)</u> services that support air traffic services (ATS) or aircraft navigation.
In this EAC, each reference to an ECAR Part 171 regulation number is the cross-reference to the relevant Part171 regulation.

3. ECAR Subpart 171.A – General:

Subpart A of ECAR Part 171 contains Applicability and definitions which are generally consistent with those definitions used in Annex 10 to the Convention on International Civil Aviation.

3.1 Regulation 171.1 – Applicability

3.1.1 ECAR Part 171 applies to organization seeking approval as a provider of one or more ground-based <u>Communication, Navigation and Surveillance</u> services that support ATS or IFR flight. In determining what constitutes 'provision of an <u>Communication, Navigation and Surveillance service,</u> the Part 171 requirements relate to organization that undertake the operation and maintenance of the facilities that provide the defined services. The term 'operation and maintenance' of the services in the context of Part 171 means:

a) placing a facility into operational service; or
b) removing a facility from operational service; or
c) undertaking any functions which affect the operability of a facility while the facility remains in operational service; or
d) undertaking periodic performance inspections, or any maintenance on a facility while the facility remains in operational service; or
e) Undertaking any flight tests on a facility for the purpose of compliance with Part 171.

4. ECAR Subpart 171.B – Certification Requirements

Subpart B of ECAR part 171 contains on certification requirements which are represented in the form of personnel requirements, facility requirements, Records, quality control management system and <u>CNS</u> facility security program.

4.1 Regulation 171.41 – Personnel requirements

4.1.1. The senior person referred to in section (a) (2) must not be the same individual listed as the Chief Executive. This person or group of senior persons must have the authority to make changes to processes and procedures to ensure continuing compliance with the ECARs. Preferably, this person or group will have significant experience in Air Traffic Control services or facilities.

4.1.2. This regulation requires also sufficient qualified personnel to inspect, supervise, and maintain <u>CNS</u> facilities listed in the applicant's operation manual to satisfy the minimum applicable number of personnel required by the manufacture manuals for operation/maintenance of <u>CNS</u> facilities and achieving to ICAO requirements.

4.2 Regulation 171.47 – Documentation

4.2.1 In addition to the requirements listed in this part, the service provider should have a system that tracks the issuance of document revisions and acknowledges the receipt and incorporation by each document holder. Any document holder that does not reply within a reasonable time should be contacted by the revision issuer to verify receipt and incorporation of the revision.

4.2.2 Service providers must hold and keep amended those documents that are necessary as basic references for their services and functions. As a minimum, the documentation that will be required is:
(a) the service provider's operations manual, and all documents referenced within the manual. This will include:
   (i) the functional and technical specifications of services and facilities;
   (ii) the configuration of services and facilities;
   (iii)facility operation and maintenance plans;
   (iv)interface agreements with other organizations;
   (v) local instructions and technical procedures;
   (vi)Safety Cases produced in relation to services/facilities.
(b) ICAO Annex 10 Volumes I to V, (those volumes actually held will depend upon the services provided);
(c) ICAO Annex 11 (if the services are in support of ATS);
(d) ICAO Doc 8071 (if the services are radio navigation services);
(e) ECAR Part 171 and Related ~~Advisory~~ Circulars;
(f) Manufacturer's equipment handbooks, in particular those volumes that contain the Operation and Maintenance Instructions, the logistics support and spare parts listings, as relevant to each facility, and for each associated item of test equipment used for maintenance.

4.2.3 These documents must be available to maintenance personnel at their workplace.

4.3 Regulation 171.49 – Records

4.3.1 All records should be stored in a fire-proof room that contains appropriate fire-fighting equipment. No flammable materials should be present, other than the records themselves.

4.3.2 Adequate and accurate records are a necessary element of a safety management system. Under this regulation, a service provider is required to have a records system to identify, collect, index, store and maintain records necessary to provide a traceable history over the complete life cycle of services and facilities. Records kept are to include at least the following:
(a) records of design, manufacturing, procurement, installation, testing, commissioning, maintenance, routine operation, 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 utilized identity of authorized personnel conducting operation and maintenance, changes to maintenance procedures;
(e) records of facility failures and faults; and
(f) records of defect reports and associated defect investigations;

(g) records of each personnel's competencies, including details of the personnel's qualifications, experience, specialized training, competency assessments and facility authorizations.

4.4 Regulation 171.53 – Quality Management System

4.4.1 A Quality Management System (QMS) is based on the premise that the facility service provider is primarily responsible for continuously monitoring and ensuring that the facilities are systematically safe and in compliance with the Egyptian Civil Aviation Regulations. Although ECAA provides standards and guidance, and promotes compliance through its surveillance, enforcement and other programs, it is the certificate holders upon whom rests the primary and ultimate responsibility to verify that their operations are continuously in compliance with all regulatory requirements. Because certificate holders are in the best position to identify deficiencies and promptly correct them, it is to their advantage to have a procedure in place whereby they monitor compliance and continuously improve their compliance posture.

4.5 Regulation 171.55 - <u>CNS</u> Facility Security Program

4.5.1 The security program established by a service provider should be based on a risk assessment of the possibility of intrusion by unauthorized persons and animals, or damage by natural events.

4.5.2 Service providers must establish appropriate physical security measures for all facilities that provide a <u>Communication, Navigation and Surveillance</u> service. The level of security afforded to each facility will be to minimize the risk of destruction, unauthorized access, entry by animals, and malicious damage or tampering, to each facility. It will generally be necessary to have, as a minimum, a system of personnel control that positively limits access to facilities to personnel approved by the service provider.

4.5.3 The physical security measures adopted for site security should:
(a) control entry access at all times to all entry points;
(b) protect personnel on duty;
(c) establish procedures in respect to bomb or other threats; and
(d) establish monitoring facilities that detect unauthorized access to critical Radio navigation or radio communication facilities.

5. ECAR Subpart 171.C – Personnel

Subpart C of ECAR part 171 contains on the specified training required for maintenance personnel of <u>CNS</u> facilities.

5.1 Regulation 171.61 – Training

5.1.1 Regulation 171.61 establishes the specialized training required for maintenance personnel engaged by a service provider to operate and/or carry out the maintenance of facilities providing <u>CNS</u> services.

5.1.2 Personnel Qualifications. The minimum academic qualification for personnel performing operation and maintenance functions associated with <u>CNS</u> 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.

5.1.3 Personnel Training. Personnel who carry out functions associated with the operation and maintenance of <u>CNS</u> facilities shall be given appropriate, specialized training on the facility type, followed up by an on-the-job evaluation of their competence as follows:

(A) Basic training – phase one;

(B) Qualification training – phase two;

(C) Specific training – phase three;

(D) Continuation training;

(E) Development training if applicable.

5.1.4 Personnel Certification. It is important that service providers have a system in place for assessing the competency of its personnel, whether they are employed by the service provider or they are contract personnel by third-party organizations. Service providers must have an internal certification or rating scheme for its personnel that establish the technical authorizations granted to each personnel. The certification must be in the form of a controlled document provided to each personnel that identifies the personnel and the types of <u>CNS</u> facilities for which the personnel has been granted authorization, the operation and maintenance functions authorized in relation to each facility, the date on which each authorization was granted, and the date on which the authorization expires or the date on which revalidation or reassessment is due.

5.1.5 Ongoing Competency Checks. It is also necessary to have a procedure for ongoing competency checking and refresher training to ensure retention of competence. As a guide, where personnel have not been involved in particular maintenance works on a particular facility for periods in excess of 2 years, refresher training is to be provided and re-authorization of the personnel's personal certification is to be undertaken. The competency assessments must be carried out by a person holding the qualifications for assessors, and the assessment process must ensure that each personnel:

(a) has received a course of training or instruction in the operation and maintenance of each facility for which he/she has responsibility; and

(b) has been assessed as competent to operate and maintain those facilities without supervision.

5.1.6 Guidelines on personnel training courses. ICAO has issued guidelines on personnel training in the ICAO Training Manual (ICAO Doc 7192) Air Traffic Safety Electronic Personnel (ATSEP). This material provides general guidance material on training courses for technical staff operating in Part 171 service providers.

6. ECAR Subpart 171.D – Operation Requirements

6.1 Regulation 171.83 – Facility operation manuals

6.1.1 Regulation 171.83 establishes the requirements in relation to a service provider's operations manual. Prospective providers are required to prepare a draft operations manual to support an application to ECAA for approval as a Part 171 provider. ECAA considers the content of the operations manual to be of primary importance in the approval process. Approval of prospective providers will not be granted by ECAA unless the applicant's operations manual complies with the Requirements of Subpart D of Part 171.

6.1.2 Contents of operations manual. Facility operation manual shall include the following parts:

1) **Definitions.**

2) **General provision for the facility.**
   As this part includes general information about the system and overview about the service accomplished by this facility.

3) **Technical specifications.**
   3.1 Under this part, the following information concerning the specification and interconnection of facilities must be included for each service:
   (a) the kind and the location of each facility making up the service;
   (b) the technical specification of each type of facility;
   (c) the interconnection of each facility making up the service, or to any other service to be provided under the operations manual; and
   (d) the monitoring system relevant to each facility.

   3.2 **Kind and location of facilities.** The type of facility and the location of the facility is the geographic name of the place at which the facility is installed.

   3.3 **Technical specification of each kind of facility**. The technical specification of a facility should include, in technical terms, all inputs and outputs to the facility, and the specifications and standards to which the facility has been designed. The technical specification must cover both the hardware and software of the facility. This information is normally provided by the equipment designer/manufacturer. (If that is the case, reference to the relevant content in the manufacturer's documentation is all that is necessary in the operations manual.

   3.4 **Facility interconnection.** This should be in the form of a block diagram. Each facility representing one of the blocks should be identified and the major signal or data inputs and outputs between facilities or to from other services shown.

   3.5 **Facility monitoring.** The monitoring system for each facility, or group of facilities, should also be included in block diagram form, conveying the method of monitoring, parameters monitored, monitoring outputs and the location at which the outputs are presented. The monitoring requirements for navaids are presented in the following paragraph.

   3.6 **Navaid status monitoring and reporting.** ICAO Annex 10, Volume 1, paragraph 2.8.1 '*Provision of information on the operational status of radio navigation aids*' states:

   '*Aerodrome control towers and units providing approach control service shall be provided without delay with information on the operational status of radio navigation aids essential for approach, landing and takeoff at the aerodrome(s) with which they are concerned.*'

   3.7 **Remote Status Indication**: Monitoring of navaid performance is carried out by electronic monitoring systems installed as part of the equipment. Monitor circuits will take executive action if the performance of the facility is outside specified tolerances. The monitor system will shutdown the equipment, or, in the case of a duplicated equipment, changeover to the standby equipment. The monitoring system will also provide a status output at the equipment site.

4) System Testing

4.1 **Functional specification.** The functional specification of the service is essentially a brief statement of its operational function from the perspective of those for whom the service is intended (air traffic control or pilots). For example, the functional specification for an Instrument Landing System might be:

"Precision approach to landing navigation aid providing pilots with electronic data for glide path and vertical and horizontal guidance to ICAO Category 1 in accordance with the standards of ICAO Annex 10 Vol I."

Or, for an aeronautical mobile service used for the purpose of ATC air/ground control at an aerodrome:

"VHF air/ground service in accordance with ICAO Annex 10 Vol II used for local aerodrome control"

4.2 **Availability and Reliability.** Values for each of the following basic parameters, as relevant to each service type, are to be included for each service:

(a) **Availability.** All <u>Communication, Navigation and Surveillance</u> services must provide high levels of operational availability. In many cases, achievement of the necessary availability levels will require the use of design features such as redundancy and/or duplication of facilities, automatic changeover from main to standby facility in the event of a fault, remote monitoring and maintenance capability including remote reconfiguration, remotely actuated equipment recycling capability, dial-up monitoring, etc. Availability is a measure of the operational availability of the system to users over the total time period that it is required by users. It is normally quoted over the period of an average year or longer, and takes into account the time the service will be unavailable as a result of both unscheduled failures and scheduled or unscheduled maintenance.

$Ao=Ta/Tt$ where **Ao** = Operational Availability, **Ta** is the total time that the service is available when required by users, and **Tt** is the total time period that the service is required to be available.

Where a service comprises a completely new design, and operational experience is not available, Ao may not be available for the system as there is no in-service knowledge of its actual performance. In this case, the Inherent Availability Ai should be stated in lieu of Ao. (Manufacturer's technical specifications or equipment manuals often include Ai.)

$Ai=Tt-Td/Tt$ where Tt is total time, Td is down time due to failure.

Where a service has duplicated or redundant facilities (including standby power supply) with automatic changeover or automatic or remote reconfiguration, or main/standby capability, an additional parameter termed 'continuity' should also be quoted in the operations manual for the applicable services. 'Continuity' is a measure of the time that the service takes to Change over from the main to the standby facility, or to reconfigure itself following a fault, including a power supply fault or failure. Services for which continuity is an applicable parameter include precision nav-aids, radar display services for ATC, A/G communication channels for ATC, point-to point data and communication links. A major factor in achieving required levels of Ao is the provision of standby power systems. Standby power systems may take the form of Diesel No-Break Generating Sets, Diesel Standby Generating Sets, and floating battery supply across a mains charger, or Uninterruptible Power Supplies with battery backup to mains supply. For remotely located facilities having relatively low power requirements, solar power supplies used in conjunction with floating batteries may be a satisfactory solution. The provision of standby power is necessary for many <u>CNS</u> services and facilities where continuity of service is a critical requirement. ICAO Annexes 10 and 14 provide guidance in regard to the requirements for standby power for particular facility types.

Critical <u>CNS</u> facilities that should have no-break standby power supply systems to ensure continuity are those in the following classes:

(i) All control tower facilities;
(ii) All terminal area radar surveillance systems;
(iii) All terminal area precision and non precision approach navaids;
(iv) All terminal area air/ground VHF communication systems;
(v) All radio bearers/networks and stations servicing any CNS system(s) used for terminal area control;
(vi) All enroute communication systems; including all satellite communication ground stations used for ATS voice and data; and
(vii) All enroute radar facilities.

(b) **Reliability.** This is measured in terms of long-term mean time between failures (MTBF) of the complete service, taking account of all possible failure modes.

MTBF = total time period/number of failures during time period

(c) **Accuracy.** This is a measure of the degree to which the actually displayed or presented value complies with the true value of any parameter provided by the system to operational users. The measure is mainly applicable to radio-navigation services, including radar data and display services. It is not applicable to communication or broadcast services. Accuracy figures should take account of all sources of error of the provided service other than user interpretation errors. Since accuracy is a statistical measure of performance, in the case of a radio-navigation system, the statement of the accuracy is not meaningful unless it is qualified by the probability that the accuracy is achieved, or the uncertainty in position which applies.

(d) **Integrity**. This is a measure of the ability of the service to provide a warning to users when the service should not be used, or when an error has occurred in data transfer or computation. Integrity may be computed and presented in a variety of ways, warning based on internally measured parameters that utilize built-in test equipment or self-monitoring systems.
Integrity values for radio-navigation services are often stated as a probability of the loss of integrity over a number of events.

4.3 For newly procured facilities, the above parameters will normally be included in the technical specifications and/or will be specified by the facility manufacturers. For existing facilities, providers will have to calculate overall values for complete services based on the configuration of the facilities (including power supply systems and support services) that comprise or support each service, and knowledge of the history of the performance of the facilities.

4.4 ICAO Guidance Material. ICAO Attachment F to Annex 10 Volume 1 provides guidance material concerning the levels of reliability and availability for radio-communication services and radio-navigation aids, which should be considered by service providers as minimum standards.

4.5 The following table provides, for guideline purposes only, values of the performance parameters for a number of service types. These values do not necessarily represent those that ECAA would require or approve for any specific service; such requirements will depend upon each individual service and its specific application.

service	Ao	MTBF	Accuracy	Integrity	Continuity
Aeronautical broadcasting service	>.99	>1000 hours	N/A	N/A	15 seconds
Aeronautical mobile service (ATC A/G comms)	>.9999	>1000 hours	N/A	Direct , continuous, static free, rapid	Immediate
Radar Data Display for ATC	>.9999	>10000 hours	TBA	Not specified	Immediate
ILS Localizer and Glide Path	>.999	>1000 hours	ICAO Annex 10 Vol 1 Ch 3and Table C2 Attachment C	ICAO Annex 10 Vol 1 Ch 3and Table C2 Attachment C	Immediate
DME	>.99	>1000 hours	ICAO Annex 10 Vol 1 Ch 3 section 3.5.3.13	Not specified	Immediate
VOR	>.99	>1000 hours	Not specified	Not specified	Immediate
NDB	>.99	>1000 hours	N/A	ICAO Annex 10 Vol 1 Ch 3 section 3.4.8.1	Immediate

5) Maintenance Plan

5.1 The operation and maintenance of facilities used in service provision must be undertaken in accordance with a pre-established plan that is included or referenced in the operations manual. The facility operation and maintenance plan, for a facility may be derived from the facility manufacturer's documentation, or may be developed or varied by the provider based on its knowledge of the performance and maintenance requirements of each facility. What is included in the Plan must have a sound basis in logistics support. In considering this section of an operations manual, ECAA will pay close attention to the adequacy of the Plan to support the ongoing performance, and the availability and recoverability specifications, of a service.

5.2 Many existing facilities, in particular existing radio-communication facilities, Nav-aids, and radar systems, incorporate analogue circuitry that has to be subject to periodic inspection to ensure that it is operating within its performance specification. Other than for facilities incorporating RCMS, the periodic inspection is carried out on- site at specified time intervals. The inspection procedures and the test and measurements taken or checked are to be designed to confirm that each facility meets the established performance specifications, and also that the facility is likely to continue to do so until least the time of the next performance inspection.

5.3 Flight inspections. For nav-aids systems in particular, periodic inspections not only entail ground tests on site but also flight inspections at defined time intervals. The time intervals, procedures, standards and equipment used for flight inspections are to provide the final assurance that the signal-in-space accuracy, integrity, and coverage of the facilities are within tolerances defined in the operational specifications.

5.4 The facility operation and maintenance plan for each service/facility should include:
   (a) the procedures for scheduled and unscheduled maintenance; including reporting and call-out processes, removal and return to service of operational facilities, recording of the maintenance activities to provide a traceable history of events, etc.;

(b) A description of the maintenance scheduling system. The scheduling system should specify and record the scheduled maintenance intervals, the maintenance standards that apply to the facility, a record of the last maintenance activities and the next scheduled maintenance;

(c) The interval of time between scheduled maintenance and/or routine performance inspections, and the basis of the establishment of that time interval;

(d) The operation and maintenance instructions for each facility;

(e) A workload analysis of the technicians involved in facility operation and maintenance. The objective of this requirement is to show that the service provider has, or will have, sufficient numbers of technicians to carry out the operation and maintenance plan;

(f) Details of planned facility flight inspections. This must include details of the standards and procedures to be used for flight inspections, the time interval between flight inspections, and the identity of the flight inspection organization that will be contracted to carry out the flight inspections;

(g) The disposition of support spares and test equipment; and

(h) The plan for repair of facility modules and equipment components. External repair specialist agencies may be used, in which case the identification of the repair agency should be included in the plan.

5.5 Necessity for Flight Inspections. The necessity for a flight inspection of a Radio-navigation aid will arise in the following situations:

(a) At the time of installation, as part of the pre-commissioning tests;

(b) For routine confirmation of facility performance and integrity at predetermined intervals. These intervals are to be based on the ICAO guidelines in Doc 8071;

(c) Where investigation of the performance of a nav-aid is necessary resulting from pilot reports, incident/accident investigations, or engineering developments; and

(d) In addition, the necessity for flight-testing is to be assessed following nonscheduled maintenance or modification. A flight-test will be required unless it can be absolutely determined from ground based performance inspection that the radiated signal has not been affected. If it cannot be absolutely ascertained that no unsafe variation in performance has resulted from maintenance or modification action, the aid is to be removed from service pending a flight inspection.

5.6 Maintenance activities not requiring a confirming flight check. Some examples of the typical maintenance activities that can be performed without necessitating a confirmation flight check/inspection are:

• **NDB including locator beacons:** All maintenance can be carried out without necessity for a flight inspection, provided the antenna current is restored to the value at the last flight inspection. The antenna may be replaced, on the same earth mat, with one which is an identical type, provided the antenna current is restored to the value at the last test flight. Change of operating frequency by less than 20% is permissible (NOTAM action applies).

• **DME and VOR:** All maintenance procedures and modifications can be carried out on the transmitting and monitoring equipment circuitry provided that the aerial system conditions, as determined by field measurement or monitor indications, can be restored to the condition that existed at commissioning or during the last flight inspection. Maintenance of fixed field detectors may be undertaken providing no change is made to the physical location of the monitor aerials.

• **ILS Localizer and Glide Path:** All maintenance procedures and modifications may be undertaken on duplicated transmission assemblies. Maintenance on monitor modules may be undertaken. Maintenance on unduplicated circuits that are not phase or amplitude sensitive may

be carried out. Maintenance on surface finishes and obstacle warning systems may be undertaken provided there is no physical damage or displacement of antenna assembly.

• **ILS Marker Beacon:** All maintenance procedures and modifications may be carried out provided that power output and modulation percentages are returned to at least the Low Performance Level and no adjustments that affect the phase relationship of the currents in the various antenna elements are made and the antenna position remains unchanged.

5.7 Maintenance activities requiring routine confirming flight check: Typical maintenance functions that require the performance of a confirming flight inspection within a 6 months period (usually conducted when the flight inspection aircraft is in the vicinity) are as follows:

• **NDB:** Following any change in antenna current, antenna height, or earth mat changes, for the purpose of increasing the published coverage. Note that any increase in coverage should be confirmed by flight inspection before being advised by NOTAM.
• **DME:** Antenna replacement with an antenna of identical type mounted at the same height. The power delivered to the antenna must be of the nominal value for the beacon and VSWR must not exceed the low performance level.

5.8 Maintenance activities and environmental changes requiring confirming flight check before returning to service. Typical maintenance functions that require the performance of a confirming flight check before the facility is returned to service are:
• **NDB:** Following any change in antenna current, for the purpose of decreasing the published coverage. Note that any decrease in coverage must be published in NOTAM after the extent of the decrease is confirmed by flight inspection.
• **VOR:** Following replacement of the antenna; after repositioning of the monitor antenna; after replacement of transmission lines of critical length; following a change in operating frequency.
• **DME:** Following any change to the height or type of antenna.
• **ILS Localizer and Glide Path:** Following the replacement or repositioning of any fixed field detector directly associated with course/path position, sensitivity or clearance monitoring. Whenever corrective maintenance of a major nature is carried out on any transmission line of critical length, antenna array or parts of the antenna system contributing to the field pattern, such as absorber or reflection screens and parasitic elements. For the ILS Glide Path only; after adjustment of the carrier phasing and width controls if the monitor indications are outside tolerance when SOC are set. In the case of the carrier phasor, a variation of + 20 degrees is allowed in its setting to obtain maximum DDM at the width monitor.
• **ILS Marker Beacons:** A flight check will be required following adjustments to transmission lines and antenna array, which may affect the phasing and thereby distort the radiated field pattern.
• **Environmental changes:** Any significant environmental changes, e.g. buildings, earthworks, fences, roadwork's, power lines, vegetation, or cause changes in standard operating conditions as determined by ground inspections.

5.9 Standards for the Maintenance of Nav-aids. The standard for the routine maintenance of nav-aids is ICAO Doc 8071 Volume 1 Manual on Testing of Radio Navigation Aids. The maintenance periodicities specified in ICAO Doc 8071 Vol 1 for Ground Test Requirements and Flight Test requirements should be adopted by service providers for the ground maintenance and flight-inspection/testing of navigation aids. The periodicities specified in ICAO Doc 8071 are repeated in the table below and these must not be extended unless other periodicities **have been specifically approved by ECAA by an entry in the service provider's operations manual**. Where actual operational data provides a firm knowledge of the long-term performance stability and integrity of any particular type of navigation aid, approved service providers may make submissions to ECAA

for approval for variation to the periodicities. Such requests are to include supporting data.

Note: The periodicities specified relate to the most frequently recurring maintenance item of the specified ground or flight inspection schedule. Not all scheduled maintenance items are required to be undertaken at every ground or flight inspection. Refer to ICAO Doc 8071 for details.

Nav-aid facility type Maintenance	standard	Maximum Periodicity - Ground Performance Inspections	Maximum Periodicity – Flight Inspections
NDB	ICAO Doc8071 Vol 1	6 months	12 months
DME	ICAO Doc8071 Vol 1	6 months	12 months
CVOR	ICAO Doc8071 Vol 1	12 months	12 months
DVOR	ICAO Doc8071 Vol 1	12 months	5 years
ILS	ICAO Doc8071 Vol 1	Localizer: 3 months Glide path: 3 months Markers: 3 months	Localizer: 6 months Glide path: 6 months Markers: 6 months

6) Safe Operation

6.1 This part requires the service provider to document in its operations manual the in-house technical and operational procedures under which the service provider intends to carry out its service provision functions. The procedures required are:

(a) **Configuration recording and control process:** Part 171 providers are required to establish and apply configuration management processes to all CNS facilities, throughout the life cycle of the facilities. The life cycle commences from the time operational requirements are determined, to technical specification, through the project acquisition phase where baselines are established and the system is commissioned, through normal operation and maintenance, to decommissioning. Configuration management is a discipline applying technical and administrative direction and surveillance to a facility or equipment. The component elements of configuration management are:
   • **Baseline identification,** which is the process for defining and documenting the characteristics of the items that make up a Part 171 service. This is normally undertaken by the unique identification and description of each circuit component, module, sub-assembly and equipment.
   • **Configuration control**, which is the process by which proposed changes to the baseline are evaluated, designed, co-ordinated, approved or disapproved and, if approved, implemented in a controlled manner.
   • **Status accounting,** which is the process for recording changes made to the system, and amending the baseline identification to reflect the changes.
   • **System audits,** which is the process by which the systems are reviewed to ensure that they meet stated needs and performance specifications. These processes are to ensure that the current physical configuration of hardware, software and operational processes relevant to each service/facility are recorded and kept under control. A person or persons should be established by the service provider as the 'configuration control authority' to define and carry out in-house configuration control processes and maintain the associated records.

(b) **Design control.** This is the process for the control of the design of new services or facilities or the modification of services or facilities. The process should cover design and development planning, organizational and technical interfaces between different groups including the user groups, design input and output requirements, design review processes, design verification and validation processes and major modification processes. This need not be included if a service provider does not intend to undertake in-house design and development of new systems or the

major modification of existing systems. The procedure should establish the system design authority for the design, changes to the design, and/or the modification, of services or facilities, and its procedures, equipments, software and components. The system design authority is a person (or group of persons), not necessarily within the service provider, qualified, competent and knowledgeable, in the technology of a service/facility. Unless a service provider retains in-house engineering expertise, the design authority will normally be the equipment manufacturer or agent and in that case any design changes should be subject to its design approval. In undertaking design authorization, the design authority should ensure that the system design meets its functional and technical specifications.

(c) **Commissioning of new services or facilities.** This is the procedure under which the commissioning of any new service or facility is undertaken. The commissioning procedure must ensure that system performance has been validated by engineering tests and flight tests as necessary, and that the appropriate design, operation and maintenance authorities have accepted that the service operates in accordance with its operational requirements, safety objectives and requirements, and applicable ICAO. For services, which support ATS, the relevant Part 172 service provider for which the service is intended should be included as a signatory in the commissioning authorization process. For major systems, commissioning should also be subject to the production of a safety case that establishes that all predicted aviation safety hazards have been considered and the risks have been managed within safety objectives.

(d) **Performance Analysis and Recording.** This is a procedure that maintains a record of the operational performance of each service over its life cycle. The procedure should establish a history of service/facility failures and fault occurrences, and the corresponding system or facility downtimes. It should also support analytical summaries to establish the achieved values of Ao, MTBF, and system recovery times. These actually achieved values can then be compared with the engineering and operational specifications for services and facilities as a means of monitoring their on-going performance.

(e) **Fault Reporting.** This is a procedure by which the service provider internally communicates the reporting of service and facility failures and faults to responsible supervisors and technicians for the management of their rectification. The procedure should establish the objectives for service recovery times and cover the reporting and technician call-out processes necessary to return services to operation within the defined recovery times. The procedure must cover failure/fault occurrences outside normal working hours as well as those during working hours.

(f) **Defect Reporting.** A defect reporting system, by which the service provider identifies, reports, investigates and rectifies any facility design deficiencies which are beyond the scope of the normal maintenance activity to manage and correct, or any procedural weaknesses, or any configuration/documentation errors. The defect reporting system should at least cover:
  (i) continual inability of services and facilities to perform within specification or standard operating parameters;
  (ii) continual faults on equipment or software, including software bugs;
  (iii) unavailability or unsuitability of spares and test equipment;
  (iv) Incorrect configuration identification, drawings, or operation and maintenance procedures;
  (v) Poor VHF coverage or interference.

(g) **Modification Procedure.** A facility modification process must be established unless a service provider intends to use external engineering expertise for this purpose rather than undertaking modifications in-house. In that case, such a statement should be included in this section of the operations manual. This procedure should cover:

(i) The process for software changes, including the processes to test for latent faults in software following the change; and

(ii) The process for design changes. (See also Design Control above; a similar process for the nomination of a design authority, etc, should apply here.)

7) System Disruption/Interruption

7.1 The operations manual must include the following requirements, which are amplified in the following paragraphs:

(a) The procedure to be used if a <u>CNS</u> service is interrupted;

(b) A specification of the acceptable recovery time for each service;

(c) The procedure to be used if the acceptable recovery time of a service is exceeded; and

(d) A description of any method to provide an alternative service if an <u>CNS</u> service is interrupted (unless the alternative service is to be provided by another approved service provider, e.g. another Part 171 or Part 172 provider, in which case that should be stated in the operations manual).

7.2 Procedure to be used if a <u>CNS</u> **service is interrupted**. ECAA takes the term interrupted in the context of this regulation to mean that, during its scheduled hours of operation, a <u>CNS</u> service:

(a) Has failed and is not available to users; or

(b) Has been withdrawn from service for the purpose of either scheduled or unscheduled maintenance at a time that the service is required by users; or

(c) Is operating outside its performance parameters (i.e., a fault has occurred which affects its technical performance or integrity such that the service has to be withdrawn at a time that the service is required by users;

(d) But, does not include facility faults that have not resulted in the <u>CNS</u> service being inoperable or unusable. Examples are a fault that results in a changeover to a standby or duplicated facility, or a fault in a redundant element, where the service continues to be delivered in accordance with specification. While such faults obviously need to be attended to, they may not require the same level of response as a complete service failure, and are not classified as interruptions.

7.3 The objective of the procedure for responding to a complete failure of service should be to re-establish the service as quickly as is possible, consistent with properly restoring its operability. Factors important in attaining this objective are:

(a) Quick response by maintenance technicians;

(b) The location of the technicians in relation to the location of the facilities;

(c) Equipment designs that provide good maintainability;

(d) Efficient logistics support, particularly the availability of spares and test equipment; and

(d) The establishment of contingency plans for the provision of replacement or alternate services, facilities, equipment, and/or procedures by the users.

7.4 Specification of recovery time. The regulation requires service providers to determine a time period, termed the recovery time, which will define the planned level of response for the restoration of each service. While the recovery time will be the primary factor establishing the logistics support plan for a service, it should be based essentially on the operational requirement for the service, not on the capability of the logistics support system. In specifying recovery times that will satisfy aviation safety dictates and be acceptable to ECAA, service providers should consider the following:

(a) The requirements of the service users;

(b) The type of service. As a guide, all facilities for terminal communications and radar surveillance, and all terminal precision and non-precision approach aids are to be allocated

the shortest possible response times. (Recovery times for these services should be in the order of 30 to 60 minutes maximum);

(c) If the service is used by ATS, are there alternate back-up services available to ATS and/or are there fall back contingency procedures, until the service can be restored; and

(d) The availability of alternate services.

7.5 Procedure if the acceptable recovery time of a service is exceeded. The provider is required to establish and document a contingency plan that defines the planned actions to be taken by the provider in the event that the specified recovery time is not achieved in practice. The contingency plan may take various forms depending on each particular situation. In many instances it will not be feasible to provide alternate or backup AT/RN CNS services, in which case the most appropriate contingency response will have to be based on particular operational procedures such as reversion to procedural control, or reduction of aircraft movements, etc. For this reason, the plan should be established in conjunction with the associated ATS provider, and may take into account the following aspects:

(a) The likely outage time. Extended periods of outages resulting from major failures and facility breakdowns should be taken into account;

(b) The type of service involved and the feasibility of providing a reduced service, or the availability of alternate or backup services; and

(c) the possibility of diversion of aircraft to other aerodromes, the handover of ATS functions to another sector/unit, or the reduction of aircraft movement rates to a predetermined level, etc.;

8) Staff Competency

The operations manual must describe the service provider's competency scheme for its facilities personnel - see sections 5.1.4 and 5.1.5 of this AC concerning the requirements in this regard.

9) Document Control Procedure System Records

The operations manual must describe the service provider's document control Processes

10) Administration

10.1 The operations manual must include a chart of the service provider's structure which clearly depicts the lines of management, technical authority, and functional responsibility, across all functional areas of the service provider that are associated wholly or partially with the Communication, Navigation and Surveillance service delivery. The chart should include the names, relevant qualifications, relevant experience, and positions of the chief executive of the service provider, and of the key personnel. The responsibilities of these persons should also be included or appended.

10.2 Management Structure. The chief executive is the person who is nominated as having overall responsibility for the proposed services, and the key personnel are those persons (or person) who has the responsibility within the service provider for the management of the operation, maintenance, and the safe provision, of its services. These persons plus any other persons at management level that represent the management structure of the service provider should be suitably qualified and/or experienced for the position held.

10.3 Depending upon the size and complexity of the service provider's organization, the extent of the services it proposes to provide, and whether it intends to undertake system engineering, installation and commissioning functions, the following are the activities and functions for which these key management personnel should be responsible, and capable of managing:

(a) The establishment of internal standards, practices and procedures that comply with the Part 171 requirements and standards;

(b) System engineering, specification, procurement, installation and commissioning of facilities;

(c) Establishment and review of the internal safety management system and its review;

(d) Establishment, review and on-going responsibility for the facility maintenance regime, including logistics support of facilities and the procedures required under Part 171 in relation to the maintenance functions;

(e) The resourcing of qualified, competent technicians in sufficient numbers, at appropriate locations, to carry out the operation and maintenance functions of the service provider; and

(f) Where a service provider has a number of manned bases, it is expected that an appropriate supervisory structure will be established at each base such that there is a senior officer in charge, plus sufficient supervisory personnel to oversight the technical functions.

10.4 In assessing applications, ECAA will give close attention to the management structure, and the capabilities of the managers of the applicant. Where ECAA considers that the proposed management structure does not satisfactorily support the proposed services, approval will not be granted.

10.5 The applicant needs to have sufficient personnel to undertake all its proposed functions. The number of personnel required will depend on many factors, but mainly the types and extent of the facilities, their geographic locations, and the geographic locations of the maintenance bases. Only personnel associated with those operations and maintenance functions undertaken by the service provider itself should be included in the organization chart. For example, where the facility operation and maintenance plan specifies that the repair of modules or equipment components of facilities will be carried out externally by a contract agency such as the facility manufacturer or an authorized repair agency, the organization chart need not include details of that part of the maintenance function. Again, in assessing applications, ECAA will give close attention to the proposed structure and the disposition of the key personnel, supervisors and technicians; if it is considered that the structure does not satisfactorily support the proposed functions, approval will be withheld.

6.1.3 Changes to Procedures. The operations manual must include the means by which changes are to be made to the procedures established under the facility operation and maintenance Plan. The change procedures should establish an appropriate authority within the service provider
(e.g. the key person(s) responsible for operation and maintenance functions) to assess and authorize any changes to operation and maintenance procedures; the procedures for removal and return of facilities to operational service; the logistics support of services; and the amendment of relevant documentation including the operations manual. Major changes to any service should always be supported by a safety case that assesses the safety risks of the change.

6.2 Regulation 171.87 – Contingency Plan
Each contingency plan developed by the certificate holder must be acceptable to ECAA. If a plan is not acceptable, then the certificate holder must be notified in writing and given a reasonable period to correct the plan.

6.3 Regulation 171.97 - Inspection Measuring and Test Equipment
Each piece of equipment must be identified with a suitable indicator to show its calibration status. This indicator should readily display the next required calibration date so that facility personnel can determine if the equipment is within its calibrated life span.

6.4 Regulation 171.135 - Safety Management System

Air Navigation Service Provider certified under this part shall show a complete compliance with ECAR Part 19, by establishing a safety management system that is acceptable to the ECAA, maintaining it, and completing its implementation as per the chronology mentioned in this regulation.

6.5 Regulation 171.139 - Reporting Unsafe Conditions

Each Air Navigation Service Provider certified under this part shall establish reporting system of unsafe conditions or practices observed by its facility personnel.

APPENDIX A

OPERATIONAL VOICE AND DATA RECORDING

1. Introduction

1.1 AT/RN CNS services provided for ATS purposes may require the Part 171 provider to establish operate and maintain facilities for the automatic recording of electronic information.

1.2 ICAO Annex 11 standards require the recording of all ATS operational communications and surveillance data. The primary purpose of such recordings is to provide information for SAR and for accident or incident investigation. The recordings may also be used for the purpose of legal evidence. Consequently, the availability, integrity, legibility and security of the recording procedures, recording facilities, and recording media management practice, must be assured.

1.3 This Appendix contains guidance on the standards pertaining to the management of recorded information by a Part 171 provider. The term 'tapes' is used generically in this Appendix and should be interpreted to also include other electronic storage media.

2. Programs to be recorded
2.1 The programs to be recorded will be subject to agreement with the Part 172 ATS service provider, and will normally include:
   • Operational voice communications on all ATS channels;
   • Radar video programs at all radar display positions;
   • Flight data (AFTN and ADS);
   • Controller Pilot Data Link (CPDLC) data;
   • Equipment status records.

3. Responsibilities

3.1 At ATS units, the responsibility for providing the electronic recording of the above programs rests with the Part 171 staff. However, in some instances, particularly at those ATS units where Part 171 electronic personnel are not resident, the routine management of tapes (i.e. the loading, changing, labeling and storage of the tapes) used for recording voice and data programs is undertaken by ATS staff. However, the usual situation is that that the Part 172 provider will request the Part 171 provider to provide the complete voice and data recording service, including the recording media management.

3.2 Whether the ATS staff or the Part 171 personnel undertake the tape management functions, the responsibilities and procedures of all the staff involved in voice and data recording functions should be formally agreed between the Part 171 and 172 providers.

4. Maintenance personnel training

4.1 Part 171 maintenance personnel should receive training in the recording management functions they are responsible for. The maintenance personal authorization certificate is to identify those recording functions each technician is authorized to undertake.

5. Recording Procedures and Management of Recording Media

5.1 Part 171 providers should provide recording services in accordance with following standards:

• **Recording of each operational position**. Voice recording and radar data recording facilities shall provide a chronological record of all voice communications and the radar program for each operational position of an ATS service.

• **Time injection.** All recordings shall incorporate time injection or stamping which will provide for the re-establishment of the actual time of events.

• **Status monitoring of recording facilities.** Status monitoring of all recording facilities shall be undertaken at all times that the ATS unit is operative.

• **Failure notification to operational positions**. For voice recording, a priority indication of a failure of the recording facility shall be presented to the relevant ATS operational position so that a manual record of communications can be kept by ATS.

• **Labeling of recording media.** All recording media (tapes) shall be clearly labeled or indexed unambiguously in accordance with documented procedures. Labels to include start and end times and the subject recording(s)/position(s).

• **Period of retention.** Recordings shall be retained in storage for at least 30 days. When the recording is pertinent to accident or incident investigations they shall be retained for longer periods until the service provider is advised that they will no longer be required.

• **Storage and security of recording media.** All recording media shall be stored in a manner that will ensure its safekeeping, in a locked, cabinet that is located in a secure area with controlled access.

• **Tape site holdings.** The quantity of removable recording media applicable to the equipment to be held on site shall be sufficient to cover the rotation period before tapes are re-used, with contingency provided for a loss of tapes through quarantining for investigations or unforeseen tape damage arising from equipment fault or normal wear.

• **Erasure of tapes.** Recording media that is designated for disposal shall be erased before disposal, or otherwise treated as classified waste. Magnetic storage media is to be bulk erased before disposal.

• **In the event of accident or incident.** On receipt of notice of an accident or incident from the Part 172 ATS provider, recorded media possibly pertinent to any possible investigation shall immediately be removed from the recording facilities, regardless of the available recording time remaining, and placed in a quarantine area. The removal of the media shall ensure that there is no Loss of recording during the process. All such media shall be clearly labeled and held in the media quarantine storage area.

• **Retention of accident and incident tapes.** All tapes involved in an accident are to be permanently retained in the quarantine area until handed over to one of the designated release authorities. All tapes placed in the quarantine area must remain there until a formal release request is received from the designated release authority of the ATS, ECAA or the Part 172 provider. The actual release of the tapes must be by means of person-to-person handover. If no formal release request is received, the tapes shall continue to be held in quarantine until such time that one of the designated release authorities formally advises that the tape is not required.

• **On site review of accident or incident recordings.** A Part 171 provider may provide an on-site review of an accident or incident recording to the one of the designated release authorities of ECAA or the associated Part 172 provider.