



The European Organisation for Civil Aviation Equipment
L'Organisation Européenne pour l'Équipement de l'Aviation Civile

FUNCTIONAL SPECIFICATIONS FOR CNS/ATM GROUND RECORDING

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The expansion of air transport exerts growing pressure on current CNS infrastructures, ATM concepts and ATM systems. The role of improved CNS infrastructures is to support and enable the practical operation of new ATM concepts and ATM systems.

CNS/ATM ground recording will enable a greater understanding of the interactions between ground stations, other aircraft under control and any other agencies which comprise part of the CNS infrastructure. The recordings are of fundamental importance for accident and incident investigation.

1.2 PURPOSE

The purpose of this document is to establish a set of requirements for the functionality of ground recording functions for recording of CNS/ATM messages, transmitted to or received from aircraft and between ATC and Airline facilities.

This document is in line with ED-93, "Minimum Aviation System Performance Specification for CNS/ATM message recording systems" and ED-112, "Minimum Operational Performance Specifications for crash protected airborne recorder systems" in preparation.

1.3 SCOPE

This document defines a minimum functional specification to ensure that all Air Traffic Service Units (ATSU) provide a CNS/ATM Recording and Retrieval function to assist the investigation of a reportable accident/incident and support a search & rescue function. In the context of this document an ATSU is a unit providing air traffic control service (area control, approach - or aerodrome control service).

CNS/ATM data recording at an ATSU is mainly done at the boundary of the ATSU, i.e. where data is entering or leaving the ATSU, and where data is displayed to the controller. This functionality is illustrated in Annex 1.

Further internal recording by the ATSU may be required to cope with retrieval and replay requirements/recommendations.

Non-ATS datalink services (i.e. AAC or AOC messages) shall be recorded by the airline or CSP.

1.4 DEFINITIONS AND ABBREVIATIONS

1.4.1 Definition of Terms

AAC	Aeronautical Administrative Communication. Communication used by aeronautical operating agencies related to the business aspects of operating their flights and transport services. This non-safety related communication is used for a variety of purposes, such as flight and ground transportation, bookings, deployment of crew and aircraft or any other logistical purposes that maintain or enhance the efficiency of over-all flight operation.
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NOTE: *The airlines use the term Airline Operational Communication (AOC). ICAO uses the abbreviation "AOC" for different purpose. See below.*

AOC	Aeronautical Operational Control. This Safety-related datalink communications is required for the exercise of authority over the initiation, continuation, diversion or termination of flight for safety, regularity and efficiency reasons.
ATC	Air Traffic Control. In this context, the use of safety-related datalink communication for the purpose of: a) Preventing collisions between aircraft, and on the manoeuvring area between aircraft and obstructions; b) Expediting and maintaining an orderly flow of traffic.
ATM	Air Traffic Management. A system consisting of a ground and air part, to ensure the efficient and safe movement of aircraft during all phases of operation. The system includes equipment, people and procedures.
ATSU	Air Traffic Services Unit. A generic term, meaning variously air traffic control unit (providing area control-, approach control- or aerodrome control service), flight information centre, air traffic advisory service and air traffic control service (area control services reporting office), and also used for the airborne equipment.
CNS	Communications, Navigation and Surveillance. The way in which enhanced capabilities of satellite-based navigation and digital data link communication systems will permit the next generation of ATM systems to combine the features of ADS and CPDLC with the conventional ATC functions.
CSP	Communication Service Provider. An organisation, deploying a network infra-structure for air-ground and/or ground-ground communications in support of CNS/ATM services.
GBAS	Ground Based Augmentation System
Interpretation	Any tool used to interpret recorded data.
Incident	Any fortuitous or unexpected event not being a reportable accident by which the safety of the aircraft or person is threatened.
Processed	Data as presented to end-user equipment
Recording	The act of making certain data persistent, with a view to subsequent replay or analysis.
Replay	The act of reconstructing the recorded situations/scenarios.
Retrieval	Retrieval of data from the storage device(s) for the task of presenting the data for analysis purposes.
Unprocessed	Data as received at the front-end processing function.

1.4.2

Abbreviations and Acronyms

AAC	Aeronautical Administrative Communication
ACARS	Aircraft Communication Addressing and Reporting System
ACC	Area Control Centre
ACL	ATC Clearances

ACM	ATC Communications Management
ADS-A	Automatic Dependent Surveillance-Addressed (identical to ADS-C)
ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C	Automatic Dependent Surveillance-Contract
AFN	ATS Facility Notification
AMC	ATC Microphone Check
ANP	Actual Navigation Performance
ATC	Air Traffic Control
AOC	Aeronautical Operational Control
ASTERIX	All purpose Structured EUROCONTROL Radar Information Exchange
ATIS	Automatic Terminal Information Services
ATM	Air Traffic Management
ATN	Aeronautical Telecommunications Network
ATS	Air Traffic Services
ATSU	Air Traffic Service Unit
CAP	Controller Access Parameters
CPDLC	Controller / Pilot Data Link Communications
CM	Context Management
CMU	Communications Management Unit
CNS	Communications, Navigation and Surveillance
COTS	Commercial Off The Shelf
CSP	Communication Service Provider
DAP	Downlink Airborne Parameters
D-FIS	Digital Flight Information Services
DL	Data Link
DLIC	Data Link Initiation Capability
DCL	Departure Clearance
DRA	Data Reduction and Analysis
DSC	Downstream Clearance
FANS 1/A	Future Air Navigation Systems , including datalink capabilities in compliance with EUROCAE ED-100”
FDPS	Flight Data Processing System
FDR	Flight Data Recorder
FLIPCY	Flight Plan Consistency
FMS	Flight Management System
FPL	Flight Plan
GBAS	Ground Based Augmentation System
GPS	Global Positioning System

HMI	Human Machine Interface
ICAO	International Civil Aviation Organisation
MASPS	Minimum Aviation System Performance Specification
MTC	Master Time Clock
OLDI	On-Line Data Interchange
SDPS	Surveillance Data Processing System
RNP	Required Navigation Performance
SARPs	Standards And Recommended Practices
SYSCO	System Coordination
TCAS	Traffic Collision Avoidance System
TWIP	Terminal Weather Information for Pilots
UTC	Universal Coordinated Time
VCI	Voice Communication Instruction
VDL-4	VHF Digital Link (Mode) 4
VHF	Very High Frequency

1.5

REFERENCES

- [1] Rules of the Air and Air Traffic Services, ICAO 4444-RAC/501, Thirteenth Edition, 1996
- [2] ICAO Annex 10 to the Convention on International Civil Aviation, Volume II, Sixth Edition, October 2001
- [3] ICAO Annex 11 to the Convention on International Civil Aviation, Thirteenth Edition, July 2001
- [4] EUROCONTROL Standard Document for Radar Surveillance in En-Route Airspace and Major Terminal Areas (SUR.ET1.1000-STD-01-01, March 1997)
- [5] EUROCONTROL Standard Document for On-Line Data Interchange (DPS.ET1.ST06-STD-02-00, Ed. 2.3, Eurocontrol, December 2000)
- [6] Manual of ATS Datalink Applications, Part IV – Doc 9694-AN/955, First Edition, 1999
- [7] ED-93: Minimum Aviation System Performance Specification (MASPS) for CNS/ATM Message Recording Systems
- [8] ED-112: Minimum Operational Performance Specifications (MOPS) for Crash Protected Airborne Recorder Systems

CHAPTER 2

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

2.1 REQUIREMENTS AND RECOMMENDATIONS

2.1.1 International Standards and Recommended Practices

The following sources define international standards and recommended practices on recording and retrieval:

- **ICAO documents:**
 - SARPs: Annex 10, Aeronautical Telecommunications, Vol. 2 (ref. [2]), Chapter 3, Section 3.5
 - SARPs: Annex 11, Air Traffic Services, (ref. [3]), Chapter 6
 - Manual of Datalink Applications, Part IV (ref. [6])
- **EUROCONTROL documents (applicable within Europe):**
 - EUROCONTROL Standard Document for Radar Surveillance in En-Route Airspace and Major Terminal Areas (ref. [4])
 - EUROCONTROL standard for OLDI (ref. [5])

Extracts of these requirements will be found in Annex 1.

- **Other agencies:**

Other agencies may impose additional standards and recommendations for their area of responsibility.

2.1.2 Summary

- Recording of voice and data link communications with aircraft (mandated by ICAO)
- Recording of voice and data link communications with air traffic services units and military units (mandated by ICAO and EUROCONTROL)
- Recording of voice and data link communications with any other unit (recommended by ICAO)
- Recording of unprocessed surveillance data (recommended by ICAO and mandated by EUROCONTROL)
- Recording of surveillance data provided to the display system (mandated by EUROCONTROL)
- Replay of the information, presented to the controller display (recommended by EUROCONTROL)

2.2 ACCIDENT AND INCIDENT INVESTIGATION

To support accident and incident investigation, the subsequent replay of the recorded information available at the controller workstation up to the moment of the accident or incident is highly recommended.

2.3 SEARCH AND RESCUE

To support search and rescue, the immediate replay of surveillance data as it was presented to the controller plus all voice or data communications, is highly recommended.

This replay should be available “on demand”.