NOTICE OF PROPOSED AMENDMENT (972 NPA 2015/001)

TITLE OF PROPOSAL:
Military Air Traffic Management Equipment Safety and Performance Standards

Stage of Policy Development:	Review

MAA-NPA Serial No:	**972 NPA 2015/001**		
RFC Serial No:	N/A		
MAA Originator:	DSA-MAA-Cert-ES3a	Redacted	Date: 28/07/2015
MAA Supervisor:	DSA-MAA-Cert-ES3-ATM	Redacted	Date: 28/07/2015
MAA Independent:	DSA-MAA-Reg-DepHd	Redacted	Date: 28/07/2015
Date of Impact Assessment preparation:	16/07/2015		

Affected Publication: (including paragraphs)	Military Air Traffic Services Equipment Safety and Performance Standards Parts 0 - 13
Cross-reference to other relevant amendment proposals or documents:	N/A

ATM Equipment Certification Group Point of Contact details		
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Part 1 (for issue to Regulated Community)

INTRODUCTION

Defence Standard (Def Stan) 00-972 uses civilian regulations as normative reference for the safety and performance requirements of Air Traffic Management (ATM) Equipment. The principal reference, CAP 670, has been significantly updated since the last issue of Def Stan 00-972, which now renders the Def Stan 00-972 inconsistent with the extant normative references. The Def Stan 00-972 now makes the maximum, practicable, use of referencing out to normative references and focusses the document as a Military ATM Equipment delta,

SUMMARY OF PROPOSED AMENDMENT

Change:

The Def Stan will maximise the referencing out to appropriate civil standards, whilst detailing those specific military requirements. The format has also been changed to improve catagorization and align, presentationally, to civilian standards.

Impact Assessment:

Proposed changes have been reviewed by during the development of this new issue of Def Stan 00-972. All comments were reviewed and actioned as necessary.

Objective:

To approve the up-dated version of Def Stan 00-972 for formal release.

Risk Assessment: The extant issue of Def Stan 00-972 is not wholly aligned to applicable civilian standards that the MOD must comply with. New projects could be contracted to an out-of-date military standard and compromise the MOD ability to use ATM equipment.

Courses of Action.

Do Nothing:

The Def Stan is out of date which could cause incorrect standards to apply to future projects. Future projects/upgrades may also would also need to apply for AAMC for those technologies not covered by the extant Def Stan 00-972.

Partial amendment:

As above.

Full amendment:

Future projects and upgrades will comply with the latest standards and the Def Stan; thereby, demonstrating appropriate equivalence with the mandated civilian standards.

Preferred Course of Action.

The preferred course of action is to implement a full amendment as this will make the Def Stan current and accurate.

Organisations/business sectors affected:
Contracted organisations that build or maintain ATM equipment, users of ATM equipment and DT/PT procuring ATM equipment and services.

Costs and Benefits:
Authors need to estimate the costs and benefits expected with each Course of Action including the 'Do Nothing' option. The costs may have to be completed by other departments (commercial/financial branch personnel) or by contractors. As with all airworthiness issues, financial reasons should not be driving factor in determining whether an airworthiness issue is resolved or not, but due consideration to the financial implications is required.
There will be no financial impact as a result of these changes.

Do Nothing: No benefits as information is incorrect and outdated. Not recommended.

Partial Amendment: Same as Do Nothing. Not recommended.

Full Amendment: The Def Stan will be current with appropriate civilian standards. Future projects will be compliant with current standards and regulations providing safer equipment and services.

Post Implementation Review:
A review will be carried out a year after publishing as this is the minimum time required to analyse the impact of the new changes. Current projects already on contract will not be effected.

Consultation period ends: **15th Sept 2015**
The consultation period for this proposed amendment ends on the stated date. Please send your feedback via email to DSA-MAA-CertificationGrooup@mod.uk

MOD

DEF STAN 00-972 Part 0 Issue 3

Defence Standard:-

Date: 31 Jul 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 0: Procedures for Use, Content and Definitions

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a. This standard has been revised to Issue 3 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 0 Issue 2 Amendment 1 dated 26 July 2013

Def Stan 00-972 Part 0 Issue 2 dated 24 May 2013

Def Stan 00-972 Part 0 Issue 1 dated 21 May 2012

b. This Part of the Defence Standard (Def San) provides requirements and guidance for the design aerodrome, Naval Air Traffic Services (ATS) Land, Air and Afloat Air Traffic Management (ATM) Equipment to meet the air safety requirements for United Kingdom (UK) military operation. The Ministry of Defence (MOD) and the contractor as agreed and defined in the contract **shall** apply the requirements stated herein.

c. This Part of the Defence Standard has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the MOD Service Departments, and the Aerospace, Defence and Security Industries (A|D|S).

d. This standard **should** be used in all future designs, upgrades, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises, which prevents application of the Def Stan, DStan and the MAA **shall** be informed so that a remedy may be sought.

e. Any enquiries regarding this standard, whether in relation to an Invitation To Tender (ITT) or to a contract in which it is incorporated, are to be addressed to the responsible technical or supervising authority named in the ITT or contract.

f. Compliance with this Def Stan **shall** not in itself relieve any person from any legal obligations imposed upon them.

g. This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Introduction

a. Part 0 provides guidance for the use and application of the Def Stan. A status of issue contents (paragraph 10) contains a configured list of the entire document and is included as a guide to enable the user to select the appropriate parts.

Military Air Traffic Management Equipment Safety and Performance Standards

Part 0: Procedures for Use, Content and Definitions

1. Scope

1.1. Part 0 provides guidance and content information, together with definitions of the terms used throughout this document. Specific technical definitions may be separately defined as they are used.

1.2. The material contained in all parts of this Def Stan set out the requirements for System Safety and Functional Performance of Military ATS Systems. All equipment that has the capability to be used for ATS or ATM, **shall** comply with all the appropriate requirements within this Def Stan for the full coverage area, hardware and software used when in this mode regardless of the location of the equipment, platform it is situated on or the operational context in which it is being used. Application of the appropriate contents within this Def Stan **shall** be made at the time of any significant change to an ATS System Design or Architecture[1]. The scope of the contents of this Def Stan covers Safety, Performance and Regulatory aspects.

1.3. The legal framework for regulatory powers of the MAA is vested in the Secretary of State, with specific exclusions stated in both European Unions (EU) Regulations and the UK Air Navigation Order (ANO). Consequently, provisions within International Civil Aviation Organization (ICAO), EU and UK ANO Regulation are not directly legally applicable to Military ATS Systems, although Military ATS Systems **should** be demonstrably at least equivalent in Safety and Performance.

1.4. 'Significant ATM programmes such as SESAR[2] and NextGen[3], which are commencing their respective deployment phases, are underpinned by a framework of legislation that will inevitably affect how Defence operates both in UK airspace and overseas. These programmes have the potential to significantly affect military aircraft equipage, and military ATM and ASACS capabilities. Capability Sponsors, Duty Holders, Commanders and Project Teams **should** endeavour to utilise the Defence Airspace and Air Traffic Management (DAATM) to aid them in identifying potential options for compliance and the setting of priorities for future equipage requirements'[4].

1.5. 'SofS' instruction to Defence is that where it can rely on exemptions or derogations from either domestic or international law, it is to introduce standards and management arrangements that produce outcomes that are, so far as is reasonably practicable, at least as good as those required by legislation'[5]. Military ATS Systems are regulated by the MAA.

2. Warning

2.1. The MOD, like its contractors, is subject to both UK and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

2.2. Note: Where a design to the requirements of this document may result in an adverse environmental impact the MOD Project Team (PT)/ Delivery Team (DT) Leader **shall** be advised.

3. Normative References

3.1. The normative references that apply to all parts of the Def Stan are at **Annex A**. In addition, some parts of the Def Stan have an additional normative reference list for part specific references.

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1 RA 3120 ATM Equipment Standards.

2 SESAR is the technological dimension of the Single European Sky to modernise ATM (Air Traffic Management) in Europe.

3 NextGen is the Next Generation Air Transportation System, the name given to the National Airspace System due for implementation across the United States in stages until 2025.

4 ACAS/03/04, Dated 6 October 2014.

5 MAA01 – Chapter 1.

3.2. Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting **http://dstan.uwh.diif.r.mil.uk** for those with Dii access or **https://www.dstan.mod.uk** for all other users. All referenced standards were correct at the time of publication of this standard (see below for further guidance); if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

3.3. Reference in this Standard to any normative references means in any ITT or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated. Care **should** be taken when referring out to specific portions of other standards to ensure that they remain easily identifiable where subsequent amendments and supersession's might be made. For some standards, the most recent editions **shall** always apply due to safety and regulatory requirements.

3.4. In consideration of paragraph 3.3 above, users **shall** be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an ITT or contract. Correct application of standards is as defined in the ITT or contract.

3.5. DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Defence Standards.

3.6. All normative references **shall** be complied with in addition to those stated within this Def Stan.

3.7. Any reference to a governing body (e.g. CAA) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions

4.1. All definitions in this standard are listed in **Annex B**. Common use definitions are also listed in the MAA Master Glossary MAA 02.

4.2. In addition, verbal forms for the expression of provisions (**shall**, **should** etc) **shall** be in accordance with MAA 02. Where they cannot be found in MAA 02, they will be in accordance with Annex H of ISO/IEC Directives, Part 2, Sixth Edition, 2011.

5. Abbreviation

5.1. Abbreviations contained in this document are referenced at **Annex C**.

6. Purpose and Background

6.1. The purpose of all Parts of this Def Stan is to define Military ATS Equipment System Safety and Performance Standards within the Scope noted above, to providers of Military ATS.

6.2. Military ATS providers are expected to demonstrate compliance with applicable requirements either directly or through the provision of Safety Assurance documentation to the MAA and Military Aviation Duty Holder chain.

6.3. Where an ATS provider in support of application for approval submits material produced by a third party (and equipment manufacturer for example), the provider must endorse the content.

7. Format of Def Stan 00-972

7.1. This Def Stan is primarily a Military Delta to Civil Aviation Publication (CAP) 670 ATS Safety Requirements. CAP 670 **shall** be used as a baseline in establishing appropriate design and air safety requirements taking account of the procurement strategy to be adopted, unless otherwise stated within this Def Stan. In the event of a requirement being deemed as non-applicable or out of scope of the equipment or systems function/design, MAA approval **shall** be obtained before the design/project progresses to the next stage.

7.2. Additionally maximum use has been made of civilian regulations (ICAO and European standards and specifications) where these are applicable to both military and civil roles and incorporated into this Def Stan for compliance.

7.3. This document is intended to provide a modular set of requirements that define the fundamental design considerations necessary to produce equipment and services that are considered safe. These are the minimum requirements and do not represent a standard specification. The requirements are broken down into thirteen parts, each focused on a different application. A list of all parts is listed at **paragraph 10**.

7.4. The Organizational framework currently in place for Military ATS systems, is diverse in scope and spread between disparate authorities, including, but not limited to:

7.4.1. Defence Equipment and Support (DE&S).

7.4.2. The Directorate of Information Systems and Services (D ISS). The Site Coordinating Installation Design Authority (SCIDA) of ISS, helps ensure the Resilience, Integrity, Confidentiality and Availability of MOD Command, Control, Communications, Computing and Intelligence (C4I) systems; including ATS Systems.

7.4.3. The appointed Office will perform an internal Safety and Engineering Quality function for Royal Air Force (RAF) and Joint Helicopter Command (JHC) and other ATS Systems.

7.4.4. Navy Command Aviation Ops, are the focal point for internal Safety and Engineering function for Royal Navy (RN) ATS systems at land-based Naval Air Stations and afloat; with Air Traffic Control (ATC) Engineering representation

7.4.5. Safety. The MAA and Ship Safety Management Office, along with Aviation Duty Holders (ADH).

7.5. Guidance on the Hierarchy of applicable and referenced regulations is available from DStan; but in essence includes:

7.5.1. International Regulations (ICAO SARPs).

7.5.2. European Standards and Regulations (EU Regs and EUROCONTROL Safety Regulatory Requirement (ESARR)).

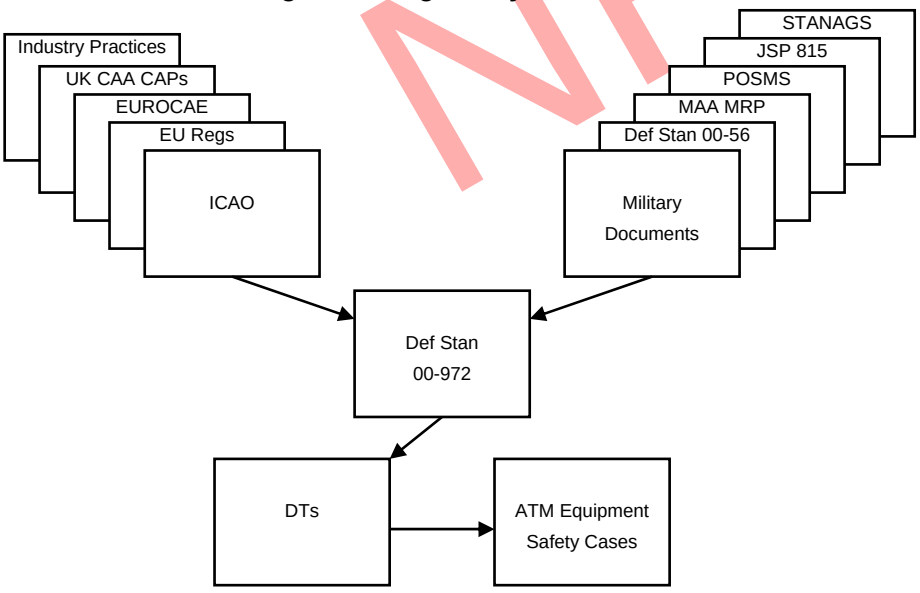
7.5.3. UK Regulations (Civil Aviation Authority (CAA) Publications).

7.5.4. Industry Good Practice.

7.5.5. North Atlantic Treaty Organization (NATO) STANAGs.

7.6. This standard utilises a broad approach to Regulatory Hierarchies. Figure 1 below is a representation of some provenance and source influences and intended audiences for this Defence Standard.

Figure 1 - Regulatory Hierarchies



7.7. Each part typically contains individual requirements and guidance material which are divided into sections:

7.7.1. Safety Integrity Requirements

7.7.2. Functional and Performance Safety Requirements

7.7.3. Front Line Command, Danger Area Crossing/Range, Military Deployed and other differences

7.7.4. Statutory and Regulatory References

7.8. Each Section may contain:

7.8.1. Safety Objectives

7.8.2. Mandatory Requirements

7.8.3. Recommendations

7.8.4. Acceptable Means of Compliance

7.8.5. Guidance and/or notes providing additional information

7.9. Externally provided services not specifically covered in this Standard are assumed to meet all other relevant requirements and Standards. It is the responsibility of the ATS provider to ensure that the consequences of safety-related failures associated with externally provided data or services are adequately considered and mitigated against[6]. This Def Stan does not cover ATC Human Resources issues.

7.10. Broad formatting within parts will attempt to reflect CAP 670 order, where possible. The contents of this Def Stan will either be:

7.10.1. Referring to a comparable Civil Requirement with some additions or changes

7.10.2. A Military Requirement

8. Use of Def Stan 00-972

8.1. Regulation of Military ATS and technical elements of associated services is achieved through oversight, approvals and/or Release into Service Processes (RiSP)[7], along with the approval of organizations[8] and the sampled Audit and Inspection of ATS Systems and service provision. The details of these processes are in the Military Regulation Publications (MRP).

8.2. Adherence to MAA Safety Management System Requirements[9] is required for all aspects of the Air System, including ATS Equipment. Audit and Inspection of these processes and the activities underpinning them will occur as part of the MAA Assurance programme.

8.3. The MAA and ADH, require to be notified of planned safety related changes at ATC Units. These include planned changes to ATM Equipment and engineering procedures; any related Safety Management Systems (SMS) and associated documentation and unit organization.

8.4. The standard has been formulated as the UK baseline against which a PTL/DTL can make judgements to determine the requirements for a specific project. The requirements, with or without explanatory matter, **shall** not be regarded as constituting a text-book of current knowledge. Their interpretation against a background of such knowledge is essential. Where the Def Stan cannot be met or

[6] RA 3140 Air Traffic Management Equipment End to End Safety

[7] RA 3134 Air Traffic Management Equipment Release into Serive Process

[8] RA 1027 Air Traffic Management Equipment Organizations - Responsibilities

[9] RA 1200 Defence Air Safety Management

an Alternative Acceptable Means of Compliance[10] another means of compliance is proposed this **shall** be put to the MAA for approval.

8.5. For new ATM Equipment Def Stan 00-972 will be the contract requirement for design standards to achieve air safety. Additional specification requirements will be necessary to ensure that the design meets all 'fitness for purpose' attributes necessary for full operational capability. Where equipment is procured 'Off the Shelf', the requirements of Def Stan 00-972 are applicable.

8.6. All future equipment, systems, designs and upgrades **shall** as a minimum, whilst being at least tolerable and ALARP, meet the safety requirements of existing equipment.

8.7. Where more than one safety principle or target could be applied due to an accumulation of services or where a common mode failure is introduced the most onerous standard/target **should** be used.

9. Amendment Procedure

9.1. This document **shall** be reviewed periodically by the technical sponsor (DSA-MAA-Cert-ES3-ATM@mod.uk) and updated where necessary.

9.2. The Unsatisfactory Text / Content Reporting Form at **Annex D** is to be used to notify the Editorial Team, and for the Editorial team to document subsequent actions relating to proposed amendments or textual reviews to Def Stan 00-972, it may also be used to notify the editorial team of requirements not covered by the Def Stan. Where there is a perceived discrepancy in the text, the originator can forward details to: DSA-MAA-Cert-ES3-ATM@mod.uk

9.3. Where responsibility is held by the editorial team for ensuring that the proposal is assessed and, where approved, incorporated in the next issue.

10. Status of Issue

10.1. The current configuration status of the individual Parts comprising Def Stan 00-972 are as listed in Table 1.

Table 1 – Issue status of effective Parts

Part	Title	Issue Status	Publication Date
0	Procedures for Use, Content and Definitions	Issue 3	31 Jul 2015
1	Generic and Software	Issue 5	31 Jul 2015
2	Communications	Issue 5	31 Jul 2015
3	Surveillance	Issue 5	31 Jul 2015
4	Navigation	Issue 5	31 Jul 2015
5	Satellites	Issue 5	31 Jul 2015
6	Meteorological Systems	Issue 5	31 Jul 2015
7	Flight Data Information Management Systems	Issue 5	31 Jul 2015
8	Airfield Ground Lighting (AGL) and Arrestor Systems	Issue 4	31 Jul 2015
9	Systems Assurance (Safeguarding and Flight Inspection)	Issue 5	31 Jul 2015
10	Air Traffic Control (ATC) Support Systems	Issue 5	31 Jul 2015
11	Recording and Replay Systems	Issue 5	31 Jul 2015
12	Alarm and Alerting Systems	Issue 5	31 Jul 2015
13	Master Time Sources	Issue 5	31 Jul 2015

[10] MAA 03 Annex B

Annex A
Normative References

Publication	Title
AvP 67	Ministry of Defence. Flying Orders to Contractors
CAP 168	Licensing of Aerodromes
CAP 670	Air Traffic Services Safety Requirements (Version 3)
Def Stan 00-56	Safety Management Requirements for Defence Systems
ESARR 1-5 Publications	ESARR Publications
EU Regulations	EU Regulations
JSP 375	MOD Health and Safety Handbook
JSP 430	Ship Safety Management
JSP 454	Land Systems Safety and Environmental Protection
JSP 604	Defence Manual for Information and Communication Technologies (ICT)
JSP 815	Defence Environment and Safety Management
MRP and Associated Manuals	MAA Regulatory Publications

Annex B
Definitions

Definitions

The following terms have been defined to remove any doubt about the meaning of instructions in the text of this and associated documents. Where a term is used, which is defined by ICAO in a relevant Annex or PANS document that definition will apply, unless:

a) The contrary is indicated; or

b) There is a different definition in Military or European Regulations.

Suitable interpretations, where they exist, have been selected from national, international and military documents. Some terms appear in more than one document and sometimes have different meanings.

Terms that have not been annotated are those which have specific meanings within the text and have been defined to avoid ambiguity or misunderstanding. In some cases they are slight modifications of definitions in other documents.

A

Accuracy — A degree of conformance between the estimated or measured value and the true value. (ICAO).
Note: For measured positional data the accuracy is normally expressed in terms of a distance from a stated position within which there is a defined confidence of the true position falling.

Aerodrome — A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft. (MAA02)
Note: In the context of this Defence Standard, this relates to Government Aerodromes, HM Ships and could also encompass Danger Areas and Air Weapons Ranges.

Aerodrome Authority — In relation to any aerodrome, the person in charge of the aerodrome.
Note: This may relate to the Operational, Senior or Delegated Duty Holder. (MAA 02)

Aerodrome Traffic Monitor — An electronic display indicating the position and distance from touchdown of arriving aircraft relative to the extended centreline of the runway in use. It may also be used for other purposes. It is also known as the Distance From Touchdown Indicator. (MAA 02)

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. (MAA 02)

Aeronautical Ground Lighting — Any light specifically provided as an aid to air navigation, other than a light displayed on an aircraft. (MAA02).

Aeronautical Information Service — A service established within the defined area of coverage responsible for the provision of aeronautical information and data necessary for the safety, regularity, and efficiency of air navigation. (EC 549/2004)
Note: For No1 AIDU, this may also relate to No1 AIDU.

Aeronautical Mobile Service (RR S1.32)	A mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate; emergency position-indicating radio beacon stations may also participate in this service on designated distress and emergency frequencies. (ITU RR S1.32)
Aeronautical Radio Station	A radio station on the surface, which transmits or receives signals for the purpose of assisting aircraft. (ANO).
Aeronautical Station (RR S1.81)	A land station in the aeronautical mobile service. In certain instances, an aeronautical station may be located, for example, on board ship or on a platform at sea. (ICAO) Note: A Military Aeronautical Station may also operate from an Aircraft, although this is currently out-of-scope of this Defence Standard.
Air-Ground Communication	One/two-way communication between aircraft and stations or locations on the surface of the earth. (MAA 02)
Airspace Management	A planning function with the primary objective of maximising the utilisation of available airspace by dynamic time-sharing and, at times, the segregation of airspace among various categories of airspace users on the basis of short-term needs. (EC 549/2004). Note: In the Military context, this is a jointly performed function, with CAA DAP and DAATM involvement.
Air Navigation Services	Air traffic services; communication, navigation and surveillance services; meteorological services for air navigation; and aeronautical information services. (EC 549/2004). Note: Divisions exist in Military structures, between Air Traffic Services, CNS provision, Meteorological provision and Aeronautical Information Services.
Air Navigation Service Provider	Any public or private entity providing air navigation services for general air traffic. (EC 549/2004) Note: Military ANSP equivalents are Military Front Line Commands and/or Contracted ATC Organizations, providing services to both Military and Civil Air Traffic.
Air Traffic	All aircraft in flight or operating on the maneuvering area of an aerodrome. (MAA 02) Note: See definition of Aerodrome above.
Air Traffic Control Unit	A unit of air traffic controllers established by a person appointed by a person maintaining an aerodrome or other place in order to provide an area control service, an aerodrome control service or an approach control service. (CAP 393)
Air Traffic Control Service	A service provided for the purpose of: a) preventing collisions: i) between aircraft, and ii) On the maneuvering area between aircraft and obstructions; and b) expediting and maintaining an orderly flow of traffic. (MAA 02) Note: This also relates to relevant RN Ships and Range Air Control Units.
Air Traffic Flow	

Management	A function established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that ATC capacity is utilised to the maximum extent possible, and that the traffic volume is compatible with the capacities declared by the appropriate air traffic Service Providers. (EC 549/2004) Note: Military may have additional objectives for Air Traffic Flow Management, in service of the Military function. (MAA 02)
Air Traffic Management	The dynamic, integrated management of air traffic and airspace including air traffic services, airspace management and air traffic flow management – safely, economically and efficiently through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground based functions. (ICAO Doc 4444)
Air Traffic Management Equipment	Equipment used for the provision of ATM, including equipment used in the air defence environment. ATM equipment can be land based or part of an aircraft, ship or vehicular platform. (MAA 02)
Air Traffic Services	A generic term meaning variously flight information services, alerting service, air traffic advisory service, air traffic control service area control service, approach control service or aerodrome control service. (MAA 02) Note: This also relates to relevant RN Ships and Range Air Control Units.
Air Traffic Standards Officer	Air Traffic Standards Officers are persons, authorized by the CAA, for the purposes defined within applicable sections of the (Air Navigation Order) ANO. Note: ATS Officer's remit does not cover Military ATS Equipment, as noted in ANO Articles 205(8) and 206(16). The MAA may cover a similar function for Military ATS Equipment.
Airway	A control area or portion thereof established in the form of a corridor (MAA 02)
Altitude	The vertical distance of a level, a point or object considered as a point, measured from mean sea level. (MAA 02)
Approval	That which permits something to be done. (MAA 02) Note: Approval may be granted to an individual or an organization verbally or in writing by an appropriately authorized person or authority.
Articulation Index	A measure of a communication systems expected intelligibility, derived from electrical and acoustic measurements on a system.
ATS Message Handling System	The set of computing and communication resources implemented by ATS organizations to provide the ATS message handling service. (ICAO Annex 10 Vol III)
ATS Surveillance Service	Term used to indicate a service provided directly by means of an ATS surveillance system. (ICAO)
Authorised	An authorisation in writing that amplifies instructions and/or specifies conditions of operation. Note: Authorisations within the Military may be sought from the MAA, the Release Authority or through the Duty Holder
Availability	The ability of a system to perform within specified limits, required function under given conditions at a given time.

B

Base Turn
A turn executed by the aircraft during the initial approach between the end of the outbound track and the beginning of the intermediate or final approach track. The tracks are not reciprocal. (ICAO)
NOTE: Base turns may be designated as being made either in level flight or while descending, according to the circumstances of each individual procedure.

Blocking
When a switching matrix cannot make an immediate connection between any input and output it is said to be blocked. This may also be termed 'limited availability'. The opposite of this condition is 'non-blocking' or 'full availability'.

C

Code of Practice
A Code of Practice is nominally a guideline document that provides guidance or recommendations. The document is not mandatory unless it is made a specific requirement by the regulator.

Conditional Maintenance
Maintenance performed after an event or specified condition, where the systems function, components, etc. are potentially at risk of degradation to the point where the required system performance / integrity is compromised.

Connection Delay
The time between a request to establish a connection with a system and the corresponding confirmation of connection.

Controlled Airspace
Airspace that has been notified as Class A, Class B, Class C, Class D or Class E airspace. (ANO)

D

Data Communications Network
The communication equipment, sub-networks and nodes that provide for the routing for the transfer of data from one system to another.

Data Communications Service Provider
An organization that provides the means to transfer data between an ATS facility and aircraft.

Data Link Application
The implementation of data link technology to achieve specific ATM operational functionalities.
Note: Military Data Links also exist, which may differ from Civil Data Links. Military Data Links may be suitable for ATM Data Link Services

Data Link Service
A set of ATM related transactions, both system supported and manual, within data link applications, which have a clearly defined operational goal. Each data link application is a description of its recommended use from an operational point of view.

Data Link Service Provider
The organization with overall accountability for the data link service. This includes the operational requirements of the data link system.

Data Link System
The total set of component parts, equipment, software and protocols that is required to provide the data link service.

Dead Band
A term used to describe the cross-over characteristic on a 360o potentiometer or position resolver and optical encoder alignment errors.

Demonstrate Equivalence
This means that an appropriate level of compliance with GATM regulations **should** be sought where non-compliance would impose an unacceptable level of restriction on Military operations or training, or lead to restricted access to airspace and conflict with European or UK courts of law

Displayed Gust	This is a wind speed, averaged over a 3 second sample, that has increased from the 2 or 10-minute mean wind speed by 10 knots or more. (CAP 746)
Distance From Touchdown Indicator	See Aerodrome Traffic Monitor.

E

Endorse	Wherever the term 'endorse' is used in connection with safety regulation matters this **shall** be taken to mean acceptance.
Equipment	A non-specific term used to denote any product (which may be called by a specific name) designed and built to perform a specific function as a self-contained unit or to perform a function in conjunction with other units. Units are physical hardware entities, possibly with software and firmware.
Error	A deviation in any system output from normal system output parameters.
Error Detection	A process of testing for non-valid data, bit error or syntax, and addressing problems or the event of an error being detected. Error Rate The number of allowable errors detected within a specified time interval.

F

Facility Performance Category I – ILS	An Instrument Landing System (ILS) which provides guidance information from the coverage limit of the ILS to the point at which the localiser course line intersects the ILS glide path at a height of 60m (200 ft) or less above the horizontal plane containing the threshold.
Failure	A loss of function, or malfunction, of a system or part thereof.
Fault Tolerance	The built-in capability of a system to provide continued correct execution, i.e. provision of service as specified, in the presence of a limited or specified number of equipment faults.
Flight Visibility	The visibility forward from the cockpit of an aircraft in flight. (ICAO)

G

Ground-Ground Communications	Two-way communications between or with ATS facilities located on the surface of the earth. (MAA 02)
Ground Visibility	The visibility at an aerodrome as reported by an accredited observer or by automatic systems. (ICAO)
Gust	The peak wind speed averaged over a 3 second period. (CAP746)

H

Hazard	An intermediate state where potential for harm exists. (MAA 02)
Heading	The direction in which the longitudinal axis of an aircraft is pointed, usually expressed in degrees from north (true, magnetic, compass or grid). (ICAO)
Height	The vertical distance of a level, point or object considered as a point, measured from a specified datum. (MAA 02)

I

Identification	The process by which the system correctly identifies the user's identity. This may be through a machine-readable device (MRD), a user log-in name or another similar system. (MAA 02)
Information Urgency	The order of display, processing or other action in accordance with

the sequencing of essential, routine and time-expired data.

Instrument Meteorological Conditions — Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minima specified for visual meteorological conditions. (MAA 02)

Integrity — That quality, which relates to the confidence that can be placed in the validity of the information provided by a system.

Integrity Risk — The probability of an undetected failure, event or occurrence within a given time interval.

International Airport — Any airport designated by the Contracting State in whose territory it is situated as an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are carried out.

L

Lines of Communication — A communications link which can be accessed at a particular operating position. Selected lines of communication are those available lines which have been selected by the operator for a particular mode of operation.

Luminance — In a given direction at the point on a surface is the luminous intensity in that direction, of an infinitesimal element of the surface containing the point, by the area of the orthogonal projection of this element on a plane perpendicular to the direction considered. (Commission Internationale De L'Eclairage (CIE))

Luminous Intensity — The luminous flux per unit solid angle in a given direction (candelas). **NOTE:** Luminous Flux is defined by CIE.

M

Maintenance — The combination of all technical and administrative actions, including supervision actions, intended to retain an item in, or to restore it to, a state in which it can perform a required function (BS 4778). (MAA 02)
Note: It includes: inspection, testing, servicing, and classification as to serviceability, repair, rebuilding and reclamation (JWP 0-01.1).

MATS Part 2 — The unit specific instructions to controllers produced by the Provider of the Air Traffic Control Service.

Mitigation — Steps taken to control or prevent a hazard from causing harm and reduce risk to a tolerable or acceptable level. (CAP 746)

N

Non-Radar Separation — The separation used when aircraft position information is derived from sources other than radar.

O

Operational Control — The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight. (ICAO)

Operational Requirement — The basic operational need in the aeronautical environment from the air traffic service perspective.

P

Per Controlled Flying Hour — When the ATS is promulgated and/or in active operation, per Air Traffic Service Unit (ATSU)/area of operation.

Plan Position Indicator — A surveillance display indicating in plan the positions of objects producing radar echoes.

Position Indication — The visual indication, in non-symbolic and/or symbolic form, on a situation display, of the position of an aircraft, aerodrome vehicle or other object. (ICAO)

Position Symbol — The visual indication in symbolic form, on a situation display, of the position of an aircraft, aerodrome vehicle or other object, obtained after automatic processing of positional data derived from any source. (ICAO)

Primary Radar — A radar system which uses reflected radio signals. (ICAO)

PSR Blip — The visual indication, in non-symbolic form, on a situation display of the position of an aircraft obtained by primary radar. (ICAO)

Provider (of an Air Traffic Service) — A legal person nominated by an aerodrome or other authority to provide an air traffic service. The Provider will usually be a legal entity such as a company and it is to this entity that the ANO refers in the legal form of a 'person'.
Note: In the Military context, the SATCO or Duty Holder or Duty Holder-facing Front Line Command ATM organization may be an equivalent.

Q

QNH — QNH is the atmospheric pressure corrected to mean sea level, assuming International Standard Atmosphere conditions across the height difference. (CAP 746)

Qualitative Processes — Those analytical processes which are subjective and non-numerical in manner.

Quantitative Processes — Those analytical processes, which are numerical in manner.

R

Radar — A radio detection device which provides information on range, azimuth and/or elevation of objects. (ICAO)

Radar Approach — An approach in which the final approach phase is executed under the direction of a controller using radar. (MAA 02)

Radar Clutter — The visual indication on a situation display of unwanted signals. (ICAO)

Radar Contact — The situation which exists when the radar position of a particular aircraft is seen and identified on a situation display. (ICAO)

Radar Separation — The separation used when aircraft position information is derived from radar sources. (ICAO)

Radial — A magnetic bearing extending from a VHF Omni-directional Range (VOR) /VORTAC/TACAN.

Radiation Shield — A reflective radiation shield housing capable of protecting the internal sensors from direct and reflected solar and terrestrial (long wave) radiation and from precipitation. The shield **shall** provide adequate ventilation and **shall** not represent a significant thermal mass.

Reliability	The ability of a system to perform a required function under given conditions for a given time interval. (CAP 746)
Reporting Point	A specified geographical location relative to which an aircrafts position can be reported. (ICAO)
Risk	Is a measure of exposure to possible loss and it combines the severity of loss (how bad) and the likelihood of suffering that loss (how often). (MAA 02)
Risk Assessment	Assessment of the likelihood and severity related to a hazard. (MAA 02)
Routine Maintenance	Maintenance at regular periodic intervals, identified at the systems design stage of equipments, functions, components etc., which are known to cause or potentially cause degradation to the required system performance. (CAP 746)
Rule	One of the rules of the ANO. Note: Military ATM Systems are excluded from the ANO
Runway	A defined rectangular area on a land aerodrome prepared for the landing and take-off run of aircraft. (MAA 02)
Runway Visual Range	The range over which the pilot of an aircraft on the centreline of a runway can see the runway surface markings or the lights delineating the runway or identifying its centreline. (MAA 02)

S

Safety	Freedom from unacceptable risks of personal harm. (MAA 02)
Safety Assurance	**Shall** mean all planned and systematic actions necessary to afford adequate confidence that a product, a service, an organization or a functional system achieves acceptable or tolerable safety. (EC2096/2005)
Safety Critical	An item or system the failure of which could lead to, or directly contribute to, the possibility of an accident or serious loss of functionality, integrity, or safety margins will be identified as safety critical.
Safety Objective	**Shall** mean a qualitative or quantitative statement that defines the maximum frequency or probability at which a hazard can be expected to occur. (EC 2096/2005)
Safety Policy	A safety policy is a declaration of a general plan of action set by the authority of management and Military command.
Safety Related	Since the ability to cause a catastrophic incident is often linked to a series of apparently innocuous and seemingly unrelated events all processes are assumed to be safety related. If something or some process is to be excluded from this precept the burden of proof for exclusion lies with the regulated party.
Safety Regulatory	A systematic and independent examination conducted by, or on behalf of, a competent authority to determine whether complete safety-related arrangements or elements thereof, related to processes and their results, products or services, comply with required safety-related arrangements and whether they are implemented effectively and are suitable to achieve expected results. (EC 1034/2011)
Safety Regulatory	The requirements established by the Union or national regulations for the provision of air navigation services or ATFM and ASM functions or other network functions as well as concerning the technical and operational competence and suitability to provide these services and functions, their safety management, as well as systems, their constituents and associated procedures. (EC 1034/2011)

Safety Requirement	**Shall** mean a risk-mitigation means, defined from the risk mitigation strategy that achieves a particular safety objective, including organizational, operational, procedural, functional, performance, and interoperability requirements or environmental characteristics. (EC 2096/2005)
Secondary Surveillance Radar	A surveillance radar system which uses transmitters/receivers (interrogators) and transponders. (ICAO) Note: Revised parlance is “Cooperative Surveillance”
Sidetone	A speech signal derived from the transmit path and fed back at a reduced level to the receive path with negligible delay.
Situation Display	An electronic display depicting the position and movement of aircraft and other information as required. (ICAO)
Special Event	Any flying activity that is not a Flying Display, and not open to the public, but could involve Display Flying. (MAA 02)
Specification	A precise technical definition of the required parameters or performance to be achieved. (CAP 746)
Standard	Characteristics, methods, principles and practices that can be used to satisfy a requirement. (CAP 746)
Station Time Marking	All recorded information requires a time label. The time reference or standard used for this **shall** be the station clock. This will require the system to be interfaced to the station master clock or station operational procedures put in place to ensure that the system clock is within ±5 seconds of the station clock.
Stopway	A defined rectangular area on the ground at the end of take-off run available, prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off. (MAA 02)
Suitably Qualified Engineer	An engineer with appropriate working experience on the equipment or system, or has attended a manufacturer’s course or similar that covers the areas necessary to provide a competent response / repair to restore the service.
Surface Movement Control Service	A surface movement control service using a two-way communications facility for the control of vehicles on the maneuvering area.
Surveillance Radar	Radar equipment used to determine the position of an aircraft in range and azimuth. (MAA 02)
System Failure	The inability of a system to fulfill its operational requirements. Failure may be systematic or due to a physical change.
System Self Test	An automatic test procedure that ensures the system is free from error.
T	
Technical Response Time	The time from the issue of a triggering event by the originator / user process to the moment a logical system response is received by the originator / user process. It therefore includes the technical data extraction, the composition of the data message, the data transmission and processing, the logical checks at the destination, and the transmission and receipt of a response.
Temporary ATS unit	An ATS unit established to provide a service associated with a Special Event and normally comprising no more than 7 consecutive days of air operations.

Note: Military ATS regularly deploy Temporary ATS units and may not have restriction on duration. Military terms are: 'Static Deployed' and 'Tactical' ATS.

Terminal Control Area A control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes. (MAA 02)

Threshold The beginning of that portion of the runway usable for landing. (MAA 02)

Touchdown The point where the nominal glide path intercepts the runway. (ICAO)
NOTE: 'Touchdown' as defined above is only a datum and is not necessarily the actual point at which the aircraft will touch the runway.

Track The projection on the earth's surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from North (true, magnetic or grid). (MAA 02)

Transfer Delay The time from the issue of a triggering event by the originator user process to the moment the message is received, validated and ready for further treatment at the destination user process. It therefore includes the technical data extraction, the composition of the data message, the data transmission and processing.

Transponder A receiver/transmitter which will generate a reply signal upon proper interrogation, the interrogation and reply being on different frequencies.

V

Video Mapping The electronic superimposing of a map or plan on a situation display.

Visibility Visibility for aeronautical purposes is the greater of:
a) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognised when observed against a bright background;
b) the greatest distance at which lights in the vicinity of 1000 candelas can be seen and identified against an unlit background. (ICAO)
NOTE 1: The two distances have different values in air of a given extinction coefficient and the latter b) varies with the background illumination. The former a) is represented by the meteorological optical range.
NOTE 2**:** The definition applies to the observations of visibility in local routine and special reports, to the observations of prevailing and minimum visibility reported in Aerodrome Routine Meteorological Report (METAR) and SPECI and to the observations of ground visibility.

Visual Approach An approach by an Instrument Flight Rules (IFR) flight when either part or all of an instrument approach procedure is not completed and the approach is executed with visual reference to terrain. (MAA 02)

Visual Approach Procedure A series of predetermined maneuvers by visual reference, from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, a go-around (Missed Approach) procedure can be carried out. (ICAO)

W

Where appropriate This statement intends to articulate the potential for different scope of application of Civil Standards and Regulations into the Military context. Where there is a difference in scope of application, a narrative contained within Safety Case documentation **should** be in place to articulate the relevant rationale employed. It may be noted that the proportion of ATS activity devoted to Civil activities at an ATSU may be an indicator of levels of alignment to Civil Standards and Regulations. Guidance on Regulatory overlap **shall** be discussed with the MAA and CAA.

Annex C
Abbreviations

A

AAIB	Air Accident Investigation Branch
ABS	Anti-Blocking System
ADEXP	ATS Data Exchange Presentation
ADH	Aviation Duty Holder
ADO	Air Defence Organization
AFIS	Aerodrome Flight Information Service
AFPEx	Assisted Flight Plan Exchange
AFTN	Aeronautical Fixed Telecommunications Network
AGA	Air-Ground-Air (Radio)
AGC	Automatic Gain Control
AGL	Aeronautical Ground Lighting
AIXM	Aeronautical Information Exchange Model
ALARP	As Low As Reasonably Practicable
AM	Amplitude Modulation
AMTI	Adaptive Moving Target Indication
ANO	Air Navigation Order
ANSP	Air Navigation Services Provider
APV	Approach with Vertical Guidance
ASMS	Air Safety Management System
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATG	At the Glass
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATS	Air Traffic Service
ATSU	Air Traffic Service Unit

B

BABT	British Approvals Board for Telecommunications

C

CAA	Civil Aviation Authority
CAP	Civil Aviation Publication.
CAT	Category
CCAMS	Centralised SSR Code Assignment and Management System
CCCC	Civil Code Callsign Conversion
CCDS	Code Callsign Distribution System
CFg/Hr	Controlled Flying Hour
CVF	Carrier Vessel Future

D

DAATM	Defence Airspace and Air Traffic Management
DE&S	Defence, Equipment & Support
Def Stan	Defence Standard
DFTI	Distance from Touchdown Indicator (also known as Aerodrome Traffic Monitor)
DH	Duty Holder
DI	Design Integrity
Dii	Defence Information Infrastructure
DIO	Defence Infrastructure Organization
DISC	Defence IFF/SSR Committee
DME	Distance Measuring Equipment
DOC	Designated Operational Coverage
DSB	Double Sideband
DSO	Defence Spectrum Organization
DT	Delivery Team

E

EC	Commission Regulation
ECAC	European Civil Aviation Conference
EMC	Electro Magnetic Compatibility
EMC	Electro Magnetic Capability
ERP	Effective Radiated Power
ESARR	EUROCONTROL Safety Regulatory Requirement
EU	European Union
EUROCAE	European Organization for Civil Aviation Equipment

F

FAA	Federal Aviation Administration
FDP	Flight Data Processing
FMEA	Failure Modes and Effects Analysis
FMTP	Flight Message Transfer Protocol
FPS	Flight Progress Strip
FTA	Fault Tree Analysis

G

GFE	Government Furnished Equipment
GG	Ground-Ground (Radio or Telephone)
GNSS	Global Navigation Satellite System
GPIP	Glide Path Intercept Point

H

HAT	Height Above Threshold
HAZID	Hazard Identification (Process)
HDD	Hard Disc Drives

I

IAP	Instrument Approach Procedures
ICAO	International Civil Aviation Organization
IGIA	Interagency Group on International Aviation
ILS	Instrument Landing System
INS	Inertial Navigation System
IP	Internet Protocol
IRVR	Instrumented Runway Visual Range
ISTAR	Intelligence, Surveillance, Target Acquisition and Reconnaissance
ITT	Invitation To Tender
ITU	International Telecommunication Union.

J

JASC	Joint Air Safety Committee
JOMOC	Joint Operational Meteorology and Oceanographic Centre
JSP	Joint Service Publication

L

LPV	Localiser Performance with Vertical Guidance

M

MAA	Military Aviation Authority
MAAIB	Military Air Accident Investigation Branch
MATS	Manual of Air Traffic Services
METAR	Aerodrome Routine Meteorological Report
MilFLIP	Military Flight Information Publications
MMATM	Military Manual of Air Traffic Management
MOD	Ministry of Defence
MORSN	UKMO Met Office Remote Site Network
MOS	Mean Opinion Score

MRP	Military Regulatory Publication
MSAW	Minimum Sector Altitude Warning
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair

N

NATO	North Atlantic Treaty Order
NATO	North Atlantic Treaty Organization
NATS	NATS Limited
NDB	Non-Directional Beacon
NERL	NATS En-Route Ltd
NISC	National IFF/SSR Committee
NVD	Night Vision Device

O

OFCOM	Office of Communications
OR	Operational Requirement

P

PAPI	Precision Approach Path Indicator
PAR	Precision Approach Radar
PBR	Private Business Radio
PE	Permanent Echoes
PE	Programmable Elements
PESQ	Perceptual Evaluation of Speech Quality
POSMS	Project Oriented Safety Management System
PSR	Primary Surveillance Radar
PSTN	Public Switched Telephone Network
PT	Project Team
PTT	Press To Talk

R

R&TTE	Radio and Telecommunications Terminal Equipment
R&TTED	Radio and Telecommunications Terminal Equipment Directive
RA	Regulatory Article
RADHAZ	Radiation Hazard
RAF	Royal Air Force
RAID	Redundant Array of Independent Drives
RDP	Radar Data Processing
RF	Radio Frequency
RN	Royal Navy
RNAV	Area Navigation
RNEIN	Royal Navy Environmental Information Network
RPAS	Remotely Piloted Air Systems
RPL	Repetitive Flight Plans
RSP	Radio Site Protection
RTF	Radio Telephony Facility
RVR	Runway Visual Range
RVSM	Reduced Vertical Separation Minima

S

SARPS	Standards and Recommended Practices (ICAO)
SCIDA	Site Coordination Installation and Design Authority
SESII	Single European Sky 2
SI	Supplementary Instruction
SID	Standard Instrument Departure
SMS	Safety Management System
SQEP	Suitably Qualified and Experienced Personnel
SRA	Surveillance Radar Approach
SRG	Safety Regulation Group

SSD	Solid State Drives
SSE	Safety Significant Events
SSR	Secondary Surveillance Radar
STCA	Short Term Conflict Alert

T

TACAN	Tactical Area Navigation System
THD	Total Harmonic Distortion
TLS	Target Level of Safety
TTA	Time To Alert
TTW	Through the Wall

U

UHF	Ultra High Frequency
UK	United Kingdom
UPS	Un-interruptible Power Supply
US	United States
UTC	Universal Co-ordinated Time

V

VCCS	Voice Communications Control Systems
VCR	Visual Control Room
VDF	VHF Direction Finding
VFR	Visual Flight Rules
VHF	Very High Frequency
VoIP	Voice-over-Internet Protocol
VOR	VHF Omni-directional Range

W

WAM	Wide Area Multilateration
WMO	World Meteorological Organization
WT Act	Wireless Telegraphy Act 2006
WXCM	Eurocontrol Weather Information Conceptual Model
WXXM	Weather Information Exchange Model

Annex D
Unsatisfactory Text / Content Reporting Form

Reference	Def Stan 00-972 Part 0, Annex D

Part 1 - Originator				
Title / Address		Reference		
		Contact number		
		e-mail		
Subject Text - Location Details				
Part	Section	Paragraph	Sub-Paragraph	Additional.
Subject Text *				
Proposed Text **				
Rationale ***				
Originator's Signature	Name	Appointment	Date	

Part 2 - Editor		Date Received	
Accepted / Rejected	Yes / No	Date Decided	
Reply to Originator		Date Sent	
Internal resolution	Yes / No	Date Complete	
Pass to SME		Date Sent	
		Date received	
Incorporated into up-issue.		Date Closed	

* Copy the selection of original text requiring review.

** Proposed new text if SME; this section can be left blank.

*** Narrative description of the issue with current text, reference to other documents if known.

Continuation sheets are acceptable and are to be referred to in each applicable area.

Defence Standards are published by and obtainable from:

Defence Equipment and Support

UK Defence Standardization

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Internet e-mail: enquiries@dstan.mod.uk

File Reference

The DStan file reference relating to work on this standard is D/DStan/21/972/0

Contract Requirements

When Defence Standards are incorporated into contracts users are responsible for their correct application and for complying with contractual and statutory requirements. Compliance with a Defence Standard does not in itself confer immunity from legal obligations.

Revision of Defence Standards

Defence Standards are revised as necessary by an up issue or amendment. It is important that users of Defence Standards **should** ascertain that they are in possession of the latest issue or amendment. Information on all Defence Standards can be found on the DStan Website www.dstan.mod.uk, updated weekly and supplemented regularly by Standards in Defence News (SID News). Any person who, when making use of a Defence Standard encounters an inaccuracy or ambiguity is requested to notify UK Defence Standardization (DStan) without delay in order that the matter may be investigated and appropriate action taken. Sponsors and authors **shall** refer to Def Stan 00-00 before proceeding with any standards work.

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MOD

DEF STAN 00-972 Part 1 Issue 5

Defence Standard:-

Date: 31 Jul 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 1: Generic and Software

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a. This standard has been revised to Issue 5 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 1 Issue 4 dated 24 May 2013 Amendment 1 26 July 2013

Def Stan 00-972 Part 1 Issue 4 dated 24 May 2013

Def Stan 00-972 Part 1 Issue 3 dated 21 May 2012

INTERIM Def Stan 00-972 Part 1 Issue 2 dated 29 July 2011

INTERIM Def Stan 00-972 Part 1 Issue 1 dated 12 August 2010

b. This Defence Standard (Def Stan) provides requirements for System Safety and Functional Performance of Military Air Traffic Management (ATM) Systems, ashore, airborne and afloat.

c. This Part of the Def Stan has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the Ministry Of Defence (MOD) Service Departments, and the Aerospace, Defence and Security Industries (A|D|S).

d. This standard **should** be used in all future designs, upgrades, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises which prevents application of the Def Stan, DStan and the MAA **shall** be informed so that a remedy may be sought.

e. Please address any enquiries regarding this standard, whether in relation to an Invitation To Tender (ITT) or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the ITT or contract.

f. Compliance with this Def Stan **shall** not in itself relieve any person from any legal obligations imposed upon them.

g. This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Military Air Traffic Management Equipment Safety and Performance Standards

Part 1: Generic and Software

1. Scope and Regulatory Framework

1.1. Prior to using any part of this Def Stan Part 0 **should** be read which contains procedures for use, content and definitions. This Part 1 covers generic references to linked regulatory documentation, along with aspects common to all other parts within this Def Stan, such as Installation Standards and Software Assurance Levels, along with Standards hierarchies and Risk Classification Schema.

2. Warning

2.1. The MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

3. Normative References

3.1. Generic normative references are in Part 0. The references shown in **Annex B** are specific to this part.

3.2. Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting **http://dstan.uwh.diif.r.mil.uk** for those with Dii access or **https://www.dstan.mod.uk** for all other users. All referenced standards were correct at the time of publication of this standard (see below for further guidance); if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

3.3. Reference in this Standard to any normative references means in any ITT or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated. Care **should** be taken when referring out to specific portions of other standards to ensure that they remain easily identifiable where subsequent amendments and supersession's might be made. For some standards the most recent editions **shall** always apply due to safety and regulatory requirements.

3.4. In consideration of paragraph 3.3 above, users **shall** be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an ITT or contract. Correct application of standards is as defined in the ITT or contract.

3.5. DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Def Stans.

3.6. All normative references **shall** be complied with in addition to the requirements stated within this Def Stan.

3.7. Any reference to a governing body (e.g. CAA) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. General Information

5.1. Def Stan 00-972 Structure and Format

5.1.1. This Def Stan is formed of a number of parts. A configured list of all the parts is contained in Part 0.

6. Generic Safety and Regulatory Requirements

6.1. **EU Interoperability Regulation:** Air Traffic Service (ATS) Systems or Capabilities **shall** demonstrate equivalence with The Interoperability Regulation (552/2004) as amended by Single European Sky 2 (SESII) where appropriate. *(EU Reg 552/2004)*

6.2. **UK CAA Regulation:** ATS Systems or Capabilities **shall** endeavour to demonstrate equivalence with Civil Aviation Authority (CAA) Regulations, where appropriate. Discussions with MAA and CAA may be made to qualify areas of Regulatory overlap. Air Traffic Control (ATC) Units approved under Article 169 of the Air Navigation Order (ANO) (CAP393) and located at Military Aerodromes and Military Units employing Civil Air Traffic Control Officers (ATCO) **shall** hold documents as shown in CAP670. *(CAP393 ANO) (MOD Stated Policy, from 2nd PUS) (CAP670)*

6.3. **Military Aviation Regulations:** Military ATM Systems **shall** meet the relevant requirements embedded in (though not limited to) the Military Regulatory Publication (MRP).

6.4. **MOD Safety Regulation:** ATS Systems Safety Process **shall** adhere to Def Stan 00-55, Def Stan 00-56, MRP Regulation, JSP815, JSP430 (where applicable), JSP454 (where applicable), along with JSP604. BRd0765, BRd0766, BRd0767 and BRd9424 may also apply for Royal Navy (RN). AFSP-1(A) may apply for North Atlantic Treaty Order (NATO) Systems. (*Def Stan 00-56) (MRP) (JSP430) (JSP454) (JSP815) (JSP604) (AFSP-1(A))*

6.5. **Safety Assurance:** Safety Management System (SMS) Assurance **shall** be an embedded part of organisations governance and **shall** comply with MRPs. It **shall** also demonstrate equivalence with CAP670 and European Union (EU) Regulation 2096/2005 and 668/2008 via ESARR3. Note: All references referring to submission of documents to the CAA **shall** be taken to mean to the MAA. *(CAP670) (EU Regulations) (2096/2005 & 668/2008) (ESARR3)*

6.6. **MOD Human Factors:** Human Factors assessments related to ATS Equipment or environment **shall** be made for each project in accordance with Def Stan 00-250 and in liaison with MOD Human Factors Integration Team (or a suitable equivalent Human Factors Team). *(Def Stan 00-250)*

6.7. **MOD Reliability Case:** ATS System Reliability **shall** be coherent within the context of the Safety Requirements in this document and the ATS System Safety Case. *(Def Stan 00-40) (Def Stan 00-42)*

6.8. **MOD Environmental Factors:** The ATS System **shall** be capable of ongoing operation within the Operating Environment. Environmental factors **should** be considered in accordance with Def Stan 00-35, JSP815, JSP454 and JSP430. *(Def Stan 00-35) (JSP454) (JSP430) (JSP815)*

6.9. **Engineering Training:** Engineering Training and Licensing of ATS Equipment Maintainer and System Manager Competence **shall** be in accordance with the MRP.

6.10. **Installation Standards:** All MOD ATS Engineering Systems **shall** be installed in accordance with AP600, JSP604 and BS7671 in force at the time installation occurs. Liaison with Site Coordinating Installation Design Authority (SCIDA) or the appropriate Installation Authority **shall** occur. Installations **shall** comply with Def Stans 59-35 Parts 6 and 7; 59-188 Part 1; 59-411 Part 5. *(AP600) (JSP604) (BS7671:2008) (Electricity at Work Regs1989) (Def Stans 59-35) (Def Stan 59-188) (Def Stan 59-411)*

6.11. **System Security:** All systems and processes **shall** adhere to JSP 440. (*JSP 440)*

6.12. **Airfield Infrastructure:** Where utilised for or in support of ATS, relevant parts of an airfield infrastructure (e.g. power, ducting) **shall** be considered as part of the overall Safety argument.

6.13. **Health and Safety:** Military ATM Systems **shall** meet the requirements laid down in MOD H&S Handbook, JSP375; similar to ISO14001, HSG65 and OHSAS18001. *(JSP815) (JSP375) (ISO14001) (HSG65) (OHSAS18001) (PUWER) (EPA)*

6.14. **EMC and Radio Frequency Compliance:** All ATM Systems **shall** comply with the Radio and Telecommunications Terminal Equipment Directive (R&TTED) and Electro Magnetic Capability (EMC) Directives in peacetime environments (see Def Stan 59-411). All ATM Systems **shall** comply with JSP604 for Radio Site Clearances in the UK and Regulatory Article (RA) 3136. NATO RN Radiation Hazard (RADHAZ) STANAG 1380 and AECP-2(B) may apply.

6.15. The UK EMC Regulations 2006:3418 and the EMC Directive 2004/108/EC do not include a specific military exemption. *R&TTED: (1999/5/EC) (EMC:(2004/108/EC)) (Def Stan 59-411) (JSP604) (STANAG 1380) (AECP-2(B))*

6.16. **Master Time Sources:** ATM systems **shall** have accurate time; see Part 13 for more detail. *(CAP670)*

7. Software Safety and Regulatory Requirements

7.1. **Software Safety Equivalence:** Software **shall** be in accordance with Def Stan 00-56 and JSPs (where applicable). Software Safety Assurance **should** be mapped against EUROCAE ED153 (Guidelines for ANS Software Safety Assurance), Software Integrity Assurance **should** be mapped against EUROCAE ED109A (Software Integrity Assurance Considerations for Communication, Navigation, Surveillance and Air Traffic Management (CNS/ATM) Systems). *(ED109A) (ED153) (IEC61508) (CAP670) (SW01) (ESARR6)*

7.2. **Software Safety Independent Assessment:** If an apportioned part of an ATC system containing software relies on an assurance in line with ED109A AL2 or above, this software **shall** be independently audited. *(ED109A) (ED153)*

7.3. **Software Safety Quality Assessment:** System Software Quality processes **shall** be Audited and assessed as part of any Equipment Safety Case; by a project team and an independent Approval Authority, in liaison with the manufacturer. *(ED109A) (ED-153)*

7.4. **Software Safety and Security:** ATM systems utilising networked software and Internet Protocols (IP) **shall** ensure that Security considerations are in accordance with this Def Stan and JSP440. In addition, ATM systems / networks **should** be able to detect intrusion into IP networks; whereupon they **should** fail-safe and operate autonomously, with procedural backups where necessary. *(JSP 440)*

7.5. **Design Integrity (DI) of Programmable Elements (PE) in Defence Systems:** The DI of PE in Products, Services and Systems **shall** be achieved, assured and managed in accordance with Def Stan 00-55, Part 1. *(Def Stan 00-55)*

8. Generic Static Deployed and Tactical Safety and Regulatory Requirements

8.1. The environmental parameters for Static Deployed and Tactical Environments may be more demanding than Fixed. These **shall** be defined and tested as part of the Operational Requirement (OR).

8.2. Tactical Equipment tests **should** consider the following for use in-theatre *(Def Stan 00-35) (JATE Instructions)*:

8.2.1. Reduced EMC Compliance

8.2.2. ECM Performance

8.2.3. Vibration

8.2.4. Parachute Drop

8.3. **Tactical Systems Performance assurance:** Systems Performance Inspections (Flight Checking or equivalent) **shall** be performed on Static Deployed ATS systems. These **should** be performed on Tactical ATS systems as required Operationally. *(RAF FCI) (AEtP-1(D)) (STANAG 3374)*

8.4. **Tactical EMC and Radio Frequency:** Radio Frequency (RF) Regulations may differ on Operations outside of UK/EU. These **should** comply with International Telecommunication Union (ITU)/NATO Regulations; such as AECTP-500. Contact the Defence Spectrum Org for advice. *(JSP604) (ITU-R) (ACP190(D)) (ACP194)(AECTP-500)*

9. Risk Classification Schema

9.1. MAA RA 3130 (ATM Equipment Safety Management) **should** be read for a full explanation of how to apply the Risk Classification Schema and Matrix.

9.2. Defence ATM Risk Severity Classification

9.2.1. CAP728, ESARR4 and NATS Safety Management Manual enable derivation of the schema noted below. The assumptions underlying these documents are supported as being also broadly relevant for UK Military ATM. Although CAP 728 has been withdrawn the severity descriptions are a useful tool.

CAP 728 ESARR4	Catastrophic 1	Hazardous 2	Major 3	Minor 4	Negligible 5
CAP728	• ATC issues instruction or information which can be expected to cause loss of one or more aircraft (no reasonable and reliable means exists for the aircrew to check the information or mitigate against the hazards) • continued safe flight or landing prevented	• the ATC separation service provided to aircraft that are airborne or are inside a runway protected area in one or more sectors is suddenly, and for a significant period of time, completely unavailable • provision of instructions or information which may result in a critical near mid-air collision or a critical near collision with the ground • many losses of acceptable separation possible	• the ATC separation service provided to aircraft that are airborne or are inside a runway protected area in one or more sectors is suddenly, and for a significant period of time, severely degraded or compromised (e.g. contingency measures required or controller workload significantly increased such that the probability of human error is increased) • the ATC separation service provided to aircraft on the ground outside a runway protected area is suddenly, and for a significant period of time, completely unavailable • provision of instructions or information which may result in the separation between aircraft or aircraft and the ground being reduced below	• the ATC Separation service provided to aircraft that are airborne or are inside a runway protected area in one or more sectors is suddenly, and for a significant period of time, impaired • the ATC separation service provided to aircraft on the ground outside a runway protected area is suddenly, and for a significant period of time, severely degraded • ATS emergency support ability severely degraded	• no effect on ATC separation service provided to aircraft • Minimal effect on ATC separation service provided to aircraft on the ground outside a runway protected area • Minimal effect on ATS emergency support ability Negligible

			normal standards • No ATS action possible to Support aircraft emergency		
ESARR 4	❑ one or more catastrophic accidents, ❑ one or more mid-air collisions ❑ one or more collisions on the ground between two aircraft ❑ one or more Controlled Flight Into Terrain ❑ total loss of flight control. No independent source of recovery mechanism, such as surveillance or ATC and/or flight crew procedures can reasonably be expected to prevent the accident(s).	❑ large reduction in separation (e.g., a separation of less than half the separation minima), without crew or ATC fully controlling the situation or able to recover from the situation. ❑ one or more aircraft deviating from their intended clearance, so that abrupt manoeuvre is required to avoid collision with another aircraft or with terrain (or when an avoidance action would be appropriate).	❑ large reduction (e.g., a separation of less than half the separation minima) in separation with crew or ATC controlling the situation and able to recover from the situation. ❑ minor reduction (e.g., a separation of more than half the separation minima) in separation without crew or ATC fully controlling the situation, hence jeopardising the ability to recover from the situation (without the use of collision or terrain avoidance manoeuvres).	❑ increasing workload of the air traffic controller or aircraft flight crew, or slightly degrading the functional capability of the enabling CNS system. ❑ minor reduction (e.g., a separation of more than half the separation minima) in separation with crew or ATC controlling the situation and fully able to recover from the situation.	No hazardous condition i.e. no immediate direct or indirect impact on the operations.

9.3. Defence ATM Risk Classification Matrix

9.3.1. ESARR 4 states that the Maximum Tolerability (of ATM direct contribution) to a Severity Class 1 Incident in the European Civil Aviation Conference (ECAC) Region is quoted as being **1.55 x 10^{-8}** per flight hour (controlled). It is agreed that this is broadly suitable for use in a Military/Civil Joint and Integrated ATM environment. Further EU Target levels for Severity Classes 2-5 are not given so a derivation of the figures used in this Def Stan is given below.

9.3.2. Previous assumptions drew upon legacy NATS performance targets of 6 Airprox and 3.5 Safety Significant Events (SSE) Cat1, 2 or 3 per 100000 movements, along with a SSE1+2 ratio to SSE3 of 1:10 in further deriving the Target Levels below.

9.3.3. **Annex A** shows the mathematical workings for the figures in the tolerability matrix below and in a similar fashion to the NATS Safety Management Manual Safety Procedures, it cascades down probabilities by an order of magnitude per probability category.

ATM Probability			ATM Severity				
ATM Frequency	ATM Qualitative Description	Probability per controlled flying hour (Cfg Hr)	1	2	3	4	5
			ATM Risk Class				
Frequent	Likely to occur often	>$2.8x10^{-3}$	A	A	A	B	C
Probable	Likely to occur many times	>$2.8x10^{-4}$	A	A	B	C	D
Occasional	Likely to occur sometimes	>$2.8x10^{-5}$	A	B	C	D	D
Remote	Unlikely to occur	>$2.8x10^{-6}$	A	C	D	D	D
Improbable	Very unlikely to occur	>$1.55x10^{-8}$	A	D	D	D	D
Incredible	Extremely unlikely to occur	<$1.55x10^{-8}$	B	D	D	D	D

9.3.4. To assist with understanding the reality of the probabilities the table below can be used:

Probability	Frequency
$2.8x10^{-3}$	1 in 357
$2.8x10^{-4}$	1 in 3571
$2.8x10^{-5}$	1 in 35714
$2.8x10^{-6}$	1 in 357142
$2.8x10^{-7}$	1 in 3571428
$1.55x10^{-8}$	1 in 64516129

9.3.5. The frequency with which the event is likely to occur (in years) can be calculated using the formula:

$\frac{(1/\text{probability})}{a} = x$ (where x is the number of years between occurrences and a is the number of controlled flying hours a year)

Annex A
Mathematical Derivation of Safety Targets

Previous assumptions drew upon legacy NATS performance targets of 6 Airprox and 3.5 Safety Significant Events (SSE) Cat 1, 2 or 3 per 100000 movements, along with a SSE1+2 ratio to SSE3 of 1:10 in further deriving the Target Levels below.

More recently, NATS safety performance internal targets have been revised, improving on the above. These are Zero Airprox and Zero SSE 1-3 per 100000 movements. Similar targets may also be adopted by the Military ATM community; although pragmatism would indicate that this is a theoretical aim.

Actual NATS safety performance since 2007 is broadly as follows (based on over 2.4 million flights per annum and an average probability of an accident of 2.31×10^{-8} per flight with an average flight time of 89.4 mins From EASRR 4))):

a) SSE1a/b (involving loss of separation of more than 1/3rd), attributable to ATC is under 2 per annum
   i. SSE1 – 8.33×10^{-7} per flt (or 5.59×10^{-7} per Controlled flight hour)
   i. 2.4m/2=1.2m 1/1.2m=8.33×10^{-7} per flight
   ii. $(8.33 \times 10^{-7}/89.4) \times 60 = 5.59 \times 10^{-7}$ per controlled fg hr

b) SSE2a/b (involving loss of separation of more than 1/3rd), attributable to ATC is under 8 per annum
   i. SSE2 – 3.33×10^{-6} per flt (or 2.24×10^{-6} per Controlled flight hour)

c) SSE3a/b (involving loss of separation of more than 1/3rd), attributable to ATC is under 28 per annum
   ii. SSE3 – 1.16×10^{-5} per flt (or 7.83×10^{-6} per Controlled flight hour)

This equates to a currently achieved Civil safety performance of 1.58 SSE1-3 per 100000 movements.
(2+8+28)/2.4m=1.58×10^{-5}
$1.58 \times 10^{-5} \times 100000 = 1.58$

On this basis and in order to create a tolerability matrix; the Military Risk Class C/D Boundary must be determined as this is the boundary between unacceptable and broadly acceptable so is the boundary that as a minimum must be reached. This means uncovering the SSE1-2 boundary:

a) SSE1+2 to 3 boundary (involving loss of separation of more than 1/3rd), attributable to ATC is under 10 p.a.(2 SSE1 events and 8 SSE2 events)

b) 2.4m/10=240000 1/240000=4.16×10^{-6} per flight

c) $(4.16 \times 10^{-6}/89.4) \times 60 = 2.79 \times 10^{-6}$ per controlled fg hr

This provides the figure for the C/D Boundary for a remote event as this is our lowest probability C/D boundary, we can then change each line up or down by an order of magnitude respectively, however an incredible event must meet the EASRR4 figure of 1.55×10^{-8}. This is also demonstrably equivalent with Civil ATM Safety Management System Guidance.

Annex B
Normative References

Publication	Title
ACP190(D)	Guide To Spectrum Management In Military Operations
ACP194	Policy For The Coordination Of Military Electromagnetic Spectrum Allocations And Assignments Between Cooperating Nations
AECP-2(B)	NATO Naval Radio And Radar Radiation Hazards Manual
AECTP-500	Electrical/Electromagnetic Environmental Tests
AetP-1(D)	NATO Flight Inspection Standards
AFSP-1(A)	NATO Aviation Safety
AP600	RAF Information and CIS Policy
BRd0765	Naval Aviation Safety Management System
BRd0766	RN Embarked Aviation Operating Handbook
BRd0767	Naval Aviation Orders
BRd9424	RN Fleet Operation Orders
BS7671:2008	Wiring Regulations
CAP 393	Air Navigation: The Order and the Regulations
CAP 670	ATS Safety Requirements
Def Stan 00-35	Environmental Handbook for Defence Materiel
Def Stan 00-40	Reliability and Maintainability
Def Stan 00-42	Reliability and Maintainability (R&M) Assurance Activity
Def Stan 00-55	Requirements for Safety of Programmable Elements (PE) in Defence Systems
Def Stan 00-56	Safety Management Requirements for Defence Systems
Def Stan 00-250	Human Factors for Designers of Systems
Def Stan 59-35	Requirements for Safety of Programmable Elements (PE) in Defence Systems
Def Stan 59-411	Electromagnetic Compatibility
ED-109A	Software Integrity Assurance Considerations For Communication, Navigation, Surveillance And Air Traffic Management (Cns/Atm) Systems
ED-153	Guidelines For Ans Software Safety Assurance
EMC Directive 2004/108/EC	Electromagnetic Compatibility
EMC Regulations 2006:3418	The Electromagnetic Compatibility Regulations 2006
ESARR3	Use of Safety Management Systems by ATM Service Providers
ESARR4	Risk Assessment and Mitigation in ATM
ESARR6	Software in ATM Functional Systems
EU Regulation (552/2004)	Interoperability Of The European Air Traffic Management Network

EU Regulation (668/2008)	Laying Down Common Requirements For The Provision Of Air Navigation Services, As Regards Working Methods And Operating Procedures
EU Regulation (2096/2005)	Laying Down Common Requirements For The Provision Of Air Navigation Services
HSG65	Managing For Health And Safety
IEC 61508	Functional Safety
ISO 14001	Environmental Management
JSP 375	MOD Health and Safety Handbook
JSP 430	Ship Safety Management
JSP 440	Defence Manual of Security
JSP 454	Land Systems Safety and Environmental Protection
JSP 604	Defence Manual for Information and Communication Technologies (ICT)
JSP 815	Defence Environment and Safety Management
MOD Stated Policy, from 2nd PUS	MOD Stated Policy, from 2nd PUS
MRP and Associated Manuals	Military Regulatory Publications
NATS Safety Management Manual	NATS Safety Management Manual
OHSAS18001	Occupational Health and Safety
RAF FCI	RAF FCI
STANAG 1380	NATO Naval Radio and Radar RADHAZ Manual
STANAG 3374	Flight Inspection Of NATO Radio/Radar Navigation And Approach Aids

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Contract Requirements

When Defence Standards are incorporated into contracts users are responsible for their correct application and for complying with contractual and statutory requirements. Compliance with a Defence Standard does not in itself confer immunity from legal obligations.

Revision of Defence Standards

Defence Standards are revised as necessary by an up issue or amendment. It is important that users of Defence Standards **should** ascertain that they are in possession of the latest issue or amendment. Information on all Defence Standards can be found on the DStan Website www.dstan.mod.uk, updated weekly and supplemented regularly by Standards in Defence News (SID News). Any person who, when making use of a Defence Standard encounters an inaccuracy or ambiguity is requested to notify UK Defence Standardization (DStan) without delay in order that the matter may be investigated and appropriate action taken. Sponsors and authors **shall** refer to Def Stan 00-00 before proceeding with any standards work.

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DEF STAN 00-972 Part 2 Issue 5

Defence Standard:-

Date: 31 Jul 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 2: Communications

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a. This standard has been revised to Issue 5 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 2 Issue 4 Amendment 1 dated 26 July 2013

Def Stan 00-972 Part 2 Issue 4 dated 24 May 2013

Def Stan 00-972 Part 2 Issue 3 dated 21 May 2012

INTERIM Def Stan 00-972 Part 2 Issue 2 dated 29 July 2011

INTERIM Def Stan 00-972 Part 2 Issue 1 dated 12 August 2010

b. This Defence Standard (Def Stan) provides requirements for System Safety and Functional Performance of Military Air Traffic Management (ATM) Systems, ashore, airborne and afloat.

c. This Part of the Def Stan has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the Ministry Of Defence (MOD) Service Departments, and the Aerospace, and Defence and Security Industries (A|D|S).

d. This standard **should** be used in all future designs, upgrades, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises which prevents application of the Def Stan, DStan and the MAA **shall** be informed so that a remedy may be sought.

e. Please address any enquiries regarding this standard, whether in relation to an Invitation To Tender (ITT) or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the ITT or contract.

f. Compliance with this Def Stan **shall** not in itself relieve any person from any legal obligations imposed upon them.

g. This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Military Air Traffic Management Equipment Safety and Performance Standards

Part 2: Communications

1. Scope and Organisational Background

1.1. Prior to using any part of this Def Stan Part 0 **should** be read which contains procedures for use, content and definitions. This Part 2 provides system safety and functional performance requirements for communication systems used for Military Air Traffic Services (ATS) ashore, airborne and afloat and including ATS elements of MOD Contractor Airfield and Range Air Control systems. Refer to Part 1 for information on Regulatory Frameworks for all subsequent Parts.

2. Warning

2.1. The MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

3. Normative References

3.1. Generic normative references are in Part 0. The references shown in **Annex A** are specific to this part.

3.2. Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting **http://dstan.uwh.diif.r.mil.uk** for those with Dii access or **https://www.dstan.mod.uk** for all other users. All referenced standards were correct at the time of publication of this standard (see below for further guidance); if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

3.3. Reference in this Standard to any normative references means in any ITT or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated. Care **should** be taken when referring out to specific portions of other standards to ensure that they remain easily identifiable where subsequent amendments and supersession's might be made. For some standards the most recent editions **shall** always apply due to safety and regulatory requirements.

3.4. In consideration of paragraph 3.3 above, users **shall** be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an ITT or contract. Correct application of standards is as defined in the ITT or contract.

3.5. DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Def Stans.

3.6. All normative references **shall** be complied with in addition to the requirements stated within this Def Stan.

3.7. Any reference to a governing body (e.g. CAA) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. Communications Safety Integrity Requirements

5.1. The following System Safety Integrity Requirements are guidance on comparable Minima found in Civil Air Traffic Control (ATC). Where they are not followed, a process deriving specific Safety Integrity

Requirements on similar failure modes **shall** be conducted by Suitably Qualified and Experienced Personnel (SQEP), resulting in a Minimum Specific Failure Rate (λ) per Operational Hour.

5.2. The use of Failure Modes and Effects Analysis (FMEA) and Event/Fault Tree Analyses (FTA) to derive Safety Requirements are industry practice and are discussed in Project Oriented Safety Management System (POSMS) and Military Regulatory Publications (MRP). The Risk Classification Schema and definitions used are shown in Part 1, paragraph 9.

5.3. The probability of failure of all Air-Ground-Air (AGA) RT communications for a period in excess of 10 seconds **shall** be no greater than REMOTE.

5.4. The probability of failure of a single primary AGA channel for a period in excess of 10 seconds **shall** be no greater than REMOTE.

5.5. The probability of distortion on a single AGA channel for a period in excess of 10 seconds **shall** be no greater than OCCASIONAL.

5.6. The probability of failure of all AGA and Ground-Ground (GG) connectivity at an ATS Operator position for a period in excess of 10 seconds **shall** be no greater than REMOTE.

5.7. The probability of failure of a single Radio Telephony Facility (RTF) Channel in use for control of Ground traffic on an Aerodrome or afloat facility/ship for a period in excess of 10 seconds **shall** be no greater than PROBABLE.

5.8. The probability of a total inability to communicate by telephone with ATS units occurring for more than 10 seconds **shall** be no greater than PROBABLE.

5.9. The total inability to communicate by telephone with the Emergency Services by ATS occurring for more than 10 seconds **shall** be no greater than FREQUENT.

5.10. The total inability to communicate by telephone with non-operational destinations (i.e. not ATS or Emergency services) **should** have No Safety Effect.

6. Communications Functional and Performance Safety Requirements

6.1. The equipment and systems **shall** be designed and constructed to operate within the Aeronautical Mobile (R) Service allocation 117.975 MHz to 137.000 MHz. Military Very High Frequency (VHF) equipment may operate extended VHF to 156 MHz and incorporate Link11. *(CAP 670)*

6.2. Equipment and systems at Aeronautical Radio Stations must be capable of operation in both 8.33 kHz and 25 kHz to ensure their compliance with Commission Implementing Regulation (EU) No 1079/2012. *(EU No.1079/2012)*

6.3. The first and last assignable frequencies being 118.000 MHz and 136.975 MHz. For radiotelephony channel spacing is either 8.33 kHz or 25 kHz using Double Sideband (DSB) Amplitude Modulation (AM) full carrier with International Telecommunication Union (ITU) emission designator 6K80A3EJN for 25 kHz and 5K00A3EJN for 8.33 kHz channel spacing. *(CAP 670) (STANAG 4204/4205)*

6.4. Military VHF Equipment **shall** be capable of 8.33 kHz spacing. Military Ultra High Frequency (UHF) AGA and UHF GG equipment is not subject to this requirement. STANAG 4204/4205 also applies to Military AGA RTF Equipment and agile tactical radio.

6.5. For data link communications channel spacing is 25 kHz using DSB AM full carrier with ITU emission designators 13K0A2DAN for ACARS using MSK modulation, 14K0G1D for VDL 2 using D8PSK modulation and 13K0F7D for VDL Mode 4 using GFSK modulation. Military aspects of any Aeronautical Datalink may not be subject to this requirement. *(CAP 670)*

6.6. Military Designated Operational Coverage (DOC) **should** be contained in Military Flight Information Publications (MilFLIP) published by No1 AIDU. *(CAP 670)*

6.7. Radio Licensing, which will trigger the process of issuing a Wireless Telephony (WT) Act aeronautical radio license. New/relocated Radio Frequency (RF) emitter installations, sponsored by or on behalf of the

MOD and intending to operate on aeronautical frequency assignments, **shall** be achieved in accordance JSP 604.

6.8. Radio Site Clearance **shall** be obtained in accordance with JSP 604.

6.9. Failure to renew a WT Act aeronautical radio licence will invalidate the associated Approval to operate. *(CAP670) (JSP604)*

6.10. Military Terminal and Aerodrome ATC Services - The provision **should** be of Main (A), Contingency (B) and Emergency (E) equipment.

6.11. Deconfliction and Procedural Service - The provision **should** be of main and emergency equipment redundancy.

6.12. Traffic, Basic and Aerodrome Flight Information - The provision of main equipment is considered sufficient.

6.13. The configuration of equipment includes associated antennas, cables, filters, commutation units and other equipment necessary for the operation of the equipment and systems.

6.14. Main and Contingency equipment may be operated as 'System A' and 'System B' where either may be considered as Main whilst in operational service and the other is considered as Standby, awaiting selection. Emergency ‘System E’ equipment **should** be in place with independent access.

6.15. The application of A System, B System and E System provision **should** be made on a per-channel basis; with ATC operational understanding of the context of the frequency usage.

6.16. Where N+2 configurations are used for Multi-channel Emergency RTF provision, this **shall** be designed so there is no possibility of blocking or unavailability of the Emergency RTF Access.

6.17. Emergency Speech facilities on other NavAids (incl. ILS) may be utilized in addition to the above and integrated to the Voice Communications Control Systems (VCCS).

6.18. Wherever a service is provided using main equipment only, it **shall** be explicitly shown how the risks of ATS radiotelephony failure have been adequately mitigated, taking account of: the local airspace environment, specific ATS task, aircraft characteristics and needs and flight crew procedures. Where appropriate mitigation cannot be demonstrated, it is expected that emergency radiotelephony equipment and/or additional contingency equipment will be provided.

6.19. It **shall** also be clearly demonstrated how services will be managed during periods of planned withdrawal of single systems to provide for such things as periodic maintenance.

6.20. Temporary upgrades of Air Traffic or Flight Information Service with reduced equipment **shall** not occur.

6.21. The AGA RTF system architectural design **shall** be non-blocking. Any incidences of blocking may be viewed as an availability interruption.

6.22. The configuration of equipment includes associated antennas, cables, filters, commutation units and other equipment necessary for the operation of the equipment and systems.

6.23. Each channel and each leg of Radio Audio **shall** be discretely recorded and stored for at least 30 Days. Telephone Audio from each ATC Desk Position **shall** be recorded discretely and stored for at least 30 days. If Audio sources are mixed during recording, as a result of parallel usage (Radio&Tel.) then each audio source **shall** be distinguishable from the other. If Multiple recording solutions are used, these sources **shall** be able to be synchronised in time; using a Morse Channel, or AudioData Time-stamping. The Voice Recording systems **shall** be synchronised with all Surveillance recording systems.

6.24. Where Software defined, Internet Protocol (IP)-based Radio Systems are used; the system network **shall** ensure all received data from these systems are routed also to Voice/Data Recording Equipment. In addition, where these systems are utilized, then audio side tone may be simulated. If this is the case, then an alternative method of ‘off-air’ side tone ‘verification’ **shall** be presented to the operating ATC addressing the whole RTF system loop, including Antenna system.

6.25. If True ‘off-air’ side tone is available, it **should** be used (most Terminal or Aerodrome systems, where traditional TDM Voice Communications Control Systems (VCCS) and RTF Systems are utilized) as it offers benefits to ATC and GRMS in terms of fault scenarios. Where IP based VCCS and RTF systems are utilized, audio side tone may be simulated. If this is the case, then an alternative method of ‘off-air’ side tone ‘verification’ **shall** be presented to the operating ATC.

6.26. Refer also to VCCS Requirements in this Def Stan.

6.27. European Organisation for Civil Aviation Equipment (EUROCAE) Voice over Internet Protocol (VoIP) Operational and Technical Requirements: Where ATC Voice Systems utilise VoIP technologies they **should** be at least compliant with ED-136 in terms of Operational and Technical requirements, except where the provisions within this Def Stan are more stringent. *(EUROCAE ED-136)*

6.28. EUROCAE VoIP Interoperability Requirements: Where ATC Voice Systems utilise VoIP technologies they **should** be at least compliant with ED-137 in terms of interoperability, except where the provisions within this Def Stand are more stringent. *(EUROCAE ED-137)*

6.29. EUROCAE VoIP Network Performance Requirements: Where ATC Voice Systems utilise IP networks to interlink VoIP VCCS and RTF systems, these **should** be at least compliant with ED-138, except where the provisions within this Def Stan are more stringent. *(EUROCAE ED-138)*

7. VCCS Functional and Performance Safety Requirements

7.1. **Should** minimum audio level not be audible at minimum setting, an alternative means of identifying audio activity at the operating position **shall** be provided. *(CAP 670)*

7.2. Where such devices or functions are incorporated, a signal gain path memory or similar feature can be used to prevent distortion of the initial syllables of speech at the beginning of a transmission or after pauses in speech. The principle of operation being that the last dynamic gain/attenuation setting is stored and used for subsequent transmissions.

7.3. The Voice Switch **shall** be viewed as part of the whole Voice Communications System-of-Systems for the purposes of Non-Blocking.

7.4. Local side tone may be a suitable solution if associated with a test of the “off-air” reception. In this respect a self-proving mechanism for the control of vehicles on the manoeuvring area (system loop check) **should** be provided. *(CAP670) (EUROCAE ED136)*

7.5. Where a mix of VHF and UHF AGA ATS frequencies are in use by a controller, these frequencies **should** be duplex cross-coupled. This is also recommended between VHF/UHF and GG UHF.

7.6. Local side tone may be a suitable solution if associated with a test of the “off-air” reception. In this respect a self-proving mechanism (system loop check) **shall** be provided.

7.7. Where a Radio channel is used exclusively for active runway crossings it **shall** only be as a cross coupled channel associated with the channel on which runway operations are being controlled and **shall** be such that all users can hear all traffic on both channels.

7.8. This requirement **should** be viewed as the round-trip signalling delay. Whilst 20 milli seconds **should** be achievable in TDM systems, for digital systems, EUROCAE ED136 indicated that round-trip delay may exceed this. Ultimately, the round-trip delay in signalling **shall** be suitable to prevent clipping of ATC or Aircraft speech during operations.

7.9. For multi-site area radio coverage (aka Climax), differentials between each channel speech/signalling **should** be less than 10 milli seconds.

7.10. Independent Anti-Blocking Systems (ABS) are not required on Military ATS systems, although time-out facilities may be incorporated into Radio Equipment, where a transmitter timeout may be used.

7.11. The Provider **shall** satisfy the MAA, the Release Authority and the Duty Holder (DH) that the GG Aeronautical Fixed Services equipment is adequate for the task for which it is to be used. *(CAP 670)*

7.12. Implementation direct to Headset **should** be made for normal operation. Implementation of Priority lines or signalling **should** be considered for liaison lines to neighbouring units. Implementation of utilizing Direct Access circuits, with Indirect Access/Dialled backup **should** also be considered.

7.13. Airfield cables and fibres **shall** be considered as part of this.

7.14. Primary PSTN access **should** be via the VCCS, with a discrete, standalone Public Switched Telephone Network (PSTN) access available on the same extensions. *(CAP 670)*

7.15. A resilient GG Telephone solution may consist of a Direct Access CCT, a protected ATOTN Autodial and a PSTN Autodial. The PSTN Autodial **should** have an independent access via backup telephone.

7.16. For digital systems, where the above may not be a measurable in the same way, the voice transmission quality **shall** achieve at least a Mean Opinion Score (MOS) of 4.

7.17. Radio and Telecommunications Terminal Equipment (R&TTE) approvals may be gained via British Approvals Board for Telecommunications (BABT).

8. Date Link Functional and Performance Safety Requirements

8.1. Provided the Safety Assessment concludes that the datalink system / application is at least tolerably safe, then the use of private or Military datalink networks, which may pre-date the International Civil Aviation Organisation (ICAO) Standards and Recommended Practices (SARPs), **shall** be permitted for the following categories of communications messages *(CAP670)*:

8.1.1. Meteorological Communications

8.1.2. Flight Regularity Communications

8.1.3. Aeronautical Information Service Messages

8.1.4. Network/Systems Administration

8.2. When Member States decide to equip new transport type State aircraft with data link capability relying upon standards, which are not specific to military operational requirements, they **should** implement technical solutions complying with Regulation (EC) No 29/2009 of 16 January 2009.

8.3. Link 16 or Link 22 functionality **should** be assessed according to these and other relevant Civil Datalink specifications. *(CAP 670)*

9. ATIS Functional and Performance Safety Requirements

9.1. See Part 1 of this Def Stan for more information on applicability of International Standards and their Hierarchy to Military ATS Equipment. *(CAP 670)*

9.2. See Part 11 of this Def Stan for more information on signals and information to Data Recording Equipment. *(CAP 670)*

9.3. The Automatic Terminal Information Service (ATIS) message **should** relate to a single aerodrome, except in circumstances where Military ATS responsibilities may cover multiple Aerodromes. *(CAP 670)*

10. Ground to Ground Communications Functional and Performance Safety Requirements

10.1. For Military Systems, GG UHF may be combined with Trunk UHF Radio facilities provided for other Airfield services. The design and implementation of the Trunk Radio system **shall** be such that any ATC GG UHF channel can be connected to any output without the possibility of blocking occurring. *(CAP 670)*

10.2. The GG UHF equipment, systems, services and facilities **shall** comply with the applicable Radio Regulations of the ITU, except where these differ for the purposes of Military systems. *(CAP 670)*

10.3. Should implementation of Military GG UHF not be in accordance with the above, then a Safety Argument **shall** be submitted to the MAA, ATM Release Authority and DH for approval.

10.4. The ATS GG UHF equipment and systems **shall** be installed, operated and maintained in compliance with this Def Stan, MAA Regulation and Release Authority/DH procedures in respect of the ATS GG Communications being provided. *(CAP 670)*

10.5. The equipment, systems and associated records **shall** be made available for inspection by an authorised person, being a MAA Inspector, for the purpose of demonstrating compliance with this Def Stan and MAA Regulation. *(CAP 670)*

11. Communications Static Deployed Tactical Safety and Regulatory Requirements

11.1. Once ruggedized, the complete Communications system **should** maintain at least the same Safety Performance as noted above when Static Deployed.

11.2. Coverage Trials **should** be performed in the required area of Tactical operations and defined in Deployed ATC Documentation.

11.3. Secure Voice Communication Systems used for ATC Purposes **should** maintain at least the same Safety Performance as noted above.

11.4. Static Deployed equipment (once ruggedized) **shall** have undergone assessment according to Def Stan 00-35, prior to deployment. *(Def Stan 00-35)*

11.5. Limitations of the transceiver operations **shall** be defined and justified.

12. RAF Communications Specific Requirements

12.1. Radio Interfaces to Air Defence Organisation (ADO) Equipment **shall** not affect the ATC system, or vice versa.

12.2. Runway Caravan **shall** enable use of On-Channel Frequency Intercom and priority signalling to the main ATC tower.

13. Contracted Airfields and Weapons Range Communications Requirements

13.1. The performance and architecture of Range Air VHF and UHF Communication systems **shall** meet the requirements in this Def Stan.

13.2. This **shall** also apply if Range Air Control is performed remotely.

13.3. The Trial Control Officers **should** have the same Communications System as the Range Air Controllers, to facilitate On-Channel Frequency Intercom and priority signalling.

14. Remotely Piloted Air Systems Communications Requirements

14.1. Remotely Piloted Air Systems (RPAS) Ground-Ground Comms used in-lieu of VHF Communication; the link from RPAS Pilot to ATC Service Provider **shall** meet the same Communications Integrity and Performance Requirements for Air-Ground-Air Communications. *(CAP720)*

15. Communications Statutory and Regulatory Requirements

15.1. The system **shall** be certified as meeting Electro Magnetic Compatibility (EMC) requirements where appropriate. (*ITU-R)(Regs JSP604)*

15.2. Liaison with CAA and Office of Communications (OFCOM) is advisable for VHF RTF licences. (*CAP670) (JSP604) (ICAO Ax10VolV) (ITU-R Regs)*

15.3. The entire communications system **should** comply with the Requirements and Provisions within this Def Stan and in doing so, demonstrate equivalence with the Air Navigation Order (ANO), Articles 205 and 206.

15.4. The entire communications system **should** be documented as being in compliance with Regulation (EC) 552/2004 Single European Sky – Interoperability Regulation, where there is a majority of Civil ATS activity being performed.

15.5. The entire communications system **should** demonstrate equivalence with EU Regulations (and ESARR) where appropriate.

15.6. R&TTE Directive 1999/5/EC **should** be met.

Annex A
Normative References

These Annex specific References are in addition to those noted in Part 0 of this Defence Standard

Publication	Title
ANO Article 205	Requirement To Notify Aeronautical Radio Station Service
ANO Article 206	Requirement To Keep Air Traffic Service Equipment Records
CAP 413	The UK Radiotelephony Manual
CAP 670	ATS Safety Requirements
CAP 720	Flight Crew Training: Cockpit Resource Management (CRM) and Line-Oriented Flight Training (LOFT)
Def Stan 00-35	Environmental Handbook for Defence Materiel
(EC) No 29/2009	Data Link Services For The Single European Sky
EU No.1079/2012	Voice channels spacing for the single European sky
EUROCAE ED 136	Voice over Internet Protocol (VoIP) Air traffic Management (ATM) System Operational and Technical Requirements
EUROCAE ED 137	Interoperability Standards for VoIP ATM Components (Volume 3 European Legacy Telephone Interworking)
EUROCAE ED 138	Network Requirements and Performances for Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) Systems
ITU-R	ITU Radio communications Regulations
ITU-T G.712	Transmission performance characteristics of pulse code modulation channels
JSP 604	Defence Manual for Information and Communication Technologies (ICT)
MMATM	Manual of Military Air Traffic Management
R&TTED 1999/5/EC	Guide to the R&TTE Directive 1999/5/EC
STANAG 4204	Single Channel VHF
STANAG 4205	Single Channel UHF

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Contract Requirements

When Defence Standards are incorporated into contracts users are responsible for their correct application and for complying with contractual and statutory requirements. Compliance with a Defence Standard does not in itself confer immunity from legal obligations.

Revision of Defence Standards

Defence Standards are revised as necessary by an up issue or amendment. It is important that users of Defence Standards **should** ascertain that they are in possession of the latest issue or amendment. Information on all Defence Standards can be found on the DStan Website www.dstan.mod.uk, updated weekly and supplemented regularly by Standards in Defence News (SID News). Any person who, when making use of a Defence Standard encounters an inaccuracy or ambiguity is requested to notify UK Defence Standardization (DStan) without delay in order that the matter may be investigated and appropriate action taken. Sponsors and authors **shall** refer to Def Stan 00-00 before proceeding with any standards work.

MOD

DEF STAN 00-972 Part 3 Issue 5

Defence Standard:-

Date: 31 Jul 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 3: Surveillance

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a This standard has been revised to Issue 5 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 3 Issue 4 Amendment 1 dated 26 July 2013

Def Stan 00-972 Part 3 Issue 4 dated 24 May 2013

Def Stan 00-972 Part 3 Issue 3 dated 21 May 2012

INTERIM Def Stan 00-972 Part 3 Issue 2 dated 29 July 2011

INTERIM Def Stan 00-972 Part 3 Issue 1 dated 12 August 2010

b This Defence Standard (Def Stan) provides requirements for System Safety and Functional Performance of Military Air Traffic Management (ATM) Systems, ashore, airborne and afloat.

c. This Part of the Def Stan has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the Ministry Of Defence (MOD) Service Departments, and the Aerospace, Defence and Security Industries (A|D|S).

d. This standard **should** be used in all future designs, upgrades, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises, which prevents application of the Def Stan, DStan and the MAA **shall** be informed so that a remedy may be sought.

e. Please address any enquiries regarding this standard, whether in relation to an Invitation To Tender (ITT) or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the ITT or contract.

f. Compliance with this Def Stan **shall** not in itself relieve any person from any legal obligations imposed upon them.

g. This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Military Air Traffic Management Equipment Safety and Performance Standards

Part 3: Surveillance

1. Scope and Organisational Background

1.1. Prior to using any part of this Def Stan Part 0 **should** be read which contains Procedures for use, content and definitions. This Part 3 provides System Safety and Functional Performance requirements for Surveillance systems used for Military Air Traffic Services (ATS) ashore, airborne and afloat and including ATS elements of MOD Contractor Airfield and Range Air Control systems. Refer to Part 1 for information on Regulatory Frameworks for all subsequent Parts.

2. Warning

2.1. The MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

3. Normative References

3.1. Generic normative references are in Part 0. The references shown in **Annex A** are specific to this part.

3.2. Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting **http://dstan.uwh.diif.r.mil.uk** for those with Dii access or **https://www.dstan.mod.uk** for all other users. All referenced standards were correct at the time of publication of this standard (see below for further guidance); if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

3.3. Reference in this Standard to any normative references means in any ITT or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated. Care **should** be taken when referring out to specific portions of other standards to ensure that they remain easily identifiable where subsequent amendments and supersession's might be made. For some standards, the most recent editions **shall** always apply due to safety and regulatory requirements.

3.4. In consideration of paragraph 3.3 above, users **shall** be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an ITT or contract. Correct application of standards is as defined in the ITT or contract.

3.5. DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Defence Standards.

3.6. All normative references **shall** be complied with in addition to the requirements stated within this Def Stan.

3.7. Any reference to a governing body (e.g. CAA) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. Surveillance Safety Integrity Requirements

5.1. The following System Safety Reliability Requirements are guidance on comparable Minima found in Civil Air Traffic Control (ATC). These may be followed where appropriate. Where they are not followed, a process deriving specific Safety Reliability Requirements on similar failure modes **shall** be conducted by Suitably Qualified and Experienced Personnel (SQEP) resulting in a Minimum Specific Failure Rate (λ) per Operational Hour.

5.2. The use of Failure Modes and Effects Analysis (FMEA) and Event/Fault Tree Analyses (FTA) to derive Safety Requirements are industry practice and are discussed in Project Oriented Safety Management System (POSMS) and Military Regulatory Publications (MRP). The Risk Classification Schema and definitions used are shown in Part 1, paragraph 9.

5.3. The probability of total loss for more than 12 seconds of the Surveillance System **shall** be no greater than OCCASIONAL.

5.4. The probability of loss of Cooperative Surveillance for more than 12 seconds **shall** be no greater than PROBABLE.

5.5. The probability of loss of Non-Cooperative Surveillance for more than 12 seconds **shall** be no greater than PROBABLE.

5.6. The probability of loss of one Surveillance display for more than 12 seconds **shall** be no greater than PROBABLE.

5.7. The probability of credible corruption of Surveillance data for more than 12 seconds **shall** be no greater than OCCASIONAL.

5.8. The probability of loss of transponder code / callsign for more than 12 seconds within the surveillance system **shall** be no greater than FREQUENT.

5.9. The probability of total loss of the Precision Approach Radar (PAR) on Final Approach within 3NM of Touchdown **shall** be no greater than PROBABLE.

5.10. The probability of corruption or false tracking of the PAR on Final Approach within 3NM of Touchdown **shall** be no greater than PROBABLE.

5.11. The probability of failure of a Windfarm Surveillance Mitigation System **shall** be no greater than OCCASIONAL.

5.12. The probability of corruption of a Windfarm Surveillance Mitigation System **shall** be no greater than OCCASIONAL.

5.13. The probability of loss or credible corruption of CCTV Visual Surveillance when used for ATC clearance purposes **shall** be no greater than PROBABLE.

5.14. The probability of credible corruption of CCTV Visual Surveillance when used for ATC information purposes **shall** be no greater than FREQUENT.

6. Surveillance Functional and Performance Safety Requirements

6.1. Non-Cooperative Surveillance Systems **shall** use the following bands *(CAP 670)*:

6.1.1. 1215 MHz to 1365 MHz (23 cm) medium/long range radar services.

6.1.2. 2700 MHz to 3100 MHz (10 cm) short/medium range radar services.

6.1.3. 9000 MHz to 9200 MHz and

6.1.4. 9300 MHz to 9500 MHz (3 cm) short-range radar services.

6.2. The following stability tolerances **shall** be applied to Non-Cooperative Surveillance Systems *(CAP 670)*. Frequency Band Stability Tolerance:

6.2.1. 1215 MHz–1365 MHz within 500 ppm

6.2.2. 2700 MHz–9500 MHz within 1250 ppm

6.3. For a Non-Cooperative Surveillance System, the level of any spurious component **shall** be either 50dB down on the mean power in bandwidth or less than 100 mW, whichever results in the least spurious output. A spurious component is one outside the necessary bandwidth. *(CAP 670)*

6.4. For Cooperative Surveillance, the spurious radiation of Carrier Wave **shall** not exceed -76 dBW. *(CAP 670)*

6.5. Spurious returns include clutter, garble, spurious reflections etc, including those introduced by Wind Turbines. The Surveillance system **should** also be capable of suppressing Sea clutter, where required. *(CAP 670)*

6.6. Non-Cooperative System Accuracy, when used for Surveillance Radar Approach (SRA) purpose (i.e. Non-Cooperative only), the Horizontal accuracy **shall** be better than 1 degree of bearing and 55 Metres, +5% of target range. In any event, Horizontal Accuracy **shall** be no worse 385 metres from a true position. *(CAP 670)* (*Eurocontrol SUR.ET1.ST01.1000-STD-01-01) (ICAO Doc4444*)

6.7. Speed Accuracy **should** be less than 30 metres/second (58kts) from the true speed. Three Dimensional (3D) Primary Surveillance Radar (PSR) accuracy **should** have a vertical accuracy better than ±60 metres (200ft) vertically (in Reduced Vertical Separation Minima (RVSM) Airspace) or ±90 metres (300ft) vertically (in all other Airspace). *(CAP 670)* (*Eurocontrol SUR.ET1.ST01.1000-STD-01-01) (ICAO Doc4444*)

6.8. Cooperative System Accuracy from the true Horizontal position **should** be at least comparable to Non-Cooperative horizontal System Accuracy in all directions and ideally less than 385 metres from a true position. Cooperative System Accuracy from the true Vertical position **shall** be better than ±60 metres (200ft) vertically (in RVSM Airspace) or ±90 metres (300ft) vertically (in all other Airspace). (*CAP 670) (ICAO Doc 4444) (ICAO Doc 9426).*

6.9. The following Sensor Positional 2D Accuracies **shall** also be met:

6.9.1. Slant Range Bias <100 metres

6.9.2. Azimuth Bias <0.1 degree

6.9.3. Slant Range Gain Error <1 metre/NM

6.9.4. Time Stamp Error <100 milli seconds

6.10. When used for radar separation, the intended minimum separation standard or deconfliction minima **shall** be justified. Typically, the deconfliction minima **should** be 5 NM. When reduced to 3 NM (or further), this **should** be commensurate with greater Surveillance System accuracy, both for Cooperative and Non-Cooperative Surveillance. Guidance on factors to be considered when determining the minimum radar separation to be employed can be found in International Civil Aviation Organisation (ICAO) Doc 9426. *(CAP 670) (ICAO Doc 4444)*

6.11. The worst combination of error distributions **shall** achieve the Surveillance Target Level of Safety (TLS). For the system configurations covered by this document the required TLS, expressed as the probability of horizontal overlap due to loss of accuracy, are generally accepted to be 7 x 10-7 per event (i.e. two adjacent targets) which uses the radar separation minimum. The TLS depends on the operational purpose of the system. *(CAP 670)*

6.12. To assess a Surveillance system, several aspects **shall** be determined:

6.12.1. The systems that produce the radar data used for separation or deconfliction **shall** be assessed.

6.12.2. For a local/remote Cooperative Surveillance system used in conjunction with a local/remote Non-Cooperative system, the following errors **shall** be assessed: *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01)*

6.12.2.1. Error in slant range correction, if applied.

6.12.2.2. Error in prediction of position due to differing scan rates

6.12.2.3. Error due to the curvature of the earth when transferring the centre of one volume to another centre.

6.12.2.4. Stability and accuracy of original plots.

6.12.2.5. Tolerance error in detected position of site marker.

6.12.2.6. Provision of Cooperative & Non-Cooperative markers

6.12.2.7. Allowable error in combination box.

6.12.2.8. The plot delay (from sensor to Display) **shall** be acceptable in respect of the Operational Requirement (OR) and within the context of Safe Separation Minima. In any event, this **shall** be no greater than 2 seconds for 95% of the time. This assessment **shall** consider both the mean delay and the distribution of the delay.

6.13. Multi-Radar Tracking/Data Fusion/Mosaic Functions **should** provide a service of equivalent accuracy to the rest of the system, minimising the effect of boundary positioning and slant-range error differences. *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01)*

6.14. The error in range and bearing between:

6.14.1. The aircraft position reported by Cooperative and Non-Cooperative Surveillance.

6.14.2. The reported Cooperative Surveillance Monitor position and the video map.

6.14.3. The reported Cooperative Surveillance Monitor position and the known monitor position **should** be less than ± 2 degrees in azimuth and ± 3% of target range.

6.15. The processing precision **shall** be sufficient to meet the error budget for the system accuracy and resolution. The following details **should** also be addressed *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01*):

6.15.1. There **should** be less than 20 false reports per scan for the entire coverage area.

6.15.2. There **should** be no more than 2 randomly distributed false reports per scan from the entire area of interest.

6.15.3. False Associations **should** be less than 0.1%.

6.15.4. Ghost tracks **should** occur less than 0.01 per track hour.

6.15.5. False track length **shall** occur for less than 3 scans.

6.15.6. Cooperative False tracks **should** occur for less than 1.5 scans.

6.15.7. Overall False Cooperative target reports **should** be less than 0.1%.

6.15.8. Non-Cooperative Track Swap Rate probability **should** be 0.15 per swap opportunity.

6.15.9. Cooperative Track Swap Rate probability **should** be 0.01 per swap opportunity.

6.15.10. Non-Cooperative mean track initiation delay **should** be less than 3.5 scans with a standard deviation of 1 scan.

6.15.11. Cooperative mean track initiation delay **should** be less than 2.5 scans with a standard deviation of 0.5 scan

6.15.12. Track Drop Rate Uniform Motion **should** be less than 0.1/track hour

6.16. A Non-Cooperative (or Non-Cooperative and Cooperative combined) Surveillance system providing the positional data for the following services **shall** provide regular updates with at least the following update periodicity: *(CAP 670) (ICAO Ax10 Vol 1)*

6.16.1. SRA to 2 NM; 6 seconds update periodicity

6.16.2. SRA to 1 NM; 4 seconds update periodicity

6.16.3. SRA to 0.5 NM; 3 seconds update periodicity

6.17. In reference to existing system performance and ICAO commendations, a Military Surveillance system **should** have an update periodicity of 4 seconds. *(CAP 670) (ICAO Ax10 Vol 1)*

6.18. For 3 NM separation the equipment **shall** resolve two targets at 1 NM separation and for 5 NM separation the equipment **shall** resolve two targets at 3NM, both to a probability of resolution of 95% or greater throughout the required azimuth and range as defined in the OR. *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01) (ICAO Ax10 Vol 1)*

6.19. The Surveillance System **should** also be capable of resolving two targets within the following limits: *(CAP 670) (SUR.ET1.ST01.1000-STD-01-01) (ICAO Ax10 Vol 1)*

6.19.1. Cooperative: slant range: ≤ 2NM azimuth: ≤ 2x nominal 3dB interrogation beamwidth (where this does not apply, use a 1 NM or 1% of range from closest sensor, whichever is least)

6.19.2. Non-Cooperative: slant range corresponding to: ≤ 2x nominal (compressed) pulse width azimuth: ≤ 3 x nominal 3dB beamwidth

6.20. The 3dB beamwidth is the azimuth extent of the horizontal main beam pattern for the antenna, as measured between the two points that are 3 dB below the peak of the horizontal main beam pattern. The measurement of the horizontal pattern being made at the elevation angle that corresponds to the vertical main beam peak. *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01) (ICAO Ax10 Vol 1)*

6.21. The statistical resolution performance for Non-Cooperative and Cooperative Surveillance **shall** be expressed by the probability of target position detection. In addition, for Cooperative Surveillance, the probability of code detection. The most stringent of these requirements **should** be applied to Military Surveillance systems. *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01) (ICAO Ax10 Vol 1)*

6.22. Coverage defines the areas that can support the provision of radar services to aircraft as defined in Military Regulatory Publications (MRPs). These areas **shall** be in the OR. *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01)*

6.23. The Surveillance coverage **should** coincide with the use and boundaries of the ATC service that require it. In normal operation, radar data from the known coverage area **shall** be continuously displayed to controllers. *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01)*

6.24. In Terminal Areas, there **should** be both Non-Cooperative and Cooperative Surveillance provision. Cooperative-only Surveillance operations **should** only occur for limited periods and only in Controlled Airspace. *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01)*

6.25. The Non-Cooperative Surveillance system **shall** have a theoretical coverage, in the areas of the OR, which corresponds to 90% detection of the returns from a 1metre^2 target. This theoretical cover **shall** assume Swerling Case 1 targets. *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01)*

6.26. There **should** be no averaging of these Detection Requirements over the coverage area. Any variations in detection capability based on higher target agilities of Military aircraft; **shall** be defined and justified. This coverage requirement is a minimum for both Non-Cooperative and Cooperative sensors if separation standards or deconfliction minima between primary, reinforced and Secondary Surviellence Radar (SSR) only plot positions are applied. *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01)*

6.27. The Velocity range assumed for this detection capability is currently based on Eurocontrol assumptions of: *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01)*

6.27.1. Ground Speed: V = 555 km/h (300 kt)

6.27.2. Transversal acceleration: 4 metres/second^2

6.27.3. Longitudinal acceleration: 1 metres/second^2

6.27.4. Vertical speed: 10 metres/second (2000 ft/min)

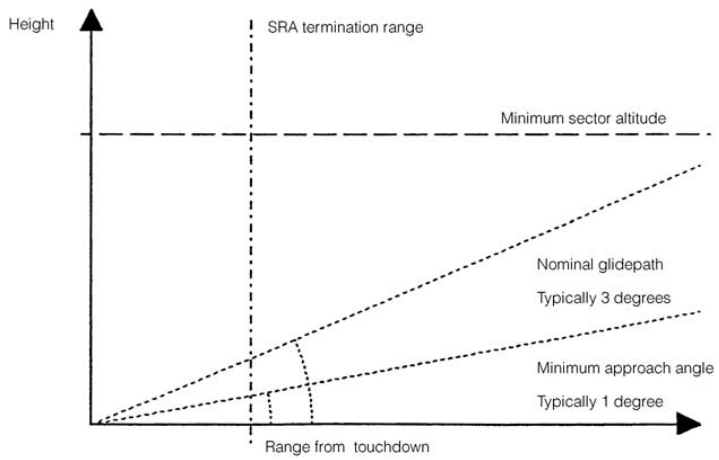
6.28. Detection capabilities for Aircraft with high-energy manoeuvres in wider performance envelopes of Military Aircraft, when operating in or out of segregated Airspace, **should** be Risk Assessed by the Duty Holder (DH) as being As Low As Reasonably Practicable (ALARP). *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01)*

6.29. The Cooperative (and/or combined Non-Cooperative and Cooperative) Surveillance system **shall** have a theoretical coverage, in the areas of the OR, which corresponds to 97% detection of the returns from a 1 metre^2 target. This theoretical cover **shall** assume Swerling Case 1 targets. This coverage requirement applies to combined Non-Cooperative and Cooperative sensors, when combined for use by ATC. *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01)*

6.30. Non-Cooperative and Cooperative Surveillance system sensors **shall** have their performance continuously monitored. *(CAP 670)*

6.31. Where the use of the Non-Cooperative surveillance system includes SRA approaches, the coverage **shall** be suitable for the termination distance. The Surveillance service coverage **should** extend as shown in the diagram below. *(CAP 670)*

Diagram 1



6.32. ASTERIX format **should** be used for data interchange and **shall** be used for data interchange to and between centres. *(CAP 670)*

6.33. All default values **shall** be stated. Default settings control such items as filter settings, clutter level defaults, fixed arithmetic offsets, feedback loops etc. This does not apply to arithmetic constants fixed in the equipment design. The system default **should** be configured not to coast tracks in Military Terminal or Aerodrome Areas. *(CAP 670)*

6.34. In monitoring of a Non-Cooperative Surveillance system, the system **shall** use appropriate outputs to check the positioning error based on Permanent Echoes (PE), or equivalent. *(CAP 670)*

6.35. In monitoring Cooperative (or Combined Non-Cooperative and Cooperative) Surveillance Systems; the Cooperative system **should** have an independent site monitor. The system **should** determine the collimation errors between multiple Cooperative and Non-cooperative Surveillance sources. *(CAP 670)*

6.36. The Cooperative Surveillance system site transponder and monitoring system **shall** monitor those radar parameters, which affect detection, performance, accuracy or resolution. *(CAP 670)*

6.37. An electronic alerting system, reporting status to the maintenance department and to ATC **should** be used. The display system **shall** provide an indication of system faults on each operational display. In normal circumstances, the presentation of these alarms **shall** be at a sufficiently low level so as not to significantly increase controller workload, and the indication provided **shall** provide the controller with a clear indication of which system element has failed. *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01)*

6.38. It **shall** indicate, where possible, the cause of the event. *(CAP 670)*

6.39. The reliability of the surveillance sensor **shall** be defined and justified. *(CAP 670)*

6.40. The reliability analysis **shall** be combined with a hazard analysis to produce a functionally based reliability analysis and **should** be linked to the Safety Requirements in Section 7. *(CAP 670)*

6.41. Where in-fill radar is not owned by the Air Navigation Services Provider (ANSP) providing the air traffic service, and is owned or maintained by a third party, appropriate formalised agreements **shall** be in place. Such agreements **shall** indicate the:

6.41.1. Availability of spare equipment supplied to the ANSP

6.41.2. Time to repair the equipment

6.41.3. Contact points

6.41.4. Any remote accessibility by the ANSP to configure the system

6.41.5. Physical accessibility to the equipment

6.41.6. Maximum outage periods tolerated by the ANSP

6.42. The maximum time taken to establish full operating conditions following a power supply interruption **shall** be justified. The power supply architecture to the Surveillance System **should** be uninterruptible. *(CAP 670)*

6.43. The external monitor **shall** provide accurate reference information to test the transmission, reception and decoding characteristics of the Cooperative Surveillance System service in conjunction with the range and azimuth accuracy of the ground interrogator. *(CAP 670)*

6.44. If the Cooperative Surveillance service is to be used without a Non-Cooperative Surveillance system, an external site monitor **shall** be provided. Cooperative-only operation is not recommended for Military ATM Systems. *(CAP 670)*

6.45. The external monitoring equipment **shall** continuously monitor those Surveillance parameters, which affect detection performance, accuracy or resolution. *(CAP 670)*

6.46. The positioning of the Cooperative Surveillance System monitor will depend on the use of the equipment. Where the controller uses the monitor to assess collimation errors the monitor **should** be sited within the range that the ATS operators can view. This does not imply that the controller **should** continuously check the position. Merely that a suitable range setting be available to the controller. *(CAP 670)*

6.47. Where an equipment sub-system, under the control of the user, uses the monitor to assess collimation errors, the monitor **shall** be within the nominal coverage of the Surveillance system. If the monitor is at a range greater than the normal range displayed to the controller, a reporting procedure **shall** be in place. *(CAP 670)*

6.48. Where a sub-system, not under the control of the user, uses the monitor to assess collimation errors, the monitor **shall** be within the nominal coverage of the Surveillance System. If the monitor position is outside the normal defined area displayed to the remote controller, a reporting procedure **shall** be in place. This procedure **shall** report alarms from the system provider to the service user. The originator of the service, not the remote user, **shall** identify and notify the remote users of any collimation errors determined. *(CAP 670)*

6.49. The Cooperative Surveillance System monitor **should** be located at a range greater than 4 km from the radar head. Where there is no single radar head, the Cooperative Surveillance Monitor position(s) **shall** be justified. *(CAP 670)*

6.50. The monitor **should** be set up to report its true position. This allows easier co-ordination with other users. Where operational considerations make this undesirable, the monitor **should** not be visible from any other operational Cooperative Surveillance service. If this is not possible, a written agreement to the installation **shall** be obtained from the owners of the affected systems. *(CAP 670)*

6.51. The Mode A code for the Cooperative Surveillance Site Monitor **shall** be 7777 unless specific approval is granted for a different code. Equivalent discrimination **should** be replicated under a Mode S Cooperative Surveillance framework. *(CAP 670)*

6.52. When a Non-Cooperative Aerodrome Surveillance system is intended to be used for SRA, there **shall** be a particular configuration of fixed returns or markers. This use of fixed return markers does not apply to Royal Navy (RN) Afloat. Where markers/fixed returns are not practicable alternative methods of assuring the positional accuracy **shall** be provided. *(CAP 670)*

6.53. For airports with reciprocal approaches, one permanent marker on each approach path may be used. This does not apply to RN Afloat. *(CAP 670)*

6.54. The display specification **shall** be related to the operational requirement both in functional and performance terms. There **should** be one spare ATC Radar Data Processing (RDP) User display per system; available for use in the event of single RDP Display failure. *(CAP 670)*

6.55. A Code Callsign Distribution System (CCDS), or equivalent, **should** be implemented for Military systems. Any Civil Code Callsign Conversion (CCCC) interface **should** be certified using the NATS En-Route Ltd (NERL) certification procedure, to ensure the correct processing of callsign and route data. An equivalent process for Military Systems may be implemented. *(CAP 670)*

6.56. Any Aeronautical Fixed Telecommunications Network (AFTN)/EDDUS/CAPSIN/FPDS interfaces to Aerodromes and Terminal RDPs for Callsign Data **shall** be in place and in accordance with NATS and Military interfacing procedures. Military RDP Systems **should** interface to Centralised SSR Code Assignment and Management System (CCAMS). *(CAP 670)*

6.57. The following parameters **shall** be specified and justified in relation to the OR, technical specification and hazard analysis, as appropriate: *(CAP 670)*

6.57.1. All Surveillance elements **shall** be capable of handling the maximum plot loads anticipated, based on overall and sector peaks; including all targets within sensor coverage and in poor weather.

Any shedding due to exceptional overload **shall** be handled in a manner acceptable to the operation that **shall** not be on a random or unpredictable basis.

6.57.2. Identification of appropriate data input faults. This information **shall** be indicated within one surveillance periodic update interval. All data entries having a limited range of validity which can be entered on the display HMI and associated input devices **shall** be checked to prevent out of range, inappropriate or invalid entries

6.58. The RDP system **shall** not further corrupt the received data prior to presentation on the display. Measurement and vectoring aids that display range/bearing information (RBM, Compass Rose, Cursors) **should** be presented with an azimuth accuracy of +/- 0.5 degree, and a range accuracy of +/- 0.1 NM. The displayed resolution **should** be 1 degree and 0.1 NM (greater resolution is more difficult to interpret). *(CAP 670)*

6.59. The display **shall** be capable of displaying QNH and/or QFE values. *(CAP 670)*

6.60. When it is possible to change the QNH (or QFE) remotely, the equipment **shall** require the change to be drawn to the controller's attention and confirmed on all other displays. Any conversion of Flight Level to Altitude **shall** be carried out in accordance with the data provided in the ICAO document "Manual of the ICAO Standard Atmosphere" (Doc 7488/3). *(CAP 670)*

6.61. Measures **shall** be taken to minimize the presentation of 'nuisance' alerts by Safety Net systems. *(CAP 670)*

6.62. Recommendation: Where installing a Short Term Conflict Alert (STCA), Minimum Sector Altitude Warning (MSAW), and APW or APM system it **should** comply with the Relevant EUROCONTROL Specification. *(CAP 670) (Eurocontrol Spec-0122)*

6.63. Traffic monitor equipment **shall** be approved by the MAA/Release into Service process. The traffic monitor is also known as the Distance From Threshold Indicator (DFTI). *(CAP 670)*

6.64. In such cases where the ATM picture is not aligned with the view of the runway from the Visual Control Room (VCR) then the Human Factors risks that this may pose **shall** be addressed in the supporting Safety Assurance Documentation. *(CAP 670)*

6.65. The ATS provider **shall** ensure the operation of surveillance data displays is unambiguous and does not compromise the safety of the Air Traffic Service. *(CAP 670)*

6.66. For a display used for SRA, all features used in the SRA zone **shall** be accurate to within 5% of range scale +55 metres (180 ft) in range and within 1 degree measured from the airfield reference point. *(CAP 670)*

6.67. The following display Positional 2D Accuracies **shall** also be met: *(CAP 670)*

6.67.1. Slant Range Bias <100 metre

6.67.2. Azimuth Bias <0.1 degree

6.67.3. Slant Range Gain Error <1 metre/NM

6.67.4. Time Stamp Error <100 milli second

6.68. For all other features, accuracy **shall** be within 450 metres (0.25 NM). All RN Afloat display features **shall** be accurate to within 5% of range scale +55 metres (180 feet) in range and within 1 degree measured from the ship reference point. *(CAP 670)*

6.69. When producing video maps the aim is to place the feature at the position where the surveillance sensor would place a co-located target. However, as the radar calculates by range and angle, this will not account for the change in angle between grid north and magnetic north. In addition, all systems use published geographical co-ordinates to derive the feature position in range angle. Use of a different system to convert the geographical co-ordinates from that used to derive the original geographical co-ordinates will

produce an error. The procedures in Sections 4, 6 and 7 will evaluate these errors. The video maps **should** be in WGS84 format. *(CAP 670)*

6.70. The equipment **should** present the data to the controller within a period equivalent to one quarter of the periodic update rate of the Surveillance System. *(CAP 670)*

6.71. Duplicate data paths **should** be implemented if required to increase the Availability and be addressed as part of a Safety and availability assessment. *(CAP 670)*

7. Precision Approach Radar

7.1. **PAR Coverage Volume** - The final approach coverage volume for the approach system **shall** be a minimum of ±10 degree azimuth, -1 degree to +7 degree elevation, referenced to the Runway /Flight Deck centreline within a range 16 NM down to 0.5 NM, or 15 NM in Rain Conditions. *(ICAO Ax10 Vol1)*

7.2. **PAR Aircraft Velocity Range** - The Approach System **shall** be able to provide the required precision approach at relative velocities up to 250 kts with blind speeds minimized between 40 and 250 kts. *(ICAO Ax10 Vol1)*

8. Mode S

8.1. **Mode S Accuracy:** Mode S Accuracy **shall** be better than: *(EC Reg 262/2009) (ICAO Ax 10 – 11) (CAP 761)*

8.1.1. Range: 14 metre systematic + 15 metre RMS

8.1.2. Azimuth: 0.0022 degree bias + 0.068 degree RMS

8.2. **Mode S IC Codes:** *(EC Regs 262/2009) (Eurcontrol Mode S IC Allocation Process 05/09/27-01) (ICAO AX I & III) (CAP 761)*

8.2.1. SI/II Interrogation codes used for Civil-use outside the Military reserved codes **shall** be in accordance with EC Regulation 262/2009 Articles 3-7, 12, ICAO Ax I. and Ax III.

8.2.2. Mode S Interrogators **shall** not be used prior to allocation of a code by UK National IFF/SSR Committee (NISC).

8.2.3. Mode S interrogators **shall** ideally utilise SI codes and in any event coordinate the use of eligible Civil or Military Codes in areas of overlapping Mode S Cooperative Surveillance cover.

8.2.4. Mode S Mode Interlace Pattern **shall** be used.

8.2.5. II/ Supplementary Instruction (SI) Special Mode s**hall** be supported.

8.2.6. Where SI codes are not used or there is code overlap; then Clustering or Multisite lockout **shall** be applied.

8.3. **Autonomous Radar Status:** For Autonomous Radar Status to be permissible, Non-Cooperative, Cooperative Surveillance and Communication Links to neighbouring ATC Units **should** be functional according to the requirements in this Standard. *(DAP Policy Statement)*

9. Multilateration

9.1. Multi-lateration Systems used to provide co-operative surveillance **shall** define the system refresh rate Pd. *(ED-142)*

9.2. To understand the performance of a Wide Area Multilateration (WAM) system, when compared to a secondary surveillence radar system, the “update interval[1]” and “output period[2]” **shall** be defined and justified.

9.3. The “update interval” **shall** not exceed 4 seconds.

9.4. The Probability of position detection (PD) within the defined Update Interval **shall** be greater than or equal to 97**%** for any target.

10. Windfarm Specific Surveillance Requirements

10.1. An ATS Provider, ANSP, DH and DE&S **shall** be notified of a proposal to develop a Windfarm by the developer. This notification provides the opportunity to enter into consultation with the developer and provide comment, ahead of a formal planning application, on an intention to develop a Windfarm site. *(CAP 670)*

10.2. In order to ensure comprehensive notification of any intended development, ATS Providers, ANSPs, Duty Holder and DE&S **shall** arrange for the relevant Local Planning Authority (LPA) to inform and consult with them, when they receive Windfarm development proposals within a minimum radius of 20 km from the boundary of Aerodrome, Radio Site, Range or relevant Military facility. *(CAP 670)*

10.3. ATS Providers, ANSPs, Duty Holder and Defence, Equipment & Support (DE&S) **shall** also ensure that any area of particularly intense aircraft activity, e.g. an approach to a runway, is also considered by the LPA as requiring safeguarding. This will normally be outside the 'standard' 20 km range and may extend to 34 km for Instrument Landing System (ILS) approaches. It **should** be noted that such ranges could require consultation with more than one LPA. *(CAP 670)*

10.4. Windfarms **shall** be considered as a safeguarding activity. *(CAP 670)*

10.5. The ATS Provider, ANSP, DH and DE&S **shall** ensure, as far as is reasonably practicable, that such development does not affect the safety of the ATS environment. *(CAP 670)*

10.6. The ATS Provider, ANSP, DH **shall** be responsible for deciding whether it can accept any degradation to the ATS environment with MAA oversight. *(CAP 670)*

10.7. If the ATS Provider, ANSP or DH predicts that the degradation is unacceptable then it **should** make representations to the appropriate Local Authority, with MAA oversight. *(CAP 670)*

10.8. The ATS Provider, ANSP or DH, after consultation with the developer, is responsible for mitigating against any deterioration to ATS caused by Windfarms. The MAA may request to examine any mitigation measures taken and may vary approvals for ATS where the deterioration caused by a Windfarm has an adverse effect on the continued safe operation of that service. *(CAP 670)*

10.9. ATS Providers and DH are reminded that information regarding the technical safeguarding of aeronautical radio stations at their aerodromes, including examples of the minimum dimensions for those areas which must be safeguarded, is contained in Part 9 of this Def Stan and in JSP 604. *(CAP 670)*

10.10. When examining the effects of wind turbines on an ATC Surveillance system, particular attention **should** paid to the following: *(CAP 764)*

10.10.1. Standard Instrument Departure (SID) Routes;

10.10.2. STAR Routes;

10.10.3. Airways;

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[1] The term ‘Update Interval’ is used to define the time interval over which the performance of the WAM system is measured.

[2] The term ‘Output Period’ is used to define the selectable period that the WAM system uses to output target reports periodically.

10.10.4. Royal Navy Area Navigation (RNAV) and P-RNAV Routes;

10.10.5. Sector Entry and Exit points;

10.10.6. Holding points (including the holding areas);

10.10.7. Missed Approach Routes;

10.10.8. Radar Vectoring Areas;

10.10.9. Final Approach Tracks;

10.10.10. Visual Reporting Points;

10.10.11. Published IFP for the aerodrome;

10.10.12. Future Airspace and Operational requirements where the airport growth is anticipated

10.11. ATC Service providers **should** also take the following into account, when considering impact on: *(CAP 764)*

10.11.1. Type of ATC Surveillance Service

10.11.2. Airspace Classification

10.11.3. Relationship between Windfarm and traffic patterns

10.11.4. Proximity of Windfarm to areas of turn maneuvers

10.11.5. Traffic Density

10.11.6. Proximity to other Windfarm clutter (Cumulative effect)

10.11.7. Proximity of Windfarm clutter to regular aviation activity

10.11.8. Aircraft characteristics in the area

10.11.9. Surveillance system performance

10.11.10. Air Traffic Service Unit (ATSU) complexity and workload

10.12. The defined areas with higher levels of aerial activity **should** be addressed on a site-by-site basis. A Windfarm contained within these Areas **should** not impinge on the Functional or Safety Performance of the ATM system. *(CAP 764)*

10.13. If a Windfarm is located in an area with higher levels of aerial activity, then the Surveillance System Performance in the Windfarm area **shall** meet the existing Surveillance System performance as noted above. *(CAP 764) (CAP670)*

10.14. If a Windfarm is not located in an area with higher levels of aerial activity, Operational mitigations may be applied with reduced Surveillance System Performance in that area. *(CAP 764) (CAP670)*

10.15. Functionality **shall** be included to indicate to ATC when the windfarm mitigation system is lost.

10.16. Operational Procedures for using the local radar when the windfarm mitigation system is not present are required.

10.17. ATC User Training **shall** include information about the effects of the Windfarm mitigation system on the displayed position of aircraft.

10.18. Boundaries of the mitigation system areas **shall** be indicated on ATC User displays. Formal consideration of this boundary **shall** be conducted prior to operational use.

10.19. Analyses of the effects of separation and positional accuracy **shall** be made above the area of the Windfarm being mitigated to establish that the required separation or SRA can be performed.

10.20. For surveillance systems, ANSPs must identify all effects (e.g. display effects/processing system effects etc) caused by wind turbines within the line of sight of the radar. Discussion and guidance on assessment of impacts caused by wind turbines on radars from existing wind turbines and planned wind turbine installations can be found in Civil Aviation Publication (CAP) 764 Appendix 2 “Radar Assessment Methodology”. *(CAP670)*

10.21. ANSPs must consider the possibility that their ATC radars be affected by each of these phenomena (as a minimum) because of wind turbines within the coverage range of their surveillance systems. *(CAP670)*

10.21.1. Twinkling Appearance/Blade Flash Effect

10.21.2. Masking of True Targets by Increased Clutter on Display

10.21.3. Increase in False Targets or False Aircraft Tracks

10.21.4. Receiver Saturation

10.21.5. Receiver De-sensitisation causing Loss of Targets with Small RCS

10.21.6. Loss of Targets due to Adaptive Moving Target Detection (AMTD) Techniques

10.21.7. Shadowing behind the Turbines caused by Physical Obstruction

10.21.8. Degradation of Tracking Capabilities

10.21.9. Degradation of Target Processing Capability

10.21.10. Effects on Secondary Surveillance Radar

10.22. Where feeds from radars (PSR or Secondary Surveillance Radar (SSR)) located at separate locations are combined (fused), the methodology for slant range correction and azimuth accuracy of the combined positional data **shall** be justified. *(CAP670)*

10.23. The methodology for the integration of positional information from different sources to obtain the positional information of the combined position in the format desired **shall** be clearly defined. *(CAP670)*

10.24. The methods used to integrate positional information from multiple surveillance sources may introduce features that may affect the accuracy and the ability to apply a certain separation standard. *(CAP670)*

10.25. The local or remote surveillance data feed **shall** provide complete and uncorrupted data such that the safety of the Air Traffic Service utilising it is not compromised.

11. Surveillance Static Deployed Safety Requirements

11.1. The Surveillance System utilised on operations, **should** maintain the same Safety Performance as noted above. Any limitations **shall** be assessed by the DH, Release Authority and the Operating Authority according to MAA Guidelines. *(Def Stan 00-972 Part 1)*

11.2. Mode S Codes **should** be easily adjustable on deployable Mode S Interrogators; using rapid notification of code usage where necessary. *(EU Regulation 262/2009)*

11.3. Any limitations in Surveillance System Performance during Operational and High Energy Training Manoeuvres **shall** be assessed by the DH, Release Authority and the Operating Authority according to MAA Guidelines.

11.4. SSR / IFF Operations in Military Modes **shall** be facilitated in Tactical Equipment on Operations. *(STANAG 4193)*

12. RAF Surveillance Specific Requirements

12.1. Air Defence Surveillance systems used in support of Military Terminal ATS **should** meet the Safety and Performance criteria noted in paragraph 8.

13. RN Surveillance Specific Requirements

13.1. RN Surveillance systems **should** allow for the use of Seawatch data, or an equivalent, where required.

13.2. Antenna Stabilisation mechanisms used afloat **should** be included in calculations for Surveillance System Safety Reliability.

13.3. Mode S Codes **shall** be easily adjustable on RN Mode S Interrogators Afloat; using rapid notification of code usage where necessary. Interrogator code conflicts **shall** be monitored and avoided by the Ship systems or procedures. *(EU Regulation 262/2009)*

13.4. RN Navigational Radars used for rotary traffic only by AC and North Atlantic Treaty Order (NATO) Control Grade Operators; may extrapolate a track for a number of sequential lost plots or returns. Coasted/Extrapolated Tracks **shall** indicate they are coasted and/or not display Mode C. ATC procedures **shall** ensure a Broadcast Service is only offered against extrapolated tracks/plots of over 2 instances. *(BRd0768)*

13.5. For Rotary Traffic Only, mean track initiation delay **shall** be less than 10 scans with a standard deviation of 1 scan and **shall** only be used for Broadcast Service. *(BRd0761)*

13.6. Where Ship Navigation Surveillance systems are used for ATS, the system **shall** be subject to assessment against the Safety and Performance criteria in paragraph 8 of this Defence Standard.

13.7. Stabilise systems (antenna or beam) in use, **shall** be included in calculations for System Safety Reliability.

13.8. Where Autonomous Radar Status is required, then Communications to neighbouring ATC units **should** be established to the same Safety Performance as noted in Generic Communications Safety Performance.

13.9. LRR Coverage between 100 and 130nm from Carrier **should** meet Probability of Detection of no less than 90% for a 3 metre^2 target[3].

13.10. Alarm/Status Monitoring to ATC of Surveillance Systems Afloat **should** include Jamming Map information.

13.11. Where Ship Inertial Navigation System (INS) Systems affects Surveillance System mapping Accuracy (Afloat) at higher/lower latitudes, the limitations **shall** be defined in System and Operational procedures.

13.12. Where Legacy Ship Navigation Surveillance Systems are in use for RN ATC, performance of the Ship Surveillance system **shall** be recorded against the parameters noted above. In areas where Safety Performance is not in line with the above, mitigated reasoning for continued usage **shall** be applied in lieu. *(BRd0768)*

[3] Swerling Case 1

13.13. Track Initiation and Coasting may be maintained outwith the requirements above, with appropriate Safety assessment. *(BRd0766)*

13.14. If SRA's are performed to RN Afloat facilities positional accuracy **shall** be assured in leiu of Surveillance markers.

14. Contracted Airfields and Weapons Range Surveillance Requirements

14.1. Air Weapons Range / Danger Area Surveillance Systems in use **shall** meet at least the performance noted in this document when utilised for Air Traffic Services.

14.2. Air Weapons Range / Danger Area Surveillance systems procured by different agencies, **shall** retain end-to-end Safety and Performance as noted in this document with commensurate end-to-end Safety Cases.

14.3. Use of Surveillance Systems with an Air Safety component, may be assessed in accordance with this document. Where this document does not cover the specific nature of the Range Air Surveillance Systems, then these Systems **shall** be assessed as part of an end-to-end System Safety Case with resultant Assurance against defined Safety Requirements.

14.4. If Air Defence Surveillance systems are used in support of Air Safety, related Range Operations **should** meet the Safety and Performance criteria noted in section 10 above, or assessed as part of an end-to-end System Safety Case with resultant Assurance against defined Safety Requirements.

14.5. Legacy Range Air Control and Tracking equipment used in support of Range Air Control Activities are not specifically considered within Section 10 or this document. However, these Systems **shall** be assessed as part of an end-to-end System Safety Case with Assurance against Safety Requirements.

15. Surveillance Statutory and Regulatory Requirements

15.1. All equipment provided **shall** be certified as meeting EMC requirements. This may be derogated per-equipment under Article 296. This derogation **shall** only apply to equipment for Arms, Munitions or War Materiel and **should** not be possible for Dual-Use equipment with a civil component. *(EMC Directive 2004/108/EC) (JSP604)*

15.2. Surveillance Systems **should** demonstrate equivalence with Commission Implementing Regulation (EU) No 1207/201 and Eurocontrol Spec-0147, where there is a Civil ATS component. *(JSP 604)*

15.3. Approval of the NISC **shall** be obtained for any Cooperative Surveillance system. *(EU Reg 262/2009) (Eurocontrol Mode S IC Allocation Process 05/09/27-01) (JSP604)*

Annex A
Normative References

These Annex specific References are in addition to those noted in Part 0 of this Defence Standard

Publication	Title
BRd0761	Naval Aircraft Movements and Marshalling
BRd0766	RN Embarked Aviation Operating Handbook
BRd0768	RN Air Traffic Management and Assurance
CAP 670	ATS Safety Requirements
CAP 761	Operation of IFF/SSR Interrogators in the UK
CAP764	CAA Policy and Guidelines on Wind Turbines
DAP Policy Statement	DAP Policy Statement
Draft Eurocontrol Surveillance System Performance Specification	Draft Eurocontrol Surveillance System Performance Specification
EC Regulation 262/2009	Coordinated Allocation And Use Of Mode S Interrogator Codes For The Single European Sky
ED-142	Technical Specifications For WAM Systems
EMC Directive 2004/108/EC	Electromagnetic Compatibility
EU No 1207/201	Performance And The Interoperability Of Surveillance For The Single European Sky
Eurocontrol Spec-0147	EUROCONTROL Specification for ATM Surveillance System Performance
Eurocontrol Specification 0122	Eurocontrol specification for short term conflict alert
Eurocontrol SUR.ET1.ST01.1000-STD-01-01	Eurocontrol Specification for Interoperability and Performance Requirements for the Flight Message Transfer Protocol (FMTP)
ICAO Annex 1	Medical assessment process and ATOs
ICAO Annex 3	Meteorological Services for International Air Navigation
ICAO Annex 10	Aeronautical Telecommunications
ICAO Doc 4444	Procedures for Air Navigation Services
ICAO Doc 7488	Manual of the ICAO Standard Atmosphere
ICAO Doc 9426	Air Traffic Services Planning Manual
JSP 604	Defence Manual for Information and Communication Technologies (ICT)
STANAG 4193	Technical Characteristics of IFF Mk XA and Mk XII Interrogators and Transponders

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Contract Requirements

When Defence Standards are incorporated into contracts users are responsible for their correct application and for complying with contractual and statutory requirements. Compliance with a Defence Standard does not in itself confer immunity from legal obligations.

Revision of Defence Standards

Defence Standards are revised as necessary by an up issue or amendment. It is important that users of Defence Standards **should** ascertain that they are in possession of the latest issue or amendment. Information on all Defence Standards can be found on the DStan Website www.dstan.mod.uk, updated weekly and supplemented regularly by Standards in Defence News (SID News). Any person who, when making use of a Defence Standard encounters an inaccuracy or ambiguity is requested to notify UK Defence Standardization (DStan) without delay in order that the matter may be investigated and appropriate action taken. Sponsors and authors **shall** refer to Def Stan 00-00 before proceeding with any standards work.

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DEF STAN 00-972 Part 4 Issue 5

Defence Standard:-

Date: 31 Jul 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 4: Navigation

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a. This standard has been revised to Issue 5 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 4 Issue 4 Amendment 1 dated 26 July 2013

Def Stan 00-972 Part 4 Issue 4 dated 24 May 2013

Def Stan 00-972 Part 4 Issue 3 dated 21 May 2012

INTERIM Def Stan 00-972 Part 4 Issue 2 dated 26 August 2011

INTERIM Def Stan 00-972 Part 4 Issue 1 dated 12 August 2010

b. This Defence Standard (Def Stan) provides requirements for System Safety and Functional Performance of Military Air Traffic Management (ATM) Systems, ashore, airborne and afloat.

c. This Part of the Def Stan has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the Ministry Of Defence (MOD) Service Departments, and the Aerospace, Defence and Security Industries (A|D|S).

d. This standard **should** be used in all future designs, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises which prevents application of the Def Stan, DStan and the MAA **shall** be informed so that a remedy may be sought.

e. Please address any enquiries regarding this standard, whether in relation to an Invitation To Tender (ITT) or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the ITT or contract.

f. Compliance with this Def Stan **shall** not in itself relieve any person from any legal obligations imposed upon them.

g. This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Military Air Traffic Management Equipment Safety and Performance Standards

Part 4: Navigation

1. Scope and Organisational Background

1.1. Prior to using any part of this Def Stan, Part 0 **should** be read which contains Procedures for use, content and definitions. This Part 4 provides System Safety and Functional Performance requirements for Navigation systems used for Military Air Traffic Services (ATS) ashore, airborne and afloat and including ATS elements of MOD Contractor Airfield and Range Air Control systems. Refer to Part 1 for information on Regulatory Frameworks for all subsequent Parts.

2. Warning

2.1. The MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

3. Normative References

3.1. Generic normative references are in Part 0. The references shown in **Annex A** are specific to this part.

3.2. Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting **http://dstan.uwh.diif.r.mil.uk** for those with Dii access or **https://www.dstan.mod.uk** for all other users. All referenced standards were correct at the time of publication of this standard (see below for further guidance); if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

3.3. Reference in this Standard to any normative references means in any ITT or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated. Care **should** be taken when referring out to specific portions of other standards to ensure that they remain easily identifiable where subsequent amendments and supersession's might be made. For some standards the most recent editions **shall** always apply due to safety and regulatory requirements.

3.4. In consideration of paragraph 3.3 above, users **shall** be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an ITT or contract. Correct application of standards is as defined in the ITT or contract.

3.5. DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Def Stans.

3.6. All normative references **shall** be complied with in addition to the requirements stated within this Def Stan.

3.7. Any reference to a governing body (e.g. CAA) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. Navigation Safety Integrity Requirements

5.1. The following System Safety Integrity Requirements are guidance on comparable Minima found in Civil Air Traffic Control (ATC). These may be followed where appropriate. Where they are not followed, a process deriving specific Safety Reliability Requirements on similar failure modes **shall** be conducted by Suitably Qualified and Experienced Personnel (SQEP), using User Requirements, Hazard Identification (HAZID) and Event / Fault Tree Analysis (FTA), resulting in a Minimum Specific Failure Rate (λ) per Operational Hour.

5.2. The use of Failure Modes and Effects Analysis (FMEA) and Event/Fault Tree Analyses (FTA) to derive Safety Requirements are industry practice and are discussed in Project Oriented Safety Management System (POSMS) and Military Regulatory Publications (MRP). The Risk Classification Schema and definitions used are shown in Part 1, paragraph 9.

5.3. The probability of total loss of Military Instrument Landing System (ILS) (including Localiser-only) for ATC use **shall** be no greater than FREQUENT.

5.4. The probability of total loss of Military ILS (including Localiser-only) for flight interpreted use for over 15s **shall** be no greater than REMOTE.

5.5. The probability of total loss of the Glidepath for a Military ILS for ATC use **shall** be no greater than FREQUENT.

5.6. The probability of total loss of the Glidepath for a Military ILS for flight interpreted use for over 15 seconds use **shall** be no greater than REMOTE.

5.7. The probability of credible corruption of the Localiser for a Military ILS for ATC use **shall** be no greater than PROBABLE.

5.8. The probability of credible corruption of the Localiser for a Military ILS for flight interpreted use for any one landing **shall** be no greater than IMPROBABLE.

5.9. The probability of credible corruption of the Glidepath for a Military ILS for ATC use **shall** be no greater than PROBABLE.

5.10. The probability of credible corruption of the Glidepath for a Military Cat1 ILS for flight interpreted use for any one landing **shall** be no greater than IMPROBABLE.

5.11. The probability of credible corruption of ILS-related Runway status for a Military ILS for ATC use **shall** be no greater than PROBABLE.

5.12. The probability of total loss of Distance Measuring Equipment (DME) when used for an ILS approach **shall** be no greater than PROBABLE.

5.13. The probability of credible corruption of DME Information when used for an ILS approach **shall** be no greater than OCCASIONAL.

5.14. The probability of total loss of Instrumented Runway Visual Range (IRVR) for ATC use has no identified Safety Integrity requirement.

5.15. The probability of total loss of IRVR for ATC use from one sensor site for a period of over 2 minutes has no identified Safety Integrity requirement.

5.16. The probability of total loss of IRVR Information from all sensor sites for ATC use has no identified Safety Integrity requirement.

5.17. The probability of loss of a single IRVR display where other displays remain available has no identified Safety Integrity requirement.

5.18. The probability of loss of all IRVR displays **shall** be no greater than FREQUENT.

5.19. The probability of credible corruption of IRVR Information **shall** be no greater than FREQUENT.

5.20. The probability of total loss of DME **shall** be no greater than PROBABLE.

5.21. The probability of credible corruption of DME Information **shall** be no greater than OCCASIONAL.

5.22. The probability of credible corruption or failure of DME Ident Information **shall** be no greater than FREQUENT.

5.23. The probability of total loss of Tactical Area Navigation System (TACAN) when used for an ILS approach **shall** be no greater than PROBABLE.

5.24. The probability of credible corruption of TACAN Information **shall** be no greater than OCCASIONAL.

5.25. The probability of total loss of DF **shall** be no greater than OCCASIONAL.

5.26. The probability of total loss of VHF Omni-directional Range (VOR) **shall** be no greater than PROBABLE.

5.27. The probability of total loss of Non-Directional Beacon (NDB) **shall** be no greater than FREQUENT.

6. Navigation Functional and Performance Safety Requirements

6.1. An operationally available ILS/TACAN/DME/NDB/VOR **shall** radiate an identity code permitting it and its operational status to be positively identified. *(CAP 670)*

6.2. An ILS with no associated TACAN DME **shall** always key 4/4, i.e. the Morse code **shall** be repeated at regular intervals, not less than 6 times per minute. *(CAP 670)*

6.3. Evidence of the required routine measurements by the Cat II ILS Noise Monitor **shall** be available when requested by the MAA, Duty Holder (DH) and ATM DH facing organizations. *(CAP 670)*

6.4. When measurements of the Cat II ILS Noise Monitor show that the interference level exceeds limits, the SATCO, DH, MAA, ATM Release Authority and ATM DH facing organizations must be advised immediately. *(CAP 670)*

6.5. ILS is classified as Category I, Category II or Category III, in ascending order of accuracy, integrity and reliability. *(CAP 670)*

6.6. Full definitions of these categories may be found in International Civil Aviation Organisation (ICAO) Annex 10, Volume 1, Chapter 3.1.1. *(CAP 670)*

6.7. Any monitors on which the integrity assessment is based **shall** correlate with changes in the far field. This correlation **shall** be demonstrated for each new design of ILS transmitter, antenna or monitor system installed Worldwide. *(CAP 670)*

6.8. Due to the differences found at some Military Aerodromes, there may be some ILS restrictions in place in respect of Civil ILS Categorisations that are acceptable for Military ILS. *(CAP 670)*

6.9. Where Military ILS Systems offer a service primarily to Civil Aircraft, with Civilian Passengers and/or crew, the Military ILS systems **shall** comply with provisions in ICAO Annex 10 and Civil Aviation Publication (CAP) 670. *(CAP 670)*

6.10. For Military ILS systems, Localiser alignment measurements on centreline and as close to threshold as practicable **shall** be taken at monthly intervals or as agreed by MAA and the ATM Release Authority in advance on all transmitters. *(CAP 670)*

6.11. All Military Aerodromes wishing to use the ground measurements of displacement sensitivity instead of flight inspection as standard, **shall** submit the following information to the MAA and ATM Release Authority *(CAP 670)*:

6.11.1. Position of the ground measurement points; and

6.11.2. Details of the equipment to be used for this measurement.

6.12. The Military Aerodrome ILS maintenance instructions **shall** show the method of calculating the width angle from the ground measurements. *(CAP 670)*

6.13. In the event of an accident or incident a DH and ATM DH facing organisations **should** do all that is reasonable to ascertain that the ILS is operating correctly. For this reason all Military aerodromes **shall** have equipment suitable for making field measurements available within 12 hours. *(CAP 670)*

6.14. The systems are installed and maintained to acceptable standards (e.g. Military JSP604 and manufacturer's installation and commissioning specifications). *(CAP 670)*

6.15. The location of IRVR sensors **shall** be agreed by the MAA and/or ATM Release Authority. *(CAP 670)*

6.16. TACAN beacon systems **shall** comply with STANAG 5034 and MIL-STD-291C. *(CAP 670)*

6.17. The VOR Designated Operational Coverage (DOC) will be determined as part of a standard flight check during the commissioning of the VOR and TACAN. *(CAP 670)*

6.18. With the exception of Automatic Terminal Information Service (ATIS), no other voice communication channel **shall** be transmitted via the VOR or TACAN system. *(CAP 670)*

6.19. VOR and TACAN Standby power supplies **shall** be provided commensurate with the service being supported. *(CAP 670)*

6.20. VOR and TACAN Flight inspection **shall** be carried out in accordance with the requirements in CAP 670. *(CAP 670)*

6.21. The equipment **shall** operate only on the frequencies assigned by the Civil Aviation Authority (CAA), or local equivalent for UK jurisdiction systems and the JSA for deployed systems.facing organisation and as appears in the schedule to the radio licence issued under the Wireless Telegraphy Act. *(CAP 670)*

7. Navigation Static Deployed Safety Requirements

7.1. The Navigation systems performance **shall** maintain at least the same Safety Performance as noted above where possible.

8. RN Navigation Specific Requirements

8.1. Stabilise systems (antenna or beam) in use, **shall** be included in calculations for System Safety Reliability.

8.2. Where Ship Inertial Navigation System (INS) impacts Navigation Accuracy at higher/lower latitudes, the limitations **shall** be defined in System and Operational procedures.

9. Contracted Airfields and Weapons Range Navigation Requirements

9.1. Where Government Airfields or Weapons Ranges are contracted in ATM service provision, they **shall** meet at least the requirements in this document.

10. Navigation Statutory and Regulatory Requirements

10.1. The ILS **should** comply with appropriate regulatory requirements and recommendations defined in ICAO Annex 10.

10.2. The IRVR **shall** comply with the provisions within ICAO Annex 3.

Annex A

Normative References

These Annex specific References are in addition to those noted in Part 0 of this Defence Standard

Publication	Title
CAP 670	ATS Safety Requirements
ICAO Annex 3	Meteorological Services for International Air Navigation
ICAO Annex 10	Aeronautical Telecommunications
MAA 02	MAA Master Glossary
MRP and Associated Manuals	Military Regulatory Publications
POSMS	Project Oriented Safety Management System
STANAG 5034	NATO STANAG for TACAN

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Contract Requirements

When Defence Standards are incorporated into contracts users are responsible for their correct application and for complying with contractual and statutory requirements. Compliance with a Defence Standard does not in itself confer immunity from legal obligations.

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MOD

DEF STAN 00-972 Part 5 Issue 5

Defence Standard:-

Date: 31 Jul 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 5: Satellites

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a. This standard has been revised to Issue 5 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 5 Issue 4 dated 24 May 2013

Def Stan 00-972 Part 5 Issue 3 dated 21 May 2012

INTERIM Def Stan 00-972 Part 5 Issue 2 dated 02 September 2011

INTERIM Def Stan 00-972 Part 5 Issue 1 dated 12 August 2010

b. This Defence Standard (Def Stan) provides requirements for System Safety and Functional Performance of Military Air Traffic Management (ATM) Systems, ashore, airborne and afloat.

c. This Part of the Def Stan has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the Ministry Of Defence (MOD) Service Departments, and the Aerospace, Defence and Security Industries (A|D|S).

d. This standard **should** be used in all future designs, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises which prevents application of the Def Stan, DStan and the MAA **shall** be informed so that a remedy may be sought.

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f. Compliance with this Def Stan **shall** not in itself relieve any person from any legal obligations imposed upon them.

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Military Air Traffic Management Equipment Safety and Performance Standards

Part 5: Satellites

1. Scope and Organisational Background

1.1. Prior to using any part of this Def Stan, Part 0 **should** be read which contains Procedures for use, content and definitions. This part 5 provides System Safety and Functional Performance requirements for Satellite systems used for Military Air Traffic Services (ATS) ashore, airborne and afloat and including ATS elements of MOD Contractor Airfield and Range Air Control systems. Refer to Part 1 for information on Regulatory Frameworks for all subsequent Parts.

2. Warning

2.1. The MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

3. Normative References

3.1. Generic normative references are in Part 0. The references shown in **Annex A** are specific to this part.

3.2. Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting **http://dstan.uwh.diif.r.mil.uk** for those with Dii access or **https://www.dstan.mod.uk** for all other users. All referenced standards were correct at the time of publication of this standard (see below for further guidance); if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

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3.7. Any reference to a governing body (e.g. CAA) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. Satellite Safety Integrity Requirements

5.1. The following System Safety Reliability Requirements are guidance on comparable Minima found in Civil Air Traffic Control (ATC). These **should** be followed where appropriate. Where they are not followed, a process deriving specific Safety Reliability Requirements on similar failure modes **shall** be conducted by Suitably Qualified and Experienced Personnel (SQEP), using User Requirements, Hazard Identification (HAZID) and Event / Fault Tree Analysis (FTA), resulting in a Minimum Specific Failure Rate (λ) per Operational Hour.

5.2. The use of Failure Modes and Effects Analysis (FMEA) and Event/ FTA to derive Safety Requirements are industry practice and are discussed in Project Oriented Safety Management System (POSMS) and Military Regulatory Publications (MRP). The Risk Classification Schema and definitions used are shown in Part 1, paragraph 9.

5.3. The probability of total loss of function of a Cat I Satellite Precision Approach (with Ground-based Augmentation) for flight interpreted use for over 15 seconds **shall** be no greater than REMOTE.

5.4. The probability of credible corruption of Signal-In-Space Integrity for a Cat I Precision Approach (with Ground-based Augmentation) for flight interpreted use in any 15 second period **shall** be no greater than IMPROBABLE.

5.5. The probability of total loss of function of a Military APV-I or Cat I Satellite Precision Approach (with Space-based Augmentation) for flight interpreted use for over 15 seconds **should** be no greater than REMOTE.

5.6. The probability of credible corruption of Signal-In-Space Integrity for a Military Approach with Vertical Guidance (APV) I or Cat I Precision Approach (with Space-based Augmentation) for flight interpreted use in any 15s period **should** be no greater than IMPROBABLE.

6. Satellite Functional and Performance Safety Requirements

6.1. Ground Augmented Satellite Systems used for Military ATS **should** meet criteria laid down in European Organisation for Civil Aviation Equipment (EUROCAE) ED-144. *(ED-144)*

6.2. The position information provided by the GNSS to the user **shall** be expressed in terms of WGS84, converted if necessary from Global Navigation Satellite System (GNSS) Ephemeris data. *(ICAO Ax10)*

6.3. Time information presented to the user **shall** be expressed as or in reference to; Universal Time Co-ordinated (UTC). *(ICAO Ax10)*

6.4. Positional Accuracy of a Satellite System, without Augmentation, used for Navigation or Surveillance purposes **shall** be better than 13 metres horizontally and 22m vertically. *(ICAO Ax10)*

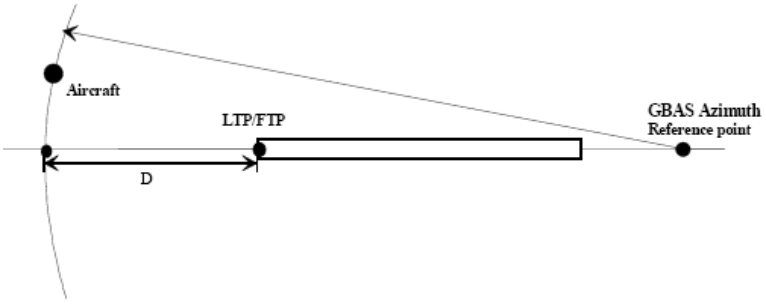
6.5. **GBAS System Lateral Accuracy – Cat I** *(ED-144)*

6.5.1. From 291-873 metres from Threshold, 95% probability of accuracy of a constant 16 metres.

6.5.2. From 7500 metres to 873 metres from Threshold, 95% probability of accuracy linearly varying from 16 metres to 27.7 metres.

6.5.3. Over 7500 metres from Threshold, 95% probability of accuracy of a constant 27.2 metres.

Figure 1. GBAS System Lateral Accuracy



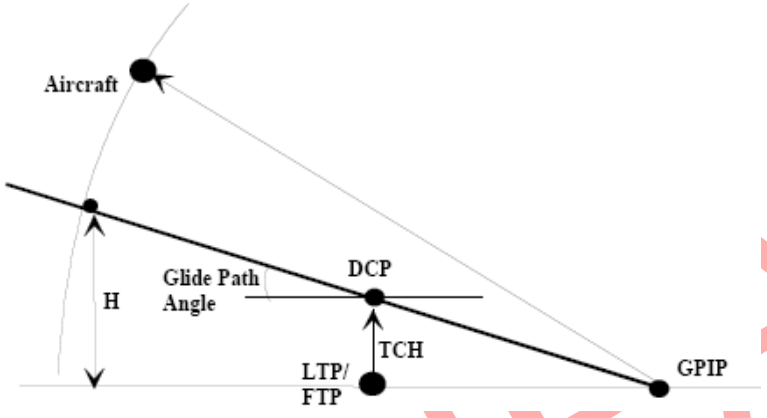
6.6. **GBAS System Vertical Accuracy – Cat I (200ft Decision Height)** *(ED-144)*

6.6.1. From 100-200 ft Height above Threshold, 95% probability of accuracy of a constant 4 metres.

6.6.2. From 200 ft to 1340 ft from Threshold, 95% probability of accuracy linearly varying from 4 metres to 17.3 metres.

6.6.3. Over 1340 ft from Threshold, 95% probability of accuracy of 27.2 metres.

Figure 2. GBAS System Vertical Accuracy



6.7. **GBAS Lateral Alert Limits – Cat I** *(ED-144)*

6.7.1. From 291-873 metres from Threshold, 95% probability of accuracy of 40 metres.

6.7.2. From 7500 metres to 873 metres from Threshold, 95% probability of accuracy linearly varying from 40 metres to 69.15 metres.

6.7.3. Over 7500 metres from Threshold, 95% probability of accuracy of 69.15 metres.

6.8. **GBAS Vertical Alert Limits – Cat I** *(ED-144)*

6.8.1. From 100-200 ft Height above Threshold, 95% probability of accuracy of a constant 10 metres.

6.8.2. From 200 ft to 1340 ft from Threshold, 95% probability of accuracy linearly varying from 10 metres to 43.35 metres.

6.8.3. Over 1340 ft from Threshold, 95% probability of accuracy of 43.35 metres.

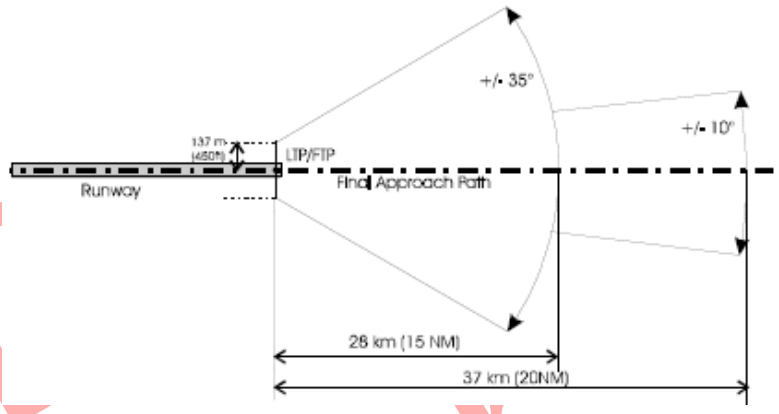
6.9. **GBAS Time-to-Alert Limits – Cat I** *(ED-144)*

6.10. The GBAS System **shall** Alert ATC within 3.5 seconds of a system Alert Condition, coincident with the Aircraft Alert.

6.11. **GBAS Lateral Service Volume** *(ED-144)*

6.12. From 137 metres (450 ft) each side of the runway datum point and projecting out ±35 degrees either side of the final approach path to 28 km (15 NM) and ±10 degrees either side of the final approach path to 37 km (20 NM).

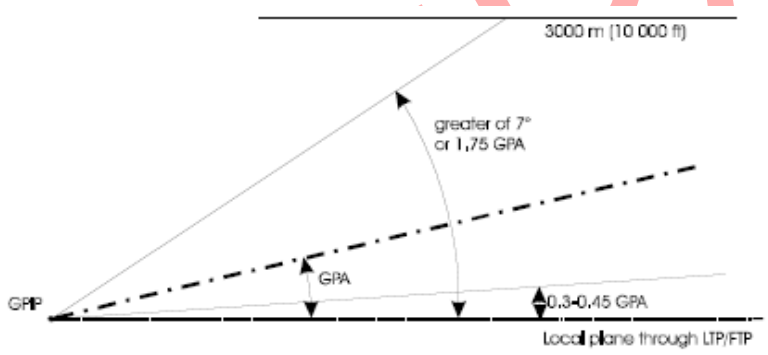
Figure 3. GBAS Lateral Service Volume



6.13. **GBAS Vertical Service Volume** *(ED-144)*

6.14. Within the lateral region, up to the greater of 7 degrees or 1.75 times the promulgated glide path angle (GPA) above the horizontal with an origin at the Glide Path Intercept Point (GPIP) and 0.45 GPA above the horizontal or to such lower angle, down 0.30 GPA, as required to safeguard the promulgated glide path intercept procedure. This coverage applies between 30 metres (100 ft) and 3000 metres (10 000 ft) Height Above Threshold (HAT).

Figure 4. GBAS Vertical Service Volume



6.15. **SBAS System Vertical Accuracy (APV)** An SBAS System Vertical Accuracy **shall** be less than 4 metres, to a 95% confidence level. *(EGNOS SoL SDD)*

6.16. **SBAS System Horizontal Accuracy (APV)** An SBAS System Vertical Accuracy **shall** be less than 3 metres, to a 95% confidence level. *(EGNOS SoL SDD)*

6.17. **SBAS Time To Alert (TTA)** The maximum allowable time elapsed between the SBAS system Accuracy being out of tolerance to the user equipment enunciating the alert **shall** be less than 10 seconds. *(EGNOS SoL SDD) (ICAO)*

6.18. An SBAS receiver used for Military ATS **should** be capable of supporting at least Localiser Performance with Vertical Guidance (LPV) and APV. *(EGNOS SoL SDD)*

6.19. Where GBAS or SBAS Precision Approaches are utilized to a Military Aerodrome, Signal-In-Space Integrity Monitoring **shall** be in place, with information made directly available to ATC.

7. Satellite Static Deployed Safety Requirements

7.1. Satellite Systems used for Static Deployed Military ATS **should** maintain at least the same Safety Performance as noted above.

7.2. Where Deployed location impacts Satellite or Augmentation System Accuracy at higher/lower latitudes, or other locations; the limitations **shall** be defined in System and Operational procedures.

8. RN Satellite Specific Requirements

8.1. Satellite Systems used for Naval Afloat Military ATS **should** maintain at least the same Safety Performance as noted above.

8.2. Where Ship location impacts Satellite or Augmentation System Accuracy at higher/lower latitudes, or other locations; the limitations **shall** be defined in System and Operational procedures.

9. Satellite Statutory and Regulatory Requirements

9.1. Satellite Systems used for Military ATS **shall** be in accordance with International Civil Aviation Organisation (ICAO) Annex 10 Volume 1. *(ICAO Annex 10)*

9.2. Satellite Systems used for Military ATS **shall** be in accordance with ICAO Doc 9849 GNSS Manual. *(ICAO Doc 9849)*

9.3. Satellite Systems Communications used for Military ATS **shall** be assessed in accordance with ICAO Doc 9869 RNP. *(ICAO Doc 9869)*

9.4. Satellite System Datalinks used for Military ATS **should** be assessed in accordance with ICAO Doc 9694 ATS Datalinks. *(ICAO Doc 9694)*

9.5. Satellite System Navigation Positioning used for Military ATS **should** be assessed in accordance with ICAO Doc 9613 PBN. *(ICAO Doc 9613)*.

Annex A
Normative References

These Annex specific References are in addition to those noted in Part 0 of this Defence Standard

Publication	Title
EGNOS SoL SDD	EGNOS Safety of Life, Service Definition Document
ED 144	High-Level Performance Requirements for a global Navigation Satellite System/Ground Based Augmentation System to support Precision Approach Operations
ICAO Annex 10	Aeronautical Telecommunications
ICAO Doc 9613	ICAO Performance Based Navigation
ICAO Doc 9694	ICAO ATS Datalinks
ICAO Doc 9849	ICAO GNSS Manual
ICAO Doc 9869	ICAO Required Comms Performance
MAA 02	MAA Master Glossary

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DEF STAN 00-972 Part 6 Issue 5

Defence Standard:-

Date: 31 Jul 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 6: Meteorological Systems

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REVISION NOTE

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INTERIM Def Stan 00-972 Part 6 Issue 2 dated 16 September 2011

INTERIM Def Stan 00-972 Part 6 Issue 1 dated 12 August 2010

b. This Defence Standard (Def Stan) provides requirements for System Safety and Functional Performance of Military Air Traffic Management (ATM) Systems, ashore, airborne and afloat.

c. This Part of the Def Stan has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the Ministry Of Defence (MOD) Service Departments, and the Aerospace, Defence and Security Industries (A|D|S).

d. This standard **should** be used in all future designs, upgrades, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises, which prevents application of the Def Stan, DStan and the MAA **shall** be informed so that a remedy may be sought.

e. Please address any enquiries regarding this standard, whether in relation to an Invitation To Tender (ITT) or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the ITT or contract.

f. Compliance with this Def Stan **shall** not in itself relieve any person from any legal obligations imposed upon them.

g. This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Military Air Traffic Management Equipment Safety and Performance Standards

Part 6: Meteorological Systems

1. Scope and Organisational Background

1.1. Prior to using any part of this Def Stan, Part 0 **should** be read which contains Procedures for use, content and definitions. This Part 6 provides System Safety and Functional Performance requirements for Meteorological systems used for Military Air Traffic Services (ATS) ashore, airborne and afloat and including ATS elements of MOD Contractor Airfield and Range Air Control systems. Refer to Part 1 for information on Regulatory Frameworks for all subsequent Parts.

2. Warning

2.1. The MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

3. Normative References

3.1. Generic normative references are in Part 0. The references shown in **Annex A** are specific to this part.

3.2. Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting **http://dstan.uwh.diif.r.mil.uk** for those with Dii access or **https://www.dstan.mod.uk** for all other users. All referenced standards were correct at the time of publication of this standard (see below for further guidance); if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

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3.4. In consideration of paragraph 3.3 above, users **shall** be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an ITT or contract. Correct application of standards is as defined in the ITT or contract.

3.5. DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Defence Standards.

3.6. All normative references **shall** be complied with in addition to the requirements stated within this Def Stan.

3.7. Any reference to a governing body (e.g. CAA) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. General Requirements

5.1. The broad content of Functional and Safety Performance Requirements below is selected and derived from Civil Aviation Publication (CAP) 670; Joint Service Publication (JSP) 847; CAP746 - Meteorological Observations at Aerodromes; International Civil Aviation Organisation (ICAO) Annex 3; World Meteorological Organisation (WMO)-No. 49 – Technical Regulations. Other related items may be incorporated as required from other sources, such as WMO-No.386 - Manual on the Global Telecommunications System and EUROCONTROL Weather Information Exchange Model (WXXM) Standards.

6. Meteorological Safety Reliability Requirements

6.1. The use of Failure Modes and Effects Analysis (FMEA) and Event/Fault Tree Analyses (FTA) to derive Safety Requirements are industry practice and are discussed in Project Oriented Safety Management System (POSMS) and Military Regulatory Publications (MRP). The Risk Classification Schema and definitions used are shown in Part 1, paragraph 9.

6.2. The probability of total loss of the Met Observing and Display (& Automatic Terminal Information Service (ATIS)) System for more than 2 minutes **shall** be no greater than FREQUENT.

6.3. The probability of total loss of Visual Met Information for more than 2 minutes **shall** be no greater than FREQUENT.

6.4. The probability of total loss of Temperature/Dew Point Information for more than 2 minutes **shall** be no greater than FREQUENT.

6.5. The probability of total loss of Pressure Information for more than 2 minutes **shall** be no greater than FREQUENT.

6.6. The probability of Total loss of Surface Wind Information **shall** me no greater than FREQUENT.

6.7. The probability of Credible Corruption of Cloud/Present weather Information **shall** be no greater than FREQUENT.

6.8. The probability of Credible Corruption of Horizontal Visibility Information **shall** be no greater than PROBABLE.

6.9. The probability of Credible Corruption Temperature / Dew point Information **shall** be no greater than FREQUENT.

6.10. The probability of Credible Corruption of Pressure Information **shall** be no greater than OCCASIONAL.

6.11. The probability of Credible Corruption of Surface Wind information **shall** be no greater than FREQUENT.

7. Meteorological Functional and Performance Safety Requirements

7.1. The equipment, origination, processing, display and presentation to ATC and promulgation of Military Meteorological reports and other related information for use in Military ATM is regulated by the MAA. *(CAP670)*

7.2. For the purposes of safety regulation, the Meteorological Service is considered separate from the Air Traffic Control (ATC) service. *(CAP670)*

7.3. The Military ATS provider/Duty Holder facing organization is recommended to ensure that a Service Level Agreement or similar formal arrangement is in force between the Meteorological Information provider and ATC.

7.4. The Accuracy of Meteorological Measurements or Observations for ATS **should** be as follows:

Element to be observed	Operationally desirable accuracy of measurement or observation
Mean surface Direction: ± 5 degree wind	Direction: ± 5 degree Speed: ± 5%
Variations from the mean surface wind	± 4km/h (2kt), in terms of longitudinal and lateral components
Visibility	± 50 metres up to 600 metres ± 10% between 600 metres and 1500 metres ± 20% above 1500 metres
Runway visual range	± 10m up to 400 metres ± 25m between 400 metres and 800 metres ± 10% above 800 metres
Cloud amount	± 1 okta
Cloud height	± 10 metres (33ft) up to 100 metres (330ft) ± 10% above 100 metres (330ft)
Air temperature and dew-point temperature	± 1 degree celcius
Pressure Value (QNH, QFE)	± 0.5 hPa

7.5. For flight testing purposes, Pressure Values for Military Met systems **should** be accurate to 0.1 hPa. *(ICAO Ax 3) (Def Stan 08-133 Pt 2)*

7.6. At Military aerodromes, control positions are to be equipped with a surface wind indicator capable of giving surface wind information in accordance with ICAO Annex 3, Meteorological Service For International Air Navigation. *(CAP670)*

7.7. The display of surface wind information **shall** be updated at least once per second. *(CAP670)*

7.8. Aerodromes supporting flights by Military aircraft, providers of meteorological services and such other aerodromes as the MAA may direct **shall** comply with these Standards and Recommended Practices. *(CAP670)*

7.9. Surface wind sensors for take-off and landing **shall** be positioned to represent the wind flow at between 6 metres to 10 metres (20-30 ft) above the runway. *(CAP670)*

7.10. No corrections to the speed measurements are required for sensors positioned between 5 metres and 7 metres above the runway. The minimum acceptable height for the primary wind sensor is 5 metres. *(CAP670)*

7.11. For Meteorological Terminal Aviation Routine (METAR) weather reports, sensors **shall** be positioned to represent the wind flow at 10 metres (20-30 ft) above the whole runway where there is only one runway and the runway complex where there is more than one runway. The minimum acceptable height for the primary wind sensors is 5 metres. *(CAP670)*

7.12. Representative surface wind observations are to be obtained by the use of sensors appropriately sited as determined by local conditions. *(CAP670)*

7.13. Sensors for surface wind observations for reports, for take-off and landing are to be sited to give the best practicable indication of conditions along the runway. *(CAP670)*

7.14. At aerodromes where the topography or prevalent weather conditions cause significant differences in surface wind at various sections of the runway, additional sensors are to be provided. *(CAP670)*

7.15. The sensor giving the best practicable indication of the surface wind at the aerodrome or ATS Unit **shall** be used for all reports for take-off and landing. If this sensor does not give representative winds along the whole length of the runway then the indications from other sensors may be passed when requested by the pilot or when considered appropriate by the controller. *(CAP670)*

7.16. Variations in the wind direction **shall** be given when the total variation is 60 degrees or more with mean speeds above 6 km/h (3 kt); such directional variations **shall** be expressed as the two extreme directions between which the wind has varied during the past 10 minutes. *(CAP670)*

7.17. Variations from the mean wind speed (gusts) during the past 10 minutes **shall** be reported only when the variation from the mean speed has exceeded 20 km/h (10kt) or more; such speed variations (gusts) **shall** be expressed as the maximum and minimum speeds attained. *(CAP670)*

7.18. When the ten-minute period includes a marked discontinuity in the wind direction and/or speed, only variations in the direction and speed occurring since the discontinuity are to be reported. The variations in direction and speed are to be derived *(CAP670)*:

7.18.1 For non-automated systems from the wind direction and speed indicators or from the anemograph recorder trace if available.

7.18.2 For automated systems from the actual measured values of wind direction and speed, and not from the two-minute and ten-minute running averages. This may apply to Royal Navy (RN) systems afloat.

7.19. Surface winds of 6 km/h (3 kt) or less **shall** include a range of wind directions, whenever possible.

7.20. A marked discontinuity occurs when there is an abrupt and sustained change in wind direction of 30 degrees or more, with a wind speed of 20 km/h (10 kt) or more, lasting at least two minutes. *(CAP670)*

7.21. Runway Visual Range (RVR) data derived by the Human Observer method **shall** be displayed in operational positions as a distance (measured in m) determined from conversion tables approved for the purpose and contained within MAA Regulatory Article (RA) 3275 and the Military Manual of Air Traffic Management (MMATM). *(CAP670)*

7.22. Communication of Meteorological Information between Military ATS Units **should** consider utilizing the Eurocontrol Weather Information Conceptual Model (WXCM) and WXXM. *(CAP670)*

7.23. The system **shall** not be capable of corrupting other ATC systems, or vice versa. *(CAP670)*

7.24. The system is required to interface with the appropriate systems/sensors to obtain the following data *(CAP670)*:

7.24.1 Barometric Pressure (QNH & QFE) (in hPa)

7.24.2 Visibility (in metres)

7.24.3 Cloud Height(in feet)

7.24.4 Present Weather (rain, snow, fog etc.)

7.24.5 Cloud Amount

7.24.6 Temperature & Dew Point

7.25. The system **shall** not display dynamic data, which is out of date, or invalid. Where data is still valid, but is not being actively updated, the system **shall** provide a clear indication of this to ATC. *(CAP670)*

7.26. The system **shall** allow the Met Observer to produce meteorological observations in accordance with JSP847 and CAP746 and transmit METARs into the national system. *(CAP670)*

7.27. Meteorological information may be through displays provided or as part of an integrated Support Information System. *(CAP670)*

7.28. The system **should** provide a facility to access the ATIS via the public telephone exchange. Telephone access **shall** not be capable of interfering with operation of SAMOS/ATIS. *(CAP670)*

7.29. The system **shall** enable Manual Messages to be appended to the Transmitted ATIS Audio. *(CAP670)*

7.30. Where Meteorological Information is transposed manually, there **shall** be safeguards to ensure the accuracy of the data inputted. Confirmation/Warning Messages may be utilised. *(CAP670)*

7.31. Where use of Faxed Meteorological Reports is prevalent; a Fax machine and line **shall** be considered as part of the Meteorological System. *(CAP670)*

7.32. Where Meteorological Information is provided through Met Office Systems, these may be integrated. *(CAP670)*

7.33. Met Information **should** consist of the following information for a flight *(JSP847)*:

7.33.1 Forecast Synoptic Chart

7.33.2 Significant Weather or Low-Level Weather Chart

7.33.3 Chart showing winds at suitable levels

7.33.4 Max Wind/Ducting charts, station cross section etc

7.33.5 Aerodrome Forecasts TAFs, METARs, SPECIs for takeoff, destination and aerodromes en-route

7.33.6 SIGMET Information

8. RN Meteorological Specific Requirements

8.1. Where a Met System is integrated, this **shall** accommodate links to Joint Operational Meteorology and Oceanographic Centre (JOMOC), the UKMO Met Office Remote Site Network (MORSN) and RN Environmental Information Network (RNEIN). RNCSS access by RN Ships and Intranet for 'Smart Pull' Met. Information **shall** be accommodated. *(JSP847)*

8.2. If the RN Meteorological equipment for ATS produces 2 and 10-minute rolling averages of the wind speed and direction, consideration of any alteration in ship's heading on this average measurement **shall** be accommodated for, or disabled.

9. Meteorological Statutory and Regulatory Requirements

9.1. Military Meteorological Systems for ATS **shall** comply with the provisions in ICAO Annex 3. *(ICAO Annex 3)*

9.2. Military Meterological Systems for a Flight Information Service **shall** comply with ICAO Annex 11. *(ICAO Annex 11)*

9.3. Military Meteorological Systems **should** comply with the provisions in WMO-No.49 – Technical Regulations Volume II. *(WMO-No.49)*

9.4. Military Meteorological Systems communicating with other Meteorological facilities **should** comply with the provisions in WMO-No.386 – Manual on the Global Telecommunications System. *(WMO-No.386)*

9.5. Military Meterological Systems **should** conform to CAP746. *(CAP746)*

9.6. MAA MRP RA 3301 and RA 3275 and MMATM Chapter 14. *(MMATM)*

Annex A
Normative References

These Annex specific References are in addition to those noted in Part 0 of this Defence Standard

Publication	Title
CAP 670	ATS Safety Requirements
CAP 746	CAA Meteorological Observations at Aerodromes
Def Stan 08-133 Pt 2	Requirements and Guidance for the Aviation Arrangements in Surface Ships Part 2 - Guidance for the Design and Construction of Aviation Requirements
ICAO Ax 3	Meteorological Services for International Air Navigation
JSP 847	Defence Meteorological Services Manual
MAA 02	MAA Master Glossary
MMATM	Manual of Military Air Traffic Management
MRP and Associated Manuals	Military Regulatory Publications
RA 3301	Meteorological (Met) Information
RA 3275	Runway Visual Range (RVR)
WMO-No.49	World Meteorological Organization - Technical Regulations PtII
WMO-No.386	World Meteorological Organization – Manual on the Global Telecommunications System

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Contract Requirements

When Defence Standards are incorporated into contracts users are responsible for their correct application and for complying with contractual and statutory requirements. Compliance with a Defence Standard does not in itself confer immunity from legal obligations.

Revision of Defence Standards

Defence Standards are revised as necessary by an up issue or amendment. It is important that users of Defence Standards **should** ascertain that they are in possession of the latest issue or amendment. Information on all Defence Standards can be found on the DStan Website www.dstan.mod.uk, updated weekly and supplemented regularly by Standards in Defence News (SID News). Any person who, when making use of a Defence Standard encounters an inaccuracy or ambiguity is requested to notify UK Defence Standardization (DStan) without delay in order that the matter may be investigated and appropriate action taken. Sponsors and authors **shall** refer to Def Stan 00-00 before proceeding with any standards work.

MOD

DEF STAN 00-972 Part 7 Issue 5

Defence Standard:-

Date: 31 Jul 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 7: Flight Data Information Management Systems

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a. This standard has been revised to Issue 5 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 7 Issue 4 Amendment 1 dated 26 July 2013

Def Stan 00-972 Part 7 Issue 4 dated 24 May 2013

Def Stan 00-972 Part 7 Issue 3 dated 21 May 2012

INTERIM Def Stan 00-972 Part 7 Issue 2 dated 16 September 2011

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Military Air Traffic Management Equipment Safety and Performance Standards

Part 7: Flight Data Information Management Systems

1. Scope and Organisational Background

1.1. Prior to using any part of this Def Stan, Part 0 **should** be read which contains Procedures for use, content and definitions. This Part 7 provides System Safety and Functional Performance requirements for Flight Data Information Management used for Military Air Traffic Services (ATS) ashore, airborne and afloat and including ATS elements of MOD Contractor Airfield and Range Air Control systems. Refer to Part 1 for information on Regulatory Frameworks for all subsequent Parts.

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2.1. The MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

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4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. General Requirements

5.1. The broad content of Functional and Safety Performance Requirements below is selected and derived from International Civil Aviation Organisation (ICAO) Doc 4444 and Civil Aviation Publication (CAP) 694.

6. Flight Data Information Management Systems Safety Integrity Requirements

6.1. The use of Failure Modes and Effects Analysis (FMEA) and Event/Fault Tree Analyses (FTA) to derive Safety Requirements are industry practice and are discussed in Project Oriented Safety Management System (POSMS) and Military Regulatory Publications (MRP). The Risk Classification Schema and definitions used are shown in Part 1, paragraph 9.

6.2. The probability of Loss of ability to Input data to a Flight Data Information Management System **shall** be no greater than PROBABLE.

6.3. The probability of Loss of ability to Output data from a Flight Data Information Management System to Aeronautical Fixed Telecommunications Network (AFTN) or other network **shall** be no greater than PROBABLE.

6.4. The probability of Delay of data Input to a Flight Data Information Management System for a period exceeding 15 minutes **shall** be no greater than PROBABLE.

6.5. The probability of Delay of data Onput from a Flight Data Information Management System for a period exceeding 5 minutes **shall** be no greater than PROBABLE.

6.6. The probability of Data misdirection within a Flight Data Information Management system **shall** be no greater than PROBABLE.

6.7. The probability of Data corruption within a Flight Data Information Management system **shall** be no greater than PROBABLE.

6.8. The probability of Loss or corruption of function of a Flying Programme System **shall** be no greater than FREQUENT.

7. Flight Data Information Management Systems Functional and Performance Safety Requirements

7.1. A Flight Data Information Management system **should** use a flight plan form based on the model in ICAO Doc 4444, Appendix 2 and **should** be used by Military operators and Military ATS units for the purpose of completing flight plans. *(ICAO Doc 4444)*

7.2. Military Operators and Military ATS units **should** comply with the instructions for completion of the flight plan form and the repetitive flight plan listing form given in ICAO Doc 4444, Appendix 2. This **shall** include provisions for the revisions to comply with the FPL2012 Flight Plan format, in accordance with ICAO State Letter AN 13/2.1-08/50. *(ICAO Doc 4444)*

7.3. The Military ATS authority **shall** establish provisions and procedures for the presentation to controllers, and subsequent updating, of flight plan and control data for all flights being provided with a service by an ATS unit. Provision **shall** also be made for the presentation of any other information required or desirable for the provision of ATS. *(ICAO Doc 4444)*

7.4. Sufficient information and data **shall** be presented in such a manner as to enable the controller to have a complete representation of the current air traffic situation within the controller's area of responsibility and, when relevant, movements on the manoeuvring area of aerodromes. The presentation **shall** be updated in accordance with the progress of aircraft, in order to facilitate the timely detection and resolution of conflicts as well as to facilitate and provide a record of coordination with adjacent ATS units and control sectors. *(ICAO Doc 4444)*

7.5. An appropriate representation of the airspace configuration, including significant points and information related to such points, **shall** be provided. Data to be presented **shall** include relevant information from flight plans and position reports as well as clearance and coordination data. The information display may be generated and updated automatically, or the data may be entered and updated by authorized personnel. *(ICAO Doc 4444)*

7.6. The required flight plan and control data may be presented through the use of paper flight progress strips or electronic flight progress strips, by other electronic presentation forms or by a combination of presentation methods. *(ICAO Doc 4444)*

7.7. The method(s) of presenting information and data **shall** be in accordance with Human Factors principles. All data, including data related to individual aircraft, **shall** be presented in a manner minimizing the potential for misinterpretation or misunderstanding. *(ICAO Doc 4444)*

7.8. Means and methods for manually entering data in Air Traffic Control (ATC) automation systems **shall** be in accordance with Human Factors principles. *(ICAO Doc 4444)*

7.9. When Flight Progress Strips (FPS) are used, there **should** be at least one individual FPS for each flight. The number of FPS for individual flights **shall** be sufficient to meet the requirements of the ATS unit concerned. Procedures for annotating data and provisions specifying the types of data to be entered on FPS, including the use of symbols, may be specified by the ATS Operating Authority/MAA/ATM Release Authority and Duty Holder (DH) facing organization and **should** be common across ATS Units. *(ICAO Doc 4444)*

7.10. Data generated automatically **shall** be presented to the controller in a timely manner. The presentation of information and data for individual flights **shall** continue until such time as the data is no longer required for the purpose of providing control, including conflict detection and the coordination of flights, or until terminated by the controller. *(ICAO Doc 4444)*

7.11. Paper FPS **shall** be retained for a period of at least 30 days. Electronic flight progress and coordination data **shall** be recorded and retained for at least the same period of time. *(ICAO Doc 4444)*

7.12. ATC units **shall** immediately report in accordance with local instructions any failure or irregularity of Flight Data Information Management systems which could adversely affect the safety or efficiency of flight operations and/or the provision of air traffic control service. *(ICAO Doc 4444)*

7.13. Military Flight Data Information Management systems **shall** support ATS Coordination processes in line with ICAO Doc 4444 Chapter 10. *(ICAO Doc 4444)*

7.14. Military ATS Messages **should** be in accordance with ICAO Doc 4444 Chapter 11, where applicable. *(ICAO Doc 4444)*

7.15. Military Flight Data Information Management systems may support Repetitive Flight Plans (RPLs) in accordance with ICAO Doc 4444 Section 16.4. *(ICAO Doc 4444)*

7.16. Military Flight Data Information Management systems **should** support the provisions within European Organisation for Civil Aviation Electronics (EUROCAE) ED-133, Flight Object Interoperability Specification. *(ED-133)*

7.17. Military Flight Data Information Management systems **shall** support the processes in place in CAP694. *(CAP694)*

7.18. Military Flight Data Information Management systems **shall** provide a method for receiving, interaction, processing and store flight plans and associated messages. These systems **should** support UK Assisted Flight Plan Exchange (AFPEx), AFTN, ICAO FPL and Eurocontrol ATS Data Exchange Presentation (ADEXP) and Military Aerodrome data from the UK En-Route system. *(AFPEx)*

7.19. Military Flight Data Information Management systems **should** support formatting according to Eurocontrol Standard for ADEXP. *(ADEXP DPS.ET1.ST09-STD-01-01)*

7.20. Military Flight Data Information Management systems **should** conform to the Eurocontrol Specification for Interoperability and Performance Requirements for the Flight Message Transfer Protocol (FMTP). *(EUROCONTROL-SPEC-0100)*

7.21. Military Flight Data Information Management systems **should** support the use of existing national interfaces, ensuring that future interfaces can be supported (e.g: EUROCONTROL / Federal Aviation Administration (FAA) Aeronautical Information Exchange Model (AIXM 5); including the eASM Military extension). *(AIXM 5eASM Extension)*

7.22. Military Flight Data Information Management systems **should** address a flight data exchange function and an airspace crossing function. *(DPS.ET1.ST10.200-FS-01-00)*

7.23. Military Flight Data Information Management system Flight Data Exchange **should** be in accordance with Eurocontrol Functional Specifications for System Support to Airspace Data Distribution and Civil/Military Coordination. *(DPS.ET1.ST10.200-FS-01-00)*

7.24. Military Flight Data Information Management system **should** support bilateral forwarding of Flight Data between Military and Civil Units, where appropriate. *(DPS.ET1.ST10.200-FS-01-00)*

7.25. Military Flight Data Information Management Systems **should** provide a method for receiving, interaction, processing and storing of Slot Allocation Messages, updated as required.

7.26. Military Flight Data Information Management Systems **shall** handle reception and update of Flight plan data with minimal intervention by operators.

7.27. Military Flight Data Information Management Systems **shall** provide automated delivery of Flight data (Flight Strips or Electronic Flight Strips) in a timely manner.

7.28. Military Flight Data Information Management Systems **should** provide the ability to manually produce strips with minimal operator inputs and in a timely fashion.

7.29. Military Flight Data Information Management Systems **shall** provide the ability to manually generate flight strips for local, over flight, vehicle and all non flight planned air traffic activities.

7.30. Military Flight Data Information Management Systems **should** have working positions required in Visual Control Room and Approach Control Room for each controller.

7.31. Military Flight Data Information Management Systems **should** allow control positions to be combined, where one controller may undertake the task of one or more operating positions.

7.32. Military Flight Data Information Management Systems **should** provide electronic sharing of information between controllers to improve co-ordination efficiency.

7.33. Military Flight Data Information Management Systems **shall** enable strip marking and position to emulate the status, location and clearance given to an aircraft.

7.34. Military Flight Data Information Management Systems **shall** provide positive indication of runway occupancy and management.

7.35. Military Flight Data Information Management Systems **should** provide design resilience in support of system failures, linked to ATS failure measures. Such measures **shall** address identification and immediate safety issues of aircraft in flight.

7.36. Military Flight Data Information Management Systems **shall** provide information to ATS operators regarding the system serviceability and Interface status.

7.37. Military Flight Data Information Management Systems **should** provide an ability to adapt strip layout, content and manipulation of data.

7.38. Military Flight Data Information Management Systems **shall** provide information to local Ground Radio regarding the system serviceability and Interface status.

7.39. Flight Data Information Management Systems **shall** retain all system logs, including transactions, for minimum 30 Days with search and archive facility to aid investigation. Replay and investigation of material evidence **shall** be capable of being undertaken from stand alone systems.

7.40. Flight Data Information Management System recordings **shall** be synchronised in time with Voice and Surveillance Recordings[1].

7.41. Flight Data Information Management Systems **shall** have the capacity and capability of delivering flight strips and associated messages for an assessed maximum peak capacity for the Military ATS unit in question.

7.42. Some examples of Military Flight Data Information Management System scenarios that **should** be supported are:

7.42.1. Aircraft on the ground at a Military Aerodrome, departing to land at another Civil or Military Aerodrome.

7.42.2. Aircraft on the ground at a Military Aerodrome, departing to carry out a local flight, landing back at the same Military Aerodrome.

7.42.3. Aircraft on the ground at a Military Aerodrome, departing to carry out training at another Civil or Military airport then returning to land at the original Military Aerodrome.

7.42.4. Aircraft on the ground at a Military Aerodrome, departing to carry out training, returning to land at the airport of first departure (the number of landings and takeoffs must be recorded).

7.42.5. Aircraft inbound to a Military Aerodrome to land.

7.42.6. Aircraft inbound / outbound to/from a Military Aerodrome after diverting from the original destination.

7.42.7. Aircraft inbound to a Military Aerodrome to carry out training then departing to land at another Civil or Military Aerodrome.

7.42.8. Aircraft inbound / outbound to another airfield which is close to a Military Aerodrome and which the Military Aerodrome ATS will control at some point.

7.42.9. Aircraft over-flying a Military Aerodrome, within a MATZ or under a LARS whilst en-route from another departure point to another destination.

7.42.10. Aircraft which operate close to a Military Aerodrome but which depart from and land at other airfields or landing sites.

7.42.11. Military Ground vehicle movements from one point to another along Runways and Taxiways at Military Aerodromes.

7.42.12. Notified vehicle traffic, which are performing Aerodrome duties in specified areas (grass cutting, runway maintenance, and bird-scaring).

7.42.13. Emergencies, missed approach, go-around aircraft performing flight checks, circuit training and aircraft returning for unspecified reasons.

7.42.14. Input of free-call information to accept aircraft that ad-hoc flights not subject to formal flight plan i.e. Visual Flight Rules (VFR) airspace transits.

[1] See Part 11 of this Def Stan.

7.43. Example Information that may be contained in Flight Data Information Management Systems are: (Flight Plan (P), Flying Programme (F) and Flight Strip (S))

7.43.1. Callsign (PFS)

7.43.2. Heading & Level (PS)

7.43.3. Clearance Calls (S)

7.43.4. Co-ordination data (S)

7.43.5. Vehicle Data (P)

7.43.6. Aircraft Under control identifier

7.43.7. Strip Manipulation (S)

7.43.8. Strip Archive (S)

7.43.9. Strip Editing (S)

7.43.10. Type of Service (PS)

7.43.11. Squawk (S)

7.43.12. Pressure Settings (S)

7.43.13. Airways Joining Clearance (S)

7.43.14. Liaison Data (PS)

7.43.15. Approach Minima (S)

7.43.16. Type of Approach (S)

7.43.17. Cockpit Checks (S)

7.43.18. Emergency Data (PFS)

7.43.19. Air Weapons Range Data (S)

7.43.20. Force Protection Status (S)

7.43.21. Aircraft Type / Number of / armed status / DAC (PFS)

7.43.22. Persons On Board (PFS)

7.43.23. Route including Destination & Departure Airfield (PFS)

7.43.24. Estimated Time of Arrival (PFS)

7.43.25. Frequency (S)

7.43.26. RVSM Status (PS)

7.43.27. 8.33KHz Status (PS)

7.43.28. Mode-S Status (PS)

7.43.29. RNAV Status (PS)

7.43.30. Further Intentions Data (S)

7.43.31. Weather Status Passed (S)

7.44. Example Information that may also be contained in a Flying Programme (F) System:

7.44.1. Callsign

7.44.2. Date of Flight

7.44.3. Squadron

7.44.4. Aircraft Type

7.44.5. Callsign

7.44.6. Tail Number

7.44.7. Captain

7.44.8. Fuel and Endurance

7.44.9. Load / Weapons

7.44.10. Sortie Type

7.44.11. Sortie State

7.44.11.1. Sqn WalkOut

7.44.11.2. Ops WarnOut

7.44.11.3. Complete

7.44.12. Persons on Board

7.44.13. Remarks

7.44.14. Est. Time Departure

7.44.15. Actual Time Departure

7.44.16. Flight From

7.44.17. Flight To

7.44.18. Est. Time Arrival

7.44.19. Actual Time Arriva

7.44.20. Hours Flown

7.44.21. Emergency Data

7.45. Flight Data Management systems **should** be able to take inputs from Squadrons for display and promulgation of information to intranet sites as required.

7.46. Flight Status Changes and Overdue Flights **shall** be highlighted.

7.47. Flight Data Management Systems **should** be interoperable between required locations (Royal Air Forces (RAF), Royal Navy (RN), MOD and Civil establishments).

7.48. This time **shall** be presented in Universal Co-ordinated Time (UTC) (Zulu) and **should** be synchronized to a Master Time Source.

8. RN Flight Data Information Management Specific Requirements

8.1. RN and RN Afloat Flight Data Information Management Systems **should** be interoperable with RAF, MOD and Civil Systems.

8.2. RN Afloat FDP Systems **should** be able to accommodate alternative methods for interoperation with other nation Carriers and/or littoral Civil/Military systems.

9. Contracted Airfields and Weapons Range Flight Data Information Management Requirements

9.1. Air Range Flight Data Processing (FDP) Systems **shall** be interoperable with RN, RN Afloat, MOD and Civil Systems, where necessary.

10. Flight Data Information Management Statutory and Regulatory Requirements

10.1. Military Flight Data Information Management Systems **shall** conform to requirements in ICAO Doc 4444. *(ICAO Doc 4444)*

Annex A
Normative References

These Annex specific References are in addition to those noted in Part 0 of this Defence Standard

Publication	Title
ADEXP DPS.ET1.ST09-STD-01-01	Military Flight Data Information Management systems **shall** support formatting according to Eurocontrol Standard for ATS Data Exchange Presentation (ADEXP).
AFPEx Quick Start Guide	NATS Assisted Flight Planning Exchange Guide
AIXM 5	EUROCONTROL / FAA Aeronautical Information Exchange Model (AIXM 5)
CAP 670	ATS Safety Requirements
CAP 694	CAA UK Flight Planning Guide
DPS.ET1.ST10.200-FS-01-00 (B)	Eurocontrol Functional Specifications for System Support to Airspace Data Distribution and Civil/Military Coordination
ED-133	EUROCAE Flight Object Interoperability Specification
Eurocontrol SUR.ET1.ST01.1000-STD-01-01	Eurocontrol Specification for Interoperability and Performance Requirements for the Flight Message Transfer Protocol (FMTP)
ICAO Doc 4444	Procedures for Air Navigation Services
MAA 02	MAA Master Glossary

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DEF STAN 00-972 Part 8 Issue 4

Defence Standard:-

Date: 31 Jul 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 8: Airfield Ground Lighting (AGL) and Arrestor Systems

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a. This standard has been revised to Issue 4 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 8 Issue 3 cancelled 24 May 2013

Def Stan 00-972 Part 8 Issue 3 dated 21 May 2012

INTERIM Def Stan 00-972 Part 8 Issue 2 dated 07 October 2011

INTERIM Def Stan 00-972 Part 8 Issue 1 dated 12 August 2010

b. This Defence Standard (Def Stan) provides requirements for System Safety and Functional Performance of Military Air Traffic Management (ATM) Systems, ashore, airborne and afloat.

c. This Part of the Def Stan has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the Ministry Of Defence (MOD) Service Departments, and the Aerospace, Defence and Security Industries (A|D|S).

d. This standard **should** be used in all future designs, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises, which prevents application of the Def Stan, DStan and the MAA **shall** be informed so that a remedy may be sought.

e. Please address any enquiries regarding this standard, whether in relation to an Invitation To Tender (ITT) or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the ITT or contract.

f. Compliance with this Def Stan **shall** not in itself relieve any person from any legal obligations imposed upon them.

g. This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Military Air Traffic Management Equipment Safety and Performance Standards

Part 8: Airfield Ground Lighting (AGL) and Arrestor Systems

1. Scope and Organisational Background

1.1. Prior to using any part of this Defence Standard Part 0 **should** be read which contains Procedures for use, content and definitions. This Part of the Def Stan provides requirements for System Safety and Functional Performance of Air Traffic Control (ATC) Systems, ashore, airborne and afloat. It **shall** be applied to any MOD project for introduction or upgrade of any ATC System for the version of this Standard in force at the time. Refer to Part 1 for information on Regulatory Frameworks for all subsequent Parts.

2. Warning

2.1. The MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

3. Normative References

3.1. Generic normative references are in Part 0. The references shown in **Annex A** are specific to this part.

3.2. Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting **http://dstan.uwh.diif.r.mil.uk** for those with Dii access or **https://www.dstan.mod.uk** for all other users. All referenced standards were correct at the time of publication of this standard (see below for further guidance); if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

3.3. Reference in this Standard to any normative references means in any ITT or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated. Care **should** be taken when referring out to specific portions of other standards to ensure that they remain easily identifiable where subsequent amendments and supersession's might be made. For some standards, the most recent editions **shall** always apply due to safety and regulatory requirements.

3.4. In consideration of paragraph 3.3 above, users **shall** be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an ITT or contract. Correct application of standards is as defined in the ITT or contract.

3.5. DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Def Stans.

3.6. All normative references **shall** be complied with in addition to the requirements stated within this Def Stan.

3.7. Any reference to a governing body (e.g. CAA) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. General Information

5.1. **Purpose**

5.1.1. The purpose of Part 8 of this Def Stan is to define Military Air Traffic Service (ATS) Equipment System Safety and Performance Standards for Aeronautical Ground Lighting (AGL) and Aircraft Arrestor Control Systems, within the scope noted above, to providers of Military Terminal ATS.

6. AGL & Arrestor Safety Reliability Requirements

6.1. The use of Failure Modes and Effects Analysis (FMEA) and Event/Fault Tree Analyses (FTA) to derive Safety Requirements are industry practice and are discussed in Project Oriented Safety Management System (POSMS) and Military Regulatory Publications (MRP). The Risk Classification Schema and definitions used are shown in Part 1, paragraph 9.

6.2. The Total loss of all AGL functions **shall** be no greater than OCCASIONAL.

6.3. The probability of Loss or Corruption of one or more of the AGL functions associated with Guidance for Aircraft Taking off or Landing **shall** be no greater than OCCASIONAL.

6.4. The probability of Loss of one or more of the AGL functions associated with Guidance for Aircraft entering the runway **shall** be no greater than PROBABLE.

6.5. The probability of Corruption of one or more of the AGL functions associated with Guidance for Aircraft entering the runway **shall** be no greater than PROBABLE.

6.6. The probability of Loss or Corruption of one or more of the AGL functions associated with Guidance for Aircraft Taxiing **shall** be no greater than PROBABLE.

6.7. The probability of Loss or Corruption of any other AGL function **shall** be no greater than PROBABLE.

6.8. The Total loss of all Arrestor Gear control functions from ATC **shall** be no greater than PROBABLE.

6.9. The probability of Corruption of one or more of the Arrestor Gear Control functions from ATC **shall** be no greater than PROBABLE.

7. AGL & Arrestor Functional and Performance Safety Requirements

7.1. The AGL System **shall** accurately illuminate airfield lights as selected through the control panel.

7.2. The AGL system **shall** accurately indicate the current light settings, representing the actual status.

7.3. The AGL system **shall** indicate where a service has failed, or cannot be set to the desired setting.

7.4. The response time of an AGL control system **should** be less than 250 milli seconds. The overall response time **shall** be better than 5 seconds. The system **shall** provide a visual and audible alarm within 1 second of a failure.

7.5. In the event of a failure of an AGL or Arrestor control system, the field equipment **shall** default to a safe state.

7.6. Any display equipment **shall** be demonstrated to meet the safety requirements and be fit for purpose.

7.7. Functionality **shall** be provided such that operators can easily determine if the AGL or Arrestor Control panel is frozen.

7.8. When interfaced to and Instrumented Runway Visual Range (IRVR) system, any AGL Failure condition **should** be promulgated to the IRVR system.

7.9. The AGL **shall** meet the requirements specified in Manual of Aerodrome Design and Safeguarding (MADS).

7.10. The AGL **shall** meet the requirements specified in Civil Aviation Publication (CAP) 168. *(CAP 168)*

7.11. The AGL **shall** meet the requirements specified in CAP 670. In particular, the AGL control software **shall** be designed in such a way that evidence is available to satisfy the requirements of Regulatory Objectives for Software Safety Assurance in ATS Equipment.

7.12. All Airfield Lighting Systems **should** be compatible with the Night Vision Device (NVD) Plan. *(RA 3265) (MADS)*

7.13. Arrestor Systems **should** be controllable by ATC, through a control panel.

8. AGL & Arrestor Tactical Safety Requirements on Operations

8.1. Portable Airfield Marking **shall** be NVD compatible in accordance with MADS.

8.2. Deployed Airfield Lighting **shall** be implemented in accordance with MADS.

9. Royal Navy (RN) AGL Specific Requirements

9.1. The AGL **shall** meet the requirements in Def Stan 00-133 Part 3.

Annex A
Normative References

Publication	Title
AFSP-1(A)	NATO Aviation Safety
AvP67	Ministry of Defence. Flying Orders to Contractors
BRd 0763	Naval Aviation Quality Manual
BRd 0765	Naval Aviation Safety Management System
BRd 0766	RN Embarked Aviation Operating Handbook
BRd 0767	Naval Aviation Orders
BRd 9424	RN Fleet Operation Orders
CAP 168	Licensing of Aerodromes
CAP 670	Air Traffic Services Safety Requirements, Issue 2, July 2008
Def Stan 00-56	Safety Management Requirements for Defence Systems
Def Stan 00-133 Part 3	Aviation Arrangements in Surface Ships
ESARR Publications	ESARR Publications
EU Regulations	EU Regulations
ICAO Annex 10	Aeronautical Telecommunications
ICAO Annex 11	ATS
ICAO Annex 13	Incident Reporting, Data Systems And Information Exchange
ICAO Annex 14	Aerodromes
ICAO Annex 15	Aeronautical Information Services
JSP 360	Use of Military Airfields by British and Foreign Civil Aircraft
JSP 375	MOD Health and Safety Handbook
JSP 430	Ship Safety Management
JSP 454	Land Systems Safety and Environmental Protection
JSP 604	Defence Manual for Information and Communication Technologies (ICT) Part 1 Volume 2: Leaflets 4800, 4801, 4802 and 4803
JSP 815	Defence Environment and Safety Management
MAA 02	MAA Master Glossary
MADS	Military Aviation Authority Manual of Aerodrome Design and Safeguarding
NSL Airports Generic Safety Requirements	NSL Airports Generic Safety Requirements
RA 3265	Aerodrome Lighting Operating Requirements
STANAG 7104	Airfield Aircraft Arresting System Operating Procedures

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MOD

DEF STAN 00-972 Part 9 Issue 5

Defence Standard:-

Date: 31 Jul 2015

Military Air Traffic Management Equipment Safety and Performance Standards

Part 9: Systems Assurance (Safeguarding)

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a. This standard has been revised to Issue 5 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 9 Issue 4 dated 24 May 2013

Def Stan 00-972 Part 9 Issue 3 dated 21 May 2012

INTERIM Def Stan 00-972 Part 9 Issue 2 dated 19 August 2011

INTERIM Def Stan 00-972 Part 9 Issue 1 dated 12 August 2010

b. This Defence Standard (Def Stan) provides requirements for System Safety and Functional Performance of Military Air Traffic Management (ATM) Systems, ashore, airborne and afloat.

c. This Part of the Def Stan has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the Ministry Of Defence (MOD) Service Departments, and the Aerospace, Defence and Security Industries (A|D|S).

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Military Air Traffic Management Equipment Safety and Performance Standards

Part 9: Systems Assurance (Safeguarding)

1. Scope and Organisational Background

1.1. Prior to using any part of this Def Stan, Part 0 **should** be read which contains Procedures for use, content and definitions. This Part 9 provides System Safety and Functional Performance requirements for Systems Assurance (Safeguarding and Flight Inspection) processes used by Military Air Traffic Services (ATS) ashore, airborne and afloat and including ATS elements of MOD Contractor Airfield and Range Air Control systems. Refer to Part 1 for information on Regulatory Frameworks for all subsequent Parts.

2. Warning

2.1. MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

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3.7. Any reference to a governing body (e.g. Civil Aviation Authority (CAA)) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. Systems Assurance Functional and Performance Safety Requirements

5.1. Duty Holders (DH) together with their DH-facing ATS Providers are ultimately responsible for the Technical Safeguarding (or Radio Site Protection (RSP)) of all of the radio sites used in support of an ATS. *(CAP670)*

5.2. Other Military DH-facing organizations involved in Technical Safeguarding include:

5.2.1. MOD Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR)

5.2.2. RSP

5.2.3. Joint Spectrum Authority (JSA)

5.2.4. Defence Infrastructure Organisation (DIO)

5.2.5. Defence IFF/SSR Committee (DISC)

5.2.6. Other Civil DH-facing organizations involved in Technical Safeguarding include:

5.2.7. Office of Communications (OFCOM)

5.2.8. National IFF/SSR Committee (NISC)

5.3. Evidence of adequate technical safeguarding is expected to be seen during audits. If the quality of service of the radio signal reduces below acceptable limits, a recommendation may be made to withdrawal the affected radio facility until corrective measures have been taken. *(CAP670)*

5.4. PT/DTs **shall** obtain specific criteria from the manufacturer or supplier of their equipment and **shall** provide it to RSP to include it in the relevant documentation. It is likely that the manufacturer may specify a smaller area to be safeguarded, which could provide operational benefits to the ATS Unit. ATS Units and Front Line Command organizations are expected to maintain and apply criteria pertinent to their own technical sites. *(CAP670)*

5.5. Radio Spectrum safeguarding processes **shall** be applied as part of the technical safeguarding of all Radio Sites to prevent any development near to a radio transmitter or receiver site, which may degrade the radio signal by enabling harmonic interference. *(CAP670) (JSP604)*

5.6. The Radio Site Clearance process of safeguarding against such third party radio site development is part of a UK wide OFCOM notification activity.

5.7. Military Radio Technical Safeguarding **shall** be performed in accordance with Joint Service Publication (JSP) 604.

5.8. An authorised person, being a RSP representative, a member of the MAA, Release-Authority or Operating Authority DH, authorised person or an OFCOM Radio Investigation Service Officer, **shall** make the equipment and systems at aeronautical radio stations, associated records and Wireless Telegraphy Act 2006 (WT Act) Aeronautical Radio Licence available for inspection. *(CAP670)*

5.9. The equipment, systems and associated records **shall** be made available for inspection by an authorised person, being a suitably qualified and experienced MAA Inspector, for demonstrating compliance with this Def Stan and MAA Regulation. *(CAP670)*

5.10. A supplementary flight inspection may be requested by MAA, the DH or the relevant Delivery Team (DT)/ Project Team (PT) at any time if the following conditions arise *(CAP670)*:

5.10.1. An MAA or other auditor/inspector considers that any aspect of maintenance is not being correctly carried out.

5.10.2. An inspection of equipment monitor records, which may be requested at any time, shows any evidence of instability.

5.10.3. Changes have been made within the safeguarded areas.

5.10.4. A periodic inspection has shown any unusual, though not necessarily out of tolerance, aberrations in the course structure.

5.10.5. A Priority Flight Check is deemed necessary.

5.11. Certain types of engineering work involving the aerial distribution unit, feeder cables, aerials or monitor-combining unit may require that the system be assurred before being returned to service. If an operator is uncertain of the type of inspection required, he **should** contact the ATS Service Provider or ATM Engineering Release Authority. *(CAP670)*

5.12. The DH, DH-facing organization and ATS Provider **shall** analyse the flight inspection report at the earliest opportunity for operational systems and prior to entering a facility into operational service, to ensure that the flight inspection requirements are met. *(CAP670)*

5.13. A navigation aid **should** be assured by the MOD or a person/organization approved or accepted by the MAA, on such occasions as the MAA may require. *(CAP670)*

5.14. The applicant Flight Inspection Organisational Approval may propose an aircraft or system which is new in concept or not in common use for flight inspection. In such a case, the MAA will seek advice and may also initiate a general consultation with the industry. *(CAP670)*

5.15. The MAA **shall** evaluate, oversee and/or require evaluation of the results of these trials by a DH, DH facing-organization and DT. *(CAP670)*

5.16. The MAA reserves the right to inspect the flight inspection system or organisation at any time and to request regular flight inspection reports. *(CAP670)*

5.17. For all applicants the MAA reserves the right to require that a practical demonstration of ability be given. *(CAP 670)*

5.18. Military Flight Inspection Aircraft in theatre **should** be equipped with the relevant defensive aids according to the relevant Front Line Command and Theatre Commander. *(CAP670)*

5.19. The equipment fitted in the aircraft must be capable of measuring all the parameters in International Civil Aviation Organisation (ICAO) Ax10 and as require by the MAA for other Military ATM systems. *(CAP670)*

5.20. Distance Measuring Equipment (DME) associated with another piece of ATM equipment **shall** be inspected in accordance with the other associated equipment. *(CAP670)*

5.21. Unassociated DME Routine Inspections **shall** be conducted annually. *(CAP670)*

5.22. The flight trial **shall** contain an appropriate series of slices to demonstrate the detection profile of the Surveillance System. *(CAP670)*

5.23. The Systems Assurance (by flight trial or otherwise) **shall** assess the accuracy of the system in the areas of operational significance. *(CAP670)*

5.24. The flight trial **shall** demonstrate that the Surveillance system continues to meet the Operational Requirement (OR), particularly in the areas applying a separation standard or deconfliction minima. *(CAP670)*

5.25. The following accuracy assessment is required for any Surveillance System intended for use for Surveillance Radar Approaches (SRA) terminating at or below 1NM from touchdown *(CAP670)*:

5.25.1. Angular error **shall** be less than ±1 degree.

5.25.2. Range error **shall** be less than ±55 + 0.05R metres where 'R' is the range of the respective range checkpoint.

5.26. Precision Approach Radar (PAR) Flight Inspection **shall** be in accordance with MOD Flight Checking Instruction 3 and additionally in response to any MAA requirements. *(ICAO Ax10 Vol 1) (FCI No.3) (ICAO Doc 8071 Vol 1)*

5.27. Tactical Area Navigation System (TACAN) Systems Assurance by Flight Inspection **shall** be in accordance with MOD Flight Checking Instruction 5. *(FCI No.5) (ICAO Doc 8071 Vol 1)*

5.28. Systems Assurance of Precision Approach Path Indicators (PAPI) **shall** be performed at commissioning in accordance with MOD requirements, examples of parameters that may be assessed are *(MAA MADS) (ICAO 9157-AN901 Pt4)*:

5.28.1. Glide Angle

5.28.2. Light Intensity

5.28.3. Symmetry

5.28.4. Lateral Coverage

5.28.5. Light Colour

5.28.6. Acquisition Range

5.28.7. Obstruction Clearance PAPI, A-PAPI

5.28.8. Heli Obstruction Clearance A-PAPI

5.29. Specific guidelines apply to light displays using lasers and searchlights within 500 metres either side of extended runway centrelines within ten miles of an aerodrome. *(CAP493) (CAP736)*

5.30. Within three miles of an aerodrome but not on the extended centreline, the same guidelines apply but with the addition that any light **should** not stray towards the aerodrome or the extended centreline. In both cases, information **should** be passed to any affected aircraft. If a pilot requests that the lights be extinguished or if Air Traffic Control (ATC) considers this necessary, then action **should** be taken immediately. *(CAP493) (CAP736)*

5.31. The Safety of Aircraft and Aircrew **should** not be compromised when utilising Lasers in UK Airspace. Any subsidiary regulations do not absolve any person from using best judgement to ensure the safety of aircraft and aircrew while operating equipment employing lasers, searchlights or other light sources.

5.32. The ‘Update Interval’ and ‘Output Period’ **shall** be defined and justified. (*ED-142)*

6. Systems Assurance Static Deployed Safety Requirements

6.1. Systems Assurance by Flight Inspection when static deployed, **should** be in accordance with this Def Stan. Where this is not possible, North Atlantic Treaty Order (NATO) Flight Inspection Standards **should** be utilized, or mitigated reasoning applied in-lieu, be subject to Risk Assessment by the relevant DH. *(AetP-1(D)) (STANAG 3374)*

6.2. Abnormal markings of Flight Inspection Aircraft are not required in-Theatre.

6.3. Systems Assurance by Flight Inspection of UK ATS Equipment may be performed using other national ICAO approved Flight Inspection documents. *(IGIA Document 77/4.6G) (DoT Order VN8200.3A)*

6.4. Some examples of these are:

6.4.1. United States (US) Federal Aviation Administration (FAA) in accordance with the Interagency Group on International Aviation (IGIA) Document 77/4.6G.

6.4.2. US Department for Transportation Order VN8200.3A.

6.4.3. FAA Document 8200.1C – US Standard Flight Inspection Manual.

7. RN Systems Assurance Specific Requirements

7.1. Royal Navy (RN) Systems Assurance by Flight Inspection Organisations **shall** be assessed and approved by the MAA/DH for the suitability of their 'At Sea' Flight Inspection processes.

Annex A

Normative References

These Annex specific References are in addition to those noted in Part 0 of this Defence Standard

Publication	Title
AetP-1(D)	NATO Flight Inspection Standards
CAP 493	Manual of Air Traffic Services
CAP 670	ATS Safety Requirements
CAP 736	Operation of Directed Light, Fireworks, Toy Balloons and Sky Lanterns within UK Airspace
ED-142	Technical Specification For Wide Area Multilateration (Wam) Systems
ICAO Doc 8071	ICAO Flight Inspection Standards
ICAO Doc 9157	Aerodrome Design Manual
ICAO Doc 9426	Air Traffic Services Planning Manual
IGIA Document 77/4.6G	Flight Testing Of Navigation Aids – U.S Policy With Respect To The Flight Inspection Of Air Navigation On A Worldwide Basis
JSP 604	Defence Manual for Information and Communication Technologies (ICT)
MAA 02	MAA Master Glossary
MAA MADS	Military Aviation Authority Manual of Aerodrome Design and Safeguarding
STANAG 3374	Flight Inspection Of NATO Radio/Radar Navigation And Approach Aids

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Contract Requirements

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DEF STAN 00-972 Part 10 Issue 5

Defence Standard:-

Date: 31 Jul 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 10: ATC Support Systems

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a. This standard has been revised to Issue 5 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 10 Issue 4 Amendment 1 dated 26 July 2013

Def Stan 00-972 Part 10 Issue 4 dated 24 May 2013

Def Stan 00-972 Part 10 Issue 3 dated 21 May 2012

INTERIM Def Stan 00-972 Part 10 Issue 2 dated 30 September 2011

INTERIM Def Stan 00-972 Part 10 Issue 1 dated 12 August 2010

b. This Defence Standard (Def Stan) provides requirements for System Safety and Functional Performance of Military Air Traffic Management (ATM) Systems, ashore, airborne and afloat.

c. This Part of the Def Stan has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the Ministry OF Defence (MOD) Service Departments, and the Aerospace, Defence and Security Industries (A|D|S).

d. This standard **should** be used in all future designs, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises which prevents application of the Def Stan, DStan and the MAA **shall** be informed so that a remedy may be sought.

e. Please address any enquiries regarding this standard, whether in relation to an Invitation To Tender (ITT) or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the ITT or contract.

f. Compliance with this Def Stan **shall** not in itself relieve any person from any legal obligations imposed upon them.

g. This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Military Air Traffic Management Equipment Safety and Performance Standards

Part 10: Air Traffic Control (ATC) Support Systems

1. Scope and Organisational Background

1.1. Prior to using any part of this Def Stan Part 0 **should** be read which contains Procedures for use, content and definitions. This part 10 provides System Safety and Functional Performance requirements for Air Traffic Control (ATC) Support Systems used for Military Air Traffic Services (ATS) ashore, airborne and afloat and including ATS elements of MOD Contractor Airfield and Range Air Control systems. Refer to Part 1 for information on Regulatory Frameworks for all subsequent Parts.

2. Warning

2.1. MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

3. Normative References

3.1. Generic normative references are in Part 0. The references shown in **Annex A** of this part are specific to this part.

3.2. Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting **http://dstan.uwh.diif.r.mil.uk** for those with Dii access or **https://www.dstan.mod.uk** for all other users. All referenced standards were correct at the time of publication of this standard (see below for further guidance); if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

3.3. Reference in this Standard to any normative references means in any ITT or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated. Care **should** be taken when referring out to specific portions of other standards to ensure that they remain easily identifiable where subsequent amendments and supersession's might be made. For some standards, the most recent editions **shall** always apply due to safety and regulatory requirements.

3.4. In consideration of paragraph 3.3 above, users **shall** be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an ITT or contract. Correct application of standards is as defined in the ITT or contract.

3.5. DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Def Stans.

3.6. All normative references **shall** be complied with in addition to the requirements stated within this Def Stan.

3.7. Any reference to a governing body (e.g. CAA) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. ATC Support Systems Safety Integrity Requirements

5.1. The probability of Total or Partial loss of a Support Information System for a period in excess of 10 seconds **shall** be no greater than FREQUENT.

5.2. The probability of Credible Corruption of Safety-related Information (Pressure settings or Danger Area Airspace Activation Status) within a Support System **shall** be no greater than OCCASIONAL.

6. ATC Support Systems Functional and Performance Safety Requirements

6.1. Providers must satisfy the MAA that the system is adequate for its purpose by design or by procedural mitigation.

6.2. ATC Support Systems incorporating Airspace Management Systems **should** utilize management tools for example EUROCONTROL LARA tools.

6.3. ATC Support systems incorporating Airspace Management Systems **should** be implemented in accordance with EUROCONTROL Concepts and Guidance. *(DCMAC/HS/DEL/08-015)*

Annex A
Normative References

These Annex specific References are in addition to those noted in Part 0 of this Defence Standard

Publication	Title
CAP 670	ATS Safety Requirements
DCMAC/HS/DEL/08-015	LARA Local and Regional Airspace Management Supporting System Conceptual Description
MAA 02	MAA Master Glossary
MATS Part 2	Manual of Air Traffic Services

Defence Standards are published by and obtainable from:

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The DStan file reference relating to work on this standard is D/DStan/21/972/10

Contract Requirements

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Revision of Defence Standards

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DEF STAN 00-972 Part 11 Issue 4

Defence Standard:-

Date: 31 July 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 11: Recording and Replay Systems

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a. This standard has been revised to Issue 4 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 11 Issue 3 dated 21 May 2012

INTERIM Def Stan 00-972 Part 11 Issue 2 dated 29 July 2011

INTERIM Def Stan 00-972 Part 6 Issue 1 dated 12 August 2010

b. This Defence Standard (Def Stan) provides requirements for System Safety and Functional Performance of Military Air Traffic Mangement (ATM) Systems, ashore, airborne and afloat.

c. This Part of the Def Stan has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the Ministry Of Defence (MOD) Service Departments, and the Aerospace, Defence and Security Industries (A|D|S).

d. This standard **should** be used in all future designs, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises, which prevents application of the Def Stan, DStan and the MAA **shall** be informed so that a remedy may be sought.

e. Please address any enquiries regarding this standard, whether in relation to an Invitation To Tender (ITT) or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the ITT or contract.

f. Compliance with this Def Stan **shall** not in itself relieve any person from any legal obligations imposed upon them.

g. This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Military Air Traffic Management Equipment Safety and Performance Standards

Part 11: Recording and Replay Systems

1. Scope and Organisational Background

1.1. Prior to using any part of this Def Stan, Part 0 **should** be read which contains Procedures for use, content and definitions. This part 11 provides System Safety and Functional Performance requirements for Recording and Replay systems used for Military Air Traffic Services (ATS) ashore, airborne, afloat, and including ATS elements of MOD Contractor Airfield and Range Air Control systems. Refer to Part 1 for information on Regulatory Frameworks for all subsequent Parts.

2. Warning

2.1. The MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

3. Normative References

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3.4. In consideration of paragraph 3.3 above, users **shall** be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an ITT or contract. Correct application of standards is as defined in the ITT or contract.

3.5. DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Def Stans.

3.6. All normative references **shall** be complied with in addition to the requirements stated within this Def Stan.

3.7. Any reference to a governing body (e.g. Civil Aviation Authority (CAA)) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. Recording & Replay Systems Safety Integrity Requirements

5.1. The probability of any failure of the Voice and Data Record and Replay system compromising any single Air Ground Air RT communications channel or Surveillance data link for a period in excess of 10 seconds **shall** be no greater than REMOTE. This may be apportioned between channel legs.

5.2. Failure of the Record and Replay system, which does not compromise any communications, **shall** be no greater than PROBABLE.

5.3. Failure of the Record and Replay system, which does not compromise any communications, **shall** be no greater than PROBABLE.

6. Recording & Replay Systems Functional and Performance Safety Requirements

6.1. The ATM Release Authority / Engineering Authority **shall** liaise with the Military Air Accident Investigation Branch (MAAIB) (and/or CAA Safety Regulation Group (SRG) Transcription Unit where necessary) to ensure that the recording equipment is compatible with the replay facilities and working practices in use and **shall** present evidence to support this in any application for approval. *(CAP 670)*

6.2. The time-recording device or technique **shall** be checked as necessary to ensure that the time-stamps are maintained within ±1 seconds of Universal Time Coordinated (UTC) or by regular reference to an international time standard such as the MSF signal radiated from Anthorn in Cumbria or from the Global Navigation Satellite System (GNSS). This also applies wherever Data Link Communications are in operation. *(CAP 670)*

6.3. It is recommended to utilize centralized Master Time sources, with a Global Navigation Surveillance System synchronization to UTC, along with an MSF backup to feed the Voice/Data Recorder System. *(CAP 670)*

6.4. Communications between all ATS Units **shall** be recorded. Direct communications, which are not already covered, **should** be recorded, including Crash and Emergency communications. *(CAP 670) (ICAO Annex 11)*

6.5. Any equipment configuration-enabling recording of dynamically allocated and/or tunable radios **shall** allow for consistent ‘track’ allocations and/or dynamic labeling of the channels/ frequencies being recorded. *(CAP 670)*

6.6. Where the recording solution is based on an Internet Protocol (IP) architecture, then the network interfaces **shall** be compatible with the Telecom provider network infrastructure. The method of initiation of IP data recording from the IP Datagram between Radio and Voice Communications Control Systems (VCCS) **should** be articulated within the Recorder Safety Case. *(CAP 670)*

6.7. Line or network interfaces **shall** be provided which are compatible with radio connections made via the Public Switched Telephone Network (PSTN), private lines or telecoms network infrastructure to transmitter, receiver and associated control equipment at 2 Wire, 4 Wire or network level. Optional modules to provide telephone connection Off-Hook and Ring Detect signals for the contact activation circuits may be incorporated into the line interfaces. *(CAP 670)*

6.8. The Ground-Ground equipment and systems at the Base Station **shall** provide all the necessary signals and information to the Voice / Data Recording Equipment, including Military Management Radio channels utilized for the purposes of ATS. *(CAP 670) (ICAO Ax11)*

6.9. Automatic recording facilities **should** be provided on communications channels used for the control of vehicles on the maneuvering area, including Military Management Radio channels utilized for the purposes of ATS. These recordings **shall** also be retained for a period of 30 Days. *(CAP 670)*

6.10. Operating ATS Providers **shall** be responsible for providing synchronized Voice and Surveillance data for use in accident and incident investigations by the MAA, MAAIB, CAA or civil AAIB to support search and rescue, Air Traffic Control (ATC) and surveillance systems evaluation and training. *(CAP 670)*

6.11. Surveillance data **shall** be recorded from at least one point. *(CAP 670)*

6.12. At ATS Units where the surveillance data displayed is obtained from either ADS or multi-lateration systems, the data **shall** be recorded with no loss of accuracy or detail and at a rate equal to the update rate of the surveillance data source. *(CAP 670)*

6.13. Recorded information **shall** be retained for a minimum of 30 days. *(CAP 670) (Eurocontrol SUR.ET1.ST01.1000-STD-01-01)*

6.14. Latitude and longitude data, along with time relative to UTC cannot easily be derived from screen recordings so the ATS Unit or a third party provider **shall** retain recordings of the original data returned from the surveillance sensor (or sensors), if the ATS Unit was using surveillance data derived from an external source. *(CAP 670)*

6.15. The users of analogue radar systems **shall** record surveillance data captured at the display position-using screen shots recorded At The Glass (ATG), as described in this document. *(CAP 670)*

6.16. It is unlikely that the ATS Unit will be able to provide sufficient data for the AAIB, or MAAIB, or other investigating agency, to reconstruct the flight path of an individual aircraft based solely on analogue primary radar data unless that Unit was receiving secondary surveillance data (as an overlay to the analogue radar data) from a third party such as NATS, and the source data was being recorded (and retained) by the provider of that data. *(CAP 670)*

6.17. The equipment configuration **should** take account of such factors as the hours of operation of the ATS Unit, and any provisions for maintenance/repair at the ATS Unit, including the ability to replay recorded data, and when needed, the ability to copy such data to removable media whilst continuing to record surveillance data. *(CAP 670)*

6.18. In accordance with the existing requirements published in this Def Stan, the ATS Unit, or third party provider of surveillance data, will be permitted to retain one copy of the quarantined data for local use but data retained in the "quarantine" area of the ATS recorder must not be replayed, deleted or over-written until MAA written permission for the release of such data is received. *(CAP 670)*

6.19. ATS Units and third party providers are reminded of the need to provide, when required by either the MAAIB, another part of the MAA, CAA, AAIB or the Radar Analysis Cell a copy of the aircraft tracks. In most cases this data is provided as a spreadsheet formatted as .xml files or similar. *(CAP 670)*

6.20. Data extracted from recordings made using screen capture techniques **shall** be capable of being exported to, and being replayed by, either the MAA or MAAIB using standard media player software. *(CAP 670)*

6.21. The Meteorological data displayed at control positions **should** be recorded and the records **should** be retained for at least 30 days. It **should** be possible to recreate reliably the appearance of the Meteorological data display at an operational position from the recorded data. *(CAP 670)*

7. Recording & Replay Static Deployed Safety Requirements

7.1. Systems redundancy may be reduced in lower intensity Tactical Operational systems, with a commensurate As Low As Reasonably Practicable (ALARP) assessment by the Operational Duty Holder (DH).

8. Tactical Radios

8.1. TBC

9. RN Recording & Replay Systems Specific Requirements

9.1. Where Ship-Time is used, this **shall** be translated to UTC for Royal Navy (RN) ATC Systems.

9.2. Where Recording systems are not fully centralised, procedures and methods **shall** be established to ensure procedural time synchronisation for coordinated and synchronised replay.

10. Contracted Airfields and Weapons Range Recording & Replay Systems Requirements

10.1. Any Recorder systems procured independently, not as Government Furnished Equipment (GFE), **shall** be managed safely in a similar process implemented for GFE Recorder systems with coordinated end-to-end Safety Arguments.

Annex A
Normative References

These Annex specific References are in addition to those noted in Part 0 of this Defence Standard

Publication	Title
CAP 670	ATS Safety Requirements
Eurocontrol SUR.ET1.ST01.1000-STD-01-01	Eurocontrol Specification for Interoperability and Performance Requirements for the Flight Message Transfer Protocol (FMTP)
ICAO Annex 10	Aeronautical Telecommunications
ICAO Annex 11	ATS
MAA 02	MAA Master Glossary
MATS Part 2	Manual of Air Traffic Services

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Contract Requirements

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MOD

DEF STAN 00-972 Part 12 Issue 5

Defence Standard:-

Date: 31 July 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 12: Alarm and Alerting Systems

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a. This standard has been revised to Issue 5 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 12 Issue 4 Amendment 1 dated 26 July 2013

Def Stan 00-972 Part 12 Issue 4 dated 24 May 2013

Def Stan 00-972 Part 12 Issue 3 dated 21 May 2012

INTERIM Def Stan 00-972 Part 12 Issue 2 dated 07 October 2011

INTERIM Def Stan 00-972 Part 12 Issue 1 dated 12 August 2010

b. This Defence Standard (Def Stan) provides requirements for System Safety and Functional Performance of Military Air Traffic Management (ATM) Systems, ashore, airborne and afloat.

c. This Part of the Def Stan has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the Ministry Of Defence (MOD) Service Departments, and the Aerospace, Defence and Security Industries (A|D|S).

d. This standard **should** be used in all future designs, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises which prevents application of the Def Stan, DStan and the MAA **shall** be informed so that a remedy may be sought.

e. Please address any enquiries regarding this standard, whether in relation to an Invitation To Tender (ITT) or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the ITT or contract.

f. Compliance with this Def Stan **shall** not in itself relieve any person from any legal obligations imposed upon them.

g. This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Military Air Traffic Management Equipment Safety and Performance Standards

Part 12: Alarm and Alerting Systems

1. Scope and Organisational Background

1.1. Prior to using any part of this Defence Standard, Part 0 **should** be read which contains Procedures for use, content and definitions. This Part 12 provides System Safety and Functional Performance requirements for Alarm and Alerting systems used for Military Air Traffic Services (ATS) ashore, airborne and afloat and including ATS elements of MOD Contractor Airfield and Range Air Control systems. Refer to Part 1 for information on Regulatory Frameworks for all subsequent Parts. Other parts may also contain information specific to their function regarding more detailed alarms and alerting systems.

2. Warning

2.1. The MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

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3.6. All normative references **shall** be complied with in addition to the requirements stated within this Def Stan.

3.7. Any reference to a governing body (e.g. CAA) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. Alarm and Alerting Systems Safety Integrity Requirements

5.1. The probability of Loss of function of an Alarm and Alerting System **shall** be no greater than FREQUENT.

5.2. The probability of failure of the Alarm and Alerting System causing a failure in the Monitored ATM System **shall** be no greater than REMOTE.

5.3. The probability of credible corruption of the Alarm and Alerting System to Air Traffic Control (ATC) **shall** be no greater than PROBABLE.

6. Alarm and Alerting Systems Functional and Performance Safety Requirements

6.1. Approval of aerodrome, afloat and Anti-Blocking Systems (ABS) Emergency Orders is the responsibility of the MAA, ATM Release Authority and ATM Duty Holder (DH) facing Organisation. *(CAP 670)*

6.2. This **should** be adopted for Alarms from all ATM-related equipment. *(CAP 670)*

6.3. Alarms provided to ATC **should** not unduly distract from the provision of the ATS and **should** be easy to interpret.

7. Alarm and Alerting Systems Static Deployed Safety Requirements

7.1. Alarm Handling Requirements may be relaxed on operations. Where they are relaxed, this must be documented in conjunction with the in Theatre Duty Holder, ATM DH facing Organisation, ATM Release Authority and the MAA.

Annex A
Normative References

These Annex specific References are in addition to those noted in Part 0 of this Defence Standard

Publication	Title
CAP 670	ATS Safety Requirements
MAA 02	MAA Master Glossary

Defence Standards are published by and obtainable from:

Defence Equipment and Support

UK Defence Standardization

Kentigern House

65 Brown Street

GLASGOW

G2 8EX

DStan Helpdesk

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File Reference

The DStan file reference relating to work on this standard is D/DStan/21/972/12

Contract Requirements

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Revision of Defence Standards

Defence Standards are revised as necessary by an up issue or amendment. It is important that users of Defence Standards **should** ascertain that they are in possession of the latest issue or amendment. Information on all Defence Standards can be found on the DStan Website www.dstan.mod.uk, updated weekly and supplemented regularly by Standards in Defence News (SID News). Any person who, when making use of a Defence Standard encounters an inaccuracy or ambiguity is requested to notify UK Defence Standardization (DStan) without delay in order that the matter may be investigated and appropriate action taken. Sponsors and authors **shall** refer to Def Stan 00-00 before proceeding with any standards work.

MOD

DEF STAN 00-972 Part 13 Issue 5

Defence Standard:-

Date: 31 July 2015

Military Air Traffic Management Equipment

Safety and Performance Standards

Part 13: Master Time Sources

Contents

Foreword

AMENDMENT RECORD

REVISION NOTE

a. This standard has been revised to Issue 5 publication status following further development, including holding a workshop session and soliciting feedback from stakeholder engagement.

HISTORICAL RECORD

Def Stan 00-972 Part 13 Issue 4 Amendment 1 dated 26 July 2013

Def Stan 00-972 Part 13 Issue 4 dated 24 May 2013

Def Stan 00-972 Part 13 Issue 3 dated 21 May 2012

INTERIM Def Stan 00-972 Part 13 Issue 2 dated 07 October 2011

INTERIM Def Stan 00-972 Part 13 Issue 1 dated 12 August 2010

b. This Defence Standard provides requirements for System Safety and Functional Performance of Military Air Traffic Management (ATM) Systems, ashore, airborne and afloat.

c. This Part of the Defence Standard (Def Stan) has been produced by the Military Aviation Authority (MAA) and will be maintained by the Joint Air Safety Committee (JASC). The JASC is composed of representatives from the MAA, the Ministry Of Defence (MOD) Service Departments, and the Aerospace, Defence and Security Industries (A|D|S).

d. This standard **should** be used in all future designs, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises which prevents application of the Def Stan, DStan and the MAA **shall** be informed so that a remedy may be sought.

e. Please address any enquiries regarding this standard, whether in relation to an invitation to tender or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the Invitation To Tender (ITT) or contract.

f. Compliance with this Def Stan **shall** not in itself relieve any person from any legal obligations imposed upon them.

g. This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Military Air Traffic Management Equipment Safety and Performance Standards

Part 13: Master Time Sources

1. Scope and Organisational Background

1.1. Prior to using any part of this Def Stan Part 0 **should** be read which contains Procedures for use, content and definitions. This part 13 provides System Safety and Functional Performance requirements for Master Time Source systems used for Military Air Traffic Services (ATS) ashore, airborne and afloat and including ATS elements of MOD Contractor Airfield and Range Air Control systems. Refer to Part 1 for information on Regulatory Frameworks for all subsequent Parts.

1.2. ATS Master Time Sources refer to Time Clock information presented to ATM Systems, rather than Data Clock information required as part of any digital networked ATM System.

2. Warning

2.1. The MOD, like its contractors, is subject to both United Kingdom (UK) and European laws regarding Health and Safety at Work. Many Def Stans set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work or legal obligations regarding Duty of Care.

3. Normative References

3.1. Generic normative references are in Part 0. The references shown in **Annex A** are specific to this part.

3.2. Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting **http://dstan.uwh.diif.r.mil.uk** for those with Dii access or **https://www.dstan.mod.uk** for all other users. All referenced standards were correct at the time of publication of this standard (see below for further guidance); if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

3.3. Reference in this Standard to any normative references means in any ITT or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated. Care **should** be taken when referring out to specific portions of other standards to ensure that they remain easily identifiable where subsequent amendments and supersession's might be made. For some standards, the most recent editions **shall** always apply due to safety and regulatory requirements.

3.4. In consideration of paragraph 3.3 above, users **shall** be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an ITT or contract. Correct application of standards is as defined in the ITT or contract.

3.5. DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Defence Standards.

3.6. All normative references **shall** be complied with in addition to the requirements stated within this Def Stan.

3.7. Any reference to a governing body (e.g. CAA) requiring contact or notification in normative reference documents **shall** be read as the MAA.

4. Definitions & Abbreviations

4.1. All generic definitions and abbreviations in this standard are listed in Part 0 and in the MAA Master Glossary, MAA 02.

5. Master Time Source Systems Safety Reliability Requirements

5.1. The probability of Loss of function of a Master Time Source System **shall** be no greater than FREQUENT. If the master time source is lost, the system will defer to its own clock.

5.2. The probability of credible corruption of a Master Time Source System affecting the ATM System **shall** be no greater than PROBABLE.

6. Master Time Source Systems Functional and Performance Safety Requirements

6.1. A clock **should** be visible to the air traffic controller, in a position decided in accordance with a Human Factors assessment. *(CAP 670)*

7. Master Time Source Systems Static Deployed Safety Requirements

7.1. The extent of automated Time Synchronisation for ATM systems may be reduced and performed manually.

8. RN Master Time Source Systems Specific Requirements

8.1. Where Ship-Time is used, this **shall** be translated to Universal Time Co-ordinated (UTC) for Royal Navy (RN) Air Traffic Control (ATC) Systems.

8.2. Where Master Time Sources are not universally distributed, manual synchronisation of systems to the above accuracy may be permitted.

Annex A
Normative References

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