Defence
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TYPE AIRWORTHINESS ENGINEERING (TAE) 5000 SERIES REGULATORY ARTICLES

Military Aviation Authority

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5000 SERIES - TYPE AIRWORTHINESS ENGINEERING (TAE) REGULATORY ARTICLES

1. The RA 5000 series of RAs address the responsibility and authority for design and modification of Air Systems through either Service or contractor organizations. In the context of the RA 5000 Series the use of the term 'Product' is intended to reflect the type certificated elements of the military Air System, such as the aircraft, engine and/or propeller. Whereas the term 'Part' reflects those articles that are not type certificated but are approved and qualified by the relevant Design Organizations (DO); the term 'Appliance' reflects those articles that are otherwise certified.

2. The RA 5000 series defines the general requirements of the Delivery Teams and the DO in the design and certification of Air Systems (and related Products, Parts and Appliances). While the RA 5800 series forms the requirements to qualify for the issue or continuation of a Military Type Certificate (MTC) or military Design Organizational Approval, it does not negate the requirement to adhere to other applicable regulations within the RA 5000 Series. Of note; the RA 5800 series is based on the framework published in EMAR 21 – Certification of Military Aircraft and Related Products, Parts and Appliances, and Design and Production Organizations and its associated Acceptable Means of Compliance (AMC) and Guidance Material (GM). These RA are suffixed with 'MRP 21'.

3. The 5000 Series (TAE) RA are owned by D MAA. Tables 1 and 2 show the current and withdrawn Regulations respectively. The Rationale for withdrawal stated in these documents was correct at point of publish and it is incumbent on the user to check the references remain valid prior to use.

Table 1: 5000 Series (TAE) Regulatory Articles

RA NUMBER	RA DESCRIPTION	SUB RA
RA 5010	**Type Airworthiness Strategy**	5010(1): Type Airworthiness Strategy
RA 5011	**Type Airworthiness Safety Management System**	5011(1): Type Airworthiness Safety Management System
RA 5012	**Type Airworthiness Safety Assessment**	5012(1): Type Airworthiness Safety Assessment
RA 5013	**Air Safety Management of Equipment and Commodity Items**	5013(1): Air Safety Management of Equipment and Commodity Items
		5013(2): Air Safety Assessment of Equipment and Commodity Items
RA 5103	**Certificate of Design**	5103(1): Requirement and Scope for Certificate of Design
		5103(2): Management and Authorization of Certificates of Design
RA 5212	**Weight and Moment Determination**	5212(1): Aircraft Weight and Moment Determination
		5212(2): Propulsion System Weight and Moment Data
		5212(3): Propulsion System Production Weight and Moment
		5212(4): Measurement of Aircraft Weight and Moment
RA 5219	**Instrumentation and Flight Data Recorder Requirements for Flight Trials of Air Systems**	5219(1): Instrumentation and Flight Data Recorder Requirements
		5219(2): Identification of Instrumentation
►◄	►◄	►◄
RA 5301	**Air System Configuration Management**	5301(1): Configuration Management Principles
		5301(2): Configuration Management under Contractor Control
		5301(3): Configuration Management under Ministry Control
RA 5305	**In-Service Design Changes**	5305(1): In-Service Design Changes – General
		5305(2): In-Service Design Changes – Safety

RA NUMBER	RA DESCRIPTION	SUB RA
		5305(3): In-Service Design Changes – Modification Procedure
RA 5320	**Air System Maintenance Schedule – Design and Validation**	5320(1): Air System Maintenance Schedule – Design and Validation
RA 5405	**Special Instructions (Technical)**	5405(1): Special Instructions (Technical)
RA 5406	**Aircrew Publications**	5406(1): Aircrew Publications
		5406(2): Amendments to Aircrew Publications
RA 5407	**Support Policy Statement**	5407(1): Support Policy Statement
RA 5602	**Propulsion Systems Part Lifing, Critical and Common Pool Parts**	5602(1): Classification of Critical Parts
		5602(2): Determination of Critical Part Life
		5602(3): Control of Critical Parts
		5602(4): Quality Verification Tests and Acceptance and Test Criteria
		5602(5): Common Pool Parts
RA 5723	**Ageing Air System Audit**	5723(1): Ageing Air System Audit
RA 5724	**Life Extension Programme**	5724(1): Requirement for a Life Extension Programme
		5724(2): Development and Implementation of a Life Extension Programme
RA 5725	**Out of Service Date Extension Programme**	5725(1): Development and Implementation of an Out of Service Date Extension Programme
RA 5726	**Integrity Management**	5726(1): Integrity Management
		5726(2): Establishing Integrity Management
		5726(3): Sustaining Integrity Management
		5726(4): Validating Integrity
		5726(5): Recovering Integrity
		5726(6): Exploiting Integrity
RA 5805	**Airworthiness Directives and Service Bulletins (MRP Part 21 Subpart A)**	5805(1): Airworthiness Directives and Service Bulletins (MRP Part 21.A.3B)
RA 5810	**Military Type Certificate (MRP Part 21 Subpart B)**	5810(1): Certification of UK Military Registered Air Systems (MRP Part 21.A.11)
		5810(2): Demonstration of Capability (MRP Part 21.A.14)
		5810(3): Application (MRP Part 21.A.15)
		5810(4): Type Certification Basis (MRP Part 21.A.15)
		5810(5): Certification Programme (MRP Part 21.A.15)
		5810(6): Changes Requiring a New Military Type Certificate (MRP Part 21.A.19)
		5810(7): Compliance with the Type Certification Basis (MRP Part 21.A.20)
		5810(8): Issue of Military Type Certificate (MRP Part 21.A.21)
		5810(9): Issue of Restricted Military Type Certificate (MRP Part 21.A.21)
		5810(10): Type Design (MRP Part 21.A.31)
		5810(11): Inspections and Tests (MRP Part 21.A.33)
		5810(12): Flight Tests (MRP Part 21.A.35)

RA NUMBER	RA DESCRIPTION	SUB RA
		5810(13): Responsibilities of the Holder (MRP Part 21.A.44)
		5810(14): Transferability (MRP Part 21.A.47)
		5810(15): Duration and Continued Validity (MRP Part 21.A.51)
		5810(16): Record Keeping (MRP Part 21.A.55)
		5810(17): Manuals (MRP Part 21.A.57)
RA 5812	**Digital Models and Simulations Supporting Airworthiness-Related Decision-Making**	5812(1): Development and Assurance of Modelling and Simulation
		5812(2): Use of Modelling and Simulation to Claim Credit for Certification Evidence
RA 5815	**Instructions for Sustaining Type Airworthiness**	5815(1): Provision and Amendments to Instructions for Sustaining Type Airworthiness
RA 5820	**Changes in Type Design (MRP Part 21 Subpart D)**	5820(1): Classification of Changes in Type Design (MRP Part 21.A.91)
		5820(2): Application (MRP Part 21.A.93)
		5820(3): Approval of Minor Changes (MRP Part 21.A.95)
		5820(4): Approval of Major Changes (MRP Part 21.A.97)
		5820(5): Designation of Applicable Certification Specifications for Airworthiness (MRP Part 21.A.101)
		5820(6): Record Keeping (MRP Part 21.A.105)
RA 5825	**Fault Reporting and Investigation**	5825(1): Fault Reporting and Investigation
RA 5835	**Production Organizations (MRP Part 21 Subpart G)**	5835(1): Production Organizations
RA 5850	**Military Design Approved Organization (MRP Part 21 Subpart J)**	5850(1): Responsibilities of a Design Organization
		5850(2): Scheme Inclusion and Approval Award
		5850(3): Design Management System (MRP Part 21.A.239)
		5850(4): Design Organization Exposition
		5850(5): Approval Requirements (MRP Part 21.A.245)
		5850(6): Changes in Design Management System (MRP Part 21.A.247)
		5850(7): Investigations and Inspections (MRP Part 21.A.257)
		5850(8): Failures, Malfunctions and Defects
		5850(9): Findings (MRP Part 21.A.258)
		5850(10): Validity of Approval (MRP Part 21.A.259)
		5850(11): Privileges (MRP Part 21.A.263)
		5850(12): Designs using Government Furnished Equipment
		5850(13): Record Keeping
RA 5855	**Parts and Appliances (MRP Part 21 Subpart K)**	5855(1): Compliance with Applicable Requirements (MRP Part 21.A.303)
		5855(2): Release of Newly Produced Parts and Appliances for Installation (MRP Part 21.A.307)
RA 5865	**Repairs (MRP Part 21 Subpart M)**	5865(1): Scope (MRP Part 21.A.431A)
		5865(2): Demonstration of Capability (MRP Part 21.A.432B)
		5865(3): Classification of Repairs (MRP Part 21.A.435)
		5865(4): Repair Design (MRP Part 21.A.433)

RA NUMBER	RA DESCRIPTION	SUB RA
		5865(5): Issue of a Repair Design Approval (MRP Part 21.A.435)
		5865(6): Production of Repair Parts (MRP Part 21.A.439)
		5865(7): Repair Embodiment (MRP Part 21.A.441)
		5865(8): Limitations (MRP Part 21.A.442)
		5865(9): Unrepaired Damage (MRP Part 21.A.445)
		5865(10): Record Keeping (MRP Part 21.A.447)
RA 5875	**(European) Technical Standard Order (MRP Part 21 Subpart O)**	5875(1): (European) Technical Standard Order
RA 5880	**Military Permit to Fly (Development) (MRP Part 21 Subpart P)**	5880(1): Military Permit to Fly (Development)
		5880(2): Military Permit to Fly (Development) Procedure (MRP Part 21.A.707)
		5880(3): Flight Conditions (MRP Part 21.A.708)
		5880(4): Approval of Flight Conditions (MRP Part 21.A.710)
		5880(5): Issue of a Military Permit to Fly (Development) (MRP Part 21.A.711)
		5880(6): Changes (MRP Part 21.A.713)
		5880(7): Transferability (MRP Part 21.A.719)
		5880(8): Inspections (MRP Part 21.A.721)
		5880(9): Validity of Approval (MRP Part 21.A.723)
		5880(10): Renewal of Military Permit to Fly (Development) (MRP Part 21.A.725)
		5880(11): Obligations of the Holder of a Military Permit to Fly (Development) (MRP Part 21.A.727)
		5880(12): Record Keeping (MRP Part 21.A.729)
RA 5885	**Identification of Products, Parts and Appliances (MRP 21 Subpart Q)**	5885(1): Identification of Products
		5885(2): Withdrawn – Not applicable to Type Airworthiness Management
		5885(3): Identification of Parts and Appliances
		5885(4): Identification of Critical Parts
		5885(5): Withdrawn content subsumed into RA 5885(4)
►RA 5890	**Cyber Security for Airworthiness and Air Safety – Type Design and Changes / Repairs to Type Design**	5890(1): Cyber Security for Airworthiness and Air Safety – Type Design and Changes / Repairs to Type Design◄
-	**Manual of Air System Integrity Management**	

Table 2: Withdrawn 5000 Series (TAE) Regulatory Articles (not included in the 5000 Series combined document)

RA NUMBER	RA DESCRIPTION	SUB RA
RA 5001	**Certification and Release of Materiel**	5001(1): Withdrawn – content incorporated into RA 5103
		5001(2): Withdrawn – content duplicated in RA 5880
RA 5002	**Remotely Piloted Air Systems Type Airworthiness Engineering Regulations**	5002(1): Withdrawn – Incorporated into the RA 1600 series
		5002(2): Withdrawn – Incorporated into the RA 1600 series
		5002(3): Withdrawn – Incorporated into the RA 1600 series
		5002(4): Withdrawn – Incorporated into the RA 1600 series
		5002(5): Withdrawn – Incorporated into the RA 1600 series
		5002(6): Withdrawn – Incorporated into the RA 1600 series
		5002(7): Withdrawn – Incorporated into the RA 1600 series
		5002(8): Withdrawn – Incorporated into the RA 1600 series
		5002(9): Withdrawn – Incorporated into the RA 1600 series
		5002(10): Withdrawn – Incorporated into the RA 1600 series
		5002(11): Withdrawn – Incorporated into the RA 1600 series
RA 5101	**Design Approved Organization Scheme (DAOS) Approval Procedures and Responsibilities**	5101(1): Withdrawn – Incorporated into RA 5850
		5101(2): Withdrawn – Incorporated into RA 5850
		5101(3): Withdrawn – Incorporated into RA 5850
RA 5102	**Design and Development Responsibilities**	5102(1): Withdrawn – Incorporated into RA 5850
		5102(2): Withdrawn – Incorporated into RA 5850
		5102(3): Withdrawn – Incorporated into RA 5850
		5102(4): Withdrawn – Incorporated into RA 5850
		5102(5): Withdrawn – Incorporated into RA 5850
RA 5104	**Material Specification**	5104(1): Withdrawn - Def Stan 00-970 Part 1/15 Section 3 refers
RA 5105	**Requalification and Production Testing**	5105(1): Withdrawn – Incorporated into RA 5203
		5105(2): Withdrawn – Incorporated into RA 5203
RA 5106	**Aircraft Contractors' Responsibilities**	5106(1): Withdrawn – Not deemed regulatory material
		5106(2): Withdrawn – Not deemed regulatory material
		5106(3): Withdrawn – Not deemed regulatory material
		5106(4): Withdrawn – Not deemed regulatory material
RA 5107	**Aircraft Repair Schemes**	5107(1): Withdrawn – Incorporated into RA 5865
		5107(2): Withdrawn – Incorporated into RA 5865
		5107(3): Withdrawn – Incorporated into RA 5865
RA 5201	**Interchangeability**	5201(1): Withdrawn – Incorporated into RA 5885
RA 5202	**Certification for Flight Trials**	5202(1): Withdrawn – Incorporated into RA 5880
		5202(2): Withdrawn – Incorporated into RA 5880
RA 5203	**Materiel Specifications**	5203(1): Withdrawn – Not deemed regulatory material
		5203(2): Withdrawn – Not deemed regulatory material
		5203(3): Withdrawn – Not deemed regulatory material
RA 5204	**Information for Installation of Aircraft or Remotely Piloted Air Systems Equipment**	5204(1): Withdrawn – Not deemed regulatory material

RA NUMBER	RA DESCRIPTION	SUB RA
RA 5205	**Reporting of Mass for Aircraft Equipment**	5205(1): Withdrawn – Incorporated into RA 5212
RA 5206	**Sampling Procedure for In-Service Materiel**	5206(1): Withdrawn – Content duplicated in RA 5726
RA 5207	**Identification under the NATO Codification System**	5207(1): Withdrawn - Def Stan 00-970 Part 1/15 Section 3 refers
RA 5208	**Testing of Experimental and Development Aircraft Equipment**	5208(1): Withdrawn – Not deemed regulatory material
		5208(2): Withdrawn – Not deemed regulatory material
		5208(3): Withdrawn – Not deemed regulatory material
		5208(4): Withdrawn – Not deemed regulatory material
RA 5209	**Relationship between Service Units, MOD and Contractors in the Development of Materiel**	5209(1): Withdrawn – Not deemed regulatory material
RA 5211	**Mock-Ups and Working Rigs**	5211(1): Withdrawn – Not deemed regulatory material
		5211(2): Withdrawn – Not deemed regulatory material
RA 5213	**Final Examinations and Conferences**	5213(1): Withdrawn – Not deemed regulatory material
RA 5214	**Schedule of Equipment – Appendix A to the Aircraft Specification**	5214(1): Withdrawn – Not deemed regulatory material
RA 5215	**Provision of Miscellaneous Data during Development**	5215(1): Withdrawn – Not deemed regulatory material
		5215(2): Withdrawn – Not deemed regulatory material
		5215(3): Withdrawn – Not deemed regulatory material
		5215(4): Withdrawn – Not deemed regulatory material
		5215(5): Withdrawn – Not deemed regulatory material
		5215(6): Withdrawn – Not deemed regulatory material
		5215(7): Withdrawn – Not deemed regulatory material
		5215(8): Withdrawn – Not deemed regulatory material
		5215(9): Withdrawn – Not deemed regulatory material
RA 5216	**Contractor Participation in MOD Flight Testing**	5216(1): Withdrawn – Not deemed regulatory material
RA 5217	**Testing of Pre-Production Aircraft**	5217(1): Withdrawn – Not deemed regulatory material
		5217(2): Withdrawn – Not deemed regulatory material
		5217(3): Withdrawn – Not deemed regulatory material
RA 5218	**Testing of Production Aircraft**	5218(1): Withdrawn – Not deemed regulatory material
		5218(2): Withdrawn – Not deemed regulatory material
►RA 5220	**Special Flying Instructions and Restrictions on Flying◄**	5220(1): Issue of Special Flying Instructions◄
RA 5221	**Traceability of Aircraft Identifiable Parts**	5221(1): Withdrawn – Incorporated into RA 5885
RA 5222	**Development Trials of Weapon Materiel**	5222(1): Withdrawn – Content duplicated in RA 5103 Annex C and Def Stan 07-085
RA 5223	**Trials to Assess the Safety of Weapons Materiel**	5223(1): Withdrawn – Content duplicated in RA 5103 Annex C and Def Stan 07-085
RA 5302	**Design Records**	5302(1): Withdrawn – Not deemed regulatory material
RA 5303	**Local Technical Committee**	5303(1): Withdrawn – content transferred to RA 5301
		5303(2): Withdrawn – content transferred to RA 5301
RA 5304	**Configuration Control Board**	5304(1): Withdrawn – content transferred to RA 5301

RA NUMBER	RA DESCRIPTION	SUB RA
RA 5306	**Draft Modification Leaflets**	5306(1): Withdrawn – No longer deemed appropriate
RA 5307	**Identification and Recording of Design and Modification States of Materiel**	5307(1): Withdrawn – Not deemed regulatory material
		5307(2): Withdrawn – Not deemed regulatory material
		5307(3): Withdrawn – Not deemed regulatory material
		5307(4): Withdrawn – Not deemed regulatory material
RA 5308	**Service Modifications**	5308(1): Withdrawn – No longer deemed appropriate
		5308(2): Withdrawn – No longer deemed appropriate
		5308(3): Withdrawn – No longer deemed appropriate
RA 5309	**Fatigue Type Record for Aircraft**	5309(1): Withdrawn – Refer to the Manual of Air System Integrity Management
RA 5310	**Hazard Warning Marking of Guided Missiles and their Explosive Parts**	5310(1): Withdrawn – Content duplicated in Def Stan 07-085 Chapter 10.7
RA 5311	**Configuration Management - Project Team**	5311(1): Withdrawn – Content transferred to RA 5301
RA 5312	**In-Service Design Changes**	5312(1): Withdrawn – content transferred to RA 5305
RA 5313	**Design Modifications**	5313(1): Withdrawn – content transferred to RA 5305
RA 5401	**Provision of Technical Information**	5401(1): Withdrawn – Pertinent Regulation transferred to RA 5815 - Instructions for Sustaining Type Airworthiness
		5401(2): Withdrawn – Pertinent Regulation transferred to RA 5815 - Instructions for Sustaining Type Airworthiness
		5401(3): Withdrawn – Pertinent Regulation transferred to RA 5815 - Instructions for Sustaining Type Airworthiness
		5401(4): Withdrawn – Pertinent Regulation transferred to RA 5815 - Instructions for Sustaining Type Airworthiness
RA 5402	**Validation and Verification of Service Technical Publications**	5402(1): Withdrawn – Incorporated into RA 5401(2)
		5402(2): Withdrawn – Incorporated into RA 5401(3)
RA 5403	**Amendments to Service Technical Publications**	5403(1): Withdrawn – Incorporated into RA 5401(4)
RA 5404	**Fault Reporting and Investigation for Contractors**	5404(1): Withdrawn – Pertinent content transferred to RA 5850 - Military Design Organization Approval and RA 5825 - Fault Reporting and Investigation
		5404(2): Withdrawn – Pertinent content transferred to RA 5850 - Military Design Organization Approval and RA 5825 - Fault Reporting and Investigation
		5404(3): Withdrawn – Pertinent content transferred to RA 5850 - Military Design Organization Approval and RA 5825 - Fault Reporting and Investigation
RA 5501	**Issue of MOD Owned Equipment**	5501(1): Withdrawn – Not deemed regulatory material
		5501(2): Withdrawn – Not deemed regulatory material
		5501(3): Withdrawn – Not deemed regulatory material
RA 5502	**Air System Maintenance Documentation, Forms and Certificates**	5502(1): Withdrawn – Refer to the Manual of Airworthiness Maintenance – Documentation
		5502(2): Withdrawn – Refer to the Manual of Airworthiness Maintenance – Documentation
RA 5503	**Loans of Aircraft for Demonstration by Contractors**	5503(1): Withdrawn – Incorporated into RA 1125
		5503(2): Withdrawn – Incorporated into RA 1125
		5503(3): Withdrawn – Incorporated into RA 1125
		5503(4): Withdrawn – Incorporated into RA 1125

RA NUMBER	RA DESCRIPTION	SUB RA
RA 5601	**Propulsion System Design and Certification**	5601(1): Withdrawn – No longer deemed appropriate
		5601(2): Withdrawn – No longer deemed appropriate
		5601(3): Withdrawn – No longer deemed appropriate
RA 5603	**Design Change Approval and Validation of Modifications**	5603(1): Withdrawn – Content duplicated in RA 5303, RA 5304 and RA 5615
RA 5604	**Flight Clearance of Non-Production Standard Propulsion Systems**	5604(1): Withdrawn – Not deemed regulatory material
RA 5605	**Engine Specification**	5605(1): Withdrawn – Content duplicated in RA 5203
RA 5607	**Mass and Centre of Gravity Data of Aircraft Engines and Jet Pipes**	5607(1): Withdrawn – Incorporated into RA 5601(2) and RA 5615(3)
RA 5608	**Engine and Jet Pipe Mock-Ups and Installation Jigs**	5608(1): Withdrawn – Not deemed regulatory material
RA 5610	**Technical Documentation for Engines and Accessories**	5610(1): Withdrawn – Content duplicated in Def Stan 00-600
RA 5612	**Allotment and Movement of Engines**	5612(1): Withdrawn – Not deemed regulatory material
RA 5613	**Reporting Procedures for Movement and Serviceability of Engines and Modules**	5613(1): Withdrawn – Not deemed regulatory material
RA 5614	**Repair/Salvage Schemes for Engines and Associated Equipment**	5614(1): Withdrawn – Not deemed regulatory material
RA 5615	**Propulsion System Production Design Assurance**	5615(1): Withdrawn – Content transferred to RA 5602
		5615(2): Withdrawn – Content transferred to RA 5602
		5615(3): Withdrawn – Content transferred to RA 5212
		5615(4): Withdrawn – Content transferred to RA 5602
RA 5616	**Drawing Procedure, Control of Designs and Design Records**	5616(1): Withdrawn – Content duplicated in RA 5301, RA 5810 and Def Stan 05-10 Part 1
RA 5617	**Post Delivery Fault Reporting and Investigation**	5617(1): Withdrawn – Content duplicated in RA 5404
RA 5720	**Structural Integrity Management**	5720(1): Withdrawn – Incorporated into RA 5726
		5720(2): Withdrawn – Incorporated into RA 5726
		5720(3): Withdrawn – Incorporated into RA 5726
		5720(4): Withdrawn – Incorporated into RA 5726
		5720(5): Withdrawn – Incorporated into RA 5726
		5720(6): Withdrawn – Incorporated into RA 5726
RA 5721	**Systems Integrity Management**	5721(1): Withdrawn – Incorporated into RA 5726
		5721(2): Withdrawn – Incorporated into RA 5726
		5721(3): Withdrawn – Incorporated into RA 5726
		5721(4): Withdrawn – Incorporated into RA 5726
		5721(5): Withdrawn – Incorporated into RA 5726
		5721(6): Withdrawn – Incorporated into RA 5726
RA 5722	**Propulsion Integrity Management**	5722(1): Withdrawn – Incorporated into RA 5726
		5722(2): Withdrawn – Incorporated into RA 5726
		5722(3): Withdrawn – Incorporated into RA 5726
		5722(4): Withdrawn – Incorporated into RA 5726
		5722(5): Withdrawn – Incorporated into RA 5726

RA NUMBER	RA DESCRIPTION	SUB RA
		5722(6): Withdrawn – Incorporated into RA 5726
RA 5800	**General Requirements – Delivery Teams and Organizations (MRP 21)**	5800(1): Withdrawn – Not deemed regulatory material and the guidance material transferred to the Table of Contents
		5800(2): Withdrawn – Not deemed regulatory material and the guidance material transferred to the Table of Contents
RA 5840	**Certificate of Airworthiness (MRP 21 Subpart H)**	5840(1): Withdrawn – Not deemed regulatory material

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RA 5010 - Type Airworthiness Strategy

Rationale

A Type Airworthiness (TAw) Strategy is required for each Air System type to set down the intended approach to Type-related Air Safety and the demonstration and sustainment of TAw through life. Not having the TAw Strategy in place may result in key stakeholders not being sufficiently aware of the TAw management details for each Air System, resulting in the lack of evidence necessary to support TAw decision making. This Regulatory Article (RA) sets out the requirements and processes necessary to support the TAw Strategy.

Contents

Regulation 5010(1)

Type Airworthiness Strategy

5010(1) The TAw Authority (TAA) or TAw Manager (TAM)[1] **shall** ►establish◄ and maintain a through life TAw Strategy for an Air System[2] that supports the Air System Safety Case (ASSC)[3].

Acceptable Means of Compliance 5010(1)

Type Airworthiness Strategy

1. Under arrangements for Civilian Operated Air Systems which invoke a TAA and TAM►[4]◄, the TAA **should** ►establish◄ a TAw Strategy. Under arrangements for Special Case Flying[1], the TAM **should** prepare a TAw Strategy.

2. The TAw Strategy **should** be:

   a. Approved by the Defence Equipment and Support (DE&S) Operating Centre Director (OCD) or Sponsor at project initiation.

   b. Updated as the project matures in line with ASSC[3] requirements and to support ►the◄ Release To Service, ►Military Permit To Fly (MPTF) (Development),◄ MPTF (In-Service) or MPTF (Special Case Flying) issue.

   c. Reviewed on the succession of the TAA, TAM, OCD or Sponsor, or on the requirement to undertake significant TAw Strategy updates. The review **should** ensure that the TAw strategy remains valid and continues to support the ASSC[3] argument(s).

   d. Reviewed in line with the ASSC.

   e. Updated by the TAA or TAM and approved by the OCD or Sponsor.

   f. ►Authorized◄ by TAA or TAM►[4]◄, and approved by the OCD or Sponsor, within 6 months of ►any change of these personnel.◄

3. The TAA or TAM **should** ensure that:

   a. Key stakeholders[5] are invited to comment on initial issue of the TAw Strategy and on significant update[6], prior to approval.

   b. Key stakeholders are informed of routine updates[6] to the TAw Strategy when approved by OCD or Sponsor.

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[1] Where the Air System is not UK MOD-owned, TAw management regulatory Responsibility by either the TAA or TAM needs to be agreed within the Sponsor's approved model; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems.

[2] Open Category and Specific S1 sub-category Remotely Piloted Air Systems (RPAS) do not require a TAw Strategy. Specific S2 sub-category and Certified Category RPAS require a TAw Strategy. Refer to RA 1600 Series – Remotely Piloted Air Systems.

[3] Refer to RA 1205 – Air System Safety Cases.

[4] ►Where both a TAA and TAM exist, both **should** sign the TAw Strategy.◄

[5] Key stakeholders include (but are not limited to) the Senior Responsible Owner (SRO), Aviation Duty Holders (ADH), Accountable Manager (Military Flying) (AM(MF)), the relevant Release To Service Authority (RTSA), DE&S Airworthiness Team and the ►Military Aviation Authority (MAA) via DSA-MAA-OA-ACC@mod.gov.uk.◄

[6] The definition of significant and routine update to TAw Strategy is at the discretion of the OCD or Sponsor, as described in the Guidance Material of this RA.

Acceptable Means of Compliance 5010(1)

4. The TAA or TAM **should** ensure that the TAw Strategy includes:

a. A clearly defined context, scope and boundary, including a declaration of the In-Service Date, Out of Service Date, and the intended military use of the Air System[7] ►◄.

b. The delegation of Responsibilities between the TAA and TAM, if applicable.

c. The approach to establishing and sustaining an effective Air Safety Management System (ASMS)[8] with appropriate interfaces.

d. Detail on the approach to establishing the Type Design[9] and managing in-Service design changes[10, 11].

e. The approach for ensuring the use of Airworthiness competent organizations and persons[12, 13].

f. The approach to assurance and review of TAw management activities, including Quality Management Systems, Independent Technical Evaluation►[14]◄, Independent Safety Auditing►[14]◄ and independent review of publications.

g. Detail on the approach to delivering and sustaining the Air System TAw through proactive Integrity Management[15], reactive Fault and Occurrence investigation[16] and Hazard Management activity[17].

h. Identification and approach to integration of equipment and systems that are included within the Type Airworthiness Safety Assessment (TASA)[17, 18] but are managed or supplied by other TAw organizations[19].

i. The approach to Configuration Management[20] and Air System Document Set management[21, 22].

j. The approach to Airworthiness Information Management[23] and Data Exploitation[24].

k. The approach to production acceptance, including an overview of oversight and how production concessions and Waivers will be managed[25].

l. The approach for assessing and ensuring sufficient human and capital resource to conduct the required tasks.

Guidance Material 5010(1)

Type Airworthiness Strategy

5. The TAw Strategy facilitates the following management elements:

a. Identification and development of project-specific TAw and Safety-related standards, guidelines, procedures and training, including addressing all Airworthiness related standards that the TAA or TAM expects to employ to demonstrate compliance with the Type Certification Basis[9, 10]. Where a Military

[7] Including sufficient Air Safety consideration of the integration of equipment to support Air System operation. Refer to RA 1340 – Equipment Not Basic to the Air System.
[8] Refer to RA 1200 – Air Safety Management and RA 5011 – Type Airworthiness Safety Management System.
[9] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B).
[10] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D).
[11] Refer to RA 5305 – In-Service Design Changes.
[12] Refer to RA 1002 – Airworthiness Competent Persons.
[13] Refer to RA 1005 – Contracting with Competent Organizations.
[14] ►Refer to the Knowledge In Defence (KiD) website.◄
[15] Refer to RA 5726 – Integrity Management.
[16] Refer to RA 5825 – Fault Reporting and Investigation.
[17] Refer to RA 5011 – Type Airworthiness Safety Management System.
[18] Refer to RA 5012 – Type Airworthiness Safety Assessment.
[19] Refer to RA 5013 – Air Safety Management of Equipment and Commodity Items.
[20] Refer to RA 5301 – Air System Configuration Management.
[21] Refer to RA 1310 – Air System Document Set
[22] Refer to RA 5815 – Instructions for Sustaining Type Airworthiness.
[23] Refer to RA 1223 – Airworthiness Information Management
[24] Refer to RA 1207 – Air Safety Data Management and Exploitation
[25] Refer to RA 5835 – Production Organizations ►(Part 21 Subpart G).◄

Guidance Material

5010(1)

Type Certificate is not awarded, the approach is likely to be based on Defence Standard (Def Stan) 00-970[26] unless otherwise agreed with the MAA.

b. Ensuring that resource provision is sufficient to produce and sustain an airworthy design by carrying out necessary engineering and Safety Management activities.

c. Articulating the relationship (contractual or otherwise) with, and requirements placed upon, stakeholder organizations for the generation of the TASA. These may include the Front Line Command (FLC), Capability SRO, current or future ADH or AM(MF), the Design and Production Organizations, the appropriate Test and Evaluation (T&E) organization[27], the Military Continuing Airworthiness Manager (Mil CAM), Defence Aircrew Publications Squadron, and other relevant contractors and other defence equipment organizations (eg Commodity Delivery Teams[19]).

d. Where the TAA or TAM proposes either using evidence supporting a civil Type Certificate or claiming credit for the certification activities of another military regulator, details will be provided in the TAw Strategy, along with a statement of intent to use MAA recognition if applicable.

Users of the TAw Strategy

6. The TAA or TAM will generate their TAw Strategy to guide their planning of the acquisition of and support to the Air Systems under their Responsibility. The TAA or TAM will use the Strategy to lay out how they will satisfy their Airworthiness Responsibilities.

7. The associated OCD or Sponsor will use the document to approve the TAA or TAM approach to delivering airworthy Air Systems. The OCD or Sponsor's Approval of the TAw Strategy represents their endorsement that TAw aspects of the programme are viable.

The Airworthiness Strategy through the CADMID/T[28] Cycle

8. The TAw Strategy is particularly important in the early stages of the CADMID/T cycle. The first issue of the TAw Strategy will be available before Outline Business Case (OBC). Thereafter it will evolve throughout the life of the project, remaining relevant through to disposal.

9. At OBC, the TAw Strategy is expected to indicate basic details of the policies and approach that the TAA or TAM intends to adopt throughout the life of the Air System. By Full Business Case (FBC), the TAw Strategy is expected to be further refined to accurately provide the context, policies and processes adopted by the TAA or TAM.

10. The TAA or TAM requirement to review the TAw Strategy in line with ASSC review will need to be an auditable review, but may conclude that an update to the TAw strategy is not required at time of review.

11. The definition of a significant update to TAw Strategy (which therefore requires stakeholder comment before approval) is at the discretion of the OCD or Sponsor, but is likely to include any of the following circumstances:

a. Changes in scope or approach to the delivery of TAw (perhaps because the assumptions that were made in the original TAw Strategy proved to be incorrect).

b. Changes in commercial arrangements that have the potential to impact Air Safety.

c. Significant changes in the Air System operating environment and / or usage.

[26] Refer to Def Stan 00-970 – Certification Specifications for Airworthiness.
[27] Refer to RA 2370 – Test and Evaluation.
[28] The Concept, Assessment, Demonstration, Manufacture, In-Service and Disposal (CADMID) Cycle. In some cases, Termination of service is more appropriate than Disposal.

Guidance Material 5010(1)

d. Planning the delivery of Airworthiness in a new stage of the CADMID/T cycle.

e. Significant changes in legislation, Regulation or policy.

RA 5011 - Type Airworthiness Safety Management System

Rationale

A comprehensive Air Safety Management System (ASMS)[1] is necessary to deliver a systematic, pro-active and auditable approach to Air Safety and enable the delivery of effective operational capability. Type Airworthiness (TAw) organizations have specific Safety Management System (SMS) requirements which must interface effectively with other adjoining ASMS. An ineffective TAw SMS is likely to compromise TAw. This RA sets out the specific requirements for a TAw SMS to include all activity and decision-making key to managing TAw and Hazards in support of the Air System Safety Case (ASSC)[2].

Contents

Regulation 5011(1)

Type Airworthiness Safety Management System

5011(1) The TAw Authority (TAA) and / or TAw Manager (TAM)[3] **shall** be responsible for the Safety Management of TAw activity.

Acceptable Means of Compliance 5011(1)

Type Airworthiness Safety Management System

1. The TAA and / or TAM **should** develop, own and manage an SMS[1], which is described in a Safety Management Plan (SMP) detailing how the TAw Strategy[4] is enacted.

2. During the generation and management of the SMP, the TAA and / or TAM **should** consult with all relevant stakeholders[5].

3. The SMP, articulating the requirements of RA 1200[1], **should** be integrated and coordinated with relevant Safety Management documentation generated by the Design Organization (DO)[6] to cover their activities[7]. The SMP **should** also articulate interaction with relevant Commodity Delivery Team SMS[8].

Hazard Management Process

4. As part of the SMP, the TAA and / or TAM **should** implement a standardized process to identify, review, manage and record all TAw Hazards[9].

5. The Hazard management process **should** account for an overall Air System approach (eg Hazards identified through Type Certification activity[10], In-Service civil or military usage, and emerging Hazards).

6. The Hazard management process **should** be conducted in line with the recognized principles of Risk Management[11].

7. As a subset of this Hazard management process[12], when a Hazard is identified that may lead to a Risk to Life (RtL)[13], the TAA and / or TAM **should** communicate this to all relevant stakeholders[5] and obtain formal acknowledgement.

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[1] Refer to RA 1200 – Air Safety Management.
[2] Refer to RA 1205 – Air System Safety Cases.
[3] Refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems and RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems.
[4] Refer to RA 5010 – Type Airworthiness Strategy.
[5] Necessary stakeholders for the communication of TAw SMS activity, depending on the phase of the project and approach to delivery, are likely to include the Senior Responsible Owner (SRO), Aviation Duty Holders (ADH), Accountable Manager (Military Flying) (AM(MF)), Defence Equipment and Support (DE&S) Operating Centre (OC) Director, Sponsor, and all relevant TAA, TAM and Commodity Chief Engineers (CE).
[6] The DO is required to develop an SMP in accordance with (iaw) Def Stan 00-056.
[7] Refer to RA 1014 – Design Organizations and Co-ordinating Design Organizations – Airworthiness Responsibilities.
[8] Refer to RA 5013 – Air Safety Management of Equipment and Commodity Items.
[9] MAA02 provides definitions for Risk to Life, Hazard and Risk which are to be used in conjunction with this RA.
[10] If Type Certification activity has not been undertaken, Hazards identified through DO Safety Analysis **should** be accounted for.
[11] Refer to Manual of Air Safety (MAS), Figure 4 – The Risk Management Cycle.
[12] RA 1210 specifically excludes damage to assets where no injury results, but Hazards leading to such damage still require management.
[13] Refer to RA 1210 – Ownership and Management of Operating Risk (Risk to Life).

Acceptable Means of Compliance 5011(1)

Type Airworthiness Safety Panel (TAwSP)

8. The TAA or TAM **should** establish and chair a TAwSP every six months, with the appropriate stakeholder attendance, to coordinate and manage the SMS. The TAwSP **should** review the continued validity of the Type Airworthiness Safety Assessment Report and the sufficiency of supporting products[14, 15].

9. Under arrangements for Civilian Operated Air Systems which invoke a TAA and TAM[3], the TAA **should** chair the TAwSP. Under arrangements for Special Case Flying, the TAM **should** chair the TAwSP.

10. The TAA or TAM **should** ensure that the TAwSP:

a. Reviews Hazard management activities and ensures ADH / AM(MF) agreement that Hazards which may lead to a RtL have been communicated.

b. Reviews relevant design changes[16] for impact on activities within the SMP.

c. Provides advice to the appropriate SRO, Operating Duty Holder (ODH), AM(MF) and their staff in support of the ASSC.

d. Reviews independent evaluation and Assurance activity.

e. Reviews Instructions for Sustaining Type Airworthiness[17] and Data Exploitation[18].

f. Co-ordinates the SMP.

11. To support the TAwSP, the TAA or TAM **should** ensure they are suitably represented at equivalent DO Safety Management meetings[19].

Independent Audit

12. The TAA and / or TAM **should** ensure that the TAw SMS and its outputs are subjected to audit iaw Defence Standard (Def Stan) 00-056, by a competent and suitably qualified Independent Safety Auditor (ISA), independent of the outcome or processes they are reviewing.

Guidance Material 5011(1)

Type Airworthiness Safety Management System

13. RA 1200 requires all ADH-Facing organizations to have an ASMS[1]. This RA supports and complements the standing ASMS requirements by highlighting aspects which require specific TAw focus.

Hazard Management Process

14. The TAA and / or TAM is expected to manage a variety of Hazards to ensure that the Air System can be operated without significant Hazard. A subset of this Hazard management activity is the management of Hazards associated with RtL, which require management at ADH / AM(MF) level. In these cases, the TAA / TAM will propose an As Low As Reasonably Practicable position and communicate this to the ADH / AM(MF), for formal acknowledgement and a decision on tolerability.

15. The recording of TAw Hazards is best achieved through a Hazard Log[20] that supports the legal requirement for an ADH / AM(MF) to ensure that Risk Assessments are carried out[13]. Hazard attributes will, therefore, need to complement their standardized approach to managing RtL.

16. A Hazard Log accounts for Hazards, a subset of which contribute to RtL. It is expected to incorporate information from a number of Hazard data sources.

[14] Refer to RA 5012 – Type Airworthiness Safety Assessment.
[15] Refer to RA 5013 – Air Safety Management of Equipment and Commodity Items.
[16] Refer to RA 5305(2): In-Service Design Changes – Safety.
[17] Refer to RA 5815 – Instructions for Sustaining Type Airworthiness.
[18] Refer to RA 1207 – Air Safety Data Management and Exploitation.
[19] Such as a DO Project Safety Committee (PSC).
[20] As defined within MAA02, the term Hazard Log refers to the approach, not a specific tool. It accommodates a range of tools which can be used to record and manage Risk.

Guidance Material 5011(1)

17. Where Hazards are managed by external organizations, including where the Air System DO manages the Type Certificate, the Hazard Log will need to incorporate information resulting from clear and robust interfaces with these organizations.

18. The Hazard Log may need to absorb information on transient / emerging Hazards, due to DE&S driven Occurrence / Fault investigations, global Faults which have not yet been addressed by appropriate mandatory, advisory and deferred instructions[21], or proactive investigations identified through Integrity management activity. This allows the transient Hazard to be assessed and communicated to the SRO, ADH or AM(MF).

19. To fully identify Hazards, TAAs and / or TAMs will need to consider any exemptions and concessions attached to a Type Certificate, as well as additional Hazards caused by certification non-compliances and changes in context from a previously certified civil or military usage.

TAwSP

20. The TAwSP may be referred to by a different title (such as a Platform or Project Safety Panel), providing all regulatory requirements are appropriately met.

21. The TAwSP will include representatives from the following areas as appropriate:

a. The TAA and / or TAM organization (technical, contracts and finance officers as required).

b. Other relevant TAA, TAM or Commodity CE.

c. Front Line Command Capability Organization.

d. Continuing Airworthiness Management Organization.

e. Release To Service (RTS) Authority.

f. ADH and AM(MF).

g. Co-ordinating Design Organization (CDO) / DO.

h. The appropriate Test and Evaluation organization.

i. Defence Aircrew Publications Squadron or competent appointed contractor.

j. ISA.

k. DE&S OC Safety Team.

l. Specialist advisers where appropriate.

22. The SRO, ADH or AM(MF) involvement with the TAwSP will vary dependant on project phase. For each phase the relative role of the TAA and / or TAM, Commodity CE, SRO, ADH or AM(MF) will need to be described in the SMP, and when appropriate, in an Internal Business Agreement (or equivalent).

23. To support the TAwSP the TAA and / or TAM may establish one or more Working Groups (WGs) (proportionate to the scale of the Project). Possible examples include a WG to assess Hazards or review the Integrity of specific systems.

Independent Audit

24. ISA assurance will cover such activities as (but not limited to) the TAwSP and supporting products, RTS WG, TAA and / or TAM organizational processes, and DO Safety Management documentation.

25. Care will need to be taken to ensure that independent auditing of the TAw SMS is undertaken by demonstrably Suitably Qualified and Experienced Person(s) or organization(s) that are not unduly influenced by commercial, peer or rank / status pressures.

26. Def Stan 00-056 states that the appointment of an ISA will be at the sole discretion of the MOD. Early appointment will allow the ISA to engage with the DO and

[21] Such as Airworthiness Directive or Service Bulletin activity. Refer to RA 5805 – Airworthiness Directivies and Service Bulletins (MRP Part 21 Subpart A).

Guidance Material 5011(1)

better assess early versions of the SMP, assist with tendering and provide Safety advice throughout the project's life. The ISA could also provide generic Safety advice about the TAw SMS to the Type Airworthiness organization, the DO and other stakeholders.

27. It is acceptable for the ISA and Independent Technical Evaluator (ITE[14]) to be involved in the joint working environment between the TAw organization and DO; for example in a Hazard Log WG or in a Combined Test Team approach. Duplication of effort will be avoided if the ISA and ITE work collaboratively with the MOD and DO so that their assessments can be incorporated in the overall project schedule.

28. It is important that the ISA and ITE work is conducted on behalf of the TAA and / or TAM and that any advice they may have about the design and / or Safety is directed to them.

RA 5012 - Type Airworthiness Safety Assessment

Rationale

Type Airworthiness (TAw) is a key element of an Air System Safety Case (ASSC)[1]. A Type Airworthiness Safety Assessment (TASA) will provide a reasoned and evidenced argument that the Air System is safe to operate in a clearly defined context. Failure to articulate a comprehensive argument supported by evidence is likely to undermine the ASSC. This RA sets out the specific requirements for a TASA to include claims, arguments and evidence, subject to independent evaluation and Assurance, in support of the ASSC.

Contents

Regulation 5012(1)

Type Airworthiness Safety Assessment

5012(1) The TAw Authority (TAA) or TAw Manager (TAM)[2] **shall** own and manage a TASA.

Acceptable Means of Compliance 5012(1)

Type Airworthiness Safety Assessment

1. The TAA or TAM **should** initiate and maintain a TASA for each Air System type they have responsibility for[3].

2. Under arrangements for Civilian Operated Air Systems which invoke a TAA and TAM[4], the TAA **should** maintain the TASA and produce the necessary TASAR. Under arrangements for Special Case Flying[2], the TAM **should** maintain the TASA and produce the necessary TASAR.

3. The TASA **should** consist of a claim (or number of claims), a structured and explicit argument, and supporting body of evidence, that together provide a compelling, comprehensible and valid case in support of the ASSC that the Air System is safe to operate within defined limits.

4. The TAA or TAM **should** ensure that regardless of structure, the TASA:

   a. Defines the configuration and operating environment (referencing the Statement of Operating Intent / Statement of Operating Intent and Usage[5]) of the applicable Air System.

   b. Has scope and boundaries aligned with those defined in the TAw Strategy[6].

   c. Describes the Safety requirements, targets and attributes.

   d. Provides a justification for the Airworthiness of the design.

   e. Is supported by Safety analysis[7].

   f. Identifies the limitations and procedures[8] necessary to achieve the required level of Safety for the subject configuration.

   g. Takes account of the Minimum Equipment List if applicable[9].

Type Airworthiness Safety Assessment Report

5. The TASA **should** be summarized in a Type Airworthiness Safety Assessment Report (TASAR).

6. The TASAR **should** be produced to support the ASSC[1] as part of the Military Aircraft Registration activation request.

7. The TASAR **should** be updated as a complete new issue:

[1] Refer to RA 1205 – Air System Safety Cases.
[2] Refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems.
[3] A single TASA can be maintained to cover variations in the Type Design providing the assessment of each variation is clear, whether using a compatibility matrix or other method.
[4] Refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems.
[5] Refer to RA 5726 – Integrity Management.
[6] Refer to RA 5010 – Type Airworthiness Strategy.
[7] Refer to Def Stan 00-056 – Safety Management Requirements for Defence Systems.
[8] Including where appropriate reference to the Support Policy Statement. Refer to RA 5407 – Support Policy Statement.
[9] Refer to RA 1300 – Release To Service.

Acceptable Means of Compliance 5012(1)

a. At least every 5 years for an In-Service Air System.

b. Following Major Type Design Change (TDC)[10].

c. Additionally, as determined by the TAA or TAM.

8. For all other Air System changes, the TASAR **should** be reviewed and updated with an Addendum to the previous Report, ensuring that the content of the addendum does not alter the validity of the claims, arguments and evidence within the TASAR main body.

9. The TAA or TAM **should** make a declaration regarding the validity of the TASAR and any addenda at the Type Airworthiness Safety Panel[11]. If this declaration cannot be made then a new issue of the TASAR **should** be produced.

Independent Evaluation and Audit

10. The TAA or TAM **should** ensure that the TASA is subjected to evaluation by a competent and suitably qualified Independent Technical Evaluator (ITE), independent of the outcome or processes they are reviewing, and recognized by the TAA or TAM as a Subject Matter Expert in the field which is being reviewed.

11. The TAA or TAM **should** ensure that the TASA is subjected to Audit in accordance with Defence Standard (Def Stan) 00-056, by a competent and suitably qualified Independent Safety Auditor (ISA), independent of the outcome or processes they are reviewing.

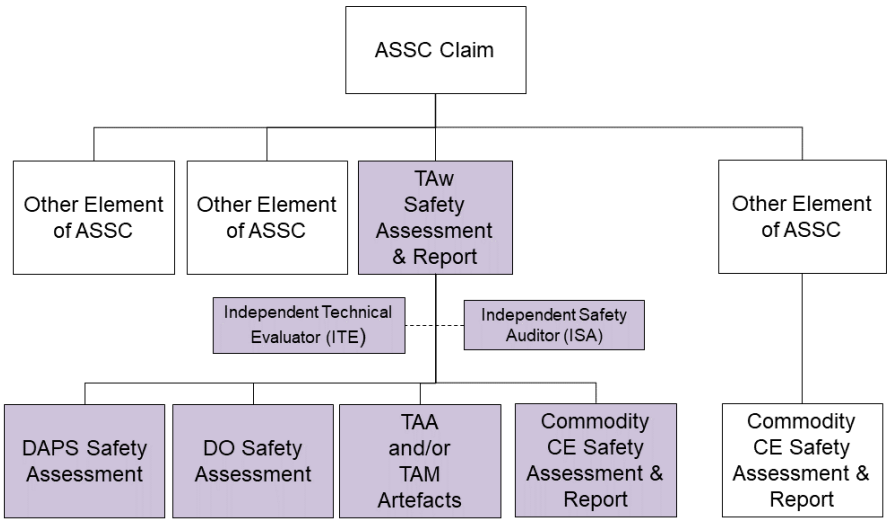
Guidance Material 5012(1)

Type Airworthiness Safety Assessment

12. The TASA will need to be treated as Airworthiness information[12].

13. The TAw Strategy will define the TASA boundaries and articulate commodity items that are controlled by the TAw Safety Management System. Therefore, the claim(s), arguments and supporting body of evidence within the TASA can include Equipment Not Basic to the Air System (ENBAS)[13]; Air Launched Weapons (ALW)[14]; and Commodity Delivery Team[15] Safety Assessments and integration evidence, in addition to TAA-sourced Type Design artefacts and other externally provided assessments, such as those provided by Defence Aircrew Publications Squadron (DAPS)[16] or ITE. This relationship of artefacts is shown in Figure 1.

Figure 1. Relationship of ASSC



[10] By exception, agreement for the use of the TASAR addendum procedure may be gained from the MAA as part of the Form 30 process. Refer to RA 5820 – Changes in Type Design (MRP 21 Subpart D).
[11] Refer to RA 5011 – Type Airworthiness Safety Management System.
[12] Refer to ►RA 1225 – Air Safety Documentation Audit Trail.◄
[13] Refer to RA 1340 – Equipment Not Basic to the Air System.
[14] Refer to RA 1350 – Air Launched Weapon Release.
[15] Refer to RA 5013 – Air Safety Management of Equipment and Commodity Items.
[16] A Safety Assessment provided by DAPS is an example of an appropriate independent operator evaluation.

Guidance Material 5012(1)

14. Figure 1 highlights that it is possible for some commodity items to be excluded from the TAw Strategy. In these cases the Commodity Delivery Team Safety Management System (SMS) will interact directly with the ASSC (and hence the Aviation Duty Holder / Accountable Manager (Military Flying) Air Safety Management System) without recourse to the TAw SMS.

TASAR

15. The initial TASAR supports the ASSC to enable activation on the Military Aircraft Register. The TASAR does not then require reissue prior to each ASSC review. Reviewing the TASAR for continued validity at the TAwSP provides the basis for the TAw input to the ASSC.

16. In addition to the requirements listed in this RA, the TAA or TAM may choose to update the TASAR with an Addendum, including a declaration that the content of the Addendum does not alter the validity of the claims, arguments or evidence within the TASAR main body. Such an update may be required following counter-evidence identified through Fault Reporting and Data Exploitation activities[17], or a change of information from TAwSP review or other source of evidence, as long as the circumstances are not listed in this RA as requiring a complete new issue.

17. Following a major TDC, it is expected the TASAR will uplifted. By exception, if the change has minimal impact to the TASAR, the TAA / TAM may request the Safety Assessment for the change is captured in an addendum rather than a re-issue of the TASAR. This request will be submitted as part of the Form 30 process[10].

18. The guidance provided within Def Stan 00-056 is one method of achieving a suitable TASAR structure.

Safety Analysis

19. The TAA or TAM will need to ensure that, where applicable, the TASA:

a. Addresses any differences in the operating environment and usage from those in the certification basis of the competent certifying body.

b. Addresses the Risks and mitigations of not complying with UK legislation and standards.

20. Safety analysis will be carried out on new Air Systems and subsequent changes, in support of claims and arguments within a TASA, by the equipment DO, or by specialist agencies contracted by the TAw organization.

21. The justification of the TAw of the design requires addressing both new equipment and systems, and the effect of subsequent changes to the Type Design[18].

22. The evidence for demonstration of TAw may include design analysis, successful application of specified procedures and standards (such as Def Stan 00-970[20]) with any shortfalls addressed and agreed by the MAA, historical evidence of successful use of particular design features, and results of tests and trials carried out by the DO and ITE organizations, to arrive at an overall assessment of Airworthiness.

Commercial Off The Shelf (COTS) Systems and Software

23. The TAA or TAM for projects involving the use of COTS systems or software will need to ensure that the Safety Assessment contains an adequate Safety justification for the COTS components.

24. Guidance on the Safety Assessment of COTS systems is contained in Def Stan 00-056[7]. Guidance on the assessment of Programmable Elements of Unknown Pedigree is available within the Knowledge in Defence portal[19]. Ultimately, Def Stan 00-970[20] refers to acceptable standards for Programmable Elements.

[17] Refer to RA 1207 – Air Safety Data Management and Exploitation.
[18] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B).
[19] Knowledge in Defence Portal:https://www.gov.uk/guidance/knowledge-in-defence-kid.
[20] Refer to Def Stan 00-970 – Certification Specifications for Airworthiness.

Guidance Material 5012(1)

Independent Evaluation and Audit

25. ITE Assurance will consist of independent analysis of the data evidence supporting the TASA, including, where appropriate[21], a qualitative assessment of Air System handling, Human Machine Interface (HMI) and crew workload.

26. Care will need to be taken to ensure that independent auditing of the TASA is undertaken by Suitably Qualified and Experienced Person(s) or organization(s) that are not unduly influenced by commercial, peer or rank / status pressures.

27. Multiple ITEs may be employed to provide evaluation of different aspects of a TASA.

28. Where a contractor is employed as ITE, it is important that this is exclusively by the TAA or TAM to act on their behalf and not via the Prime Contractor and / or DO; with any advice the ITE may have about the design and / or Safety directed to TAA or TAM. It is noted that if the MOD has the required competence and level of independence, then this independent technical evaluation could be provided from within the MOD.

29. It is acceptable for the ISA and ITE to be involved in the joint working environment between the TAw organization and DO; for example, in a Hazard Log Working Group or in a Combined Test Team approach. Duplication of effort will be avoided if the ISA and ITE work collaboratively with the MOD and DO so that their assessments can be incorporated in the overall project schedule.

[21] As decided by the Senior Responsible Officer (SRO) or receiving Operating Duty Holder (ODH).

RA 5013 - Air Safety Management of Equipment and Commodity Items

Rationale

Equipment may be provided to support operation of an Air System. The organization providing the equipment is required to operate a Safety Management System (SMS)[1] which specifically supports the Type Airworthiness Safety Assessment (TASA)[2] and / or Air System Safety Case (ASSC)[3] and which interfaces with adjoining Air Safety Management Systems (ASMS). An ineffective SMS and incomplete Safety Assessment are likely to compromise safe operation and Hazard management, which may undermine the ASSC and thus Air Safety. This Regulatory Article (RA) sets out the requirements for an independently assured equipment-specific SMS and Safety Assessment in support of a TASA and / or ASSC.

Contents

Definitions

Definitions Relevant to this RA

1. ►◄

Regulation 5013(1)

Air Safety Management of Equipment and Commodity Items

5013(1) The Commodity Chief Engineer (CE) **shall** be responsible for the Air Safety Management of the equipment.

Acceptable Means of Compliance 5013(1)

Air Safety Management of Equipment and Commodity Items

2. The Commodity CE **should** hold a Letter of Air Safety Notification (LoAN)►[4]◄.

3. ►The Commodity CE **should** develop, own and manage an SMS which is described in a Safety Management Plan (SMP) and meets the requirements of RA 1200[1].◄

4. During the generation and management of the SMP, the Commodity CE **should** consult with all relevant stakeholders[5].

5. The SMP **should** include:

   a. Description of the Safety requirements, targets and attributes.

   b. Detail on the scope and boundaries between the DT and all interfacing DTs and organizations.

   c. Detail on the approach to establishing and maintaining safe equipment design.

   d. Detail on the arrangements for effective integration and coordination with relevant Type Airworthiness (Taw) SMS[6] or ASSC requirements.

   e. Detail on the arrangements for effective integration and coordination with relevant Safety Management documentation generated by the Design Organization (DO)[7] to cover their activities[8].

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[1] Refer to RA 1200 – Air Safety Management.
[2] Refer to RA 5012 – Type Airworthiness Safety Assessment.
[3] Refer to RA 1205 – Air System Safety Cases.
[4] Refer to RA 1003 – Delegation of Airworthiness Authority and Notification of Air Safety Responsibility.
[5] ►◄ Stakeholders, ►dependent◄ on the phase of the project and approach to delivery, are likely to include the Senior Responsible Officer (SRO), Aviation Duty Holder (ADH), Accountable Manager (Military Flying) (AM(MF)), Defence Equipment and Support (DE&S) Operating Centre Director (OCD), Sponsor, ►◄ relevant Type Airworthiness Authority (TAA), Type Airworthiness Manager (TAM) and Commodity CEs.
[6] Refer to RA 5011 – Type Airworthiness Safety Management System.
[7] The DO is required to develop an SMP in accordance with (iaw) Def Stan 00-056.
[8] Refer to RA 1014 – Design Organizations and Co-ordinating Design Organizations – Airworthiness Responsibilities.

Acceptable Means of Compliance 5013(1)

f. Detail on the approach to delivering and sustaining equipment Safety through proactive Integrity Management►9◄ and reactive Fault and Occurrence investigation.

g. The approach to Configuration Management, Air System Document Set management[10], Air Safety Data Management and Exploitation[11].

h. The approach to Assurance and review of Safety Management activities, including Quality Management Systems, Independent Technical Evaluation►12◄, Independent Safety Auditing►12◄ and independent review of publications.

Hazard Management Process

6. As part of the SMP, the Commodity CE **should** implement a process to identify and review all Hazards within scope of the SMP.

7. The Hazard management process **should** account for Hazards identified through certification activity, in-service civil or military usage, and any emerging Hazards.

8. The Hazard management process **should** be conducted in conjunction with the relevant TAA / TAM►13◄, in line with the recognized principles of Risk Management[14].

9. As a subset of this Hazard management process[15], when a Hazard is identified that may lead to a Risk to Life (RtL)[16], the Commodity CE **should** communicate this to the relevant TAA / TAM[17] and / or the ADH / AM(MF). In either case, formal acknowledgement **should** be obtained.

Safety Panel

10. The Commodity CE **should** establish and chair a Safety Panel every 6 months, with the appropriate stakeholder attendance, to coordinate and manage the SMS. The Safety Panel **should** review the continued validity of the Safety Assessment Report and the sufficiency of supporting products[18].

11. The Commodity CE **should** ensure that the Safety Panel:

a. Reviews Hazard management activities and ensures ADH / AM(MF) agreement that Hazards which may lead to a RtL have been communicated.

b. Reviews relevant design changes[19] for impact on activities within the SMP.

c. Provides advice, depending on the phase of the project, to the appropriate SRO, Operating Duty Holder (ODH), AM(MF), TAA, TAM and their staff in support of the ASSC.

d. Reviews independent evaluation and Assurance activity.

e. Reviews Fault Reporting[20], Occurrence Reporting[21], Data Exploitation[11] and Air System Integrity Management activity[17], including the impact of changes to the Air system Statement of Operating Intent and Usage (SOIU).

[9] ►Refer to RA 5726 – Integrity Management.◄
[10] Refer to RA 1310 – Air System Document Set.
[11] Refer to RA 1207 – Air Safety Data Management and Exploitation.
[12] ►Refer to – https://www.gov.uk/guidance/knowledge-in-defence-kid.◄
[13] Where the Air System is not UK MOD-Owned, ownership of regulatory responsibility by either the TAA or TAM needs to be agreed within the Sponsor's approved model for TAw management; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities the TAM or Competent organization supporting the TAM may be read in place of Delivery Team (DT) as appropriate throughout this RA.
[14] Refer to Manual of Air Safety (MAS), Figure 4 – The Risk Management Cycle.
[15] RA 1210 specifically excludes damage to assets where no injury results, but Hazards leading to such damage still require management.
[16] Refer to RA 1210 – Ownership and Management of Operating Risk (Risk to Life).
[17] Where the Safety Assessment supports the TASA.
[18] Refer to RA 5013(2): Air Safety Assessment of Equipment and Commodity Items.
[19] Refer to RA 5305(2): In-Service Design Changes – Safety.
[20] Refer to RA 5825 – Fault Reporting and Investigation.
[21] Refer to RA 1410 – Occurrence Reporting and Management.

Acceptable Means of Compliance 5013(1)

f. Reviews the Support Policy Statement (SPS) or information contributing to the Air System SPS[22].

g. Co-ordinates the SMP.

12. Regardless of whether equipment or commodity items are discussed within the Type Airworthiness Safety Panel associated with the organization receiving the equipment, the Commodity CE **should** still conduct their own Safety Assessment review through a separate Safety Panel.

13. To support the Safety Panel, the Commodity CE **should** ensure they are suitably represented at equivalent DO Safety Management meetings[23].

14. The Commodity CE **should** ensure either that a Commodity SPS[22] is produced, or that the required information is provided to support the Air System SPS.

Independent Audit

15. The Commodity CE **should** ensure that the SMS and its outputs are subjected to Audit iaw Def Stan 00-056, by a Competent and suitably qualified Independent Safety Auditor (ISA), independent of the outcome or processes they are reviewing.

Guidance Material 5013(1)

Air Safety Management of Equipment and Commodity Items

16. A Commodity DT SMS ►must◄ appropriately address the requirements of RA 1200[1]. RA 5013(1) contains specific requirements for a Commodity DT SMS, which augment and complement the standing requirements of RA 1200.

17. Where the TAM has regulatory responsibility for the Air System, they are expected to ensure appropriate SMS arrangements, including the management of Hazards, are in place to meet the requirements of RA 1200 for commodity items not provided by a DE&S Commodity DT.

18. A TAw Strategy is not mandated for equipment and commodity items, but there is a requirement for the SMP to detail how it interfaces with the Air System TAw SMS[6] and / or the ASSC[3].

Hazard Management Process

19. The Commodity CE is expected to manage a variety of Hazards. A subset of this Hazard management activity is the management of Hazards associated with RtL, which require management at ADH / AM(MF) level. In these cases, the Commodity CE will communicate this to the TAA / TAM[17] or ADH / AM(MF) for formal acknowledgement and a decision on Tolerability.

20. The recording of Commodity DT Hazards is best achieved through a Hazard Log that supports the legal requirement for an ADH / AM(MF) to ensure that Risk Assessments are carried out[16]. Hazard attributes will, therefore, need to complement their standardized approach to managing RtL.

21. A Hazard Log accounts for Hazards, a subset of which contribute to RtL. It is expected to incorporate information from a number of Hazard data sources.

22. Where Hazards are managed by external organizations, the Hazard Log will need to incorporate information resulting from clear and robust interfaces with these organizations.

23. The Hazard Log may need to absorb information on transient / emerging Hazards, due to DE&S driven Occurrence / Fault investigations, global Faults which have not yet been addressed by appropriate mandatory, advisory and deferred instructions, or proactive investigations identified through Integrity Management activity. This allows the transient Hazard to be assessed and communicated to the TAA / TAM[17], SRO, ADH or AM(MF).

[22] Refer to RA 5407 – Support Policy Statement.
[23] Such as a DO Project Safety Committee (PSC).

Guidance Material 5013(1)

Safety Panel

24. A Commodity CE may choose to group multiple similar equipment types into one Safety Panel or hold standalone Safety Panels, providing each equipment or commodity item is reviewed every 6 months.

25. The Safety Panel will include representatives from the following areas as appropriate:

a. The Commodity DT (technical, contracts and finance officers as required).

b. Other relevant TAA, TAM or Commodity CE.

c. Front Line Command Capability Organization.

d. Continuing Airworthiness Management Organization.

e. Release To Service Authority.

f. ADH and AM(MF).

g. Co-ordinating Design Organization (CDO) / DO.

h. The appropriate Test and Evaluation organization.

i. Defence Aircrew Publications Squadron (DAPS) or Competent appointed contractor.

j. ISA.

k. DE&S Operating Centre Safety Team.

l. Specialist advisers where appropriate.

26. SRO, ADH, AM(MF), TAA or TAM involvement with the Safety Panel will vary dependant on project phase; for each phase the relative role of the Commodity CE, TAA, TAM, SRO, ADH or AM(MF) will need to be described in the SMP, and when appropriate, in an Internal Business Agreement.

27. To support the Safety Panel the Commodity CE may establish one or more Working Groups (WGs) (proportionate to the scale of the Project). Possible examples include a WG to assess Hazards or review the integrity of specific systems.

Independent Audit

28. ISA Assurance will cover such activities as (but not limited to) the Safety Panel and supporting products, Commodity DT organizational processes, and DO Safety Management documentation.

29. ►◄

30. Def Stan 00-056 states that the appointment of an ISA will be at the sole discretion of the MOD. Early appointment will allow the ISA to engage with the DO and better assess early versions of the SMP, assist with tendering and provide Safety advice throughout the project's life. The ISA could also provide generic Safety advice about the SMS to the DT, the DO and other stakeholders.

31. It is acceptable for the ISA and Independent Technical Evaluator (ITE)[18] to be involved in the joint working environment between the Commodity DT and DO; for example, in a Hazard Log WG or in a Combined Test Team approach. Duplication of effort will be avoided if the ISA and ITE work collaboratively with the MOD and DO so that their assessments can be incorporated in the overall project schedule.

32. It is important that the ISA and ITE work is conducted on behalf of the Commodity CE and that any advice they may have about the design and / or Safety is directed to them.

Regulation 5013(2)

Air Safety Assessment of Equipment and Commodity Items

5013(2) The Commodity CE **shall** own and manage a Safety Assessment.

Acceptable Means of Compliance 5013(2)

Air Safety Assessment of Equipment and Commodity Items

33. The Commodity CE **should** initiate and maintain a Safety Assessment for each equipment or commodity item they are responsible for[24].

34. The scale of Commodity CE Safety Assessments **should** be proportionate to the Hazards and the level of RtL presented by the particular equipment.

35. Each Safety Assessment **should** consist of a claim (or number of claims), a structured and explicit argument, and supporting body of evidence, that together provide a compelling, comprehensible and valid case which supports the host Air System TASA and / or the ODH / AM(MF) ASSC.

36. The Commodity CE **should** ensure that the Safety Assessment:

a. Defines the approved Configuration and operating environment for the equipment to which it applies, referencing the appropriate Air System SOIU where applicable[10].

b. Describes the Safety requirements, targets and attributes.

c. Provides a justification for the design standards chosen for use, and demonstration of compliance, supported by Safety analysis iaw the Def Stan[25].

d. Identifies the limitations and procedures[26] necessary to achieve the required level of Safety for the subject Configuration.

Safety Assessment Reports

37. The Safety Assessment **should** be summarized periodically in a Safety Assessment Report, communicated to and acknowledged by the TAA / TAM and / or ODH / AM(MF) accordingly.

38. The Safety Assessment Report **should** be produced to support the initial Approval of the relevant TASA and / or ASSC[3].

39. The Safety Assessment Report **should** be updated as a complete new issue:

a. At least every 5 years.

b. Following a change which drives a Major Type Design Change (TDC) to the Air System[27].

c. Additionally, as determined by the Commodity CE or requested by the related TAA and / or TAM.

40. For all other equipment changes, the Safety Assessment Report **should** be reviewed and updated with an Addendum to the previous Report, ensuring that the content of the addendum does not alter the validity of the claims, arguments and evidence within the Safety Assessment Report main body.

41. The Commodity CE **should** make a declaration regarding the validity of the Safety Assessment and any addenda at the Safety Panel. If this declaration cannot be made, then a new issue of the Safety Assessment Report **should** be produced.

Independent Evaluation and Audit

42. The Commodity CE **should** ensure that the Safety Assessment is subjected to evaluation by a Competent and suitably qualified ITE, independent of the outcome or processes they are reviewing, and recognized by the Commodity CE as a SME in the field which is being reviewed.

[24] These include items being installed in the Air System as part of the Type Design (see RA 5810 – Military Type Certificate (MRP Part 21 Subpart B) / RA 5305 – In-Service Design Changes), Aircrew Equipment Assemblies etc that are required to be worn to comply with Type Design requirements, and items which may be carried on to support delivery of the capability (see RA 1340 – Equipment Not Basic to the Air System).
[25] Refer to Def Stan 00-056 – Safety Management Requirements for Defence Systems.
[26] Including where appropriate reference to the Support Policy Statement. Refer to RA 5407 – Support Policy Statement.
[27] Agreement for the use of the addendum procedure can be gained from the MAA as part of the Form 30 process. Refer to RA 5820 – Changes in Type Design (MRP 21 Subpart D).

Acceptable Means of Compliance 5013(2)

43. The Commodity CE **should** ensure that the Safety Assessment is subjected to Audit iaw Defence Standard (Def Stan) 00-056, by a Competent and suitably qualified ISA, independent of the outcome or processes they are reviewing.

Guidance Material 5013(2)

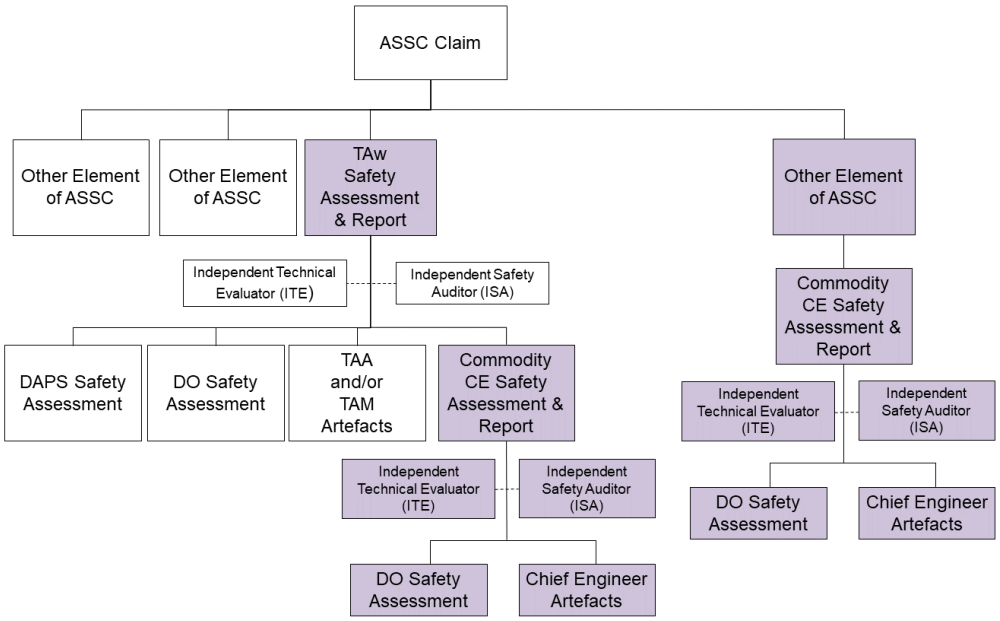
Air Safety Assessment of Equipment and Commodity Items

44. The Safety Assessment will need to be treated as Airworthiness information[28].

45. Before completing the Safety Assessment, the Commodity CE will need to understand the context in which the assessment will be used by the TAA / TAM or ODH / AM(MF). The TAA / TAM may use the Safety Assessment to support the Type Design assessment or to enable the use of Equipment Not Basic to the Air System (ENBAS).

46. The Commodity Safety Assessment, such as for a life raft, may be incorporated within the TASA alongside a number of Commodity items, in addition to integration information and Configuration Control activity. However, some Commodity DTs may provide assets directly to the ODH / AM(MF), such as a Portable Electronic Device (PED). In these cases, the Safety Assessment, integration and Configuration Control activity is provided to the ODH / AM(MF) and incorporated directly in the ASSC. This relationship of artefacts is shown in Figure 1[29].

Figure 1. Relationship of ASSC



47. A Safety Assessment may be produced for an individual equipment or commodity item, or may be provided as combined Safety Assessment for multiple items, in order to be appropriate and proportionate to the level of RtL presented by the particular equipment.

48. When scaling the proportionality of a Safety Assessment, any assessment on the level of RtL will be made in consultation with all relevant TAA / TAM and ADH / AM(MF) accordingly.

49. Whether a Safety Assessment is for one or more item, there is a requirement for clear articulation on the extent of the clearance, and the limitations for use relating to specific Air Systems or roles.

[28] ►Refer to RA 1225 – Air Safety Documentation Audit Trail.◄
[29] A Safety Assessment provided by DAPS is an example of an appropriate independent operator evaluation.

Guidance Material 5013(2)

Safety Assessment Report

50. The scale of a Commodity CE Safety Assessment Report will be proportionate to the Hazards and the level of RtL presented by the particular equipment.

51. The initial Safety Assessment Report supports the ASSC (in some cases via the TASA) to enable activation on the military register. The Safety Assessment Report does not then require reissue prior to each ASSC review, but a valid Safety Assessment Report, reviewed at the Safety Panel, provides the basis for the input to the TASA and / or ASSC.

52. When an existing equipment or commodity item is being provided to a new Air System, the Commodity CE may choose (or be requested) to update an existing Safety Assessment Report as a complete new issue, to demonstrate current Safety Assessment activity to the TAA and / or TAM.

53. In addition to the requirements listed in this RA, the Commodity CE may choose to update the Safety Assessment Report with an Addendum, including a declaration that the content of the Addendum does not alter the validity of the claims, arguments or evidence within the Safety Assessment main body. Such an update may be required following counter-evidence identified through Fault Reporting and Data Exploitation activities[11], or a change of information from Safety Panel review or other source of evidence, as long as the circumstances are not listed in this RA as requiring a complete new issue.

54. If a proposed change drives a Major TDC to the Air System, but has minimal impact to the Safety Assessment Report, the Commodity CE may request the Safety Assessment for the change is captured in an addendum rather than a re-issue of the report. This request will be submitted by the relevant TAA / TAM as part of the Form 30 process[27].

55. The guidance provided within Def Stan 00-056 may be regarded as one method of achieving a suitable Safety Assessment Report structure.

Safety Analysis

56. The Commodity CE will need to ensure that, where applicable, the Safety Assessment:

a. Addresses any differences in the operating environment and usage from those in the certification basis of the Competent certifying body.

b. Addresses the Risks and mitigations of not complying with UK legislation and standards.

57. Safety analysis will be carried out on new equipment and subsequent changes, in support of claims and arguments within a Safety Assessment, by the equipment DO, or by specialist agencies contracted by the Commodity DT.

Commercial Off The Shelf (COTS) Systems and Software

58. The Commodity CE for projects involving the use of COTS systems or software will need to ensure that the Safety Assessment contains an adequate Safety justification for the COTS components.

59. Guidance on the Safety Assessment of COTS systems is contained in Def Stan 00-056[25]. Guidance on the assessment of Programmable Elements of Unknown Pedigree is available within the Knowledge in Defence portal►12◄. Ultimately, Def Stan 00-970[30] refers to acceptable standards for Programmable Elements.

Independent Evaluation and Audit

60. ITE Assurance will consist of independent analysis of the evidence supporting the Safety Assessment, including, where appropriate[31], a qualitative assessment of Air System handling, Human Machine Interface (HMI) and crew workload.

61. Care will need to be taken to ensure that independent Auditing of the Safety Assessment is undertaken by demonstrably Suitably Qualified and Experienced

[30] Refer to Def Stan 00-970 – Certification Specifications for Airworthiness.
[31] As decided by the SRO or receiving ODH.

Guidance Material 5013(2)

Person(s) or organization(s) that are not unduly influenced by commercial, peer or rank / status pressures.

62. Multiple ITEs may be employed to provide evaluation of different aspects of a Safety Assessment.

63. Where a contractor is employed as ITE, it is important that this is exclusively by the Commodity CE to act on their behalf and not via the Prime Contractor and / or DO; with any advice the ITE may have about the design and / or Safety directed to the Commodity CE. It is noted that if the MOD has the required Competence, and based on the level of acceptable Risk, then this independent technical evaluation could be provided from within the MOD.

64. It is acceptable for the ISA and ITE to be involved in the joint working environment between the DT and DO; for example, in a Hazard Log WG or in a Combined Test Team approach. Duplication of effort will be avoided if the ISA and ITE work collaboratively with the MOD and DO so that their assessments can be incorporated in the overall project schedule.

RA 5103 – Certificate of Design

Rationale

Each Air System[1] (including related Products, Parts, Appliances, Airborne Equipment and Air Launched Weapons (ALW)) will be designed to meet the specification requirements. Any deviation from the specification requirements could have significant Airworthiness implications. The Certificate of Design (CofD) identifies the extent to which the requirements of the specification have been achieved and details any related exceptions and limitations.

Contents

Regulation 5103(1)

Requirement and Scope for Certificate of Design

5103(1) The Design Organization (DO) **shall** produce a CofD for new Air Systems, Products, Parts, Appliances, Airborne Equipment and ALW including changes and Repairs.

Acceptable Means of Compliance 5103(1)

Requirement and Scope for Certificate of Design

DO AMC

1. The CofD **should** certify the extent to which the design satisfies the requirements of the specification issued by or on behalf of the MOD, including any exceptions or limitations.

2. The DO **should** issue a new CofD in any of the following circumstances[2]:

   a. New Air Systems, Products, Parts, Appliances, Airborne Equipment and ALW.

   b. Major Changes in Type Design[3].

   c. Major Repairs[4].

   d. Modification of a Product, Part, Appliance, Airborne Equipment or ALW which requires re-substantiation of specification compliance.

   e. When deemed necessary by the Type Airworthiness Authority (TAA)[5], Commodity Chief Engineer (CE) or Local Technical Committee[6] in consideration of the nature of change.

3. The DO **should** consider the need to repeat qualification tests (re-qualification), in whole or in part, when a change in process, manufacture, material or material source, including explosive materiel, would invalidate the current issue of a CofD.

4. The DO **should** ensure any ►exceptions◄ or limitations affecting Products, Parts and Appliances supplied to them by a sub-contractor are replicated in the new CofD issued by them.

Guidance Material 5103(1)

Requirement and Scope for Certificate of Design

DO GM

5. **Scope of CofD**. The CofD will cover the entirety of the specification. Therefore, it will cover both the Certification requirements from the agreed Type Certification Basis, together with other qualification requirements such as operational performance and maintainability. The CofD is a key element of the evidence required for

[1] For Remotely Piloted Air Systems (RPAS) refer to RA 1600 Series – Remotely Piloted Air Systems.
[2] This list is not exhaustive and CofDs may be deemed appropriate for other circumstances.
[3] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D) for definition of Major Changes.
[4] Refer to RA 5865 – Repairs (MRP Part 21 Subpart M).
[5] Refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems. Dependant on the agreed split of Type Airworthiness responsibilities, Type Airworthiness Manager (TAM) may be read in place of TAA as appropriate throughout this RA.
[6] Refer to RA 5301 – Air System Configuration Management.

Guidance Material 5103(1)

compliance with Phase 4 of the Military Air Systems Certification Process (MACP)[7]. Similarly, exceptions and limitations with the CofD will be considered within the TAA Release To Service Recommendations[8].

6. If the DO decides that re-qualification testing is considered necessary, they will advise the TAA or Commodity CE and explain any effect this will have on the CofD of the component or equipment. The DO will advise the TAA or Commodity CE of any significant changes to test requirements specified in the relevant production contract.

7. Where a Modification is undertaken by an alternative DO[9] and intended for integration into an Air System it is generally expected that a single CofD be issued covering the complete installation.

8. **New or modified Air Systems, Products, Parts and Appliances – Use of existing evidence**. If evidence supplied by the DO is based on civil-certificated designs, the DO may discuss with the TAA or Commodity CE to what extent the requirement for a CofD is satisfied by appropriately recognized artefacts such as Civil Aviation Authority / European Aviation Safety Agency (EASA) / Federal Aviation Administration Type Certificates and (European) Technical Standard Order[10].

9. **RPAS**. The CofD requirements for new RPAS are dependent on the RPAS category. The categories of RPAS are detailed in the relevant RA for the particular sub-category in the RA 1600 series[1].

Regulation 5103(2)

Management and Authorization of Certificates of Design

5103(2) The TAA, Commodity CE and DO **shall** appropriately manage the CofD.

Acceptable Means of Compliance 5103(2)

Management and Authorization of Certificates of Design

DO AMC

10. The CofD **should** be signed by the responsible DO to certify the Air System, Part, Appliance, Airborne Equipment or ALW complies with the design and identifies any associated ►exceptions◄ and limitations. DO signatories **should** be approved in accordance with (iaw) RA 5850[11].

11. There is no prescribed format for the CofD. A CofD **should** contain the following, or reference to the following, as a minimum:

a. Unique reference number.

b. Item description.

c. Organization name.

d. Design Approved Organization Scheme (DAOS) approval reference number.

e. Applicable certification basis.

f. Identification and brief description of the change or Repair and the reason for the change or Repair if applicable.

g. Applicable Certification requirements and methods of compliance.

h. Change / Repair classification[12].

i. Compliance documents and independent checking function.

j. Any exceptions or limitations.

[7] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B).
[8] Refer to the RA 1300 Series – Release To Service.
[9] Refer to RA 5305 – In-Service Design Changes.
[10] Refer to RA 5875 – (European) Technical Standard Order (MRP Part 21 Subpart O).
[11] Refer to RA 5850 – Military Design Approved Organization (MRP Part 21 Subpart J).
[12] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D) and RA 5856 – Repairs (MRP Pt 21 Subpart K).

Acceptable Means of Compliance 5103(2)

k. Structural Integrity artefacts in support of the integrity baseline[13] if applicable.

l. Configuration Status Record or equivalent.

m. ALW Structural Design Record[14] (if applicable).

n. A Safety Assessment iaw Defence Standard 00-056[15] to demonstrate that the design is tolerably safe for the intended purpose.

o. A statement that the change or Repair has been approved under privilege[11] (if applicable).

p. Date of approval.

q. Approved DO design signature.

r. Head of Design Organization or their authorized representative signature (only required if not approved under privilege). This statement confirms that the applicable DO procedures as specified in the Design Organization Exposition[11] have been followed.

s. TAA / Commodity CE acceptance signature.

12. When produced a CofD is a key element of the Design Records and **should** be managed iaw RA 5301[6].

TAA / Commodity CE AMC

13. The CofD **should** be signed by the TAA, Commodity CE or their authorized representative to signify their acceptance of the CofD including any ►exceptions◄ and limitations.

14. When signed by the MOD, the CofD **should** be returned to the originating DO for retention.

Guidance Material 5103(2)

Management and Authorization of Certificates of Design

TAA / Commodity CE GM

15. Acceptance by the TAA or Commodity CE of the CofD does not imply acceptance of responsibility for the design, which remains with the DO.

[13] Refer to RA 5726 – Integrity Management.
[14] Refer to Defence Standard 07-085 Part 2.
[15] Refer to Defence Standard 00-056 – Safety Management Requirements for Defence Systems.

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RA 5212 – Weight and Moment Determination

Rationale

The handling qualities of an Aircraft are affected by the weight and moment, which are used to determine the approved flight characteristics. Misrepresentation of the weight and moment of an Aircraft is likely to have an adverse impact on the handling qualities. In order to ensure the approved flight characteristics are maintained it is essential that the weight and moment limits are accurately established and recorded. This RA details the regulatory requirements regarding Aircraft weight and moment.

Contents

Regulation 5212(1)

Aircraft Weight and Moment Determination

5212(1) The Design Organization (DO) **shall** ensure the weight and moment of each Aircraft is determined by weighing before final delivery of the initial production or any change that has ►an◄ appreciable effect on the Aircraft weight and moment.

Acceptable Means of Compliance 5212(1)

Aircraft Weight and Moment Determination

1. The weight and moment position relating to the basic and all-up weight conditions (allowing for equipment deviations) **should** be reported to the Type Airworthiness Authority (TAA)[1] in an agreed timescale and frequency[2].

2. For rotary wing Aircraft stability and certain fixed wing Aircraft (ie with short take-off and vertical landing capability), the vertical Centre of Gravity (CG) position **should** be measured on one of the first ten representative Aircraft and thereafter as requested by the TAA to validate CG calculations.

3. The position of the datum lines and points of origin **should** be quoted in the weight and moment reports, ISTA►[3]◄ or referenced from the Military Permit To Fly (Development)[4] when used. The basic weight and moment of each Aircraft **should** be recorded in the Technical Log.

Guidance Material 5212(1)

Aircraft Weight and Moment Determination

4. The DO may use any suitable method of weighing that achieves the required accuracy.

Regulation 5212(2)

Propulsion System Weight and Moment Data

5212(2) The Propulsion System DO **shall** establish and record the weight and moment of the Propulsion System elements for which they are responsible and **shall** agree the datum planes with the Air System DO.

[1] Where the Air System is ►not UK MOD owned, Type Airworthiness (TAw) management◄ regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model ►◄; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems. Dependant on the agreed ►delegation◄ of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA, noting the TAM **should not** authorize issue of or amendments to the Instructions for Sustaining Type Airworthiness (ISTA).
[2] Refer to Manual of Airworthiness Maintenance - Processes (MAM-P) Chapter 4.19 for further information pertaining to frequency.
[3] ►Refer to RA 5815 – Instructions for Sustaining Type Airworthiness.◄
[4] Refer to RA 5880 – Military Permit to Fly (Development) (MRP Part 21 Subpart P).

Acceptable Means of Compliance 5212(2)

Propulsion System Weight and Moment Data

5. The weight, moment, datum plane and reference points of the defined System **should** be recorded in the Configuration Status Record (CSR)[5], and Interface Control Documents (ICD) where used. This **should** include the propeller, jet pipe, and other assemblies where separate from the declared engine configuration.

Guidance Material 5212(2)

Propulsion System Weight and Moment Data

6. Nil.

Regulation 5212(3)

Propulsion System Production Weight and Moment

5212(3) The Propulsion System DO **shall** monitor and verify the weight and moment of new production Propulsion Systems.

Acceptable Means of Compliance 5212(3)

Propulsion System Production Weight and Moment

7. As the mass and CG data may vary during production, the Propulsion System DO **should** monitor the mass and CG records of the produced Propulsion Systems, as determined and recorded by the Production Organization, to verify they are to specification within agreed tolerance.

Guidance Material 5212(3)

Propulsion System Production Weight and Moment

8. Nil.

Regulation 5212(4)

Measurement of Aircraft Weight and Moment

5212(4) The TAA[6] **shall** promulgate in the ISTA the processes and periodicities required to ensure that the weight and moment of each Aircraft type is maintained within acceptable limits.

Acceptable Means of Compliance 5212(4)

Measurement of Aircraft Weight and Moment

9. The ISTA **should** identify:

a. The basic weight for each Aircraft type and list the relevant equipment configuration.

b. The process for preparing the Aircraft to be weighed.

c. The weight and moment arm for equipment which is routinely removed (such as role equipment).

d. Permissible tolerances between weight and moment obtained during an Aircraft weigh and those detailed in relevant ISTA.

e. The periodicity for routine check weighs.

f. Any additional occasions for weighing.

Guidance Material 5212(4)

Measurement of Aircraft Weight and Moment

10. TAAs and Continuing Airworthiness Management Organizations (CAMO) will be required to manage Aircraft weight and moment issues through life[7]. Where discrepancies are identified between the calculated weight and moment and actual measured values the TAA and CAMO are to agree actions for resolution[8].

[5] Refer to RA 5301 – Air System Configuration Management.
[6] In accordance with RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, the TAM **shall not** approve initial issue of or amendments to the ISTA.
[7] Refer to RA 4947 – Continuing Airworthiness Management – MRP Part M Sub Part G.
[8] As required by RA 5726(5): Recovering Integrity.

RA 5219 - Instrumentation and Flight Data Recorder Requirements for Flight Trials of Air Systems

Rationale

Instrumentation is often required for flight trials of new types of Air System, and of Air Systems incorporating major changes to Type Design to facilitate the gathering of trial data. Importantly, the recording of flight trial data can also be used for post-event analysis in case of an unexpected Incident or Accident. However, the conduct of flight trials may pose an additional Airworthiness Risk hence the installation of a crashworthy Flight Data Recorder (FDR) and other Instrumentation may be required.

Contents

Definitions

Definitions Relevant to this RA

1. **Instrumentation**. Refers to all items which are fitted temporarily to an Air System specifically for carrying out flight trials which will be subsequently removed.

Regulation 5219(1)

Instrumentation and Flight Data Recorder Requirements

5219(1) The Type Airworthiness Authority (TAA)[1] **shall** agree the need for installation of Instrumentation and a crashworthy FDR for the purposes of the flight trial programme[2], in consultation with the Design Organization (DO) and / or selected Test and Evaluation (T&E) Organization.

Acceptable Means of Compliance 5219(1)

Instrumentation and Flight Data Recorder Requirements

2. The Instrumentation and FDR requirements, including the parameters and sampling rates to be measured, **should** be considered and the actions taken formally recorded by the TAA for;

   a. Trials of major changes to Type Design[3].

   b. Trials which seek to extend the approved flight limitations, or which entail an increased Hazard.

   c. Trials of any special equipment installation which might affect the Safety of the Products, Parts or Appliances including Airborne Equipment and Air Launched Weapons.

3. The following requirements **should** be considered:

   a. Instrumentation required in each Air System allocated for flight trials[4].

   b. Provision for automatic monitoring and recording, including telemetry.

   c. Provision of a crashworthy FDR which meets the requirements of Defence Standard (Def Stan) 00-970 Part 13 UK 13.4.3.1 and 13.4.3.2[5].

   d. Provision for navigational or Safety aids necessary for the safe and satisfactory conduct of the flight trials.

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[1] Where the Air System is not UK MOD owned, Type Airworthiness (TAw) management regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model. However due to the non-delegable responsibilities detailed in RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems only the TAM for developmental activity conducted under Special Case Flying is applicable to this RA. Where this is the case, then TAM may be read in place of TAA as appropriate throughout this RA.
[2] Refer to RA 2370 – Test and Evaluation.
[3] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D).
[4] Refer to RA 5301 – Air System Configuration Management.
[5] Refer to Def Stan 00-970 Certification Specifications for Service Aircraft - Part 13.

Acceptable Means of Compliance 5219(1)

4. The DO / selected T&E organization **should** submit all relevant information on the Instrumentation and FDR to the TAA.

5. All installations **should** conform to the Type Certification Basis applicable to the Air System concerned, or by agreement with the MAA, to the requirements of alternative Certification Specifications for Airworthiness.

6. The DO / selected T&E organization **should** demonstrate to the satisfaction of the TAA, with appropriate trials and Safety arguments, that the installation, when completed, is safe and effective.

Guidance Material 5219(1)

Instrumentation and Flight Data Recorder Requirements

7. The TAA may assist the DO / selected T&E organization by obtaining and / or modifying Instrumentation and equipment when by so doing there are advantages to the flight trials programme.

8. On removing the temporary fit Instrumentation, the Air System will be returned to its original configuration. Any changes that remain have to be correctly documented and managed.

Regulation 5219(2)

Identification of Instrumentation

5219(2) When Instrumentation is installed in a Military Registered Air System it **shall** be marked in order that its experimental nature is readily identified.

Acceptable Means of Compliance 5219(2)

Identification of Instrumentation

9. All items of Instrumentation equipment (mountings, fixed and the visible surfaces of removable items) **should** be marked to ensure they are uniquely identifiable as such.

Guidance Material 5219(2)

Identification of Instrumentation

10. Def-Stan 61-12[6] part 33 requires that all cables be identified on the outside surface and details the coding system to be used.

11. Mil Hdbk 516[7] refers to the use of Mil Std 27733[8] for test equipment which details that all test equipment including cabling be orange (BS 381 colour 592 or equivalent) or marked with orange.

12. The requirements of this regulation do not apply to equipment which is under test.

[6] Refer to Def-Stan 61-12 – Wires Cords, and Cables Electrical Metric Units.
[7] Refer to Mil Hdbk 516 – Airworthiness Certification Criteria.
[8] Refer to Mil Std 27733 – Modification and Marking Requirements for Test Equipment in Aerospace Vehicles and Related Support Equipment.

RA 5301 – Air System Configuration Management

Rationale

During the development and In-Service life of an Air System (and related Products, Parts, Appliances), Airborne Equipment and Air Launched Weapons (ALW) there will be changes in design. ►Failure to control the configuration of the Air System (and related Products, Parts and Appliances) may compromise Type Airworthiness (TAw) and Air Safety.◄ In order to preserve TAw and ensure the Air System remains safe to operate, it is necessary to implement strict management of the design configuration. This is achieved by carrying out Configuration Management (CM) in accordance with (iaw) a defined plan under the supervision of a management board. This is a joint endeavour between Industry and MOD stakeholders, with the lead for specific responsibilities moving from Industry to MOD during the project lifecycle. This Regulatory Article (RA) details the regulatory requirements that facilitate the management of design Configuration and records, through the life of the design.

Contents

Regulation 5301(1)

Configuration Management Principles

5301(1) The Type Airworthiness Authority (TAA)[1] **shall** manage the Configuration of their Air System (and related Products, Parts, Appliances), Airborne Equipment and ALW iaw an agreed Configuration Management Plan (CMP) under the oversight of an established design Configuration governance system.

Acceptable Means of Compliance 5301(1)

Configuration Management Principles

1. CM activities **should** be conducted iaw a CMP prepared to the applicable requirements of Defence Standard (Def Stan) 05-057[2].

2. A CMP **should** be maintained throughout the life of the Air System (including related Products, Parts, Appliances), Airborne Equipment and ALW.

3. As a minimum, a CMP **should**:

   a. Reference the Configuration Status Record (CSR) management process to enable the Configuration of an item to be established at any time during its life cycle.

   b. Detail the principal CM activities of planning, identifying, changing, accounting, ►◄ Auditing and ►verifying◄ an item's Configuration.

4. A governance system **should** be established comprising of Configuration Control Boards (CCB)[3] and supporting committees as required to review and make decisions on changes to design and to ensure the effective delivery of the agreed change programme.

5. The procedures for a CCB, its chairpersonship and mandatory attendees **should** be included in the CMP. In order to provide the necessary support, and input appropriate recommendations, a CCB **should** consist of, as a minimum, the following members each of whom will have executive authority[4]:

[1] Refer to RA 5301(2) for the TAA / Design Organization (DO) relationship when Under Contractor Control (UCC).
[2] Refer to Def Stan 05-057 – Configuration Management of Defence Materiel.
[3] DOs may use different terminology but CCB is used throughout this Regulation for convenience to describe the management board responsible for dispositioning design changes.
[4] The TAA or Commodity Chief Engineer (Commodity CE) will require appropriate delegations to make the required commercial commitments or be supported by staff with the required authority.

Acceptable Means of Compliance 5301(1)

a. TAA[5] or Commodity CE (Chair[6]).

b. Representative(s) of the DO(s) affected (Chair[7]).

c. TAM (if applicable).

d. Specialist adviser(s) (if required)[8].

e. Representative(s) of the Service user(s) and Military Continuing Airworthiness Manager (Mil CAM).

f. Representative(s) of the Production Organization (PO)[9] (if not the DO).

g. Representative of the Release To Service Authority (RTSA) when discussing changes which could necessitate an update of the extant Release To Service (RTS)[10].

6. Generic CCB Responsibilities **should** include the need to:

a. Consider and make decisions on proposed changes to design which affect project performance, cost, timescale or delivery.

b. Define and approve the limits of delegated authority to any subordinate committees.

c. Review and improve CM processes as required.

d. Ensure compliance with CM processes.

7. A CSR **should** be prepared by the DO and maintained through life iaw the requirements of Def Stan 05-057 to enable effective management of design Configuration and Design Records[11].

8. The TAA or Commodity CE **should** ensure that the DO retains the Design Records and manufacturing data relating to the articles supplied or the work performed under the contract for a minimum of 5-years beyond the Product's, Part's, Appliance's, Airborne Equipment's and ALW's Out-of-Service date[12]. The master copy of any Design Record **should not** be altered during this period without the written permission of the TAA or Commodity CE.

9. The TAA or Commodity CE **should** ensure that the DO tasking arrangements facilitate provision of copies of particular CSR and Design Records in an agreed format when requested.

10. The outcome from the CCB **should** be recorded in ►a manner that provides an Auditable trail[12].◄

CM of Flight Simulation Training Devices (FSTD)

11. The TAA **should** consider possible effects of Air System Design Changes on the CM of associated FSTD. Any Design Changes that are considered to affect this parity **should** be passed to the relevant FSTD Senior Responsible Owner (SRO)[13].

[5] Where the Air System is not UK MOD-owned, TAw management regulatory Responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw Responsibilities TAM may be read in place of TAA as appropriate throughout this RA.
[6] The TAA or Commodity CE will chair the CCB when the design is Under Ministry Control – see RA 5301(3).
[7] The DO will chair the CCB when the design is Under Contractor Control – see RA 5301(2).
[8] Specialist roles may include Safety, Environmental, Quality, Commercial or Finance.
[9] Refer to RA 5835 – Production Organizations (MRP Part 21 Subpart G).
[10] Refer to RA 1300 – Release To Service.
[11] Refer to MAA02 – MAA Master Glossary.
[12] Refer to RA 1225 – Air Safety Documentation Audit Trail.
[13] Where an SRO is not appointed the Operating Duty Holder (ODH), Accountable Manager (Military Flying) (AM(MF)) or In-Service Capability Manager, on behalf of the ODH or AM(MF), **should** fulfil this responsibility, ie In-Service Modification where an SRO is not appointed or Contractor Flying Approved Organization Scheme.

Guidance Material 5301(1)

Configuration Management Principles

12. Initial Configuration Control of the design is vested in the DO who manages the CSR. This contains the indexes to drawings, documentation, specifications and design changes, including ancillary equipment, packaging and Service-supply items. It is to be kept up to date through-life on behalf of the TAA or Commodity CE by the DO. The CSR provides a baseline for defining the Configuration state through-life. Normally a CSR is produced for each item of equipment[14] for which a Certificate of Design (CofD)[15] is required upon delivery of the equipment to the TAA or Commodity CE.

13. The DO is responsible for the design of equipment to meet the specification based on a development programme, within the constraints imposed by the contract.

14. CM will need to be applied by the DO and TAA or Commodity CE in order to:

a. Maintain effective control of the approved Configuration.

b. Ensure that change proposals are processed in a timely manner and are appropriately justified with a documented Audit trail.

c. Apply an embodiment priority classification[16] based on the urgency and applicability of the change.

d. Enable the implementation of authorized changes and make use of Configuration Status Accounting[2] to track progress from concept through to completion.

e. Ensure that the impact of individual design changes are assessed across the whole Air System (and related Products, Parts, Appliances), Airborne Equipment and ALW and that a review process maintains the agreed progress of embodiment.

f. Ensure that a focal point for the Maintenance of CM is appointed and individual authorities and responsibilities for CM are identified within a DO / Delivery Team (DT)►[17]◄.

g. Ensure that all relevant supporting information for CM is included during the UCC / Under Ministry Control (UMC)[18] transition. This will include the plan and supporting information (eg Configuration baseline, control system, data, decision histories and Audit trail records).

15. The Knowledge in Defence[19] and the DE&S Air Engineers Toolkit Design Configuration Management Tools websites provides governing policy that outlines the CM principles to be applied by a DO, TAA, Commodity CE and their suppliers to ensure that equipment design is effectively managed though life.

Configuration Management Plan

16. The CMP will be used to define how the CM requirements of an item will be managed throughout the life cycle of the item. An overview of the main requirements is provided below with further detail in Def Stan 05-057.

a. Purpose, scope and programme milestones.

b. Organization structures, committees and Responsibilities.

c. Configuration change management procedures.

d. Change control of the CM documentation.

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[14] For convenience, 'equipment' refers to the Air System, Product, Part, Appliance, Airborne Equipment or ALW which is being managed by the TAA or Commodity CE within the context of the relevant paragraph.
[15] Refer to RA 5103 – Certificate of Design.
[16] This is the classification of the Modification as detailed in Def Stan 05-057; it must not be confused with classification as Major or Minor iaw RA 5820 – Changes in Type Design (MRP Part 21 Subpart D). Input will be required from the end users of the modified item.
[17] ►Where the term DT or Commodity DT is used in this RA, this may include the TAM and organizations supporting the TAM.◄
[18] During development, and before designs are brought UMC, the DO is free to alter the design, without reference to the MOD, within the constraints of the specification.
[19] Refer to https://www.gov.uk/guidance/knowledge-in-defence-kid and Defence Equipment & Support (DE&S) Air Engineers Toolkit Design Configuration Management Tools.

Guidance Material 5301(1)

e. Interfaces with other plans.

f. Procedures for auditing compliance with CM requirements.

Regulation 5301(2)

Configuration Management Under Contractor Control

5301(2) Whilst the design is UCC, the DO **shall** lead CM activities.

Acceptable Means of Compliance 5301(2)

Configuration Management under Contractor Control

17. A CMP **should** be developed by the DO and agreed with the TAA or Commodity CE at the commencement of the contract and **should** be subject to review and revision ►◄ as the design progresses.

18. Within the CMP, the DO **should** establish the CCB to bring ►the design under formal control.◄ At this phase of the project the CCB **should**:

a. Prepare and maintain a provisional CSR.

b. Record and control the standard of design to be manufactured.

c. Make available to the TAA or Commodity CE the record of its decisions.

19. The TAA or Commodity CE **should** be invited to the CCB when the schedule to bring the design(s) UMC is to be discussed. Interim arrangements **should** be agreed by which the TAA or Commodity CE will gain sufficient knowledge and control over the Air System, Product, Part, Appliance, Airborne Equipment or ALW Configuration to accept transfer to UMC.

20. Prior to the Design Records being brought UMC, the TAA or Commodity CE **should** establish the Local Technical Committee (LTC), ensuring that Terms of Reference are agreed by the CCB and detailed in the CMP.

21. The DO **should** make the CSR available for issue to the TAA or Commodity CE before the design transitions to UMC unless alternative arrangements have been made via the CCB.

22. If the design is not brought UMC by the time of initial RTS, the TAA **should** set out the plan within the RTS Recommendations for achieving UMC and how CM for In-Service Air Systems will be managed.

Guidance Material 5301(2)

Configuration Management under Contractor Control

23. The design will be UCC during the project development phase which would typically end at acceptance of the CofD when the design will normally transition to UMC. The transition to UMC does not necessarily mean that the design fully meets the specification.

24. Formal control of the design will be required as a lead-in to the process of bringing the design UMC. It may also be required when long lead-time items need to be ordered. Formal control will normally be progressive as each group of designs becomes sufficiently stable.

25. The CofD will be produced when the TAA or Commodity CE and the DO agree, via the CCB, that the design adequately meets the requirements of the specification within the limits and exceptions stated.

Regulation 5301(3)

Configuration Management under Ministry Control

5301(3) Whilst the design is Under Ministry Control, the TAA or Commodity CE **shall** lead CM activities.

Acceptable Means of Compliance 5301(3)

Configuration Management under Ministry Control

26. The TAA **should** ensure that the approved Air System Configuration is accurately documented in the Air System Document Set[20].

27. The TAA or Commodity CE **should** ensure that their CMP describes the CM dependencies with the DO and interfacing Products, Parts, Appliances, Airborne Equipment and ALW.

28. The CCB **should** be chaired by the TAA or Commodity CE who **should** ensure the required attendance. In addition to the generic CCB ►Responsibilities◄ listed in paragraph 6, the CCB **should**:

a. Approve the development of Modifications based on LTC recommendations.

b. Authorize the DO[21] to proceed with approved changes iaw the agreed commercial arrangements.

c. Approve the recommended Modification classification[16] and roll-out plan from the LTC[22].

d. Set requirements for monitoring compliance with the DO's CMP so that UMC can be assured.

29. After the design is brought UMC, the TAA or Commodity CE **should** authorize any change to the Design Records using the procedures detailed in the agreed CMP.

30. The TAA or Commodity CE **should** chair►[23]◄ the LTC and ensure the required mandatory attendance as detailed in the CMP.

31. The LTC **should** make recommendations to the CCB based on technical scrutiny of design change proposals.

32. The outcome of the LTC **should** be recorded in ►a manner that provides an Auditable trail[12].◄

Guidance Material 5301(3)

Configuration Management under Ministry Control

33. A TAA►[17]◄ will have a CMP for each Mark or Type for which they hold Responsibility. A Commodity CE will have a CMP for Products, Parts, Appliances, Airborne Equipment and ALW that may be subject to design changes. The relationship between an Air System and its ►support organizations◄ will be recorded in the Air System Airworthiness Strategy[24] and Support Policy Statement[25], and managed via appropriate business agreements.

34. The TAA or Commodity CE will ensure that, where items are shared across multiple DTs, CM is strictly maintained and duplicated activities are avoided.

35. For smaller and more simple programmes it may be appropriate to combine the CCB and LTC into a suitable single forum, but the CMP will clearly articulate how the intent of this Regulation is met.

Local Technical Committee

36. ►◄

37. An LTC will consist of the following members:

a. TAA or Commodity CE (Chair).

[20] Refer to RA 1310 – Air System Document Set.
[21] Refer to RA 5850 – Military Design Approved Organization (MRP Part 21 Subpart J).
[22] Def Stan 05-057 Annex E describes potential embodiment considerations; the Mil CAM will manage embodiment by platform tail number.
[23] ►It is only acceptable for the TAA or Commodity CE to delegate chairpersonship of LTC meetings to appropriate Letter of Airworthiness Authority (LoAA) or Letter of Air Safety Notification (LoAN) holders when formalized arrangements are in place for the TAA or Commodity CE to be fully informed of the outcomes of the LTC.◄
[24] Refer to RA 5010 – Type Airworthiness Strategy.
[25] Refer to RA 5407 – Support Policy Statement.

Guidance Material 5301(3)

b. TAM (if applicable).

c. Specialist ►◄ representatives as required[8].

d. Representative(s) of the DO(s) affected.

e. Representative(s) of the PO[9] if not the DO.

f. RTSA representative when discussing changes which could necessitate an update of the extant RTS.

g. Additional representatives of ►organizations◄ affected by the proposed changes.

h. Subject Matter Experts to advise on specialist technical aspects.

38. The members detailed in the CMP, or by exception deputies fully empowered to act on their behalf, will be present at all LTC meetings.

39. The LTC will provide a forum for dealing with technical and associated matters, including design changes, to make decisions and where necessary make recommendations to the CCB for Modification proposals and their classification. An LTC is the committee through which the Design Records are managed.

40. The LTC ►recorded outputs◄ will reference any significant changes to the information given on a Modification Proposal Form[2] and the effects thereof.

41. Although the greater part of the activity of an LTC is devoted to design changes and associated Modifications, it is not intended that it be limited to such work. It can also officiate as a means of resolving, or referring to MOD, local questions which may arise in the implementation of specified technical requirements, such as whether a new CofD may be required[26], or whether a change in a design, manufacture or supply process will necessitate requalification testing.

42. An LTC may deal with a range of equipment at a contractor's[27] premises, or more than one LTC may be established at a contractor's premises to deal with different types of equipment. The range of each LTC will be agreed by the TAA or Commodity CE setting up the LTC using the process detailed in the respective CMP.

[26] Refer to RA 5305(3): In-Service Design Changes – Modification Procedure.
[27] Contractor is used as a generic term to include industry organizations who may be involved in the design or production of relevant Products, Parts, Appliances, Airborne Equipment or ALW.

RA 5305 – In-Service Design Changes

Rationale

Following the introduction of an Air System (and related Products, Parts, Appliances, Airborne Equipment and Air Launched Weapons (ALW)) into service it may be necessary to develop design changes which may require Modifications, either to overcome deficiencies or to satisfy new requirements. Proposals for In-Service design changes will be appropriately controlled to avoid impacting on the Safety and Airworthiness of the Air System (and related Products, Parts, Appliances, Airborne Equipment and ALW); this Regulation describes the required control measures.

Contents

Regulation 5305(1)

In-Service Design Changes – General

5305(1) The Type Airworthiness Authority (TAA)[1] or Commodity Chief Engineer (CE) **shall** be responsible for managing the design change procedure.

Acceptable Means of Compliance 5305(1)

In-Service Design Changes – General

1. In-Service changes to the Air System Type Design **should** be conducted in accordance with (iaw) the classification[2] and approval process in RA 5820[3]. In-Service design changes to individual Products, Parts, Appliances, Airborne Equipment and ALW **should** be conducted iaw this Regulation.

2. The TAA or Commodity CE **should** ensure that, when selecting an organization for any design change, the organization has been approved under the MAA Design Approved Organization Scheme (DAOS)[4, 5].

3. During the design change procedure, the TAA or Commodity CE **should** manage configuration iaw their respective Configuration Management Plan (CMP)[6].

Guidance Material 5305(1)

In-Service Design Changes – General

General

4. A change in the design does not necessarily require the development and embodiment of a Modification since it could just require a change to the design drawings for future production, or a review of the planned usage. That is the intent of the terminology used in this Regulation.

5. Design changes to items of support and test equipment also need to be effectively managed to prevent impacting Air Safety. Therefore, appropriate arrangements are required that deliver the intent of this Regulation for those items.

6. The TAA or Commodity CE manage the design change procedure to amend the design once it is Under Ministry Control[6].

7. Commodity CE input is required at the earliest opportunity[6].

8. If a design change to a Part, Appliance, Airborne Equipment or ALW is implemented independently from a change in Type design of an Air System, the

[1] Where the Air System is ►not UK MOD-owned, Type Airworthiness (TAw) management◄ regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model ►◄; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems. Dependant on the agreed ►delegation◄ of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA, noting the TAM may not authorize major changes.
[2] Classification in this context means 'Major' or 'Minor', rather than the embodiment priority defined in this regulation.
[3] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D).
[4] Refer to RA 1005(2): Design Organizations.
[5] Refer to RA 5850 – Military Design Approved Organization (MRP Part 21 Subpart J).
[6] Refer to RA 5301 – Air System Configuration Management.

Guidance Material 5305(1)

Commodity CE will need to ensure that their changed item can be integrated into applicable Air Systems and still meet Certification and Safety requirements[7].

9. The Military Continuing Airworthiness Manager (Mil CAM) has a critical role to play in ensuring the effective embodiment of any Modifications[8], so they will be closely engaged in the development process.

10. Design change proposals can be initiated for many reasons[9], including:

a. Continued development to meet the specification;

b. Address faults experienced In-Service;

c. Fulfil new operational roles or improve operational effectiveness in existing roles;

d. Improve reliability, maintainability or cost-effectiveness;

e. Counter obsolescence.

11. The TAA or Commodity CE will give due consideration to the non-exhaustive list of factors detailed in the Modification Proposal Form example within Defence Standard (Def Stan) 05-057[10] prior to, and during, the design change procedure.

Management Procedures and Responsibilities

12. The Local Technical Committee (LTC)[6] will consist of technical and operating stakeholders to conduct the technical management of the design change procedure and any associated Modification(s). The LTC may be supported by specialist sub-groups if required, such as for development of detailed Modifications or for software-intensive programmes[7].

Regulation 5305(2)

In-Service Design Changes – Safety

5305(2) The TAA or Commodity CE **shall** ensure that In-Service design changes are conducted within an Air Safety Management System (ASMS)[7].

Acceptable Means of Compliance 5305(2)

In-Service Design Changes – Safety

13. All design changes and associated Modifications **should** be supported by their own Safety Assessment (SA) which **should** demonstrate continued compliance with Certification requirements[3].

14. The TAA **should** conduct a review of the Type Airworthiness Safety Assessment (TASA) when progressing all design change proposals[11].

15. The Commodity CE **should** ensure that the SA for any design change is promulgated to the appropriate Air System TAA for integration into the TASA.

16. The TAA or Commodity CE **should** ensure that design changes are addressed within the project Safety Management activities[12].

[7] Refer to RA 1200 – Air Safety Management.
[8] Refer to RA 4963(1): Modifications and Repairs.
[9] Refer to the Knowledge in Defence website - https://www.gov.uk/guidance/knowledge-in-defence-kid.
[10] Refer to Def Stan 05-057 – Configuration of Defence Materiel.
[11] Refer to RA 5012 – Type Airworthiness Safety Assessment.
[12] Refer to RA 5011 – Type Airworthiness Safety Management System.

Guidance Material 5305(2)

In-Service Design Changes – Safety

17. Managing design changes within an effective ASMS will ensure that they will receive the required focus on Air Safety, and any Hazards which impact on the Air System Safety Case[13] can be appropriately managed. Specifically, RA 5012[11] describes the role of the TASA in supporting the Release To Service (RTS)[14] and Military Permit To Fly (MPTF)[15]. There is also the requirement to seek Defence Equipment and Support (DE&S) Operating Centre Director approval[16] to reject any significant Airworthiness advice which may be received in relation to a proposed design change.

18. The aim will be to meet the requirements of an In-Service design change within the project's Design Safety Target (DST)[17] but in some instances this may not be achievable. In such cases any residual Risk needs to be appropriately managed and communicated to the Aviation Duty Holder (ADH) ►/ Accountable Manager (Military Flying)AM(MF). If the ADH / AM(MF) assesses that the residual Risk is not As Low As Reasonably Practicable and Tolerable[18], they may reject the proposed Design Change stating their rationale.◄

Regulation 5305(3)

In-Service Design Changes – Modification Procedure

5305(3) The TAA or Commodity CE **shall** select the most appropriate Design Organization (DO) to develop the required Modification.

Acceptable Means of Compliance 5305(3)

In-Service Design Changes – Modification Procedure

19. The TAA or Commodity CE **should** task development of the Modification to the DO of the Air System or relevant Product, Part or Appliance wherever possible[19] (termed 'Lead DO' henceforth in this Regulation).

20. When an Alternate DO is tasked to develop an Alternate Design Organization Modification (ADOM)[20], the TAA or Commodity CE **should** ensure that the CMP and the Airworthiness Strategy[21] clearly describe how the intent of RA 5301[6] and this Regulation will be met to retain Configuration, ensure continued access to relevant Design Records, and maintain Air Safety.

21. If an ADOM is developed for integration into an Air System, a Certificate of Design (CofD)[22] **should** be provided for the complete installation as part of the evidence to support the change in Type Design.

22. The TAA or Commodity CE **should** seek a Cover Modification from the Lead DO when an ADOM has been embodied where there is a need to fully incorporate the change into Design Records.

23. Where no Cover Modification is intended, the TAA **should** implement equivalent arrangements to ensure the effective through-life support of modified items and detail them within the relevant Support Policy Statement[23].

[13] Refer to RA 1205 – Air System Safety Cases.
[14] Refer to RA 1300 – Release To Service.
[15] Refer to RA 1305 – Military Permit to Fly (In-Service), (Special Case Flying) and (Single Task).
[16] Refer to RA 1013 – Air Systems Operating Centre Director - Provision of Airworthy and Safe Systems.
[17] Refer to RA 1230 – Design Safety Targets.
[18] Refer to RA 1210 – Ownership and Management of Operating Risk (Risk to Life). If the modified item is not being fitted to an Air System, the DST requirement does not apply.
[19] The DO (termed here the Lead DO for convenience) will maintain the Configuration Status Record (CSR) (refer to RA 5301 – Air System Configuration Management) and fulfil the requirements of RA 1014 – Design Organization and Co-ordinating Design Organizations - Airworthiness Responsibilities.
[20] In legacy terms this would often have been termed a Service Modification.
[21] Refer to RA 5010 – Type Airworthiness Strategy.
[22] Refer to RA 5103 – Certificate of Design.
[23] Refer to RA 5407 – Support Policy Statement.

Acceptable Means of Compliance 5305(3)

24. Regardless of any requirement for Cover Modification action, the Lead DO **should** be informed of the Modification development via the LTC to enable the CSR to be appropriately annotated.

25. The LTC **should** recommend for Configuration Control Board[6] agreement the embodiment priority classification and roll-out plan for all Modifications to be undertaken iaw Def Stan 05-057[10] Annex E.

26. The TAA or Commodity CE **should** ensure the following when implementing design changes via Modification:

a. That the urgency of developing the Modification is appropriate to the embodiment priority allocated, and that progress is actively managed via the relevant committees[24].

b. That clear instructions for embodying the Modification are developed iaw an effective, consistent process and are provided in a Modification Leaflet (ML) in advance of the Modification kits being issued.

c. The ML specifies the tools and equipment necessary to embody the Modification.

d. That the ML specifies how the Modification **should** be recorded, both on the item and in the technical records.

e. That sufficient Modification kits, tools and equipment are provisioned and made available for the Mil CAM to plan embodiment.

f. That amendments to the Air System Document Set (ADS)[25] and Commodity CE-approved Maintenance Manuals are provided which identify all required changes to affected operating, Maintenance and handling instructions. The ML **should** be filed within the Topic 2 series (or equivalent) of relevant publications.

g. A copy of the draft ML is provided to the Officer Commanding Defence Aircrew Publications Squadron (OC DAPS) or competent contractor and the User Authenticator as appropriate to determine its effect, if any, on operation or handling of the Air System[26].

Guidance Material 5305(3)

In-Service Design Changes – Modification Procedure

27. The Lead DO would be the preferred consideration for implementing design changes due to the existing infrastructure for managing design configuration, ADS contributions and through life support. However, the use of Alternate DOs provides the flexibility to embody Modifications of an urgent, special or short-term nature when normal procedures may not be suitable.

28. Careful consideration needs to be given before tasking Modifications to Alternate DOs in the following circumstances due to the potential impact on commercial arrangements and wider interchangeability of equipment:

a. Equipment supplied or maintained by Government agencies outside the MOD, unless a prior agreement has been arranged with the provider;

b. Equipment on loan to the MOD, unless a prior agreement has been arranged with the provider;

c. Equipment that forms part of a global spares pool or Contractor Logistic Support agreement where the Contractor owns the equipment unless a prior agreement has been arranged.

[24] The ADH and Mil CAM will have an input regarding the urgency of developing Modifications for Air Systems.
[25] Refer to RA 1310 – Air System Document Set.
[26] Refer to RA 5406 – Aircrew Publications.

Guidance Material 5305(3)

29. If development of the Modification requires a trial installation which takes the Air System outside of its RTS or MPTF (In Service) or MPTF (Special Case Flying) and a Special Clearance[27, 28] is not appropriate, a MPTF will be required[29].

30. The roll-out plan proposed by the LTC will need to consider effective concurrent operation of pre and post Modification Systems where applicable.

Certificate of Design

31. Where the design change is undertaken by the Lead DO for the Air System and is deemed to be a Major Change[3], a new CofD will be required; a Minor Change can generally be annotated in the Design Records. RA 5103[22] details minimum requirements for generating a new CofD and the relevant LTC will agree any additional requirements.

Recording of Modifications

32. The CSR will reflect the details of the Modification in the Design Records and marking of individual items will be iaw RA 5885[30]. For Products which have been subject to multiple Modifications during production, it may be appropriate to mark the item and annotate its individual record card with a Y-List[31] number for ease of identifying its configuration standard.

Preparation of Modification Leaflets

33. Regardless of who is tasked to produce the ML, the TAA or Commodity CE retain responsibility for ensuring their accuracy and suitability for use; the Mil CAM(s) will be closely engaged. Careful configuration control of MLs will be required where the ML and embodiment kits iterate through trial installations as part of development prior to formal issue.

Cover Modifications

34. Prior to a Cover Modification being progressed, the Lead DO will, as a minimum, be provided with a general assembly drawing of the proposed Modification for temporary annotation of the Design Records. This will allow appropriate consideration when the Lead DO conducts other activities such as scheming repairs. The decision to not seek Cover Modification action will need to be appropriately justified within the relevant Safety Assessment, given the potential challenges introduced for managing configuration, maintaining the ADS and Commodity CE Maintenance Manuals, increased complexity in conducting Maintenance[32] and ensuring long-term provisioning of spares. Support of the Mil CAM for the proposed support solution will be obtained via the appropriate committee (paragraph 11).

[27] Refer to RA 1305 – Military Permit To Fly (In-Service), (Special Case Flying) and (Single Task).
[28] Refer to RA 1330 – Release To Service Special Clearances.
[29] Refer to RA 5880 – Military Permit To Fly (Development) (MRP Part 21 Subpart P).
[30] Refer to RA 5885 – Identification of Products, Parts and Appliances (MRP Part 21 Subpart Q).
[31] An example of an item Modification record is the MOD Form 753 (Refer to the Manual of Airworthiness Maintenance - Documentation). The LTC may decide (for instance) that Modifications 1 - 100 form Y/1 which will be annotated on the item and its MOD Form 753, rather than listing all 100 Modifications.
[32] The Instructions for Sustaining Type Airworthiness (ISTA) (refer to RA 5815 – Instructions for Sustaining Type Airworthiness) contain the Lead DO's instructions, thus the need to follow the revised Maintenance instructions will be clearly indicated and robustly managed.

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►This RA has been substantially re-written; for clarity, no change marks are presented – please read RA in its entirety◄

RA 5320 - Air System Maintenance Schedule – Design and Validation

Rationale

Maintenance schedules are a key component of the Instructions for Sustaining Type Airworthiness (ISTA)[1]. Failure to implement an appropriate Maintenance schedule regime, such as Reliability Centred Maintenance (RCM), could potentially jeopardize Airworthiness. Maintenance schedules need to be maintained and validated throughout the life of the Air System, to account for changes in operating usage, environment, configuration, Ageing and Maintenance regime. This RA details the protocols for implementing an Air System Maintenance schedule through life in order to sustain Airworthiness.

Contents

Regulation 5320(1)

Air System Maintenance Schedule – Design and Validation

5320(1) The Type Airworthiness Authority (TAA)[2] **shall** ensure Air System Maintenance schedules are designed in accordance with an appropriate protocol and remain valid throughout the life of the Air System.

Acceptable Means of Compliance 5320(1)

Air System Maintenance Schedule – Design and Validation

1. The Air System Maintenance schedule **should** be a complete and overarching Preventive Maintenance regime for maintaining the TAw of an Air System throughout its designed and certified life. The Maintenance schedule **should** be based on forecast usage, reliability performance and include the task content and metric or events that trigger the tasks.

2. The Maintenance schedule, with supporting evidence, **should** be in place to support Air System Certification[3]. The Maintenance schedule **should** be detailed in the ISTA[1].

3. Any preventive Maintenance schedule **should** be derived and reviewed in conjunction with the Design Organization (DO) and the Military Continuing Airworthiness Manager.

4. The Air System Maintenance schedule **should** be subject to periodic review and validation. These activities **should** consider operating experience[4] and any changes to the Maintenance regime proposed by the DO and promulgated by the TAA, resulting in amendment to the Maintenance schedule when necessary. DO design data and assumptions **should** be utilized to validate the effectiveness of the Maintenance schedule in mitigating the failure modes and failure rates anticipated during Certification and the development of the initial Maintenance schedule. The periodicity **should** be dictated to preserve Airworthiness but **should not** exceed 5 years.

5. During design, review and validation either of the following Maintenance protocols **should** be utilized:

   a. JAP(D)100C-22[5].

   b. Air Transport Association Maintenance Steering Group-3 (MSG-3).

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[1] Refer to RA 5815 – Instructions for Sustaining Type Airworthiness.
[2] For Civilian-Owned / Civilian Operated Air Systems the Air System Sponsor has the opportunity to split Type Airworthiness (TAw) responsibility between a TAA and a Type Airworthiness Manager (TAM); however due to the non-delegable responsibilities detailed in RA 1162 - Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, TAM is not applicable to this RA.
[3] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B).
[4] Refer to Manual of Air System Integrity Management (MASIM).
[5] Refer to JAP(D)100C-22 – Guide to Developing and Sustaining Preventative Maintenance Programmes.

Acceptable Means of Compliance 5320(1)

6. If the Air System is a civil derivative design then the TAA **should** attend or send a representative to the Maintenance Review Board, or the appropriate civil Maintenance Review Meeting for the type.

Guidance Material 5320(1)

Air System Maintenance Schedule – Design and Validation

7. The procedures for the preparation and amendment of Maintenance schedules are identified in JAP(D)100C-20[6].

[6] Refer to JAP(D)100C-20 – Preparation and Amendment of Maintenance Schedules.

RA 5405 – Special Instructions (Technical)

Rationale

When a Fault or potential Fault impairs the Safety, serviceability or operational capability of an Air System (and related Products, Parts, Appliances), Airborne Equipment or Air Launched Weapons), temporary Instructions are issued to authorize remedial action. These Instructions, known as Special Instructions (Technical) (SI(T)), are approved and issued by the Type Airworthiness Authority (TAA)[1] or the Commodity Chief Engineer (CE). An SI(T) provides the authority to undertake a work package to identify, monitor, repair or prevent the potential Occurrence or re-Occurrence of a Fault.

Contents

Regulation 5405(1)

Special Instructions (Technical)

5405(1) The TAA or Commodity CE **shall** raise ►an◄ SI(T) when a work package is needed to identify, monitor, repair or prevent the Occurrence or re-Occurrence of a Fault.

Acceptable Means of Compliance 5405(1)

Special Instructions (Technical)

Delivery Team Responsibilities

1. Prior to issuing an SI(T), the TAA or Commodity CE **should** assess:

   a. The effect of the Fault or potential Fault on the Type Airworthiness Safety Assessment / Equipment Safety Assessment and, if required, consult with the Operating Duty Holder (ODH) / Accountable Manager (Military Flying) on the effect on the Air System Safety Case.

   b. Any effect that SI(T) compliance itself could introduce (for example, an SI(T) that requires the frequent disturbance of a critical Aircraft system could itself introduce a Risk to Airworthiness).

2. When an SI(T) is raised, the TAA or Commodity CE **should** notify the Design Organization (DO) and / or the Original Equipment Manufacturer.

3. The TAA or Commodity CE **should** take responsibility for:

   a. Consulting with the Military Continuing Airworthiness Manager (Mil CAM)[2] to ensure the Maintenance organizations are able to fulfil the requirements of an instruction and the implications of applying the instructions to stored equipment.

   b. Ensuring that SI(T)s comply with the applicable Type Certification Basis.

   c. Promulgation of SI(T)s.

   d. Maintaining registers for all SI(T)s, including an index of applicable SI(T)s in the Orders and Instructions issued by the TAA (Topic 2(N/A/R)1).

   e. Ensuring that SI(T)s remain extant for the minimum required period and issuing clear instructions when they are superseded, time expired, fully completed, or otherwise cancelled.

   f. Initiating appropriate follow up action as required, such as modifications or Instructions for Sustaining Type Airworthiness (ISTA)[6] amendment.

   g. Liaising with other TAA or Commodity CEs and Service Non-Destructive Testing (NDT) organizations.

[1] Where the Air System is ►not UK MOD owned, Type Airworthiness (TAw) management◄ regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model ►◄; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.

[2] Refer to RA 4947 – Continuing Airworthiness Management – MRP Part M Sub Part G.

Acceptable Means of Compliance 5405(1)

h. Retaining an audit trail of all actions relating to the SI(T).

i. Conducting periodic summaries, at least every 6 months, of all instructions issued, extended or cancelled during the previous period.

j. Issuing the periodic summaries to all parties as appropriate.

k. Agreeing categories for the instruction from those listed at Annex A.

4. When an Airworthiness Directive (AD) or Service Bulletin (SB)[3] for a civil derivative Air System is received, the TAA or Commodity CE **should** utilize the SI(T) process to initiate corrective action in the same way they would with a military Air Systems.

5. The TAA or Commodity CE **should** engage with the Release To Service (RTS) Authority (RTSA) or Sponsor[4] during the production of an SI(T) to ensure sufficient evidence is made available to enable changes to be incorporated into the RTS, Military Permit to Fly (MPTF) (In-Service) or MPTF (Special Case Flying (SCF)) or the letter of release for ship-borne operations.

6. When an NDT technique is required to satisfy an SI(T), the relevant TAA or Commodity CE **should** engage the appropriate NDT organization as early as possible to enable development of the required technique.

7. The TAA **should** provide Officer Commanding Defence Aircrew Publications Squadron (OC DAPS) or a competent contractor with a draft copy of the SI(T) to enable DAPS or the competent contractor to determine whether operation or handling are affected.

8. **Armament Safety**. Special clearance procedures **should** be identified before ►an◄ SI(T) is issued which affects Air System weapons or equipment, which have an RTS or MPTF (In-Service) or MPTF (SCF) covering an armament capability.

Design Organization Responsibilities

9. When tasked, the DO **should** be responsible for the following:

a. Retaining an audit trail of all actions relating to the SI(T).

b. Maintaining registers for all SI(T)s.

c. Conducting periodic summaries, at least every 6 months, of all instructions issued, extended or cancelled during the previous period.

d. Issuing the periodic summaries to all parties as appropriate.

e. Preparing a draft SI(T) for submission to the Delivery Team (DT) as required.

f. Advising the TAA or Commodity CE of the need for NDT.

g. Recommending acceptance of an SI(T) drafted by other DOs.

h. Initiating modification[5], drawing amendment, ISTA amendment[6] or other action to enable cancellation of the SI(T).

i. Providing technical advice.

j. Obtaining TAA or Commodity CE approval.

10. These procedures **should not** be used to circumvent more formal action. ►An◄ SI(T) **should** remain extant until the TAA or Commodity CE withdraws it for one of the following reasons:

a. Issue of a superseding SI(T).

b. Issue of an over-riding publication amendment or design change.

[3] Refer to RA 5805 – Airworthiness Directives and Service Bulletins (MRP Part 21 Subpart A).
[4] Refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems.
[5] For modifications the DO will be tasked by the TAA or Commodity CE.
[6] Refer to RA 5815 – Instructions for Sustaining Type Airworthiness.

Acceptable Means of Compliance 5405(1)

c. When further application is not required.

Guidance Material 5405(1)

Special Instructions (Technical)

General

11. SI(T) are of two types:

a. Urgent Technical Instructions (UTI) where remedial action is necessary within 14 days / 25 flying hours.

b. Routine Technical Instructions (RTI) for less urgent actions.

12. DO input into SI(T)s is at the discretion of the TAA or Commodity CE, noting DO activity may result as a means of investigating or resolving the identified issue.

13. When the TAA considers that it is neither practicable nor cost-effective to convert an AD or SB into SI(T) format the AD or SB may be issued under cover of ►an◄ SI(T). This also applies to civil-issued directives, assessed by the DO as applicable to Service Air Systems.

14. The UTI / RTI can be used to disseminate information of a technical, administrative or policy nature.

Layout and Content

15. The SI(T) Generic Template layout and content[7] includes the prescribed paragraph numbering and paragraph headings. All content will be completed, except when a paragraph has no relevant content; then it will be annotated "Not Applicable" or as instructed in the detail for the paragraph heading.

16. Amendments that do not require the SI(T) to be re-satisfied are identified by the addition of a suffix letter to the original number. When amendments require the Instruction to be re-satisfied, a superseding Instruction will be issued using a new number.

TAA or Commodity CE Responsibilities

17. The TAA or Commodity CE is responsible for the following:

a. Ensuring that an RTI or UTI has been raised with the appropriate level of urgency.

b. Determining whether any extension may be applied locally to single-application or repetitive instructions. Where no latitude is permitted, a statement to that effect will be included in the instruction.

c. Ensuring that appropriately authorized staff[8] approve release of SI(T).

d. Ensuring any issues regarding Health and Safety at Work, Control of Substances Hazardous to Health etc have been dealt with appropriately.

e. Ensuring action is taken to initiate updating of Airworthiness Information Systems[9] on generation and cessation of instructions.

f. Ensuring the details of the equipment quoted are accurate and the availability of items required from stock is verified. For equipment managed in the MOD supply system, the details required are: The North Atlantic Treaty Organization (NATO) Stock Number, part number and NATO Commercial and Government Entity code. For equipment not managed in the MOD supply system, the required details are part number and manufacturer or supplier.

[7] The SI(T) generic template is available on the MAA website.
[8] Refer to RA 1003 – Delegation of Airworthiness Authority and Notification of Air Safety Responsibility.
[9] Refer to RA 1223 – Airworthiness Information Management.

Guidance Material 5405(1)

g. Ensuring the requirements and implications of applying the instruction to equipment fitted to flight simulators and synthetic trainers, fatigue test specimens, not-in-use equipment and equipment in store are met.

h. Ensuring the relevant approval(s) details have been included in the SI(T).

18. In addition, unless the Airworthiness Risk precludes it, the appropriate Mil CAM will be contacted in order to give advanced notification of the SI(T) to ensure that the instruction can be complied with and that any impact on availability and operational capability is understood. The following will be considered as a minimum:

a. Availability of any spares required (including Fuels, Lubricants and Associated Products) and any specialist tooling.

b. The requirement for any specialist skills or training.

c. The potential impact on deployed operations and overseas exercises.

d. The potential impact on UK training.

19. Where a Commodity CE is the Engineering Authority for an equipment with multi-Air System applicability and has a requirement to issue ►an◄ SI(T) against this equipment, the issuing TAA will request an SI(T) reference number from the appropriate Commodity CE. The Air System TAA will be responsible for distributing the SI(T) and ensuring the Commodity DT is copied on any SI(T) returns.

ANNEX A

SI(T) - CATEGORIES

Equipment Category	Air System / Equipment Sponsor	Remarks
Aerial Targets	Trials Evaluation Services and Targets (TEST) Team	
Aircraft (by type)	Air System DT	
Air Cargo Equipment	Air Commodities DT	
Aircraft Assisted Escape Systems	Crew Escape Systems Team	
Airborne Equipment[10]	C17 Command Support Team - Airborne Equipment	Sponsor requirement: SI(T) category – AD & AFE to form part of reference number, ie RTI/AD&AFE/0001
Airborne Night Vision Goggles	Air Commodities DT	
Air Refuelling	Voyager DT	See Note 1
Armaments	Hawk DT: Armament Support and Role Equipment (ASRE) for Hawk & Merlin Air System DT International Guns, Missiles & Rockets (IGMR): 70 mm Rockets (unguided), Hellfire missile (guided), Paveway (guided), 3 kg practice bomb (unguided), M60D Machine Gun, M134 Minigun & M3M Heavy Machine Gun Attack Helicopter DT: Apache gun	See Note 2 Includes Special-to-Type Test Equipment (STTE) Includes CRV7, Mauser, Aden and helicopter guns, other than Apache
Defence General Munitions	Defence General Munitions (DGM) DT: Depth Charge (unguided), Air Countermeasures (chaff / flare), Cartridge Electrically Operated Fire Extinguisher (not all, some sponsored by platform, ERU Cartridges, Misc – small explosive devices	
Electrical	Air Commodities DT	
Electronic Warfare	Air Platform Systems DT	
Engines (by type)	Air System DT	For engines fitted to more than one Aircraft type, lead will be taken by the nominated DT
General Purpose Automated Test Equipment	Air Commodities DT	
General Systems	Air Commodities DT	

[10] As defined in MAA02 – Military Aviation Authority Master Glossary.

Equipment Category	Air System / Equipment Sponsor	Remarks
Ground Support Equipment	Air Commodities DT	Includes Armament Ground Support Equipment (GSE)
Guided Air-Launched Weapons (by type)	Lightweight and Medium Attack Systems Team (LMAS): Brimstone (guided) and Lightweight Multi-role Missile (guided) Long Range Precision: Storm Shadow Air to Air Missiles (AAM). Meteor, AMRAAM and ASRAAM	See Note 2 Includes STTE
Helicopter Under-Slung Load Equipment	Air Commodities DT	
Instruments	Air Commodities DT	
NDT Equipment	Air Commodities DT	
Photographic Equipment	Air Commodities DT	
Personal Aircrew Equipment and Oxygen Systems	Air Commodities DT	
Propellers	Air System DT	
Radio – Airborne	Air Commodities DT Electronic warfare and identification equipment: Air Platform Systems Team	See Note 2
Rescue Hoists	Air System DT	
Simulators (by type)	Flight Simulation & Synthetic Trainers (FsAST) Team	
Survival Equipment (by type)	Air Commodities DT	See Note 1
Test and Measuring Equipment	Operational Infrastructure Programme Team (OIP) – Test Equipment Management	See Note 1
Air Launched Torpedoes	Torpedoes, Tomahawk and Harpoon (TTH) DT (Sting Ray, Spearfish and Mark 54)	
Remotely Piloted Air Systems (RPAS)	Remotely Piloted Air System DT	

Notes:

1 Where STTE / Special to Type Airfield Support Equipment (STTASE) has been procured, the Air System / equipment sponsor procuring the equipment will be the Engineering Authority (EA) unless other arrangements have been agreed.

2 Multiple Air System / Equipment Sponsors may use a four element reference number to clearly identify SI(T) DT and equipment to ensure there is no reference number duplication by different equipment sponsors. For example: SI(T)/DT/Equipment/001.

RA 5406 – Aircrew Publications

Rationale

Aircrew Publications are a subset of the Air System Document Set (ADS)[1] that provide Aircrew with information on the technical details, performance and handling characteristics of an Air System, together with normal and emergency operating procedures and limitations, in an accessible format at the point of need. Failure to create and maintain Aircrew Publications will result in the Aircrew being unable to ensure that the associated Air System is operated safely. To maintain safe operation, Aircrew Publications need to be amended through-life in a coherent and expedient manner so that they continue to reflect the Release To Service (RTS)[2] or Military Permit To Fly (MPTF)[3] cleared configuration of the Air System.

Contents

Regulation 5406(1)

Aircrew Publications

5406(1) The Type Airworthiness Authority (TAA)[4] **shall** approve and provide a complete set of Aircrew Publications to the Operating Duty Holder (ODH) / Accountable Manager (Military Flying) (AM(MF)).

Acceptable Means of Compliance 5406(1)

Aircrew Publications

1. The TAA **should** develop Aircrew Publications in accordance with (iaw) the requirements of the ADS management plan[1] ►◄.

2. All related Aircrew Publications ►**should** be◄ issued before the Air System is required to commence In-Service flying.

3. ►Aircrew Publications **should**◄ provide the following as a minimum (but not limited to):

   a. Normal and emergency drills in a format suited to use by the Aircrew in the operating environment.

   b. Detailed system descriptions including installed avionics, weapons equipment and associated software, Air System operating instructions, handling advice and expanded normal and emergency procedures.

   c. Sufficient performance information to permit effective flight planning calculations, enabling adherence to civilian Regulation where applicable, suitable to the Air System role, and supportive of mission management decision making. ►This **should** be provided via an Electronic Performance Planning Aid (EPPA) unless the stakeholder community is agreed that an EPPA is not required[5].◄

4. If the need is identified, the following ►**should** also be◄ provided:

   a. A Maintenance procedure suitable for use by the Air System crew iaw their engineering authorizations.

   b. A method of determining the Air System suitability for dispatch or continuance on task.

   c. Procedures to confirm the performance, mission effectiveness or handling qualities of an Air System or to perform diagnostic analysis of its Systems.

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[1] Refer to RA 1310 – Air System Document Set.
[2] Refer to RA 1300 – Release To Service.
[3] Where an Air System is operated under MPTF, refer to RA 5880 – Military Permit to Fly (Development) (MRP Part 21 Subpart P) or RA 1305 – Military Permit to Fly (In-Service), (Special Case Flying) and (Single Task).
[4] Where the Air System is not UK MOD-Owned, Type Airworthiness (TAw) management regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.
[5] ►Refer to AAP 00-002 – Defence Aircrew Publications Guide (DAPG) for specialist advice regarding the development, production and assessment of EPPA, including those installed on Electronic Flight Bags.◄

Acceptable Means of Compliance 5406(1)

5. Officer Commanding Defence Aircrew Publications Squadron (OC DAPS)[6] and / or a competent contractor[7] ►**should** be◄ appointed to support the TAA in:

a. Ensuring the timely and effective management of the production, validation, verification and maintenance of Aircrew Publications[1].

b. Liaising where necessary with an Operating Data Manual (ODM) Agency[8] to ensure the provenance of performance data by independent scrutiny of the Performance Data Substantiation Document (PDSD), and to maintain consistency and coherence of the ODM with the RTS, MPTF and other Aircrew Publications.

6. OC DAPS or a competent contractor ►**should**◄ provide independent Assurance and advice on the acceptability of the Aircrew Publications, iaw Air Acquisition Publication (AAP) 00-002 Defence Aircrew Publications Guide (DAPG) and DAPS Business Processes, as an integral element of the Type Air Safety Assessment (TASA) or Project Safety Assessment[9].

7. OC DAPS or a competent contractor **should** be:

a. The Subject Matter Expert (SME) for Aircrew Publications and provides the independent Assurance and advice on the acceptability of Aircrew Publications.

b. Responsible for providing independent Air System performance advice to the TAA and ODH / AM(MF).

8. The TAA **should** ensure that OC DAPS or a competent contractor is undertaking the management of production, independent assessment and publication activities for Aircrew Publications, leading to the provision of the information required to support the RTS and MPTF.

9. When DAPS is used to manage the production of Aircrew Publications, the preferred layout and technical content **should** follow that detailed in AAP 00-001[10]. Otherwise the format of new material **should** follow that detailed in Defence Standard 00-601 Part 1[11]. In either case, the TAA **should** ensure that the source data is valid or has been validated, and that the content and presentation are verified by the User Authenticator (UA)[12] as fit for purpose.

10. The ODH / AM(MF) **should**:

a. Ensure that the implications of any changes to the RTS and MPTF are evaluated, and that timely action is taken to amend appropriate orders or provide guidance and information to staff under their command.

b. Appoint a UA, typically the Standardization / Evaluation office for each Air System. The UA **should** provide verification to OC DAPS or competent contractor and the RTSA that the content and presentation of the Aircrew Publications meet user requirements. However, the advice in the Aircrew Publications **should** reflect what is authorized by the RTS.

11. The Design Organization (DO) **should**:

a. Provide the TAA with all the information required to ensure that Aircrew Publications reflect the Type Certification Basis of the Air System.

b. Maintain the master source material (recommended to the TAA, including all graphics) throughout the life of the Air System and make this material available ‘on demand’ to the MOD.

c. Generate appropriate text on the ‘Effect on Operation and Handling’ when an effect on operation and / or handling is identified.

[6] OC DAPS will be issued with terms of reference by the Delegated Release to service Authority (DRTSA) RAF, and counter-signed by DRTSA (RN) and DRTSA (Army).
[7] Refer to RA 1005 – Contracting with Competent Organizations.
[8] Refer to AAP 00-002 - Defence Aircrew Publications Guide (DAPG) for definition of an ODM Agency.
[9] Refer to RA 5011 – Type Airworthiness Safety Management System and RA 5012 - Type Airworthiness Safety Assessment.
[10] Refer to AAP 00-001 – Defence Aircrew Documentation Specifications.
[11] Refer to Defence Standard 00-601 Part 1 – MOD Business Rules – Contracting for Technical Documentation.
[12] Refer to MAA02: MAA Master Glossary.

Acceptable Means of Compliance 5406(1)

d. Produce a PDSD to support all performance data provided for the Aircrew Publications. The PDSD describes how the Air System performance data are derived and validated. The PDSD **should** be updated as required to support changes to the provided data.

Guidance Material 5406(1)

Aircrew Publications

12. The ODH / AM(MF) may require the TAA to provide operators with information in addition to that listed ►in paragraphs 3 and 4.◄ This information will be presented within the Air System's Aircrew Publications.

13. Operating data will be provided to the Normal Operating Standard as a minimum. Details of normal, reduced and military operating standards can be found in AAP 00-002[8].

Air Systems procured with existing civilian or foreign Aircrew Publications

14. The TAA may use Aircrew Publications sourced from civilian or foreign sources that allow the ADS requirement to be satisfied, subject to assessment and Assurance by the OC DAPS or a competent contractor. There will be a reasoned 'evidence-based' argument as to why such publications are suitable for use in the Defence Air Environment and how they will be kept up-to-date with the UK military registered Configuration through the life of the Air System.

Advance Warning of Changes

15. Aircrew Manuals (AMs) and Flight Reference Cards (FRCs) may contain advance warning notices of changes such as Advance Information Leaflets or Advance Notification of Amendments; nevertheless, users need to be aware that these publications may not fully reflect the latest limitations or procedures due to the following:

a. **RTS Limitations**. If limitations are quoted in advanced warning notices of change to the AMs, ODM and FRCs they will be based directly upon those contained in the RTS.

b. **Security Classified Limitations**. Information graded higher than OFFICIAL SENSITIVE are not included in the standard RTS, AMs or FRCs; they may be published in classified supplements.

UA

16. The UA's tasks will include:

a. As Air System SME, maintaining a close working relationship with DAPS and / or the DO.

b. Acting as the focal point in providing advice from the operators' perspective.

c. Specifying the content of Pilot Notes.

d. Verifying the fitness for purpose of Aircrew Publications.

e. Co-ordinating proposals from operating units, consideration by the TAA and for taking immediate action if warranted by the urgency of the proposed change.

►◄

17. ►◄

Regulation 5406(2)

Amendments to Aircrew Publications

5406(2) The TAA **shall** ensure that the Aircrew Publications are maintained in coherence with the RTS or MPTF (as applicable) cleared configuration through the life of the Air System.

Acceptable Means of Compliance 5406(2)

Amendments to Aircrew Publications

18. The TAA **should** amend Aircrew Publications through-life iaw the requirements of the ADS management plan[1], ensuring that changes to the design of the Air System affecting Aircrew are promulgated to the DRTSA via RTS Recommendations.

19. For changes to the Air System configuration that are likely to affect Aircrew Publications (especially important for software changes) and the RTS, ►the TAA **should** identify those responsible for providing all relevant data associated with such changes to OC DAPS or a Competent Contractor and arrange for any required amendment of the related Aircrew Publications.◄

a. ►◄

b. ►◄

20. OC DAPS or a competent contractor **should** determine whether handling, performance or operation is affected and, when tasked, recommend appropriate amendments to the Aircrew Publications, to the TAA.

21. In the case of changes to Type Design or in-service design changes and Special Instructions (Technical) (SI(T)s), the TAA **should** request advice from OC DAPS, UA or a competent contractor to advise whether an entry in the Air System Technical Log[13] is required and provide the wording for such entries.

Guidance Material 5406(2)

Amendments to Aircrew Publications

22. Duty Holder-Facing organizations all have a responsibility to ensure that the ramifications of changes to the Aircrew Publications are notified to staff in a timely fashion, if necessary, by the prompt issue of warnings or orders, and in all cases followed up by the timely amendment of the appropriate publications. It is essential that amendments to Aircrew Publications are developed in the same timescale as the issue of changes to the RTS.

23. For each Air System, the TAA and RTSA will agree their responsibilities for ensuring that amendments to all Aircrew Publications in the ADS are made in a timely fashion to reflect changes to the Air System design, the RTS, and Maintenance policy statements. Where the change to the Air System affects both the Aircrew and ground crew it is crucial that both sets of orders, or amendments to publications, are promulgated simultaneously.

24. The TAA and RTSA will ensure that all changes likely to affect the Aircrew Publications are supported by a TASA / Project Safety Assessment change report that clearly carries forward the ramifications of the change to all relevant parts of the Aircrew Publications. Where appropriate this will include the requirement for the DO to amend the Air System performance data for further consideration by an ODM agency on behalf of the TAA.

25. Most changes to the Aircrew Publications during an Air System's In-Service life result from changes to Type Design, In-Service design changes or SI(T)s. For all changes, the TAA will require the DO to provide OC DAPS with validated information and procedures. To ensure that the operating information available to Aircrew reflects the RTS cleared configuration, it is vital that both the TAA and RTSA keep the OC DAPS fully informed as to the nature of changes. When the source of change to the Aircrew Publications is In-Service experience, and the TAA and RTSA have agreed that it does not require a change to the RTS or ODM, OC DAPS or a competent contractor may initiate the change. In this case OC DAPS will seek validation of the change from the DO, through the Delivery Team, if practicable.

[13] MOD Form 703A1 – List of Modifications and Service Issued Instructions of Direct Operating Interest to Aircrew, MOD Form 703A2 – List of Frequently Moved Modifications and Service Issued Instructions of Direct Operating Interest to Aircrew, or equivalent.

RA 5407 – Support Policy Statement

Rationale

An Air System Safety Case (ASSC) is critically reliant on a range of support requirements. The Support Policy Statement (SPS) is the executive document specifying all the support arrangements for an Air System and / or its associated equipment, when operated in the interest of the MOD[1]. Failure to identify, provision for and articulate the range of support requirements is likely to compromise Air Safety. This RA describes the engineering and supporting administrative actions that are necessary to enable the safe and efficient operation of the Air System.

Contents

Regulation 5407(1)

Support Policy Statement

5407(1) The Type Airworthiness Authority (TAA)[2] **shall** ensure that a SPS is produced, promulgated and maintained for their Air System.

Acceptable Means of Compliance 5407(1)

Support Policy Statement

1. The SPS **should**:

a. Be promulgated as the first leaflet in the Topic 2(N/A/R)1[3] or equivalent, with specific support policy requirements identified in subsequent leaflets.

b. Detail the authorities and / or organizations with management responsibilities.

c. Define the on-Aircraft and equipment Maintenance philosophies (both Preventive and Corrective), and the methodology used to develop the relevant Maintenance schedule[4].

d. Detail the Approved Data[5] that enables delivery of the Support Policy, including the planned method for promulgating amendments.

e. Identify the equipment, Systems and commodity items which are included within the Safety Assessment but which are managed and supplied by other organizations, referencing any relevant individual SPS and necessary information from the relevant providers.

f. Identify the data to be gathered through life and how it will be managed to support the requirements for data exploitation[6] and Fault trend analysis[7].

g. Detail the utilization of Logistic Information Systems (LIS) that contribute to Air System operation[8].

h. Define the approach to ensuring provision of sufficient spares to enable delivery of Instructions for Sustaining Type Airworthiness (ISTA)[9, 10].

i. Detail the arrangements for providing sufficient tools, test equipment and material to enable delivery of ISTA[11].

j. Detail the requirements and arrangements for appropriate training of ground-based personnel.

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[1] Refer to RA 1160 – The Defence Air Environment Operating Framework. For Special Case Flying, the Type Airworthiness Manager (TAM) can choose to follow a similar approach within the construct of their own internal governance and procedures.
[2] Whilst the TAA holds the responsibility for producing the SPS, the information held within it may include aspects authored and approved by other key contributors.
[3] Topic 2(N/A/R)1 is a legacy military reference. Equivalent ISTA titles are acceptable.
[4] Refer to RA 5320 – Air System Maintenance Schedule – Design and Validation.
[5] Refer to RA 5815 – Instructions for Sustaining Type Airworthiness.
[6] Refer to RA 1207 – Air Safety Data Management and Exploitation.
[7] Refer to RA 5825 – Fault Reporting and Investigation.
[8] Refer to RA 1223 – Airworthiness Information Management.
[9] Refer to RA 4809 – Acceptance of Components (MRP 145.A.42).
[10] Refer to RA 5855 – Parts and Appliances (MRP Part 21 Subpart K).
[11] Refer to RA 4808 – Equipment, Tools and Material (MRP 145.A.40).

Acceptable Means of Compliance 5407(1)

k. Detail the requirements for support facilities and infrastructure, including Flight Simulation Training Devices[12] where applicable.

2. The SPS **should** be issued at initial authorization of the Release To Service (RTS) or the Military Permit to Fly (MPTF) (In-Service) and reissued at least every 5 years, or following significant change, to ensure continued alignment with ASSC requirements[13]. SPS requirements when an MPTF (Development) is generated **should** be defined by the TAA accordingly to be appropriate and proportionate for the phase of the project.

3. The TAA **should** ensure that a routine review of the SPS for continued accuracy is included within the Quality Management System.

4. Reviews of the SPS **should** be carried out in consultation with appropriate Military Continuing Airworthiness Manager and support organizations, including exploitation of all relevant data sources[6].

5. Where equipment is provided by a Commodity Chief Engineer (CE)[14], the TAA **should** ensure that sufficient information is either provided to support the Air System SPS, or produced in a standalone commodity SPS. The equivalent content of a commodity SPS **should** be proportionate to the complexity of the equipment, its support requirements and the Hazards it presents.

Guidance Material 5407(1)

Support Policy Statement

6. The SPS will typically include the minimum requirements listed in Annex A.

7. The SPS describes the engineering and supporting administrative actions that are necessary to enable the safe and efficient operation of the Air System or Equipment and it forms an essential element of the ASSC, and Air System Document Set that underpins the RTS or the MPTF (In-Service) / MPTF (Development). A comprehensive SPS is also a key component of the Establish-Sustain-Validate-Recover-Exploit approach to Integrity Management[15].

8. The Maintenance philosophy needs to address aspects such as the rationale for grouping of servicing operations, the anticipated location for their conduct (eg Forward or Depth), and relevant latitudes or periodicities.

9. The Approved Data will encompass ISTA[5] provided by the appropriate Design Organization (DO). Approved Data may also include information (such as equipment bay servicing schedules) provided by Competent Organizations[16] or from other Type Airworthiness (TAw) organizations, which is ultimately approved for use by the TAA[17].

10. For off-board systems that contribute to Air System operation (such as Mission Planning tools and LIS), it is acceptable for support aspects to be addressed in their individual Safety Assessments rather than requiring a separate SPS. Each Safety Assessment will be referenced by the ASSC.

11. The individual equipment SPS referenced from the Air System SPS will include systems within the Air System Type Design (such as Avionics and Commodities), Air Launched Weapons and Role Equipment.

12. The TAA will need to ensure appropriate arrangements are in place with other TAw organizations responsible for delivering the required support according to the related SPS.

[12] Refer to RA 2375 – Qualification, Approval and Use of Flight Simulator Training Devices.
[13] Refer to RA 1205 – Air System Safety Cases.
[14] Refer to RA 5013 – Air Safety Management of Equipment and Commodity Items.
[15] Refer to RA 5726 – Integrity Management.
[16] Refer to RA 1005 – Contracting with Competent Organizations.
[17] Refer to RA 1310 – Air System Document Set.

Annex A

Air System or Equipment Support Policy Statement (SPS) Minimum Requirements

Section	Description
Introduction	The Introduction provides a brief description of the Air System / Equipment, its operational role, location of operating base(s) and the quantity of Air System / Equipment to be supported. The Introduction will also highlight any unusual features that are likely to influence support arrangements.
Aim	Detail the aim of the SPS in such a way to define the support arrangements necessary to maintain the Air System / Equipment type in the Defence Air Environment.
Management Responsibilities	Detail the authorities and / or organizations with management responsibilities. These will include the following: • Co-ordinating DO (CDO) and significant DOs. • TAA and TAM (if applicable). • Release To Service Authority. • ADH and / or AM(MF). • MOD Sponsor or Senior Responsible Owner. • Front Line Command. • Unit (Forward and Depth). • Military Maintenance Organizations and Approved Maintenance Organizations. • Continuing Airworthiness Management Organization.
Security Aspects	Detail the security classification of the Air System / Equipment.
Engineering Maintenance Philosophy	Describe the Preventive and Corrective Maintenance philosophies (in Forward / Depth and Base / Line) applicable to the Air System / Equipment. This would include, but is not limited to: • On-Aircraft Preventive Maintenance philosophy, covering: o Flight Servicing. o Preventive Maintenance. o Condition-based Maintenance. o Contingency-based Maintenance. o Anti-deterioration Maintenance. o De-contamination instructions and Maintenance. o Flight Testing. o Aircraft Displaying Abnormal Flying Characteristics. o Health Monitoring System. o Aircraft Weighing. o Equipment acceptance. o Maintenance of equipment in storage. o Calibration. o Flight Simulation Training Devices and Other Training Devices[12]. o Dehumidification. • Limits for the deferral and, if required, anticipation of Preventive Maintenance. • Limits for the extension and, if required, anticipation of: o Explosives Maintenance lives (these also need to be detailed in the Joint Service Munitions Control Register). o Component scrap, reconditioning, bay Maintenance and textile scrap lives. • On-Aircraft Corrective Maintenance, covering: o Identification of Maintenance philosophy. o Allocation of on-Aircraft Corrective Maintenance. • Policy for the Air System's Electrical Wiring Interconnect System (EWIS), which will include:

	○ A statement to ensure that pure polyimide wire is not introduced, as Aircraft Electrical Wire by Modification or Maintenance activity. ○ The conditions for the acceptable use of an environmentally sealed, in-line, crimped splice in the Air System's EWIS. • Policy for the Air System's Fibre Optic systems including the foot printing requirements for Aircraft Data Bus systems. • Equipment controlled by other TAw organizations – authorized equipment to be maintained in-phase with the Air System Maintenance cycle is to be detailed in the Topic 2(N/A/R)1 or equivalent. • Component Maintenance – detail the arrangements for off-Aircraft Preventive and Corrective Maintenance of components. • Surface finish[18] – detail the surface finish philosophy. • Environmental Maintenance – due to the additional Risks associated with operations in an embarked maritime environment, desert environment or extreme cold weather environment, where necessary Risk Assessments will be completed to suit the environmental conditions. Specific cleaning and Maintenance procedures and routines are to be detailed in the Topic 2(N/A/R)1 or equivalent. • Software support – describe the arrangements for software support. • Safety and environment – detail how the Safety of the Air System / Equipment in its operating environment will be managed. In particular, identify the Safety Hazards to the equipment, in-use and during Maintenance. A non-exhaustive list of topics to be considered is: ○ Environmental: thunderstorm warnings, refuelling operations. ○ Contamination of the Air System / Equipment by body fluids►[19]◄. ○ Chemical Biological Radiological Nuclear procedures. ○ Radio frequency. ○ High voltages. ○ Hazardous materials. ○ Laser emissions. ○ Maintenance precautions, in particular handling Electro-Sensitive Semiconductor Devices. ○ Maintenance precautions, in particular working in Hardened Aircraft Shelters / Rubb Hangar.
Armed Air System	Where appropriate, define the procedures in the Air System's Topic 2(N/A/R)1 and appropriate Topic 5 (or equivalent locations) for the following processes: 1. Maintenance on armed Air Systems. 2. Maintenance on Air System armament systems. 3. Armed Air System safety precautions.
Independent Inspections	Detail a list of those systems that are subject to Independent Inspection in the appropriate system chapters of the ISTA.
Personnel and Training	Specify the trades and levels of skill / experience to be employed for ground-based personnel, ensuring that the levels set are the minimum required for the task, and identify the arrangements for appropriate training.
Test and Support Equipment	Identify any of the following as required: 1. General Purpose Test and Measurement Equipment. 2. Special-to-Type Test Equipment. 3. Ground Support Equipment (GSE). 4. Special-to-Type GSE. 5. Special-to-Type hand tools.
Technical Information (TI)	Air Publications – identify the authorized Air Publications for the Air System / Equipment and the standard to which they are written. Maintenance Schedules – identify the authorized Maintenance schedules for the Air System / Equipment.

[18] Refer to RA 4815(2): Procedures for Good Maintenance Practices (MRP 145.A.65(b)).
[19] ►Refer to RA 4103 – Removal of Body Fluid Contaminmation from Aircraft.◄

	Engineering Maintenance Documentation – detail the Maintenance documentation applicable to the Air System / Equipment. Fault Report Procedures – detail the Fault reporting and Mandatory Fault Reporting Instruction procedures applicable to the Air System / Equipment. Special Instructions (Technical) (SI(T)) – detail the arrangements for issuing SI(T). Fatigue Data – state the arrangements for recording and handling fatigue data. Joint-Service Responsibilities – detail the procedures for obtaining support from, or providing support to, other Services.
Facilities	Air System Support – identify the resources required to support the Air System / Equipment, including any Contractor-run Maintenance organizations. Accommodation – identify the technical accommodation and any infrastructure requirements. Simulation Devices – specify where applicable Flight Simulation Training Devices and Other Training Devices are located.
Information Technology (IT) Resources	IT System – detail any IT systems that are provided exclusively to support the Air System / Equipment. LIS – detail the utilization of LIS for the Air System / Equipment.
Supply Support Philosophy	Detail the support arrangements for supply and logistics.

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RA 5602 – Propulsion Systems Part Lifing, Critical and Common Pool Parts

Rationale

Propulsion Systems are complex, have multiple failure modes and contain a number of critical parts whose failure could have a significant impact to the Air Safety of the Air System in which it is installed. In order to assure the Integrity of critical parts within a Propulsion System, the production, identification, and usage of such parts will be controlled and managed. Additionally, the control and management of common pool parts, conduct of Quality Verification Tests (QVT) and utilization of acceptance and test criteria ensure the Airworthiness of the Air System.

Contents

Regulation 5602(1)

Classification of Critical Parts

5602(1) The Propulsion System Design Organization (DO) **shall** identify the critical parts contained within the Propulsion System.

Acceptable Means of Compliance 5602(1)

Classification of Critical Parts

1. As part of the Type Certification process, Propulsion System DOs **should** conduct Safety analyses in order to identify critical parts whose failure has the potential to cause hazardous Propulsion System effects, or where failure would have unacceptable consequences.

2. Critical parts **should** be clearly detailed in the Configuration Status Record (CSR)[1] and **should** be appropriately identified[2].

3. Where life marking is deemed necessary to record critical part usage, the marking system, location and means of marking **should** be detailed in the Air System Document Set (ADS) and authorized by the Type Airworthiness Authority (TAA)[3].

Guidance Material 5602(1)

Classification of Critical Parts

4. Whilst civil Certification Specifications may be used as guidance, military design features may introduce hazardous Propulsion System effects not captured by civil requirements.

5. Life marking of the specified critical parts provides a record of usage, whereby the usage is marked onto the part. The process will be closely controlled to ensure that the markings do not compromise the Integrity of the part.

Regulation 5602(2)

Determination of Critical Part Life

5602(2) The Propulsion System DO **shall** determine critical part lives and exchange rates using a recognized process and **shall** present the lives to the TAA.

[1] Refer to RA 5301 – Air System Configuration Management.
[2] Refer to RA 5885 – Identification of Products, Parts and Appliances (MRP Part 21 Subpart Q).
[3] Refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems. Dependant on the agreed split of Type Airworthiness responsibilities, Type Airworthiness Manager may be read in place of TAA as appropriate throughout this RA.

Acceptable Means of Compliance 5602(2)

Determination of Critical Part Life

6. Propulsion System critical part approved lives **should** be formulated using processes consistent with the Type Certification Basis[4].

7. The rationale for the lifing of non-critical parts **should** be recorded by the Propulsion System DO and provided to the TAA.

Guidance Material 5602(2)

Determination of Critical Part Life

8. In the early stages of a project, part life may be released proportionately in-line with greater operating experience and sample testing. The proportional release of life is not considered a life extension[5].

9. The Propulsion System DO may also propose lives for non-critical parts whose failure or reduced reliability would erode safety margins. Non-critical lives include overhaul, inspection and recondition lives. Through Reliability Centred Maintenance[6] analysis the DO, or service provider (for performance-based support contracts), may propose Maintenance lives such as overhaul, inspection and recondition. Whilst these lives may be formulated to optimize Maintenance and availability of Propulsion Systems, they may also guard against specific non-critical failures. The rationale behind the life will be recorded in order to ensure that any extension of such life does not compromise safety or availability.

Regulation 5602(3)

Control of Critical Parts

5602(3) The Propulsion System DO **shall** control the manufacture of critical parts and **shall** record the manufacturing history.

Acceptable Means of Compliance 5602(3)

Control of Critical Parts

10. The Propulsion System DO **should** demonstrate, to the satisfaction of the TAA, the processes for the control[2] and verification of critical parts, including those from alternative methods or sources of manufacture.

11. Decisions on introducing alternative methods or sources of production **should** be recorded in Local Technical Committee and Configuration Control Board[1] meeting minutes.

Guidance Material 5602(3)

Control of Critical Parts

12. An alternative method of manufacture is a method other than that previously used to produce the critical part that requires a change to the information recorded on the relevant drawings and supporting documentation.

13. An alternative manufacturing source is a Production Organization (PO) or manufacturer other than that which has previously produced the critical part, or a change in location of production by an existing PO or manufacturer.

14. Critical parts from alternative methods or sources of manufacture which require validation testing may be included in engines on test for other purposes.

Regulation 5602(4)

Quality Verification Tests and Acceptance and Test Criteria

5602(4) The Propulsion System DO **shall**:

a. Propose a test schedule programme for QVT to the TAA for agreement.

b. Submit acceptance and test schedules for the Propulsion System to the TAA for agreement.

[4] Refer to Defence Standard 00-970 Part 11 – Certification Standard for Service Aircraft.
[5] Refer to RA 5724 – Life Extension Programme.
[6] Refer to RA 5320 – Air System Maintenance Schedule – Design and Validation.

Acceptable Means of Compliance 5602(4)

Quality Verification Tests and Acceptance and Test Criteria

15. The first Propulsion System accepted post production[7] and after Type Certification **should** be subject to QVT, with further routine samples taken as agreed by the TAA.

16. The agreed acceptance and test criteria **should** be published in the Propulsion System Maintenance Manual(s) for all new, repaired and overhauled Propulsion Systems by the TAA.

17. The Propulsion System DO **should** ensure the accuracy and consistency of measurement, of all test facilities used for production testing to ensure consistency of Propulsion System performance.

Guidance Material 5602(4)

Quality Verification Tests and Acceptance and Test Criteria

18. The QVT programme assures that production standard parts and systems are representative of those used for the certification process. Inspection and test is integral to the production verification process. QVT is a specific element of the control and verification process for Propulsion Systems.

19. The TAA may involve QVT on any Propulsion System that has completed production acceptance as deemed necessary. Occasions where QVT would be appropriate include:

a. On initial production.

b. On a change of PO or after significant changes at a PO's facilities, such as methods of manufacture or manufacturing source.

c. After a significant break in production or overhaul.

d. On commencement of a major overhaul or major repair[8].

e. On embodiment of a Major Change[9], rework, conversion, or update programme.

f. After detection of significant quality failings, such as during production or overhaul.

20. The QVT programme will include strip and inspection activity, appropriate and sufficient testing (to include endurance and performance elements) and the QVT report.

21. The agreed acceptance and test criteria may include but is not limited to, parameters such as performance, vibration and oil consumption.

22. Performance trending of test facilities may be used to supplement test facility calibration records.

Regulation 5602(5)

Common Pool Parts

5602(5) The TAA s**hall** approve the use of common pool parts.

Acceptable Means of Compliance 5602(5)

Common Pool Parts

23. Where the use of common pool parts is approved, the TAA **should** define and promulgate the set acceptance criteria for the use of such parts in the Propulsion System Support Policy Statement[10] of the Air System Topic 2(N/A/R)1 publication.

24. The TAA **should** approve the Propulsion System Maintenance Organization to use the common pool parts.

[7] Refer to AS9102 – Aerospace First Article Inspection Requirement.
[8] Refer to RA 5865 – Repairs (MRP Part 21 Subpart M).
[9] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D).
[10] Refer to ►RA 5407 – Support Policy Statement.◄

Guidance Material 5602(5)

Common Pool Parts

25. Common pool parts can be defined as those from other nations or operators that lie outside MOD control and maybe made available for use in the production, repair or overhaul of Service equipment.

26. When considering the use of common pool parts the TAA needs to be assured that the configuration standards, life / usage and provenance of a part would be acceptable for use within the Propulsion System.

RA 5723 - Ageing Air System Audit

Rationale

A rigorous periodic Audit is necessary to provide Assurance that the Airworthiness risks associated with Ageing of a fleet's Air System are being managed appropriately. An Ageing Air System Audit (AAA) covers both Air System physical condition and wider Assurance of continued applicability of Airworthiness procedures and management processes, providing a comprehensive review of the interrelated effects of Ageing on the fleet. The requirement for an AAA is supplementary to routine Integrity Management (IM).

Contents

Definitions

Definitions Relevant to this RA

1. **Ageing.** The degradation of the system (equipment, knowledge or information) potentially leading to an increased Safety Risk.

2. **AAA initiation**. The AAA is deemed to start at the point where the AAA initiation meeting is held with the organization responsible for conducting the independent aspects of the Audit.

3. **AAA completion**. The AAA is deemed to have been completed following the production of the final AAA Report, covering all Audits and detailing the closure plan for all resultant actions and recommendations.

Regulation 5723(1)

Ageing Air System Audit

5723(1) All UK military registered Air System types **shall** be subjected to an AAA, to provide an overall indication of the condition of the fleet and to give confidence that the Integrity of the Air System is being sustained as the fleet ages and regulatory requirements evolve.

Acceptable Means of Compliance 5723(1)

Ageing Air System Audit

Programme

4. The Type Airworthiness Authority (TAA)[1] **should** initiate[2] an AAA for each Air System type[3] under their control at an appropriate stage but no later than the earliest occurrence of the following:

   a. 15 years after a type's declared In-Service Date (ISD).

   b. The mid-point between the declared ISD and the initial planned Out of Service Date.

   c. Where any member of a fleet, acquired under short-duration arrangements (ie a service provision contract), exceeds 50% of its Air System-level certified life (in any parameter).

   d. In the case of the acquisition of a fleet which can already be regarded as Ageing, an AAA **should** be conducted before ISD.

5. The TAA **should** initiate repeat audits at periodic intervals, no greater than 10 years from the previous initiation date.

[1] Where the Air System is not UK MOD-owned, Type Airworthiness (TAw) management regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model ; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.
[2] In initiating the AAA the TAA **should** consult with the Military Continuing Airworthiness Manager as manager of Continuing Airworthiness and the Operating Duty Holder as owner of the Air System Safety Case.
[3] For RPAS refer to RA 1600 series – Remotely Piloted Air Systems.

Acceptable Means of Compliance 5723(1)

6. The TAA **should** submit requests for recognition of comparable programmes as Alternative Acceptable Means of Compliance to the MAA at least 12 months prior to the Audit becoming due.

7. The TAA **should** ensure that all Audit activity is completed and a final AAA report, covering all Audits and detailing the closure plan for all resultant actions and recommendations, is issued within 2 years of the AAA initiation.

Scope

8. The AAA **should** cover the Airworthiness and IM of the Air System, giving particular consideration to Ageing. To achieve this, the TAA **should**:

a. Specify the areas to be covered by the Audit.

b. Identify the organizational boundaries of the Audit based on current issues.

c. Assess the Safety consequences of potential failure (of Aircraft structure, Systems, components etc).

d. Analyze information from all available resources (supply chain constraints, IM systems, etc).

9. The TAA **should** clearly state which Air System areas or Systems, if any, are to be excluded from the AAA and the rationale for their exclusion.

10. The AAA **should** include a detailed, independent condition survey to assess the condition and Husbandry standards of representative Air Systems (and, where appropriate, sub-systems) from the fleet. The condition survey **should** be undertaken by an organization which is independent of those responsible for the condition and Husbandry of the Air System.

11. The AAA **should** include items managed by Commodity Delivery Teams (DT), where necessary. The Air System DT►[4]◄ **should** take primacy in the Audit, seeking Commodity DT support as necessary.

12. The AAA **should** include an independent review of the continued applicability of Airworthiness procedures, management processes and interfaces between organizations providing aspects of the overall fleet delivery. This review **should** be undertaken by an organization which is independent of those responsible for providing these Airworthiness aspects.

Guidance Material 5723(1)

Ageing Air System Audit

13. Refer to the Manual of Air System Integrity Management[5] for related Guidance Material and other non-regulatory process.

[4] ►Where the term DT or Commodity DT is used in this RA, this may include the TAM and organizations supporting the TAM.◄
[5] Refer to Manual of Air System Integrity Management (MASIM) Chapter 10: Ageing Air System Audit.

RA 5724 - Life Extension Programme

Rationale

Occasions may arise in which an Air System type is required to operate beyond its certified life. In such cases, Airworthiness Risks may increase if the Air System Products, Parts and Appliances exceed the life parameters against which they were tested and approved. A Life Extension Programme (LEP) can identify, mitigate and ultimately ►manage◄ these Risks.

Contents

Regulation 5724(1)

Requirement for a Life Extension Programme

5724(1) The requirement to extend the certified life of any UK military Air System type, in any parameter, **shall** be identified by the Type Airworthiness Authority (TAA)[1].

Acceptable Means of Compliance 5724(1)

Requirement for a Life Extension Programme

1. The TAA **should** undertake an LEP when it is identified that the operation of an Air System type needs to be extended beyond its current certified life (in terms of calendar time, flying hours, Fatigue Index, landings or pressure cycles).

2. Where the severity of In-Service usage is greater than that assumed in design, the implications upon service life **should** be assessed and any potential life extension requirement **should** be identified by the TAA.

3. The potential requirement for a life extension **should** be considered by the TAA no later than 10 years before the original Out of Service Date and **should** be reviewed annually thereafter.

4. ►A confirmed extension to an Air System's certified life **should** be treated as a Major Change to Type Design[2]. An application for a Major Change to Type Design **should** be made to the MAA by the TAA using a MAA Form 30[2].◄

Guidance Material 5724(1)

Requirement for a Life Extension Programme

5. Refer to the Manual of Air System Integrity Management (MASIM)[3] for related Guidance Material and other non-regulatory process.

Regulation 5724(2)

Development and Implementation of a Life Extension Programme

5724(2) When required to extend the certified life of a UK military Air System type, in any parameter, the TAA **shall** develop and implement an LEP to underwrite the Airworthiness of the Air System type for its extended life.

Acceptable Means of Compliance 5724(2)

Development and Implementation of a Life Extension Programme

LEP Scope

6. The TAA **should** determine the scope of the LEP using a Risk-based approach: all Structure, Systems components and propulsion components whose failure could compromise Airworthiness **should** be identified and considered for inclusion within the

[1] Where the Air System is not UK MOD-owned, Type Airworthiness management regulatory Responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model ; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems.
[2] ►Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D).◄
[3] Refer to MASIM Chapter 11: Life Extension Programme.

Acceptable Means of Compliance 5724(2)

LEP. The exclusion of any such components from the LEP **should** be identified and the rationale for their exclusion documented.

7. The TAA **should** ensure that an analysis of all components to be included in the LEP is undertaken, using appropriate evidence and inputs from all relevant stakeholders (including the Delivery Team (DT) and relevant Design Organization(s) (DO), maintainers and operators), to categorise each as either:

a. 'Non-extendable', where the life cannot be extended to meet the new requirement. A Component Replacement Plan **should** be developed to address all such components.

b. 'Extendable', where the life can be extended without further work. Revised life limits, including any associated caveats such as Maintenance actions, **should** be determined and promulgated for all such components.

c. 'Subject to LEP', where the life can potentially be extended subject to further LEP work. Revised life limits, including any associated caveats such as Maintenance actions, **should** be determined and promulgated for all such components.

Evidence Supporting an LEP

8. The additional evidence necessary to support life extension of the LEP components **should** be identified and documented. The LEP evidence requirements **should** include ►a review◄ of all Safety-relevant failure modes or mechanisms and reference to design, qualification and In-Service information sources.

9. The baseline LEP Configuration standard (or standards for different marks, block releases or 'fleets-within-fleets') **should** be identified for all 'Subject to LEP' components.

10. Validation **should** be undertaken of the Modification status of the fleet against the LEP baseline standards.

11. Validation **should** be undertaken of any Maintenance data used to make Airworthiness-related decisions within an LEP.

12. Information gained from Operational Loads Monitoring (OLM) / Operational Data Recording (ODR) programmes **should** be ►utilized◄ within the LEP to ensure that significant Structures, Systems and propulsion loads and usage are adequately understood. Where there is no OLM / ODR capability within the fleet, initiation of an OLM / ODR programme **should** be ►reviewed◄ as soon as possible to support the LEP.

13. A Widespread Fatigue Damage (WFD) assessment **should** be undertaken to identify areas of the Structure potentially susceptible to WFD and any remedial actions required to meet the proposed life extension.

14. A Repair Assessment Programme **should** be undertaken to identify any structural Repairs that require either additional fatigue substantiation or replacement to meet the proposed life extension.

15. A condition survey of a representative sample of fleet-leader Air System **should** be used to inform life extension activities.

16. The TAA **should** agree the DO's plans to meet the LEP evidence requirements. This evidence **should** be assembled, usually by the DO, as revised Certificates of Design (CofD)[4], together with any recommended caveats. The revised CofD **should** be reviewed and endorsed by the TAA.

17. The TAA **should** compile a Type Airworthiness Safety Assessment Report (TASAR)[5] detailing the scope, assumptions and results of the LEP which **should** be evaluated by a Suitably Qualified and Experienced Person who is independent of the DT. The TAA **should** formally submit the TASAR to the Aviation Duty Holder /

[4] Refer to RA 5103 – Certificate of Design.
[5] Refer to RA 5012 – Type Airworthiness Safety Assessment.

Acceptable Means of Compliance 5724(2)

Accountable Manager (Military Flying) for incorporation within the Air System Safety Case►6◄.

18. A revised Release To Service►7◄ / Military Permit To Fly (In Service)[8] (and, where applicable, Military Type Certificate) **should** be produced to reflect the revised life limits for the fleet.

Guidance Material 5724(2)

Development and Implementation of a Life Extension Programme

19. Refer to the MASIM[3] for related Guidance Material and other non-regulatory process.

[6] ►Refer to RA 1205 – Air System Safety Cases.
[7] Refer to RA 1300 – Release To Service.◄
[8] Refer to RA 1305 – Military Permit To Fly (In-Service), (Special Case Flying) and (Single Task).

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RA 5725 - Out of Service Date Extension Programme

Rationale

Occasions may arise which require an Air System to operate beyond the agreed Out of Service Date (OSD). Risks to Airworthiness of the fleet may increase with potentially unforeseen results. An Out of Service Date Extension Programme (OSDEP) can identify, mitigate and ultimately underwrite these Risks.

Contents

Regulation 5725(1)

Development and Implementation of an Out of Service Date Extension Programme

5725(1) When required to extend the OSD of a UK military Air System, the Type Airworthiness Authority (TAA)[1] **shall** develop and implement an OSDEP to underwrite the Airworthiness of the Air System type for its extended service.

Acceptable Means of Compliance 5725(1)

Development and Implementation of an Out of Service Date Extension Programme

1. An OSD **should** remain within the bounds of the certified Air System life. If a proposed OSD requires the extension of any applicable lifing parameter, then a Life Extension Programme (LEP) **should** be conducted[2]. Where doubt exists as to the certified Air System life, and consequently whether a LEP is applicable, then guidance **should** be sought from the MAA.

2. The TAA **should** consider the potential requirement for an OSD extension as early as possible, and at least 12 months before the present OSD.

3. The baseline configuration standard of the fleet subject to OSDEP (or build standards for different marks, block releases or 'fleets-within-fleets') **should** be identified and individual Air System status validated accordingly.

4. The OSDEP **should** include a review of all Integrity Management activities to ensure they remain adequate to maintain the platform Airworthiness for the extension period.

5. A review of the equipment contribution log **should** be conducted to assess the impact on operating Risk brought about by the OSD extension.

6. The TAA **should** review the TAw decisions paying particular attention to any Air Safety-related modifications or Design Changes not embodied due to utilization of a Cost Benefit Analysis rationale. Where appropriate, the TAA **should** initiate a review of any associated Aviation Duty Holders (ADH) or Accountable Manager (Military Flying) (AM(MF)) As Low as Reasonably Practicable (ALARP) decisions to ensure continued validity.

7. The TAA **should** ensure that the Continuing Airworthiness decisions are reviewed by the Military Continuing Airworthiness Manager, specifically those time-bound assumptions in order to confirm they remain valid for the extension period.

8. The evidence required to support the OSD extension **should:**

   a. Be documented within a Type Airworthiness Safety Assessment Report (TASAR)[3].

[1] Where the Air System is ►not UK MOD-owned, Type Airworthiness (TAw) management◄ regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model ►◄; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed ►delegation◄ of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.

[2] Refer to RA 5724 – Life Extension Programme.

[3] Refer to RA 5012 – Type Airworthiness Safety Assessment.

Acceptable Means of Compliance 5725(1)

b. Be evaluated by a Suitably Qualified and Experienced Person who is independent of the Delivery Team.

c. Support a wider review of the Air System Safety Case (ASSC)[4].

9. A review of the Release To Service (RTS) or Military Permit to Fly (MPTF) (In Service) or MPTF (Special Case Flying) **should** be conducted in light of any relevant recommendations from the OSD extension TASAR.

Guidance Material 5725(1)

Development and Implementation of an Out of Service Date Extension Programme

10. Refer to the Manual of Air System Integrity Management (MASIM)[5] for related Guidance Material and other non-regulatory processes.

[4] Refer to RA 1205(2): Ownership of the Air System Safety Case. Air System Safety Cases require that a review be carried out when an OSD extension is planned.
[5] Refer to MASIM Chapter 12: Out of Service Date Extension Programme.

RA 5726 – Integrity Management

Rationale

The technical and organizational uncertainties associated with military aviation contribute to a complex range of Hazards that may compromise Air System Integrity. A comprehensive, through-life, Integrity Management (IM) approach enables these potential Airworthiness threats to be managed. Whilst support from various stakeholders is needed for effective IM, the overall responsibility is assigned to the Type Airworthiness Authority's (TAA)[1]. This Regulatory Article (RA) details these TAA IM responsibilities and will be read in conjunction with the Manual of Air System Integrity Management (MASIM)[2].

Contents

Definitions

Definitions Relevant to this RA

1. **Integrity**. The ability of an Air System to retain its design intended properties and function throughout its service life when maintained and operated in accordance with (iaw) the Air System Document Set (ADS).

2. **Integrity Baseline**. The artefacts that define the Design Organization's (DO) contribution to the ADS for an Integrity discipline. In a Claim-Argument-Evidence approach, the Integrity Baseline (the 'Claim') is underpinned by Integrity Assertions (the 'Argument') of the Integrity Evidence (the 'Evidence'). Integrity Baselines are established prior to entry of the Air System to service and are updated through-life.

3. **Integrity Assertions**. Declarations made in the Integrity Baseline that a feature of the design has Integrity. The Integrity Assertions within the Integrity Baseline (the 'Claim) are the outcome of an assessment (the 'Argument') of the Integrity Evidence (the 'Evidence').

4. **Integrity Evidence**. The design and Certification products that underpin the Integrity Assertions stated explicitly / implicitly in the Integrity Baseline. In the first instance Integrity Evidence is produced to support the Air System entering service and may be based upon design assumptions and / or service operating intent. When In-Service, the Integrity Evidence is continuously updated according to analysis of Service Data. It is captured in an Integrity Evidence record.

5. **Service Data**. The information relating to the usage, condition, failures or loads experienced by an Air System that, when collected and analyzed, needs to be tested against the Integrity Evidence to support the Integrity Baseline.

6. **IM Systems**. The IM programmes, tools and processes, established by the TAA, that are necessary to assure the Integrity of the Air System. These Systems capture and assess Service Data to better understand the usage of the Air System, the failures of systems, and / or the loads that it experiences. Programmes are established to better understand the condition of the Air System.

7. **Independent Airworthiness Advisor (IAA)**. An IAA is a competent individual, independent of the DO, who provides independent Air System technical advice to the

[1] Where the Air System is not UK MOD-owned, Type Airworthiness (TAw) management regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.
[2] Refer to the Manual of Air System Integrity Management (MASIM).

Definitions

TAA[3]. To be considered a Suitably Qualified and Experienced Person (SQEP), they will be a Chartered Engineer and have a minimum of 5 years' experience in Air System design, Safety Assessment, IM or Maintenance; relevant to both the Air System type and the specialization for which advice will be given.

8. ►**Independent Structural Airworthiness Advisor (ISAA)**. An ISAA is a competent individual, independent of the DO, who acts as the specialist Independent Airworthiness Advisor to the TAA regarding Aircraft Structures and Structural Integrity Management.◄

Regulation 5726(1)

Integrity Management

5726(1) The TAA **shall** be responsible for IM, for all Air System types within their Area of Responsibility, to maintain Integrity.

Acceptable Means of Compliance 5726(1)

Integrity Management

9. As a key enabler of the Air System Safety Case[4], the TAA **should** ensure an IM programme is in place prior to the Air System In-Service Date (ISD) and is maintained throughout the life of the Air System.

10. The Establish-Sustain-Validate-Recover-Exploit management framework **should** be used to confirm the Integrity Assertions to provide confidence in the Integrity Baseline and counter threats to Integrity identified by evolving Integrity Evidence.

11. The TAA **should** consider the most effective and efficient strategy for managing IM activities. As a minimum, consideration **should** be given to the need for separate activities for the three most commonly used Integrity disciplines (Structural, Systems and Propulsion), including Integrity Working Groups (IWG). The overall approach **should** be recorded in the Air System Integrity Strategy Document (AISD).

12. Where threats to Integrity are identified, they **should** be managed, and continually reviewed in response to In-Service developments and service data.

13. All those with responsibilities which impact on, or which contribute to Integrity **should** identify to the TAA at the earliest opportunity any decision, activity or change in circumstances that has the potential to pose a threat to Integrity.

14. Delivery Team (DT) personnel with specific Integrity responsibilities **should** be identified by the TAA and attend the appropriate Integrity course[5].

15. IM for Remotely Piloted Air Systems **should** be iaw ►the Remotely Piloted Air System Manual (RPASM)◄[6].

Guidance Material 5726(1)

Integrity Management

16. For guidance on all aspects of IM, refer to the MASIM[2].

Regulation 5726(2)

Establishing Integrity Management

5726(2) The TAA **shall** establish IM to demonstrate that the Air System is airworthy to operate through all conditions detailed in the Release To Service (RTS), Military Permit To Fly (MPTF) (In-Service) or MPTF (Special Case Flying) and reflect the usage set out in the Statement of Operating Intent (SOI).

[3] The IAA is not to be confused with the Independent Technical Evaluator or Independent Safety Auditor.
[4] Refer to RA 1205 – Air System Safety Cases.
[5] For further training details see RA 1440 – Air Safety Training.
[6] Refer to ►RPASM◄.

Acceptable Means of Compliance 5726(2)

Establishing Integrity Management

Integrity Governance

17. The TAA **should** establish an IM Strategy that is:

a. Communicated to stakeholders through the AISD prior to Full Business Case Approval of the project.

b. Managed through an IM Plan (IMP) initiated prior to ISD.

c. Implemented through a 6-monthly IWG initiated prior to the ISD.

d. Implemented with defined boundaries and interfaces between various IM disciplines.

e. Implemented with defined mechanisms for reporting on the status of Integrity of the Air System within Defence Equipment & Support and to the Aviation Duty Holder (ADH) / Accountable Manager (Military Flying) (AM(MF)).

18. The AISD **should** be owned by the TAA and endorsed on first release and following any significant amendment.

19. The IWG **should** be chaired by the TAA or a holder of a delegated Letter of Airworthiness Authority (LoAA) that refers specifically to the role of IWG Chair, who is at least OF4 (or equivalent).

20. The IWG Chair **should** ensure that the IWG comprises a quorum of SQEP stakeholders (identified below), and additional stakeholders as necessary.

a. DO / Coordinating DO.

b. DT[7] member(s) responsible for IM.

c. Service provider / Support contractor (if applicable).

d. Continuing Airworthiness Management Organization (CAMO) member responsible for IM.

e. Civil Aviation Authority for military registered Aircraft subject to civil oversight[8].

f. DT Safety Manager.

g. IAA(s) with the requisite SQEP[9].

h. Release To Service Authority or Sponsor representative.

i. MAA **should** be invited ►◄ although the MAA **should not** form part of the quorate SQEP stakeholders list.

Integrity Evidence and Baseline

21. The TAA **should** identify the Integrity Baseline, including the underpinning Integrity Evidence and Integrity Assertions.

22. The SOI (AP101X-XXXX-15S or equivalent) **should** be owned and authorized by the ADH or AM(MF) and **should** include requirements for all relevant disciplines, to be published in the ADS no later than the issue of the Type Certification Basis[10]. The TAA and ADH or AM(MF) **should** ensure that an SOI for all new Air System types and significant Marks, is developed in consultation with, and formally conveyed to, the Air System DO. In turn, the Air System DO **should** communicate this information to the Type Certified Product DOs (ie Propulsion System DO).

23. Where an Air System is operated, or intended to be operated, by multiple Operating Duty Holders (ODH) / AM(MF), the SOI **should** be owned and authorized

[7] Where the term DT or Commodity DT is used in this RA, this may include the TAM and organizations supporting the TAM where appropriate.
[8] Refer to RA 1165 – UK Civil Aviation Authority Oversight of UK Military Registered Aircraft.
[9] Recognizing the long-standing requirement for the Independent Structural Airworthiness Advisor (ISAA) role to support IM, an experienced ISAA may be regarded as SQEP in pan-discipline IM matters from a regulatory compliance perspective, but an IAA in the required field **should** address specific issues in disciplines other than structures where the TAA requires that SQEP.
[10] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B).

Acceptable Means of Compliance 5726(2)

by the lead end-user ADH or AM(MF) and **should** encompass the full scope of activities to be conducted by all ODH / AM(MF).

24. ►The TAA **should**, in consultation with the DO, ensure that the design static and fatigue loads and Design Usage Spectrum (DUS), obtained during design substantiation and Certification of the Air System, is available as part of the Integrity Baseline. The DUS **should** include the intended usage and associated loads developed in the design of the Air System. Where the DUS has not been derived from a UK specific SOI, the TAA **should**, in consultation with the DO, use the SOI to identify the implications of any deviation between the design assumptions and expected In-Service usage.◄

25. The TAA **should** ensure that all critical or significant items[2], eg Structural Significant Items or Functionally Significant Items, have appropriate associated Maintenance activities derived by suitable methodology, in consultation with the DO, as part of the Integrity Baseline.

26. The TAA **should** authorize the component lives (Critical and Non-Critical) and, where applicable exchange rates identified by the DO, and promulgate these in AP101X-XXXX-5A1 or equivalent Maintenance schedule.

27. The TAA **should** ensure that Commodity DT Chief Engineers (DT CE) establish the lifing details and Continuing Airworthiness requirements of components for which they are responsible and present their Integrity Evidence and Integrity Assertions to the TAA for final authorization.

IM Systems

28. The TAA, in consultation with the DO, **should** identify any IM Systems requirements necessary to assure the Integrity of the Air System.

29. The TAA **should** establish:

a. Health monitoring and usage monitoring systems and ensure that thresholds for acceptable capture rate of usage data are defined, to enable inspection and replacement of components to be scheduled with adequate confidence.

b. ►An Individual Aircraft Tracking (IAT) ◄ system to capture usage against sortie profiles throughout the life of the Air System, and a means to quantify unmonitored sorties.

c. An approach to validate the usage data ►In-Service usage[11] against the DUS◄ through engagement with the DO during the design and introduction to service of the Air System.

d. In consultation with the DO, an exceedance monitoring system in order to capture events that may be a threat to the Integrity of the Air System.

e. An Air System Fault Reporting, Analysis and Corrective Action System.

f. A Configuration Status Record (CSR)[12] for the Air System ►◄.

30. ►The CSR **should** detail the Configuration of each Air System Type Design and its components in sufficient detail to maintain Configuration Control (CC) and to support Integrity decisions.◄

31. The TAA **should** ensure that IM programmes, or the capability to conduct them, are in place in order to understand the condition of the Air System In-Service. The nature of these programmes of activity are likely to be particular to an Integrity discipline.

32. The TAA **should** agree with the CAMO and DO stakeholder, access to, and the means of providing, Service Data from the Forward and Depth domains.

33. The TAA **should** define limits for investigation / urgent action on any data loss from monitoring systems and implement a process to monitor and react. Limits may differ depending on the complexity, reliability and criticality of the monitoring system.

[11] ►Usage including In-Service loads and engine usage.◄
[12] Refer to RA 5301 – Air System Configuration Management.

Acceptable Means of Compliance 5726(2)

34. The TAA **should** ensure that an Environmental Damage (ED) Prevention and Control (EDPC) programme, including measures to manage the Risk to Airworthiness arising from ED, is established in cooperation with the DO.

35. The TAA **should** ensure IM is supported by an Examination Programme (EP), established prior to the ISD, which **should** include:

a. Classification of significant items as either At Risk (AR) or Not at Risk (NAR) from Accidental Damage (AD) or ED.

b. Scheduled examinations based on this classification, and examination and retirement of components according to their fatigue clearances or component lives.

c. A Sampling Programme (SP), for components not normally inspected during scheduled examinations, which includes any requirements for teardown[13] to inform the Maintenance schedule.

d. An inspection of all critical or significant items, iaw the Preventive Maintenance and EP / SP programmes, before the fleet leader reaches 80% of its original design life (or revised life, if less).

36. The TAA or Commodity DT Leader (DTL) **should** ensure appropriate arrangements are in place for the SP with the DO. The DO **should**:

a. Notify the TAA or Commodity DT CE of the date, time and location scheduled for the tests and / or strip examination of SP materiel subject to fault action.

b. Submit a report to the TAA or Commodity DTL, covering the following points:

(1) The deterioration in performance and / or the degree of wear which has occurred.

(2) The recommended future service life for this type of item and whether further sampling is required.

(3) Those features of design which limit life extension and whether Modification action is feasible and economic.

37. The TAA **should** ensure, where appropriate, that experience and data from other operators of the same Air System type, or Air Systems in similar roles, is used to inform the IM of their Air System.

Guidance Material 5726(2)

Establishing Integrity Management

38. For guidance refer to the MASIM[2].

Regulation 5726(3)

Sustaining Integrity Management

5726(3) The TAA **shall** ensure that IM is sustained, and In-Service Data used, to continuously monitor and counter threats to Integrity.

Acceptable Means of Compliance 5726(3)

Sustaining Integrity Management

Integrity Governance

39. The TAA **should** review and monitor outputs from the IM Systems and report key issues to the IWG.

40. The AISD and the IMP **should** be reviewed by all stakeholders prior to every IWG and both **should** be ratified by the quorate members of the IWG.

41. The TAA **should** identify any unmitigated or unquantified Airworthiness Risks, associated with IM which have been accepted by the relevant IWG, and raise them to

[13] Refer to Military Aircraft Structures Airworthiness Advisory Group (MASAAG) Paper 105 Guidance and Best Practice for Teardown Inspections.

Acceptable Means of Compliance 5726(3)

the ►Type Airworthiness Safety Panel[14]◄ and / or the Air System Safety Working Group.

Integrity Evidence and Baseline

42. All changes to component lives, Maintenance thresholds or intervals **should** be:

a. Supported by a Risk Assessment.

b. Conveyed to the IWG and reviewed periodically.

c. Considered within the Type Airworthiness Safety Assessment.

d. Authorized by personnel with the appropriate delegated authority supported by independent assessment as required.

43. Stakeholders **should** report any significant changes in usage or operation to the IWG.

IM Systems

44. The TAA **should**:

a. Ensure that IM systems created in the Establishing phase are implemented correctly and periodically reviewed, with significant findings, including data loss, unmonitored sorties and CC issues, reported to the IWG.

b. Maintain IM systems in an effective condition in order to maximize the capture, use and monitoring of Service Data by the CAMO, the DT and the IWG, respectively.

c. Ensure that lost usage data is restored if possible; if not, a technical assessment of the loss **should** be carried out. The TAA / TAM **should** ensure that procedures, or appropriate fill-in rates for lost usage data, are in place and applied as required.

d. Ensure that the Air System Airworthiness Information[15] reflects the 'as flown' Configuration is maintained for the life of the Air System and is populated with all relevant arisings that have the potential to impact Integrity.

e. Ensure that any IM Programmes created in the Establishing phase are implemented correctly and periodically reviewed, and a summary of the results reported to each IWG.

Guidance Material 5726(3)

Sustaining Integrity Management

45. For guidance refer to the MASIM[2].

Regulation 5726(4)

Validating Integrity

5726(4) The TAA **shall** ensure that Integrity Evidence, Assertions and Baseline are periodically validated.

Acceptable Means of Compliance 5726(4)

Validating Integrity

Integrity Governance

46. The TAA **should** use the IWG to validate the Integrity Baseline against the most up to date Service Data and analysis available.

47. The TAA **should** ensure that the validity of the Integrity Baseline is confirmed on completion of the IWG.

Integrity Evidence, Assertions and Baseline

48. The Integrity Evidence and Baseline **should** be reviewed and updated, with the support of the DO, in response to findings occasioned by validating activities.

[14] ►The Type Airworthiness Safety Panel may have different naming conventions within different programmes.◄
[15] Refer to RA 1223 – Airworthiness Information Management.

Acceptable Means of Compliance 5726(4)

49. The TAA **should** ensure that cleared life is reviewed in response to changes to fleet planning assumptions.

50. The TAA **should** ensure that component lifing, recording processes and metrics, are periodically reviewed.

51. The TAA **should** ensure that the Maintenance schedule[16] is reviewed at least every 5 years.

IM Systems

52. The TAA, with the assistance of the Military Continuing Airworthiness Manager and DO, **should** review and validate Maintenance processes.

53. The TAA **should** support the ADH or AM(MF) to ensure that the first usage data validation (conversion of the SOI into an SOI and Usage (SOIU)), which forms the baseline for comparison against future validation data, is undertaken once usage is considered to be stable or no later than 3 years after ISD. The ADH or AM(MF) **should** authorize the amendment to each issue of SOIU.

54. The TAA **should** support the ADH or AM(MF) review of the SOI / SOIU and make the results available to the IWG. These reviews **should** be undertaken by the ADH or AM(MF) as follows:

a. A basic annual review by the appropriate ADH or AM(MF), to confirm that the SOI or SOIU (as appropriate) remains an accurate record.

b. A detailed qualitative and quantitative triennial review is conducted using Aircrew interviews, data obtained via the Aircraft log, on-board Systems and / or instrumented flights to confirm future intent and validate usage against the DUS assumptions.

c. Establishing the ►implications to Air System integrity◄ to anticipated changes ►in future usage intent.◄

d. The review confirms that the expected and validated usage is within the RTS, MPTF (In-Service) or MPTF (Special Case Flying) limits.

55. Following SOI / SOIU reviews:

a. The TAA **should** task DO support to determine the effect of any SOI / SOIU changes on the Integrity Baseline and their recommended operating limitations and Maintenance instructions.

b. The TAA **should** retain an Audit trail of all changes made to any of their TAw limitations, instructions or arrangements as a result of the SOI / SOIU review iaw current Regulations[17].

c. The ADH or AM(MF) **should** make Aircrew familiar with the changes that have been made to sortie profile codes within the SOI / SOIU and the need for both accurate recording and efficacy of reporting of any changes in usage.

56. The ADH or AM(MF) **should** ensure that the SOI / SOIU (AP101X-XXXX-15S or equivalent) is updated in the ADS.

57. The TAA **should** ensure that results from the EP (including scheduled examinations, and where necessary, the SP and teardown[13] and forensic examination) are collated, reviewed and subjected to trend analysis to inform Maintenance Schedule Reviews, update the IWG on the efficacy of the EP and permit the DO to update lifing predictions.

58. The TAA **should** verify the ability of a system or component to: retain its function within defined limits, function without undue frequency of failure and function without adverse effect on other Systems or components.

59. The TAA **should** ensure that where a Safety-critical system relies upon measurement of a parameter (such as temperature or pressure) this system **should** have an appropriate calibration policy and procedure defined in the ADS.

[16] Refer to RA 5320 – Air System Maintenance Schedule – Design and Validation.
[17] Refer to RA 1225 – Air Safety Documentation Audit Trail.

Acceptable Means of Compliance 5726(4)

60. A programme for ►validation of the In-Service usage against the DUS demonstrated fatigue capability◄ **should** be conducted through engagement with the DO. ►A system **should** be developed to:

a. Obtain operational loads and usage data that can be used for comparison with the DUS,

b. Identify In-Service usage changes that necessitate re-evaluation of the Integrity Baseline evidence,

c. Provide the data needed to establish or update fatigue clearances and support any Life Extension Programmes.

61. Each IAT system **should** obtain sufficient data to validate the DUS by means of a Structural Health Monitoring System, Health and Usage Monitoring System or similar system accepted by the DO. Where an IAT system does not deliver sufficient data, or requires its own validation programme, then an Operational Loads Measurement / Operational Data Recording Programme **should** be conducted on a representative sample of In-Service Air Systems.◄

62. The TAA **should** ensure the timing of usage validation programmes is being determined by its aims. The requirement to carry out the validation **should** be reviewed at least every 6 years by the TAA (concurrently with a triennial SOIU review) with the decision and rationale supported by evidence and documented in the AISD.

63. The usage validation programme **should** be considered following any Major Change in usage or rate of life consumption or in conjunction with any plans for a Major Type Design change, significant change in usage or life extension, ie where re-validation of significant parameters is necessary, decisions on usage data validation requirements **should** be documented in the AISD.

64. The TAA **should** initiate an Ageing Air System Audit[18].

Guidance Material 5726(4)

Validating Integrity

65. For guidance refer to the MASIM[2].

Regulation 5726(5)

Recovering Integrity

5726(5) The TAA **shall** ensure that any loss or potential compromise of Integrity is recovered.

Acceptable Means of Compliance 5726(5)

Recovering Integrity

Integrity Governance

66. The TAA **should** treat a loss or potential compromise of Integrity as an Airworthiness Issue and act to recover Integrity.

67. Any recommendations at an IWG to amend inspection intervals **should** be ratified by the LoAA holder prior to incorporation in the Maintenance schedule.

Integrity Evidence, Assertions and Baseline

68. The TAA **should** ensure that IM Systems are established and implemented where the Integrity Evidence and Assertions no longer supports the Integrity Baseline.

69. The TAA **should** ensure that the need for measures to conserve life is considered where life may be insufficient to reach the planned Out of Service Date.

70. The TAA **should** consider the need for design change, Reconditioning or component replacement to mitigate fatigue damage in order to meet fleet planning objectives.

71. The TAA **should** ensure that Repairs are:

a. Developed by an approved DO.

[18] Refer to RA 5723 – Ageing Air System Audit.

Acceptable Means of Compliance 5726(5)

b. Assessed against the appropriate Design Standard, with lifing and inspection requirements clearly established, and consideration given to the effect of adjacent and / or previous Repairs.

c. Recorded in the Air System Airworthiness Information[15].

72. Remedial action **should** be taken, and the IWG notified, if significant deviation in individual Air System weight and balance is identified by the CAMO.

Guidance Material 5726(5)

Recovering Integrity

73. For guidance refer to the MASIM[2].

Regulation 5726(6)

Exploiting Integrity

5726(6) The TAA **shall** ensure that Integrity is exploited to make best use of the inherent capabilities of the Air System.

Acceptable Means of Compliance 5726(6)

Exploiting Integrity

74. The TAA **should** ensure activities are put in place to record, report and, if required, act where the Service Data and analysis suggests there may be an opportunity to relax requirements within the Integrity Baseline without introducing new threats to Integrity.

75. Any recommendations at an IWG to relax requirements within the Integrity Baseline **should** be ratified by the LoAA holder prior to incorporation in the Maintenance schedule.

Guidance Material 5726(6)

Exploiting Integrity

76. For guidance refer to the MASIM[2].

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RA 5805 – Airworthiness Directives and Service Bulletins (MRP Part 21 Subpart A)

Rationale

Airworthiness Directives (AD) and Service Bulletins (SB) are used to promulgate information such as unsafe conditions and Maintenance or product improvement information for civil derived[1] Air Systems. Failure to take appropriate action in response to an AD or SB may impact the Airworthiness of the Air System. Type Airworthiness Authorities (TAA)[2] for civil derived[1] Air Systems need to ensure such ADs and SBs are reviewed and appropriate action is taken as required to maintain the Airworthiness of the Air System.

Contents

Regulation 5805(1)

Airworthiness Directives and Service Bulletins (MRP Part 21.A.3B)

5805(1) Following the issue of an AD or SB on a civil derived Air System, the TAA **shall** review the relevance and take appropriate action[3].

Acceptable Means of Compliance 5805(1)

Airworthiness Directives and Service Bulletins (MRP Part 21.A.3B)

1. When an AD or SB has been received by the TAA, they **should** decide the appropriate corrective action and / or required inspections to be carried out within the timescale detailed in the AD or SB[4].

2. If the TAA defers or rejects an AD or SB regarding an unsafe condition, that is applicable to the operated Air System, they **should** seek Approval from the relevant Defence Equipment and Support Operating Centre Director[5] or Sponsor[6] and ensure that the appropriate Aviation Duty Holder / Accountable Manager (Military Flying) is aware so that any impact on Risk to Life can be considered.

Guidance Material 5805(1)

Airworthiness Directives and Service Bulletins (MRP Part 21.A.3B)

3. Promulgation of the required corrective action and / or inspection will be via an SI(T)[7] or Modification Leaflet[8] as applicable.

4. ►An AD or SB may be issued against any civil derived Type Certified item. In the civil environment, three Products are Type Certified:

   a. Air System.

   b. Engine.

   c. Propeller.◄

[1] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B) – Where the Military Type Certificate is based on a Type Certificate issued by civil regulator (such as European Union Aviation Space Agency (EASA)).
[2] Where the Air System is not UK MOD-owned, Type Airworthiness (TAw) management regulatory Responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw Responsibilities TAM may be read in place of TAA as appropriate throughout this Regulatory Article (RA), noting that a TAM may not approve Special Instruction (Technical) (SI(T))s.
[3] Refer to RA 1165 – UK Civil Aviation Authority Oversight of UK Military Registered Aircraft.
[4] Iaw Para 4e of RA 5815 – Instructions for Sustaining Type Airworthiness - Military Design Organizations (DOs) can determine how they issue Instructions for Sustaining Type Airworthiness and this can include ADs / SBs. This RA is specifically for civil-derived Air Systems where the Civil Aviation Authority / Federal Aviation Administration (FAA) issue an AD / SB that needs to be considered for applicability to the Air System.
[5] Refer to RA 1013 – Air Systems Operating Centre Director – Provision of Airworthy and Safe Systems.
[6] Refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems.
[7] Refer to RA 5405 – Special Instructions (Technical).
[8] Refer to RA 5305 – In Service Design Changes.

Guidance Material 5805(1)

Airworthiness Directives

5. An AD is a document issued by a recognized civil authority (such as the EASA or the FAA) which mandates the actions to be performed on an Air System to restore an acceptable level of Safety[9], when evidence shows that the Safety level of the Air System may otherwise be compromised.

6. An AD will contain at least the following information:

a. Identification of any unsafe condition(s).

b. Identification of the affected Air System operating and Maintenance associated documentation.

c. The action(s) required.

d. The compliance time / cycles for the required action(s).

e. The date of ►applicability.◄

Service Bulletins

7. It is common practice among civil DO to request actions to improve the Safety level of their Product, Part or Appliance by means of a SB. An SB may or may not result in the introduction of a design change. The use of a SB will provide the recipient with information or advance instruction for corrective action.

8. SBs issued by a DO do not carry a mandatory requirement for action, unless covered by an AD. It is good practice to review all SBs within the requirements of the DO.

[9] Refer to RA 1230 – Design Safety Targets.

RA 5810 - Military Type Certificate (MRP Part 21 Subpart B)

Rationale

It is necessary to demonstrate that an Air System's Type Design meets appropriate Safety requirements. ►Failure to complete◄ a systematic, independent ►◄ Certification process ►◄ for new UK military registered Air Systems ►may lead to Air Systems entering service with design deficiencies which introduce unacceptable Hazards.◄ The award of a Military Type Certificate (MTC) demonstrates that the military Air System Type Design has been shown to meet appropriate Airworthiness Requirements through satisfactory completion of the Military Air System Certification Process (MACP).

Contents

Regulation 5810(1)

Certification of UK Military Registered Air Systems (MRP Part 21.A.11)

5810(1) The Type Airworthiness Authority (TAA)[1] **shall** ensure that new UK military Air Systems, intended to be operated on the UK Military Aircraft Register (MAR), are certified prior to their Release To Service (RTS)[2, 3].

[1] Where the Air System is not UK MOD-owned, Type Airworthiness (TAw) management regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.
[2] Where RTS is used in this RA, this also includes Military Permit To Fly (MPTF) (In-Service) and MPTF (Special Case Flying), both analogous to the RTS, as detailed at RA 1305 – Military Permit to Fly (MPTF) (In-Service), (Special Case Flying) and (Single Task).
[3] Refer to RA 1300 – Release To Service.

Acceptable Means of Compliance 5810(1)

Certification of UK Military Registered Air Systems (MRP Part 21.A.11)

1. The TAA **should** set out the approach to Certification in their Certification Strategy or a Certification section within their Air System Airworthiness Strategy[4].

2. The TAA responsible for the introduction of new UK military Air Systems, except for Remotely Piloted Air Systems (RPAS) Category exemptions detailed in the RA 1600 series[5], **should** ensure that they are certified in accordance with (iaw) the MACP, comprising the following 6 phases:

   a. Phase 1 – Identify the requirement for, and obtain, organizational Approvals.

   b. Phase 2 – Establish and agree the Type Certification Basis (TCB).

   c. Phase 3 – Agree the Certification Programme (CP).

   d. Phase 4 – Demonstrate compliance with the TCB.

   e. Phase 5 – MAA review of Certification evidence.

   f. Phase 6 – Post Certification activities.

3. The TAA **should** use the output of the MAA Type Certification Report (TCR) (delivered at Phase 5) in response to the Type Certification Exposition (TCE) (submitted at Phase 4), in framing their initial RTS Recommendations (RTSR)[6].

4. An MTC **should not** be issued until the Air System is brought Under Ministry Control (UMC)[7].

5. Where a TAA proposes to request credit for Certification activities undertaken by another Airworthiness Regulator, the TAA **should** complete a structured 2-part ►Type Design Examination process to agree the scope of the credit to be awarded, and the residual CP, with the MAA[8].◄

6. Delivery Team personnel supporting the TAA with Certification responsibilities **should** be identified by the TAA and attend the appropriate Certification course[9].

Guidance Material 5810(1)

Certification of UK Military Registered Air Systems (MRP Part 21.A.11)

7. Successful completion of the MACP for a new Air System will result in the MAA issuing an MTC ►◄ to the TAA. An MTC ►◄ will cover the entire Air System, including engines and propellers, where applicable[10]. The MTC ►◄ will certify that ►◄:

   a. ►The Air System◄ has been designed by an approved organization(s);

   b. ►The Air System◄ meets the approved TCB ►◄;

   c. ►In cases in which the applicable TCB requirement cannot be literally complied with, either fully or in part, the MAA accepts a suitable alternative which provides an Equivalent Level of Safety (ELoS) through the use of compensating factors; or

   d. The MAA accepts that Alternative Means of Compliance (AltMoC) with the Essential Requirements for Airworthiness[11] have been demonstrated.

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[4] Refer to RA 5010 – Type Airworthiness Strategy.
[5] Refer to RA 1600 series: Remotely Piloted Air Systems.
[6] Refer to RA 1300 – Release To Service. Where RTS Recommendation (RTSR) is used in this RA, this also includes MPTF (In-Service) Recommendations.
[7] Refer to RA 5301 – Air System Configuration Management.
[8] ►Refer to Manual of Military Air System Certification (MMAC) Chapter 5: Certification Credit within the MACP.◄
[9] As determined by the TAA.
[10] Successful completion of the MACP for a change to Type Design for a Legacy Air System will result in the MAA issuing an Approved Design Change Certificate (ADCC) to the TAA. An ADCC only covers the certified change(s) to the Type Design as opposed to the whole Air System. Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D) and MMAC Chapter 3: Changes to Type Design (MRP Part 21 Subpart D).
[11] ►Refer to MMAC Annex A to Chapter 2.◄

Guidance Material 5810(1)

e. The Air System◄ is supported by appropriate RTSR, an approved Air System Document Set (ADS) containing instructions for safe operation and sustaining Type Airworthiness and a comprehensive Type Airworthiness Safety Assessment►[12]◄.

Relationship with RTSR

8. The initial RTSR for new Air Systems needs to be approved by the relevant Defence Equipment and Support (DE&S) Operating Centre Director (OCD) and submitted to the MAA for independent Assurance[6]. For Major Changes, the MAA, in consultation with the RTS Authority (RTSA)[13] and TAA, will decide during MACP Phase 3 if the MAA will carry out an RTSR Audit in addition to producing the TCR.

Requesting Certification credit

9. To be eligible to request Certification credit within the MACP, the TAA will need to successfully complete a structured 2-part ►Type Design Examination◄ which is comprehensive, fully documented, auditable and involves the MAA. Detailed guidance regarding this process can be found in the MMAC[8].

Further Guidance

10. Refer to the MMAC[14] for further related Guidance Material ►◄.

Regulation 5810(2)

Demonstration of Capability (MRP Part 21.A.14)

5810(2) The TAA **shall** ensure that prior to any application for ►an◄ MTC, the organization responsible for the design of the Air System and producing the associated Certification evidence can demonstrate its capability by holding an appropriate Design Organization (DO) Approval or is in the process of applying for such an Approval.

Acceptable Means of Compliance 5810(2)

Demonstration of Capability (MRP Part 21.A.14)

11. The DO **should** hold an approval from the MAA under the Design Approved Organization Scheme (DAOS) or an acceptable alternative covering the relevant scope of activities issued by the MAA[15].

Guidance Material 5810(2)

Demonstration of Capability (MRP Part 21.A.14)

12. Refer to the MMAC[14] for further related Guidance Material ►◄.

Regulation 5810(3)

Application (MRP Part 21.A.15)

5810(3) An application for ►an◄ MTC **shall** be made by the TAA using MAA Form 30.

Acceptable Means of Compliance 5810(3)

Application (MRP Part 21.A.15)

13. The MAA Form 30 submission **should** include:

a. Preliminary descriptive data of the Air System, the intended use of the Air System, and the kind of operations for which Certification is requested.

b. Details of the Type Design aspects that are considered to be novel technology and for which existing Certification Specifications do not provide adequate standards.

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[12] ►Refer to RA 5012 – Type Airworthiness Safety Assessment.◄

[13] Where RTS Authority (RTSA) is used in this RA, this also includes the Sponsor responsible for authorizing the MPTF (In-Service) or the TAM responsible for approving the MPTF (Special Case Flying) for Civilian Operated Air Systems, as detailed at RA 1305 – Military Permit to Fly (MPTF) (In-Service), (Special Case Flying) and (Single Task).

[14] Refer to MMAC Chapter 2: Certification of Air System Type Designs (MRP Part 21 Subpart B) and the MACP.

[15] Refer to RA 5850 – Military Design Approved Organization (MRP Part 21 Subpart J).

Acceptable Means of Compliance 5810(3)

c. The intended standards which will demonstrate compliance against Programmable Elements (PE) and / or Cyber Security for Airworthiness (CSA) requirements.

14. Where Operational Suitability Data (OSD) is available for the Air System, the application for an MTC or changes in Type Design **should** include**,** or be supplemented after the initial application by, an assessment of the implications on the OSD resulting from military operation.

15. An application for a change in Type Design **should** be made under RA 5820[16].

Guidance Material 5810(3)

Application (MRP Part 21.A.15)

16. When the application for ►an◄ MTC is based on a Type Certificate (TC) issued by a civil regulator (such as the European Union Aviation Safety Agency (EASA)), such a TC may contain OSD as approved data. The OSD available will depend upon the class of Air System based around the following defined constituents:

a. Minimum syllabus of pilot type rating training, including the determination of type rating.

b. Definition of scope of the Air System validation source data to support the objective qualification of simulator(s) associated to the pilot type rating training, or provisional data to support their interim qualification.

c. Minimum syllabus of Maintenance certifying staff type rating training, including determination of type rating.

d. Determination of type specific data for cabin crew training.

e. The Master Minimum Equipment List (MMEL).

f. Other type-related operational suitability elements.

17. An assessment of the implications on the OSD is required in the scope of the proposed military operation(s), taking in to account the difference in assumptions that were the basis for the OSD in the civil TC and compatibility with training for military pilots, other Aircrew and Maintenance certifying staff.

18. Refer to the MMAC for further related Guidance Material ►◄.

Regulation 5810(4)

Type Certification Basis (MRP Part 21.A.15)

5810(4) The OCD or TAA **shall** propose the TCB consisting of applicable Airworthiness Requirements and Military Certification Review Items (MCRIs) to include ►proposed◄ Special Conditions, ►◄ ELoS, ►Deviations and 'elect to comply' items◄ as applicable.

Acceptable Means of Compliance 5810(4)

Type Certification Basis (MRP Part 21.A.15)

19. Defence Standard (Def Stan) 00-970[17] series **should** be used as the default Certification Specifications for Airworthiness Requirements.

20. Formal approval **should** be sought from the MAA for the use of alternative ►◄ Certification Specifications[18].

21. Certification Specifications used **should** be annotated with a clear statement as to which versions will be applied.

22. If the TAA elects to comply with an amendment to a Certification Specification that is effective after the filing of the application for an MTC, the TAA **should** also comply with any other amendment that the MAA finds is directly related.

23. Special detailed technical specifications, named Special Conditions, for an Air System, **should** be approved by the MAA if the related Certification Specifications do

[16] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D).
[17] Refer to Defence Standard 00-970 – Certification Specifications for Airworthiness.
[18] Refer to MMAC Chapter 5: Certification Credit within the MACP.

Acceptable Means of Compliance 5810(4)

not contain adequate or appropriate Safety standards for the Air System or an element of its design, in any of the following circumstances:

a. The Air System has or may have novel or unusual design features relative to the design practices on which the applicable Certification Specifications are based.

b. The Air System design usage assumptions do not match the intended military usage.

c. Experience from other similar In-Service Air Systems or having similar design features, has shown that 'unsafe conditions'[19] may develop.

d. Suitable Certification Specifications do not exist for the concerned Air System or specific design feature.

24. For new Air Systems, the TCB **should** be proposed by the relevant DE&S OCD[20].

25. The TCB will be effective for a period of 5 years from the date of MTC application. If MTC / Restricted MTC (RMTC) is not achieved within that timescale, the TAA **should** undertake a review of the Certification Specifications used to define the TCB to assess any shortfalls against Airworthiness Requirements in the latest Issue.

26. The TCB, and all amendments to it during the Certification process, **should** be agreed by the MAA. ►Any Equivalent Safety Finding (ESF) or Deviations issued by the MAA **should** be incorporated into the TCB.◄

27. The TAA **should** maintain a register and adequate configuration control of all MCRIs applicable to the TCB.

Guidance Material 5810(4)

Type Certification Basis (MRP Part 21.A.15)

28. The MTC certifies that the Air System meets the TCB, including any ►applicable ESFs and Deviations[14]◄, otherwise an RMTC may be issued (see RA 5810(9)).

29. In line with relevant Certification Specifications, Instructions for Sustaining Type Airworthiness (ISTA) will be prepared iaw the TCB[21].

30. Any proposed alternative Certification Specifications will be sufficiently detailed and specific, such that the case for their use is clear.

31. ►Any◄ Special Conditions ►will◄ contain such Safety standards that the TAA finds necessary to establish a level of Safety that is acceptable to the MAA.

32. Where the MAA has previously approved a Specification(s) to support Certification of the Air System (or sub-system changes), it may be appropriate to use the same Specification(s) to identify Airworthiness Requirements for changes to Type Design. Justification for this choice would have to demonstrate that, with respect to the proposed change, the rationale underpinning the MAA's previous Approval remained valid and that the Certification Specification(s) provide adequate Airworthiness Requirements. Designation of applicable Certification Specifications for changes to Type Design is regulated by RA 5820[16].

33. Refer to the MMAC[14] for further related Guidance Material ►◄.

Regulation 5810(5)

Certification Programme (MRP Part 21.A.15)

5810(5) The TAA **shall** propose to the MAA a CP that **shall** include the means to demonstrate compliance.

[19] The words 'unsafe conditions' are used in RA 5805 – Airworthiness Directives and Service Bulletins (MRP Part 21 Subpart A) to justify the basis for an Airworthiness Directive or Service Bulletin.
[20] Refer to RA 1013 – Air Systems Operating Centre Director - Provision of Airworthy and Safe Systems.
[21] Refer to RA 5815 – Instructions for Sustaining Type Airworthiness.

Acceptable Means of Compliance 5810(5)

Certification Programme (MRP Part 21.A.15)

34. The CP **should** include:

a. A project schedule including major milestones.

b. Identification of relevant personnel making decisions affecting Airworthiness.

c. A detailed description of the Type Design, including all the configurations to be certified; proposed operating characteristics and limitations where available; and the intended use of the Air System and the kind of operations for which Certification is requested.

d. The TCB, as established and agreed at Phase 2, with a proposal for the Means of Compliance (MC) and related compliance document(s) for each applicable Airworthiness Requirement.

e. A proposal for a breakdown of the CP into meaningful groups of compliance demonstration activities and data, including a proposal for MC and related compliance document(s) against each group.

f. A proposal for the TAA and MAA Levels of Involvement (LoI) in the verification of compliance demonstration activities and data.

35. The CP **should** be agreed by the MAA before compliance demonstration commences and updated as necessary during the Certification process.

Guidance Material 5810(5)

Certification Programme (MRP Part 21.A.15)

36. Refer to the MMAC[14] for related Guidance Material ►◄.

Regulation 5810(6)

Changes Requiring a New Military Type Certificate (MRP Part 21.A.19)

5810(6) The TAA **shall** apply for a new MTC if it is determined that any proposed change in design, configuration, power, thrust or mass is so extensive that a substantially complete investigation of compliance with the applicable TCB is required.

Acceptable Means of Compliance 5810(6)

Changes Requiring a New Military Type Certificate (MRP Part 21.A.19)

37. Applications for a new MTC **should** demonstrate compliance with RA 5810(3).

Guidance Material 5810(6)

Changes Requiring a New Military Type Certificate (MRP Part 21.A.19)

38. Changes in Type Design are addressed in RA 5820[16] including guidance on when it may be necessary to apply for a new MTC.

39. Refer to the MMAC[14] for further related Guidance Material ►◄.

Regulation 5810(7)

Compliance with the Type Certification Basis (MRP Part 21.A.20)

5810(7) The TAA **shall** demonstrate compliance with the TCB following the means approved in the CP.

Acceptable Means of Compliance 5810(7)

Compliance with the Type Certification Basis (MRP Part 21.A.20)

40. The TAA **should** submit a TCE to the MAA that includes:

a. Access to all compliance documents referenced in the CP, updated to include justifications of compliance.

b. Detail of any difficulty or event encountered during the process of demonstration of compliance that may have an appreciable effect on Air System Safety or related Risk to Life (RtL).

c. Identification of any Airworthiness Requirements not complied with that are compensated for by controls, factors, or mitigations that provide an ELoS.

d. ►Identification of any Airworthiness Requirements not complied with that are compensated for by AltMoC to demonstrate compliance with Essential Requirements for Airworthiness[11].◄

e. A statement from the TAA declaring:

(1) Compliance with the TCB following the means approved in the CP.

(2) No feature or characteristic has been identified that may make the Air System unsafe for the uses for which Certification is requested.

Guidance Material 5810(7)

Compliance with the Type Certification Basis (MRP Part 21.A.20)

41. ►Where the MAA is satisfied that an ELoS has been demonstrated, an ESF will be issued.

42. Where the MAA is satisfied that AltMoC demonstrate compliance with the Essential Requirements for Airworthiness, a Deviation will be issued.

43. The MAA may elect to place a time limit on the validity of an ESF or Deviation, where appropriate, to enable full compliance with the applicable Certification Requirement(s) to be demonstrated.◄

44. Refer to the MMAC[14] for related Guidance Material ►◄.

Regulation 5810(8)

Issue of Military Type Certificate (MRP Part 21.A.21)

5810(8) The TAA **shall** be issued with an MTC when the MAA has accepted that the requirements of the MACP have been fully satisfied and the TAA has confirmed that their organization is appropriately placed in terms of resourcing, contractual position and access to design information to manage the MTC.

Acceptable Means of Compliance 5810(8)

Issue of Military Type Certificate (MRP Part 21.A.21)

45. The TAA **should** make a declaration when appropriate that their organization is ready to manage the MTC. The declaration **should** include confirmation that the Air System is UMC[22].

Guidance Material 5810(8)

Issue of Military Type Certificate (MRP Part 21.A.21)

46. Refer to the MMAC[14] for related Guidance Material ►◄.

[22] ►Refer to RA 5301 - Air System Configuration Management.◄

Regulation 5810(9)

Issue of Restricted Military Type Certificate (MRP Part 21.A.21)

5810(9) ►The TAA **shall** be issued with a RMTC where compliance with the TCB, including appropriate ESFs and Deviations, has not been fully demonstrated, but the Certification evidence has been assessed, by the MAA, to demonstrate a level of Safety which is adequate with regard to the intended use.◄

Acceptable Means of Compliance 5810(9)

Issue of Restricted Military Type Certificate (MRP Part 21.A.21)

47. ►Alternative Means to demonstrate a level of Safety which is adequate with regard to the intended use **should** be agreed with the MAA, via an MCRI, supported by Aviation Duty Holder[23] acceptance of any elevated RtL when compared to full compliance with the TCB requirements.◄

48. When shortcomings are identified in the Certification evidence provided in the TCE or RTSR, the TAA **should** progress the resultant MACP Actions to closure with MAA agreement or to a level deemed acceptable by the MAA.

49. Any restrictions identified in the RMTC, ►or Restricted Approved Design Changes Certificate (RADCC)[14],◄ **should** be copied verbatim into the RTS by the RTSA.

Guidance Material 5810(9)

Issue of Restricted Military Type Certificate (MRP Part 21.A.21)

50. ►◄

a. ►◄

b. ►◄

c. ►◄

51. Refer to the MMAC[14] for further related Guidance Material ►◄.

Regulation 5810(10)

Type Design (MRP Part 21.A.31)

5810(10) The TAA **shall** ensure through Configuration Management that the certified Type Design is defined, identified and controlled by drawings, specifications, manufacturing processes and Airworthiness limitations.

Acceptable Means of Compliance 5810(10)

Type Design (MRP Part 21.A.31)

52. The Type Design **should** consist of:

a. The drawings and specifications (or equivalent), and a listing of those drawings and specifications, necessary to define the configuration and the design features of the Air System shown to comply with the applicable TCB.

b. Information on materials and processes, and on methods of manufacture and assembly necessary to ensure the conformity of the Air System.

c. An approved Airworthiness limitations section of the ISTA[21] as defined by the applicable Certification Specifications.

d. Any other data necessary to allow, by comparison, the determination of the Airworthiness of later configurations of Air Systems of the same type.

Guidance Material 5810(10)

Type Design (MRP Part 21.A.31)

53. Refer to the MMAC[14] for related Guidance Material ►◄.

[23] ►or Accountable Manager (Military Flying) (AM(MF)) if appropriate.◄

Regulation 5810(11)

Inspections and Tests (MRP Part 21.A.33)

5810(11) The TAA **shall** assure themselves that for inspections and tests undertaken to demonstrate compliance with the TCB, the test specimens adequately conform to the specifications of the proposed Type Design and the test and measuring equipment to be used are adequate and appropriately calibrated.

Acceptable Means of Compliance 5810(11)

Inspections and Tests (MRP Part 21.A.33)

54. The TAA **should** assure themselves that, before inspections or tests are undertaken to demonstrate compliance with the TCB, the DO has ensured:

a. That materials and processes adequately conform to the specifications for the proposed Type Design.

b. Those parts of the Air System adequately conform to the drawings in the proposed Type Design.

c. That the manufacturing processes, construction and assembly adequately conform to those specified in the proposed Type Design.

d. That the test equipment and all measuring equipment used for tests are adequate and appropriately calibrated.

e. That a statement of conformity is issued listing any non-conformity, together with a justification that this will not affect the test results.

55. Where identified in the LoI agreed in the CP, the TAA **should** make provisions for the MAA to:

a. Review any data and information related to the demonstration of compliance.

b. Witness or carry out any test or inspection conducted for the purpose of the demonstration of compliance.

Guidance Material 5810(11)

Inspections and Tests (MRP Part 21.A.33)

56. The DO's statement of conformity is intended to ensure that: the manufactured test specimen adequately represents the proposed Type Design; the test and measuring equipment conform to its purpose; and that the sensors and measuring system are appropriately calibrated. Any non-conformity will be assessed for justification that it will not compromise the test purpose and results. This can be achieved either in the statement of conformity or by cross reference to other documents (test minutes of meetings, test notes etc).

57. Type Certification is typically an iterative process in which the design is under continuous evolution. If the Type Design evolves after the time of the inspection or test, then the final Type Design will be checked against the proposed Type Design (as it was at the time of the inspection or test), and the differences (if any) analyzed to ensure that the inspection or test results are representative of the final configuration. However, such changes made to the Type Design may lead to the invalidation of the inspection or test results and a need to repeat the inspection or test. The DO will need to have a robust configuration management process to track the evolving Type Design.

58. The LoI agreed in the CP will need to be considered by the TAA as this is where the MAA will have determined the inspections and tests they wish to witness.

59. The scope of these requirements is not limited to inspections and tests, they refer to any data or information related to demonstration of compliance with the TCB.

60. Refer to the MMAC[14] for further related Guidance Material ►◄.

Regulation 5810(12)

Flight Tests (MRP Part 21.A.35)

5810(12) Flight testing for the purpose of obtaining an MTC or RMTC **shall** be conducted iaw RA 5880[24].

Acceptable Means of Compliance 5810(12)

Flight Tests (MRP Part 21.A.35)

61. The TAA **should** ensure that all necessary flight tests are conducted to determine compliance with the applicable TCB.

62. For civil-derived Military Registered Air Systems, the TAA **should** ensure that any flight testing undertaken for the civil Certification satisfies the requirements of MOD usage or makes provision to demonstrate compliance.

Guidance Material 5810(12)

Flight Tests (MRP Part 21.A.35)

63. Nil.

Regulation 5810(13)

Responsibilities of the Holder (MRP Part 21.A.44)

5810(13) The TAA, as the MTC or RMTC holder, **shall** fulfil the responsibilities detailed in RA 1015[25].

Acceptable Means of Compliance 5810(13)

Responsibilities of the Holder (MRP Part 21.A.44)

64. Nil.

Guidance Material 5810(13)

Responsibilities of the Holder (MRP Part 21.A.44)

65. Nil.

Regulation 5810(14)

Transferability (MRP Part 21.A.47)

5810(14) If an MTC or RMTC is transferred, the transfer **shall** be made only to a TAA within the UK Defence Air Environment and who is able to fulfil the responsibilities detailed in RA 1015[25].

Acceptable Means of Compliance 5810(14)

Transferability (MRP Part 21.A.47)

66. The transfer of the MTC or RMTC **should** only be made with the agreement of the MAA.

Guidance Material 5810(14)

Transferability (MRP Part 21.A.47)

67. Refer to the MMAC[26] for related Guidance Material ►◄.

Regulation 5810(15)

Duration and Continued Validity (MRP Part 21.A.51)

5810(15) An MTC, or RMTC **shall** remain valid subject to the TAA remaining in compliance with RA 1015[25], and providing the certificate has not been suspended or revoked.

[24] Refer to RA 5880 – Military Permit to Fly (Development) (MRP Part 21 Subpart P).
[25] Refer to RA 1015 – Type Airworthiness Management – Roles and Responsibilities.
[26] Refer to MMAC Chapter 4: MTC and ADCC Explained.

Acceptable Means of Compliance 5810(15)

Duration and Continued Validity (MRP Part 21.A.51)

68. Upon notification of suspension or revocation, the MTC or RMTC **should** be surrendered to the MAA Certification Division and the appropriate RTSA, Operating Duty Holder (ODH), and AM(MF) informed.

69. The TAA **should** inform the MAA, RTSA, ODH and AM(MF) as soon as practicable when they are no longer able to meet the responsibilities defined by RA 1015[25], for one or several types of Air System under their responsibility.

Guidance Material 5810(15)

Duration and Continued Validity (MRP Part 21.A.51)

70. Refer to the MMAC[26] for related Guidance Material ►◄.

Regulation 5810(16)

Record Keeping (MRP Part 21.A.55)

5810(16) The TAA **shall** ensure that all significant documents supporting Certification are retained and are available to the MAA in order to provide an Audit trail of evidence supporting Air Safety decision-making.

Acceptable Means of Compliance 5810(16)

Record Keeping (MRP Part 21.A.55)

71. Procedures **should** be applied to ensure that:

a. An Audit trail of significant documents supporting Certification, and information necessary to ensure the continued Airworthiness and continued validity of the OSD, is maintained correctly[27].

b. Any significant document supporting Certification can be made available to the MAA on request.

Guidance Material 5810(16)

Record Keeping (MRP Part 21.A.55)

72. International or collaborative ►projects◄ will be required to co-ordinate custodianship of appropriate documentation; however, the TAA will still need to agree suitable access.

73. Significant documents supporting Certification include any document supporting decision-making or evidence submitted as part of the MACP such as relevant design information, drawings, test reports, including inspection records for the Air System tested, meeting records, Safety Assessments, independent analysis etc.

74. It is acceptable that significant documents supporting Certification are held by the appropriate DO.

75. Refer to the MMAC[14] for further related Guidance Material ►◄.

Regulation 5810(17)

Manuals (MRP Part 21.A.57)

5810(17) The TAA **shall** ensure that all master copies of manuals required by the applicable TCB are produced, maintained and updated by the appropriate DO and are available to the MAA on request.

Acceptable Means of Compliance 5810(17)

Manuals (MRP Part 21.A.57)

76. The contents of the manuals **should** be validated by the appropriate DO. For manuals generated by non-DO entities, the TAA **should** assume responsibility for validation.

[27] Refer to RA 1225 – Air Safety Documentation Audit Trail.

Guidance Material 5810(17)

Manuals (MRP Part 21.A.57)

77. Nil.

RA 5812 – Digital Models and Simulations Supporting Airworthiness-Related Decision-Making

Rationale

Modelling and Simulation (M&S) utilizes models, be they mathematical or logical representation of a system, entity, phenomenon or process, as a basis for simulations to develop data utilized for technical decision-making. Failure to appropriately assess the suitability of the M&S utilized may compromise Air System Airworthiness. It is to be demonstrated that the M&S utilized in support of Airworthiness-related decision-making (which include decisions on whether design requirements are met) have been derived from a credible source and are appropriate for their intended use.

Contents

Regulation 5812(1)

Development and Assurance of Modelling and Simulation

5812(1) The Type Airworthiness Authority (TAA)[1] **shall** ensure that the development and Assurance of M&S used to support Airworthiness-related decision-making is appropriate for their intended use.

Acceptable Means of Compliance 5812(1)

Development and Assurance of Modelling and Simulation

1. To establish appropriate levels of development and Assurance of M&S, the TAA **should** assess the M&S Criticality based on the M&S level of influence and the consequence of Airworthiness-related decisions based on the M&S outputs►[2]◄.

2. Aligned to the 'Level' of M&S Criticality established, the TAA **should**:

   a. Select recognized standard(s) / specification(s) to be used for development and Assurance of M&S and determine the applicability of their requirements.

   b. Identify any additional Assurance and safety arguments that are required to mitigate the consequences of Airworthiness-related decision-making based on the M&S outputs.

3. The standard(s) / specification(s) to be used for development and Assurance of M&S **should** be based on the application to which the M&S is being applied.

Guidance Material 5812(1)

Development and Assurance of Modelling and Simulation

Background

4. As it is becoming increasingly viable to produce M&S that can provide sufficiently accurate information for Airworthiness-related decision-making, there is a desire to exploit the time and cost benefits (beyond traditional physical testing) they can offer. However, all M&S are abstractions and as such introduce uncertainty into the information they provide to the decision-maker. This RA provides the Regulations and non-exhaustive guidance on activities required to understand and communicate the Risk associated with the uncertainty such that informed decisions can be made.

[1] Where the Air System is not UK MOD-owned, Type Airworthiness (TAw) management regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.

[2] ►Refer to JSP 939 – Defence Policy for Modelling & Simulation.◄

Guidance Material 5812(1)

M&S Criticality

5. Similar to Safety Risk (which is a product of likelihood and consequence of failure), M&S Risk is determined as a product of the level of influence and the consequence of Airworthiness-related decisions based on the M&S outputs (ie the consequence of an incorrect decision being made). The 'Level' of M&S Criticality is a measure of this M&S Risk.

6. Level of Influence. M&S level of influence estimates the degree to which M&S results impact the Airworthiness-related decision under consideration. This is predicated on the amount and quality of other (non-M&S) information available and how it was to be used to support the impending decision. It is recognized that a M&S may initially have been designed for a low (negligible or minor) impact on Airworthiness-related decisions and then be proposed for a higher level of influence (moderate or significant). Although this approach is typically very challenging and, therefore not recommended, historical assurance evidence may offer a suitable alternative to reverse engineering model development. Where the final level of influence is unknown at the beginning of a programme, it is prudent to develop a strategy that includes routes to higher levels.

7. Consequence. Consequence classifications assess the impact of a M&S-influenced decision on Airworthiness (or Air Safety). It is recommended that the consequence categories (of Airworthiness-related decisions) are aligned with the severity categories in the Defence Aviation Hazard Risk Matrix (HRM)[3], or Defence Contractor Flying Organization equivalents as appropriate.

8. An example of developing an appropriate M&S Criticality Matrix is provided at Annex A. This example is not the only acceptable means of establishing model criticality; other standards / specifications may be used with suitable evidence supporting their appropriate adaptation (where required).

Selection of Recognized Standard(s) / Specification(s)

9. There are limited application-specific standards / specifications relating to M&S available and the level of confidence that can be drawn from their use is variable. It is therefore necessary for the TAA to be confident that the chosen standard(s) / specification(s) will provide appropriate levels of development and Assurance. Where this is not possible, it may be necessary to propose a combination of standard(s) / specification(s) underpinned by processes and historical assurance data. Further guidance is as follows:

a. For software related M&S, the safety-related Programmable Elements approach defined in Defence Standard 00-970[4] is applicable (ie the application of RTCA DO-330).

b. For non-software related M&S, where application specific standards are available, the following list details the minimum expected constituent components of appropriate standard(s) / specification(s). Depending on model criticality, tailoring of these minimum requirements may be permitted, see Annex A for a worked example.

(1) Data and M&S input Verification, Validation and pedigree.

(2) A mechanism for measuring compliance.

(3) Verification and Validation for specific M&S.

(4) Uncertainty characterization.

(5) Sensitivity analysis.

(6) Competence.

(7) Methods for analysing and interpreting M&S results.

(8) Change management processes.

[3] Refer to RA 1210 – Ownership and Management of Operating Risk (Risk to Life), Annex A – ►Risk◄ Ownership, Referral and Defence Aviation Hazard Risk Matrix.
[4] Refer to Defence Standard 00-970 - Certification Specifications for Service Aircraft.

Guidance Material 5812(1)

(9) Processes for reporting results.

(10) Best practices for user interface design.

c. Where no application specific M&S standard is available, or such a standard alone is deemed to be insufficient, a combination of standards, specifications, processes and historical Assurance evidence may be utilized to establish the minimum expected constituent components detailed above.

Regulation 5812(2)

Use of Modelling and Simulation to Claim Credit for Certification Evidence

5812(2) Where M&S outputs are intended to claim credit for Certification evidence, the TAA **shall** demonstrate to the MAA that development and Assurance of M&S is appropriate and present associated evidence at the relevant Phases of the Military Air System Certification Process (MACP)[5].

Acceptable Means of Compliance 5812(2)

Use of Modelling and Simulation to Claim Credit for Certification Evidence

10. Where M&S outputs are intended to claim credit for Certification evidence, the TAA **should**:

a. Include the general strategy for the development and Assurance of M&S in the Certification Strategy produced to support completion of the MACP.

b. Produce Military Certification Review Items (MCRI) for each M&S (or group of M&S where the same approach is adopted) to demonstrate that appropriate levels of development and Assurance have been established and outline the manner of delivery.

c. Ensure that the use of M&S outputs are clearly identified as a Means of Compliance (MC) in the Certification Programme (CP) proposed to the MAA at Phase 3 of the MACP and identify documents / evidence used to demonstrate M&S Assurance claims are included in the CP.

d. Ensure that documents / evidence to demonstrate M&S Assurance claims are included in the Type Certification Exposition (TCE) submitted to the MAA to support compliance with the Type Certification Basis (TCB) at Phase 4 of the MACP.

e. Where Certification evidence includes claims against ongoing M&S performance, such as where the M&S are Digital Twins (eg in a Health and Usage Monitoring System), it **should** include details of planning for ongoing model Assurance.

Guidance Material 5812(2)

Use of Modelling and Simulation to Claim Credit for Certification Evidence

MAA Review of M&S Development and Assurance.

11. Agreeing an MCRI with the MAA provides an independent review of the proposed approach, offering the Applicant confidence that the arrangements for M&S development and Assurance are appropriate for the intended use. This supports efficient progress through later stages of the MACP, removing Risk that Certification evidence will be rejected by the MAA on the basis that the development and Assurance of the M&S has not been demonstrated as appropriate. It also allows the TAA and MAA to develop an understanding of the level of uncertainty and hence Risk that may be introduced to decision-making by the M&S; this is key to ensuring that suitable mitigations are introduced through the MACP.

[5] Refer to the Manual of Military Air System Certification (MMAC).

ANNEX A

M&S CRITICALITY

1. The purpose of assessing M&S Criticality is to support the appropriate development and Assurance activities so that M&S can be shown to deliver an equivalent level of confidence to the Assurance activity that is being eliminated, reduced or automated.

2. M&S standards / specifications generally permit a modulation of development and Assurance efforts based on M&S Criticality. M&S standards may not align with the severity categories in the Defence Aviation HRM. The following example shows how such an alignment may be achieved to underpin use of an existing M&S standard (NASA-STD-7009A[6]) to deliver AMC for this Regulation.

3. From the Risk table provided in NASA-STD-7009A Appendix D, a preliminary M&S Criticality Matrix has been developed at Table 1. The lowest NASA-STD-7009A decision consequence (Negligible) has been removed to align with the severity categories in the Defence Aviation HRM. The preliminary matrix adopts 3 x 'Levels' of M&S Criticality, based on the Red, Yellow and Green categories detailed in NASA-STD-7009A:

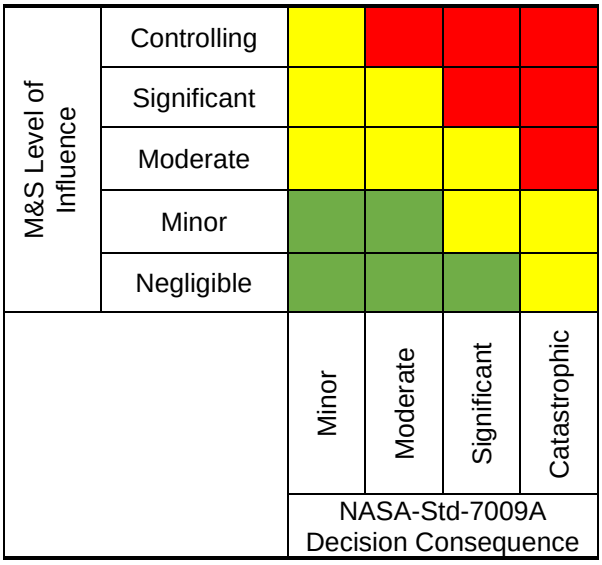
   a. Red: The full set of requirements in the selected standard(s) / specification(s) must be applied. Equivalent to NASA-STD-7009A Red (R).

   b. Yellow: Tailoring of the requirements from the selected standard(s) / specification(s) is permitted. Where M&S outputs are intended to claim credit for Certification evidence, the MAA must agree to the proposed tailoring via an MCRI (as required by AMC 5812(2)). Equivalent to NASA-STD-7009A Yellow (Y).

   c. Green: Application of requirements from the selected standard(s) / specification(s) is discretionary and does not require MAA agreement. Equivalent to NASA-STD-7009A Green (G).

4. The M&S 'Level of Influence' on the vertical axis is aligned to NASA-STD-7009A 'M&S Results Influence[7]. This makes sense in the context of M&S for design or Certification but may not for other applications of M&S, for example where the M&S is used to support software development. In such cases, the M&S would most likely fall under established RTCA DO-330 processes (as per RTCA DO-178C).

Table 1. Preliminary M&S Criticality Matrix (aligned to NASA-STD-7009A).



5. Whilst it is credible to align the M&S Level of Influence with the descriptions of M&S results influence taken from NASA-STD-7009A, Appendix D, Table 2, it is also important to reconcile the 'decision consequences' from the definitions at NASA-STD-7009A Appendix D, Table 1 with the meaning of terms in the severity categories in the Defence Aviation HRM. A summary comparison between NASA-STD-7009A Decision Consequences and Defence Aviation HRM is provided at Table 2.

[6] Refer to NASA-STD-7009A – Standard for Models and Simulations.
[7] Refer to NASA-STD-7009A, Appendix D.3 for more guidance on M&S Results Influence.

Table 2. Comparison of MAA[3] and NASA Consequence Classes

MAA Class	**Catastrophic**	**Critical**	**Major**	**Minor**
Consequence	3+ fatalities engaged in the activity in question or a single fatality of a member of the public.	1 or 2 fatalities. A large number of specified injuries will also be included in this category	Specified or large number of reportable injuries	Reportable injuries
NASA Class	**Catastrophic**	**Significant**	**Moderate**	**Minor**
Consequence	Permanent disability or death	Severe injury or occupational illness	Minor injury or occupational illness	Minor detriment (first aid)

6. Based on this comparison, use of the NASA Decision Consequence will not deliver alignment with the severity categories in the Defence Aviation HRM. Table 3 provides a proposed update to the M&S Criticality Matrix with Risk levels 'left shifted' to account for variance in the consequence classes. This delivers higher M&S Criticality levels than originally proposed (for each severity category) and forces a new M&S Criticality Level (marked in blue) to be introduced at the top end of the scale[8]. It is necessary that additional development and Assurance measures are applied in 'Level A' to account for the fact that failure of the M&S could lead to increased consequences and the revised requirements become:

a. 'Level A'. The full set of requirements in the selected standard(s) / specification(s) must be applied and Safety arguments developed to demonstrate that Risks associated with increased consequences of failure have been mitigated.

b. 'Level B' to 'Level D'. As per Paragraph 3 (above), levels 'Red' through to 'Green' respectively.

Table 3. Proposed M&S Criticality Matrix (aligned to Defence Aviation HRM Severity Categories).

M&S Level of Influence	Minor	Major	Critical	Catastrophic
Controlling	B	B	A	A
Significant	C	B	B	A
Moderate	C	C	B	B
Minor	D	C	C	B
Negligible	D	D	C	C
	Defence Aviation HRM Decision Consequence			

7. It is not within the scope of this Annex to propose what the additional Assurance activities might be required for 'Level A' M&S Criticality; these would be proposed via an MCRI (as required by AMC RA 5812(2)). However, examples might include:

a. Specific benchmarks of acceptable uncertainty.

b. The application of Data Safety standards.

c. Where surrogate or reduced order models are used to reduce computational cost, demonstration that is possible to reconstruct (to a reasonable level of accuracy) the original model from the decompositions produced.

8. It will be noted this this is not the only acceptable route to delivering AMC; other standard(s) / specification(s) may be used with suitable evidence supporting their appropriate adaptation (where required) forming part of the AMC.

[8] For consistency with DO-330 we also now label the levels as 'Level D' through to 'Level A'.

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RA 5815 – Instructions for Sustaining Type Airworthiness

Rationale

Instructions for Sustaining Type Airworthiness (ISTA) are a subset of the Air System Document Set (ADS)[1] and include the combined suite of methods, inspections, processes, and procedures necessary to support the Maintenance[2] and operation of an Air System and associated Products, Parts, Appliances, Airborne Equipment and Air Launched Weapons within its certified limits[3]. Failure to create and maintain ISTA will result in stakeholders being unable to ensure that the Air System is safe to operate. To maintain safe operation, ISTA need to be provided and amended through-life in a coherent and expedient manner so that they continue to reflect the Type Certification Basis (TCB).

Contents

Regulation 5815(1)

Provision and Amendments to Instructions for Sustaining Type Airworthiness

5815(1) The Type Airworthiness Authority (TAA)[4] **shall** approve[5, 6] and provide a complete set of ISTA to the Operating Duty Holder / Accountable Manager (Military Flying). In doing so, the TAA **shall** ensure that:

a. ISTA is developed in accordance with (iaw) the TCB[7].

b. ISTA is amended through-life, incorporating change requests.

c. The DO or Commodity Chief Engineer (CE) provides amendments to the ISTA for an Air System or related Products, Parts and Appliances.

Acceptable Means of Compliance 5815(1)

Provision and Amendments to Instructions for Sustaining Type Airworthiness

1. The TAA **should** ensure that ISTA are made available to the Military Continuing Airworthiness Manager (Mil CAM)[8] at the earliest opportunity.

2. If the availability of some elements of ISTA, associated with overhaul and heavy Maintenance, are delayed until after the Air System and associated Products, Parts and Appliances has entered service, the TAA **should** ensure that they are available before the relevant calendar backstop or flight hours / cycles limit is reached.

3. The TAA **should** develop and maintain ISTA through-life iaw the requirements of the ADS management plan[1]. Additionally, the TAA **should** ensure that their contribution to the ADS management plan details the processes for the management of change requests. The processes **should** include as a minimum, the management of changes resulting from:

a. Air System Maintenance schedule review[9].

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[1] Refer to RA 1310 – Air System Document Set.
[2] Refer to RA 4810 – Technical Information (MRP 145.A.45).
[3] ISTA can be considered an equivalent to civil Instructions for Continuing Airworthiness.
[4] Where the Air System is ►not UK MOD-owned, Type Airworthiness (TAw) management◄ regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model ►◄; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.
[5] Refer to RA 1003 – Delegation of Airworthiness Authority and Notification of Air Safety Responsibility.
[6] The TAA may privilege a Design Organization (DO) to issue information and instructions. Refer to RA 5850 (11): Privileges (MRP Part 21.A.263).
[7] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B), or the RA 1600 series for Remotely Piloted Air Systems.
[8] Refer to RA 4948 – Documentation – MRP Part M Sub Part G.
[9] Refer to RA 5320 – Air System Maintenance Schedule – Design and Validation.

Acceptable Means of Compliance 5815(1)

b. An Air Safety Occurrence[10].

c. A Narrative Fault Report.

d. An Unsatisfactory Feature Report (UFR).

e. Changes to Type Design[11] or In-Service design changes[12].

f. Repairs[13].

g. Special Instructions (Technical) (SI(T))[14].

4. The TAA **should** ensure that the DO or Commodity CE:

a. Develops ISTA iaw the TCB[15], where applicable.

b. Provides details of the Quality Assurance process for the development of ISTA[1].

c. Provides a plan for the validation process[1].

d. Makes changes to ISTA available to the TAA at the earliest opportunity.

e. Details how changes to the ISTA are promulgated.

5. The following ISTA, as a minimum, **should** be provided[16]:

a. A Maintenance Manual containing all procedures required by Maintenance organizations to maintain the Air System or equipment in a serviceable condition and to diagnose typical Faults (Topic 1).

b. Modification Instructions (Topic 2).

c. Orders and Instructions issued by the TAA (Topic 2(N/A/R)1).

d. Illustrated Parts Catalogue (Topic 3).

e. Maintenance Schedules containing all necessary servicing procedures and detailing all Preventive Maintenance requirements through-life, including associated safety warnings and cautions necessary to minimize the Risk to Life for Maintenance personnel (Topic 5).

f. Repair Schemes (Topic 6).

g. Weapon Loading / off-loading Procedures (Topic 5A6), if appropriate.

h. Weight & Balance Data Manual (Topic 9), if appropriate.

i. Sub-system Diagrams required to support Maintenance, Fault diagnosis and Repairs (Topic 10).

j. Ground Handling Instructions (Topic 12A).

k. Electrical Wiring Interconnection Systems.

l. Airworthiness limitations (including where appropriate any Airworthiness Directive, Service Bulletin).

m. Emergency Rescue and Mishap Response Information.

North Atlantic Treaty Organization (NATO) Stock Numbers (NSN)

6. Where Products, Parts and Appliances are ►provisioned through◄ the MOD Supply System, the TAA or Commodity CE **should** ensure the NSNs and associated NATO Commercial And Government Entity codes are included in the Illustrated Part Catalogue against the relevant part numbers.

[10] Refer to RA 1410 – Occurrence Reporting and Management.
[11] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D).
[12] Refer to RA 5305 – In-Service Design Changes.
[13] Refer to RA 5865 – Repairs (MRP Part 21 Subpart M).
[14] Refer to RA 5405 – Special Instructions (Technical).
[15] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B).
[16] The Topic numbers in brackets are legacy military references. Equivalent ISTA titles are acceptable.

Acceptable Means of Compliance 5815(1)

Repairs

7. Where repaired Products, Parts or Appliances are released back into service before the changes to the applicable ISTA have been completed, the TAA **should** ensure this is for a limited period and that the conditions of which, are agreed between the TAA and the holder of the Repair design approval[13].

8. If ISTA changes are issued by the holder of the Repair design approval after the Repair has been first approved, these **should** be submitted to the TAA for approval.

Guidance Material 5815(1)

Provision and Amendments to Instructions for Sustaining Type Airworthiness

9. If required by the TAA, the following ISTA may also be provided[16]:

   a. Preservation, Packing, Transport and Storage Instructions (Topic 7).

   b. Air Transport Operations Manual (Topic 11).

   c. Cross-servicing Guide (Topic 12B).

   d. Engine Ground Running Reference Cards (Topic 12C).

10. Guidance for the layout and technical content of ISTA is detailed in Defence Standard 00-601 Part 1[17].

11. The provision of ISTA for new materiel is normally developed as an element within the project Integrated Logistic Support plan.

12. UFRs may be made by means of a MOD Form 765 UFR. UFRs are routed via the TAA and / or Commodity CE, and if appropriate, to the DO.

13. Where Repairs are approved by the TAA but do not have sufficiently wide application they may not be included as Repair Schemes in the provided ISTA[13].

14. Where the DO or Commodity CE is in doubt whether ISTA prepared by a contractor or subcontractor meets the requirements, they will consult the TAA; this is particularly important when a subcontractor offers existing ISTA.

15. The DO is responsible for obtaining and supplying the required ISTA to their subcontractors. They need to ensure that these documents are properly maintained during the period of the sub-contract and withdraw them on completion of the sub-contract.

16. The DO, subcontractor or Commodity CE is responsible for the management and retention of all ISTA master materiel that they have prepared until that responsibility is transferred or terminated[18].

17. The DO or Commodity CE will provide the TAA with the ISTA for items that require in-situ Maintenance as part of a higher assembly, for incorporation in the higher assembly's Maintenance instructions, for integration purposes.

18. The TAA or Commodity CE will provide Maintenance instructions on Government Furnished Assets.

19. The DO must ensure that the copyright of all ISTA supplied in satisfaction of a contract is vested in them or that they have written permission from any other copyright holder to make use of such materiel. The Crown requires free licence to reproduce the ISTA in whole or in part for any UK Government purpose iaw DefCon 90[19].

20. Emergency Rescue and Mishap Response Information will be provided to the Defence Aerodrome Rescue Fire Fighting Service Providers[20].

[17] Refer to Defence Standard 00-601 Part 1 – AIR S1000D Business Rules.
[18] Refer to RA 5301 – Air System Configuration Management.
[19] Refer to Defence Condition 90 – Copyright. (Available in the Knowledge in Defence Commercial Toolkit).
[20] Refer to STANAG 3896 – Aerospace Emergency Rescue and Mishap Response Information (Emergency Services). The TAA or Commodity CE will confirm what ISTA can be released via Resilience Direct.

Guidance Material 5815(1)

Advance Information Leaflets (AIL)

21. AIL provide for the rapid issue of a temporary amendment to the ISTA in advance of formal amendment. It will be written using the same conventions as the parent ISTA and include a terminating note detailing a validity statement and details on amendment action.

SI(T)

22. SI(T)[14] may contain information which supersedes that contained in the ISTA and may call for a publication amendment.

RA 5820 - Changes in Type Design (MRP Part 21 Subpart D)

Rationale

During the life of an Air System there will be changes (previously referred to as Modifications) in the Type Design. It is important that any such changes meet the appropriate Safety requirements to ensure the Airworthiness implications of the change are fully understood. Failure to complete a systematic, independent Certification process for Changes in the Type Design of UK military registered Air Systems may lead to design deficiencies which introduce unacceptable Hazards. Such changes are subject to classification and Approval prior to the implementation of the change.

Contents

Regulation 5820(1)

Classification of Changes in Type Design (MRP Part 21.A.91)

5820(1) Any change in Type Design **shall** be classified as 'Minor' or 'Major' by the Type Airworthiness Authority (TAA) or an approved Design Organization (DO) within the scope of its privileges as recorded in its terms of Approval[1].

Acceptable Means of Compliance 5820(1)

Classification of Changes in Type Design (MRP Part 21.A.91)

1. For Civilian-Owned and Civilian Operated Air Systems, the Air System Sponsor has the opportunity to split Type Airworthiness (TAw) Responsibility, with regards to design changes, between the TAA and a Type Airworthiness Manager (TAM). The TAA **should** provide advice to the Sponsor on the most appropriate split of TAw design change Responsibilities[2].

2. A Minor Change has no appreciable effect on the mass, balance, structural strength, reliability, operational characteristics, armament system or other characteristics affecting the Airworthiness of the Air System. All other changes **should** be ►classified as◄ Major Changes.

3. The classification decision and supporting justification of all changes to Type Design **should** be recorded ►in a manner that provides an auditable trail[3].◄

4. In case of any doubt over the classification of change, the TAA **should** seek advice from the Military Aviation Authority (MAA) Certification Division. The MAA reserves the authority to re-classify a change if deemed appropriate to do so.

Guidance Material 5820(1)

Classification of Changes in Type Design (MRP Part 21.A.91)

5. Refer to the Manual of Military Air System Certification (MMAC)[4] for related Guidance Material.

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[1] The DO privilege is restricted to Minor Changes only. For the DO scope of privileges refer to RA 5850 – Military Design Approved Organization (MRP Part 21 Subpart J).

[2] Where the Air System is not UK MOD-owned, TAw management regulatory Responsibility by either the TAA or TAM needs to be agreed within the Sponsor's approved model; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw Responsibilities TAM may be read in place of TAA as appropriate throughout this RA.

[3] ►Refer to RA 1225 – Air Safety Documentation Audit Trail.◄

[4] Refer to MMAC Chapter 3 – Changes to Type Design (MRP Part 21 Subpart D).

Regulation 5820(2)

Application (MRP Part 21.A.93)

5820(2) An application for a proposed Major Change in Type Design **shall** be made by the TAA using MAA Form 30.

Acceptable Means of Compliance 5820(2)

Application (MRP Part 21.A.93)

6. ►◄

a. ►◄

(1) ►◄

(2) ►◄

(3) ►◄

b. ►◄

c. ►◄

7. Where Operational Suitability Data (OSD)[5] is available for the Air System, the application **should** include**,** or be supplemented after the initial application by, an assessment of the implications on the OSD resulting from military operation.

8. Where the TAA wishes to generate a Type Airworthiness Safety Assessment Report (TASAR) addendum for the Change, rather than a re-issue of the TASAR, this **should** be proposed, with justification, on the MAA Form 30 submission[6].

9. As the individual Responsible for the Type Design of the Air System, only the TAA **should** apply for Approval of a Major Change in Type Design. The TAA **should** propose, with justification[7], whether the change will be assured by the MAA or TAA. The MAA will determine, upon review, whether MAA Certification Assurance is required or the Major Change can proceed under TAA Assurance with MAA oversight.

10. ►The Type Certification Basis (TCB) for a Major change to Type Design **should** be effective for 5 years from the date of Military Type Certificate (MTC) or Approved Design Change Certificate (ADCC) application. If the change to the MTC, Restricted MTC (RMTC), ADCC or Restricted ADCC is not achieved within this timescale, the TAA **should** undertake a review of the Certification Specifications used to define the TCB to assess any shortfalls against Airworthiness Requirements in the latest issue.◄

Guidance Material 5820(2)

Application (MRP Part 21.A.93)

11. Refer to the MMAC[4] for related Guidance Material.

Regulation 5820(3)

Approval of Minor Changes (MRP Part 21.A.95)

5820(3) A Minor Change in a Type Design **shall** be approved by the TAA or an approved DO within the scope of its privileges as recorded in its terms of Approval[8] when it has been demonstrated that the change and areas affected by the change comply with the requirements of the Military Air System Certification Process (MACP).

[5] Refer to RA 5810(3): Application (MRP Part 21.A.15).
[6] Refer to RA 5012 – Type Airworthiness Safety Assessment.
[7] Refer to the GM of RA 5820(1) for advice on assurance levels for Major Changes.
[8] Refer to RA 5850 – Military Design Approved Organization (MRP Part 21 Subpart J).

Acceptable Means of Compliance 5820(3)

Approval of Minor Changes (MRP Part 21.A.95)

12. A Minor Change to a Type Design **should** only be approved ►when all the following conditions are met:◄

a. When it has been demonstrated that the Type Design change and areas affected by the change comply with the Certification Specifications, as specified in RA 5820(5), through satisfactory completion of the MACP.

b. When compliance with the TCB has been declared and the justifications of compliance have been recorded in the compliance documents.

c. When any Airworthiness provisions not complied with are compensated for by controls, factors or mitigations that provide an Equivalent Level of Safety (ELoS).

d. When no feature or characteristic has been identified that may make the product unsafe for the uses for which Certification is requested.

13. An Approval of a Minor Change to a Type Design **should** be limited to the specific Configuration(s) in the Type Design to which the change relates.

14. The DO **should** provide to the TAA the Instructions for Sustaining Type Airworthiness amendments for the Product, on which the change will be installed, prepared iaw the applicable TCB.

15. Where Operational Suitability Data is available for the Air System, the TAA, or an approved DO within the scope of its privilege(s) **should** assess the implications on the Operational Suitability Data resulting from the change to Type Design.

16. The TAA or approved DO under privilege procedure **should** ensure that the proposed Minor Change has undergone a thorough evaluation process in line with the MACP[9]. The appropriate classification and Approval of changes in Type Design will be subject to routine MAA oversight activity.

17. The ►Approval◄ of Minor Changes by either the TAA or an approved DO under the privilege procedure **should** be predicated on there being no non-compliances with the applicable TCB requirements ►and comply with following conditions◄:

a. An approved DO acting under privilege procedure **should** inform the TAA if a TCB non-compliance is identified.

b. ►Where◄ there is no appreciable effect on Airworthiness, TAAs can approve Equivalent Safety Finding (ESF) for Minor changes and **should** subsequently notify the MAA.

c. Where an appreciable effect on Airworthiness is identified and an ELoS cannot be demonstrated, the TAA **should** seek MAA acceptance of the non-compliance, via a Military Certification Review Item (MCRI) before the change is approved. The MAA will then consider whether the Approval of a Deviation and / or re-classification of the change as Major is appropriate.

18. When a Minor Change is approved by an approved DO under the privilege procedure[1] invoked by the TAA, the DO **should** inform the TAA to ensure that Configuration Control is maintained.

Guidance Material 5820(3)

Approval of Minor Changes (MRP Part 21.A.95)

19. Refer to the MMAC[4] for related Guidance Material.

[9] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B).

Regulation 5820(4)

Approval of Major Changes (MRP Part 21.A.97)

5820(4) A Major Change to a Type Design **shall** only be approved when it has been demonstrated that the change and areas affected by the change comply with the requirements of the MACP.

Acceptable Means of Compliance 5820(4)

Approval of Major Changes (MRP Part 21.A.97)

20. The TAA **should** demonstrate that the Type Design change and areas affected by the change comply with the Certification Specifications, as specified in RA 5820(5), through satisfactory completion of the MACP[9].

21. Any non-compliances and proposed Alternative Means of Compliance (AltMoC), Special Conditions, ESFs or Deviations encountered during the MACP **should** be staffed to the MAA through MCRI(s) for agreement prior to Approval of the Change.

22. Where compliance with the TCB, including appropriate ESFs and Deviations, has not been fully demonstrated, but the Certification evidence has been assessed, by the MAA to demonstrate a level of Safety which is adequate with regard to the intended use, the TAA **should** be issued with a Restricted Approved Design Change Certificate or ►RMTC◄ by the MAA.

23. Where a TAA proposes to request credit for Certification activities undertaken by another Certification Authority, the TAA **should** document their approach in a Certification Strategy for agreement with ►the◄ MAA Certification Division. If not completed during initial Certification, the Strategy **should** detail arrangements to complete a structured 2-part Type Design Examination process to agree the scope of the credit to be awarded.

24. For Major Changes under TAA Assurance, the TAA **should** approve a Type Certification Exposition (TCE) that references the TCB, compliance evidence and the statements detailed in RA 5810(7) AMC[10].

25. For Major Changes under TAA Assurance, the TAA **should** notify the MAA when the MACP has been completed and, when applicable, Release To Service Recommendations (RTSR) have been submitted. This notification **should** reference the TAA-approved TCE and, if applicable, RTSR. The MAA will then issue or update the ADCC or MTC as appropriate. These changes in Type Design will be subject to routine MAA Oversight activity.

26. An ADCC or MTC **should not** be issued or updated until the Type Design Change is brought Under Ministry Control (UMC)[11].

Impact on the Air System Safety Case (ASSC)

27. The TAA **should** inform the relevant Aviation Duty Holder / Accountable Manager (Military Flying) of the Major Changes to enable a review of the Air System Safety Case[12].

Guidance Material 5820(4)

Approval of Major Changes (MRP Part 21.A.97)

28. Refer to the MMAC[4] for related Guidance Material.

[10] Refer to RA 5810(7): Compliance with the Type Certification Basis (MRP Part 21.A.20).
[11] Refer to RA 5301 – Air System Configuration Management.
[12] Refer to RA 1205(2): Ownership of the Air System Safety Case.

Regulation 5820(5)

Designation of Applicable Certification Specifications for Airworthiness (MRP Part 21.A.101)

5820(5) The TAA **shall** ensure that the application for the change in Type Design complies with the Certification Specifications applicable to the changed product on the date of application for the change unless Certification Specifications of later amendments are chosen, or Certification Specifications of earlier amendments are agreed under the Changed Product Rule (CPR).

Acceptable Means of Compliance 5820(5)

Designation of Applicable Certification Specifications for Airworthiness (MRP Part 21.A.101)

29. ►Where the TAA elects to use CPR, any of the following **should** apply:◄

a. A change is Minor[13].

b. A change is Not Significant[14].

c. An area, System, Part or Appliance is not affected by the change.

d. Compliance with the latest amendment for a Significant change►[15]◄ does not contribute materially to the level of Safety.

e. Compliance with the latest amendment would be impractical.

30. If the TAA chooses to use requirements from an earlier amendment of the Certification Specifications, they **should** show that the changed product complies with these requirements and any other requirement the MAA finds is directly related. ►◄ The earlier amended Certification Specifications **should** be no earlier than the corresponding Certification Specifications of the original Type Design.

31. If the TAA elects to comply with requirements that are derived from an amendment to the Certification Specifications that is effective after the filing of the application for a change to a Type, the TAA **should** also comply with any other requirements that the MAA finds are directly related.

32. If the MAA finds that the Certification Specifications referenced in the TCB do not provide adequate standards with respect to the proposed change, the TAA **should** also comply with any Special Conditions, and amendments to those Special Conditions, prescribed under the provisions of RA 5810[5], in order to provide a level of Safety equivalent to that established in the Certification Specifications in effect at the date of the application for the change.

Guidance Material 5820(5)

Designation of Applicable Certification Specifications for Airworthiness (MRP Part 21.A.101)

33. Refer to the MMAC[4] for related Guidance Material.

Regulation 5820(6)

Record Keeping (MRP Part 21.A.105)

5820(6) The TAA **shall** ensure that all documents supporting Certification of changes are retained and are available to the MAA in order to provide an Audit trail of evidence supporting Air Safety decision-making.

[13] Refer to 5820(1) paragraph 2.
[14] A change is considered Not Significant if it is neither Significant nor Substantial.
[15] ►Refer to the MMAC for definition.◄

Acceptable Means of Compliance 5820(6)

Record Keeping (MRP Part 21.A.105)

34. Record keeping procedures **should** be iaw RA 5810(16)[16].

Guidance Material 5820(6)

Record Keeping (MRP Part 21.A.105)

35. Record keeping procedures will be iaw RA 5810(16).

[16] Refer to RA 5810(16): Record Keeping (MRP Part 21.A.105).

RA 5825 – Fault Reporting and Investigation

Rationale

Accurate and timely reporting and effective investigation of technical Faults is essential to identify Airworthiness Risks and deliver effective mitigation. Unreported Faults, or failure to correctly capture, analyze and act on such reporting, could compromise Air Safety and potentially increase Risk to Life (RtL). This RA requires a Type Airworthiness Authority (TAA)[1] / Commodity Chief Engineer (CE)[2], to have a system in place with the users and their Design Organizations (DO), that reports Faults in a timely fashion, ensure the proper handling of affected materiel and support related Fault investigations. The reporting of Faults by MOD personnel is addressed in RA 4814[3].

Contents

Regulation 5825(1)

Fault Reporting and Investigation

5825(1) A TAA / Commodity CE **shall** ensure a system is in place for reporting and investigating Faults that warrant specific investigation due to their potential impact on Air Safety.

Acceptable Means of Compliance 5825(1)

Fault Reporting and Investigation

Fault Reporting

1. The TAA / Commodity CE **should** have a system in place that ensures that reported failures, malfunctions and defects are managed, analyzed and appropriate action taken[4].

2. The TAA / Commodity CE **should** ensure the DO has a system is in place for:

   a. Collecting, investigating and analyzing reports of and information related to failures, malfunctions, defects or other occurrences which cause or might cause an unsafe condition in the Air System.

   b. Providing appropriate rectification advice in a timely manner.

3. The TAA / Commodity CE **should** notify the Aviation Duty Holder (ADH) / Accountable Manager (Military Flying) (AM(MF)) of any increased RtL[5] resulting from a failure, malfunction or defect.

Fault Investigation

4. The investigating authority **should** normally be the TAA but, where arrangements have been made, can be a DO.

5. When failures, malfunctions or defects are reported on materiel which has been procured as both Contractor Furnished Equipment and Government Furnished Equipment, a common investigation and reporting procedure **should** be used.

Quarantine

6. The TAA / Commodity CE **should** ensure that there are appropriate processes in place to:

   a. Quarantine, protect and dispose of faulty materiel.

   b. Clearly identify and cross-reference faulty materiel to the relevant Fault report.

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[1] Where the Air System is ►not UK MOD owned, Type Airworthiness (TAw) management◄ regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model ►◄; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA, noting the TAM may not issue or amend the Air System Document Set or approve Special Instructions (Technical) (SI(T)).

[2] Refer to RA 5013 – Air System Management of Equipment and Commodity Items.

[3] Refer to RA 4814 – Occurrence Reporting (MRP 145.A.60), for the reporting of Faults by MOD personnel.

[4] This reporting requirement is in addition to the need to report Occurrences in accordance with RA 1410 – Occurrence Reporting and Management.

[5] Refer to RA 5011 -– Type Airworthiness Safety Management System.

Acceptable Means of Compliance 5825(1)

c. Ensure quarantined items are not repaired or used before the conclusion and outcome of the investigation.

7. The TAA / Commodity CE **should** provide disposal instructions for materiel under quarantine.

Flammability Reduction Means (FRM)

8. TAA's who have FRM[6] in the Type Design **should** assess, on an on-going basis, the effects of Air System component failures on FRM reliability. This **should** be part of the system for failure or Fault data collection, investigation and analysis.

9. The TAA **should**:

a. Demonstrate effective means to ensure collection of FRM reliability data, investigation and analysis. These means **should** provide data affecting FRM reliability such as component failures.

b. Develop SI(T)[7] or revise the applicable Instructions for Sustaining Type Airworthiness[8] to correct any failures of the FRM that occur In-Service that could increase any fuel tanks Fleet Average Flammability Exposure to more than that specified by the applicable Certification Specifications.

Guidance Material 5825(1)

Fault Reporting and Investigation

Fault Reporting

10. A MOD Form 760 – Narrative Fault Report or equivalent may be used for Fault reporting.

Unsafe Condition

11. An 'unsafe' condition exists if there is factual evidence (from In-Service experience, analysis or tests) that:

a. An event may occur that would result in an increased RtL, or reduce the capability of the Air System or the ability of the crew to cope with adverse operating conditions to the extent that there would be:

(1) A large reduction in Safety margins or functional capabilities, or

(2) Physical distress or excessive workload such that the flight crew cannot be relied upon to perform their tasks accurately or completely; or

(3) Serious or fatal injury to one or more occupants unless it is shown that the probability of such an event is within the limit defined by the applicable Certification Specification; or

b. There is an unacceptable Risk of serious or fatal injury to persons other than occupants; or

c. Design features intended to minimize the effects of survivable accidents are not performing their intended function.

Fault Investigation

12. Fault investigation priorities will be determined by the TAA / Commodity CE.

13. The TAA / Commodity CE will agree with the DO the format and distribution of investigation reports resulting from data analysis requests.

14. Apart from a design change, the corrective actions, if found necessary, may consist of amendments of the manuals, inspections, training programmes, and / or information to the operators about particular design features. The TAA or Commodity CE may decide to make mandatory such corrective action if necessary[8].

[6] Refer to the Federal Aviation Administration Advisory Circular 25.981-2A.
[7] Refer to RA 5405 – Special Instructions (Technical).
[8] Refer to RA 5815 – Instructions for Sustaining Type Airworthiness.

RA 5835 – Production Organizations (MRP Part 21 Subpart G)

Rationale

Although the MAA does not currently require the specific Approval of Production Organizations (PO)[1], it is essential that the engineering process link between design and production is established. Without adequate Assurance that the engineering processes between design and PO are linked, there is potential for PO to manufacture Products, Parts, Appliances, Airborne Equipment and Air Launched Weapons that do not meet the designs produced by the Design Organization(s) (DO). This RA ensures that a level of Assurance is identified and that Air Systems (and related Products, Parts and Appliances) are produced by competent organizations and show conformity to the applicable design data and are in a condition for safe operation.

Contents

Regulation 5835(1)

Production Organizations

5835(1) The Type Airworthiness Authority (TAA)[2] or Commodity Chief Engineer (CE) **shall** ensure that 'prime'[3] PO hold a ►◄ Part 21 Subpart G Approval ►that is accepted by the MAA or have a nationally accredited Quality Management System (QMS) with an appropriate scope for Production.◄

Acceptable Means of Compliance 5835(1)

Production Organizations

Common Acceptable Means of Compliance (AMC)

1. ►Part 21 Subpart G Approvals from one of the following organizations are categorized as accepted by the MAA. If a 'prime' PO holds any of these Approvals, they **should** submit their Production Organization Exposition (POE) to the TAA or Commodity CE to confirm that its scope is appropriate for the production tasks:

   a. European Union Aviation Safety Agency (EASA).

   b. Federal Aviation Administration (FAA)[4].

   c. UK Civil Aviation Authority (CAA).

   d. A National Military Airworthiness Authority that the MAA has a Recognition in place with and that Recognition specifically enables the use of their Part 21 Production Organization Approvals (as detailed on the MAA Recognition webpage[5]).◄

2. If the 'prime' PO does not hold a recognized Part 21 Subpart G Approval ►accepted by the MAA◄, or the Approval held does not cover the scope of the production tasks, the TAA or Commodity CE **should** assure themselves that the 'prime' PO:

   a. Hold AS/EN 9100 certification and comply with Allied Quality Assurance Publication (AQAP) 2310 covering the scope of production tasks. The certification **should** be issued by a Certification Body holding suitable accreditation, with the right scope, from a National Accreditation Body (NAB)[9] who is a signatory to the International Accreditation Forum (IAF) or IAF

[1] Refer to RA 1005 – Contracting with Competent Organizations.
[2] Where the Air System is not UK owned, Type Airworthiness (TAw) management regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.
[3] 'Prime' refers to the highest level of Air System, Product, Part or Appliance procured by the DO or Delivery Team within an arrangement / contract.
[4] FAA Production Approval Regulations are a subset of the Title 14 Code of Federal Regulations (CFR) known as 14 CFR Part 21 Subpart G.
[5] ►MAA Recognition – www.gov.uk/government/publications/maa-recognition.◄

Acceptable Means of Compliance 5835(1)

Accredited Regional Multi-Lateral Agreements (MLA). The QMS **should** contain:

(1) Control procedures for traceability including a definition of clear criteria of which Parts or Appliances need such traceability eg Critical Parts.

b. Submit their POE to the TAA or Commodity CE, as appropriate, to enable assessment of competency[1].

3. The TAA or Commodity CE **should** assure themselves that the 'prime' PO can demonstrate that it has established and is able to maintain a QMS to ensure that each Product, Part and Appliance produced by the organization or by its partners, or supplied from or subcontracted to outside parties, conforms to the applicable design data and is in condition for safe operation.

4. The TAA or Commodity CE **should** assure themselves that the 'prime' PO has a documented arrangement in place with the appropriate DO describing in detail how to reliably use the applicable design data to manufacture a Product, Part or Appliance.

5. This arrangement **should** detail as a minimum:

a. The responsibilities of the PO and DO with respect to the arrangement.

b. The procedures to deal adequately with production deviations and non-conforming Parts[6].

c. The procedures and associated responsibilities to achieve adequate configuration control of manufactured Parts (ie traceability).

d. The procedure for requesting and managing changes in manufacturing methods or materials.

6. The TAA or Commodity CE **should** assure themselves that the 'prime' PO has the facilities and processes to:

a. Keep full records of all work carried out[7].

b. Maintain an auditable trail of approved concessions and deviations.

c. Ensure that their Products, Parts and Appliances conform to the approved type design.

7. Where a 'prime' PO uses Parts or Appliances from a sub-contractor, the TAA or Commodity CE **should** assure themselves that the 'prime' PO has an auditable process to demonstrate design conformity, Safety for operation and that full records of work carried out are retained.

8. If the TAA or Commodity CE is procuring through a Foreign Military Sales (FMS) contract, they **should** assure themselves of the design conformity and Assurance for operation of the Product, Part or Appliance.

Additional AMC – TAA only

9. In addition to the requirements of paragraph 2, the TAA **should** ensure that the 'prime' PO is subject to Defence Quality Assurance – Field Force (DQA-FF) surveillance.

10. The collaboration between the 'prime' PO and DO **should** be agreed by the TAA, irrespective of whether the DO is acting as a Co-ordinating Design Organization (CDO) or Air System CDO[8].

Additional AMC – Commodity CE only

11. In derogation to paragraph 4, where Products, Parts and Appliances are procured to prescribed technical specifications without reach back to the DO (eg standard Parts, Commercial Off the Shelf parts etc) the Commodity CE **should** assure themselves of the design conformity and Assurance for operation of the Product, Part or Appliance.

[6] Refer to RA 5825 – Fault Reporting and Investigation.
[7] Refer to RA 1225 – Air Safety Documentation Audit Trail.
[8] Refer to RA 1014 – Design Organizations and Co-ordinating Design Organizations – Airworthiness Responsibilities.

Acceptable Means of Compliance 5835(1)

12. The Commodity CE **should** assure themselves of the governance and Assurance management systems in place for / within POs to ensure the design conformity and Assurance for operation of the procured Product, Part of Appliance. Additionally, the Commodity CE **should** have right of access / investigation of production arrangements to ensure Quality and traceability of Products, Parts and Appliance is maintained.

Guidance Material 5835(1)

Production Organizations

Common Guidance Material (GM)

13. The POE may follow the format as defined in EASA Part 21 Subpart G detailing as a minimum:

a. A statement confirming that the POE and any associated manuals which define production processes will be complied with.

b. The organizational structure showing associated chains of responsibility.

c. A list of certifying staff.

d. A general description of the facilities located at each address.

e. A description of the PO's scope of work.

f. The procedure for the notification of organizational changes to the TAA or Commodity CE.

g. The amendment procedure for the POE.

h. A description of the QMS and the procedures necessary to demonstrate that the Products, Parts and Appliances conform to the relevant design and are in a condition for the safe operation.

14. The documented arrangement between the PO and DO may follow the sample format defined in EASA Part 21 Subpart G.

15. The 'prime' PO is responsible for determining and applying acceptance standards for physical condition, configuration status and conformity of supplied Products, Parts and Appliances, whether to be used in production or delivered to customers as spare Parts.

16. The control of POs holding an EASA Part 21 Subpart G Approval for the Parts or Appliances to be supplied can be reduced to a level at which a satisfactory interface between the two QMS can be demonstrated. Thus, the 'prime' PO can rely upon documentation for Parts or Appliances released under a supplier's EASA 21.A.163 privileges.

17. A PO ►(that is not the Prime PO)◄ who does not hold ►a◄ Part 21 Subpart G Approval ►that is accepted by the MAA (see paragraph 1)◄ is considered ►◄ a sub-contractor under the direct control of the 'prime' PO's Management System.

18. If several TAAs are relying on the same division of an organization as a PO, they might decide to co-ordinate work to achieve compliance with RA 5835(1).

19. Quality Assurance of FMS procurement may follow the processes detailed in the Knowledge in Defence[9].

20. A change in place or method of manufacture or a change of explosive material or source of explosive material will require Independent Ordnance, Munitions and Explosives Safety Advisor advice[10].

Additional GM – TAA / TAM only

21. Where the TAM is delegated to deliver Type Airworthiness responsibility[11], the tasking of DQA-FF will be through the TAA.

[9] https://www.gov.uk/guidance/knowledge-in-defence-kid.
[10] Refer to Regulation DSA 02.OME(2) – Appointment of an independent OME safety advisor.
[11] Refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems.

Guidance Material 5835(1)

Additional GM – Commodity CE only

22. Nil.

RA 5850 – Military Design Approved Organization (MRP Part 21 Subpart J)

Rationale

The Design Approved Organization Scheme (DAOS) is a mechanism by which the competence of a Design Organization (DO) can be assessed. The use of a non DAOS organization for design services may introduce design errors to the Design. Approval under DAOS is subject to adherence with the established procedures and rules governing the responsibilities and privileges for Military Design Approved Organizations.

Contents

Regulation 5850(1)

Responsibilities of a Design Organization

5850(1) A DO or Co-ordinating DO (CDO) **shall** fulfil the defined design and development responsibilities under their Terms of Approval.

Acceptable Means of Compliance 5850(1)

Responsibilities of a Design Organization

1. For Civilian-Owned or Civilian Operated Air Systems the Air System Sponsor can split Type Airworthiness (TAw) responsibility between the Type Airworthiness Authority (TAA) and a Type Airworthiness Manager (TAM), the TAA **should** provide advice to the Sponsor on the most appropriate split of responsibilities[1]. Dependant on the agreed split of TAw design responsibilities TAM may be read in place of TAA as appropriate throughout this RA.

2. The DO **should** review this RA in its entirety, noting the term DO throughout includes DO, CDO and Air System CDO. Therefore, CDO and Air System CDO may be read in place of DO as appropriate throughout this RA.

3. The DO **should**:

   a. Meet the responsibilities as defined[2].

   b. Maintain its DO Exposition (DOE) in conformity with the Design Management System (DMS).

   c. Ensure that the DOE references the basic working documents within the organization.

[1] Where the Air System is not UK MOD-owned, TAw management regulatory responsibility by either the TAA or TAM needs to be agreed within the Sponsor's approved model; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.

[2] Refer to RA 1014 – Design Organizations and Co-ordinating Design Organizations – Airworthiness Responsibilities.

Acceptable Means of Compliance 5850(1)

d. Determine that the design of Products, Parts, Appliances, Airborne Equipment and Air Launched Weapons (ALW) or changes or Repairs thereof, comply with applicable Airworthiness requirements or contracted specifications and have no feature that can lead to an unsafe condition.

e. Provide to the TAA or Commodity Chief Engineer (CE) associated documentation confirming compliance, and when applicable a Certificate of Design (CofD)[3, 4, 5].

f. Ensure TAA or Commodity CE is provided access to the Design data, including instructions associated with unsafe conditions such as Airworthiness Directives[6] (AD), Service Bulletins[6] (SB) for civil-derived Air Systems, or Special Instructions (Technical) (SI(T))[7] for military designed Air Systems.

Guidance Material 5850(1)

Responsibilities of a Design Organization

4. The role of the DO, CDO or Air System CDO to meet the Airworthiness responsibilities of RA 1014[2] will be established by the TAA.

Regulation 5850(2)

Scheme Inclusion and Approval Award

5850(2) An organization **shall** be included in the DAOS and awarded Approval for a defined range of Products, Parts, Appliances, Airborne Equipment and ALW, only when the organization has been assessed and approved by the Military Aviation Authority (MAA).

Acceptable Means of Compliance 5850(2)

Scheme Inclusion and Approval Award

5. An organization seeking inclusion in the scheme **should** apply using MAA DAOS Form 80, which can be found on the MAA website under Approval Schemes[8], through the MOD sponsor to the MAA.

6. Before a review of the organization's design, development and post-design support arrangements is undertaken, the DO **should** satisfy the MAA that:

a. It is in the interests of MOD to include the organization in the Scheme.

b. The organization holds Quality Management System (QMS) Certification to AS/EN 9100, or to ISO 9001 providing the scope of the Certification covers the proposed DO Terms of Approval.

Guidance Material 5850(2)

Scheme Inclusion and Approval Award

7. Inclusion in DAOS is normally an essential pre-requisite for the award of design and development contracts for Air Systems (including their Products, Parts and Appliances), Airborne Equipment and ALWs. Although it is understood that an organization may wish to bid for a contract, it is the TAA or Commodity CE's responsibility to consider whether, in this case, the organization is capable of holding a DAOS Approval. The DAOS Approval is recognition that the MOD accepts that an organization has demonstrated an appropriate standard of compliance and that a specified performance attribute or objective has been achieved.

8. When evidence presented by the organization demonstrates that it satisfies the requirements of RA 5850, a DAOS Approval will be issued by the MAA.

9. A list of organizations that have been granted Approval is published by the MAA[9].

[3] Refer to RA 5103 – Certificate of Design.
[4] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D).
[5] Refer to RA 5865 – Repairs (MRP Part 21 Subpart M).
[6] Refer to RA 5805 – Airworthiness Directives and Service Bulletins (MRP Part 21 Subpart A).
[7] Refer to RA 5405 – Special Instructions (Technical).
[8] Refer to https://www.gov.uk/government/publications/design-approved-organization-scheme-daos.
[9] Refer to https://www.gov.uk/government/publications/list-of-maa-approved-organisations.

Guidance Material 5850(2)

Terms of Approval

10. The Terms of Approval will identify the types of design work, categories of Air Systems (including their Products, Parts and Appliances), Airborne Equipment and ALWs for which the designer can operate as a DO, and the functions and duties that the organization is approved to perform. Those terms will be issued as part of the DO Approval.

11. The Terms of Approval encompass the Certificate and Schedule issued by the MAA:

a. The Certificate identifies the approved organization and its primary design location.

b. The Schedule includes:

(1) The scope of work (development, design changes and / or Repair and post design services unless otherwise stated), with any appropriate limitations against which the Approval has been granted.

(2) The categories of Products, Parts, Appliances, Airborne Equipment and ALWs.

(3) Airworthiness and design signatories.

(4) Military Permit to Fly (MPTF) signatories.

(5) Approved TAM.

(6) Privileges that can be invoked by the relevant TAA or Commodity CE by contract.

(7) TAM responsibilities.

(8) Reference to the DOE, provided in accordance with (iaw) RA 5850(4).

Changes to the Terms of Approval

12. An application for a change to the Terms of Approval will be made on MAA DAOS Form 82, which can be found on the MAA website under Approval Schemes[8].

13. Approval of a change in the Terms of Approval will be confirmed by an appropriate amendment of the Certificate and Schedule as appropriate.

Regulation 5850(3)

Design Management System (MRP Part 21.A.239)

5850(3) The DO **shall** demonstrate that it has established and is able to maintain a DMS for the control and supervision of the design, and of design changes, of Products, Parts and Appliances, Airborne Equipment and ALWs covered by the application.

Acceptable Means of Compliance 5850(3)

Design Management System (MRP Part 21.A.239)

14. The DO **should** establish, implement and maintain a DMS that includes a Safety Management System and a design Assurance system with clear lines of responsibility and accountability throughout the organization.

15. The DMS **should**:

a. Correspond to the size of the organization and the nature and complexity of its activities, taking into account the Hazards and the associated Risks that are inherent in these activities; and

b. Be established under the direct accountability of a single manager according to Annex A of this RA.

16. The DMS **should** be such as to enable the organization:

a. To ensure that the design of the Products, Parts and Appliances, Airborne Equipment and ALWs or the design change or Repair solution thereof, comply

Acceptable Means of Compliance 5850(3)

with the applicable Airworthiness requirements or contracted specifications and establish the extent of compliance with the requirements by Inspection, Demonstration, Analysis and Test.

b. To ensure that its responsibilities are properly discharged iaw the RA 5000 series as required by the organization's contract with MOD, and in particular:

(1) The appropriate provisions of RA 5800 series.

(2) The Terms of Approval issued under RA 5850(2).

(3) CofD[3].

(4) Defence Air Safety Management[10].

(5) Configuration Management of design[11].

c. To independently monitor the compliance with, and adequacy of, the documented procedures of the system. This monitoring **should** include a feed-back system to a person or a group of persons having the responsibility to ensure corrective actions are resolved.

17. The DO **should** hold regular design reviews to validate the design proposals, completion of which **should** be checked as part of the DMS.

18. The DMS **should** include an independent verification function to validate that the compliance evidence meets Certification requirements, on the basis of which the organization submits a CofD and associated documentation to the TAA or Commodity CE.

19. The DMS **should** ensure that complete Instructions for Sustaining Type Airworthiness (ISTA)[12] and operating instructions (as required), are provided to the TAA or Commodity CE for the Air System, Product, Part, Appliance, Airborne Equipment and ALWs. The DMS **should** ensure that support and updated ISTA and operating instructions are provided, as required, throughout the life cycle of the Air System.

20. The DO **should** specify and document the manner in which the DMS accounts for the acceptability of the Products, Parts or Appliances, Airborne Equipment and ALWs designed and / or the tasks performed by partners or subcontractors.

Guidance Material 5850(3)

Design Management System (MRP Part 21.A.239)

21. The system monitoring function may be undertaken by the existing Quality Assurance organization when the DO is part of a larger organization. For an explanation of the terms used within a DMS refer to Annex A.

22. The independent verification function is undertaken by Compliance Verification Engineers (CVE), as detailed within Annex A; this is a DO focussed role to ensure compliance with the applicable Certification requirements. This is not to be confused with the role of the Independent Technical Evaluator (ITE), who is appointed by the ►TAA or Commodity CE◄, independent of the DO and will provide independent analysis of the DO evidence.

23. However, when the approved DO is introducing a Minor Change[4] to the Air System under privilege[13] the role of the ITE may, in agreement with the TAA, be satisfied by the independent assessment conducted by the CVE.

[10] Refer to RA 1200 – Air Safety Management.
[11] Refer to RA 5301 – Air System Configuration Management.
[12] Refer to RA 5815 – Instructions for Sustaining Type Airworthiness.
[13] Refer to RA 5850(11): Privileges (MRP Part 21.A.263).

Regulation 5850(4)

Design Organization Exposition

5850(4) As part of the DMS the DO **shall** furnish a DOE to the MAA describing, directly or by cross-reference, the organization, the relevant procedures and the Products, Parts, Appliances, Airborne Equipment and ALWs to be designed, changed or Repaired.

Acceptable Means of Compliance 5850(4)

Design Organization Exposition

24. The DOE **should** be produced and include the content detailed in Annex B. The DOE **should** be concise with sufficient information that is relevant to the Terms of Approval sought by the DO. If the DOE is completely or partially integrated into the company organization manual, identification of the information required by RA 5850(4) **should** be provided by giving appropriate cross references and these documents made available to the MAA.

25. Where any Products, Parts, Appliances, Airborne Equipment or ALWs or any changes to these are designed by partner organizations or subcontractors, the DOE **should** articulate how the DO is able to give, for all Products, Parts, Appliances, Airborne Equipment and ALWs, the Assurance of compliance required by RA 5850(3) above. The statement **should** contain, directly or by cross-reference, descriptions and information on the design activities and organization of those partners or subcontractors, as necessary to establish this statement.

26. To maintain DAOS Approval, the DOE **should** remain an accurate reflection of the organization with ►significant[14]◄ amendment submitted to the MAA for Approval. Amendment submission **should not** be taken to confer that Approval for the DAOS change is in place.

27. To demonstrate compliance with RA 5850(4), a DO with a European Union Aviation Safety Agency (EASA) or a UK Part 21 Subpart J Approval can use this in support of obtaining a DAOS Approval. In these instances, the DO **should** submit the handbook used in their civil Approval providing it covers the required Terms of Approval. In addition, the DO **should** provide the MAA with a supplementary Exposition that identifies the additional measures that have been put in place over and above those set down in its extant civil handbook and associated procedures, to account for the differences in complying with the MAA Regulatory Publications (MRP). For a DO with other civil approvals, a justification **should** be submitted identifying why this is considered appropriate, and advice and agreement **should** be sought from the DAOS branch prior to submission of an application. This **should** demonstrate that the supplemental exposition route is appropriate for the associated Products, Parts, Appliances, Airborne Equipment or ALW.

28. To obtain and maintain Approval of a TAM, a DO **should** submit a Type Airworthiness Management Supplement using the template hosted on the MAA Website.

Organization.

29. The DOE **should** show that:

a. The Head of the DO (HDO) for which an application for Approval has been made, has the direct or functional responsibility for all departments of the organization which are responsible for the design of the Products, Parts and Appliances, Airborne Equipment and ALWs. If the departments responsible for design are functionally linked, the HDO still carries the ultimate responsibility for compliance of the organization with this RA.

b. The HDO has the direct or functional responsibility for all departments of the organization which are involved in the design of changes to design or Repairs to Products, Parts, Appliances, Airborne Equipment and ALWs.

c. An Office of Airworthiness, or equivalent function, has been established and staffed on a permanent basis to act as the focal point for co-ordinating

[14] ►Refer to paragraph 47.◄

Acceptable Means of Compliance 5850(4)

Airworthiness matters; it reports directly to the HDO or is integrated into an independent Quality Assurance organization reporting to the HDO.

d. Person(s) have been nominated to liaise with the Authority and to co-ordinate Airworthiness matters. Their position in the organization **should** allow direct reporting to the manager responsible for design.

e. Responsibilities for all tasks related to the design and Approval of changes to design or Repairs to Products, Parts, Appliances, Airborne Equipment and ALWs are assigned to ensure that all areas are covered.

f. Responsibilities for all tasks related to Design Investigations are assigned in such a way that gaps in authority are excluded.

g. The process for tailoring of the design system is dependant on complexity of design activities.

h. Co-ordination between technical departments and the Head of Independent System Monitoring (HISM) has been established:

(1) To ensure quick and efficient reporting and resolution of difficulties encountered using the DO handbook and associated procedures.

(2) To maintain the DMS.

(3) To optimize auditing activities.

Guidance Material 5850(4)

Design Organization Exposition

30. A template Design Organization Exposition and Type Airworthiness Management Supplement are provided on the MAA website.

Regulation 5850(5)

Approval Requirements (MRP Part 21.A.245)

5850(5) The DO **shall** demonstrate that:

a. Staff in all technical departments are of sufficient numbers and experience and have been given appropriate authority to discharge their allocated responsibilities.

b. There is full and efficient coordination between departments and within departments in respect of Airworthiness.

Acceptable Means of Compliance 5850(5)

Approval Requirements (MRP Part 21.A.245)

General

31. The DO **should** ensure that the accommodation, facilities and equipment are adequate to enable the staff to satisfy the Airworthiness requirements or contracted specifications for the Product, Part, Appliance, Airborne Equipment and ALWs.

32. The data submitted iaw RA 5850(4) **should** show that sufficient skilled personnel are available and suitable technical and organizational provisions have been made for carrying out the Design Investigation[15] defined under RA 5850(3).

Personnel

33. The DO **should** show that the personnel available to comply with this RA are, due to their special qualifications and number, able to provide Assurance of the design, design change or Repair of Products, Parts, Appliances, Airborne Equipment and ALWs, as well as the compilation and verification of all data needed to meet the applicable Certification Specifications.

34. Evidence of their qualifications and experience **should** be documented for the persons who accept the duties defined by the following roles:

[15] The term 'Design Investigation' means the tasks of the organization in support of the Military Type Certificate (MTC) or other Design approval processes necessary to show and verify and to maintain compliance with the applicable Certification Specifications.

Acceptable Means of Compliance 5850(5)

a. Chief Executive. A statement of the qualification and experience of the Chief Executive is normally not required unless they are also filling one of the other specified roles (paragraphs 34b-e).

b. HDO. ►The position of HDO, due to the nature of the role in the DO, can also hold additional roles such as the TAM where clear independence, sufficient capacity and clear separation of the responsibilities can be demonstrated.◄

c. Head of Airworthiness (HoA).

d. HISM. The position of the HISM, due to the nature of the role in independent system monitoring, **should not** be permitted to hold additional roles such as ►TAM,◄ HDO, HoA or CofD signatory.

e. CVE.

f. TAM.

35. The credentials of the, HDO, HoA, HISM and TAM **should** be provided to MAA using MAA DAOS Form 4.

36. Anyone who has authority to sign the CofD, or MPTF (Development) within the DO **should** also provide the MAA with a MAA DAOS Form 4.

37. For the CVE, no individual statement is needed. CVEs **should** be selected by the DO based on their knowledge, background and experience as defined in the DOE. When necessary, complementary training **should** be established to ensure that CVEs have sufficient background and knowledge in the scope of their authorization.

38. The DO **should** maintain a record of the CVE personnel, which includes details of the scopes of their authorizations. The CVE personnel **should** be given reasonable access on request to their own records. As part of its investigations, MAA **should** have the right to access the data held in such a system.

39. Where a TAM holds other roles in the DO, independence **should** be demonstrated.

40. The DO **should** maintain a record of anyone who has authority to sign the Flight Clearance Note for Non-Production Standard Propulsion Systems in support of a MPTF (Development)[16]. As part of its investigations, the MAA **should** be given access to the data held in such a system.

Technical

41. The Chief Executive **should** provide the necessary resources for the proper functioning of the DO.

42. The DO **should** have access to:

a. Workshops and production facilities which are suitable for manufacturing prototype models and test specimens.

b. Accommodation and test facilities which are suitable for carrying out tests and measurements needed to demonstrate compliance with the applicable Certification Specifications.

Guidance Material 5850(5)

Approval Requirements (MRP Part 21.A.245)

Technical

43. The test Facilities may be subjected to additional technical conditions related to the nature of the tests performed.

44. Staff will be suitably qualified and with commensurate levels of experience appropriate for the role they have been assigned.

45. For smaller DOs, certain roles within the DO may be combined. Combinations of responsibilities are acceptable where:

[16] Refer to RA 5880 – Military Permit to Fly (Development) (MRP Part 21 Subpart P).

Guidance Material 5850(5)

a. The role of the HDO may be fulfilled by the Chief Executive of the legal entity;

b. The HDO and the HoA are the same person, provided that the person has the competence to fulfil both functions;

c. The role of the HISM is an external person for all or part of the role;

d. A part-time HoA, provided that the person is directly involved in the DO, and not by an agreement between two DOs, and provided that the availability of the person ensures that response times will be adequate.

Regulation 5850(6)

Changes in Design Management System (MRP Part 21.A.247)

5850(6) After the issue of a DO Approval, each change to the DMS that is significant to the showing of compliance or to the Airworthiness of the Product, Part, Appliance, Airborne Equipment and ALWs **shall** require Approval by the MAA.

Acceptable Means of Compliance 5850(6)

Changes in Design Management System (MRP Part 21.A.247)

46. An application for Approval of a change to the DO **should** be made using MAA DAOS Form 82 and submitted to the MAA. Before implementation of the change the DO **should** demonstrate to the MAA, on the basis of submission of proposed changes to the DOE, that it will continue to comply with this RA after implementation.

Guidance Material 5850(6)

Changes in Design Management System (MRP Part 21.A.247)

Significant changes in the DMS

47. In addition to a change in ownership, the following changes to the DMS will be considered as 'significant' to the showing of compliance or to the Airworthiness of the Products, Parts, Appliances, Airborne Equipment and ALWs:

a. **Organization**

(1) Change in the industrial organization (partnership, suppliers, design work-sharing) unless it can be shown that the independent checking function of the showing of compliance is not affected.

(2) Change in the parts of the organization that contribute directly to the Airworthiness (independent checking function, Office of Airworthiness (or equivalent)).

(3) Change to the independent monitoring principles.

b. **Responsibilities**. Change of the management staff assessed for Airworthiness competence:

(1) HDO;

(2) HoA;

(3) HISM;

(4) Change of CofD or MPTF signatory;

(5) Or, new distribution of responsibilities affecting Airworthiness.

c. **Procedures**. ►Change to the principles of procedures related to:◄

(1) ►The design Certification.◄

(a) ►◄

(b) ►◄

(c) ►◄

(d) ►◄

(e) ►◄

(f) ►◄

(g) ►◄

Guidance Material 5850(6)

(h) ►◄

(i) ►◄

(j) ►◄

(2) ►The classification of changes and Repairs as Major or Minor[4].

(3) The management of Major Changes and major Repairs.

(4) The Approval of the design of Minor Changes and minor Repairs[13].

(5) The issue of information and instructions.

(6) Documentary changes to the Aircraft Flight Manual.

(7) Type Airworthiness.

(8) The configuration control, when Airworthiness is affected.

(9) The acceptance of design tasks undertaken by partners or subcontractors iaw RA 5850(4).

(10) MPTF (Development).◄

d. **Resources**. ►Substantial change in the number and / or experience of staff.◄

(1) ►◄

Regulation 5850(7)

Investigations and Inspections (MRP Part 21.A.257)

5850(7) The DO **shall** make arrangements that allow the MAA to make any investigations, inspections, including investigations of partners and subcontractors, or review any report necessary to determine compliance with this RA.

Acceptable Means of Compliance 5850(7)

Investigations and Inspections (MRP Part 21.A.257)

48. Arrangements **should** be made to allow the MAA to make investigations of the DO including partners, subcontractors and suppliers. This includes assisting and co-operating with the MAA in performing inspections and Audits conducted during initial assessment and subsequent Assurance.

Guidance Material 5850(7)

Investigations and Inspections (MRP Part 21.A.257)

49. Assistance to the MAA includes all appropriate means associated with the facilities of the DO to allow the MAA to perform these inspections and Audits, such as a meeting room and office support.

Regulation 5850(8)

Failures, Malfunctions and Defects

5850(8) The DO **shall** ensure that a robust process is in place for collecting, investigating and analyzing reports of and information related to failures, malfunctions and defects, as identified by themselves, their partners or subcontractors.

Acceptable Means of Compliance 5850(8)

Failures, Malfunctions and Defects

Failures, Malfunctions and Defect Reporting

50. The DO **should** make appropriate arrangements to report to the TAA or Commodity CE any failure, malfunction, defect or other occurrence related to an Air System, Product, Part or Appliance, Airborne Equipment and ALW and which has resulted in or may result in an unsafe condition.

51. The DO **should** ensure they have a system in place for the management and tracking of failure, malfunction and defect reporting for their Air System, Product, Part or Appliance, Airborne Equipment and ALW that is agreed with the TAA or Commodity CE.

Acceptable Means of Compliance 5850(8)

52. The DO **should** notify the TAA or Commodity CE of any potential need for a restriction on flying limitations (or Special Flying Instruction) arising from any reported failure, malfunction or defect.

53. The DO **should** raise and distribute a Narrative Fault Report when:

a. A failure, malfunction or defect occurs which could affect the Safety of personnel, or materiel, or operational effectiveness, or availability of materiel, and which is not of sufficient urgency to require an urgent report being sent but is nevertheless sufficiently important to justify a detailed investigation.

b. When required by a Service Inquiry or as directed by the TAA or Commodity CE.

Failures, Malfunctions and Defect Investigation and Closure

54. The DO **should** ensure they have a system in place for the investigation of failures, malfunctions and defects for their Air System, Product, Part or Appliance, Airborne Equipment and ALW, that is agreed with the TAA or Commodity CE.

55. In the case of a failure, malfunction or defect arising from a design or production deficiency, the relevant DO or Production Organization, as appropriate, **should** investigate the cause and report the results to the TAA or Commodity CE.

56. When failures, malfunctions and defects are reported on materiel which has been procured as both Contractor Furnished Equipment and Government Furnished Equipment, a common investigation and reporting procedure **should** be used.

57. On receipt of a request for an investigation, the DO **should** call forward all faulty materiel required for investigation.

58. The DO **should** ensure they have a system in place for the rectification and closure of reported failures, malfunctions and defects, that is agreed with the TAA or Commodity CE.

Quarantine

59. The DO **should** ensure that when they are in possession or control of materiel that is reported as faulty, it is quarantined and protected to prevent deterioration or disturbance which may hamper investigation and is disposed of in a controlled manner.

Guidance Material 5850(8)

Failures, Malfunctions and Defects

60. A Narrative Fault Report may be made on a MOD Form 760 Narrative Fault Report or equivalent.

61. Failure, malfunction and defect investigation priorities may be determined by the TAA or Commodity CE.

62. The DO will agree with the MOD individual authorizing the request the format and distribution of investigation reports resulting from data analysis requests.

Regulation 5850(9)

Findings (MRP Part 21.A.258)

5850(9) After receipt of notification of findings, the DO **shall** demonstrate corrective action appropriate to the level of the finding.

Acceptable Means of Compliance 5850(9)

Findings (MRP Part 21.A.258)

63. After receipt of notification of findings under the administrative procedures established by the MAA, the DO **should** demonstrate corrective action to the satisfaction of the MAA within the agreed period[17].

64. In the case of a significant finding resulting in the suspension or revocation of their DO Approval[18], the DO **should** provide confirmation of receipt of this notice in a timely manner.

[17] Refer to MAA03: MAA Regulatory Processes, Annex H – MAA Assurance.
[18] Refer to MAA01: MAA Regulatory Principles.

Guidance Material 5850(9)

Findings (MRP Part 21.A.258)

65. In case of a significant finding, the DO may be subject to a partial or full suspension or revocation of its Approval.

66. Details of Findings levels and Observations can be found in MAA03[17].

67. The MAA will inform the relevant TAA(s) or Commodity CE and sponsor of any findings and Corrective Action Requirements (CAR).

Regulation 5850(10)

Validity of Approval (MRP Part 21.A.259)

5850(10) A DAOS Approval **shall** be issued for an unlimited duration and remain valid subject to:

a. The DO remaining in compliance with applicable RAs;

b. The MAA or its nominated representative being granted access to the organization to determine continued compliance with applicable RAs; and

c. The Approval Certificate not being surrendered, suspended or revoked.

Acceptable Means of Compliance 5850(10)

Validity of Approval (MRP Part 21.A.259)

68. The DO **should** confirm in writing prior to any formal MAA assessment or not later than every 3 years from the last notification that the contents of their Approval Certificate and DOE remain valid. Failure to provide the required confirmation can result in the suspension of the Approval.

Guidance Material 5850(10)

Validity of Approval (MRP Part 21.A.259)

69. Nil.

Regulation 5850(11)

Privileges (MRP Part 21.A.263)

5850(11) A DO **shall** operate privileges only when they have been invoked by the appropriate TAA or Commodity CE.

Acceptable Means of Compliance 5850(11)

Privileges (MRP Part 21.A.263)

Invoking specific privileges

70. The DO **should** only operate privileges when they have had their competence assessed by the MAA, their Terms of Approval contain the relevant provision, and the privileges are invoked in writing by the TAA or Commodity CE.

71. Once invoked, the DO **should** be entitled, within its Terms of Approval and under the relevant procedures of the DMS, to operate the privilege to:

a. Classify changes to design[19] and Repairs[20] as Minor or Major.

b. Approve Minor Changes[21] and minor Repairs[22].

c. Issue information and instructions, containing the following statement: "The technical content of this documentation is approved under the authority of MAA DAOS ref. [UK.MAA.DAOS.xxxx]," where 'xxxx' represents the reference number. NB: This privilege **should not** be used for instructions relating to an unsafe condition[23], including ADs[6] and SI(T)s[7].

[19] Refer to RA 5820(1): Classification of Changes in Type Design (MRP Part 21.A.91).
[20] Refer to RA 5865(3): Classification of Repairs (MRP Part 21.A.435).
[21] Refer to RA 5820(3): Approval of Minor Changes (MRP Part 21.A.95).
[22] Refer to RA 5865(5): Issue of a Repair Design Approval (MRP Part 21.A.435).
[23] Refer to RA 5825 – Fault Reporting and Investigation.

Acceptable Means of Compliance 5850(11)

d. To approve the flight conditions under which a MPTF (Development) can be issued[16], except for initial flights of:

(1) A new type of Air System; or

(2) An Air System modified by a Major Change; or

(3) An Air System whose flight and / or piloting characteristics have been modified; or

(4) An Air System dedicated to expanding the agreed flight envelope, as defined within an extant Release To Service[24] (RTS).

e. Issue a MPTF (Development)[16] for an Air System it has designed or modified, or for which it has approved the conditions under which the MPTF (Development) can be issued and when the DO itself is controlling the configuration of the Air System under its scope of DO Approval, noting that the Prilvileged DO cannot issue the intial MPTF (Development).

72. The DO **should** develop its own internal procedures for the relevant privileges identified in paragraph 71, based on the requirements of Annex C.

73. The DO **should** assure the TAA or Commodity CE that any changes approved under the provision of any privilege that has been invoked are accurately classified.

74. The DO **should** assure the TAA or Commodity CE that there is a robust mechanism for managing the configuration control of the Air System or equipment for any changes approved under the provisions of any privilege that has been invoked.

75. The DO **should** provide the TAA or Commodity CE or their authorized representative a declaration that the change or Repair has been approved.

76. The TAA or Commodity CE or their authorized representative **should** acknowledge receipt of declaration of Approval.

77. The TAA or Commodity CE **should** make appropriate arrangements for Configuration Management in conjunction with the DO, to ensure that the application of design changes, including any SI(T) or SB to the same Air System or equipment, is managed effectively and is transparent to the Operating Duty Holder.

78. The privileges invoked **should** remain valid until such time as they are surrendered, suspended or revoked. In the situation where the individual invoking the privileges departs their post, the privileges invoked **should** remain valid for a maximum period of 3 months until such time as the new incumbent can re-assess the award of privileges. The privileges **should** be automatically revoked if not re-awarded within the 3 month period.

Guidance Material 5850(11)

Privileges (MRP Part 21.A.263)

Invoking Specific Privileges

79. Whilst the TAA or Commodity CE has the ability to revoke privileges, the MAA holds the ultimate sanction of limiting the scope of an organization's Approval if it is deemed the DT, ►DO◄ or organization is not fully compliant with the MRP.

80. The information and instructions, including the necessary data, are issued by the DO to the TAA or Commodity CE to implement a change, a Repair, or an inspection. Some are also issued to provide Maintenance organizations with all necessary Maintenance data for the performance of Maintenance, including implementation of a change, a Repair, or an inspection.

81. The preparation of this data involves design, production and inspection. As the overall responsibility, through the privilege, is allocated to the DO, these aspects will be properly handled by the DO to obtain the privilege "to issue information and instructions containing a statement that the technical content is approved", and a procedure will exist.

82. In derogation to para 71 sub-paras a to d, for a military Air System derived from a civil type certified Air System, the holder of a MAA DAOS Approval may be entitled

[24] Refer to RA 1300 – Release To Service.

Guidance Material 5850(11)

to declare to the TAA the applicability, through validation of no impact to the military Certification basis and the intended use, of the following when it is has already been approved by an MAA agreed civil aviation authority or a DO[25] utilizing its civil-Approval privilege:

a. A Minor design change; or

b. An ISTA; or

c. Revisions to the flight manual.

Regulation 5850(12)

Designs using Government Furnished Equipment

5850(12) The DO **shall** obtain the authority of the MOD before altering the design of any Government Furnished Equipment (GFE).

Acceptable Means of Compliance 5850(12)

Designs using Government Furnished Equipment

83. If the DO has any doubt about the design suitability of any item, or has proposals for design changes, they **should** advise the MOD at the earliest opportunity.

Guidance Material 5850(12)

Designs using Government Furnished Equipment

84. The installation, functional and environmental interface definitions documentation may be formally referred to as the Interface Control Documentation (ICD).

85. Where GFE is provided without the appropriate supporting Design Records (eg CofD, ICD), the DO will communicate the omission to the relevant TAA or Commodity CE for their decision to proceed with the design change.

Regulation 5850(13)

Record Keeping

5850(13) All relevant design information, drawings, test reports, including inspection records and Type Airworthiness Management information **shall** be held by the appropriate DO, and available if required.

Acceptable Means of Compliance 5850(13)

Record Keeping

86. Such documentation **should** be held in order to provide the information necessary to ensure the Type Airworthiness of an Air System and be retained[26].

Guidance Material 5850(13)

Record Keeping

87. International or collaborative programmes will be required to co-ordinate custodianship of appropriate documentation.

[25] Where an Alternative Acceptable Means of Compliance has been approved by the MAA for use of the civil approval under RA 1005 – Contracting with Competent Organizations or RA 1014 – Design Organizations and Co-ordinating Design Organizations - Airworthiness Responsibilities.

[26] Refer to RA 1225 – Air Safety Documentation Audit Trail.

Annex A

Design Management System (DMS)

Definitions

1. The system monitoring function may be undertaken by the existing Quality Assurance organization when the DO is part of a larger organization.

2. The DMS is the organizational structure, responsibilities, procedures and resources to ensure the proper functioning of the DO.

3. The DMS includes a Safety Management System and a design Assurance system with clear lines of responsibility and accountability throughout the organization. Design Assurance means all those planned and systematic actions necessary to provide adequate confidence that the organization has the capability:

   a. To design Products, Parts or Appliances iaw the applicable Certification Specifications.

   b. To show and verify the compliance with the applicable Certification Specifications, or Product, Part, Appliance, Airborne Equipment and ALW specifications.

   c. To demonstrate to the MAA this compliance for the purposes of DAOS Approval and to the TAA when required.

Design Management System

4. The complete process starts with the Certification Specifications and Product, Part and Appliance specifications that culminates in Type Certification. It establishes the relationship between the design, the Design Investigation and design Assurance processes.

5. Effective design Assurance demands a continuing evaluation of factors that affect the adequacy of the design for intended applications, in particular that the Product, Part or Appliance, complies with applicable Certification Specifications and will continue to comply after any change. Such changes include amendment to place of manufacture, manufacturing methods or material sources[27].

6. Two main aspects **should** therefore be considered:

   a. How the planned and systematic actions are defined and implemented, from the very beginning of design activities up to Type Airworthiness activities;

   b. How these actions are regularly evaluated and corrective actions implemented as necessary.

Design Management System - Independent checking function of the showing of compliance

7. The independent checking function of the showing of compliance **should** consist of the verification by a person not creating the compliance data. Such person may work in conjunction with the individuals who prepare compliance data.

8. The verification **should** be shown by signing compliance documents, including test programmes and data.

9. There is normally only one CVE nominated for each Certification Specification, or Product, Part and Appliance specifications for a given design activity.

10. A procedure **should** cover the non-availability of nominated persons and their replacement when necessary.

Planned and Systematic Actions

11. For the DO carrying out Design Investigation of Products, Parts, Appliances, Airborne Equipment and ALW, the subsequent tasks and procedures will be defined and put in place to cover the planned and systematic actions.

General

12. To issue or, where applicable, supplement or amend the DOE iaw RA 5850(6), in particular to indicate the initiation of design activities on a Product, Part, Appliance, Airborne Equipment and ALW.

13. To assure that all instructions of the DOE are adhered to.

14. To nominate staff as CVEs responsible to approve compliance documents.

[27] A change in place or method of manufacture or a change of explosive material or source of explosive material will require Independent Ordnance, Munitions and Explosives Safety Advisor advice; refer to DSA 02.OME(2) – Appointment of an Independent OME Safety Advisor.

15. To nominate personnel belonging to the Office of Airworthiness with appropriate responsibilities.

16. To ensure full and complete liaison between the DO and related organizations having responsibility for Products, Parts and Appliances manufactured to the specification.

17. To provide the Assurance to the TAA or Commodity CE that prototype models and test specimens adequately conform to the design.

Chief Executive and HDO (or their Deputy)

18. The Chief Executive will provide the necessary resources for the proper functioning of the DO.

19. The HDO, or an authorized representative, **should** sign a CofD[3] stating compliance with the applicable Certification Specifications, or Product, Part, Appliance, Airborne Equipment and ALW specifications, after verification of satisfactory completion of the Design Investigation. Iaw RA 5810[28] and RA 5820[4], their signature on the CofD confirms that the procedures as specified in the DOE have been followed.

20. The functions of Chief Executive and HDO may be performed by the same person.

Compliance Verification

21. Approval by signing of all compliance documents, including test programmes and data, necessary for the verification of compliance with the applicable Certification Specifications as defined in the Certification Programme.

22. Internal Approval of the technical content (eg completeness, technical accuracy), including any subsequent revisions, of the manuals for the subsequent release by the TAA or Commodity CE.

Office of Airworthiness

23. Liaison between the DO and the TAA or Commodity CE with respect to all aspects of the Certification programme.

24. Ensuring that a DOE is prepared and updated as required in RA 5850(4).

25. Co-operation with the MAA in developing procedures to be used for the design Certification process.

26. Issuing of guidelines for documenting compliance.

27. Co-operation in issuing guidelines to ensure compliance with the Regulations for the preparation of the manuals, SB, SI(T), design changes, drawings, specifications and standards.

28. Ensuring distribution of applicable Certification Specification and other specifications.

29. Co-operating with the TAA or Commodity CE in proposing the Type Certification Basis.

30. Interpretation of Certification Specification and requesting decisions of the TAA or Commodity CE.

31. Advising of all departments of the DO in all questions regarding Airworthiness Approvals and Certification.

32. Preparation of the Certification programme and co-ordination of all tasks related to Design Investigation in concurrence with the TAA or Commodity CE.

33. Regular reporting to the TAA or Commodity CE about Design Investigation progress and announcement of scheduled tests in due time.

34. Ensuring co-operation in preparing inspection and test programmes needed for demonstration of compliance.

35. Establishing and maintaining the compliance checklist to provide evidence underpinning the Compliance Statement.

36. Checking that all compliance documents are prepared as necessary to show compliance with all Certification Specifications, as well as for completeness, and signing for release of the documents.

37. Checking the required design definition documents described in RA 5810 and ensuring that they are provided to the TAA or Commodity CE for Approval when required.

38. Preparation, if necessary, of a draft for a Type Certificate Data Sheet and / or Type Certificate Data Sheet Modification.

[28] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B).

39. Providing verification to the HDO that all activities required for Design Investigation have been properly completed.

40. Approving the classification of changes[4] and granting the Approval for Minor Changes when appropriately privileged to do so.

41. Monitoring of significant events on other aeronautical Products, Parts, Appliances, Airborne Equipment and ALW as far as relevant to determine their effect on Airworthiness of Products, Parts, Appliances, Airborne Equipment and ALW being designed by the DO.

42. Ensuring co-operation in preparing SB, SI(T) and the Structural Repair Manual and subsequent revisions, with special attention being given to the manner in which the contents affect Certification Specifications for subsequent Approval by the TAA or Commodity CE.

43. Ensuring the initiation of activities as a response to failure (Air Safety Occurrences) evaluation and complaints from the operation and providing of information to the TAA or Commodity CE in case of Airworthiness impairment.

44. Advising the TAA or Commodity CE with regard to the issue of SI(T).

45. Ensuring that the manuals to be approved by the TAA or Commodity CE, including any subsequent revisions are checked to determine that they meet the respective requirements and that they are provided to the TAA or Commodity CE for Approval.

Maintenance and Operating Instructions

46. Ensuring the preparation and updating of all Maintenance and operating instructions needed to maintain Airworthiness iaw relevant Certification Specifications. For that purpose, the DO will:

a. Establish the list of all documents it is producing; and

b. Define procedures and organization to produce and issue these documents to the TAA or Commodity CE.

Continued Effectiveness of the Design Management System

47. The organization **should** establish the means by which the continuing evaluation (system monitoring) of the DMS will be performed in order to ensure that it remains effective.

Annex B

Design Organization Exposition Requirements

Part 1 - Organization

1. Document title and Organizations document reference number.
2. Organization name, address, telephone, telex, facsimile numbers, e-mail address.
3. Index.
4. List of effective pages with revision / date / amendment identification for each page.
5. Distribution list.
6. Objective of DOE and binding statement.

    a. The DOE **should** be signed by the Chief Executive and the HDO and declared as a binding instruction for all personnel charged with the development and Design Investigation of Products, Parts, Appliances, Airborne Equipment and ALW.

7. Responsible person(s) for administration of the DO handbook.
8. Amendments.

    a. Amendment record sheet.

    b. A system **should** be clearly laid down for carrying out amendments to the DOE, including how amendments are identified within the document.

9. Presentation of DO (including locations).

    a. An introduction, or foreword, explaining the purpose of the document for the guidance of the organization's own personnel. Brief general information concerning the history and development of the organization and, if appropriate, relationships with other organizations which can form part of a group or consortium, **should** be included to provide background information for the MAA.

10. Scope of work (with identification of type and models of Products, Parts, Appliances, Airborne Equipment and ALW) according to the following classification:

    a. General areas, eg type of Air Systems, Product, Part, Appliance, Airborne Equipment and ALW.

    b. Technologies handled by the organization (composite, wood or metallic construction, electronic systems, software, etc).

    c. A list of types and models for which the design Approval has been granted and for which privileges can be exercised, supported by a brief description for each Products, Parts, Appliances, Airborne Equipment and ALW.

    d. For Repair design, classification and (if appropriate) Approval activities it is necessary to specify the scope of activity in terms of Products, Parts, Appliances, Airborne Equipment and ALW.

11. Organization structure.

    a. A description of the organization, its departments, their functions and the names of those in charge: a description of the line management.

    b. A description of functional relationships between departments, including assigned responsibilities and delegated authority of all parts of the organization which, taken together, constitute the organization's DMS.

    c. A general description of the way in which the organization performs its functions in relation to the Airworthiness and continued operational suitability of the product it designs, including co-operation with the Production Organization when dealing with any Airworthiness actions that are related to production of the Product, Part, Appliance, Airborne Equipment and ALW as deemed applicable by the TAA or Comodity CE.

    d. A chart indicating the functional and hierarchical relationship of the DMS to Management and to other parts of the organization within the DMS and the control of the work of all partners and sub-contractors.

12. Human resources.

a. A description of the human resources, facilities and equipment, which constitutes the means for design and where appropriate, for ground and flight testing.

b. An outline of the system for controlling and informing the Staff of the organization of current changes in engineering drawings, specifications and design Assurance procedures.

13. Management staff.

a. A description of assigned responsibilities and delegated authority of all parts of the organization which, taken together constitute the organization's DMS; also, the chains of responsibilities within the DMS, and the control of the work of all partners and subcontractors.

14. Record Keeping.

a. A description of the recording system for:

(1) The design, including relevant design information, drawings and test reports, including inspection records of test specimens.

(2) The means of compliance.

(3) The compliance documentation (compliance check list, reports).

15. Certifying personnel.

a. The names of the DO authorized signatories. Nominated persons with specific responsibilities **should** be listed.

b. A clear definition of the tasks, competence and areas of responsibility of the Office of Airworthiness.

c. A statement of Suitably Qualified and Experienced Person(s) (SQEP) responsible for making decisions affecting Airworthiness in the organization.

16. Independent system monitoring.

a. A description of the means by which the continuing evaluation (system monitoring) of the DMS will be performed in order to ensure that it remains effective.

17. Evidence of a QMS Certification (as defined by the Defence Authority for Technical and Quality Assurance Mandatory Requirement for Appropriate Certification) to AS/EN 9100, or to ISO 9001 providing the scope of Certification covers the proposed DO Terms of Approval.

18. A description of the means by which the organization monitors and responds to problems affecting the Airworthiness or operational suitability of its product during design, production and In-Service.

19. A description of the procedures for the establishment and the control of the Maintenance and operating instructions as instructed by the TAA.

Part 2 - Procedures

20. A general description of the way in which the organization performs all the design functions in relation to Airworthiness, operational Approvals including:

a. The procedures followed and forms used in the design investigation process to ensure that the design of, or the change to the design of, the product as applicable is identified and documented and complies with the applicable Certification Specifications, including contracted requirements.

b. The procedures for classifying design changes as 'Major' or 'Minor' and for the Approval of Minor changes, if appropriately privileged to do so.

c. The procedures for classifying and approving unintentional deviations from the approved design data occurring in production (concessions or non-conformances), if appropriate to do so[29].

d. The procedures for re-establishing a Type Design definition for Parts and Appliances of orphaned Products or for obsolete Parts and Appliances, for which the original design drawings or data no longer exist.

e. The procedure for classifying and obtaining Approval for Repairs, if appropriately privileged to do so.

[29] Refer to Def Stan 05-061 Part 1 – Quality Assurance Procedural Requirements – Concessions.

f. The procedures for the establishment and the control of the Maintenance and operating instructions

g. The procedures for the establishment and the control of the MPTF (Development).

h. The procedures and controls related to the utilization of Artificial Intelligence within the design and development process. The DOE **should** make clear where and how this is utilized in relation to the DOs Approval scope.

21. In addition, the organization controls and records the design documentation and means of compliance for:

a. The basic Product, Part, Appliance, Airborne Equipment and ALW.

b. Design changes to the Product, Part, Appliance, Airborne Equipment and ALW.

c. The design schemes for Product, Part, Appliance, Airborne Equipment and ALW Repairs.

d. The reporting and response to Product, Part, Appliance, Airborne Equipment and ALW failures / malfunctions and defects.

22. The organization **should** identify (by reference or explicit description) the procedures it uses to select subcontractors and manage the design of Products, Parts, Appliances, Airborne Equipment and ALW produced.

23. The organization **should** identify (by reference or explicit description) the procedures it uses to control design production, including production by subcontractors charged with the design and production of Products, Parts, Appliances, Airborne Equipment and ALW and subcontractors charged with production of the approved design. Procedures **should** include:

a. Changes in manufacturing location, method, source material.

b. Where novel production processes such as additive manufacturing are utilized.

24. Control of design subcontractors.

25. Co-ordination with production.

26. Sustained Airworthiness.

a. A description of the way in which the organization performs its functions in relation to the Sustained Airworthiness of the Product, Part, Appliance, Airborne Equipment and ALW it designs.

27. Collecting / Investigating failures, malfunctions and defects.

a. A description of the means by which the organization monitors and responds to problems affecting the Airworthiness of its Product, Part, Appliance, Airborne Equipment and ALW.

Guidance Material - Statement of Qualifications and Experience

28. Three different types of functions are named or implicitly identified, using qualified and experienced personnel:

a. The Chief Executive.

b. The other management staff:

(1) HDO.

(2) HoA.

(3) The HISM.

c. Personnel making decisions affecting Airworthiness:

(1) CVE.

(2) Personnel of the Office of Airworthiness making decisions affecting Airworthiness, especially those linked with the privileges identified in RA 5850(11) approving the classification of changes, Repairs and granting the Approval of Minor Changes.

Chief Executive

29. The Chief Executive **should** provide the necessary resources for the proper functioning of the DO. A statement of the qualification and experience of the Chief Executive is normally not required.

Other Management Staff

30. The person or persons nominated **should** represent the management structure of the organization and be responsible through the HDO to the Chief Executive for the execution of all functions as specified in RA 5850. Depending on the size of the organization, the functions can be subdivided under individual managers.

31. The nominated managers **should** be identified and their credentials furnished to the MAA on MAA DAOS Form 4 in order that they can be seen to be appropriate in terms of relevant knowledge and satisfactory experience related to the nature of the design activities as performed by the organization.

32. The responsibilities and the tasks of each individual manager **should** be clearly defined, in order to prevent uncertainties about the relations, within the organization. Responsibilities of the managers **should** be defined in a way that all responsibilities are covered.

Personnel making decisions affecting Airworthiness

33. For personnel making decisions affecting Airworthiness, no individual statement is required. The applicant **should** show to the MAA that there is a system to select, train, maintain and identify them for all tasks where they are necessary. The following guidelines for such a system are proposed:

a. These personnel **should** be identified in the DO handbook, or in a document linked to the DO handbook. This and the corresponding procedures are there to enable them to carry out the assigned tasks and to properly discharge associated responsibilities.

b. The needs, in terms of quantity of these personnel to sustain the design activities, **should** be identified by the organization.

c. These personnel **should** be chosen based on their knowledge, background and experience.

d. When necessary, complementary training **should** be established, to ensure sufficient background and knowledge in the scope of their authorization. The minimum standards for new personnel to qualify in the functions **should** be established. The training **should** lead to a satisfactory level of knowledge of the procedures relevant for the role.

e. Training policy forms part of the DMS and its appropriateness forms part of the investigation by the MAA within the organization Approval process and subsequent surveillance of persons proposed by the organization.

f. This training **should** be adapted in response to experience gained within the organization. The organization **should** maintain a record of these personnel which includes details of the scope of their authorization. The personnel concerned **should** be provided with evidence of the scope of their authorization.

34. The following minimum information **should** be kept on record:

a. Name.

b. Experience and training.

c. Position in organization.

d. Scope of the authorization.

e. Date of first issue of the authorization.

f. If appropriate, date of expiry of the authorization.

g. Identification number of the authorization.

35. The record can be kept in any format and **should** be controlled:

a. Persons authorized to access the system **should** be kept to a minimum to ensure that records are not altered in an unauthorized manner or that such confidential records do not become accessible to unauthorized persons.

b. Personnel can be given access to their own record.

c. Under the provision of RA 5850(7) the MAA **should** have access to the data held in such a system.

d. The organization **should** keep the record for at least 2 years after a person has ceased employment with the organization or revocation of the authorization, whichever is the sooner.

Annex C

Internal Procedures for Operating Specific Privileges

Classify changes to Design and Repairs as Minor or Major (refer to RA 5850 paragraph 71.a)

Intent

1. The DO **should** develop its own internal procedure for the classification of changes to design and Repairs as Minor or Major in order to obtain the associated privilege.

Content

2. The procedure **should** address the following points:

   a. The identification of changes to design or Repairs.

   b. Classification.

   c. Justification of the classification.

   d. Authorized signatories.

   e. Supervision of changes to design or Repairs initiated by subcontractors.

3. For changes to design, criteria used for classification **should** be in compliance with RA 5820.

4. For Repairs, criteria used for classification **should** be in compliance with RA 5865[5].

Identification of changes to design or Repairs

5. The procedure **should** indicate how the following are identified:

   a. Major Changes to design or major Repairs.

   b. Those Minor Changes to design or minor Repairs where additional work is necessary to show compliance with the applicable Certification Specifications.

   c. Other Minor Changes to design or minor Repairs requiring no further showing of compliance.

Classification

6. The procedure **should** show how the effects on Airworthiness are analysed, from the very beginning, by reference to the applicable Certification requirements.

7. If no specific Certification Specifications are applicable to the change or Repairs, the above review **should** be carried out at the level of the Product, Part, Appliance or system where the change or Repair is integrated and where specific Certification Specifications are applicable.

Justification of the classification

8. All decisions of classification of changes to design or Repairs as Major or Minor **should** be recorded. These records **should** be easily accessible to the TAA for sample check.

Authorized signatories

9. All classifications of changes to design or Repairs **should** be accepted by an appropriate authorized signatory.

10. The procedure **should** indicate the authorized signatories for the various Products, Parts, Appliances, Airborne Equipment and ALW listed in the Terms of Approval.

11. For those changes or Repairs that are handled by subcontractors, it **should** be described how the DO manages its classification responsibility.

Supervision of changes to design or Repairs initiated by subcontractors

12. The procedure **should** indicate, directly or by cross-reference to written procedures, how changes to design or Repairs **should** be initiated and classified by subcontractors and are controlled and supervised by the DO.

Approve Minor Changes to design and minor Repairs (refer to RA 5850 paragraph 71.b)

Intent

13. The DO **should** develop its own internal procedure for the Approval of Minor Changes to design or minor Repairs in order to obtain the associated privilege.

Content

14. The procedure **should** address the following points:

a. Compliance documentation.

b. Approval under the DO privilege.

c. Authorized signatories.

d. Supervision of Minor Changes to design or minor Repairs handled by subcontractors.

Compliance documentation

15. For those Minor Changes to design or minor Repairs where additional work to show compliance with the applicable Certification Specifications is necessary, compliance documentation **should** be established and independently checked as required by RA 5850(3).

16. The procedure **should** describe how the compliance documentation is produced and checked.

Approval under the DO privilege

17. For those Minor Changes to design or minor Repairs where additional work to show compliance with the applicable Certification Specifications is necessary, the procedure **should** define who the change is approved by under the DO privilege.

18. This document **should** include at least:

a. Identification and brief description of the change or Repair and reasons for change or Repair.

b. Applicable Certification Specifications and methods of compliance.

c. Reference to the compliance documents.

d. Effects, if any, on limitations and on the approved documentation.

e. Evidence of the independent checking function of the showing of compliance.

f. Evidence of the Approval under the privilege of RA 5850(11) by an authorized signatory.

g. Date of the Approval.

19. For the other Minor Changes to design or minor Repairs, the procedure **should** define a means to identify the change or Repair and reasons for the change or Repair and to formalise its Approval by the appropriate engineering authority under an authorized signatory. This function can be delegated by the Office of Airworthiness but **should** be controlled by the Office of Airworthiness, either directly or through appropriate procedures of the DO Design Management System.

Authorized signatories

20. The persons authorized to sign for the Approval under privilege **should** be identified (name, signature and scope of authority) in appropriate documents that are linked to the DO handbook.

Supervision of Minor Changes to design or minor Repairs handled by subcontractors

21. For the Minor Changes to design or minor Repairs that are handled by subcontractors, the procedure **should** indicate, directly or by cross-reference to written procedures how these Minor Changes to design or minor Repairs are approved at the subcontractor level and the arrangements made for supervision by the DO.

Issue of information and instructions (refer to RA 5850 paragraph 71.c)

Intent

22. The DO **should** develop its own internal procedure for the issue of information and instructions.

Content

23. For the information and instructions issued under this privilege, the DO **should** establish a procedure addressing the following points:

a. Preparation.

b. Verification of technical consistency with corresponding approved change(s), Repair(s) or approved data, including effectivity, description, effects on Airworthiness, especially when limitations are changed.

c. Verification of the feasibility in practical applications.

d. Authorized signatories.

24. The procedure **should** include the information and instructions prepared by subcontractors or vendors and declared applicable to its Products, Parts, Appliances, Airborne Equipment and ALW by the DO.

Statement

25. The statement provided in the information and instructions **should** also cover the information and instructions prepared by subcontractors or vendors and declared applicable to its Products, Parts and Appliances by the DO.

26. The technical content **should** be related to the Design Records and accomplishment instructions and its Approval **should** mean that:

a. The Design Records has been appropriately approved.

b. The instructions provide for practical and well defined installation / inspection methods and, when accomplished, the Products, Parts, Appliances, Airborne Equipment and ALW are in conformity with the approved Design Records.

27. Where appropriate, this technical data **should** be clearly identified within the CofD for the TAA or Commodity CE.

28. Information and instructions related to required actions issued under an AD or SI(T) **should** be submitted to the TAA to ensure compatibility with the AD or SI(T) content and **should** contain a statement that they are, or soon to be, subject to an AD or SI(T) issued.

To approve the flight conditions under which a MPTF (Development) can be issued (refer to RA 5850 paragraph 71.d)

Intent

29. The DO **should** develop its own internal procedure to determine and approve that an Air System can fly under the appropriate restrictions compensating for the lack of an extant RTS.

Content

30. The procedure **should** address the following points:

a. Decision to use the privilege.

b. Management of the Air System configuration.

c. Determination of the conditions that **should** be complied with to perform safe flight.

d. Documentation of flight conditions substantiations.

e. Approval under the approved DO privilege, when applicable.

f. Authorized signatories.

31. The procedure **should** include a decision to determine:

a. Flights for which this privilege can be exercised.

b. Flights for which the Approval of flight conditions by the TAA are required.

32. The procedure **should** indicate:

a. How the Air System, for which an application for a MPTF (Development) is made, is identified and how changes to the Air System **should** be managed.

Determination of the conditions that should be complied with to perform safe flight

33. The procedure **should** describe the process used by the DO to justify that an Air System can perform the intended flight. The process **should** include:

a. Identification of deviations from the extant RTS or applicable Airworthiness requirements.

b. Analysis, calculations, tests or other means used to determine the conditions or restrictions under which the Air System can perform safe flight.

c. The establishment of specific Maintenance instructions and conditions to perform these instructions.

d. Independent technical verification of the analysis, calculations, tests or other means used to determine under which conditions or restrictions the Air System can perform the intended flight(s) safely.

e. Statement by the Office of Airworthiness (or equivalent), that the determination has been made iaw the procedure and that the Air System has no features and characteristics making it unsafe for the intended operation under the identified conditions and restrictions.

f. Approval by an authorized signatory.

Documentation of flight conditions substantiations

34. The analysis, calculations, tests, or other means used to determine the conditions or restrictions under which the Air System can perform in flight safely, **should** be compiled in compliance documents. These documents **should** be signed by the author and by the person performing the independent technical verification.

35. Each compliance document **should** have a number and issue date. The various issues of a document **should** be controlled.

Authorized signatories

36. The person(s) authorized to sign the Approval form **should** be identified (name, signature and scope of authority) in the procedure, or in an appropriate document linked to the DOE.

Issue a MPTF (Development) iaw RA 5880 (refer to RA 5850 paragraph 71.e)

Intent

37. The DO **should** develop its own internal procedure for the issue of a MPTF (Development)[16] for an Air System it has designed or modified, or for which it has approved under privilege the conditions under which the MPTF (Development) can be issued and when the DO itself is controlling under its DO Terms of Approval the configuration of the Air System and is attesting conformity with the design conditions approved for the flight.

Content

38. The procedure **should** address the following points:

a. Conformity with approved conditions.

b. Issue of the MPTF (Development) under privilege in the scope of the DO Approval.

c. Authorized signatories.

d. Interface with the TAA for the flight.

Conformity with approved conditions

39. The procedure **should** indicate how conformity with approved conditions is made, documented and attested by an authorized person.

Issue of the MPTF (Development) under the DO privilege

40. The procedure **should** describe the process to prepare the MPTF (Development) and how compliance is established before signature of the MPTF (Development).

Authorized signatories

41. The person(s) authorized to sign the MPTF (Development) under the privilege in the scope of the DO Approval **should** be identified (name, signature and scope of authority) in the procedure, or in an appropriate document linked to the DOE.

Interface with the TAA for the flight

42. The procedure **should** include provisions describing the communication with the TAA for compliance with the local requirements which are outside the scope of the flight conditions.

RA 5855 - Parts and Appliances (MRP Part 21 Subpart K)

Rationale

Only approved Parts and Appliances will be used on an Air System. The use of non-approved Parts and Appliances can lead to unforeseen consequences potentially jeopardizing Airworthiness. It is necessary to demonstrate the compliance of Parts and Appliances for use on an Air System with applicable Regulations and the Type Design criteria. This RA details the regulatory requirements relating to the approval of Parts and Appliances.

Contents

Regulation 5855(1)

Compliance with Applicable Requirements (MRP Part 21.A.303)

5855(1) The Type Airworthiness Authority (TAA)[1] **shall** ensure compliance with applicable requirements for Parts and Appliances to be installed in an Air System.

Acceptable Means of Compliance 5855(1)

Compliance with Applicable Requirements (MRP Part 21.A.303)

1. The TAA **should** ensure the demonstration of compliance of Parts and Appliances to be installed in an Air System is made:

   a. In conjunction with the Type Certification procedures [2,3] for the Product in which it is to be installed, or

   b. With an appropriate Certificate of Design approved under RA 5103[4].

   c. Where applicable, under the (European) Technical Standard Order ((E)TSO)[5] authorization procedures[6], or

   d. In the case of Standard Parts[7], in accordance with (iaw) officially recognized standards.

Guidance Material 5855(1)

Compliance with Applicable Requirements (MRP Part 21.A.303)

Officially recognized standards

2. In this context “officially recognized standards” means:

   a. Those standards established or published by an official body, which are widely recognized as constituting good practice.

   b. The standard used by the Design Approval holder of the certified equipment.

[1] Where the Air System is ►not UK MOD-Owned, Type Airworthiness (TAw) management◄ regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor’s approved model ►◄ ; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.
[2] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B).
[3] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D).
[4] Refer to RA 5103 – Certificate of Design.
[5] The (E)TSO abbreviation **should** be taken to mean a Technical Standard Order (TSO) from the US or a European TSO.
[6] Refer to RA 5875 – (European) Technical Standard Order (MRP Part 21 Subpart O).
[7] Refer to MAA02 – MAA Master Glossary.

Regulation 5855(2)

Release of Newly Produced Parts and Appliances for Installation (MRP Part 21.A.307)

5855(2) The TAA **shall** ensure that a Part or Appliance, eligible for installation in an Air System operating in the Defence Air Environment is only authorized for installation when it has been assessed as being manufactured in conformity with approved design data, and it is:

a. Accompanied by an authorized release certificate certifying that the item was manufactured in conformity to approved design data marked iaw RA 5885[5]; or

b. A standard part.

Acceptable Means of Compliance 5855(2)

Release of Newly Produced Parts and Appliances for Installation (MRP Part 21.A.307)

3. An Original Equipment Manufacturer Certificate of Compliance (CoC) or Authorized Release Certificate[8] **should** be used as the release certificate identifying a newly produced Part or Appliance as serviceable.

Guidance Material 5855(2)

Release of Newly Produced Parts and Appliances for Installation (MRP Part 21.A.307)

4. Nil.

[8] Refer to RA 4809 – Acceptance of Components (MRP 145.A.42).

RA 5865 – Repairs (MRP Part 21 Subpart M)

Rationale

During the design and development of ►Air Systems,◄ consideration will be given to the possible need for Repairs. It is important that only approved organizations undertake the design of such Repairs. Failure to correctly control the Repair process may result in unforeseen outcomes. Design Organizations (DO) whose terms of Approval covers the classification or the design of Repairs are subject to certain obligations relating to those Approvals.

Contents

Regulation 5865(1)

Scope (MRP Part 21.A.431A)

5865(1) The term “Repair” **shall** be understood to mean the elimination of damage and / or restoration to an airworthy condition ►and approved configuration.◄

The elimination of damage by replacement of Parts or Appliances without the necessity for design activity **shall** be considered as a Maintenance task and therefore require no approval under this Regulation.

Acceptable Means of Compliance 5865(1)

Scope (MRP Part 21.A.431A)

1. Standard Repairs that follow design data published in the Instructions for Sustaining Type Airworthiness (ISTA)[1], containing acceptable methods, techniques and practices for carrying out and identifying standard Repairs, **should** require no additional approval under this Regulation.

Guidance Material 5865(1)

Scope (MRP Part 21.A.431A)

2. Nil.

Regulation 5865(2)

Demonstration of Capability (MRP Part 21.A.432B)

5865(2) The Type Airworthiness Authority (TAA) or Commodity Chief Engineer (CE) **shall** ensure that the DO holds an extant approval from the MAA under the Design Approved Organization Scheme (DAOS) covering the relevant scope of activities[2].

[1] Refer to RA 5815 – Instructions for Sustaining Type Airworthiness.
[2] Refer to RA 5850 – Military Design Approved Organization (MRP Part 21 Subpart J).

Acceptable Means of Compliance 5865(2)

Demonstration of Capability (MRP Part 21.A.432B)

3. For Civilian-Owned / Civilian Operated Air Systems the Air System Sponsor has the opportunity to split Type Airworthiness (TAw) responsibility, with regards to Repairs, between the TAA and a Type Airworthiness Manager (TAM), the TAA **should** provide advice to the Sponsor on the most appropriate split of TAw Repair responsibilities[3], noting that a TAM **should not** authorize major Repairs.

4. The TAA or Commodity CE **should** enable a direct interface between the Product, Part, Appliance, Airborne Equipment and Air Launched Weapons DO and the DO designing the Repair for the availability of appropriate Design Records and the timely provision of Design advice when requested by the DO designing the Repair.

5. The DO **should** have the appropriate Design Records and staff to Design and conduct airworthy Repair schemes.

Guidance Material 5865(2)

Demonstration of Capability (MRP Part 21.A.432B)

6. Nil.

Regulation 5865(3)

Classification of Repairs (MRP Part 21.A.435)

5865(3) A Repair **shall** be classified major or minor either by the TAA or by a privileged DO[4].

Acceptable Means of Compliance 5865(3)

Classification of Repairs (MRP Part 21.A.435)

7. A new repair **should** be classified as major if the result on the approved Type Design has an appreciable effect on structural performance, weight, balance, Systems, operational characteristics or other characteristics affecting the Airworthiness of the Product, Part or Appliance.

8. A Repair **should** be classified as major if it needs extensive static, fatigue and damage tolerance strength justification and / or testing in its own right, or if it needs methods, techniques or practices that are unusual (ie unusual material selection, heat treatment, material processes, jigging diagrams, etc).

9. Repairs that require a re-assessment and re-evaluation of the original certification substantiation data to ensure that the Air System still complies with all the relevant requirements **should** be considered major Repairs.

10. The DO **should** provide a recommended classification, with supporting justification, to the TAA for all major Repairs.

11. For major Repairs, the TAA **should** consider if a Change to the Type Design[5] is a better solution than repairing the Air System.

Guidance Material 5865(3)

Classification of Repairs (MRP Part 21.A.435)

Clarification of the term's major / minor

12. It is understood that not all the Certification substantiation data will be available to those persons / organizations classifying repairs. A qualitative judgement of the effects of the Repair will therefore be acceptable for the initial classification. The subsequent review of the design of the Repair may lead to it being re-classified, owing to early judgements being no longer valid.

Airworthiness concerns for major / minor classification

13. The following are to be considered for the significance of their effect when classifying Repairs. If the effect is considered to be significant then the Repair is to be

[3] Where the Air System is not UK MOD-owned, Type Airworthiness (TAw) management regulatory responsibility by either the TAA or TAM needs to be agreed within the Sponsor's approved model; refer to RA 1162 - Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, or refer to RA 1163 - Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.

[4] Invoked in accordance with (iaw) RA 5850 – Military Design Approved Organization (MRP Part 21 Subpart J).

[5] Refer to RA 5820 – Changes in Type Design.

Guidance Material 5865(3)

classified major. The Repair may be classified as minor where the effect is known to be without appreciable consequence. Considerations for classifying Repairs major / minor are not limited to those listed below:

a. **Structural performance**. Structural performance of the product includes static strength, fatigue, damage tolerance, flutter and stiffness characteristics. Repairs to any element of the structure are to be assessed for their effect upon the structural performance.

b. **Weight and Moment**. The weight of the Repair may have a greater effect upon smaller Air Systems as opposed to larger Air System's. The effects to be considered are related to overall Centre of Gravity (CofG) and load distribution. Control surfaces are particularly sensitive to the changes due to the effect upon the stiffness, mass distribution and surface profile which may have an effect upon flutter characteristics and controllability.

c. **Systems**. Repairs to any elements of a System are to be assessed for the effect intended on the operation of the complete System and for the effect on System redundancy. The consequence of a structural Repair on an adjacent or remote System are also to be considered as above, (for example: airframe Repair in the area of a static port).

d. **Operational characteristics** Changes may include:

(1) Stall characteristics.

(2) Handling.

(3) Performance and drag.

(4) Vibration.

e. **Other characteristics**

(1) Changes to load path and load sharing.

(2) Change to noise and emissions.

(3) Fire protection / resistance.

14. Examples of major Repairs:

a. A Repair that requires a permanent additional inspection to the approved Maintenance schedule, necessary to ensure the TAw of the product.

b. A Repair to life limited or critical parts.

c. A Repair that introduces a change to the Aircraft Flight Manual[6].

Note:

Temporary Repairs for which specific inspections are required prior to installation of a permanent Repair do not necessarily need to be classified as major. Also, inspections and changes to inspection frequencies not required as part of the approval to ensure TAw do not cause classification as major of the associated Repair.

Regulation 5865(4)

Repair Design (MRP Part 21.A.433)

5865(4) The applicant for approval of a Repair Design **shall** demonstrate its compliance with the Type Certification Basis (TCB) plus any amendments to the TCB.

[6] The Aircraft Flight Manual contains the limitations within which the Air System is to be considered airworthy, and instructions and information necessary to the flight crew for the safe operation of the Air System ie the Aircrew Manual in military terms.

Acceptable Means of Compliance 5865(4)

Repair Design (MRP Part 21.A.433)

15. A Repair to a (European) Technical Standard Order ((E)TSO)[7] article **should** be treated as a change to the (E)TSO design and **should** be processed iaw the issuing authority procedures.

16. The applicant for approval of a Repair design **should** submit all necessary substantiation data (eg analysis, calculations or tests) to the TAA[8].

17. The TAA **should** consider the implications of a Repair scheme embodied that does not restore static strength, stiffness, fatigue life, functionality and Airworthiness to the original design levels, in order that consideration can be given to the need for an amendment to the Air System Release To Service (RTS).

18. Any Repair not meeting design limitations **should** be recorded and agreed with the TAA.

Repair schemes

19. The DO **should** respect any extant design limits and comply with the following requirements:

a. The DO **should** notify the TAA where an RTS limitation may be necessary following the incorporation of an approved Repair scheme.

b. Where there is a Repair, any limitations prescribed by the Air System DO or ►TAA◄ for structure, aerodynamics, weight, CofG, and Systems (including software) **should** be respected. Designs **should not** transgress such limitations without the written technical agreement of the Air System DO for the Air System concerned.

c. Arrangements **should** exist for all Repair schemes, where technical advice or written technical agreement is required, as defined by paragraph 19b above, to be passed to the Air System DO. The Air System DO **should** provide advice as to whether or not the proposed Repair transgresses the prescribed design limitations.

d. The DO **should** seek the written approval of the TAA to design any Repair where the Air System DO advise that prescribed design limitations will be transgressed.

20. In designing Air System Repairs the DO **should** comply with the following requirements:

a. The Air System DO **should** be consulted by the DO designing the Repair when there is no valid precedent, principle, DO Repair Instruction or sufficient evidence to prove restoration with the TCB.

b. A complete list of all Repair schemes, and consequently changes to the Air System build standard, **should** be forwarded to the ►TAA◄ for the Air System affected, for configuration management purposes and Maintenance of any Design Records.

c. Consideration **should** be given to whether the approved Repair scheme has a sufficiently wide application to be included in the ISTA[1].

21. Repair schemes **should** individually identify the designing DO.

Repair Design substantiation data

22. Relevant substantiation data associated with the design of a new major Repair and record keeping **should** include:

a. Damage identification and reporting source.

b. Major Repair design approval sheet identifying applicable specifications and references of justifications.

c. Repair drawing and / or instructions and scheme identifier.

[7] The (E)TSO abbreviation **should** be taken to mean a TSO from the USA or a European TSO.
[8] Note not applicable for minor Repairs approved under privilege.

Acceptable Means of Compliance 5865(4)

d. Correspondence with the TAA, DO or (E)TSO approval holder, if its advice on the design has been sought.

e. Structural justification (static strength, fatigue, damage tolerance, flutter etc) or references to this data.

f. Effect on the Air System, engines and / or Systems (performance, flight handling, etc as appropriate).

g. Effect on the Maintenance schedule.

h. Effect on Airworthiness limitations, the Flight Manual and the Operating Manual.

i. Weight and balance change.

j. Special test requirements.

23. Relevant minor Repair documentation **should** include paragraphs 22a and 22c. Other points of paragraph 22 **should** be included where necessary. If the Repair is outside the approved Type Design, justification for classification **should** be provided.

Guidance Material 5865(4)

Repair Design (MRP Part 21.A.433)

24. The term 'Repair scheme' will be taken to include 'Repair instructions'.

25. When manuals and other instructions for TAw are as approved, they may be used by operators without further approval to cope with anticipated In-Service problems arising from normal usage provided that they are used strictly for the purpose for which they have been developed.

Repair schemes

26. Repair schemes which restore the original structural designer's intent inherently meet the full load spectrum of the Air System design. A Repair scheme is not a Modification and therefore a full Safety Assessment (SA), iaw Def Stan 00-056[9], is not required in order to substantiate the Repair's Structural Integrity (SI) and Airworthiness.

27. A list of DO approved Repair schemes which have not been included in the ISTA will be retained in a master list forming part of the Design Records.

Regulation 5865(5)

Issue of a Repair Design Approval (MRP Part 21.A.435)

5865(5) The TAA **shall** ensure that the Repair design complies with the applicable TCB prior to approval.

Acceptable Means of Compliance 5865(5)

Issue of a Repair Design Approval (MRP Part 21.A.435)

28. The approval for major Repair designs **should** be issued only:

a. By the TAA.

b. For minor Repairs by the TAA or by an appropriately privileged DO.

29. In order for the TAA to approve Repair designs the following **should** be applicable:

a. The TCB for the Product, Part or Appliance to be repaired has been identified together with all other relevant requirements.

b. All records and substantiation data including documents showing compliance with all relevant Certification Specifications are held for review by the MAA.

30. All major Repairs **should** be accompanied with a Certificate of Design (CofD) and installation instructions[10].

[9] Refer to Def Stan 00 – 056 – Safety Management Requirements for Defence Systems.
[10] Note: A minor Repair has no appreciable effect on Airworthiness as it is returning the item to the approved certification basis, a CofD will not be required for a minor Repair.

Acceptable Means of Compliance 5865(5)

31. A summary list of all Repair approvals **should** be provided to the TAA on a regular basis as agreed.

Air Systems Type Certified by the MAA

32. The TAA **should** seek MAA approval in cases of major Repairs proposed by DO approval holders, if the major Repair is:

a. Related to new interpretation of the Certification Specifications as used for Type Certification.

b. Related to different means of compliance from that used for Type Certification.

c. Related to the application of Certification Specifications different from that used for Type Certification.

Guidance Material 5865(5)

Issue of a Repair Design Approval (MRP Part 21.A.435)

33. **Approval by DO**. Approval of Repairs through the use of privileges invoked by the TAA[1], means an approval issued by the DO without requiring TAA involvement. The MAA will monitor application of this procedure within the surveillance plan for the relevant organization. When the organization exercises this privilege, the Repair release documentation is to clearly state that the privilege has been identified under their DAOS approval.

34. **Previously approved data for other applications**. When it is intended to use previously approved data for other applications, it is expected that applicability and effectiveness would be checked with an appropriately approved DO. After damage identification, if a Repair solution exists in the available approved data, and if the application of this solution to the identified damage remains justified by the previous approved Repair design, (structural justifications still valid, possible Airworthiness limitations unchanged), the solution can be considered approved and can be used again.

35. **Temporary Repairs**. These are Repairs that are life limited, to be removed and replaced by a permanent Repair after a limited service period. These Repairs are to be classified under RA 5865(3) and the service period defined at the approval of the Repair and recorded in the Technical Log.

36. **Fatigue and damage tolerance**. When the repaired Product is released into service before the fatigue and damage tolerance evaluation has been completed, the release is to be for a limited period, defined at the issue of the Repair.

Regulation 5865(6)

Production of Repair Parts (MRP Part 21.A.439)

5865(6) Parts and Appliances to be used for the Repair **shall** be manufactured iaw production data based upon all the necessary Design data as provided by the DO:

a. By an appropriately recognized[11] Production Organization (PO); or

b. By an Approved Maintenance Organization (AMO)[12], or a Military Maintenance Organization (MMO)[13].

Acceptable Means of Compliance 5865(6)

Production of Repair Parts (MRP Part 21.A.439)

37. Parts or Appliances used for the Repair **should** be appropriately marked[14].

[11] Refer to RA 5835 – Production Organizations (MRP Part 21 Subpart G).
[12] Refer to RA 4800 to RA 4821 (MRP Part 145).
[13] Refer to RA 4809 – Acceptance of Components (MRP 145.A.42).
[14] Refer to RA 5885 – Identification of Products, Parts and Appliances (MRP Part 21 Subpart Q).

Guidance Material 5865(6)

Production of Repair Parts (MRP Part 21.A.439)

38. Nil.

Regulation 5865(7)

Repair Embodiment (MRP Part 21.A.441)

5865(7) The embodiment of a Repair **shall** be made:

a. By an appropriately recognized[11] PO; or

b. By an AMO[15] or MMO using the necessary installation instructions issued by the TAA or a privileged DO[16].

Acceptable Means of Compliance 5865(7)

Repair Embodiment (MRP Part 21.A.441)

39. The TAA or a privileged DO **should** transmit to the organization performing the Repair all the necessary installation instructions.

Guidance Material 5865(7)

Repair Embodiment (MRP Part 21.A.441)

40. Nil.

Regulation 5865(8)

Limitations (MRP Part 21.A.443)

5865(8) The instructions and any limitations for a Repair design **shall** be submitted by the Repair design approval holder to the TAA.

Acceptable Means of Compliance 5865(8)

Limitations (MRP Part 21.A.443)

41. Any limitations associated with major Repairs **should** be identified in the CofD[17].

Guidance Material 5865(8)

Limitations (MRP Part 21.A.443)

42. Nil.

Regulation 5865(9)

Unrepaired Damage (MRP Part 21.A.445)

5865(9) When a damaged Product, Part or Appliance is left unrepaired and is not covered by previously approved data, the TAA or a privileged DO **shall** approve its continued use.

Acceptable Means of Compliance 5865(9)

Unrepaired Damage (MRP Part 21.A.445)

43. When the DO evaluates the unrepaired damage for its Airworthiness consequences, they **should** inform the TAA.

44. When the organization evaluating the unrepaired damage is neither the TAA nor the DO, this organization **should** justify that the information on which the evaluation is based is adequate either from its own resources or through an arrangement with the original DO.

[15] Appropriately approved iaw RA 4800 – RA 4821 (MRP Part 145).
[16] Where there is a Continuing Airworthiness Management Organization, these instructions are to be transmitted through them to the AMO or MMO.
[17] Refer to RA 5103 – Certificate of Design.

Acceptable Means of Compliance 5865(9)

45. The TAA **should** evaluate the unrepaired damage for Airworthiness consequences and if in any doubt, **should** consult with the DO.

Guidance Material 5865(9)

Unrepaired Damage (MRP Part 21.A.445)

46. This is not intended to supersede the normal Maintenance practices defined by the DO, (eg blending out corrosion and re-protection, stop drilling cracks, etc), but addresses specific cases not covered in the ISTA.

47. A damaged Product, Part or Appliance that is left unrepaired can be approved for its continued use by a TAA.

Regulation 5865(10)

Record Keeping (MRP Part 21.A.447)

5865(10) For each Repair, all relevant design information, drawings, test reports, instructions and limitations issued iaw RA 5865, justification for classification and evidence of the Repair design approval, **shall**:

a. Be held by the Repair design approval holder at the disposal of the TAA.

b. Be retained by the Repair design approval holder in order to provide the information necessary to ensure the TAw of the repaired Products, Parts or Appliances.

Acceptable Means of Compliance 5865(10)

Record Keeping (MRP Part 21.A.447)

48. Nil.

Guidance Material 5865(10)

Record Keeping (MRP Part 21.A.447)

49. Nil.

RA 5875 – (European) Technical Standard Order (MRP Part 21 Subpart O)

Rationale

A Technical Standard Order (TSO) or (European) TSO ((E)TSO)[1] is a detailed design specification issued by a recognized Certification body detailing the essential requirements for an article[2] to be (E)TSO approved. Although the MAA does not issue a (E)TSO, the Type Airworthiness Authority (TAA) or Type Airworthiness Manager (TAM) can utilize an (E)TSO from another recognized Certification authority. (E)TSOs are only issued for articles that were designed for civil use, although they may be fitted to military Air Systems. Whilst the (E)TSO details how the article meets a minimum performance standard, the suitability of the article for integration or use on the Air System is not guaranteed and its use may still pose a risk to the Air System's Airworthiness. This RA ensures that appropriate consideration is given to the technical conditions of the (E)TSO article with regard to its intended use.

Contents

Regulation 5875(1)

(European) Technical Standard Order

5875(1) The TAA[3] **shall** ensure that the technical conditions of the (E)TSO article are suitable for the intended use in or on the Air System.

Acceptable Means of Compliance 5875(1)

(European) Technical Standard Order

1. The TAA **should** ensure they have verified the (E)TSO design specification is suitable for the intended use in or on the Air System and **should** ensure they have received and reviewed the article's Declaration of Design and Performance (DDP).

2. The TAA **should** ensure the replacement or Repair of an article is evaluated for its effect on the Type Airworthiness Safety Assessment[4] and Air System Type Certification Basis[5].

Guidance Material 5875(1)

(European) Technical Standard Order

3. An (E)TSO is an approved specification detailing the minimum performance standard for an article. As such an article issued as conforming to an (E)TSO can be presumed to meet the minimum performance standard and (E)TSO design specification without additional compliance demonstration. However, an article's compliance with an (E)TSO does not infer any approval to fit to an Air System and will not necessarily ensure the article's suitability for integration or use on the Air System. In ensuring the (E)TSO design specification is suitable for the Air System the TAA may wish to consult the Design Organization.

4. The design or performance limitations which limit an article's use will be explicitly recorded in the DDP.

5. When an article has been approved to an (E)TSO the article is permanently marked with the appropriate (E)TSO number. All documentation associated with Certification and Release for installation on an Air System will record this (E)TSO number.

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[1] The (E)TSO abbreviation can be taken to mean a TSO from the USA, UK or a European TSO. With the departure of the UK from the EU, the Civil Aviation Authority (CAA) can commence issuing TSO Approvals. These will be named UK Technical Standing Order Approvals (UKTSOA).

[2] For the purposes of the RA 5800 series, an 'article' means any Parts and Appliances (including Government Furnished Equipment) to be used on military Air Systems.

[3] Where the Air System is ►not UK MOD-owned, Type Airworthiness (TAw) management◄ regulatory responsibility by either the TAA or TAM needs to be agreed within the Sponsor's approved model ►◄ ; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.

[4] Refer to RA 5012 – Type Airworthiness Safety Assessment.

[5] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D).

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RA 5880 – Military Permit to Fly (Development) (MRP Part 21 Subpart P)

Rationale

A Military Permit to Fly (MPTF) (Development) is required for all Air Systems operating in the Development and Special Case Flying categories of the Defence Air Environment (DAE) Operating Categories[1] where no extant Release To Service (RTS) or MPTF (In-Service)[2] or MPTF (Special Case Flying) exists, and the Air System is capable of safe flight under defined conditions. It is important to clearly define the design and flight conditions approved under an MPTF (Development), without these conditions, there is a Risk that the safe operation of the Air System may be reduced with the potential for an Accident or Incident. This RA defines the rules governing the production of an MPTF (Development) and the obligations of the MPTF (Development) applicant.

Contents

Definitions

Definitions Relevant to this RA

1. **MPTF (Development).** The MPTF (Development) is designed to enable Test and Evaluation (T&E)[3] activity prior to the Air System being In-Service, or when the Air System is undergoing design change or upgrade which requires the Air System to be evaluated or assessed in order to generate evidence in support of the Air System Safety Case[4]. The MPTF will be applicable to Air Systems operating in the Military Operated (Development) and Civilian Operated (Development) and Special Case Flying Operating Categories[1].

2. **Operator.** The term Operator can be read as Aviation Duty Holder (ADH) or Accountable Manager (Military Flying) (AM(MF)).

[1] Refer to RA 1160 – The Defence Air Environment Operating Framework.
[2] Refer to RA 1305 – Military Permit to Fly (In-Service), (Special Case Flying) and (Single Task).
[3] Refer to RA 2370 – Test and Evaluation.
[4] Refer to RA 1205 – Air System Safety Cases.

Regulation 5880(1)

Military Permit to Fly (Development)

5880(1) An MPTF (Development) **shall** be required for all Air Systems operating within the DAE for developmental purposes, where there is not a valid RTS or MPTF (In-Service) or MPTF (Special Case Flying) in place, or the operation is outside the flight conditions permitted by an extant RTS or MPTF (In-Service) or MPTF (Special Case Flying).

Acceptable Means of Compliance 5880(1)

Military Permit to Fly (Development)

3. For Civilian-Owned and Civilian Operated Air Systems the Air System Sponsor[5] has the opportunity to delegate Type Airworthiness (TAw) responsibility, with regards to MPTF (Development), between the Type Airworthiness Authority (TAA) and a Type Airworthiness Manager (TAM)[6], noting that a TAM[7] **should not** approve the initial issue of MPTF (Development) for Civilian Operated (Development) Air Systems.

Guidance Material 5880(1)

Military Permit to Fly (Development)

4. In some circumstances it may be preferable to conduct Development activity within the flight limitations detailed in the RTS, MPTF (In-Service) or MPTF (Special Case Flying), rather than use an MPTF (Development). This may necessitate an amendment to the RTS, MPTF (In-Service) or MPTF (Special Case Flying), or the creation of a Special Clearance[8] in the RTS or MPTF (In Service), to allow alternative flight conditions.

Regulation 5880(2)

Military Permit to Fly (Development) Procedure (MRP Part 21.A.707)

5880(2) An MPTF (Development) applicant **shall** supply all the required supporting evidence to the TAA, or an appropriately privileged Design Organization (DO) for review, prior to the issue of an MPTF (Development).

Acceptable Means of Compliance 5880(2)

Military Permit to Fly (Development) Procedure (MRP Part 21.A.707)

Procedure

5. The MPTF (Development) **should** state the Definition, Airworthiness, Safety and Limitations of the Air System to be flown. An application for an MPTF (Development) **should** be in the format available on the MAA websites.

6. In support of the request for an MPTF (Development), the applicant **should** submit a signed Declaration of Compliance (DofC) to the TAA or privileged DO. The DofC **should** include evidence that the Air System has been inspected and tested, as required, to determine that it is airworthy and that no features or characteristics make it unsafe for its intended use. The content of a DofC is defined in the Military Permit to Fly – Declaration of Compliance Form[9].

7. For a new Air System or Major Change in Type Design[10], the DofC **should** be supported by a valid Certificate of Design (CofD)[11].

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[5] Refer to RA 1019 – Sponsor of Military Registered Civilian-Owned and Civilian Operated Air Systems - Air Safety Responsibilities.
[6] Where the Air System is not UK MOD-owned, TAw management regulatory responsibility by either the TAA or TAM needs to be agreed within the Sponsor's approved model ; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.
[7] For Open Category Remotely Piloted Air Systems (RPAS), where there is no TAA / TAM, the RPAS Responsible Officer / RPAS Accountable Manager fulfils the RA 5880 TAA / TAM role.
[8] Refer to ►RA 1300 – Release To Service.◄
[9] The Military Permit to Fly – Declaration of Compliance Form is available on the MAA website.
[10] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D).
[11] Refer to RA 5103 – Certificate of Design.

Acceptable Means of Compliance 5880(2)

8. The Product, Part, Appliance, Airborne Equipment or Air Launched Weapon (ALW) on trial **should** have a valid CofD[11].

9. Where the applicant and the authorizer are the same entity then there **should** be an independent check to verify the supplied evidence. Evidence of the independent check **should** be recorded and available for review ►by the MAA on request.◄

10. The TAA or the privileged DO **should** ensure that the nominated Operator is endorsed to conduct the proposed T&E flying[3].

11. The terms of the DO approval[12] and Contractor Flying Organization approval[13] **should** include the type of Air System for which an MPTF (Development) is being sought.

Flight trials of Non-Production Standard Propulsion Systems

12. Where the MPTF (Development) is required for flight trials of a Non-Production Standard Propulsion System, including a new design type, or unapproved changes, the Propulsion System DO **should** demonstrate in their Safety Assessment, that sufficient testing and analysis has been completed to establish the conditions for safe flight and confidence that an in-flight Hazard is unlikely to occur, for Non-Production Standard Propulsion System Flight Clearance[14].

13. The establishment of flight conditions **should** be defined by the Propulsion System DO and provided to the Air System DO; in this context, Propulsion System DO acts as a supplier of the Air System DO.

14. These conditions **should** be established and substantiated under an arrangement between the Propulsion System DO and the Air System DO. However, the Air System DO **should** take responsibility for the establishment and substantiation of the flight conditions for the Air System, including its engine(s).

15. On completion of the Non-Production Standard Propulsion System Flight Clearance, and prior to commencing flight, taxiing or ground running trials, the Propulsion System DO **should** submit a Flight Clearance Note[15] to the MPTF (Development) applicant for subsequent countersignature by the TAA or the privileged DO. This document **should** be attached to the CofD and **should** detail the operating limitations. The submission **should** be supported by a statement to define the configuration.

Flight trials of ALW

16. ►Where the MPTF (Development) is required for an Air System to conduct T&E activity on ALW, the DofC **should** be supported by an interim ALW Release (ALWR) which has sufficient detail to support an effective Safety Assessment for the intended trials[16].◄

17. Where the MPTF (Development) is required for an Air System to evaluate an armament store or ALW system the applicant **should**:

a. Provide evidence, in the DofC submitted in support of the MPTF (Development), or any amendment thereto, that the airborne armament store or ALW DO has provided a CofD with respect to any carriage, firing, launch / release or jettison limitations.

b. Demonstrate compliance with RA 1350(2)[16].

MPTF (Development) Signatures

18. The applicant **should** declare that the submitted information is complete and accurate by signing the applicant section of the MPTF (Development) statement.

19. The Air System DO's approved signatory[12], or approved signatory of the DO appointed as an integrator by the TAA[17], **should** declare, by signing the DO section of

[12] Refer to RA 5850 – Military Design Approved Organization (MRP Part 21 Subpart J).
[13] Where applicable refer to ►RA 1028◄ – Contractor Flying Approved Organization Scheme.
[14] Refer to Def-Stan 00-970 – Certification Standard for Service Aircraft.
[15] The Flight Clearance Note is available on the MAA website.
[16] Refer to RA 1350 ► – Air Launched Weapon Release.◄
[17] Refer to RA 1005 – Contracting with Competent Organizations.

Acceptable Means of Compliance 5880(2)

the MPTF (Development) statement, that the supporting evidence has been reviewed and that the Air System is airworthy for the intended use.

20. The Operator **should** declare they are able to conduct the defined flight trials and will comply with all flight conditions, by signing the MPTF (Development) statement.

21. In signing the MPTF (Development) the TAA or privileged DO **should** approve the flight conditions and declare acceptance of the activity for which the applicant has requested the MPTF (Development).

22. The MPTF (Development) **should** be signed in accordance with (iaw) this procedure before the first flight of the proposed flying programme can commence, including taxiing, or ground running trials.

Guidance Material 5880(2)

Military Permit to Fly (Development) Procedure (MRP Part 21.A.707)

23. The applicant is the organization requiring the trial to be conducted.

24. ►T&E of ALW may be conducted to generate further ALWR evidence, or to assess ALW performance for development of the required flight clearance. The interim ALWR will need to be at a level of maturity that supports the required Risk Assessment for the trials plan that will feed the Safety Assessment. Where evidence gaps in the ALWR present potential Risk to Life (RtL) that cannot be mitigated by trial design or flight limitations, these will be clearly identified for acceptance by the ADH or AM(MF).◄

25. An MPTF (Development) may be specific to an individual Air System or multiple Air Systems of the same design configuration, identified upon the permit by the Military Registration Number(s).

26. When there is no change to the Type Design for the flight trial, the original DofC may be used in support of the MPTF (Development).

27. On receipt of the request the TAA or privileged DO will review the evidence supplied and once satisfied the MPTF (Development) will be signed by the TAA or the privileged DO.

28. The MPTF (Development) approves the Air System to be released to a competent Operator to fly. The final decision to fly rests with the ADH or AM(MF) once they have satisfied themselves that the RtL is As Low As Reasonably Practicable (ALARP) and Tolerable.

29. Following an Occurrence, the applicant, TAA or privileged DO may revoke the MPTF (Development). The person responsible for the revocation will advise all other involved parties including the Air System Operator and the Government Quality Assurance Representative.

Regulation 5880(3)

Flight Conditions (MRP Part 21.A.708)

5880(3) The conditions for safe flight **shall** be determined by the TAA or the privileged DO.

Acceptable Means of Compliance 5880(3)

Flight Conditions (MRP Part 21.A.708)

30. The flight conditions specified in the DofC which forms part of the MPTF (Development) **should** be determined on the principles set out in the Certification Specification applicable to the Air System design.

31. The determination of flight conditions **should** include:

a. The conditions or restrictions put on itineraries, operating bases or airspace required for the flight(s).

b. The conditions and restrictions put on the Aircrew to fly the Air System.

c. The restrictions regarding carriage of persons other than Aircrew.

Acceptable Means of Compliance 5880(3)

d. The operating limitations, specific procedures or technical conditions to be met (which may include the restrictions regarding carriage / release / firing of ALW).

e. The specific flight test programme.

f. The specific Continuing Airworthiness arrangements and the governance under which they will be performed.

32. The flight conditions **should** take into account the qualifications and competence of the Air System Aircrew and flight test engineers as appropriate.

33. If at any time after an MPTF (Development) has been issued, the applicant becomes aware of evidence that necessitates a restriction on existing limitations, the applicant **should** immediately advise the TAA or the privileged DO.

34. Where the restriction may affect other Operators of similar type Air Systems, the applicant **should** inform the relevant TAA.

Guidance Material 5880(3)

Flight Conditions (MRP Part 21.A.708)

Safe flight

35. Safe flight normally means continued safe flight and landing but in some limited cases (eg higher Risk flight testing) it can mean that the Air System is able to fly in a manner that will primarily ensure the Safety of over-flown third parties, the Aircrew and, if applicable other occupants.

36. This definition of “safe flight” is not to be interpreted as allowing a test pilot, equipped with a parachute and operating over a sparsely populated area, to set out on a test flight in the full knowledge that there is a high probability of losing the Air System.

37. The applicant will take reasonable care to minimize Safety Risks and to be satisfied that there is a reasonable probability that the Air System will complete the flight without damage or injury to the Air System and its occupants or to other property or persons whether in the air or on the ground.

Substantiation

38. The substantiation that the Air System is capable of safe flight under the specified conditions or limitations will detail the analysis, calculations, tests or other means used to determine the conditions or limitations.

Control of Air System configuration

39. The applicant will establish a method for the control of any change or Repair made to the Air System, but which do not invalidate the conditions established for the MPTF (Development).

40. All other changes must be approved iaw RA 5880(6).

Regulation 5880(4)

Approval of Flight Conditions (MRP Part 21.A.710)

5880(4) The flight conditions **shall** be approved by the TAA or where applicable, the privileged DO.

Acceptable Means of Compliance 5880(4)

Approval of Flight Conditions (MRP Part 21.A.710)

41. The TAA or the privileged DO **should** be satisfied that the Air System is capable of safe flight under the specified conditions and limitations.

42. The appropriate ADH or AM(MF) **should** satisfy themselves that the RtL of the proposed flying activity is ALARP and Tolerable.

Guidance Material 5880(4)

Approval of Flight Conditions (MRP Part 21.A.710)

43. The TAA or the privileged DO may require the applicant to make any necessary inspections or tests for the purpose of satisfying themselves that the Air System is capable of safe flight under the specified conditions and limitations.

Regulation 5880(5)

Issue of a Military Permit to Fly (Development) (MRP Part 21.A.711)

5880(5) The MPTF (Development) **shall** be issued to the applicant by the TAA[6] or where applicable, the privileged DO.

►◄

Acceptable Means of Compliance 5880(5)

Issue of a Military Permit to Fly (Development) (MRP Part 21.A.711)

44. The MPTF (Development) **should** specify the purpose(s) and any conditions and limitations approved under RA 5880(4).

45. All evidence supporting the application **should** be reviewed prior to issue of the MPTF (Development).

46. The initial issue of the MPTF (Development) **should** be approved by the TAA (or their approved representative); a privileged DO may issue subsequent versions of MPTF (Development)[18].

47. The TAA or the privileged DO issuing the MPTF (Development) **should** revoke the permit if there is evidence that any of the conditions specified in RA 5880(9) are not met.

Guidance Material 5880(5)

Issue of a Military Permit to Fly (Development) (MRP Part 21.A.711)

48. When the MPTF (Development) has been issued, the applicant becomes the holder of the MPTF (Development).

Regulation 5880(6)

Changes (MRP Part 21.A.713)

5880(6) Any change that invalidates the flight conditions or associated substantiation established for the MPTF (Development) **shall** be approved by the TAA or the privileged DO.

Acceptable Means of Compliance 5880(6)

Changes (MRP Part 21.A.713)

49. The applicant **should** apply to the TAA or the privileged DO for a new or amended MPTF (Development) when there are changes to the evidence contained in the DofC relating to: limitations, Airworthiness, Safety or configuration.

50. If changes to the data attached to the MPTF (Development) are required, the change to the MPTF (Development) **should** be approved and issued by the TAA or the privileged DO[19].

Guidance Material 5880(6)

Changes (MRP Part 21.A.713)

51. Changes to the conditions or associated substantiations that are approved but do not affect the text on the MPTF (Development) do not require a new MPTF (Development) to be issued.

52. In case a new application is necessary, the substantiation for approval of the flight conditions only needs to address the change.

Regulation 5880(7)

Transferability (MRP Part 21.A.719)

5880(7) An MPTF (Development) **shall not** be transferable.

Acceptable Means of Compliance 5880(7)

Transferability (MRP Part 21.A.719)

53. If there is a proposed change of holder, ownership and / or a change of register a new application **should** be submitted iaw RA 5880(2).

[18] Refer to RA 5850(11): Privileges (MRP Part 21.A.263).
[19] MPTF Amendment Statement is available on the MAA websites.

Guidance Material 5880(7)

Transferability (MRP Part 21.A.719)

54. Nil.

Regulation 5880(8)

Inspections (MRP Part 21.A.721)

5880(8) The holder of, or applicant for, an MPTF (Development) **shall** provide access to the Air Systems concerned at the request of the TAA or the privileged DO.

Acceptable Means of Compliance 5880(8)

Inspections (MRP Part 21.A.721)

55. Nil.

Guidance Material 5880(8)

Inspections (MRP Part 21.A.721)

56. Nil.

Regulation 5880(9)

Validity of Approval (MRP Part 21.A.723)

5880(9) An MPTF (Development) **shall** remain valid for a stated period.

Acceptable Means of Compliance 5880(9)

Validity of Approval (MRP Part 21.A.723)

57. The MPTF (Development) **should** continue to be valid for the stated period providing the Air System remains in compliance with the specific conditions and limitations of RA 5880, the MPTF (Development) has not been suspended or revoked, and the Air System remains on the UK Military Aircraft Register.

58. Upon suspension or revocation, the MPTF (Development) **should** be marked in such a way that it cannot be re-used.

Guidance Material 5880(9)

Validity of Approval (MRP Part 21.A.723)

59. Nil.

Regulation 5880(10)

Renewal of Military Permit to Fly (Development) (MRP Part 21.A.725)

5880(10) A renewal of the MPTF (Development) **shall** be approved by the TAA or the privileged DO.

Acceptable Means of Compliance 5880(10)

Renewal of Military Permit to Fly (Development) (MRP Part 21.A.725)

60. The renewal of the MPTF (Development) **should** be processed as a change iaw RA 5880(6).

Guidance Material 5880(10)

Renewal of Military Permit to Fly (Development) (MRP Part 21.A.725)

61. Nil.

Regulation 5880(11)	**Obligations of the Holder of a Military Permit to Fly (Development) (MRP Part 21.A.727)** 5880(11) The holder of an MPTF (Development) **shall** ensure that all the conditions and limitations associated with the permit are satisfied, maintained and provided to the Operator.
Acceptable Means of Compliance 5880(11)	**Obligations of the Holder of a Military Permit to Fly (Development) (MRP Part 21.A.727)** 62. Following signature by the TAA or the privileged DO, the MPTF (Development) document and any amendments and revisions thereto, **should** be returned to the holder of the MPTF (Development). 63. The holder of the MPTF (Development) **should** distribute copies of the MPTF (Development) and any amendments and revisions thereto to the Air System Operators and other agencies involved in the conduct of the associated flight testing of the Air System as required.
Guidance Material 5880(11)	**Obligations of the Holder of a Military Permit to Fly (Development) (MRP Part 21.A.727)** 64. Nil.
Regulation 5880(12)	**Record Keeping (MRP Part 21.A.729)** 5880(12) All documents produced to establish and justify the flight conditions **shall** be held by the applicant or holder of the MPTF (Development), as appropriate, at the disposal of the TAA or the privileged DO, in order to provide the information necessary to ensure the continued Airworthiness of the Air System.
Acceptable Means of Compliance 5880(12)	**Record Keeping (MRP Part 21.A.729)** 65. A historical record of the original MPTF (Development) and subsequent amendments, and the substantiations determined in the application of the MPTF (Development) **should** be held[20] in order to provide the information necessary to ensure the continued Airworthiness of the Air System.
Guidance Material 5880(12)	**Record Keeping (MRP Part 21.A.729)** 66. Nil.

[20] Refer to RA 1225 – Air Safety Documentation Audit Trail.

RA 5885 – Identification of Products, Parts and Appliances (MRP Part 21 Subpart Q)

Rationale

To comply with configuration control requirements, each Product, Part or Appliance to be fitted on an Air System needs to be individually identified. There are important safety, operational and economic benefits if the possibility of recurrent failure of a Product, Part or Appliance can be confined to identifiable material batches, components, equipment or Air System. Furthermore, unidentifiable Parts and Appliances lack traceability and thus can lead to excessive Maintenance and economic burden in rectifying Airworthiness concerns, or increased Airworthiness Risk if applicable Products, Parts or Appliances cannot be identified and issues rectified. To prevent this, RA 5885 requires the identification and traceability of all Products, Parts and Appliances.

Contents

Regulation 5885(1)

Identification of Products (MRP Part 21.A.801)

5885(1) The Type Airworthiness Authority (TAA)[1] **shall** ensure that identification of Products includes the specific information of the Manufacturer's name, Product designation, and the Manufacturer's Serial Number.

Acceptable Means of Compliance 5885(1)

Identification of Products (MRP Part 21.A.801)

1. Any organization that manufactures an Air System or engine **should** identify that Air System or engine by means of a fireproof plate that has the information specified in RA 5885(1) marked on it by etching, stamping, engraving, or other approved method of fireproof marking. The identification plate **should** be secured in such a manner that it is accessible, legible and not likely to be defaced or removed during normal service (including Maintenance) or lost or destroyed in an Accident.

2. Any organization that manufactures a propeller, propeller blade, or propeller hub **should** identify it by means of a plate, stamping, engraving, etching or other approved method of fireproof identification that is placed on it on a non-critical surface, contains the specified information, and is not likely to be defaced or removed during normal service or lost or destroyed in an Accident.

3. All Products and main assemblies within them **should** be fitted with a modification plate where practicable to do so.

Guidance Material 5885(1)

Identification of Products (MRP Part 21.A.801)

4. In addition to the requirement to mark Products, MOD policy also requires allocation of a unique North Atlantic Treaty Organization (NATO) Stock Number, there are detailed requirements for the marking of packaging. Further details are provided in Knowledge in Defence[2].

[1] Where the Air System is ►not UK MOD-owned, Type Airworthiness (TAw) management◄ regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor's approved model ►◄; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.

[2] MOD's Knowledge in Defence via the 'Gov' site https://www.gov.uk/guidance/knowledge-in-defence-kid.

Regulation 5885(2)

Handling of Identification Data (MRP Part 21.A.803)

5885(2) Withdrawn – Not applicable to TAw Management.

Acceptable Means of Compliance 5885(2)

Handling of Identification Data (MRP Part 21.A.803)

5. Withdrawn – Not applicable to TAw Management.

Guidance Material 5885(2)

Handling of Identification Data (MRP Part 21.A.803)

6. Withdrawn – Not applicable to TAw Management.

Regulation 5885(3)

Identification of Parts and Appliances (MRP Part 21.A.804)

5885(3) The TAA or Commodity Chief Engineer (CE) **shall** ensure that each Part or Appliance is permanently and legibly marked in accordance with (iaw) the applicable design data[3].

Acceptable Means of Compliance 5885(3)

Identification of Parts and Appliances (MRP Part 21.A.804)

7. If a Part or Appliance is too small or that it is otherwise impractical to mark a Part or Appliance with any of the information specified in RA 5885(3), the authorized release document accompanying the Part or Appliance, or its container **should** include the information that could not be marked on the Part.

8. Any private markings used by the manufacturer to facilitate the assembly of Parts and Appliances **should not** be located in a position where they will confuse other identification marks.

9. All Parts and Appliances **should** be fitted with a modification plate where practicable to do so.

10. European Part Approval (EPA) mark, for Parts and Appliances produced under European Union Aviation Safety Agency (EASA) approval that can be installed in military registered Air Systems, **should** be considered as a recognized mark for Parts and Appliances.

11. United Kingdom Part Approval (UKPA) mark, for Parts and Appliances produced under UK Civil Aviation Authority Design Organization Approval (UK CAA DOA) that can be installed in military registered Air Systems, **should** be considered as a recognized mark for Parts and Appliances.

Guidance Material 5885(3)

Identification of Parts and Appliances (MRP Part 21.A.804)

12. Where a design change does not affect interchangeability and so does not require a change in the Part or Appliance's part number, the change is to be identified on the modification plate. If the design change is just software related and can be embodied locally, the procedure for identifying the change on the item and / or its technical record is to be defined in the Instructions for Sustaining Type Airworthiness (ISTA)[4].

13. The design drawings are to specify the requirements for fitting the modification plate. For Technical Standard Order (TSO) or European TSO ((E)TSO)[5,6] articles which do not require such a marking to comply with the relevant design specification, there is no requirement to fit a modification plate.

[3] The Design Organization determines what data is applicable for the marking of Parts and Appliances.
[4] Refer to RA 5815 – Instructions for Sustaining Type Airworthiness. A leaflet in the Topic 2(N/A/R)1 would be an appropriate solution. Details on software change control are provided in the MOD's Knowledge in Defence (KiD).
[5] The (E)TSO abbreviation will be taken to mean a TSO from the UK, USA or a European TSO.
[6] Refer to RA 5875 – (European) Technical Standard Order (MRP Part 21 Subpart O).

Guidance Material 5885(3)

14. Where the TAA or Commodity CE agree that the fitting of a modification plate is impractical, an alternate method of marking is to be agreed via the Local Technical Committee[7].

15. In addition to the requirement to mark Parts and Appliances, MOD policy also requires allocation of a unique NATO Stock Number, and there are detailed requirements for the marking of packaging. Further details are provided in Knowledge in Defence[2].

Regulation 5885(4)

Identification of Critical Parts (MRP Part 21.A.805)

5885(4) The TAA or Commodity CE **shall** ensure that, in addition to the requirements of RA 5885(3), each manufacturer of a Part which has been identified as a critical part[8] **shall** permanently and legibly mark that Part with a Part number and a serial number.

Acceptable Means of Compliance 5885(4)

Identification of Critical Parts (MRP Part 21.A.805)

16. The Design Organization **should** prepare, for inclusion in the Design Records, a list of all Parts.

17. The list of Parts **should** include all Critical Parts, Principal Structural Elements and those Parts likely, in the case of a Fault, to affect Airworthiness or operational effectiveness.

18. Drawings of Parts **should** contain the following:

a. The statement ‘Critical Part’ or ‘Principal Structural Element’ if applicable.

b. The information to be recorded to ensure traceability.

c. Show where such information is to be marked or recorded.

Guidance Material 5885(4)

Identification of Critical Parts (MRP Part 21.A.805)

19. Traceability is the capability to trace a Part through its usage. In this case appropriate marking of Parts enables them to the be traced through production and into use[9] to enable data exploitation and investigations.

Regulation 5885(5)

Traceability of Parts

5885(5) Withdrawn content subsumed into RA 5885(4).

Acceptable Means of Compliance 5885(5)

Traceability of Parts

20. Withdrawn content subsumed into RA 5885(4).

Guidance Material 5885(5)

Traceability of Parts

21. Withdrawn content subsumed into RA 5885(4).

[7] Refer to RA 5301 – Air System Configuration Management.
[8] A Critical Part is a Part, the failure of which could have a catastrophic effect on the Air System in which it is installed.
[9] The requirement for recoding the part usage once In-Service is detailed in RA 4813 – Maintenance Records (MRP 145.A.55).

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RA 5890 – Cyber Security for Airworthiness and Air Safety – Type Design and Changes / Repairs to Type Design

Rationale

Cyber vulnerabilities in Air Systems represent a significant threat to Type and Continuing Airworthiness and Air Safety. Cyber Security for Airworthiness (CSA) measures are required to identify and mitigate against inadvertent or malicious introduction of such cyber vulnerabilities, to maintain Airworthiness. This RA sets out the CSA requirements for Air System Type Design and Changes / Repairs to Type Design throughout the life of an Air System.

Contents

Regulation 5890(1)

Cyber Security for Airworthiness and Air Safety – Type Design and Changes / Repairs to Type Design

5890(1) Type Airworthiness Authorities (TAA)[1] **shall** ensure Air System Type Design[2] and Changes / Repairs to Type Design[3] are assessed for cyber threats, which once identified are suitably mitigated to combat the potential negative impact on CSA and Air Safety; this applies to all Air Systems on, or destined for, the UK Military Aircraft Register (MAR).

Acceptable Means of Compliance 5890(1)

Cyber Security for Airworthiness and Air Safety – Type Design and Changes / Repairs to Type Design

1. TAAs **should** use a recognized Cyber Security Risk Assessment and mitigation process[4], this can be as part of Air System Certification activity[2].

2. The fundamental requirements of any such process **should** identify:

   a. Cyber security threats (“Threat Conditions” in DO-326A).

   b. How cyber security threats can be caused (“Threat Scenarios” in DO-326A).

   c. The severity and likelihood (“Level of Threat” in DO-326A) covering each identified threat.

   d. Suitable mitigation (“Security Measure” in DO-326A) to manage the Level of Threat.

3. The TAA **should** provide appropriate Instructions for Sustaining Type Airworthiness (ISTA)[5] to the relevant Aviation Duty Holder (ADH) / Accountable Manager (Military Flying) (AM(MF)), including security event management procedures[6]. This is consistent with RTCA DO-355A / EUROCAE ED-204A, which refers to Instructions for Continuing Airworthiness (ICA)[7], the civil equivalent of ISTA.

[1] Where the Air System is ►not UK MOD owned, Type Airworthiness (TAw) management◄ regulatory responsibility by either the TAA or Type Airworthiness Manager (TAM) needs to be agreed within the Sponsor’s approved model ►◄ ; refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems or refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAw responsibilities TAM may be read in place of TAA as appropriate throughout this RA.
[2] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B).
[3] Refer to RA 5820 – Changes in Type Design (MRP Part 21 Subpart D), and RA 5865 – Repairs (MRP Part 21 Subpart M).
[4] Refer to Radio Technical Commission for Aeronautics (RTCA) DO-326A – Airworthiness Security Process Specification; or EUROCAE ED-202A – Airworthiness Security Process Specification. DO-326A / ED-202A is accompanied by associated DO-356A / ED-203A – Airworthiness Security Methods and Considerations.
[5] Refer to RA 5815 – Instructions for Sustaining Type Airworthiness.
[6] DO-392 / ED-206 – Guidance on Security Event Management are recognized standards.
[7] Refer to RTCA DO-355A / EUROCAE ED-204A – Information Security Guidance for Continuing Airworthiness (note that DO-355 is titled ‘Continued Airworthiness’, DO-355A still refers to Continuing Airworthiness throughout the standard despite title of document).

Acceptable Means of Compliance 5890(1)

4. Upon a change (ie Change / Repair to Type Design) to the Air System that affects the known cyber threats or generates new known threats[8], the TAA **should** inform the ADH / AM(MF), to gain acceptance of any increased Risk[9].

5. During the process used to identify cyber security threats, the security measures **should** be consistent with the principles of JSP 440[10].

Note:

JSP 440 is aimed at all security threats, not only those necessary to preserve Air Safety and Airworthiness, but ensuring consistency helps to integrate CSA into the wider security arrangements. This is consistent with Defence Standard (Def Stan) 00-970[11] Guidance Material (Parts 1,3,5 and 7) Guidance for Cyber Security Airworthiness para b, which acknowledges that JSP 440 does not cover design Assurance.

Guidance Material 5890(1)

Cyber Security for Airworthiness and Air Safety – Type Design and Changes / Repairs to Type Design

6. To harmonise the approach taken to address Risks to CSA, as in RTCA DO-326A / EUROCAE ED-202A and RTCA DO-356A / EUROCAE ED-203A, this RA captures the considerations for Air System Type Design and Changes / Repairs to Type Design. It is recognized that DO-326A / ED-202A has been developed for use on large civil Aircraft. As such, some tailoring of the guidance provided therein may be required for military Air Systems.

Note:

RA 1202[12] sets out the CSA operational requirements for management of cyber threats throughout the life of an Air System, based on the principles of the MOD Cyber Compliance Framework[13].

7. **Supply Chain Risk Management.** Information for the Assurance of the supply chain may be found in Def Stan 05-138[14] and Def Stan 05-135[15] (eg counterfeit materiel may not meet the original manufacturer specifications, undermining protection assumptions, and compromised materiel could deliberately introduce vulnerabilities). The National Cyber Security Centre (NCSC) also provides guidance on Assurance of supply chains.

8. **Comparison to Air System Safety Assessment**. The similarity of security assessment to Safety Assessment is already acknowledged by Def Stan 00-970 (Parts 1,3,5 and 7) Guidance Material. This similarity can be exploited to utilize the two assessments during System development, as well as improve the understanding of security considerations (by comparing them to those for Safety). The following table suggests such a comparison:

Table 1 – Mapping Between Security and Safety Assessment Terminology

Security term	DO-326A section	Corresponding Safety term
Threat Condition (which "… arise [from] vulnerabilities")	3.2.1 para 1	Hazard (or "Failure Condition*" in Aerospace Recommended Practices (ARP)
Threat Scenario ("…lead[s] to threat conditions")	3.2.2 para 2	Cause

[8] RTCA DO-356A details both acceptable qualitative and quantitative methods of Risk Assessment.
[9] Refer to RA 1015 – Type Airworthiness Management – Roles and Responsibilities, and RA 1210 – Ownership and Management of Operating Risk (Risk to Life).
[10] Refer to JSP 440 – The Defence Manual of Security.
[11] Refer to Def Stan 00-970 – Design and Airworthiness Requirements for Service Aircraft.
[12] Refer to RA 1202 – Cyber Security for Airworthiness and Air Safety.
[13] A copy of the MOD Cyber Compliance Framework should be requested from the contracting organization.
[14] Refer to Def Stan 05-138 – Cyber Security for Defence Suppliers.
[15] Refer to Def Stan 05-135 – Avoidance of Counterfeit Materiel.

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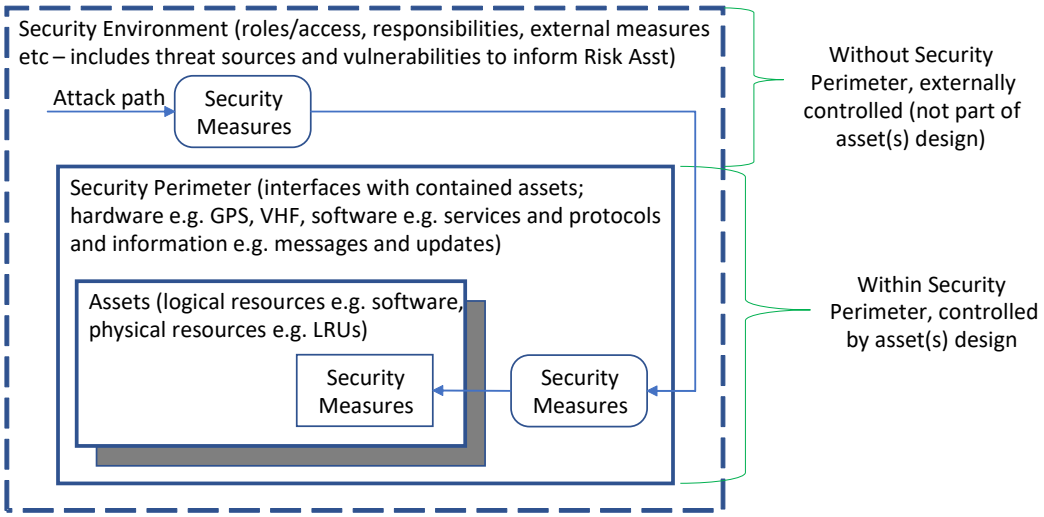
Security Measure	3.2.3 (see also 3.4.2)	Mitigation / Control / Barrier
Security term	**DO-326A section**	**Corresponding Safety term**
Level of Threat ("the possibility that threat scenarios cause a threat condition")	3.2.4 para 1	Hazard probability (from combined causes)

** Failure Condition is a better mapping, as that has Safety effects and severity (which a Hazard would normally not have)*

9. **Security Risk Assessment**. Security Risk Assessment is performed on the Security Architecture (see Figure 1), as defined in DO-326A para 3.4.1, and identifies Security Risks. If these Risks are acceptable without further mitigation, the following sections (Security Effectiveness (DO-326A 3.3) and Security Development (DO-326A 3.4)) are not required.

Figure 1 – DO-326A Basic Concepts, Showing Scope of Security Assessment



10. If further Security Measures are required to discharge the Security Effectiveness section (3.3) of DO-326A, this can be considered equivalent to Risk Reduction in the Safety Assessment process. The security process takes the Security Risk Assessment outputs and determines what level of Security Effectiveness is required. Security "Effectiveness" (DO-326A para 3.3.2.1) considers the combination of Threat Level (Probability) and Severity.

11. **Security Measures**. Security Measures (as defined in DO-326A para 3.2.3) are developed in two main parts:

a. Security Development (requirements, architecture); part of an Air System's development.

b. Security Assurance (vulnerability mitigation through Development Assurance Levels); part of integral (Safety) processes (eg Verification and Validation).

Note: DO-326A causes potential confusion by mixing the terms Security Development and Security Assurance in para 3.3.2.3.

12. **Security Effectiveness Requirements**. Security Effectiveness Requirements (DO-326A para 3.3.2.2) are equivalent to Derived Safety Requirements, in that they aim to reduce the Risk to a level that is acceptable. In this way, they are derived ("bottom-up"), as opposed to requirements which are "top-down" (flowed down from an Air System's requirements).

13. **Security Development**. Security Development is the final main part of the DO-326A process, described in its section 3.4. Its main purpose aims to develop and categorise the required Security Measures, developed as part of Security Development and Assurance (see above). Security Measures can be likened to any

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other functional requirements, and so can be developed using processes already in place to comply with ARP 4754A[16] or equivalent.

Note:

DO-326A section 2 and Appendix A are closely tied to ARP 4754A, so its use within the MRP for CSA considerations is consistent with other military usage of ARP 4754A.

14. Security Measures are developed in two main categories:

a. Technical (functions, systems).

b. Procedural (including policies and human interactions).

15. **Verification of Security Measures**. Verification of Security Measures includes testing that would apply to any other requirement (ie correctness of implementation and robustness, as well as specific-to-security vulnerability testing and / or analysis[17]). It is important to note that with modern complex Air Systems, testing alone cannot give sufficient Assurance, and so analysis is almost always required in addition to testing.

16. **Cyber Security Artefacts**. Although the list is not exhaustive, the below artefacts are detailed in DO-326A, which is an AMC for Def Stan 00-970 alongside DO-356A:

a. Plan for Security Aspects of Certification (PSecAC).

b. Aircraft Security Scope Definition (ASSD).

c. System Security Scope Definition (SSSD).

d. Preliminary Aircraft Security Risk Assessment (PASRA).

e. Preliminary System Security Risk Assessment (PSSRA).

f. System Security Risk Assessment (SSRA).

g. Aircraft Security Risk Assessment (ASRA).

h. Plan for Security Aspects of Certification Summary (PSecAC Summary).

17. The PSecAC will describe how the intent of DO-326A will be met, with the content based on section A.1.1 of DO-326A. The ASSD and SSSD are used to determine the scope of the Air System for cyber / information security, as well as the interaction the Air System may have with external systems; this scope will be the foundation of a PASRA / PSSRA.

18. Undertaking a PASRA / PSSRA will identify threat conditions and threat scenarios, assessing an Air System's security Risks at Aircraft / system level respectively. Security Assessment Criteria (SAC) and Airworthiness Security Risk Matrix are examples of tools used to facilitate a PASRA.

19. Completion of an ASRA and SSRA is used to identify threat conditions and threat scenarios and assess the Air System's cyber security threats and vulnerabilities. Following this activity, Risk mitigation strategies are then developed and assured in accordance with DO-326A. The results of the analysis and subsequent assessments with associated mitigations are then summarised in the PSecAC Summary, before being communicated to the ADH / AM(MF), including any residual Risks or areas where there are gaps in analysis.

[16] Refer to ARP 4754A – Guidelines for Development of Civil Aircraft and Systems.

[17] A weakness of DO-326A is that analysis is limited to that of test results, as opposed to the more systematic approach (eg architectural analysis).