

<b>Technical Airworthiness Authority Advisory (TAA Advisory)</b>	
Title	<b>Continuing Airworthiness Requirements for Uncrewed Aircraft Systems</b>
TAA Advisory Number	<b>2013-05-v3e</b>
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Reference	<b>TAM Part 3</b>
RDIMS File	<b>2182-1027-812-6 VOL 1, AEPM 1304885 (English) AEPM 1309800 (French)</b>

## **1. Purpose**

- 1.1 This Technical Airworthiness Authority (TAA) Advisory provides clarification and guidance pertaining to the standards governing the Department of National Defence (DND) continuing airworthiness requirements for supporting an Uncrewed Aircraft System (UAS) that requires, or intends to request, an airworthiness clearance (AC).
- 1.2 For guidance on initial Technical Airworthiness Clearance (TAC) requirements, refer to TAA Advisory 2014-02 (reference 3.3.3.b).
- 1.3 This TAA Advisory is not mandatory, nor does it constitute a regulation. It describes a means acceptable to the TAA, but it is not the only means to demonstrate compliance with the regulation(s). If you choose to use this TAA Advisory for guidance, then all of its aspects must be followed.

## **2. Applicability**

- 2.1 This TAA Advisory is applicable to Project Management Office staff responsible for the implementation of a continuing airworthiness support system for an Uncrewed Aircraft System.

## **3. Related Material**

### **3.1 Acronyms**

- a. AAB: Airworthiness Advisory Board
- b. AAR: Annual Airworthiness Report
- c. AC: Airworthiness Clearance
- d. AEPM: Aerospace Equipment Program Management
- e. AMP: Airworthiness Management Plan
- f. BN: Briefing Note
- g. CFSS: Canadian Forces Supply System
- h. ISS: In-Service Support
- i. MAP: Manual of Aerospace Procedures
- j. OEM: Original Equipment Manufacturer
- k. RTS: Release to Service
- l. SOI: Statement of Operating Intent
- m. SOW: Statement of Work
- n. SSI: Statement of Support Intent

- o. TAA: Technical Airworthiness Authority
- p. TAC: Technical Airworthiness Clearance
- q. TCH: Type Certificate Holder
- r. TAM: Technical Airworthiness Manual
- s. UA: Uncrewed Aircraft
- t. UAS: Uncrewed Aircraft System
- u. WSM: Weapons System Manager

### 3.2 Definitions

- a. **Continuing Airworthiness.** Continuing airworthiness involves those activities necessary to ensure that aeronautical products continue to meet the appropriate airworthiness rules and standards throughout their operating life. Continuing airworthiness is an integral part of the day-to-day management and monitoring of an approved type design and its associated aeronautical products, after a type certificate has been issued. Compliance with airworthiness standards during the in-service period ensures that the initial inherent safety of the approved type design and the actual aeronautical products are maintained throughout the product life cycle.

#### NOTE

*The requirement to administer continuing airworthiness management and monitoring is not limited to cases where the aeronautical product has been issued a type certificate. For example, some categories of UAS will be required to maintain a continuing airworthiness system, even when a type certificate is not issued.*

- b. **Uncrewed Aircraft (UA).** A UA is any uninhabited, powered air vehicle operated remotely and/or autonomously. Ammunition, projectiles and missiles are not UA.
- c. **Uncrewed Aircraft System (UAS).** A UA System includes the air vehicle, launch and recovery systems, if used, any ground control stations and all communication links.

### 3.3 Regulatory References

- 3.3.1 A-GA-005-000/AG-001 – *Department of National Defence and the Canadian Armed Forces (DND/CAF) Airworthiness Program*
- 3.3.2 C-05-005-001/AG-001 – *Technical Airworthiness Manual (TAM)*
- 3.3.3 Civil and/or other military airworthiness regulations/advisories
  - a. C-05-005-P12/AM-001 – Aerospace Equipment Program Management Division *Engineering Process Manual (EPM)*
  - b. TAA Advisory 2014-02 – *Technical Airworthiness Clearance Requirements for Class 1 Uncrewed Aircraft Systems (UAS) – Type Design and Aeronautical Product*
  - c. AEPM MAP Online Procedure DG09.017 – *Annual Airworthiness Review Board (ARB)*
  - d. AEPM MAP Online Procedure DG01.003 – *Airworthiness Risk Management Process*
  - e. CANFORGEN 080/15 – *Implementation of NATO UAS Classifications*
  - f. NATO Standard ATP-3.3.8.1 – *Guidance for the Training of UAS Operators*
  - g. Briefing Note for RCAF Commander – *An Alternative to Airworthiness Clearance and Release to Service for Class 1 Open UAS*

## 4. Discussion

- 4.1 The DND/CAF Airworthiness Program (reference 3.3.1) classifies a UAS as an aeronautical product. As such, it is subject to regulation under the Airworthiness Program and must follow its

Airworthiness Clearance (AC) and Release to Service (RTS) processes. The TAA has issued Technical Airworthiness rules and standards applicable to all aeronautical products in the *Technical Airworthiness Manual* (TAM). This TAA Advisory provides the required guidance on how to apply the continuing airworthiness requirements of the TAM to UAS.

**NOTE**

*For UAS, it is possible to minimize the risk to other aircraft and individuals on the ground by controlling the airspace (e.g., Class F) and area of operation. In addition, some UAS are very small, resulting in very little kinetic energy in the event of an impact with another object. This is the reason why the TAA can adjust airworthiness requirements for UAS and still maintain an acceptable level of safety.*

4.2 This TAA Advisory uses the Canadian Armed Forces UAS Categorization System approved at reference 3.3.3.g, which is also consistent with the NATO Standard ATP-3.3.8.1 (reference 3.3.3.f.) and in accordance with the CANFORGEN 080/15 (reference 3.3.3.e.). Four (4) categories of airworthiness regulatory oversight are available, based on weight, usage, training and other factors. This results in the following possibilities for UAS, as shown in Figure 1:

Category	CERTIFIED			SPECIFIC		OPEN		SUB-MICRO
Class	Class 3 > 600kg	Class 2 ≤ 600kg ≥ 150kg	Class 1 Small/Mini < 150kg ≥ 1kg	Class 2 ≤ 600kg ≥ 150kg	Class 1 < 150kg > 250g	Class 1 Mini ≤ 15kg ≥ 1kg	Class 1 Micro < 1kg > 250g	UAS 250 grams or less
Operational Scenario	All classes of airspace			Standard Scenario Based		As per conditions		As per conditions
Type Certificate/TCDS	Yes Military Type Certificate (MTC)			TBD		No. Command Approval for Operation		No
Accredited WSM	Yes			TBD		No		No
Operational Restrictions	No			Yes		Yes		Yes
Beyond Visual Line of Sight (BVLOS)	Yes			Yes		No		Yes, within ¼ nm of operator
Populous Overfly	Yes			Situation Dependent		As per conditions		Yes
UAS Operator Requirement	Military Pilot		Trained UAS Operator	Trained UAS operator, based on specific scenario		As required for conditions		Basic UAS training
Registration Requirement	Yes			Asset Register		Asset Register		Nil
UAS Marking in accordance with CFTO	Yes			No – DND identification/ Serial Number		No – DND identification/ Serial Number		Nil

Figure 1. CAF UAS Categorization

4.3 The following descriptions expand on the criteria and requirements for each of four (4) categories of UAS:

- a. **Certified.** All classes of UAS (i.e., Class 1, 2, or 3), with operations permitted in all types of airspace, conducting the full spectrum of UAS operations, without limitations. The highest level of certification and training is required. Any UAS operating in this category will require a full AC and RTS, and must have a Weapons Systems Manager (WSM) to manage the fleet, as in the case of crewed aircraft;
- b. **Specific.** Class 1 or Class 2 UAS, with operational restrictions that prohibit operation in all types of airspace and scenarios. This category will encompass those UAS that do not require a full AC, but need to conduct tasks that are more complex than what can be authorized within the Open Category. Technical and/or training requirements will be dependent on the specific scenarios;

- c. **Open.** Class 1 Mini and Micro UASs that are operated in accordance with the conditions defined in reference 3.3.1. When operated in this manner, no AC or RTS is required. The responsibility for the operation of these UAS, and for the training of operators, is delegated to L1 Commanders. Furthermore, no formal fleet management is required, even though these UAS are tracked by 1 Canadian Air Division Staff Officer (SO) UAS and will be briefed to the Airworthiness Review Board (ARB) and the Airworthiness Advisory Board (AAB); and
  - d. **Sub-Micro.** All UAS under 250 grams and subject to some operational limitations, predominately operating below 300 feet above ground level and within one-quarter nautical mile of the operator. Under this weight, there is such a small risk of injury or death to personnel, or damage to aircraft, that these UAS can be essentially unregulated.
- 4.4 The “Certified” category of UAS is required to meet all TAM requirements associated with sustaining Continuing Airworthiness for an aeronautical product.
- 4.5 To be deemed compliant by the TAA, the “Specific” category of UAS is required to meet the Continuing Airworthiness requirements provided in Section 4.7 of this advisory.
- 4.6 The “Open” and “Sub-micro” categories of UAS are not required to meet any TAM requirements associated with sustaining Continuing Airworthiness for an aeronautical product.
- 4.7 **Acceptable Means of Compliance**
- 4.7.1 In order for the TAA to issue a Technical Airworthiness Clearance (TAC) for a UAS of “Specific” category, an In-service Support (ISS) Program that provides an acceptable level of safety is required. For the “Specific” category of UAS, the TAA will accept an ISS Program that is based on DND/CAF and Industry best practices. The ISS Program will need to provide for a DND/CAF Type Certificate Holder (TCH), and Engineering, Maintenance and Logistics Support.
- 4.7.2 The ISS Program is developed by the PMO using the fleet’s Statement of Operating Intent (SOI) and Statement of Support Intent (SSI). Based on these two documents, the TAA Staff can work with the PMO to tailor the continuing airworthiness requirements, depending on the UAS complexity and capabilities. As a minimum, the ISS Program must encompass the following requirements, listed in paras 4.7.2.1 to 4.7.2.4 of this advisory.

**NOTE**

*Examples of Statement of Operating Intent and Statement of Support Intent for the CU172 Blackjack UAS are available internally, within DND, at AEPM RDIMS library, at #1859767 and #1859764, respectively.*

- 4.7.2.1 Type Certificate Holder (TCH) Requirements – An organization acceptable to the TAA must be designated as a TCH organization. The UAS TCH organization will have the following responsibilities:
- a. Nominate an individual within the TCH organization, who is acceptable to the TAA, as the UAS Senior Design Engineer (SDE);
  - b. Gain Accreditation as an Acceptable Technical Organization (ATO) that covers the scope and depth of work performed within the ATO;
  - c. Prepare, for TAA approval, an Engineering Process Manual that covers the scope and depth of work performed within the ATO;
  - d. Ensure the establishment and maintenance of data, such as: operating instructions, maintenance manuals, drawings, part catalogues and any materiel needed to support the UAS for the life of the project;
  - e. Ensure TAA access, when requested, to any data generated within the ISS system for the life of the project;
  - f. Monitor the UAS in service and implement corrective action for airworthiness-related issues;
  - g. Prepare an Annual Airworthiness Report (AAR) to be presented to the ARB as required by reference 3.3.3 c;

- h. Manage airworthiness risks identified during the operational service in accordance with reference 3.3.3.d;

**NOTE**

*The TCH organization will require an assignment of authority from the TAA to approve the content of a risk assessment. This will require the TCH organization staff to take the AEPM Risk Management Course and have engineering and technical knowledge of the UAS system they are supporting.*

- i. Ensure that the configuration management of the UAS is established and maintained for the life of the project;
- j. Establish and maintain arrangements with organizations providing the required engineering, logistic and maintenance support; and
- k. Establish appropriate technical support processes that can be used to convey and manage design changes, repair designs, deviations, flight permits, maintenance and operational publication changes, and technical guidance to operating organizations.

4.7.2.2 Engineering Support Requirements – The organization that will provide engineering support to the UAS must be recognized as an Acceptable Design Organization by the TAA. This normally requires TAA staff to travel to the engineering organization to conduct a review related to the core engineering support processes that will be applied to the UAS. The UAS engineering support program evaluated by the TAA will cover:

- a. Configuration management;
- b. Engineering (design) change approval;
- c. Technical and operational manual management;
- d. Supplier management and customer parts support;
- e. Technical problem support, including:
  - i. Technical queries;
  - ii. Non standard repairs;
  - iii. Field Service Representatives; and
  - iv. Maintenance program deviations.
- f. Training program for engineering staff;
- g. In-service monitoring of customer/supplier problems; and
- h. Quality management system.

**NOTE**

*Where engineering support is not provided by the UAS OEM, a support arrangement with the UAS OEM, or a specialist engineering organization with extensive engineering experience with the UAS type and access to original design and continuing airworthiness data, will be required. As a minimum, the support arrangement will need to provide for in-service support for engineering (design) change approvals, configuration management and customer part support. The organization providing engineering support will require Recognition as an Acceptable Design Organization by the TAA.*

4.7.2.3 Maintenance Support Requirements – The organization that will be providing maintenance support to the UAS must be Accredited or Recognized by the TAA as an Acceptable Maintenance Organization (AMO). This may require TAA staff to travel to the maintenance organization to conduct a review related to the core maintenance support processes that will be applied to the UAS. The UAS maintenance support program evaluated by the TAA will cover:

- a. Training program;

**NOTE**

*The training program can be tailored to the complexity of the UAS being supported. For example, a technician performing repair and overhaul on a UAS engine might require “two stroke small engine” training, whereas a technician working on an aircraft engine would require significantly more training and experience before being allowed to perform maintenance. It is also acceptable for a support organization that utilizes technician trades built around land vehicles or weapons to apply those skill sets to a UAS. The TAA will evaluate the complexity of the UAS maintenance against the proposed technician trade structure.*

- b. Qualification and authorization process;
- c. Maintenance certification process;
- d. UAS release to operations process;
- e. Maintenance record management;
- f. Maintenance scheduling and control;
- g. Parts control;
- h. Access to special tools and test equipment;
- i. Access to facilities suitable for the scope of work being performed;
- j. Maintenance publication management;
- k. Flight Safety reporting; and
- l. Quality management system.

**NOTE**

*The TAA will evaluate the complexity of the work performed to support a UAS of the “Specific” category to determine if the maintenance support program requires “maintenance release” or “aircraft release”, as stipulated in the TAM. In addition, the lines and level of maintenance between first, second and third may be used to identify a line or level of maintenance that does not require a “maintenance release” or “aircraft release”. Where the complexity of the work performed requires an assignment of authority from the TAA, the maintenance organization will require an Accreditation. This will require the preparation of a TAA Maintenance Process Manual (MPM) covering the scope and depth of work performed, and the nomination of an individual to be authorized by the TAA as a Senior Maintenance Manager.*

4.7.2.4 Logistics Support Requirements – The organization that will be providing logistics support to the UAS is assessed by the TAA. This may require TAA staff to travel to the logistics support organization to conduct a review related to the core logistics support processes that will be applied to the UAS. The UAS logistics support program evaluated by the TAA will cover:

- a. Receiving of parts;
- b. Packaging and handling;
- c. Storage;
- d. Shelf life control;
- e. Part documentation control;
- f. Vendor selection and parts ordering; and
- g. Quality management system.

## NOTE

*The CAF Supply System (CFSS) is acceptable for providing logistics support to aeronautical products. If the CFSS is used, the TCH organization will be required to ensure that only approved UAS parts are procured for use on the UAS, and controlled through the CFSS.*

## 5 Additional Airworthiness Considerations

### 5.1 Technical Airworthiness Authority Oversight

5.1.1 The TAA staff may require access to contractor and DND facilities to perform the initial in-service support system evaluation and any audits, review or evaluations conducted during in-service UAS operations. Where the TAA identifies that an audit, review, or evaluation is required, the following support will be needed from the organization being assessed:

- a. On-site support to the audit team, including office space to conduct meetings and interviews;
- b. Access to qualification and authorization files of staff supporting the UAS;
- c. Access to engineering, technical and maintenance specialists within the organization supporting the UAS for discussions and interviews;
- d. Access to work orders and other technical data generated within the organization supporting the UAS;
- e. Access to engineering and technical information used in support of the continued airworthiness of the UAS;
- f. Access to the organization's records and reports that support the Quality Management System registration;
- g. Access to organizational manuals, procedures and instructions used to support the UAS;
- h. Technical and management staff to support DND auditors; and
- i. Preparation of Corrective Action Plans, when required, that are acceptable to the TAA.

5.1.2 In addition to the TAA oversight of any of the UAS ISS organizations that may occur, TAA staff will, as a minimum, review the Annual Airworthiness Report (AAR) produced by the TCH organization, and all risk assessments generated during in-service operations.

### 5.2 Contract Considerations

5.2.1 Where activities identified within the UAS ISS Program are performed by a contractor, the Statement of Work (SOW) should include provisions for the TAA organizational assessment that will be required to support the initial Technical Airworthiness Clearance. In addition, the SOW will need to identify that the contractor will be required to support in-service TAA audits on an "as required" basis, and rectify any findings identified during an audit, review or evaluation to the satisfaction of the TAA.

5.2.2 Where activities identified within the UAS ISS Program are managed by an organization that is not the UAS OEM, the contract will need to have provisions that ensure that the managing organization establishes a support contract with the UAS OEM for engineering support services. If the ISS services contract does not establish this requirement, the contracted managing organization would be subject to the full provisions of the TAM Part 1, Chapter 4, for Accreditation or Recognition as an ADO/ATO for the scope of the UAS engineering support work performed.

5.2.3 If a significant portion of the ISS Program is performed by a contractor, the SOW shall have provisions to establish a contractor Airworthiness Manager, who will be responsible for the implementation and management of the contractor's airworthiness program. The contractor's Airworthiness Manager will act as the main Point of Contact (POC) for all airworthiness matters. The Airworthiness Manager will have the responsibility to facilitate and deliver the support required to meet all of the TCH organization's responsibilities detailed in paragraph 4.7.2.1.