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Standard Guide for Suggested Procedures for Applying for a Flight Authority for an Unmanned Aircraft System: Part I and Part II¹

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INTRODUCTION

Civil Aviation Authorities (CAAs) generally require that any person operating an Unmanned Aircraft System (UAS)² hold a Flight Authority (FA) issued by the CAA. At this time procedures and requirements for FAs for UAS are under development. Similarly, development of UAS is in an early stage, with several hundred types proposed by a multitude of organizations and individuals. In many cases, proponents of UAS do not enjoy an extensive experience in aviation regulations and are ill-equipped to interact with the CAAs on important safety issues. Following some discussion of general issues in Sections 1 and 2, the remainder of this guide is divided into two parts, as discussed below.

1. Scope

1.1 This document is provided as an introductory guide to assist developers in interactions with CAAs. Part I provides guidance for obtaining a FA for experimental and developmental work, while Part II describes some of the issues to be addressed when seeking a Type Certificate. Many readers will not need to read Part II as it relates to a much more rigorous and structured procedure that is expected to be applied when the developer wishes to have the UAS used in commercial operations. The material presented here is primarily based on existing practices, procedures and regulations of the U.S. Federal Aviation Administration. Many countries adopt FAA procedures directly, while others, such as the European authorities, Australia and Canada, work with the FAA to ensure that regulatory practices are harmonized to the maximum extent practical. The guidance presented here is anticipatory, since it is likely that new regulations specific to UAS will be issued in due course; the contents of this document builds on existing regulations while looking forward to future changes.³

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² The Federal Aviation Administration has adopted the acronym UAS to emphasize that the flight component is an aircraft, and it is part of the system. Other jurisdictions continue to use the term vehicle. In this guide, the term aircraft will be used, except where referring to an existing document.

³ The most up-to-date official FAA policies and developing procedures are available from Federal Aviation Administration (FAA), 800 Independence Ave., SW, Washington, DC 20591, <http://www.faa.gov>.

1.2 The FAA requires that a civil UAS, with the exception of those that are Public aircraft, must obtain an Experimental Certificate before operating in the National Airspace System (NAS). The procedures for obtaining a civil Certificate of Airworthiness (CofA) are contained in 14 CFR Part 21 of the Federal Aviation Regulations (FAR Part 21).⁴ Civil UAS that expect substantially routine access to the NAS, operating for compensation and hire, will need to undergo a full FAR Part 21 Type Certification, followed by the issuance of an FAA standard CofA. The existing procedures for Type Certification are discussed in Part II of this Guide. Based on experience with conventional civil aircraft certifications, the procedures and requirements associated with the type certification process and issuance of a standard CofA are demanding, costly and time-consuming. Since UAS represent a new class of aircraft, the procedure will no doubt be rigorous.

1.3 Many of the regulations and standards required for full application of standard airworthiness certification to UAS have not yet been developed. For an interim period, as the FAA and others develop and implement a civil UAS regulatory framework, the FAA is allowing individual civil UAS to have limited access to the NAS when they satisfy requirements for a FAR Part 21 Experimental Certificate. With an Experimental Certificate, operational use of the UAS is strictly defined and substantially limited, and the associated airworthiness requirements are less demanding than they would be for full, standard certification, consistent with the operational limits.

⁴ In this document the designation 14 CFR Part XX will be replaced by "FAR Part XX".

1.4 This is clearly a time of transition for civil UAS regulation. It is also a time of transition for the communities of users and manufacturers of civil UAS, many of whom have relatively little experience in the regulated civil aviation domains. This document is meant to provide a bridge for these UAS practitioners, as the era of regulated commercial UAS emerges.

1.5 *Objectives*—The objectives of this recommended practice document are to:

1.5.1 Present, in a single, manageable document, an overview of the aircraft certification procedures that will be adapted to the needs of UAS as the civil UAS regulatory framework takes shape. The procedures will be based largely on the procedures presently applied by the U.S. FAA;

1.5.2 Describe the procedures and requirements, based on currently available policy information, that govern the issuing of a FAR Part 21 Experimental Certificate for a UAS; and

1.5.3 Describe, in some detail, the processes that are anticipated for achieving Type Certification of a UAS.

1.6 *Outline*—This document will begin with an overview of the regulatory structure as it currently is applied, followed by a discussion of some specific issues that relate to acquiring approval for operation of a UAS. This discussion includes a general description of Flight Authorities. This is followed by Part I, a review of procedures that presently apply to gaining approval for experimental operation of a UAS; and Part II, the procedures that may be expected to apply to a Type Certificate for a UAS. Flight Authorities obtained by following procedures in Part I may not permit operations for hire and compensation. Part II is provided for applicants who may wish to obtain full certification of their system in anticipation of commercial operations within the airspace under the jurisdiction of the appropriate CAA. Proponents who may wish to pursue full Type Certification should first become familiar with the contents of Part I.

2. Referenced Documents

2.1 *ASTM Standards*:⁵

F2505 Practice for Application of Federal Aviation Administration (FAA) Federal Aviation Regulations Part 21 Requirements to Unmanned Aircraft Systems (UAS)

2.2 *FAA Standards*:³

14 CFR Part 21 Certification Procedures for Products and Parts

14 CFR Part 91 General Operating and Flight Rules

14 CFR Part 34 Fuel Venting and Exhaust Emission Requirements for Turbine Engine Powered Airplanes

⁵ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

14 CFR Part 36 Noise Standards: Aircraft Type and Airworthiness Certification

FAA Order 8130.2F Airworthiness Certification of Aircraft and Related Products

FAA Order 8130.34 Airworthiness Certification of Unmanned Aircraft Systems

FAA Order 8110.4C Type Certification: Appendix 12

FAA Advisory Circular AC 21-12 Application for a U.S. Airworthiness Certificate

FAA Advisory Circular AC 21.40 Application Guide for Obtaining a Supplemental Type Certificate

FAA Advisory Circular AC 23.1309-1C Equipment, Systems and Installations in Part 23 Airplanes

FAA Interim Operational Approval Guidance 08-01 Unmanned Aircraft Systems Operations in the U.S. National Airspace System

FAA AIR-160 Interim Operational Approval Guidance 08-01 Unmanned Aircraft Systems Operations in the U.S. National Airspace System

2.3 *Canadian Standards*:⁶

Transport Canada Advisory Circular 500-15 Certification Plans

Transport Canada Civil Aviation Regulation (CAR) Section 602.41

Transport Canada Civil Aviation Staff Instruction The Review and Processing of an Application for a Special Flight Operations Certificate for the Operation of an Unmanned Air Vehicle (UAV)

2.4 *Other Standards*:

ICAO ANNEX 16 Noise Standard⁷

CAP 722 Unmanned Aircraft System Operations in UK Airspace - Guidance⁸

Civil Aviation Safety Regulation (Australia) Part 101 Unmanned Aircraft and Rocket Operations⁹

Civil Aviation Safety Authority (Australia) Advisory Circular AC 21-43(0) Experimental Certificate for Large Unmanned Aerial Vehicle⁹

NPA No. 16/05 Policy for Unmanned Aerial Vehicle (UAV) Certification¹⁰

SAE Aerospace Recommended Practice ARP4761 Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment¹¹

⁶ Available from Transport Canada Civil Aviation, 330 Rue Sparks Street Ottawa, Ontario, CANADA, K1A 0N5, www.tc.gc.ca/CivilAviation/menu.htm.

⁷ Available from ICAO, 990 University Street, Montreal CANADA, H3C 5H7, www.icao.int/.

⁸ Available from UK Civil Aviation Authority, <http://www.caa.co.uk/>.

⁹ Available from Civil Aviation Safety Authority, CASA Operations HQ, 12-14 the Circuit, Brisbane Airport, Qld, Australia, 4007, www.casa.gov.au/.

¹⁰ Available from European Aviation Safety Agency (EASA), http://www.easa.europa.eu/ws_prod/index.html.

¹¹ Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, <http://www.sae.org>.

PART I

3. Background

3.1 At this time, regulatory agencies are developing procedures and requirements for UAS that will assure an acceptable level of safety consistent with that demonstrated by other components of the aviation community. Risks to other users of the airspace and risks to persons on the surface are the targets of these future regulations. The specific requirements to be applied are presently undefined, and not all Civil Aviation Authorities (CAAs) have determined how they will classify UAS to identify which will be subject to certification, or which systems will be substantially unregulated. While developing regulations and requirements, some CAAs are dealing with certification of civil UAS on a case-by-case basis. Nevertheless, certifying authorities, such as the Federal Aviation Administration (FAA) or the European Aviation Safety Agency (EASA), expect organizations applying for certification of a UAS to demonstrate a reasonable level of understanding of the general procedures to be followed to achieve certification.

3.2 Some CAAs have developed preliminary procedures for issuance of very restrictive flight authorities for UAS. The EASA has decided that it will be responsible for UAs of Gross Take Off Weight of 150 kg or more, while lighter aircraft are regulated by individual countries (NPA No. 16/05). For example, the UK CAA has established a policy for aircraft of takeoff weight less than 150 kg (CAP 722 and Haddon and Whittaker¹²). In the U.S., the FAA has imposed no weight limitation for Special Certificates of Airworthiness, Experimental for UAS. Guidance for application for Special Certificates of Airworthiness for UAS can be found at FAA Orders 8130.2F and 8130.34, and Advisory Circular AC 21-12.³ The authorization typically restricts the flight to low altitudes, not near other aircraft, and to daytime operations within visual range. Other agencies impose similar restrictions. The FAA has recently clarified its policy regarding UAS operations in the National Airspace (NAS) through the publication of an important policy document. (See FAA AIR-160 Interim Operational Approval Guidance 08-01).

3.3 Experience has shown that some organizations proposing new UAS products are relative newcomers to the aviation industry and are unfamiliar with the extensive body of regulatory information and the extensive safety related infrastructure that is relevant to the products for which they seek certification. In some cases, operators have attempted to modify existing model aircraft by adding sensors, other payloads and autopilots, without recognizing the regulatory requirements applicable to the proposed operations. The initial development of a new or modified UAS platform, especially those that are “small” (e.g., typically less than a few hundred pounds), may be accomplished by an organization that does not have a large company infrastructure complete with an extensive cadre of experienced aeronautical engineers. Nevertheless, the potential

risk associated with operating a UAS demands strict application of proven aeronautical technologies and safety assessment methods. Even though the proposed design may not be required to achieve full Type Certification, the certifying authority can be expected to impose a process that demands adherence to rigorous safety standards. This Suggested Procedures document aims to provide guidance to proponents of UAS that have limited experience in dealing with aircraft certification.

3.4 While this document focuses attention on procedural issues related to airworthiness certification, operational considerations are equally important. Except for a standard CofA, flight authorities will only be issued when operational questions have been addressed. This document will include a discussion of airworthiness procedural items, based in large measure on the FAR Part 21 (Certification Procedures for Products and Parts) and a brief discussion on operational matters, following the relevant regulatory issues addressed in FAR Part 91 (14 CFR Part 91).

3.5 The recommendations in this document are intended to be generic and not dependent upon the size, weight, speed, or other physical or performance parameter of the aircraft. It is recognized that regulating agencies may decide to not regulate, or only “lightly” regulate UAS for which the assessed risk is acceptably low. The following discussions do not apply to systems that fall in this “low risk” category.

3.6 In many jurisdictions, state or government-owned aircraft are authorized to fly by the application of regulations specifically applicable to Public aircraft. In the U.S., for example, flight authorities for Public aircraft are provided through the Certificate of Authorization (COA) procedure, defined in FAA Order 7610.4, for special military operations, or FAA Order 7210.3 for civil Public Use operations. These special procedures will not be discussed here.

3.7 Requirements for registration and marking will not be discussed in this document. Similarly, requirements related to noise and emissions will not be discussed in this document.

4. Preliminary Issues

4.1 Most countries worldwide accept, or adopt (sometimes with modifications) the regulations and airworthiness standards issued by the FAA or by the EASA. As mentioned earlier, the material presented herein is largely based upon the FAA model, recognizing that many CAAs tend to follow the procedures and practices of the FAA. Major differences from FAA practices that are known to exist among the CAAs will be identified.

4.2 The starting point for understanding the procedures for obtaining a FAA Certificate of Airworthiness is found in FAR Part 21 “Certification Procedures for Products and Parts”. A similar procedures document, IR 21, is issued by EASA. A version of FAR Part 21, modified to include references and procedures appropriate to UAS has been published by the

¹² Haddon, D. R. and Whittaker, C. J., “UK-Caa Policy for Light UAV Systems,” UK Civil Aviation Authority, 2004.