International Civil Aviation Organization

International Regulatory Framework for Remotely Piloted Aircraft Systems

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Overview

- Background on ICAO
- ICAO function re UAS/RPAS regulations
- UAS Study Group
- Work Programme
- Terminology
- Certification
- Licensing
- Technical requirements
- UAS Circular
- SARPS, PANS and guidance material
International Civil Aviation Organization

- Specialized agency of the United Nations
- Created 7 December 1944 in Chicago with the signing of the ‘Chicago Convention’
- Addresses all aspects of civil aviation
- 190 contracting States
- Agree on principles and arrangements for international civil aviation to develop in a safe and orderly manner
International Harmonization

Convention on International Civil Aviation

Annexes (18 +1)

   Standards and Recommended Practices (SARPs)

Documents

   Procedures for Air Navigation Services (PANS) (4 + 1)
   Guidance manuals (100+)

Circulars

   Technical information of interest to States (300+)
SARPs

- **Standard**
  
  > Doc 8143 “…specification must be such that its uniform application by all Contracting States is necessary in the interest of safety or regularity of international civil aviation.”

- **Recommended Practice**
  
  > Doc 8143 “…application by all Contracting States is desirable, but not essential in the interests of safety, regularity or efficiency of international civil aviation.”
What about unmanned aviation?
Article 8

_Pilotless aircraft_

No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization. Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft.
UAS Study Group (UASSG)

- Established by the ANC in November 2007
- Membership: Australia, Austria, Brazil, Canada, China, Czech Republic, France, Germany, Italy, Netherlands, New Zealand, Norway, Russian Federation, Singapore, South Africa, Sweden, U.K., U.S., CANSO, EASA, EUROCAE, EUROCONTROL, IAOPA, ICCAIA, IFALPA, IFATCA, NATO, RTCA, UVS Intl.

UASSG

- Focal point for all UAS issues within ICAO

- TORs: ...to assist the Secretariat in coordinating the development of ICAO Standards and Recommended Practices (SARPs), Procedures and guidance material for civil unmanned aircraft systems (UAS), to support a safe, secure and efficient integration of UAS into non-segregated airspace and aerodromes.
Integration
ICAO Focus

• International operations
  > assure safety, security, efficiency
  > harmonize across all States, airspaces, aerodromes

• Controlled airspace/aerodromes

• Civil aviation
  > State aircraft (military, customs, police) exempt
Standards Development Cooperation

- ICAO
- States
- EASA
- RTCA
- EUROCAE
- JARUS

International Regulatory Framework for Remotely Piloted Aircraft Systems
UASSG Priorities

• Terminology
• Special authorizations (Article 8 mandate)
• Airworthiness and operational certifications / approvals
• Personnel licensing
• Frequency spectrum (ITU WRC)
• Communication infrastructures (C2, C3)
• Detect and avoid / ACAS
Terminology

Unmanned aircraft - UA (umbrella term)

Unmanned aircraft system - UAS

Remotely piloted aircraft - RPA

Remote pilot station - RPS

Remotely piloted aircraft system - RPAS (RPA+RPS+C2+...)

Remote pilot

RPA observer

RPAS operator certificate - ROC (~ AOC)
Detect and avoid
Handover (between RPS)
Command and control data link - C2
Command, control + ATC comm - C3
Segregated / non-segregated airspace
Integration ???

Issues to be considered:

- Certification: RPA, operator, remote pilot
- Approval: RPAS as a complete system
- Collision and hazard avoidance
- Security: data links, RPA, remote pilot station
- C2 / C3 failure

Ability to act like any other aircraft!
Annex 7 – Aircraft Nationality and Registration Marks

Applicable 15 November 2012

• An aircraft intended to be operated with no pilot on board shall be classified as unmanned

• RPA: an unmanned aircraft which is piloted from a remote pilot station

• Nationality, common and registration marks

• Identification plate
Annex 2 – Rules of the Air

Applicable 15 November 2012

- RPA “shall be operated in such a manner as to minimize hazards to persons, property or other aircraft and in accordance with the conditions specified in Appendix 4”:

  > authorization from State of departure
  > special authorization from all States affected
  > coordination with ATS provider of high seas airspace
  > operated in accordance with conditions specified by State of Registry, State of Operator and States overflown
RPAS shall be approved as a system, additionally:
> the RPA shall have a certificate of airworthiness; and
> associated RPAS components specified in type design shall be certificated and maintained

Operator shall have an RPAS operator certificate

Remote pilots shall be licensed or have their licenses rendered valid
Certificate of Airworthiness

- Issued to RPA
  - RPA must be registered
  - Certificate of Airworthiness considers entire system
  - State of Design of RPA identifies on Type Certificate Data Sheet remote pilot station type(s) which can be utilized + all associated required components
  - Continuing airworthiness of RPA per norm
  - State oversight of remote pilot station essential
  - RPAS Operator Certificate (ROC) details specificities
  - QOS/RCP for C2/C3
The Assembly resolves that:

2. pending the coming into force of international Standards respecting particular categories, classes or types of aircraft, certificates issued or rendered valid, under national regulations, by the Contracting State in which the aircraft is registered shall be recognized by other Contracting States for the purpose of flight over their territories, including landings and take-offs.

Does not override special authorization!
RPAS Approval

• Requirement for a State authority to ensure the RPA + associated components = a safe, operational system
  > C of A for RPA
  > Certificated components
  > Data link requirements

• Details to be developed
RPAS Operator Certificate

• Similar to Air Operator Certificate (AOC)
• Requires operator to configure, maintain, operate airworthy/safe systems with licensed remote pilots, etc
• Provides State oversight of operation
• Requires SMS
Licensing

• Remote pilot
  > Licence issued by State of the RPA and/or remote pilot station - TBD
  > Licence specifies type of RPA(s) and type of remote pilot station
  > Requires many new arrangements
  > Remote pilots not “airmen” or “flight crew”; outside purview of Article 32

• RPA Observer - trained and competent (not licensed)
Technical Requirements

• Detect and avoid:
  > All aircraft
  > Hazards: obstacles, terrain, parachutists, birds, etc

• Handover between remote pilot stations
  > Technical protocols for automatic transfer of C2 data link authority
  > Crew procedures to verify link and ensure ‘relief briefing’
    (analogous to CPDLC handover between ATC facilities)
Technical Requirements

• Distributed between RPA and remote pilot station:
  > Instruments
  > Detect and avoid
  > Transponders (pressure-altitude reporting)
  > Flight recorders
What else is needed?

- Aerodrome operations
  - Joint use, UAS-only
  - Ground maneuvering
  - Markings, signage, lighting
  - Obstacle clearance
- Charting
- Flight planning
  - Aircraft type designators
  - Wake turbulence category
  - RPA indicator for ATC
What else is needed?

• Separation standards
  > Compliance with COM/NAV/SUR?
  > PBN or RVSM requirements?
  > Unusual operating characteristics?

• The list goes on…
Unmanned Aircraft Systems (UAS) (Cir 328)

- Overview of UAS wrt ICAO framework
- Terminology
- Legal considerations (re Articles of the Convention)
- Operations (rules of the air, ATM, SAR, AVSEC, aerodromes, environment)
- Equipment (aircraft, remote pilot station, ANS infrastructure)
- Personnel (remote pilot, ATCO)

Will become obsolete once guidance manual is published. (~2014)
Final thoughts

- ICAO is identifying the issues to be addressed
- Keeping within the existing regulatory framework
- Looking for novel solutions where necessary
- *Unmanned Aircraft Systems (UAS)* – Cir 328
- Will promulgate guidance material in 2014
- SARPs and PANS as material becomes mature
- ICAO UAS Symposium ~April 2014