



TP 15530E

Knowledge Requirements for Pilots of Remotely Piloted Aircraft Systems – Level 1 Complex Operations

First Edition: 03/2025

RDIMS 20176713



Transport
Canada

Transports
Canada

Canada

Table of contents

Preamble	3
Competency Based Training (CBT).....	3
Regulatory history	4
New regulatory structure for RPAS	4
General RPAS exam information	5
Where to write the examinations	5
Examination prerequisites	5
Materials required.....	5
Rewriting of examinations	5
Examination feedback	6
Level 1 complex operations RPA pilot knowledge requirements	6
Recommended study material.....	6
Knowledge areas:	8
Section 1: air law, air traffic rules and procedures (APK)	8
Section 2: RPA airframes, power plants, propulsion, and systems (KNO)	11
Section 3: Human factors (SAW / KNO / LTW / WLM / PSB).....	16
Section 4: Meteorology (APK / KNO)	17
Section 5: Navigation (APK / KNO / SAW / PSD).....	20
Section 6: Flight operations (WLM / SAW / KNO / LTW).....	21
Section 7: Theory of flight (KNO / FPM)	23
Section 8: Radiotelephony (APK / KNO / PSD / COM).....	23

Preamble

This document was prepared by a joint Transport Canada/industry working group.

This knowledge document serves as the ground training and examination guide for pilots of Remotely Piloted Aircraft (RPA) in level 1 complex operations, as outlined in Part IX – Remotely Piloted Aircraft Systems (RPAS) of the *Canadian Aviation Regulations* (CARs). This guide covers the level of knowledge required to operate RPAS in Canada in a Level 1 Complex Operation. The written examinations, as set by Transport Canada, will be in accordance with the knowledge requirements listed in this document. Both this document and the examinations may be amended as required.

Competency Based Training (CBT)

A competency is manifested and observed through behaviours that mobilize the relevant knowledge, skills, and attitudes of a person to successfully carry out activities or tasks under specified conditions. CBT in aviation is effective learning and training that addresses underlying competencies in pilots covering all phases of a pilot's career – from initial to recurrency training and evaluation.

Traditional training is aimed at meeting or maintaining the qualifications requirements – for example, required hours of study, hours of practice, passing a test – where CBT is an outcome-focused integrated training and learning program and provides candidates with the competencies to be safe, highly effective, and efficient in the performance of their duties.

The CBT system, supported by the International Civil Aviation Organization (ICAO) and most airlines, is like the traditional and more familiar instructional system design formats. However, it involves the development of learning objectives based on the 9 Competencies listed in the table below (ICAO excludes Knowledge). These objectives will need to apply to the job requirements and address the most relevant threats according to evidence collected in accidents, incidents, flight operations and training. Certain assessment tools are then used, through multiple observations, to ensure pilots are competent for that job.

Throughout this knowledge requirements document you will see the following acronyms used to begin to lay the groundwork for the future CBT type of training approach aviation will be taking.

Knowledge Areas (CBT)
APK – Application of procedures and compliance with regulations
FPA – Flight Path Management – Auto RPA Control
SAW – Situational Awareness
COM – Communication

FPM – Flight Path Management – Manual RPA Control
KNO – Knowledge
LTW – Leadership and Teamwork
PSD – Problem Solving and Decision Making
WLM – Workload Management

Regulatory history

This document is developed to guide training providers and pilots in the knowledge requirements, training required, and the examination subjects to be covered when operating RPA in level 1 complex operations under Division VI of Part IX of the *Canadian Aviation Regulations* (CARs).

New regulatory structure for RPAS

- RPA are regulated under the CARs. Part IX of the CARs deals with RPA by operating weight and complexity of the operation to be conducted. Prior to the 2025 amendments, Part IX covered up to and including 25 kg (55 lb) flown in visual line of sight (VLOS). Other operations like above 25 kg and BVLOS operations required a Special Flight Operations Certificate – RPAS.
- The 2025 amendments to Part IX added operations of medium RPA that weigh more than 25 kg (55 lb) up to and including 150 kg (331 lb) and introduced rules for beyond visual line-of-sight (BVLOS), sheltered, and extended VLOS operations.
- Operating environments are divided into basic operations, advanced operations, and level 1 complex operations.
- Level 1 complex operations covers small RPA and medium RPA operated in BVLOS below 400 feet in uncontrolled airspace, over unpopulated and sparsely populated areas, and away from aerodromes.
- Other operations using RPA that do not fall within the scope of these regulations will continue to require a Special Flight Operations Certificate–RPAS from Transport Canada.

General RPAS exam information

Where to write the examinations

The examinations required for the operation of RPAS may only be completed online via the Transport Canada Drone Management Portal.

<https://tc.canada.ca/en/aviation/drone-safety>

Examination prerequisites

Candidates for exams must create an account on the Transport Canada Drone Management Portal.

Prior to attempting the Remotely Piloted Aircraft Systems – Level 1 Complex Operations exam the candidate must have completed the required Level 1 complex operations ground school instruction and the Advanced Exam.

NOTE: Applicants must be able to read the examination questions in either English or French without assistance. Requests for accommodations may be made in advance using the contact information in the Drone Management Portal.

Materials required

The examinations are delivered via computer and requires an internet connection. However, we suggest having a pencil and paper handy before beginning the examination, to take notes, make diagrams or execute calculations during the examination.

Time limits and pass marks			
Examination	Questions	Time limit	Pass mark
Remotely Piloted Aircraft Systems – Level 1 complex operations:	50	1 ½ hours	80%

Rewriting of examinations

In the case of any RPAS examination, the examination may be rewritten after 24 hours.

Examination feedback

Feedback statements in the results letter will inform the candidate the subject of questions that were answered incorrectly. Feedback will outline general subject areas, to ensure exam integrity is maintained.

Example of feedback statement:

Identify classes of airspace from an aeronautical chart.

Level 1 complex operations RPA pilot knowledge requirements

Knowledge requirements for RPA pilots operating in level 1 complex operations are shown in the following pages. Sample learning objectives are listed after the topics. The list of sample objectives is not all-inclusive, its purpose is to illustrate the depth of knowledge required to operate RPA in Canadian airspace.

Types of operation (basic operations, advanced operations, level 1 complex operations) are set out in the *Canadian Aviation Regulations*, Part IX. There are different minimum knowledge requirements for the pilots of RPA operating in each of those groups.

Applicants for the pilot certificate – remotely piloted aircraft – Level 1 complex operations shall demonstrate their knowledge by writing the Transport Canada multiple choice examination covering the subjects set out in the *Knowledge Requirements for Pilots of Remotely Piloted Aircraft Systems – Level 1 Complex Operations* (TP 15530).

NOTE: It is encouraged that the candidate also reviews *Knowledge Requirements for Pilots of Remotely Piloted Aircraft Systems, 250 g up to and including 150 kg, Basic and Advanced Operations* (TP 15263) for the Advanced Certificate.

Recommended study material

Transport Canada publications (TP), including the following, may be purchased from retailers, or at the following web site: <http://www.tc.gc.ca/eng/civilaviation/publications/menu.htm>.

- Transport Canada Aeronautical Information Manual (TC AIM) (TP 14371)
<http://www.tc.gc.ca/eng/civilaviation/publications/tp14371-menu-3092.htm>
- AC 903-001 – Remotely Piloted Aircraft Systems Operational Risk Assessment
<https://tc.canada.ca/en/aviation/reference-centre/advisory-circulars#900-series>
- AC 107-002 – Safety Management System Development Guide for Smaller Aviation Organizations
<https://tc.canada.ca/en/aviation/reference-centre/advisory-circulars/advisory-circular-ac-no-107-002>
- Human Factors for Aviation – Basic Handbook (TP 12863),
<https://tc.canada.ca/en/aviation/publications/air-publications-abstracts#tp12863>

- Human Factors for Aviation – Advanced Handbook (TP 12864)
<https://tc.canada.ca/en/aviation/publications/air-publications-abstracts#tp12864>
- Flight Reviewer's Guide for Pilots of Remotely Piloted Aircraft Systems 250 g up to and including 150 kg, Operating within Visual Line-of-Sight (VLOS), Extended Visual Line-of-Sight (EVLOS), Sheltered VLOS, or Level 1 Complex (BVLOS)
<https://tc.canada.ca/en/aviation/publications/flight-reviewer-s-guide-pilots-remotely-piloted-aircraft-systems-250-grams-g-including-25-kilograms-kg-operating-within-visual-line-sight-vlos-tp-15395>

Canadian Aviation Regulations (CARs) are available online at:
<http://laws-lois.justice.gc.ca/eng/regulations/SOR-96-433/index.html>

Transport Canada Tips and best practices for drone pilots:
<https://tc.canada.ca/en/aviation/drone-safety/tips-best-practices-drone-pilots>

NAV CANADA publications, including the following, may be purchased from retailers, or at the following web site:
<http://www.navcanada.ca/EN/products-and-services/Pages/aeronautical-information-products.aspx>

- Aeronautical charts for visual navigation (VNC and VTA)
- Canada Flight Supplement (CFS)
- Canada Water Aerodrome Supplement (CWAS)
- Designated Airspace Handbook

NAV CANADA VFR Phraseology guide
<https://www.navcanada.ca/EN/media/Publications/VFR%20Phraseology.pdf>

RIC-21 – Study Guide for the Radiotelephone Restricted Operator Certificate with Aeronautical Qualification (ROC-A) <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01397.html>

Information on the Transportation of Dangerous Goods is available from Transport Canada.
<http://www.tc.gc.ca/eng/tdg/safety-menu.htm>

RPAS 101 – A general guide for Canadian RPA pilots
<http://www.aerialevolution.ca/rpas101/>

Additional aviation textbooks and other publications produced by commercial publishers can be obtained through training providers, aviation bookstores and similar sources.

Knowledge areas:

Section 1: air law, air traffic rules and procedures (APK)

Aeronautics Act

The RPA pilot operating within level 1 complex operations must be able to:

- Demonstrate a basic understanding of the Act.

Canadian Aviation Regulations (CARs)

Part I – General provisions

101 – Interpretation (definitions)

The RPA pilot operating within level 1 complex operations must be able to:

- Define remotely piloted aircraft.
- Define remotely piloted aircraft system.
- Define command and control link.
- Define control station.

103 – Administration and compliance

The RPA pilot operating within level 1 complex operations must be able to:

- State who may demand to inspect aviation documents.
- State that computer-stored records may be used in place of paper records if measures are taken to protect them.

Part VI – General operating and flight rules

601 – Airspace

Airspace structure, classification, and use

The RPA pilot operating within level 1 complex operations must be able to:

- Identify the altimeter setting region and the standard pressure region.
- Recall that operations in class F special use restricted airspace may require special awareness or the permission of the airspace user agency and where to find that information.

Part IX – Remotely Piloted Aircraft Systems

Subpart 1 – Small Remotely Piloted Aircraft and Medium Remotely Piloted Aircraft

Division I – General provisions

The RPA pilot operating within level 1 complex operations must be able to:

- Define terms used in RPA operations, including: small remotely piloted aircraft, medium remotely piloted aircraft, command and control link, payload, visual observer, mandatory action, BVLOS operation, contingency procedures, contingency volume, flight geography, ground risk buffer, , operational volume, operating weight, populated area, sparsely populated area, RPAS operator, RPAS operator certificate

Division II – General Operating and Flight Rules for All RPAS

The RPA pilot operating within level 1 complex operations must be able to:

- Recall the restrictions to operations in the vicinity of forest fire areas/police/safety agency site.
- Describe the circumstances when an RPA is permitted to be operated in the vicinity of a forest fire/police/safety agency site.
- Recall the prohibitions surrounding commercial air service.

Division VI – Level 1 Complex Operations

The RPA pilot operating within level 1 complex operations must be able to:

- Define how Division VI Part IX applies to different level 1 complex operations.
- Recall the rules regarding the use of visual observers in level 1 complex operations.
- State what aeronautical information must be consulted before flight.
- State which procedures must be established for normal and emergency operations for all small or medium RPA in level 1 complex operations.
- State the minimum distance that a small or medium RPA must remain from a person in level 1 complex operations.
- State the minimum visibility required for the operation of a small or medium RPA in level 1 complex operations.
- State the minimum ceiling required for the operation of a small or medium RPA in level 1 complex operations.
- State the minimum distance that a small or medium RPA must remain from an airport, aerodrome and heliport when conducting a level 1 complex operation.

- Describe the factors that must be included in a site survey for the operation of all small or medium RPA in level 1 complex operations.
- State minimum RPA pilot requirements for a Level 1 Complex Pilot Certificate
- State recency requirements related to a Level 1 Complex Pilot Certificate.
- State when a RPAS Operating Certificate is required.
- Describe when the RPAS requires a declaration under DIV VI.
- Describe when Standard 923 can be used in lieu of a declared DAA system.
- Describe permitted modifications to RPAS used for DIV VI operations.
- Explain how the level 1 complex operations are divided by RPA operating weight, population density and in BVLOS complexity.
- Explain how all operations under this Division must be conducted with a system for which a declaration has been made regarding the technical requirements applicable to the operation.
- Explain how to conduct training on individuals who do not already hold the level 1 Complex Pilot Certificate.
- Explain level 1 complex training provider requirements.

Division X – Training and Flight review

The RPA pilot operating within level 1 complex operations must be able to:

- State what is required to conduct a flight review for a pilot certificate—Level 1 complex operations.

Division XII – RPAS Operator Certificate

The RPA pilot operating within level 1 complex operations must be able to:

- Explain the requirement to comply with training program requirements.
- Explain the document that describes the roles and responsibilities of crew members before, during and after a level 1 complex flight.
- Describe the purpose of and concepts of safety management and associated processes.
- Describe the training program requirements for their assigned duties as a level 1 complex pilot.
- Describe reporting requirements.

Subpart 3 – Special Flight Operations – Remotely Piloted Aircraft Systems

The RPA pilot operating within level 1 complex operations must be able to:

- Give examples of the types of BVLOS operations that would require a special flight operations certificate.

Section 2: RPA airframes, power plants, propulsion, and systems (KNO)

The RPA pilot operating within level 1 complex operations must be able to:

- Identify Aircraft Class / Category based on ICAO definitions.
- Demonstrate knowledge of applicable operational principles such as:
 - Components
 - Aerodynamics
 - Weight and Balance
 - Launch
 - Take-off, initial climb / Level off / Hover / Forward Flight
 - Flight operations, missions and manoeuvres
 - Landing / Recovery

Airframes

The RPA pilot operating within level 1 complex operations must be able to:

- Describe how to decide if an airframe is airworthy after something out of order is found during a pre-flight inspection.

Electrical systems

The RPA pilot operating within level 1 complex operations must be able to:

- Explain the importance of keeping components within the manufacturer's recommended specifications regarding moisture, temperature and any other environmental limitations.
- Explain what an RPAS waterproof rating is and any limitations of that rating.
- Describe how to determine battery consumption during flight.

Redundancies and critical items

The RPA pilot operating within level 1 complex operations must be able to:

- State the value of having redundancy built into RPAS operating scenarios.
- Explain how to anticipate and plan for system failures and abnormalities, in developing mitigation procedures.
- Describe how to identify single points of failure in an RPAS.
- Describe latent failures & how to identify abnormal operating conditions.
- Explain how pre-flight checks and scheduled maintenance can protect against latent failures.
- Describe related cascading failures of systems or components.
- Describe flight envelope protection systems and what their purpose is.

Ground control station (GCS)

The RPA pilot operating within level 1 complex operations must be able to:

- State the importance of antenna orientation.
- Determine altitude of the GCS.
- Describe different altitude metrics related to ground control station location (HAE, AGL, ASL, Baro Corrected, Pressure Altitude) and how to convert between them.
- Demonstrate an understanding of external factors that may affect the operation of the GCS.

Data and command and control (C2) links

The RPA pilot operating within level 1 complex operations must be able to:

- Assess and predict the impact the radio frequency (RF) environment may have on the RPAS operation.
- Discuss lost link and methods of recovery and contingencies.
- Explain the purpose and function of an RPAS C2 system.
- Describe the suitability of using radio, cellular or a satellite C2 link for telemetry & control of a RPA in different operational environments.
- Describe the operational limitation of the various types of C2 links and the methods used to increase range and signal robustness.
- Describe the difference between latency and bandwidth.
- Describe the impact on bandwidth by data speed.
- Explain ISP redundancy and power redundancy regarding internet-based ground control stations and C2 or C3 links.
- Explain how local and portable devices might be configured to reduce interference.

Radio waves – Characteristics & modulation

The RPA pilot operating within level 1 complex operations must be able to:

- Explain the principles of a radio wave inverse-squared relation with respect to power and distance.
- Explain the radio frequency spectrum and how it is divided up.
- Explain what frequency bands are allowed for RPAS use in Canada, and when approval for frequency use is required.
- Explain the characteristics of radio waves and radio wave propagation.
- Describe the meaning of attenuation and how signals can be affected.
- Explain environmental conditions that can affect C2 link integrity.

- Explain how multipath propagation and signal reflection can affect C2 links.
- Explain the expected effect of spatial diversity on C2.
- Describe the Fresnel zone area surrounding a C2 link and its vulnerability.
- Explain the basic measures to follow to maximize signal strength during long range missions.
- Identify the principal frequencies and types of modulation used for RPAS C2 links.
- Describe benefits and drawbacks of different types of C2 links.

ANTENNAS

The RPA pilot operating within level 1 complex operations must be able to:

- Explain importance of antenna integrity before flight.
- Explain how to reference manufacturer information regarding antennas required for flight.

Electro magnetic interference (EMI)

The RPA pilot operating within level 1 complex operations must be able to:

- Identify the potential sources of EMI in a RPAS operating environment, including the K index.
- Describe harmonic radiation and the effect it can have on radio signals.
- Understand how to use EMI measurements to minimize C2 link interference.

Batteries

The RPA pilot operating within level 1 complex operations must be able to:

- Describe the risks associated with transporting lithium-ion batteries.
- Describe the relevance of the TDG Act regarding transportation of LiPo batteries.
- Describe how improper handling, use or storage can affect battery capacity.

Fuel systems

- Describe fuel systems.
- Describe hazards of different fuel types.
- Describe methods to assess fuel quantity and consumption under different flight conditions.
- Describe safe fuel storage and handling techniques.
- Describe proper grounding/bonding techniques.

Autopilots

The RPA pilot operating within level 1 complex operations must be able to:

- State the purpose of automated flight management systems for RPA.
- Describe the limitations of an automated flight management system.
- Identify possible faults with automated flight management system.
- Describe automated flight management system actions in abnormal and emergency situations (for example, loss of control, loss of thrust).
- Identify precautions to take when programming an automated flight management system.
- Describe the potential effects on an autopilot in the event of a system failure.
- Describe the various levels of autopilot autonomy.
- Describe how an autopilot initiates flight termination or how a return to home (RTH) procedure is initiated.

Propulsion

The RPA pilot operating within level 1 complex operations must be able to:

- Describe the characteristics of different propulsion system types.
- Describe 2-stroke and 4 stroke engines.
- Explain aircraft behaviour following a propulsion system failure.

Payloads

The RPA pilot operating within level 1 complex operations must be able to:

- Define what comprises the payload vs. the rest of the system.
- Describe considerations regarding payloads that are just transported, vs those that form part of the RPA for operational purposes.
- Describe effects of integrated payloads on the RPA system, in respect to performance and fuel/power consumption.
- Describe payloads that may be changed during flight.
- Determine what is considered OEM payload vs operator added payload.
- Explain the requirement to be properly trained and follow manufacturer instructions on carriage of payloads and proper operation of sensors.
- Explain any limitations or operational impacts associated with carriage of payloads.

Launch and recovery systems

The RPA pilot operating within level 1 complex operations must be able to:

- Identify the different danger areas associated with launch and recovery operations.
- Describe different methods of launching and recovering an RPA, including mobile launch platforms.
- Describe critical actions and priorities in the event of a failure or emergency during launch and recovery.

Maintenance and record keeping

The RPA pilot operating within level 1 complex operations must be able to:

- Follow manufacturer's instructions with respect to maintenance requirements including the need for independent verification, if applicable.

Magnetic compass

The RPA pilot operating within level 1 complex operations must be able to:

- Explain how a compass sensor is generally used by RPA.
- Describe when calibration is required.
- Describe magnetic field anomalies.
- Describe expected behaviour of a typical RPAS when encountering magnetic anomalies.

Altimeter

The RPA pilot operating within level 1 complex operations must be able to:

- Explain the purpose of a barometric altimeter setting as it is related to crewed aircraft.
- Describe how the altimeter setting region and standard pressure region may impact RPAS operations.
- Describe the difference between GPS altitude and barometric altitude.
- Describe the difference between ellipsoidal and geometric altitudes.
- Describe how to convert GPS altitude to ASL.

Airspeed indicator

The RPA pilot operating within level 1 complex operations must be able to:

- Describe the difference between airspeed and ground speed.
- Describe which system is used for RPA speed.

Inertial measurement unit (IMU)

The RPA pilot operating within level 1 complex operations must be able to:

- Describe the effects of an uncalibrated or defective IMU.

Detect and avoid systems (DAA)

The RPA pilot operating within level 1 complex operations must be able to:

- Demonstrate an understanding of DAA principles (i.e., Risk Ratio, and ARC).
- Describe different types, strengths, and weaknesses of each DAA sensor type.
- Explain what effect sensor range has on the area the RPAS can move within.
- Describe automatic collision avoidance vs. manual collision avoidance.
- Describe avoidance maneuver planning relevant to DAA systems.
- Describe the function and limitations of visual based camera detection systems.
- Describe the function and limitations of on-wing and ground-based RADAR.
- Describe the requirements of a vision-based DAA system.

Global navigation satellite system (GNSS / GPS)

The RPA pilot operating within level 1 complex operations must be able to:

- Describe the effect of solar activity on GNSS signals.
- Describe signal limitations caused by the flight environment and geography.
- Describe the various GNSS positioning solutions and augmentation systems.

Section 3: Human factors (SAW / KNO / LTW / WLM / PSB)

Aviation physiology

The RPA pilot operating within level 1 complex operations must be able to:

- Describe the effects of environmental factors on RPA pilot performance.
- Describe the effects of environmental factors on visual observer performance.
- Describe the impact of fatigue, temperature and other environmental conditions on flying operations.

Aviation psychology

The RPA pilot operating within level 1 complex operations must be able to:

- Describe the 5 Hazardous Attitudes in Aviation (Macho, Impulsivity, Resignation, Invulnerability and Anti-authority)
- Describe the importance of Crew Resource Management in RPAS operations.
- Describe the potential impact of RPAS-operations regarding specific factors such as lack of shared fate, potential for increased risk-taking, responsibility for flight termination, and disposability of the RPA.
- Recall James Reason's second level "Unsafe Acts Model" includes the following unintended actions:
 - Slips.
 - Lapses.
 - Mistakes.
 - Violations.
- Describe the importance of Situational Awareness and factors that can contribute to its degradation in BVLOS operations.
- Describe automation complacency.

Pilot—equipment/materials relationship

The RPA pilot operating within level 1 complex operations must be able to:

- Explain how to manage an interruption to a checklist or flight.
- Describe the effects of reliance on automation.
- Describe appropriate times for use of automation vs manual control.

Interpersonal relations

The RPA pilot operating within level 1 complex operations must be able to:

- Describe proper multi-crew resource management principles.
- Describe methods of effective communication and dispute resolution.

Section 4: Meteorology (APK / KNO)

The earth's atmosphere

The RPA pilot operating within level 1 complex operations must be able to:

- Describe the properties of the atmosphere that affect air density.
- Describe the conditions of the Standard Atmosphere.

Atmospheric pressure

The RPA pilot operating within level 1 complex operations must be able to:

- Explain the movement of air resulting from high and low pressure systems, convergence, and divergence.
- Explain the effects of temperature on the rate of change in pressure with height.
- Explain the effect of temperature on air density, performance, and efficiency.

Meteorological aspects of altimetry

The RPA pilot operating within level 1 complex operations must be able to:

- Recall the factors that affect density altitude.
- Assess weather and density altitude for anticipated performance (take-off and launch) and flight envelope limitations.
- Explain pressure altitude.
- Explain how density altitude affects performance and instruments.

Moisture

The RPA pilot operating within level 1 complex operations must be able to:

- Explain the potential effects of moisture on RPA.
- Explain how to forecast fog, precipitation, or icing conditions.

Surface based layers

The RPA pilot operating within level 1 complex operations must be able to:

- Explain how fog, haze, smoke, or other particulates may impact RPA operations.
- Identify the elements that can dissipate these surface-based layers.
- Explain how low level cloud can affect legacy aircraft traffic.

Turbulence

The RPA pilot operating within level 1 complex operations must be able to:

- Explain the effect of mechanical turbulence on RPA stability and its effect on operational capabilities.
- Explain how RPA flight controllers and camera stabilization can mask the level of turbulence experienced by the RPA.

Wind

The RPA pilot operating within level 1 complex operations must be able to:

- Explain the causes and risks of wind gusts.
- Describe urban airflow and items that affect it.
- Be familiar with urban airflow operator guidance material.

Fronts and frontal weather

The RPA pilot operating within level 1 complex operations must be able to:

- Discuss how weather fronts may affect RPA operations.
- Describe the frontal conditions and zones that produce freezing rain.

Aircraft icing

The RPA pilot operating within level 1 complex operations must be able to:

- Identify the atmospheric conditions that would create icing, freezing rain, freezing drizzle, and freezing fog.
- Explain which surfaces create a hazard due to susceptibility to ice accumulation.
- Describe how parts of an RPA can be affected by icing and the symptoms that might be present when encountering icing.
- Describe the situations and types of icing that can occur while on the ground or in flight.
- Demonstrate the ability to recognize and forecast icing conditions for the planned RPA operation.
- Identify whether the RPA is capable of flight in known icing conditions and under which manufacturer limitations.

Thunderstorms

The RPA pilot operating within level 1 complex operations must be able to:

- Explain how to avoid the risks associated with thunderstorms.

Meteorological services available to pilots

The RPA pilot operating within level 1 complex operations must be able to:

- Determine local weather where there is no official source of reporting.
- Identify sources of weather reports.
- Identify weather trends and how they can be used to predict fog or icing conditions.

- Assess forecast weather in comparison to control station requirements, C2 links, and RPA requirements.
- Be able to extract key weather information from a GFA.

Section 5: Navigation (APK / KNO / SAW / PSD)

Definitions

The RPA pilot operating within level 1 complex operations must be able to:

- Demonstrate an understanding of navigational terms, definitions and their uses.

Maps and charts

The RPA pilot operating within level 1 complex operations must be able to:

- Determine validity of an aeronautical publication.
- Demonstrate the ability to interpret Aeronautical charts: VNC, VTA.
- Identify a controlled or uncontrolled airspace on an aeronautical chart.
- Determining ground elevation from a map.
- Use the CFS or other publication to identify airport operators and air traffic control agencies.
- Demonstrate the ability to reconcile and validate nonofficial data sources to official ones.
- Demonstrate the ability to plot latitude and longitude on aeronautical charts.
- Demonstrate the ability to find locations on aeronautical charts using latitude and longitude.

Flight planning

The RPA pilot operating within level 1 complex operations must be able to:

- Demonstrate the ability to use flight planning software, and confirm their use of valid data sources.
- Provide Time/Distance/Energy/Endurance Calculations with the effect of wind on groundspeed.
- Demonstrate how to determine the effect of wind on range and endurance.
- Determine effect of wind on contingency planning, including return to home and other flight termination procedures.
- Consider flight termination procedures and flight termination routes when planning the operation.
- Find obstacles on a map and determining their height.

- Describe digital terrain , including digital surface model (DSM) and digital elevation model (DEM), and issues associated to terrain and obstacle avoidance.
- Demonstrate the ability to identify areas of other airspace users, gliders and ultralight flying areas, parasailing areas, etc.
- Determine the population density of a given area.
- Consider environmental considerations of proposed operations, including noise, wildlife encounters, etc.
- Explain their responsibility with respect to keeping the RPA away from another person and populated areas.
- Demonstrate how to identify population density of a given area.
- Describe how to plan DAA procedures.
- Calculate critical point/point of no return.
- Describe affects on a flight within locations that may have effects on GPS reception and impose limitations on auto pilots.
- Determine from a map what is the appropriate frequency to monitor.
- Demonstrate the ability to locate possible contingency and emergency alternate landing sites using aeronautical charts.

Section 6: Flight operations (WLM / SAW / KNO / LTW)

General

The RPA pilot operating within level 1 complex operations must be able to:

- Describe the need for, and elements of, an operational structure required by a RPOC.
- Describe the hazards that can occur in different geographic or topographical areas.
- Demonstrate how to relate hazard identification into feasible mitigations that support effective risk management.
- Describe what a CONOPS is and why it is important.
- Describe terrain modeling and considerations regarding minimum and maximum AGL limits.
- Demonstrate the ability to manage flight time, fuel levels and battery levels.
- Demonstrate how flight time estimates are calculated, and what factors affect their accuracy.
- Demonstrate an understanding of reserve or contingency fuel, battery power.
- Describe how to use a site survey to locate unregistered aerodromes and create greater overall situational awareness of the operation.
- Demonstrate the ability to make adjustments to a flight plan once the RPA operation has commenced.

Performance charts/data

The RPA pilot operating within level 1 complex operations must be able to:

- Identify wind limits from the OEM data.
- Using aircraft performance data, determine aircraft performance.

Weight and balance

The RPA pilot operating within level 1 complex operations must be able to:

- Demonstrate when a weight and balance is required to be completed.
- Describe the “Circular envelope” multirotor, vertical lift concept and tolerable deviation from center of gravity.
- Recall OEM recommendations and declarations vs operator changes.

Aircraft critical surface contamination

The RPA pilot operating within level 1 complex operations must be able to:

- Describe the different types of contaminants and how they may affect the RPA and its various components.

RPA operations

The RPA pilot operating within level 1 complex operations must be able to:

- Identify and evaluate access routes for both normal and emergency operations.
- Assess environmental considerations related to operations.
- Demonstrate how to determine population density.
- Describe how to plan DAA procedures.

Air traffic services and procedures

The RPA pilot operating within level 1 complex operations must be able to:

- Convert and compare ATC and Pilot altitude reports to RPA altitudes.
- Recognize and interpret relevant position reports.

Section 7: Theory of flight (KNO / FPM)

Theory of Flight

- Describe the effects of higher operating weight.

Principles of flight

The RPA pilot operating within level 1 complex operations must be able to:

- Describe how lift is produced in various types of RPA.
- Describe how propeller pitch affects power used and performance.
- Describe how thrust is created by a propeller.

Stability

The RPA pilot operating within level 1 complex operations must be able to:

- Explain why it is important to stay within manufacturer c of g limits in relation to stability.

Section 8: Radiotelephony (APK / KNO / PSD / COM)

Communications

The RPA pilot operating within level 1 complex operations must be able to:

- Describe requirements to operate a VHF radio.
- Describe radio operations in uncontrolled airspace.
- Describe appropriate communication equipment for the planned operation.

Ground crewmember radios and communications

The RPA pilot operating within level 1 complex operations must be able to:

- Describe factors and conditions affecting-forms of communications (radio, cellphone, text, visual signals).

Page intentionally left blank.