

Level 1 Complex Operations (L1CO) Ground School

Professional RPAS Pilot Certification Syllabus

Delivery Format:	Synchronous Online (Live Instructor-Led)	Total Hours:	20 Hours (Inclusive of Instruction & Labs)
Regulatory Alignment:	TC Standard 921.08 / TP 15530 / AC 901-002	Certification Path:	L1CO Rating & RPOC Governance

Course Description

This course provides advanced ground instruction for commercial RPAS pilots and enterprise flight crews preparing for Transport Canada Level 1 Complex Operations (L1CO) certification and RPAS Operator Certificate (RPOC) compliance. Led by a qualified Level 1 Complex Operations (L1CO) RPAS pilot, with guest lectures from experienced aviation professionals, the program combines live synchronous instruction with intensive practical labs where students master tactical Beyond Visual Line of Sight (BVLOS) flight rules, multi-observer Detect and Avoid (DAA) networks, and ground-up Operational Risk Assessments (ORA).

Course Learning Outcomes

On completion of this course, the student will be able to:

- **Interpret and apply** Level 1 Complex regulations (CARs Part IX, Standard 921.08, STSC-004) and corporate RPOC structures (AC 901-002) to establish compliant corporate aviation operations.
- **Evaluate** C2 and C3 command link dynamics, attenuation, Fresnel zone interference, and GCS telemetry metrics (HAE, AGL, Baro-corrected) to ensure robust link integrity during long-range BVLOS missions.
- **Formulate and execute** multi-observer Detect and Avoid (DAA) scanning networks, Crew Resource Management (CRM) protocols, and standard aviation radiotelephony phraseology (ROC-A standards) for Mandatory Frequency (MF/ATF) radio broadcasts.
- **Analyze** complex aviation weather products, localized microclimates, urban airflow vorticity, and atmospheric lapse rates to enforce mandatory 3 SM visibility and 1,000 ft ceiling minima.
- **Execute** 4D mission planning, VTA and VNC aeronautical chart plotting, and Canada Flight Supplement (CFS) cross-referencing for complex operations in uncontrolled and controlled airspace.
- **Formulate and engineer** an Operational Risk Assessment (ORA) using the SORA framework (AC 903-001) to define Flight Geography, Contingency Volumes, 1-to-1 Ground Risk Buffers, GRC/ARC ratings, and OSO robustness evidence.
- **Apply** advanced aerodynamic load factors, high-speed maneuver dynamics, and critical surface contamination limits to maintain airframe structural integrity under maximum takeoff weight (MTOW) limits.
- **Demonstrate** practical operational readiness for Level 1 Complex Flight Reviews (TP 15395E / L1C Rubric) and execute emergency response procedures, including lost-link, fly-away containment (TERP under 57 seconds), and TSB/TC occurrence reporting (CAR 901.49).

Integrated Practical Lab Curriculum

Running concurrently alongside lecture modules, students complete hands-on scenario challenges using active industry tools:

- **Lab 1: Weather Minima & DAA Microclimate Evaluation:** Decoding METAR, TAF, and GFA products to enforce mandatory 3 SM flight visibility and 1,000 ft cloud ceiling limits across active observer stations.
- **Lab 2: Complex Navigation & Extended Airspace Access:** Plotting 4D flight paths on VNC/VTA charts, cross-referencing CFS aerodrome entries, and auditing active NOTAMs for BVLOS corridor access.
- **Lab 3: STSC-004 Tactical BVLOS Site Survey & Multi-VO Placement:** Mapping an operational footprint bounded by the 4 NM Ground Control Station limit and placing Visual Observers within 2 NM of the RPA.

- **Lab 4: C2/C3 Link Environment Sweep & Telemetry Calibration:** Evaluating RF attenuation, Fresnel zone clearance, and calibrating GCS altitude references (Baro-corrected vs. Height Above Ellipsoid).
- **Lab 5: Multi-Observer DAA Communication & CRM Handshake:** Practicing standardized verbal handshakes between the PIC and multiple Visual Observers for sector scanning and air traffic de-confliction.
- **Lab 6 (FEATURED ORA LAB): SORA Safety Case & Risk Mitigation Engineering (AC 903-001):** Comprehensive workshop mapping a 4D operational volume (Flight Geography, Contingency Volume, 1-to-1 Ground Risk Buffer), calculating GRC and ARC ratings, constructing an Operational Safety Objective (OSO) evidence matrix across 24 objectives, and drafting an Emergency Response Plan with a Time for Emergency Response Procedure (TERP) under 57 seconds.
- **Lab 7: Enterprise Weight, CG, & Battery Performance Modeling:** Calculating payload additions, Center of Gravity (CG) shifts, MTOW limits, and LiPo discharge curves under cold weather and heavy wind loading.
- **Lab 8: L1C GCS-Only Flight Review & Crew Briefing Simulation:** Conducting candidate oral defense scenarios and practicing flight maneuvers with sole reference to the GCS (facing away from the RPA) under TP 15395E standards.
- **Lab 9: TSB & Transport Canada Incident Notification & Root-Cause Analysis:** Executing post-incident investigations using 'Five Whys' and 'Bowtie' risk modeling frameworks, and completing official CAR 901.49 notification reports.

Module Breakdown & Schedule (20.0 Hours Total)

Module & Title	Hours	Core Curriculum Topics	Lab Integration
Module 1: L1CO Regulations & RPOC Governance	2.0	CARs Part IX Div VIII, Standard 921.08, AC 901-002, AE and PRM legal roles, MCM requirements, annual OPCs, TCCA audit defense (SI SUR-001).	Lab 3 (STSC-004 Site Survey & Multi-VO Mapping)
Module 2: RPAS Systems, C2/C3 & Telemetry	2.0	Multirotor and VTOL architectures, C2/C3 link dynamics, RF attenuation, Fresnel zones, K-index/EMI, LiPo curves, GCS altitude metrics (AGL, ASL, HAE, Baro).	Lab 4 (C2/C3 Link Sweep & Telemetry Calibration)
Module 3: Human Factors, CRM & Multi-VO DAA	2.0	BVLOS visual perception, empty field myopia, automation complacency, Crew Resource Management, Reason's model, multi-observer DAA scanning.	Lab 5 (Multi-VO DAA Comms & CRM Handshake)
Module 4: Advanced Meteorology & Microclimates	2.0	Mesoscale weather, frontal wave dynamics, urban airflow vorticity (building rooftop shear), density altitude, icing hazards, 3 SM / 1,000 ft minima.	Lab 1 (Weather Minima & Microclimate Evaluation)
Module 5: Complex Navigation & Airspace	2.0	VNC/VTM chart plotting, magnetic variation, CFS decoding, NOTAM auditing, NAV CANADA controlled airspace authorization protocols.	Lab 2 (Complex Navigation & Extended Airspace Access)
Module 6: L1CO Operations & STSC-004 Limits	2.0	STSC-004 limits (4 NM GCS, 2 NM VO radius), controlled ground areas, SOP development, CAR 901.23 emergency checklists, CAR 901.49 reporting.	Lab 9 (Incident Notification & Root-Cause Analysis)
Module 7: Theory of Flight & Structural Limits	1.5	Multirotor and VTOL aerodynamics, load factors (G-forces) in steep turns, stall dynamics, vortex ring state, critical surface contamination.	Lab 7 (Weight, CG, & Battery Performance Modeling)
Module 8: Radiotelephony & Multi-Crew Comms	1.5	ROC-A standards, VHF radio operation, standard aviation phraseology, MF/ATF uncontrolled aerodrome reporting, emergency calls.	Lab 5 (VO to PIC radio comms & MF broadcasts)
Module 9: Operational Risk Assessment (ORA) & SORA	2.5	AC 903-001 SORA framework, 4D volumes (Flight Geography, Contingency Volume, 1:1 Buffer), GRC/ARC ratings, SAIL levels, 24 OSOs, TERP under 57s.	Lab 6 (FEATURED SORA Workshop & OSO Engineering)
Module 10: L1C Flight Review Preparation	1.25	Standard 921.02, TP 15395E L1C Guide, candidate oral defense, GCS-only maneuvers (facing away from RPA), candidate briefing protocols.	Lab 8 (L1C GCS-Only Flight Review & Oral Defense)
Module 11: L1CO Evaluation & Mock Exam	1.25	TP 15530 knowledge review, high-yield L1CO exam scenarios, SORA case study analysis, test strategies, 50-question timed mock exam.	Comprehensive Assessment (80% Pass Standard)