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Study and Reference Guide  
for written examinations for the

**Airline Transport Pilot Licence**

Aeroplane

Twenty-first Edition  
March 2016

TC-1002457

Canada

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## **GENERAL**

### **KNOWLEDGE REQUIREMENTS**

There is no mandatory ground school for an Airline Transport Pilot Licence - Aeroplane. An applicant is expected to have mastered the various subjects included in this guide and to demonstrate that knowledge by passing two written examinations. The Airline Transport Pilot Licence – Aeroplane also requires a multi-engine instrument rating, therefore an applicant without such a valid rating must complete the requirements for an instrument rating as well.

### **EXAMINATION RULES**

#### **CAR 400.02**

- (1) Except as authorized by an invigilator, no person shall, or shall attempt to, in respect of a written examination:
  - a) copy or remove from any place all or any portion of the text of the examination;
  - b) give to or accept from any person a copy of all or any portion of the text of the examination;
  - c) give help to or accept help from any person during the examination;
  - d) complete all or any portion of the examination on behalf of any other person; or
  - e) use any aid or written material during the examination.
- (2) A person who commits an act prohibited under subsection (1) fails the examination and may not take any other examination for a period of one year.

### **MATERIALS REQUIRED**

A pencil is required for rough work. Electronic calculators are useful and are permitted if their memory is cleared before and after the examination. Computers capable of storing text are not approved. Navigation tools (ruler/scale, flight computer) are required for the navigation questions. A list of approved electronic navigation computers is available at:

<http://www.tc.gc.ca/eng/civilaviation/opssvs/general-exams-computers-2011.htm>

### **VALIDITY PERIOD**

Examinations that are required for the issuance of a permit or licence or for the endorsement of a permit or licence with a rating shall be completed during the 24-month period immediately preceding the date of the application for the permit, licence or rating.

### **REWRITING OF EXAMINATIONS**

#### **CAR 400.04**

- (1) A person who fails an examination or a section of a sectionalized examination required for the issuance of a flight crew permit, licence, rating or foreign licence validation certificate is ineligible to rewrite the examination or the failed section for a period of
  - a) in the case of a first failure, 14 days;
  - b) in the case of a second failure, 30 days; and
  - c) in the case of a third or subsequent failure, 30 days plus an additional 30 days for each failure in excess of two failures, up to a maximum of 180 days.

## EXAMINATION FEEDBACK

Feedback statements in the results letter will inform the candidate where questions were answered incorrectly.

### Example of Feedback Statement

Identify the atmospheric conditions favourable to thunderstorm formation.

## EXAMINATIONS

CAR 421.34

### SARON

Examination	Questions	Time Limit	Pass Mark
Aviation Regulations and Air Traffic Procedures, Aeroplane Operations and General Navigation (Sections 1 to 7)	80	3½ hours	70%

### SAMRA

Examination	Questions	Time Limit	Pass Mark
Meteorology, Radio Aids to Navigation and Flight Planning (Sections 8 to 10)	80	3½ hours	70%

The Instrument Rating (INRAT) examination must also have been passed (70%) to obtain an Airline Transport Pilot Licence – Aeroplane (ATPL-A).

## CONVERSION EXAMINATION – FAA AIRLINE TRANSPORT PILOT CERTIFICATE – AEROPLANE

Pilots who hold a United States of America Airline Transport Pilot certificate – Aeroplane, which has not been “Issued on the basis...” of another foreign licence, may demonstrate their knowledge by writing the following Transport Canada multiple choice examination:

Examination	Questions	Time Limit	Pass Mark
Air Law and Procedures (FAAAA)	25	1½ hour	70%

The FAAAA examination is based on subjects contained in the AIR LAW AND PROCEDURES section of this Study and Reference Guide. Candidates should read the recommended references on pages 33 and 34 as they apply to aeroplanes).

# **SARON (sections 1 to 7)**

## **SECTION 1: AIR LAW AND PROCEDURES**

### ***CANADIAN AVIATION REGULATIONS (CARs)***

Some *Canadian Aviation Regulations* (CARs) refer to their associated standards. Questions from the CARs may test knowledge from the regulation or the standard.

#### **PART I – GENERAL PROVISIONS**

##### **101 – INTERPRETATION**

101.01 Interpretation

##### **103 – ADMINISTRATION AND COMPLIANCE**

103.02 Inspection of Aircraft, Requests for Production of Documents and Prohibitions

103.03 Return of Canadian Aviation Documents

103.04 Record Keeping

103.12 Definition of “Principal”

##### **106 – ACCOUNTABLE EXECUTIVE**

106.01 Application

106.02 Appointment and Acceptance

106.03 Accountability

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107.02 Establishing a Safety Management System

107.03 Safety Management System

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#### **PART II – AIRCRAFT IDENTIFICATION AND REGISTRATION AND OPERATION OF A LEASED AIRCRAFT BY A NON-REGISTERED OWNER**

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202.26 Carrying Certificate of Registration on Board the Aircraft

202.35 Transfer of Legal Custody and Control - General

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### **301 – AERODROMES**

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301.04 Markers and Markings  
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### **302 – AIRPORTS**

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401.04 Flight Crew Members of Aircraft Registered in Contracting States Other than Canada  
401.05 Recency Requirements  
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404.04 Issuance, Renewal and Validity Period of Medical Certificate  
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- 601.02 Airspace Classification
- 601.03 Transponder Airspace
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- 602.24 Formation Flight
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## **OTHER LAW AND PROCEDURES**

### **TRANSPORTATION SAFETY BOARD OF CANADA (TSB) (TC AIM – GEN 3.0)**

#### **OTHER CANADIAN LEGISLATION**

- 1 Canada Transportation Act Part II – Air Transportation Licences, Prohibitions (section 57); Air Transportation Regulations (sections 3 and 7)
- 2 Canada Labour Code Part II – Occupational Safety & Health, Employee Rights & Duties (sections 126, 127 and 128)
- 3 Transportation of Dangerous Goods by Air (TC AIM – RAC Annex 3.0)

#### **INTERNATIONAL AIR LAW**

- 1 Warsaw Convention (1929) – tickets/waybills
- 2 Tokyo Convention (1963) – PIC authority, responsibility of States in cases of unlawful interference
- 3 Chicago Convention (1944) – ICAO rules apply to international travel, designated airports of entry must be used

#### **INTERNATIONAL FLIGHT PROCEDURES**

- 1 Entry, Transit and Departure of Aircraft (AIP Canada (ICAO) GEN 1.2)

#### **AIR TRAFFIC SERVICES AND PROCEDURES**

- 1 Air Traffic Services
- 2 Services Other Than Air Traffic Services
- 3 Radar Service
- 4 ATC Clearances, Instructions and Information
- 5 ATC Service Priority
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- 1 General Principles
- 2 Certification Requirement

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- 2 Approval Requirement
- 3 In-Flight Procedures
- 4 In-Flight Contingencies

## **SECTION 2: AIRFRAMES, POWER PLANTS, PROPELLERS AND AIRCRAFT SYSTEMS**

### **AIRFRAMES**

- 1 Construction, Materials
- 2 Life, Fatigue, Cycles, Stress, Corrosion
- 3 Weight & G-Load Limitations

### **WING SYSTEMS**

- 1 Flaps
- 2 Slots/Slats/Leading Edge Devices
- 3 Winglets
- 4 Canards
- 5 Vortex Generators

### **FLIGHT CONTROLS**

- 1 Axes of the Aeroplane/Movement
- 2 Aerodynamic Forces, Dynamic Balancing
- 3 Trimming Devices
- 4 Flutter, Mass Balance
- 5 Aileron and Rudder Limiting
- 6 Speed Brakes
- 7 Spoilers
- 8 Primary/Secondary Flight Controls

### **POWER PLANTS**

- 1 Principles of Turbo-prop Engines
- 2 Handling Procedures for Turbo-prop Engines
- 3 Principles of Turbo-jet Engines
- 4 Handling and Procedures for Turbo-jet Engines
- 5 Engine Controls
- 6 Full Authority Digital Engine Control (FADEC)
- 7 Oil Systems

### **PROPELLERS**

- 1 Propeller Thrust and Torque
- 2 Geometric and Effective Pitch
- 3 Slipstream, Gyroscopic Effect and Asymmetric Thrust
- 4 Controls
- 5 Ground and Flight Range
- 6 Constant Speed
- 7 Feathering
- 8 Reversing

### **AIRCRAFT SYSTEMS**

- 1 Fuel
- 2 Electrical
- 3 Hydraulic
- 4 Pneumatic
- 5 Fire Protection (extinguishing systems)
- 6 Ice and Rain Protection
- 7 Oxygen
- 8 Heating, Air Conditioning and Pressurization
- 9 Landing Gear and Brakes
- 10 Autoflight
- 11 Avionics
- 12 Flight Controls
- 13 Voice/Flight Data Recording

### **WARNING AND PROTECTION SYSTEMS**

- 1 Master Warning Systems
- 2 Stall Warning /Identification/Protection
- 3 TAWS/GPWS/EGPWS
- 4 ACAS/TCAS
- 5 Altitude Alerting Systems
- 6 Lightning and Weather Detection
- 7 Take-off/Configuration Test/Warnings

### **SERVICEABILITY**

- 1 Unserviceabilities, Snags, Minimum Equipment List
- 2 Recording/Logs

## **SECTION 3: INSTRUMENTS**

### **FLIGHT INSTRUMENTS – PRINCIPLES AND OPERATIONAL USE**

- 1 Pitot Static System
- 2 Airspeed Indicator
- 3 Machmeter
- 4 Altimeter and Encoding Altimeter
- 5 Vertical Speed Indicator (VSI)
- 6 Radio/Radar Altimeter
- 7 Outside Air Temperature
- 8 Air Data Computer
- 9 Turn-and-bank Indicator / Turn Co-ordinator
- 10 Heading Indicator
- 11 Attitude Indicator (AI)
- 12 Flight Director
- 13 Radio Magnetic Indicator (RMI)
- 14 Horizontal Situation Indicator (HSI)
- 15 Angle of Attack Indicator
- 16 Electronic Flight Instrument System (EFIS)

### **FLIGHT MANAGEMENT INSTRUMENTS**

- 1 Flight Management System (FMS)
- 2 Electronic Centralized Aircraft Monitoring (ECAM/EICAS)

### **ENGINE INSTRUMENTS – PRINCIPLES AND USE**

- 1 Tachometer (including N1, N2, NH, NL)
- 2 Oil Pressure
- 3 Oil Temperature
- 4 Fuel Pressure
- 5 Fuel Flow
- 6 Torquemeter
- 7 Engine Pressure Ratio (EPR)
- 8 Turbine Temperature (ITT/TIT)

### **AIRCRAFT COMPASS SYSTEMS**

- 1 Construction
- 2 Use
- 3 Limitations and Faults
- 4 Gyromagnetic Remote Indicating Compass

## **SECTION 4: NAVIGATION – GENERAL**

### **NAVIGATION TERMS**

- 1 Air Position
- 2 Great Circle
- 3 Rhumb Line

### **MAPS AND CHARTS**

- 1 Lambert Conformal
- 2 Transverse Mercator
- 3 Enroute Low and High Altitude Charts
- 4 Navigation Databases

### **TIME AND LONGITUDE**

- 1 Time Zones and Relation to Longitude

### **EN ROUTE NAVIGATION**

- 1 Use of Aeronautical Charts
- 2 Calculation of Heading, Groundspeed and ETE
- 3 Determination of Wind Velocity
- 4 Use of Radio Aids to Determine Position
- 5 RNAV Waypoints and Position Plotting
- 6 Gyro Steering Techniques in Areas of Compass Unreliability
- 7 Maintaining Flight Log

## **SECTION 5: FLIGHT OPERATIONS**

### **ATMOSPHERIC EFFECTS IN FLIGHT**

- 1 ICAO Standard Atmosphere
- 2 Temperature and Pressure / Air Density
- 3 Humidity/Rain
- 4 Cold Temperature Corrections

### **PERFORMANCE**

- 1 Indicated and True Stalling Speeds
- 2 Slow Speed Flight Characteristics
  - Turbo-prop
  - Turbo-jet
- 3 High Speed Flight Characteristic
  - Turbo-prop
  - Turbo-jet
- 4 Relationship of Speed to Angle of Attack
- 5 Cruising for Range/Endurance
- 6 Flight Performance “V”  
Speeds – Definition and Use
- 7 Effect of Changes in Weight and Load  
Distribution
- 8 Hydroplaning
- 9 Wind Shear – Effects, Avoidance  
and Recovery
- 10 Landing Techniques

### **CHARTS AND GRAPHS**

- 1 Weight and Balance – Load  
Adjustment (refer to Annex 1)
- 2 Take-off
- 3 Climb
- 4 Cruise
- 5 Buffet Boundary
- 6 Holding
- 7 Engine Out
- 8 Descent
- 9 Landing
- 10 Crosswind/CRFI
- 11 Weight, Altitude, Temperature  
(WAT), Takeoff/Landing  
Performance Charts

### **CRITICAL SURFACE CONTAMINATION**

- 1 Clean Aircraft Concept – Practices  
and Techniques
- 2 Frozen Contaminants Including  
Cold-Soaking Phenomenon
- 3 Icing in Clear Air (Hoar Frost)
- 4 De-icing and Anti-icing Fluids
- 5 De-icing and Anti-icing Procedures
- 6 Variables that Can Influence  
Holdover Time
- 7 Critical Surface Inspections
- 8 Pre-take-off Inspection
- 9 Health Effects
- 10 Application Guideline Tables

### **WAKE TURBULENCE**

- 1 Causes and Effects
- 2 Avoidance Procedures
- 3 Separation Criteria and Waiver

### **FLIGHT MANUAL**

- 1 Approved Information

### **VOLCANIC ASH**

- 1 Hazards

### **AIRMANSHIP/RULES OF THUMB**

- 1 Average Wind in Climb
- 2 Descent Point
- 3 Rate of Descent
- 4 Thunderstorm Penetration &  
Avoidance

### **ABNORMAL FLIGHT PROCEDURES/RECOVERY**

- 1 Icing, Tailplane Stall, Roll Upset
- 2 Contaminated Runway
- 3 Turbulence Reporting Criteria

## **SECTION 6: THEORY OF FLIGHT**

### **FORCES ACTING ON AN AEROPLANE**

- 1 Load Factor
- 2 Relationship of Weight and Load Factor to Stalling
- 3 Gust Loads
- 4 Stability
- 5 Lift/Weight/Thrust/Drag
- 6 Moments

### **SUBSONIC AERODYNAMICS**

- 1 Airflow, Boundary Layer
- 2 2-Dimensional Airflow – streamline, stagnation, pressure distribution, downwash, angle of attack
- 3 3-Dimensional Airflow – vortices, spanwise flow, wake turbulence, ground effect
- 4 Degradation - effects of ice, airframe condition

### **HIGH SPEED AERODYNAMICS**

- 1 Speed of sound, Mach, Compressibility, Shock Waves
- 2 Critical Mach

### **WING DESIGN**

- 1 Sweepback
- 3 Leading and Trailing Edge Flaps
- 4 Winglets
- 5 Canards
- 6 Vortex Generators
- 7 Wing Fences

### **EFFECTS OF IN-FLIGHT ICING**

- 1 Lift and Drag
- 2 Engine and Propeller Efficiency
- 3 Wing and Tailplane Stalls

## **SECTION 7: HUMAN FACTORS**

### **AVIATION PHYSIOLOGY**

- 1 Hypoxia/Hyperventilation
- 2 Gas Expansion Effects
- 3 Decompression (Including SCUBA Diving)
- 4 Vision/Visual Scanning Techniques
- 5 Hearing
- 6 Orientation/Disorientation (Including Visual and Vestibular Illusions)
- 7 Positive and Negative "G"
- 8 Circadian Rhythms/Jet Lag
- 9 Sleep/Fatigue

### **THE PILOT AND THE OPERATING ENVIRONMENT**

- 1 Personal Health Exercise / Fitness
- 2 Obesity/Diet/Nutrition
- 3 Medications (Prescribed and Over-the-Counter)
- 4 Substance Abuse (Alcohol and Drugs)
- 5 Pregnancy
- 6 Heat/Cold
- 7 Noise/Vibration
- 8 Effects of Smoking
- 9 Toxic Hazards (Including Carbon Monoxide)
- 10 Fitness for Flight

### **AVIATION PSYCHOLOGY**

- 1 The Decision-Making Process
- 2 Factors That Influence Decision-Making
- 3 Situational Awareness
- 4 Stress
- 5 Managing Risk
- 6 Attitudes
- 7 Workload (Attention and Information Processing)

### **PILOT – EQUIPMENT/MATERIALS RELATIONSHIP**

- 1 Controls and Displays
  - Errors in Interpretation and Control
  - Information Selection: e.g. "glass" cockpits
- 2 Alerting and Warning Systems
  - Appropriate Selection and Set Up
  - False Indications
  - Distractions and Responses
- 3 Standard Operating Procedures (SOPs)
- 4 Correct Use of Charts, Checklists and Manuals
- 5 Cockpit Visibility and Eye Reference Position/Seat Position
- 6 Automation and Complacency

### **INTERPERSONAL RELATIONS**

- 1 Communications with Flight and Cabin Crew/Passengers/ Company Management/Flight Operations/Maintenance Personnel/Air Traffic Services
- 2 Operating Pressures Family / Peer Group / Employer

### **CREW RESOURCE MANAGEMENT (CRM)**

- 1 Crew Problem Solving and Decision Making
- 2 Crew Management/Small Group Dynamics

### **CONTROLLED FLIGHT INTO TERRAIN (CFIT)**

### **THREAT AND ERROR MANAGEMENT (TEM)**

- 1 Sources, Contributors
- 2 Countermeasures
- 3 Undesired Aircraft State
- 4 Pilot's Role in Safety Management System

# **SAMRA (sections 8 to 10)**

## **SECTION 8: METEOROLOGY**

### **THE EARTH'S ATMOSPHERE**

- 1 Properties
- 2 Vertical Structure
- 3 ICAO Standard Atmosphere

### **ATMOSPHERIC PRESSURE**

- 1 Pressure Measurements
- 2 Station Pressure
- 3 Mean Sea Level Pressure
- 4 Pressure Systems and their Variations
- 5 Effects of Temperature
- 6 Horizontal Pressure Differences

### **METEOROLOGICAL ASPECTS OF ALTIMETRY**

- 1 Pressure Altitude
- 2 Density Altitude
- 3 True Altitude
- 4 Altimeter Setting
- 5 Effects of both Pressure  
and Temperature
- 6 Reduction to Sea Level Pressure

### **TEMPERATURE**

- 1 Heating and Cooling of the  
Atmosphere – Convection/  
Advection/Radiation
- 2 Horizontal Differences
- 3 Temperature Variations with Altitude
- 4 Inversions
- 5 Isothermal Layers

### **MOISTURE**

- 1 Relative Humidity/Dewpoint
- 2 Change of State - Sublimation/  
Condensation/Evaporation
- 3 Cloud Formation
- 4 Precipitation
- 5 Saturated/Dry Adiabatic Lapse Rates

### **STABILITY AND INSTABILITY**

- 1 Lapse Rate and Stability
- 2 Modification of Stability
- 3 Characteristics of Stable/Unstable Air
- 4 Surface Heating and Cooling
- 5 Lifting Process
- 6 Subsidence/Convergence

### **CLOUDS**

- 1 Classification
- 2 Formation
- 3 Types and Recognition
- 4 Associated Precipitation and Turbulence

### **TURBULENCE**

- 1 Convection
- 2 Mechanical
- 3 Orographic
- 4 Clear Air Turbulence
- 5 VIRGA – Evaporation Cooling
- 6 Reporting Criteria
- 7 Mountain Waves

### **WIND**

- 1 Pressure Gradient
- 2 Deflection Caused by the Earth's Rotation
- 3 Low Level Winds – Variation in Surface Wind
- 4 Friction
- 5 Centrifugal Force
- 6 Veer and Back
- 7 Squalls and Gusts
- 8 Diurnal Effects
- 9 Land and Sea Breezes
- 10 Katabatic/Anabatic Effects
- 11 Topographical Effects
- 12 Wind Shear, Types and Causes

## **JET STREAMS**

- 1 Frontal Jet Streams
- 2 Wind Distribution / Location
- 3 Temperature Distribution
- 4 Seasonal Variations in Latitude and Speed
- 5 Arctic Stratospheric Jets
- 6 Subtropical Jet Streams
- 7 Low Level Nocturnal Jet Streams
- 8 Turbulence

## **AIR MASSES**

- 1 Definition and Characteristics
- 2 Formation
- 3 Classification
- 4 Modification
- 5 Factors that Determine Weather
- 6 Seasonal and Geographic Effects
- 7 Air Masses Affecting North America

## **FRONTS**

- 1 Structure
- 2 Types
- 3 Formation
- 4 Cross-sections
- 5 Discontinuities Along Fronts
- 6 Frontal Waves and Occlusions
- 7 Frontogenesis and Frontolysis

## **FRONTAL WEATHER**

- 1 Warm Front
- 2 Cold Front
- 3 Stationary Front
- 4 TROWAL and Upper Fronts

## **AIRCRAFT ICING**

- 1 Formation
- 2 Type of Ice
- 3 Reporting Criteria
- 4 Cloud Types and Icing
- 5 Freezing Rain and Drizzle
- 6 Collection Efficiency
- 7 Aerodynamic Heating

## **THUNDERSTORMS**

- 1 Requirements for Development
- 2 Life Cycle
- 3 Classification – Air Mass, Frontal, Squall Line, Convective, Orographic and Nocturnal
- 4 Tornadoes and Hurricanes
- 5 Hazards – Turbulence, Hail, Rain, Icing, Altimetry, Lightning, Gust Fronts, Downbursts and Microbursts

## **SURFACE BASED LAYERS**

- 1 Fog Formation
- 2 Fog Types
- 3 Haze and Smoke
- 4 Blowing Obstructions to Vision

## **METEOROLOGICAL SERVICES AVAILABLE TO PILOTS**

- 1 Pilot Briefing Service (FICs)
- 2 Aviation Weather Web Sites
- 3 Pilots Automatic Telephone Weather Answering Service (PATWAS)
- 4 Automatic Terminal Information Service (ATIS)
- 5 VOLMET (HF) Broadcast
- 6 Automatic Weather Observation Systems (AWOS)/Limited Weather Information Systems (LWIS)

## **AVIATION WEATHER REPORTS**

- 1 Aviation Routine Weather Report (METAR)
- 2 SPECI
- 3 Decoding
- 4 AWOS/LWIS
- 5 Pilot Reports (PIREP/AIREP)

## **AVIATION FORECASTS**

- 1 Times Issued / Validity Periods
- 2 Decoding
- 2 Graphical Area Forecasts (GFA) /AIRMET
- 4 Terminal Area Forecasts (TAF)
- 5 Upper Level Winds and Temperature Forecasts (FD)
- 6 Significant In-flight Weather Warning Message (SIGMET)

## **WEATHER MAPS AND PROGNOSTIC CHARTS**

- 1 Times Issued / Validity Periods
- 2 Symbols/Decoding
- 3 Surface Weather Map
- 4 Prognostic Surface Chart
- 5 Upper Level Charts – ANAL (850mb, 700mb, 500mb & 250mb)
- 6 Upper Level Charts – PROG (FL240, FL340, FL450)
- 7 Significant Weather Prognostic Chart FL100-250 (700-400mb) & FL250-630 (400-100mb)

## **SECTION 9: FLIGHT PLANNING**

### **FLIGHT PLANNING AND FORMS**

- 1 Flight Planning Fuel Requirements
- 2 Fuel Load, Zero Fuel Weight
- 3 Critical Point/Equal time Point
- 4 Flight Plans
- 5 Flight Itineraries
- 6 Aeronautical Information Sources
- 7 NOTAMs

### **COMPUTERIZED FLIGHT PLANS**

- 1 Decode (refer to Annex 2)
- 2 Analysis and Interpolation

### **AIR NAVIGATION/TRAFFIC SYSTEMS**

- 1 Canadian Domestic Routes
- 2 Use of Preferred Routes
- 3 Regional Procedures (North Atlantic, Northern Pacific, Polar) – determination and publication of routes

## **SECTION 10: RADIO COMMUNICATIONS AND AIDS TO NAVIGATION - BASIC PRINCIPLES AND USE**

### **RADIO**

- 1 Elementary Theory
- 2 Wave Length and Frequency
- 3 Frequency Bands Used in Communication and Navigation
- 4 Characteristics of Low, High and Very High Frequency Radio Waves
- 5 Ground Waves and Sky Waves
- 6 Skip Distance
- 7 Reflection and Refraction
- 8 Night Effect

### **AIRCRAFT RADIO TRANSCEIVERS**

- 1 VHF
- 2 HF
- 3 DATALINK, ACARS

### **SELECTIVE CALL SYSTEM (SELCAL)**

- 1 VHF
- 2 HF

### **EMERGENCY LOCATOR TRANSMITTER (ELT)**

- 1 Requirements
- 2 Testing
- 3 Flight Planning
- 4 Accidental Transmission
- 5 Pilot Response to Signals
- 6 Downed Aircraft Procedures

### **AIR TRAFFIC SURVEILLANCE**

- 1 Elementary RADAR Theory
- 2 Primary Returns
- 3 Secondary Returns
- 4 ADS-B
- 5 Multilateration (MLAT)

### **WEATHER RADAR**

- 1 Operating Principles
- 2 Operation and Interpretation

### **NAVIGATION SYSTEMS**

- 1 Automatic Direction Finder (ADF)
- 2 VHF Omnidirectional Range (VOR)
- 3 Distance Measuring Equipment (DME)
- 4 Co-located VOR and TACAN (VORTAC)
- 5 Global Navigation Satellite System (GNSS – GPS)
- 6 Very High Frequency Direction Finding (VHF – DF)
- 7 Area Navigation System (RNAV)
- 8 Inertial Navigation System (INS)
- 9 Inertial Reference System (IRS)

### **APPROACH AIDS**

- 1 Instrument Landing System (ILS)
- 2 Global Navigation Satellite System Approaches
- 3 Primary Surveillance Radar (PSR)
- 4 Precision Approach Radar (PAR)
- 5 Secondary Surveillance Radar (SSR)
- 6 VASIS/PAPI

### **TRANSPONDERS**

#### **ACAS/TCAS**

- 1 General
- 2 Use of TCAS/ACAS
- 3 Pilot Immunity from Enforcement Action
- 4 Pilot/Controller Actions
- 5 Pilot and Controller Interchange

## ANNEX 1

Airline transport Pilots are expected to be able to correct aircraft imbalance. Below is a formula for shifting weights.

### WEIGHT SHIFT FORMULA

$$\frac{\text{WEIGHT OF CARGO MOVED}}{\text{WEIGHT OF AEROPLANE}} = \frac{\text{DISTANCE CG MOVED}}{\text{DISTANCE BETWEEN ARM LOCATION}}$$

Airline Transport Pilots are expected to use and interpret loading and performance charts and tables applicable to two-crew aeroplanes. Applicants should review charts such as takeoff performance charts, cruise performance charts, buffet boundary charts, descent charts, landing performance charts and aircraft loading charts. Airline Transport Pilots must understand how weight, altitude, configuration and environmental factors affect aircraft performance.

Airline Transport Pilots are expected to interpret computer-generated flight plans and extract information from them. Below is a sample computer-generated flight plan with a list of abbreviations.

## ANNEX 2

### SAMPLE COMPUTER FLIGHT PLAN

PLAN 1510 CYAM TO CYOW CES2 HSC/F IFR 08/24/00  
NONSTOP COMPUTED 1209ZFOR ETD 1700Z PROGS 2400ADF CFZZZ LBBS

	FUEL	TIME	DIST	ARRIVE	TAKEOFF	LAND	AV PLD	OPNLWT
POA CYOW	001475	01/09	0386	1809Z	013703	012228	000457	008446
ALT CYND	000369	00/13	0013	1822Z				
HLD	000000	00/00						
RES	002956	03/16						
TOT	004800	04/38						

CYAM . . SSM . . YYB J513 SMARE YOW314 YOW . . CYOW

WIND P035 MXSH 1/SMARE  
FL 330

WPT MTR TTR T TAS G/S DR ZD DREM ZT CTR ZF FREQ AFR ETTA

SSM 125.5 118 . . . . . 009 0377 ./... ./... . . . . .

TOC 093.1 089 .. .. . 069 0308 0/20 0/49 004 0043  
 YYB 093.1 089 -48 372 403 R05 134 0174 0/20 0/29 004 0039  
 SMARE 102.9 092 -48 373 410 R05 053 0121 0/07 0/22 001 0038  
 TOD 131.3 118 -48 374 423 R01 035 0086 0/05 0/17 001 0037  
 YOW 131.3 118 .. .. . 074 0012 ./.. ./.. .. .. .  
 CYOW 140.5 126 .. .. . 012 0000 0/17 0/00 000 0033

CYAM N46291W084306 SSM N46247W084189 YYB N46218W0792622  
 SMARE N46196W078098 YOW N45265W075538 CYOW N45194W0754022

FIRS KZMP/0000 CZYZ/0004 CZUL/0103

(FPL-I  
 -C550/L  
 -CYAM1700  
 -N0372F330 DCT SSM DCT YYB J513 SMARE YOW314 YOW DCT  
 -CYOW0109 CYND  
 -EET/KZMP0000 CZYZ0004 CZUL0103  
 SEL/  
 -E/0438 P/ R/ S/ J/ D/ C A/ )  
 IN . . . . .DOWN . . . . .ZFW . . . . .  
 OUT . . . . .UP . . . . .R/FUEL . . . . .  
 FLT . . . . .AIR . . . . .T/O WT . . . . .

POA -Point of Arrival  
 ALT -Alternate  
 HLD -Holding  
 RES -Reserve  
 TOT -Total  
 AV PLD -Average Payload  
 OPNLT -Operational weightCYAM . . .  
 SSM -CYAM Direct to SSM  
 YOW 314 YOW -314° Radial to YOW  
 WIND P035 -Wind Push of 35 kt  
 FL330 -Flight Level 330  
 WPT -Waypoint  
 MTR -Magnetic Track  
 T -Temperature  
 TAS -True Airspeed  
 G/S -Ground Speed  
 DR -Drift  
 ZD -Zone (leg) Distance  
 DREM -Distance Remaining  
 ZT -Zone (leg) Time  
 CTR -Time Remaining  
 ZF -Zone (leg) Fuel  
 FREM -Fuel Remaining  
 AFR -Actual Fuel Remaining  
 ETA -Estimated Time of Arrival  
 CYAM -CYAM Latitude and longitude

FIRS -FIR Boundary Times  
 FPL-I -Instrument Flight Plan  
 TOC -Top of Climb  
 TOD -Top of Descent

**NOTE: Weight and balance calculation computed separately take precedence over these weight calculations.**

## **RECOMMENDED STUDY MATERIAL SARON AND SAMRA**

- Air Command Weather Manual (TP 9352E).
- Air Command Weather Manual (Supplement) (TP 9353E).
- Human Factors for Aviation – Basic Handbook (TP 12863E), and Advanced Handbook (TP 12864E).
- When in Doubt ... Aircraft Critical Surface Contamination Training (TP 10643E).
- *Canadian Aviation Regulations* (CARs). <http://laws-lois.justice.gc.ca/eng/regulations/SOR-96-433/index.html>
- Transport Canada Aeronautical Information Manual (TC AIM) (TP14371) <http://www.tc.gc.ca/eng/civilaviation/publications/tp14371-menu-3092.htm>
- AIP Canada (ICAO) <http://www.navcanada.ca/EN/products-and-services/Pages/AIP.aspx>
- Advisory Circulars 700 Series - Commercial Air Services <http://www.tc.gc.ca/eng/civilaviation/opssvs/managementservices-referencecentre-ac-700-menu-511.htm>
- Canada Flight Supplement
- Enroute High / Low Altitude Charts

The Study Guide for the Radiotelephone Operator's Restricted Certificate (Aeronautical) is available free of charge from district offices of Industry Canada – Examinations and Radio Licensing (<http://www.strategis.gc.ca>).

Information on the Transportation of Dangerous Goods is available from Transport Canada.

Air Transportation Licence information is available from the Canadian Transportation Agency (<http://www.otc-cta.gc.ca/eng/licensing-charter-permits>).

Customs Requirements are available from the Canada Customs and Revenue Agency (<http://www.cbsa-asfc.gc.ca/menu-eng.html>).

*Canada Labour Code* is available from Social Development Canada (<http://laws-lois.justice.gc.ca/eng/acts/L-2/index.html>).

Information on text books and other publications produced by commercial publishers can be obtained through local flying training organizations, bookstores and similar sources.

Publications used in pilot training in the United States are available through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (<http://www.access.gpo.gov/index.html>).

## **RECOMMENDED STUDY MATERIAL FOR THE FAA CONVERSION EXAMINATION**

Candidates attempting the examination for conversion from an FAA certificate to a Canadian Airline Transport Pilot Licence (FAAAA examination) are encouraged to review the following references as they apply to aeroplanes:

CARs Part I, Subpart 1	GENERAL PROVISIONS 101.01 – Interpretation (definitions as needed)
CARs Part IV, Subpart 1	FLIGHT CREW PERMITS, LICENCES AND RATINGS 401.05 – Recency Requirements 401.34 – Airline Transport Pilot Licence, Aeroplanes – Privileges
CARs Part IV, Subpart 4	MEDICAL REQUIREMENTS 404.04 – Issuance, Renewal, Validity Period and Extension of a Medical Certificate
CARs Part VI, Subpart 1	AIRSPACE Division I – Airspace Structure, Classification and Use Division II – Aircraft Operating Restrictions and Hazards to Aviation Safety
CARs Part VI, Subpart 2	OPERATING AND FLIGHT RULES Division I – General Division II – Operational and Emergency Equipment Requirements Division III – Flight Preparation, Flight Plans and Flight Itineraries Division IV – Pre-flight and Fuel Requirements Division V – Operations at or in the Vicinity of an Aerodrome Division VI – Visual Flight Rules Division VII – Instrument Flight Rules Division VIII – Radiocommunications Division IX – Emergency Communications and Security
CARs Part VI, Subpart 5	AIRCRAFT REQUIREMENTS Division I – Aircraft Requirements - General Division II – Aircraft Equipment Requirements
CARs Part VII, Subpart 0	COMMERCIAL AIR SERVICES, GENERAL Division II – Approach Bans Division III – Flight Time and Flight Duty Time Limitations and Rest Periods
CARs Part VII, Subpart 4	COMMUTER OPERATIONS Division I – General Division III – Flight Operations Division V – Aircraft Equipment Requirements Division VII – Personnel Requirements Division IX – Manuals

CARs Part VII, Subpart 5	AIRLINE OPERATIONS Division I – General Division III – Flight Operations Division IV – Aircraft Performance Operating Limit Division V – Aircraft Equipment Requirements Division VII – Personnel Requirements Division IX – Manuals
TC AIM - GEN	GENERAL 1.0 – General Information 3.0 – Transportation Safety Board of Canada
TC AIM - AGA	AERODROMES 3.0 – Runway characteristics 7.18 – Aerodrome Lighting – (including Aircraft Radio Control of Aerodrome Lighting (ARCAL))
TC AIM - COM	COMMUNICATIONS 4.11 – ILS 1.15 – Radio Communications – Phone use during Radio Communications Failure
TC AIM - RAC	RULES OF THE AIR AND AIR TRAFFIC SERVICES 2.0 – Airspace – Requirements and Procedures 3.6 – Flight Planning – Flight Plans and Flight Itineraries (Opening) 3.7 – Changes to the information in a Flight Plan or Flight Itinerary 3.12 – Closing 3.13 – Fuel Requirements 3.14 – Requirements for Alternate Aerodrome – IFR Flight 3.15 – Completion of Canadian Flight Plan and Flight Itinerary / ICAO Flight Plan 4.0 – Airport Operations 5.0 – VFR En Route Procedures 6.0 – Instrument flight rules (IFR) -General 7.0 – Instrument flight rules (IFR) – Departure Procedures 8.0 – Instrument flight rules (IFR) - En Route Procedures 9.0 – Instrument flight rules (IFR) Arrival Procedures 10.0 – Instrument flight rules – Holding Procedures
TC AIM - SAR	SEARCH AND RESCUE 3.9 – Emergency Locator Transmitter – Schedule of Requirements
TC AIM - LRA	LICENSING, REGISTRATION AND AIRWORTHINESS 1.12 – Pilot Licensing – Recency Requirements
TC AIM - AIR	AIRMANSHIP 1.6 – General Information – Canadian Runway Friction Index 2.12 – Flight Operations – Flight Operations in Winters
AIP Canada (ICAO)	PART 1 GENERAL 3.1 – Aeronautical Information Services 3.2 – Aeronautical Charts

The above documents can be located on the Transport Canada web pages  
<http://laws-lois.justice.gc.ca/eng/regulations/SOR-96-433/index.html> and  
<http://www.tc.gc.ca/eng/civilaviation/publications/menu.htm>  
and on the Nav Canada web page  
<http://www.navcanada.ca/EN/products-and-services/Pages/AIP.aspx>

## **ENQUIRIES**

Information concerning the location of pilot training organizations and matters pertaining to flight crew licensing may be obtained by contacting the appropriate Regional Offices. A complete listing may be found at: <http://www.tc.gc.ca/eng/civilaviation/opssvs/general-exams-centres-2010.htm>