



Transport
Canada

Transports
Canada



TP 691E
(2013)

Study and Reference Guide
for the written examinations for the

INSTRUMENT RATING – AEROPLANE AND HELICOPTER

SEVENTEENTH EDITION

TC-1004069



Canada

Please direct your comments, orders and inquiries to:

The Order Desk
MultiMedia Products and Services
Transport Canada (AARA-MPS)
2655 Lancaster Rd.
Ottawa ON K1B 4L5

Telephone: 1-888-830-4911 (in North America) 613-991-4071 (other countries)
Fax: 613-991-1653
E-Mail: MPS@tc.gc.ca

© Her Majesty the Queen in Right of Canada, as represented by the Minister of Transport, 2013

Permission is granted by the Department of Transport, Canada, to copy and/or reproduce the contents of this publication in whole or in part provided that full acknowledgment is given to the Department of Transport, Canada, and that the material be accurately reproduced. While use of this material has been authorized, the Department of Transport, Canada, shall not be responsible for the manner in which the information is presented, nor for any interpretations thereof.

The information in this publication is to be considered solely as a guide and should not be quoted as or considered to be a legal authority. It may become obsolete in whole or in part at any time without notice.

ISBN 978-1-100-22696-5

Catalogue No. T52-4/58-2013E-PDF

TP 691E
(2013)

TC-1004069

Cette publication est aussi disponible en français sous le titre [Guide d'étude et de référence pour les examens écrits pour la Qualification de vol aux instruments – Avion et hélicoptère]

TABLE OF CONTENTS

GENERAL INFORMATION	1
EXAMINATION PREREQUISITES	1
KNOWLEDGE REQUIREMENTS.....	1
EXAMINATION RULES	1
MATERIALS REQUIRED.....	2
VALIDITY PERIOD	2
EXAMINATION FEEDBACK.....	2
EXAMINATIONS.....	3
INSTRUMENT TYPE RATING EXAMINATION (INRAT).....	3
CONVERSION EXAMINATION – FAA INSTRUMENT RATING – AEROPLANE (FAAIA)	3
AIR LAW AND PROCEDURES.....	4
METEOROLOGY.....	8
INSTRUMENTATION, NAVIGATION AND RADIO AIDS	9
HUMAN FACTORS AND AIRMANSHIP	10
ENQUIRIES	11
RECOMMENDED STUDY MATERIAL.....	12
RECOMMENDED STUDY MATERIAL FOR THE FAA CONVERSION EXAMINATION	12

Intentionally left blank

GENERAL INFORMATION

The conditions of issue of the Instrument Rating are stated in the *Canadian Aviation Regulations* (CARs). CAR Standard 421.13 specifies the examination prerequisites. CAR Standard 421.46, 421.48 and 421.49 specifies the requirements for an Instrument Rating.

EXAMINATION PREREQUISITES

CAR 401.13(1)

Prior to taking a written examination, an applicant for a flight crew permit, licence or rating shall meet the prerequisites for the examination set out in the personnel licensing standards with respect to

- a) medical fitness;
- b) identification;
- c) a recommendation from the flight instructor who is responsible for the training of the applicant; and
- d) experience.

To meet the above, a candidate for an Instrument Rating examination must produce proof of medical fitness, identification bearing the signature and photograph of the candidate, and proof of having completed 20 hours of instrument flight or ground time. No recommendation from a flight instructor is required.

KNOWLEDGE REQUIREMENTS

Applicants for the Instrument Rating shall demonstrate their knowledge by writing a Transport Canada multiple-choice examination on subjects contained in this guide. Applicants must also be able to read the examination questions in either English or French without assistance.

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. A flight computer is required for the navigation questions. A list of approved electronic flight computers is available at:

<http://www.tc.gc.ca/eng/civilaviation/standards/general-exams-computers-2179.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.

CAR 400.04 (1)

Subject to subsections (2) and (6), 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 on the results letter will inform the candidate which questions were answered incorrectly.

Example of Feedback Statement:

Interpret instrument approach procedure charts.

EXAMINATIONS

INSTRUMENT TYPE RATING EXAMINATION (INRAT)

The examination consists of general IFR questions in addition to questions based on a simulated IFR flight. There are different versions of the examination for aeroplane and helicopter pilots. The category of aircraft used on the initial flight test must match the category of aircraft specified on the INRAT examination.

Examination	Questions	Time Limit	Pass Mark
INRAT	50 Multiple Choice	3 hours	70%

CONVERSION EXAMINATION – FAA INSTRUMENT RATING – AEROPLANE (FAAIA)

Pilots converting a valid United States of America FAA Instrument Rating may demonstrate their knowledge by writing the following Transport Canada examination:

Examination	Questions	Time Limit	Pass Mark
FAAIA (aeroplanes)	20 Multiple Choice	1 hour	70%

This examination is based on the differences between American and Canadian air law and procedures for IFR flight. Candidates should read the recommended references on page 13 as they apply to aircraft in IFR operations.

AIR LAW AND PROCEDURES

Canadian Aviation Regulations (CARs)

Some 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 (Definitions)

PART IV - PERSONNEL LICENSING AND TRAINING

401 - FLIGHT CREW PERMITS, LICENCES AND RATINGS

- 401.03 Requirement to Hold a Flight Crew Permit, Licence or Rating
- 401.05 Recency Requirements
- 401.46 Instrument Rating, aircraft groups (in the standards)
- 401.47 Instrument Rating Privileges
- 401.48 Instrument Rating Period of Validity

PART VI - GENERAL OPERATING AND FLIGHT RULES

601 - AIRSPACE STRUCTURE, CLASSIFICATION AND USE

- 601.01 Airspace Structure
- 601.02 Airspace Classification
- 601.03 Transponder Airspace
- 601.04 IFR or VFR Flight in Class F Special Use Restricted Airspace or Class F Special Use Advisory Airspace
- 601.05 IFR Flight in Class A, B, C, D or E Airspace or Class F Special Use Restricted or Class F Special Use Advisory Controlled Airspace

602 - OPERATING AND FLIGHT RULES

- 602.08 Portable Electronic Devices
- 602.31 Compliance with Air Traffic Control Instructions and Clearances
- 602.34 Cruising Altitudes and Cruising Flight Levels
- 602.35 Altimeter-setting and Operating Procedures in the Altimeter-setting Region
- 602.36 Altimeter-setting and Operating Procedures in the Standard Pressure Region
- 602.37 Altimeter-setting and Operating Procedures in Transition between Regions

OPERATIONAL AND EMERGENCY EQUIPMENT REQUIREMENTS

- 602.60 Requirements for Power-driven Aircraft

FLIGHT PREPARATION, FLIGHT PLANS AND FLIGHT ITINERARIES

- 602.71 Pre-flight Information
- 602.72 Weather Information
- 602.73 Requirement to File a Flight Plan or a Flight Itinerary
- 602.74 Contents of a Flight Plan or a Flight Itinerary

- 602.75 Filing of a Flight Plan or a Flight Itinerary
- 602.76 Changes in the Flight Plan
- 602.77 Requirement to File an Arrival Report
- 602.88 Fuel Requirements

OPERATIONS AT OR IN THE VICINITY OF AN AERODROME

- 602.96 General
- 602.97 VFR and IFR Aircraft Operations at Uncontrolled Aerodromes within an MF Area
- 602.104 Reporting Procedures for IFR Aircraft When Approaching or Landing at an Uncontrolled Aerodrome

INSTRUMENT FLIGHT RULES

- 602.121 General Requirements
- 602.122 Alternate Aerodrome Requirements
- 602.123 Alternate Aerodrome Weather Minima
- 602.124 Minimum Altitudes to Ensure Obstacle Clearance
- 602.125 En route IFR Position Reports
- 602.126 Take-off Minima
- 602.127 Instrument Approaches
- 602.128 Landing Minima
- 602.129 Approach Ban – General

RADIOCOMMUNICATIONS

- 602.137 Two-way Radiocommunication Failure in IFR Flight

605 - AIRCRAFT REQUIREMENTS

- 605.18 Power-driven Aircraft – IFR
- 605.30 De-icing or Anti-icing Equipment

AIR TRAFFIC SERVICES

- 1 Air Traffic Control (ATC) and Advisory Services
- 2 Flight Service Stations (FSS) / Flight Information Centres (FIC)
- 3 Clearances and instructions
- 4 Communication procedures / departure / en route / arrival
- 5 Radar Services
– departure / en route / arrival
- 6 Transponder operation
- 7 Wake turbulence separation
- 8 Reduced Visibility Operations

CANADIAN AIRSPACE

- 1 Low level controlled airspace / types / dimensions / flight rules
- 2 Classification of airspace
- 3 Special use airspace

ROUTE AND FLIGHT PLANNING

- 1 Publications/Charts
– requirements and use
- 2 Preferred routing
– factors affecting flight plan
- 3 Navigation Plan & Flight Log
- 4 Altitude selection
- 5 IFR flight in mountainous regions
- 6 Fuel requirements
– aeroplanes, helicopters
- 7 Weather requirements
– take-off, landing, alternate
- 8 NOTAM
– classifications and interpretation
- 9 Use of flight computer
- 10 *Canada Air Pilot*
– utilization and definitions

DEPARTURE PROCEDURES

- 1 ATIS
- 2 Radar departure
- 3 Non-radar departure
- 4 Standard Instrument Departure (SID)
- 5 Departure at uncontrolled aerodrome
- 6 Obstacle clearance
- 7 Visibility requirements / RVR

EN ROUTE PROCEDURES

- 1 Position reports
- 2 Clearance limits
- 3 Changes to flight plan
- 4 Altitude Limitations
– MEA, MOCA, MRA, GASA
- 5 Adherence to TAS
- 6 Fixes/waypoints
- 7 1,000 Feet on Top
– IFR flight
- 8 IFR flight from controlled airspace to uncontrolled airspace
- 9 IFR flight from uncontrolled airspace to controlled airspace

HOLDING PROCEDURES

- 1 Holding clearance
- 2 Entry
- 3 Standard holding pattern
- 4 Non-standard holding pattern
- 5 Timing
- 6 Speed limitations
- 7 DME
- 8 Shuttle

APPROACH PROCEDURES

- 1 ATIS
- 2 STARs
- 3 Radar vectors
- 4 Speed adjustment
- 5 Transition to approach
- 6 Initial approach/procedure turn
- 7 Straight-in approach (No PT)
- 8 Straight-in minima
- 9 Final approach
- 10 Precision approach – ILS, PAR
- 11 Non-Precision approach
– NDB, VOR, DME, LOC,
RNAV/GNSS
- 12 Stabilized Constant Descent
Angle approach
- 13 Visual/Contact approach
- 14 Circling approach
- 15 Missed approach
- 16 Uncontrolled aerodromes / VFR /
IFR traffic mix
- 17 Obstacle clearance – Minimum
Safe Altitude, Minimum Sector
Altitude (MSA)
- 18 Temperature compensation
- 19 Approach Ban – visibility
requirements

CANADA AIR PILOT (CAP)

CAP GEN Definitions

- 1 Chart Legend
– approach, aerodrome, lighting
and symbols
- 2 Altitude corrections
- 3 Operating minima
- 4 Aircraft categories

EMERGENCIES

- 1 Declaration of an emergency
- 2 Use of transponder
- 3 Deviation from clearance
- 4 Equipment failure

METEOROLOGY

FUNDAMENTALS OF WEATHER

- 1 Meteorological services available
- 2 Factors that determine the weather
- 3 Meteorological aspect of altimetry
- 4 Temperature
- 5 Moisture
- 6 Stability and instability
- 7 Clouds/surface based layers
- 8 Wind
- 9 Air masses
- 10 Fronts – types and associated weather

ICING

- 1 Formation, meteorological factors
- 2 Types and intensities
- 3 Effects on aircraft performance
- 4 Flight precautions and avoidance

TURBULENCE

- 1 Mechanical
- 2 Thermal
- 3 Frontal
- 4 Wind Shear
- 5 Flight precautions

THUNDERSTORMS

- 1 Conditions for development
- 2 Structure
- 3 Classification
- 4 Hazards – macro-bursts, microbursts
- 5 Squall lines
- 6 Flight precautions

AVIATION WEATHER REPORTS

- 1 Types and times (METAR, SPECI, METAR AUTO, SPECI AUTO)
- 2 Decoding
- 3 Pilot report (PIREP)

AVIATION FORECASTS

- 1 Times issued and validity
- 2 Decoding
- 3 Graphical Area Forecasts (GFA)
- 4 Aerodrome Forecasts (TAF)
- 5 Upper level winds and temperature forecasts (FD)
- 6 Significant In-Flight Weather Warning Messages (SIGMET)

WEATHER MAPS AND PROGNOSTIC CHARTS

- 1 Surface weather chart
- 2 Upper level charts – ANAL (to 700 MB)
- 3 Prognostic surface chart
- 4 Significant weather prognostic chart (700-400 MB)
- 5 Times issued and validity
- 6 Symbols and decoding

WEATHER INTERPRETATION

- 1 Weather systems affecting preferred routes and altitudes

INSTRUMENTATION, NAVIGATION AND RADIO AIDS

PITOT STATIC SYSTEM

- 1 Pitot
- 2 Static
- 3 Anti-icing
- 4 Alternate static
- 5 Sources/errors
- 6 Blockage

PITOT STATIC INSTRUMENTS

- 1 Principles
- 2 Errors

GYROSCOPIC SYSTEMS AND INSTRUMENTS

- 1 Principles
- 2 Power sources
- 3 Errors

MAGNETIC COMPASS

- 1 Principles
- 2 Use of the magnetic compass
- 3 Errors

VOR

- 1 Serviceability checks
- 2 Interpretation and use
- 3 Limitations

ADF

- 1 Serviceability checks
- 2 Interpretation and use
- 3 Limitations

ILS

- 1 Basic components – air and ground
- 2 Principles of operation
- 3 Limitations
- 4 Localizer only

GNSS

- 1 GPS – basic principles – air and ground
- 2 Limitations
- 3 Equipment
- 4 Interpretation
- 5 RAIM, Fault Detection & Exclusion
- 6 WAAS

TRANSPONDER

- 1 Principles of operation
- 2 Phraseology and use

OTHER SYSTEMS – BASIC PRINCIPLES AND USE

- 1 DME
- 2 VORTAC
- 3 Area navigation (RNAV)
- 4 RMI
- 5 Horizontal Situation Indicator (HSI)
- 6 Radio/radar altimeter
- 7 Flight Director system
- 8 Surveillance Radar - Primary and Secondary
- 9 Airborne weather radar
- 10 Lightning detection equipment (e.g. stormscope)

HUMAN FACTORS AND AIRMANSHIP

AVIATION PHYSIOLOGY

- 1 Hypoxia/hyperventilation
- 2 Orientation / disorientation / visual and vestibular illusions
- 3 Sleep/fatigue

AVIATION PSYCHOLOGY

- 1 Decision-making process
- 2 Factors that influence decision-making
- 3 Situational awareness

PILOT – EQUIPMENT/MATERIALS RELATIONSHIP

- 1 Controls and displays – errors in interpretation and control
i.e. ADF / VOR RMI
- 2 Cockpit visibility – seat position
- 3 Correct use of charts, checklists, manuals
- 4 Automation advantages / threats

CONTROLLED FLIGHT INTO TERRAIN (CFIT)

THREAT AND ERROR MANAGEMENT

- 1 Threats and errors in IFR flight

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/standards/general-exams-centres-2178.htm>

RECOMMENDED STUDY MATERIAL

- Canadian Aviation Regulations (CARs)
<http://www.tc.gc.ca/eng/civilaviation/regserv/cars/menu.htm>
- Transport Canada Aeronautical Information Manual (TC AIM) (TP 14371)
<http://www.tc.gc.ca/eng/civilaviation/publications/tp14371-menu-3092.htm>
- Canada Air Pilot (CAP) – CAP General section
- Canada Flight Supplement (CFS)
- Enroute Low/High/Terminal Charts
- Human Factors for Aviation – Basic Handbook (TP 12863)
- Air Command Weather Manual (TP 9352)
- When in Doubt ... Aircraft Critical Surface Contamination Training (TP 10643)

Knowledge of the following charts is recommended for pilots intending to fly IFR in the United States:

- FAA AeroNav Aeronautical Charts
<http://naco.faa.gov/ecom/Catalog.aspx?a=AERO+NOS+CHART>
- Jeppesen En Route and Approach Charts

Transport Canada Publications (TP) may be purchased from retailers, or at the following web site: <http://shop.tc.gc.ca/TCHtml/ibeCZzpHome.jsp?language=US>

NavCanada publications and charts may be purchased from retailers, or at the following web site:

<http://www.navcanada.ca/navcanada.asp?Language=en&Content=ContentDefinitionFiles%5CPublications%5CAeronauticalInfoProducts%5Cdefault.xml>

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

RECOMMENDED STUDY MATERIAL FOR THE FAA CONVERSION EXAMINATION

Candidates attempting the examination for conversion from an FAA aeroplane instrument rating to a Canadian aeroplane instrument rating (FAAIA examination) are encouraged to review the following references as they apply to aeroplanes:

CARs Part I, Subpart 0 GENERAL PROVISIONS

100.01 – Short Title

CARs Part I, Subpart 1 INTERPRETATION

101.01 – Interpretation (definitions as needed)

CARs Part IV, Subpart 1 FLIGHT CREW PERMITS, LICENCES AND RATINGS

401.05(3) – Recency Requirements (Instrument Rating)

Division XIV – Instrument Rating

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 VII – Instrument Flight Rules

Division VIII – Radiocommunications

CARs Part VI, Subpart 5 AIRCRAFT REQUIREMENTS

Division II – Aircraft Equipment Requirements

TC AIM - GEN GENERAL

1.0 – General Information

3.0 – Transportation Safety Board of Canada

TC AIM - COM COMMUNICATIONS

5.15 – Phone use during Radio Communications Failure

TC AIM - RAC RULES OF THE AIR AND AIR TRAFFIC SERVICES

1.0 – General Information

2.0 – Airspace – Requirements and Procedures

3.13 – Fuel Requirements

3.14 – Requirements for Alternate Aerodrome – IFR Flight

3.15 – Completion of Canadian Flight Plan / Flight Itinerary and ICAO Flight Plan

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 - MAP AERONAUTICAL CHARTS AND PUBLICATIONS

3.0 – Aeronautical Information – IFR

The above documents can be found on the Transport Canada web pages

<http://www.tc.gc.ca/eng/civilaviation/regserv/cars/menu.htm>

and

<http://www.tc.gc.ca/eng/civilaviation/publications/tp14371-menu-3092.htm>