



Transport
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TP 11954E
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Study and Reference Guide

Airline Transport Pilot Licence

Helicopter

Fifth Edition

February 2004

Canada

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GENERAL

KNOWLEDGE REQUIREMENTS

Applicants for a ATPL Helicopter are expected to have mastered the various subjects included in this guide in addition to material required to obtain a Commercial Pilot Licence – Helicopter (see TP 2476E). All applicants must also be able to read the examination questions in either English or French without assistance.

Subjects marked with a bullet (→) are considered essential knowledge for the ATPL – Helicopter applicants.

EXAMINATIONS

The conditions of issue of all flight crew licences are stated in the Canadian Aviation Regulations (CARs).

Applicants for the Commercial Pilot Licence in the Aeroplane Category shall demonstrate their knowledge by writing a Transport Canada multiple choice examination on subjects contained in this guide.

Examination	Questions	Time Limit	Pass Mark
Air Regulations and Air Traffic Procedures, Helicopter Operations and Navigation General – HARON	80	3½ hours	70%
Examination Meteorology, Radio Aids to Navigation and Flight Planning – HAMRA	80	3½ hours	70%

EXAMINATION RESULTS: FEEDBACK STATEMENTS

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

Example of a Feedback Statement

Identify the atmospheric conditions favorable for thunderstorm formation.

SECTION 1: AIR LAW AND PROCEDURES**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

PART III – AERODROMES AND AIRPORTS

- 300– INTERPRETATION

- 300.01 Interpretation

- 301– AERODROMES

- 301.01 Application
- 301.04 Markers and Markings
- 301.06 Wind Direction Indicator
- 301.07 Lighting
- 301.08 Prohibitions
- 301.09 Fire Prevention

302 – AIRPORTS

- 302.10 Prohibitions
- 302.11 Fire Prevention

PART IV – PERSONNEL LICENSING AND TRAINING

400 – GENERAL

- 400.01 Interpretation

401 – FLIGHT CREW PERMITS, LICENCES AND RATINGS

- 401.03 Requirements to Hold a Flight Crew Permit, Licence or Rating
- 401.04 Flight Crew Members of Aircraft Registered in Contracting States other than Canada
- 401.05 Recency Requirements
- 401.08 Personal Logs
- 401.10 Crediting of Flight Time Acquired by a Co-pilot
- 401.35 ATPL Privileges – Helicopter
- 401.44 VFR Over-The-Top Rating
- 401.61 Flight Instructor Ratings
- 404– MEDICAL REQUIREMENTS

- 404.03 Requirement to Hold a Medical Certificate (MC)
- 404.04 Issuance and Validity Period of MC
- 404.06 Prohibitions regarding Exercise of Privileges
- 404.10 MC Requirements for Personnel Licences
- 404.18 Permission to Continue to Exercise the Privileges of a Licence or Rating

PART VI – GENERAL OPERATING AND FLIGHT RULES

600 – INTERPRETATION

600.01 Interpretation

→ 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
- 601.06 VFR Flight in Class A Airspace
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- 601.15 Forest Fire Aircraft Operating Restrictions
- 601.16 Issuance of NOTAM for a Forest Fire Aircraft Operating Restrictions
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602 – OPERATING AND FLIGHT RULES

GENERAL

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- 602.02 Fitness of Flight Crew Members
- 602.03 Alcohol or Drugs – Crew Members
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- 602.07 Aircraft Operating Limitations
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- 602.09 Fuelling with Engines Running
- 602.10 Starting and Ground Running of Aircraft Engines
- 602.11 Aircraft Icing
- 602.12 Overflight of Built-up Areas or Open-Air Assemblies of Persons during Take-offs, Approaches and Landings
- 602.13 Take-offs, Approaches and Landings within Built-up Areas of Cities and Towns
- 602.14 Minimum Altitudes and Distances
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- 602.16 Flights over Open-Air Assemblies of Persons or Built-up Areas – Helicopters with External Loads
- 602.17 Carriage of Persons during Low Altitude Flight
- 602.19 Right-of-Way – General
- 602.20 Right-of-Way – Aircraft Manoeuvring on Water
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- 602.24 Formation Flight
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- 602.60 Requirements for Power-driven Aircraft
- 602.61 Survival Equipment – Flights over Land
- 602.62 Life Preservers and Personal Flotation Devices
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- 602.87 Crew Member Instructions
- 602.88 Fuel Requirements
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- 602.97 VFR and IFR Aircraft Operations at Uncontrolled Aerodromes within an MF Area
- 602.98 General MF Reporting Requirements
- 602.99 MF Reporting Procedures before Entering Manoeuvring Area
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- 602.102 MF Reporting Procedures when Flying Continuous Circuits
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- 604.18 Briefing of Passengers

FLIGHT TIME AND FLIGHT DUTY TIME LIMITATIONS AND REST PERIODS

- 604.26 Flight Time Limitations
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- 604.28 Split Flight Duty Time
- 604.29 Extension of Flight Duty Time
- 604.30 Unforeseen Operational Circumstances
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- 604.32 Requirements for Time Free from Flight Duty

604.33 Flight Crew Positioning

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- 604.38 Survival Equipment
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- 604.65 Designation of Pilot-in-command and Second-in-command
- 604.66 Crew Member Qualifications
- 604.68 Validity Period
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- 604.82 Distribution of Operations Manual
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- 604.84 Standard Operating Procedures

605 – AIRCRAFT REQUIREMENTS

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- 605.03 Flight Authority
- 605.04 Availability of Aircraft Flight Manual
- 605.05 Markings and Placards
- 605.06 Aircraft Equipment Standards and Serviceability
- 605.07 Minimum Equipment Lists
- 605.08 Unserviceable and Removed Equipment – General
- 605.09 Unserviceable and Removed Equipment – Aircraft with a Minimum Equipment List
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- 605.14 Power-driven Aircraft – Day VFR
- 605.15 Power-driven Aircraft – VFR OTT
- 605.16 Power-driven Aircraft – Night VFR
- 605.17 Use of Position and Anti-collision Lights
- 605.22 Seat and Safety-Belt Requirements
- 605.23 Restraint System Requirements
- 605.24 Shoulder Harness Requirements
- 605.25 General Use of Safety Belts and Restraint Systems
- 605.26 Use of Passenger Safety Belts and Restraint Systems
- 605.27 Use of Crew Member Safety Belts
- 605.28 Child Restraint System
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- 605.32 Use of Oxygen
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- 605.34 Use of Flight Data Recorders and Cockpit Voice Recorders
- 605.35 Transponder and Automatic Pressure Altitude Reporting Equipment
- 605.38 ELT
- 605.39 Use of ELT
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AIRCRAFT MAINTENANCE REQUIREMENTS

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- 605.85 Maintenance Release and Elementary Work
- 605.86 Maintenance Schedule
- 605.87 Transfer of Aeronautical Products between Maintenance Schedules
- 605.88 Inspection after Abnormal Occurrences

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- 605.95 Journey Log – Carrying on Board
- 605.96 Requirements for Technical Records other than the Journey Log
- 605.97 Transfer of Records

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700 – COMMERCIAL AIR SERVICES

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- 700.01 Definitions

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- 700.15 Flight Time Limitations
- 700.16 Flight Duty Time Limitations and Rest Periods
- 700.17 Unforeseen Operational Circumstances
- 700.18 Delayed Reporting Time
- 700.19 Requirements for Time Free from Duty
- 700.20 Flight Crew Positioning
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702 – AERIAL WORK

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- 702.01 Application

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- 702.13 Flight Authorization
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- 702.16 Carriage of Persons
- 702.17 VFR Flight Minimum Flight Visibility – Uncontrolled Airspace
- 702.18 Night, VFR OTT and IFR Operations
- 702.19 Entering or Leaving a Helicopter in Flight
- 702.20 Aircraft Operating over Water
- 702.21 Helicopter Class D External Loads
- 702.22 Built-up Area and Aerial Work Zone
- 702.23 Briefing of Persons other than Flight Crew Members

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- 702.43 Additional Equipment for Single-pilot Operations
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- 702.65 Flight Crew Member Qualifications
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- 702.84 Standard Operating Procedures

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- 703.01 Application

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- 703.18 Operational Flight Plan – Subsection (2)
- 703.20 Fuel Requirements – Paragraph (b)
- 703.21 Admission to Pilot's Compartment
- 703.22 Transport of Passengers in Single-engined Aircraft
- 703.23 Aircraft Operating over Water
- 703.24 Number of Passengers in Single-engined Aircraft
- 703.25 Carriage of External Loads
- 703.26 Simulation of Emergency Situations
- 703.27 VFR Flight Obstacle Clearance Requirements
- 703.28 VFR Flight Minimum Flight Visibility – Uncontrolled Airspace
- 703.29 VFR Flight Weather Conditions
- 703.32 Enroute Limitations

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- 703.34 Routes in Uncontrolled Airspace
- 703.36 Minimum Altitudes and Distances
- 703.37 Weight and Balance Control
- 703.38 Passenger and Cabin Safety Procedures
- 703.39 Briefing of Passengers

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- 703.64 General Requirements
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- 703.82 Equipment Standards and Inspection

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- 703.88 Flight Crew Member Qualifications
- 703.91 Validity Period
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- 703.106 Distribution of Company Operations Manual
- 703.107 Aircraft Standard Operating Procedures

704 – COMMUTER OPERATIONS

- 704.01 Application

FLIGHT OPERATIONS

- 704.12 Operating Instructions
- 704.13 General Operational Information
- 704.16 Flight Authorization
- 704.17 Operational Flight Plan – Subsection (2)
- 704.19 Checklist
- 704.20 Fuel Requirements – Paragraph (b)
- 704.22 Simulation of Emergency Situations
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- 704.25 VFR Flight Weather Conditions
- 704.28 VFR OTT Flight
- 704.29 Routes in Uncontrolled airspace
- 704.31 Minimum Altitudes and Distances
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- 704.33 Apron and Cabin Safety Procedures
- 704.34 Briefing of Passengers

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- 704.46 Take-off Weight Limitations
- 704.48 Enroute Limitations with One Engine Inoperative

AIRCRAFT EQUIPMENT REQUIREMENTS

- 704.62 General Requirements
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EMERGENCY EQUIPMENT

- 704.83 Hand-held Fire Extinguisher

PERSONNEL REQUIREMENTS

- 704.107 Designation of Pilot-in-command and Second-in-command
- 704.108 Flight Crew Member Qualifications
- 704.111 Validity Period
- 704.115 Training Program

MANUALS

- 704.122 Distribution of Company Operations Manual
- 704.123 Aircraft Operating Manual
- 704.124 Standard Operating Procedures

NOTAM

A.I.P. CANADA

- 1 A.I.P. CANADA
- 2 Supplements
- 3 Aeronautical Information Circulars
- 4 Aviation Notices and AIRAC Canada

TRANSPORTATION SAFETY BOARD OF CANADA (TSB) – (A.I.P. GEN 3.0)

AIR TRAFFIC SERVICES AND PROCEDURES

- 1 Air Traffic and Advisory Services
- 2 Flight Service Stations
- 3 Communications Procedures
- 4 Radar Service
- 5 ATC Clearances and Instructions
- 6 Wake Turbulence Separation
- 7 Airport/Aerodrome Operations – Uncontrolled
- 8 Airport/Aerodrome Operations – Controlled
- 9 Mandatory and Aerodrome Traffic Frequencies
- 10 VFR En Route Procedures
- 11 VFR Holding Procedures
- 12 Simultaneous Intersecting Runway Operations (SIRO)

OPERATIONS IN DOMESTIC AIRSPACE

- 1 Altimeter Setting Procedures
- 2 Cruising Altitudes
- 3 Profile Descent
- 4 Leaving or Entering Uncontrolled Airspace
- 5 Uncontrolled Airspace Procedures

SECTION 2: AIRFRAMES, ENGINES AND AIRCRAFT SYSTEMS

AIRFRAMES

- 1 Flight Controls
- 2 Types of Construction

ENGINES

- 1 Principles of Reciprocating Engines
- 2 Handling Procedures for Reciprocating Engines
- 3 Principles of Turbine Engines
- 4 Handling Procedures for Turbine Engines
- 5 Engine Controls

AIRCRAFT SYSTEMS

- 1 Fuel
- 2 Oil
- 3 Electrical
- 4 Hydraulic
- 5 Transmissions
- 6 Pneumatic
- 7 Warning (e.g. ice, fire, chip detectors)
- 8 Fire Protection
- 9 Heating
- 10 De-icing and Anti-icing
- 11 Particle Separators
- 12 Emergency Floatation
- 13 Oxygen
- 14 Undercarriage and Brakes
- 15 Autopilot / Stability Augmentation

SECTION 3: 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 Settings
- 5 Effects of both Pressure and Temperature

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 Sublimation and Condensation
- 3 Cloud Formation
- 4 Precipitation
- 5 Saturated and Dry Adiabatic Lapse Rates

STABILITY AND INSTABILITY

- 1 Lapse Rate and Stability
- 2 Modification of Stability
- 3 Characteristics of Stable and Unstable Air
- 4 Surface Heating and Cooling
- 5 Lifting Processes
- 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

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 Across 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 Types of Ice
- 3 Reporting Criteria
- 4 Cloud Types and Icing
- 5 Freezing Rain and Drizzle
- 6 Icing in Clear Air (Hoar Frost)
- 7 Collection Efficiency
- 8 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 (including mist)
- 3 Haze and Smoke
- 4 Blowing Obstructions to Vision

METEOROLOGICAL SERVICES AVAILABLE TO PILOTS

- 1 Aviation Weather Briefing Service (AWBS)
- 2 Aviation Weather Information Service (AWIS)
- 3 Flight Service Stations (FSS)
- 4 Weather Broadcasts by FSS
- 5 Atmospheric Environment Service Weather Briefing
- 6 Transcribed Weather Broadcasts (TWB)
- 7 DUATS – Commercial Weather Service
- 8 Automatic Terminal Information Service (ATIS)
- 9 VOLMET (HF) Broadcast
- 10 Pilots Automatic Telephone Weather Answering Service (PATWAS)

WEATHER MAPS AND PROGNOSTIC CHARTS

- 1 Times Issued and Validity Periods
- 2 Symbols and Decoding
- 3 Surface Weather Map
- 4 Prognostic Surface Chart
- 5 Upper Level Chart – ANAL (850 – 700 mb)
- 6 Significant Weather Prognostic Chart FL100 – 250 (700 – 400 mb)

AVIATION WEATHER REPORTS

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

AVIATION FORECASTS

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

SECTION 4: INSTRUMENTS

FLIGHT INSTRUMENTS – PRINCIPLES AND OPERATIONAL USE

- 1 Pitot Static System
- 2 Airspeed Indicator
- 3 Altimeter and Encoding Altimeter
- 4 Radio / Radar Altimeter
- 5 Outside Air Temperature
- 6 Turn-and-bank Indicator / Turn Coordinator
- 7 Vertical Speed Indicator (VSI)
- 8 Heading Indicator
- 9 Attitude Indicator (AI)
- 10 Radio Magnetic Indicator (RMI)
- 11 Horizontal Situation Indicator (HSI)
- 12 Flight Director

FLIGHT MANAGEMENT INSTRUMENTS

- 1 Flight Management System (FMS)
- 2 Electronic Flight Instrument System (EFIS)

ENGINE AND TRANSMISSION INSTRUMENTS – PRINCIPLES AND USE

- 1 N1 / N2 / Rotor Tachometer
- 2 Torquemeter or Degrees of Pitch
- 3 Transmission
- 4 Oil Temperatures and Pressures
- 5 Turbine Temperature
- 6 Fuel Pressure
- 7 Fuel Flow

AIRCRAFT COMPASS SYSTEMS

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

SECTION 5: NAVIGATION - GENERAL**NAVIGATION TERMS**

- 1 Air Position
- 2 Great Circle
- 3 Rhumb Line
- 4 Greenwich Hour Angle

MAPS AND CHARTS

- 1 Lambert Conformal
- 2 Transverse Mercator
- 3 Enroute Low Altitude Charts

TIME AND LONGITUDE

- 1 Time Zones and Relation to Longitude

FLIGHT PLANNING CALCULATIONS

- 1 Heading and True Airspeed
- 2 Wind and Wind Speed
- 3 IAS – CAS – EAS – TAS
- 4 Track and Groundspeed
- 5 Time
- 6 Weight and Balance
- 7 Fuel Load / Zero Fuel Weight
- 8 Pay Load / Weight Shift
- 9 Critical Point (CP)
- 10 Point of No Return (PNR) / Radius of Action

FLIGHT PLAN FORMS

- 1 Flight Plan
- 2 Flight Itinerary

EN ROUTE NAVIGATION

- 1 Use of Aeronautical Charts
- 2 Calculation of Heading and Groundspeed
- 3 Use of Radio Aids to Determine Position and Transferring Position Lines
- 4 Gyro Steering Techniques in Areas of Compass Unreliability
- 5 Maintaining a Flight Log (Air Position)
- 6 Determination of Wind Velocity
- 7 Use of Canada Flight Supplement (CFS)

**SECTION 6: 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 FM
- 4 DATALINK

EMERGENCY LOCATOR TRANSMITTER (ELT)

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

RADAR

- 1 Elementary Theory
- 2 Primary Returns
- 3 Secondary Returns
- 4 Weather Radar

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 Long Range Area Navigation (LORAN C)
- 6 Very Low Frequency (VLF) Navigation System
- 7 Global Navigation Satellite System (GNSS-GPS)
- 8 Very High Frequency Direction Finding (VHF-DF)
- 9 Area Navigation System (RNAV)
- 10 Inertial Navigation System (INS)

APPROACH AIDS

- 1 Instrument Landing System (ILS)
- 2 Global Navigation Landing System (GNSS-GPS)
- 3 Surveillance Radar (ASR & AASR)
- 4 Precision Approach Radar (PAR)
- 5 Secondary Surveillance Radar (SSR)
- 6 Weather / Mapping Radar
- 7 VASI / PAPI

TRANSPONDERS

- 1 MODE C

SECTION 7: FLIGHT OPERATIONS

ATMOSPHERIC EFFECTS ON FLIGHT

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

PERFORMANCE

- 1 Power Available and Power Required
- 2 Hovering In Ground Effect and Out of Ground Effect (IGE / OGE)
- 3 Critical Wind Envelope
- 4 Best Rate of Climb
- 5 Cruising for Range / Endurance
- 6 Effect of Changes in Weight / Temperature
- 7 Flight Performance "V" Speeds / Definition and Use
- 8 Wind Shear – Effects and Avoidance

SPECIALTY OPERATIONS

- 1 External Loads
- 2 Heliport / Helideck

CHARTS AND GRAPHS

- 1 Weight and Balance
- 2 Take-off (including Cat A and B)
- 3 Climb
- 4 Cruise
- 5 Descent
- 6 Landing

CRITICAL SURFACE CONTAMINATION

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

WAKE TURBULENCE

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

FLIGHT MANUAL

- 1 Approved Information
- 2 Unapproved Information

SECTION 8: THEORY OF FLIGHT

FORCES ACTING ON A HELICOPTER

- 1 Load Factor
- 2 Stability
- 3 Lift / Weight / Thrust / Drag

ROTOR DESIGN

- 1 Number / Speed of Blades
- 2 Rotor Blade Vortices
- 3 Limitations to Forward Speed and Vibrations
- 4 Autorotations
- 5 Tail Rotor
- 6 Ground Resonance

SECTION 9: 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
- 10 Toxic Hazards (CO₂)

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 / Vibrations
- 8 Effects of Smoking
- 9 Toxic Hazards (including carbon monoxide)

AVIATION PSYCHOLOGY

- 1 The Decision-Making Process
- 2 Factors that Influence Decision-Making
- 3 Situation 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 – eg. "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

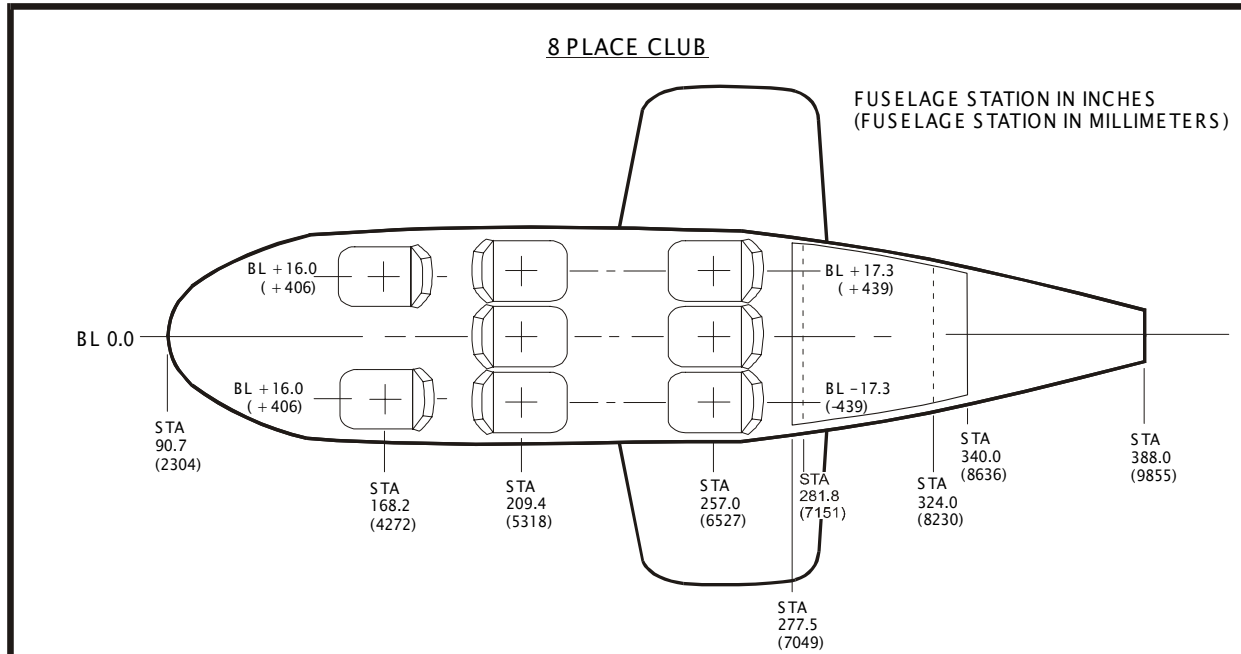
INTERPERSONAL RELATIONS

- 1 Communication with
 - Flight Crew and Cabin Crew
 - Passengers
 - Company Management
 - Flight Operations
 - Maintenance Personnel
 - Air Traffic Services
- 2 Crew Problem Solving and Decision-Making
- 3 Crew Management / Small Group Dynamics
- 4 Operating Pressures
 - Family
 - Peer Group
 - Employer

TABLES AND CHARTS

The following section contains examples of different tables and charts which may be used on ATPL-H examinations.

LOADING CONFIGURATION (Page 1 of 2)



9 PLACE SEATING -EXTREME LEFT CONFIGURATION

	Weight	Arm	Moment	Lateral Arm	Lateral Moment
* Weight Empty Condition	5202	256.3	1332876	-0.5	-2601
+ Oil	29	270.0	7831	0	0
+ Pilot	170	168.2	28594	+16.0	+2720
+ Copilot/Passenger	170	168.2	28594	-14.0	-2380
+ Pass., Forward. Left	170	200.2	34034	-17.3	-2941
+ Pass., Mid Left	170	228.4	38828	-17.3	-2941
+ Pass., Aft Left	170	257.9	43843	-17.3	-2941
+ Fuel (247 U.S. Gal. Jet A, A-1, or JP-5)	1679	263.3	442081	0	0
Take off Condition	7760	252.1	1956680	-1.4	-11084
-Fuel	-1679		-442081	0	0
Landing Condition (Extreme Left Lat. CG)	6081	249.1	1514599	-1.8	-11084

10 PLACE SEATING -MOST FWD. CONFIGURATION

	Weight	Arm	Moment	Lateral Arm	Lateral Moment
* Weight Empty Condition	5172	255.9	1323515	-0.4	-2069
+ Oil	29	270.0	7830	0	0
+ Pilot and Copilot	340	168.2	57188	+1.0	+340
+ Passengers (2) fwd	340	200.7	68238	-10.5	-3570
+ Passengers (3) Mid	510	229.2	116892	0	0
+ Fuel (247 U.S. Gal. Jet A, A-1, or JP-5)	1679	263.3	442081	0	0
Take off Condition	8070	249.8	2015744	-0.7	-5299
-Fuel	-1679		-442081		0
Landing Condition (Most fwd CG)	6391	246.2	1573663	-0.8	-5299

LOADING CONFIGURATION (Page 2 of 2)

FUEL LOADING TABLE (ENGLISH)							
TYPE A, A-1, AND JP-5 *(6.8 LB/U.S. GAL.)				TYPE B AND JP-4 *6.5 LB/U.S. GAL.)			
QUANTITY (U.S. GAL.)	WEIGHT (POUNDS)	C G (INCHES)	MOMENT (IN-LB)	QUANTITY (U.S. GAL.)	WEIGHT (POUNDS)	C G (INCHES)	MOMENT (IN-LB)
10	68	258.7	17592	10	64	258.7	16816
20	136	260.5	35428	20	130	260.5	33865
30	204	261.3	53305	30	195	261.3	50954
40	272	261.5	71128	40	160	261.5	67990
50	340	261.6	88944	50	325	261.6	85020
60	408	261.8	106813	60	390	261.8	102102
70	476	262.2	124807	70	455	262.2	119301
80	544	262.6	142854	80	520	262.6	136552
90	612	262.9	160895	90	585	262.9	153797
100	680	263.0	178840	100	650	263.0	170950
110	748	263.1	196799	110	715	263.1	188117
120	816	263.2	214771	120	780	263.2	205296
130	884	263.3	232757	130	845	263.3	222489
140	952	263.4	250757	140	910	263.4	239694
150	1020	263.4	268668	150	975	263.4	256815
160	1088	263.4	286579	160	1040	263.4	273936
170	1156	263.5	304606	170	1105	263.5	291168
180	1224	263.5	322524	180	1170	263.5	308295
190	1292	263.5	340442	190	1235	263.5	325423
200	1360	263.5	358360	200	1300	263.5	342550
210	1428	263.5	376278	210	1365	263.5	359678
220	1496	263.4	394046	220	1439	263.4	376663
230	1564	263.4	411958	230	1495	263.4	393783
240	1632	263.3	429706	240	1560	263.3	410748
247	1679	263.3	442081	247	1605	263.3	422597

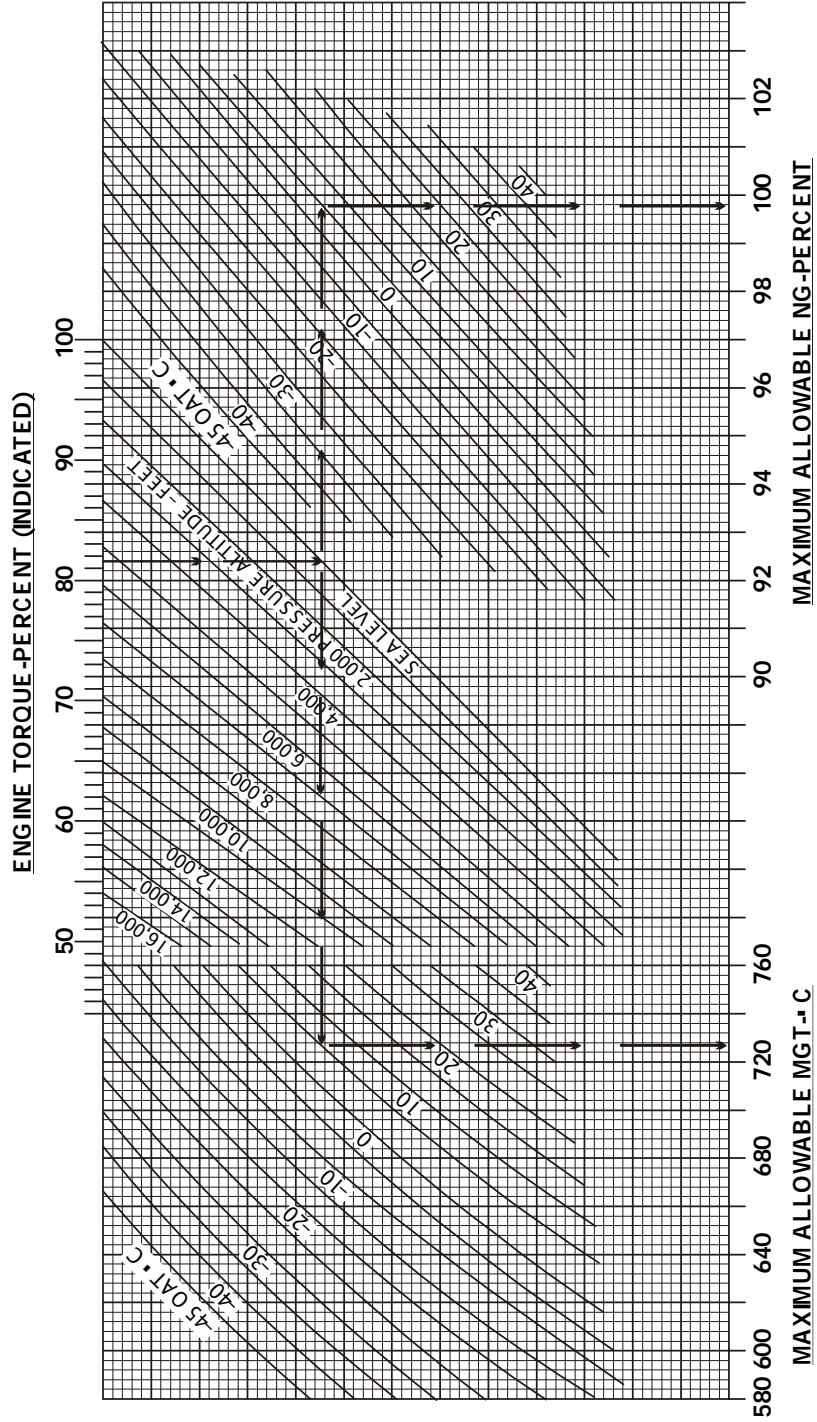
*NOTE: All data above represents usable fuel based on nominal density at 15° C (59° F).

BAGGAGE COMPARTMENT LOADING TABLE						
LOCATION OF TIE DOWNS (FOOTMAN LOOPS)						
LONGITUDINAL FUSELAGE STATION	LATERAL B.L.					
288.7	-15.4	-4.5	+4.5	+15.4		
299.3	-20.2			+20.2		
313.2	-18.5			+18.5		
327.4	-13.0	-4.3	+4.3	+13.0		
100 LBS /SQ.FT. MAXIMUM ALLOWABLE	BAGGAGE /CARGO CENTER OF GRAVITY WITH MID-SPAN LOCATION BETWEEN TIE-DOWNS MOMENT (IN-LBS)				500 POUNDS MAXIMUM ALLOWABLE	
WEIGHT (LBS)	F.S. 294.0	F.S. 301.0	F.S. 306.3	F.S. 308.1	F.S. 313.4	F.S. 320.3
25	7350	7525	7658	7703	7835	8008
50	14700	15050	15315	15405	14670	16015
75	22050	22585	22973	23108	23505	24023
100	29400	30100	30630	30810	31340	32030
125	36750	37625	38288	38513	29175	40038
150	44100	45150	45945	46215	47010	48045

POWER ASSURANCE CHECK (GROUND)

POWER ASSURANCE CHECK (GROUND)

- ANTI ICE - OFF
- HEATER/ECS - OFF
- GENERATOR - ON; OFF IF LOAD EXCEEDS 30 AMPS
- COLLECTIVE PITCH - FULL DOWN
- THRUSTLES:
TEST ENGINE - FULL OPEN
OTHER ENGINE - FLIGHT IDLE
- NP RPM - 97%
- COLLECTIVE PITCH - INCREASE UNTIL LIGHT ON SKIDS (AT OR ABOVE 95% NG). DO NOT EXCEED 86.4% ENGINE TORQUE, 785• MGT, OR 102.9% NG.
- STABILIZE POWER ONE TO FOUR MINUTES, THEN RECORD PRESSURE ALTITUDE, OAT, TORQUE, MGT, AND NG RPM.
- REDUCE COLLECTIVE.
- ENTER CHART AT INDICATED ENGINE TORQUE, MOVE DOWNWARD TO INTERSECT PRESSURE ALTITUDE, PROCEED LEFT AND RIGHT TO INTERSECT OUTSIDE AIR TEMPERATURE, THEN MOVE DOWN TO READ MAXIMUM ALLOWABLE MGT AND NG.
- REPEAT CHECK USING OTHER ENGINE.
IF EITHER ENGINE EXCEEDS ALLOWABLE MGT OR NG, PUBLISHED PERFORMANCE MAY NOT BE ACHIEVABLE.



MAXIMUM ALLOWABLE NG-PERCENT

MAXIMUM ALLOWABLE MGT - C

HELICOPTER - HOVER CEILING

HOVER OUT OF GROUND EFFECT

TAKEOFF POWER

100% N_r

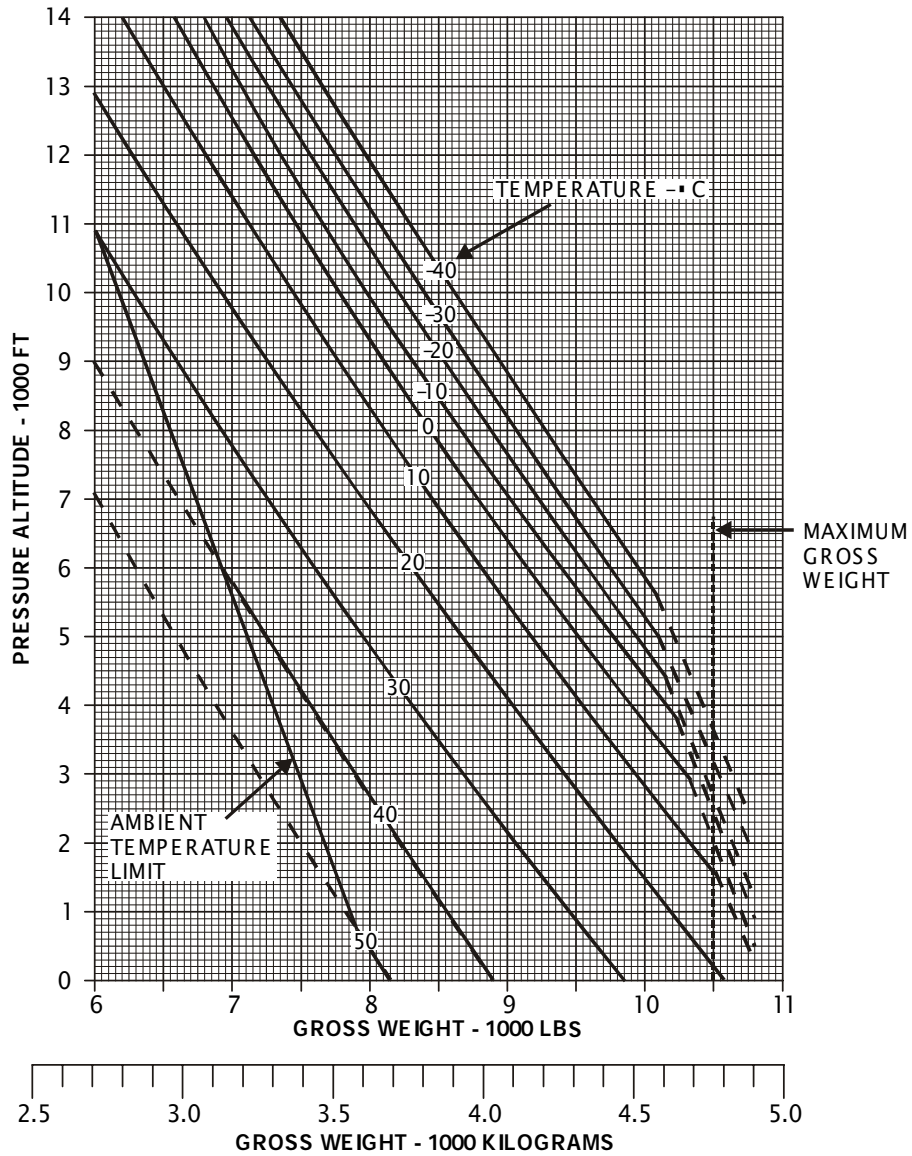
ANTI-ICE OFF

NO BLEED-AIR

REDUCE GROSS WEIGHT DETERMINED FROM CHART BY AMOUNT SHOWN IN THE FOLLOWING TABLE, AS APPLICABLE:

CONFIGURATION	WEIGHT REDUCTION
EAPS INSTALLED*	150 POUNDS
ANTI-ICE ON	200 POUNDS
ANTI-ICE ON WITH EAPS INSTALLED	270 POUNDS

*EAPS SWITCH IN THE ON POSITION. NO WEIGHT REDUCTION WITH EAPS SWITCH IN THE OFF POSITION.



HELICOPTER - TAKE-OFF AND LANDING WEIGHTS - CAT. "B"

(Page 1 of 2)

**CATEGORY "B"
MAXIMUM TAKEOFF AND LANDING GROSS WEIGHT
CT58-110 ENGINE
100% N_r**

WEIGHT BASED ON ABILITY TO HOVER AT 10 FEET WHEEL HEIGHT WITH TAKE-OFF POWER

NOTE: USE APPROPRIATE SCALE FOR ICE SHIELD AND/OR ANTI-ICE
MAXIMUM TAKE-OFF GROSS WEIGHT CANNOT EXCEED 19,000 LBS

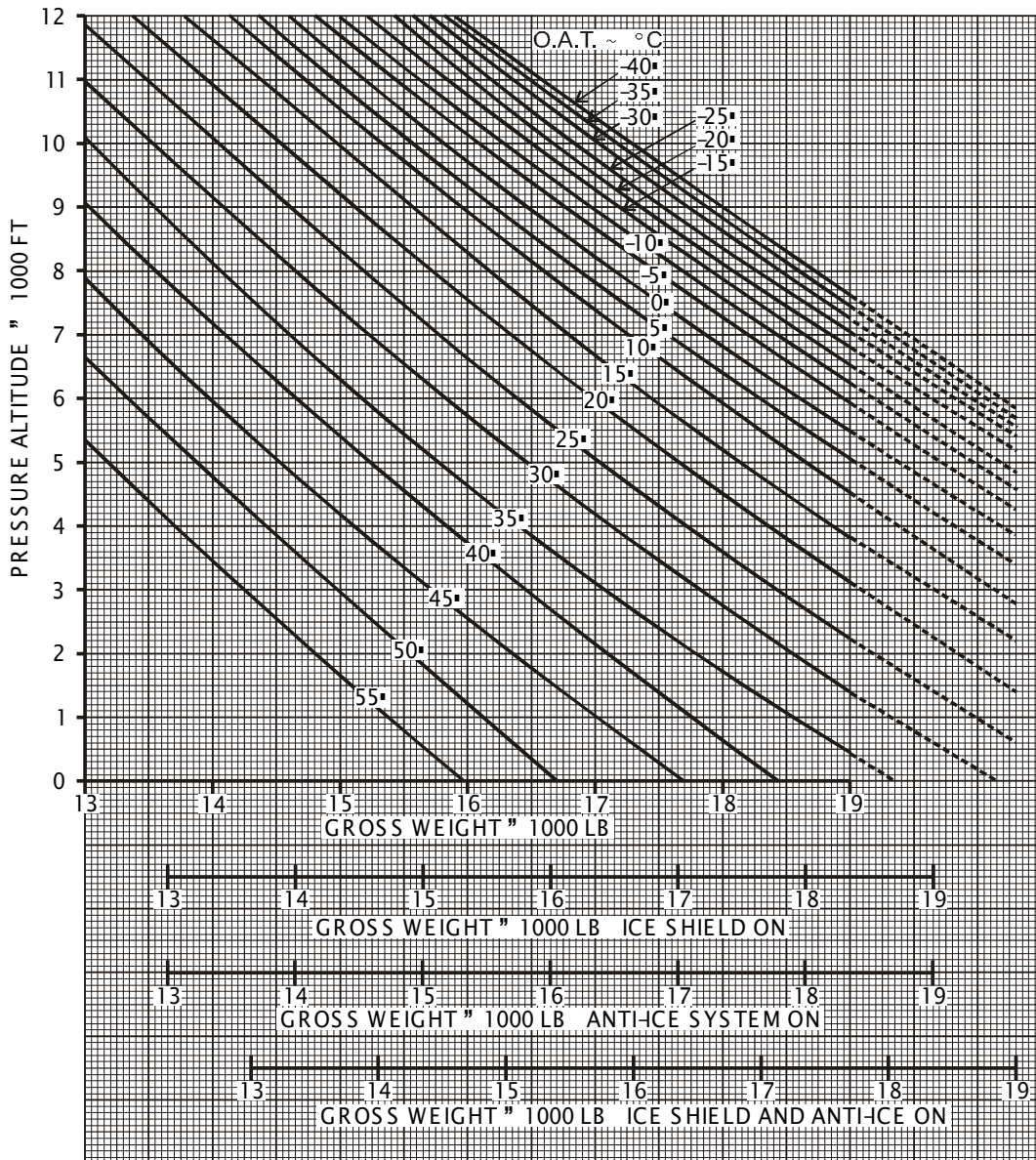


Figure 3

HELICOPTER - TAKE-OFF AND LANDING WEIGHTS - CAT "B"

(Page 2 of 2)

Category "B"

Limiting heights and corresponding speeds for safe landing after an engine suddenly becomes inoperative.

1. The curves are applicable to all altitudes and temperatures at the corresponding maximum allowable take-off gross weight as determined from Figure 3.
2. At gross weights or temperatures below the maximum allowable as determined from Figure 3, reduce the H/V diagram at the 100 feet 1 kt./ 2° C.
3. Do not decrease below 15 kt. IAS.

Information on Test Conditions:

1. Hard surface runway.
2. Winds calm.
3. Straight take-off and climb-out path,

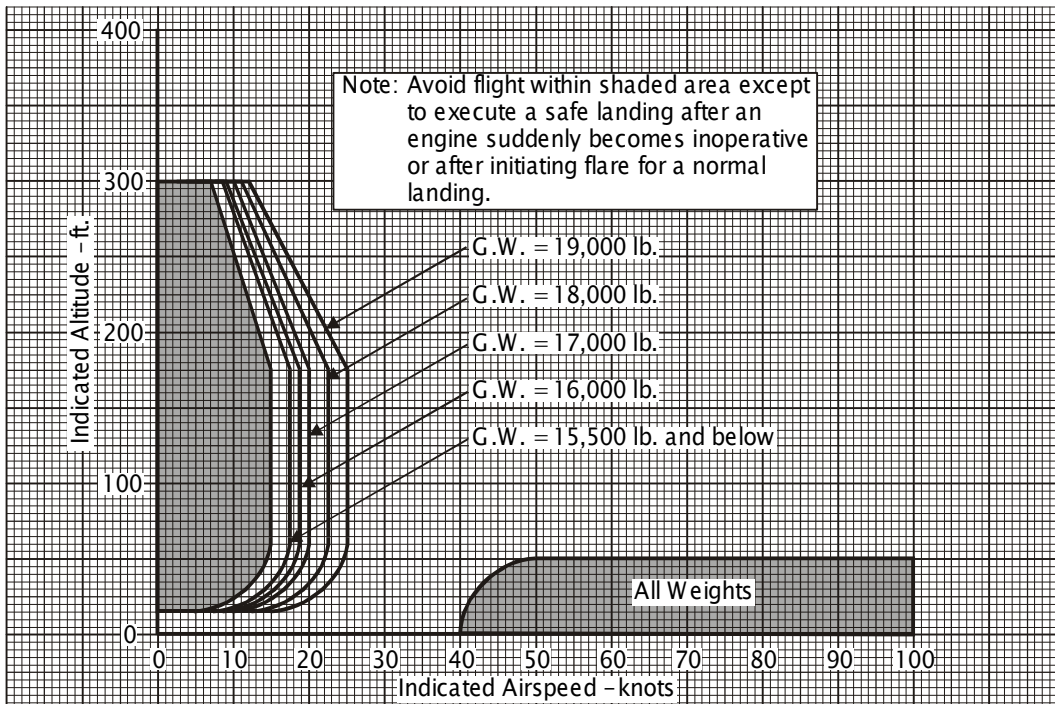
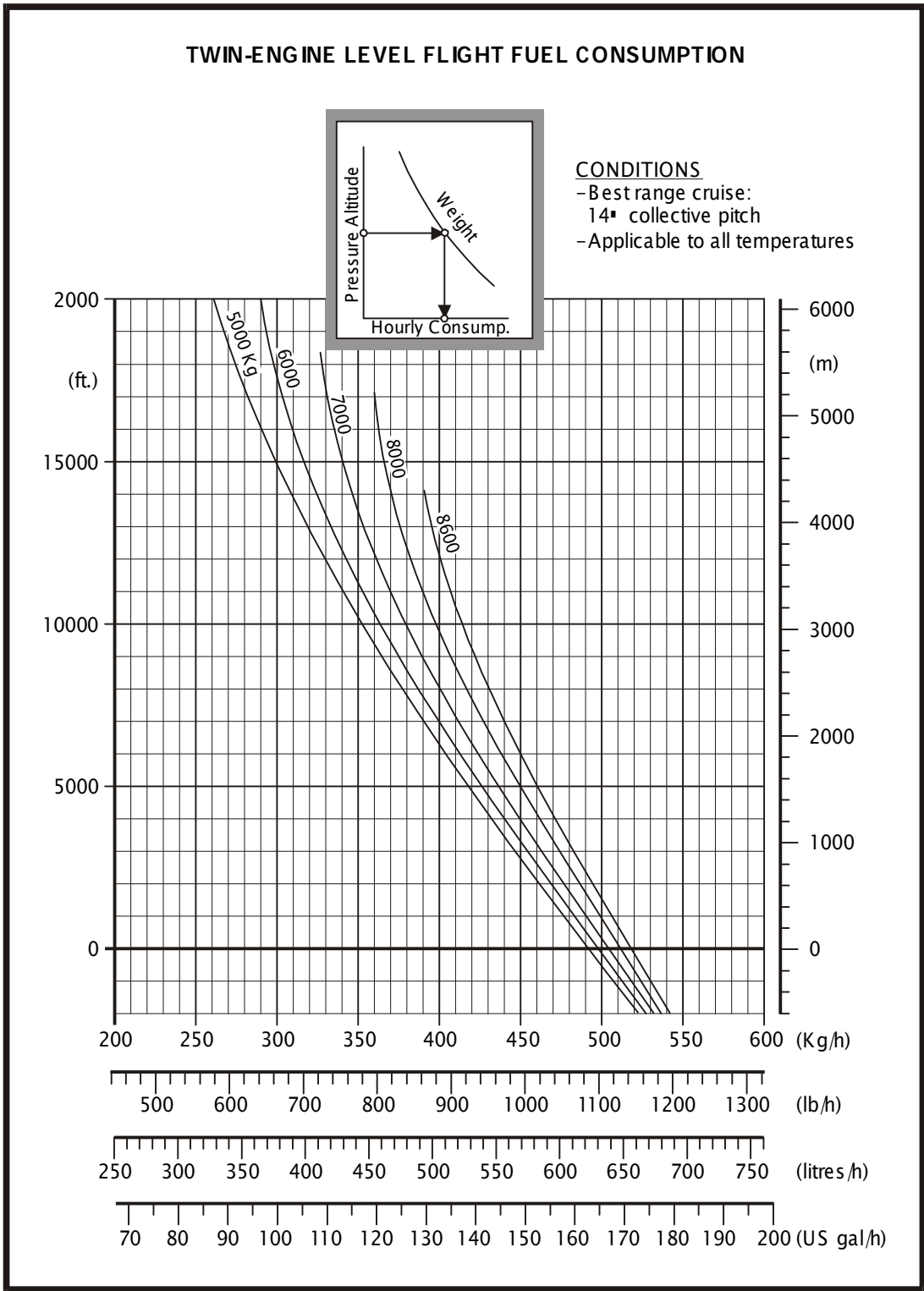


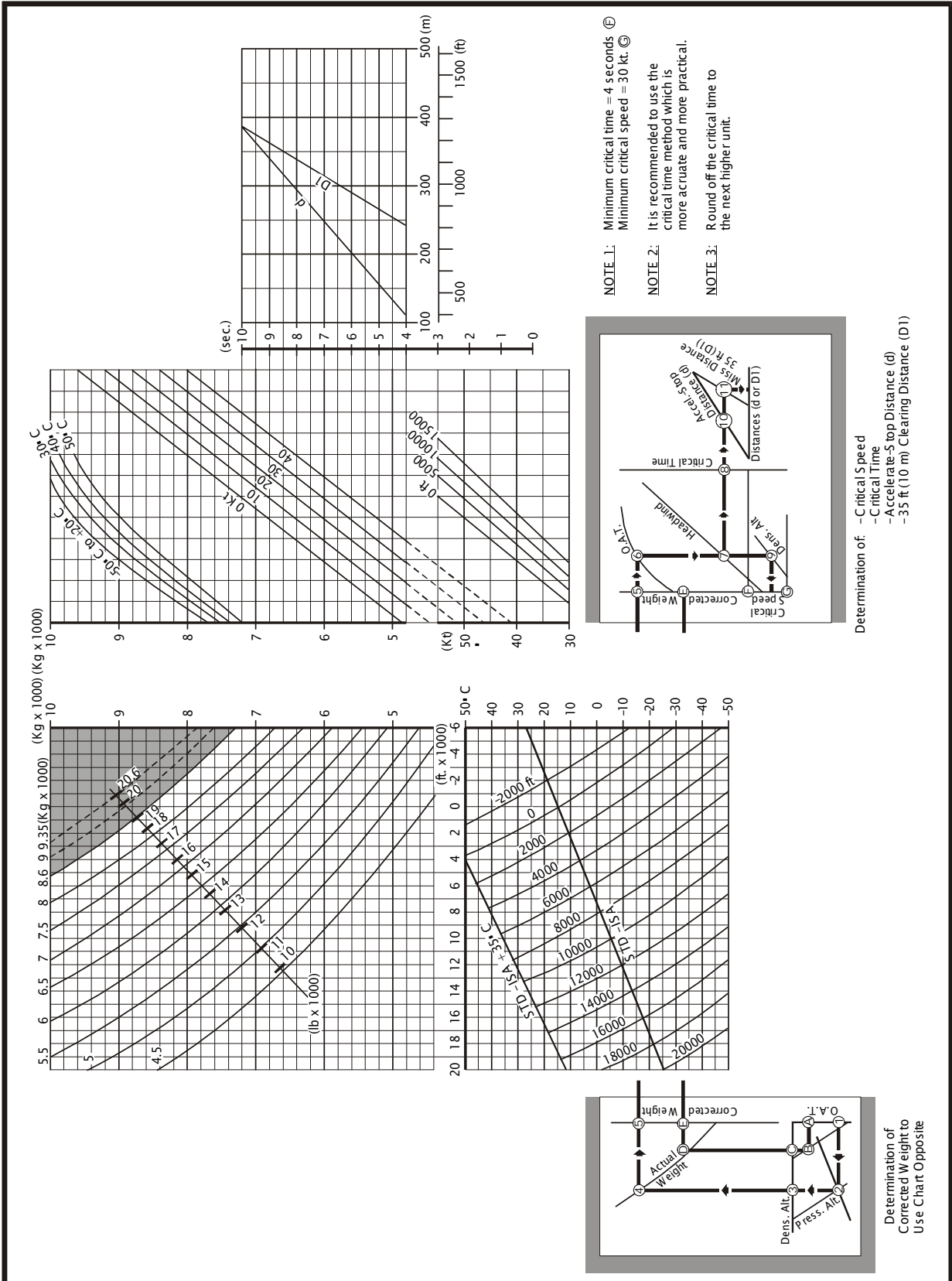
Figure 4

HELICOPTER - FUEL CONSUMPTION

TWIN-ENGINE LEVEL FLIGHT FUEL CONSUMPTION



HELICOPTER - ACCELERATE/STOP DISTANCE (Graph #1)

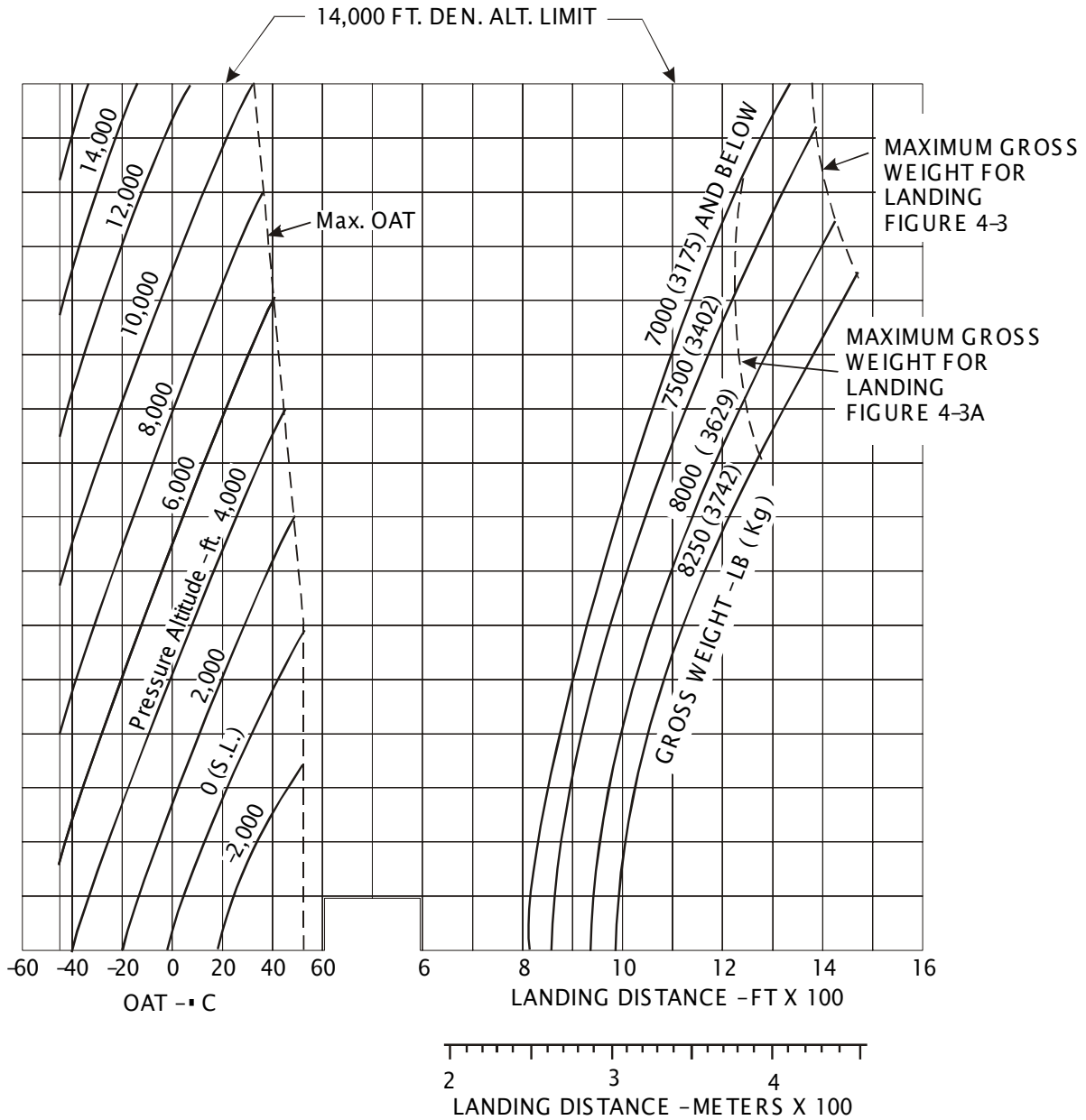


**SINGLE ENGINE LANDING DISTANCE
OVER 50 FOOT (15 METER) OBSTACLE**

POWER AS REQUIRED
ENGINE RPM 97%
GENERATOR 105 AMPS

RATE OF DESCENT 500 FT/MIN
HARD SURFACED RUNWAY
40 KIAS AT 50 FEET
HEATER/ECS OFF
ANTI-ICE OFF OR ON

INOPERATIVE ENGINE SECURED



RECOMMENDED STUDY MATERIAL

- List of Civil Aviation Publications (TP 3680E) - Contains titles, reference numbers, source and cost.
- When in Doubt... Small and Large Aircraft - Aircraft Critical Surface Contamination Training (TP 10643E)
- Air Command Weather Manual (TP 9352E)
- Air Command Weather Manual (Supplement) (TP 9353E)
- Human Factors for Aviation - Advance Handbook (TP 12864E)
- Heliport and Helideck Standards and Recommended Practices (TP 2586E)
- Aeronautical Information Publication (A.I.P. Canada) (TP 2300E)
- *Canadian Aviation Regulations* (CARs)
- Radiotelephone Operator's Restricted Certificate Guide (Aeronautical)
- The Pilot's Guide to Medical Human Factors
- Canada Flight Supplement (CFS)
- Charts: - VFR Navigation (VNC) / VFR Terminal Area (VTA) / Enroute Low Altitude

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 Licences is available from the Canadian Transportation Agency (internet address: http://www.cta-otc.gc.ca/index_e.html).

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

Canada Labour Code is available from Social Development Canada (<http://www.sdc.gc.ca/>).

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>).

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/CivilAviation/General/Exams/Centres.htm>