



Transport
Canada

Transports
Canada



TP 690E
(Revised 06/2010)

Study and Reference Guide
for written examinations for the

AIRLINE TRANSPORT PILOT LICENCE - AEROPLANE

TWENTIETH EDITION

October 2006

TC-1004095



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, 1977.

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 978-1-100-16891-3

Catalogue No. T52-4/60-2010E-PDF

TP 690E
(Revised 06/2010)

TC1004095

Cette publication est aussi disponible en français sous le titre [Guide d'étude et de référence pour les examens écrits pour la Licence de pilote de ligne Avion].

TABLE OF CONTENTS

GENERAL	1
KNOWLEDGE REQUIREMENTS	1
EXAMINATION RULES.....	1
MATERIALS REQUIRED	1
TIME LIMIT	1
REWRITING OF EXAMINATIONS	1
EXAMINATION FEEDBACK	2
EXAMINATIONS	3
CONVERSION EXAMINATION – FAA AIRLINE TRANSPORT PILOT CERTIFICATE – AEROPLANE	3
SECTION 1: AIR LAW AND PROCEDURES	4
CANADIAN AVIATION REGULATIONS (CARS).....	4
PART I – GENERAL PROVISIONS.....	4
PART II – AIRCRAFT IDENTIFICATION AND REGISTRATION AND OPERATION OF A LEASED AIRCRAFT BY A NON-REGISTERED OWNER.....	4
PART III – AERODROMES AND AIRPORTS.....	4
PART IV – PERSONNEL LICENSING AND TRAINING	5
PART V – AIRWORTHINESS	5
PART VI – GENERAL OPERATING AND FLIGHT RULES.....	5
PART VII – COMMERCIAL AIR SERVICES.....	10
PROCEDURES.....	14
SECTION 2: AIRFRAMES, ENGINES, PROPELLERS AND AIRCRAFT SYSTEMS..	16
SECTION 3: METEOROLOGY	17
SECTION 4: INSTRUMENTS	20
SECTION 5: NAVIGATION – GENERAL	21
SECTION 6: RADIO COMMUNICATIONS AND AIDS TO NAVIGATION BASIC PRINCIPLES AND USE	22
SECTION 7: FLIGHT OPERATIONS	23
SECTION 8: THEORY OF FLIGHT	24
SECTION 9: HUMAN FACTORS	25
SECTION 10: TABLES AND CHARTS	26
RECOMMENDED STUDY MATERIAL	38

RECOMMENDED STUDY MATERIAL FOR THE FAA CONVERSION EXAMINATION 39
ENQUIRIES 41

Intentionally left blank

GENERAL

Sections with sidebars indicate new topic areas.

KNOWLEDGE REQUIREMENTS

An applicant for an ATPL-A is expected to have mastered the various subjects included in this guide in addition to material required to obtain a Commercial Pilot Licence – Aeroplane (see TP 12881E).

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

<http://www.tc.gc.ca/civilaviation/general/exams/computers.htm>

TIME LIMIT

Examinations, including all sections of a sectionalized examination, 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 statement on 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

The examinations are as follows:

Examination	Questions	Time Limit	Pass Mark
Aviation Regulations and Air Traffic Procedures, Aeroplane Operations and General Navigation – SARON (Sections 1,2,4,5,7-9)	80	3½ hours	70%

Examination	Questions	Time Limit	Pass Mark
Meteorology, Radio Aids to Navigation and Flight Planning – SAMRA (Sections 3 and 6)	80	3½ hours	70%

The Instrument Rating (INRAT) examination must also be written and 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 39 and 40 as they apply to aeroplanes).

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

106.04 More than one certificate

107 – SAFETY MANAGEMENT SYSTEM REQUIREMENTS

107.01 Application

107.02 Establishing a safety management system

107.03 Safety management system

107.04 Size

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

203 – OPERATION OF A LEASED AIRCRAFT BY A NON-REGISTERED OWNER

203.02 Application

203.03 Leasing Operations – General

203.04 Leasing Operations – International

203.05 Registration of Leased Aircraft

203.06 Forwarding of Airworthiness Directives

203.07 Maximum Number of Leased Aircraft

203.08 Limits on Period of Operation under Authorization

203.09 Submission of Signed Lease

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, LICENSES 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
- 401.11 Airline Transport Licence Training Program
- 401.34 ATPL Privileges – Aeroplane
- 401.47 Instrument Rating Privileges
- 401.48 Instrument Rating Period of Validity
- 401.52 Second Officer Rating
- 401.53 Second Officer Privileges
- 401.61 Flight Instructor Rating

404 – MEDICAL REQUIREMENTS

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

PART V – AIRWORTHINESS

STANDARDS

AIR WORTHINESS MANUAL CHAPTER 525 – TRANSPORT CATEGORY AIRPLANES

SUB-CHAPTER D – DESIGN AND CONSTRUCTION

- 525.855 Cargo and Baggage Compartments
- 525.857 Cargo Compartment Classification

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
- 601.05 IFR Flight in Class A, B, C, D or E Airspace or Class F Special Use Restricted or Advisory Controlled Airspace
- 601.06 VFR Flight in Class A Airspace
- 601.07 VFR Flight in Class B Airspace
- 601.08 VFR Flight in Class C Airspace
- 601.09 VFR Flight in Class D Airspace
- 601.14 Interpretation
- 601.15 Forest Fire Aircraft Operating Restrictions
- 601.16 Issuance of NOTAM for Forest Fire Aircraft Operating Restrictions
- 601.17 Exceptions
- 601.18 Orders Prohibiting or Restricting Aircraft Operations
- 601.20 Projection of a Directed Bright Light Source at an Aircraft
- 601.21 Requirement for Notification
- 601.22 Requirement for Pilot-in-Command
- 602 – OPERATING AND FLIGHT RULES
 - 602.01 Reckless or Negligent Operation of Aircraft
 - 602.02 Fitness of Flight Crew Members
 - 602.03 Alcohol or Drugs – Crew Members
 - 602.04 Alcohol or Drugs – Passengers
 - 602.06 Smoking
 - 602.07 Aircraft Operating Limitations
 - 602.08 Portable Electronic Devices
 - 602.09 Fueling 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
 - 602.15 Permissible Low Altitude Flight
 - 602.17 Carriage of Persons during Low Altitude Flight
 - 602.19 Right-of-Way – General
 - 602.20 Right-of-Way – Aircraft Manoeuvring on Water
 - 602.21 Avoidance of Collision
 - 602.22 Towing
 - 602.23 Dropping of Objects
 - 602.24 Formation Flight
 - 602.25 Entering or Leaving an Aircraft in Flight
 - 602.26 Parachute Descents
 - 602.27 Aerobatic Maneuvers – Prohibited Areas and Flight Conditions
 - 602.28 Aerobatic Maneuvers with Passengers
 - 602.30 Fuel Dumping
 - 602.31 Compliance with Air Traffic Control Instructions and Clearances
 - 602.32 Airspeed Limitations
 - 602.33 Supersonic Flight

- 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
- 602.38 Flight over the High Seas
- 602.39 Transoceanic Flight
- 602.40 Landing at or Take-off from an Aerodrome at Night
- 602.46 Refusal to Transport

OPERATIONAL AND EMERGENCY EQUIPMENT REQUIREMENTS

- 602.58 Prohibition
- 602.59 Equipment Standards
- 602.60 Requirements for Power-driven Aircraft
- 602.61 Survival Equipment – Flights Over Land
- 602.62 Life Preservers and Flotation Devices
- 602.63 Life Rafts and Survival Equipment – Flights over Water

FLIGHT PREPARATION, FLIGHT PLANS AND FLIGHT ITINERARIES

- 602.70 Interpretation
- 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 Flight Itinerary
- 602.75 Filing of a Flight Plan or Flight Itinerary
- 602.76 Changes in the Flight Plan
- 602.77 Requirement to File an Arrival Report
- 602.78 Contents of an Arrival Report
- 602.79 Overdue Aircraft Report
- 602.86 Carry-on Baggage, Equipment and Cargo
- 602.87 Crew Member Instructions
- 602.88 Fuel Requirements
- 602.89 Passenger Briefings

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
- 602.98 General MF Reporting Requirements
- 602.99 MF Reporting Procedures before Entering Maneuvering Area
- 602.100 MF Reporting Procedures on Departure
- 602.101 MF Reporting Procedures on Arrival
- 602.102 MF Reporting Procedures When Flying Continuous Circuits
- 602.103 Reporting Procedures When Flying Through an MF Area
- 602.104 Reporting Procedures for IFR Aircraft When Approaching or Landing at an Uncontrolled Aerodrome
- 602.105 Noise Operating Criteria
- 602.106 Noise-Restricted Runways

VISUAL FLIGHT RULES

- 602.114 Minimum Visual Meteorological Conditions for VFR Flight in Controlled Airspace
- 602.115 Minimum Visual Meteorological Conditions for VFR Flight in Uncontrolled Airspace

602.116 VFR Over-the-Top

602.117 Special VFR Flight

INSTRUMENT FLIGHT RULES

602.121 General Requirements

602.122 Alternate Aerodrome Requirements

602.123 Alternate Aerodrome Weather

602.124 Minimum Altitudes to Ensure Obstacle Clearance

602.125 Enroute IFR Position Reports

602.126 Take-off Minima

602.127 Instrument Approaches

602.128 Landing Minima

602.129 Approach Ban – General

602.130 Approach Ban – Cat III

RADIOCOMMUNICATIONS

602.136 Continuous Listening Watch

602.137 Two-way Radio communication Failure in IFR Flight

602.138 Two-way Radio communication Failure in VFR Flight

EMERGENCY COMMUNICATION AND SECURITY

602.143 Emergency Radio Frequency Capability

602.144 Interception Signals, Interception of Aircraft and Instructions to Land

602.145 ADIZ

602.146 ESCAT Plan

604 – PRIVATE OPERATOR PASSENGER TRANSPORTATION

GENERAL

604.01 Interpretation

604.02 Application

604.03 Certificate

604.04 Management System

604.05 Contents of a Certificate

604.06 Issuance of Authorizations

604.07 Ministerial Orders if Safety Compromised

FLIGHT OPERATIONS AND TRAINING

604.21 VFR Flight Minimum Flight Visibility – Uncontrolled Airspace

604.22 No Alternate Aerodrome – IFR Flight

604.23 Take-off Minima

604.24 Instrument Approach Procedures

604.25 Navigation System

604.26 Training Program

604.27 Aircraft Operating Manual

605 – AIRCRAFT REQUIREMENTS

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
- 605.10 Unserviceable and Removed Equipment – Aircraft without a Minimum Equipment List

AIRCRAFT EQUIPMENT REQUIREMENTS

- 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 Restraints System
- 605.26 Use of Passenger Safety Belts and Restraint Systems
- 605.27 Use of Crew Member Safety Belts
- 605.28 Child Restraint System
- 605.29 Flight Control Locks
- 605.30 De-icing or Anti-icing Equipment
- 605.31 Oxygen Equipment and Supply
- 605.32 Use of Oxygen
- 605.33 Flight Data Recorder and Cockpit Voice Recorder Requirements
- 605.34 Use of Flight Data Recorders and Cockpit Voice Recorders
- 605.35 Transponder and Automatic Pressure-Altitude Reporting Equipment
- 605.36 Altitude Alerting System or Device
- 605.37 Ground Proximity Warning System
- 605.38 ELT
- 605.39 Use of ELTs
- 605.40 ELT Activation
- 605.41 Standby Attitude Indicator
- 605.84 Aircraft Maintenance – General
- 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

TECHNICAL RECORD

- 605.93 Technical Records – General
- 605.94 Journey Log Requirements
- 605.95 Journey Log – Carrying on Board
- 605.96 Requirements for Technical Records Other Than the Journey Log
- 605.97 Transfer of Records

606 – MISCELLANEOUS

- 606.01 Munitions of War
- 606.02 Liability Insurance
- 606.03 Synthetic Flight Training Equipment

PART VII – COMMERCIAL AIR SERVICES

700 – COMMERCIAL AIR SERVICES

- 700.01 Interpretation
- 700.02 Requirements for Air Operator Certificate
- 700.03 Authorization to Operate Specialty Air Service under NAFTA
- 700.04 Eligibility for Air Operator Certificate
- 700.05 Aircraft Requirements
- 700.06 Extended Charter
- 700.07 Management Agreement
- 700.08 Operations between Points Abroad
- 700.09 Duties of Certificate Holder

FLIGHT TIME AND FLIGHT DUTY TIME LIMITATIONS AND REST PERIODS

- 700.14 Monitoring System
- 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
- 700.21 Flight Crew Members on Reserve
- 700.22 Long Range Flights
- 700.23 Controlled Rest on the Flight Deck

704 – COMMUTER OPERATIONS

- 704.01 Application

FLIGHT OPERATIONS

- 704.12 Operating Instructions
- 704.13 General Operational Information
- 704.15 Operational Control System
- 704.16 Flight Authorization
- 704.17 Operational Flight Plan
- 704.19 Checklist
- 704.20 Fuel Requirements
- 704.21 Admission to Flight Deck
- 704.22 Simulations of Emergency Situations
- 704.23 VFR Flight Obstacle Clearance Requirements
- 704.24 VFR Flight Minimum Flight Visibility – Uncontrolled Airspace
- 704.25 VFR Flight Weather Conditions
- 704.26 Take-off Minima
- 704.27 No Alternate Aerodrome – IFR Flight
- 704.29 Routes in Uncontrolled Airspace
- 704.30 Instrument Approach Procedures
- 704.32 Weight and Balance Control
- 704.33 Apron and Cabin Safety Procedures
- 704.34 Briefing of Passengers
- 704.35 Safety Features Card

AIRCRAFT PERFORMANCE OPERATION LIMITATIONS

- 704.46 Take-off Weight Limitations
- 704.47 Net Take-Off Flight Path
- 704.48 Enroute Limitations with One Engine Inoperative
- 704.49 Dispatch Limitations: Landing at Destination and Alternate Aerodromes
- 704.50 Dispatch Limitations: Wet Runway – Turbo-jet-powered Aeroplanes

AIRCRAFT EQUIPMENT REQUIREMENTS

- 704.62 General Requirements
- 704.63 Operation of Aircraft in Icing Conditions
- 704.64 Airborne Thunderstorm Detection and Weather Radar Equipment
- 704.65 Additional Equipment for Single-Pilot Operations
- 704.66 Protective Breathing Equipment
- 704.67 First Aid Oxygen
- 704.68 Shoulder Harness

EMERGENCY EQUIPMENT

- 704.83 Hand-Held Fire Extinguisher
- 704.84 Equipment Standards and Inspection

PERSONNEL REQUIREMENTS

- 704.106 Minimum Crew
- 704.107 Designation of Pilot-in-command and Second-in-command
- 704.108 Flight Crew Member Qualifications
- 704.109 Qualifications of Operational Control Personnel
- 704.110 Check Authority
- 704.111 Validity Period

TRAINING

- 704.115 Training Program
- 704.116 Conditional Approval of Training Program
- 704.117 Training and Qualification Records

MANUALS

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

705 – AIRLINE OPERATION

- 705.01 Application

FLIGHT OPERATIONS

- 705.16 Exceptions
- 705.20 Operational Control System
- 705.21 Flight Authorization
- 705.22 Operational Flight Plan
- 705.23 Maintenance of Aircraft
- 705.24 Checklist
- 705.25 Fuel Requirements
- 705.26 Extended Range Twin-engined Operations
- 705.27 Admission to the Flight Deck
- 705.28 Seats for Cabin Safety Inspectors
- 705.29 Flight Crew Members at Controls
- 705.30 Simulation of Emergency Situations
- 705.31 Crew Member Briefing
- 705.32 VFR Flight Obstacle Clearance Requirements
- 705.33 VFR Flight Weather Conditions
- 705.34 Take-off Minima
- 705.35 No Alternate Aerodrome – IFR Flight
- 705.37 Routes in Uncontrolled Airspace
- 705.38 Instrument Approach Procedures
- 705.39 Weight and Balance Control
- 705.40 Passenger and Cabin Safety Procedures
- 705.42 Carry-on Baggage
- 705.43 Briefing of Passengers
- 705.44 Safety Features Card
- 705.45 Closing and Locking of Flight Deck Door
- 705.46 Night VFR Flight – Aeroplane

AIRCRAFT PERFORMANCE OPERATING LIMITATIONS

- 705.55 General Requirements
- 705.56 Take-off Weight Requirements
- 705.57 Net Take-off Flight Path
- 705.58 Enroute Limitations with One Engine Operative
- 705.59 Enroute Limitations with Two Engines Inoperative
- 705.60 Dispatch Limitations: Landing at Destination and Alternate Aerodromes
- 705.61 Dispatch Limitations: Wet Runway – Turbo-jet-powered Aeroplanes

AIRCRAFT EQUIPMENT REQUIREMENTS

- 705.67 General Requirements
- 705.68 Landing Lights
- 705.69 Operation of Aircraft in Icing Conditions
- 705.70 Weather Radar Equipment
- 705.71 Protective Breathing Equipment
- 705.72 First Aid Oxygen
- 705.73 Interphone System
- 705.74 Public Address System
- 705.75 Crew Member Shoulder Harness
- 705.76 Lavatory Fire Protection
- 705.78 Floor Proximity Emergency Escape Path Markings

- 705.79 Flashlight Stowage
- 705.80 Doors and Locks
- 705.81 Cargo and Baggage Compartment Fire Protection

EMERGENCY EQUIPMENT

- 705.89 Megaphones
- 705.90 First Aid Kits
- 705.91 Emergency Medical Kit
- 705.92 Crash Axe
- 705.93 Hand-held Fire Extinguishers
- 705.94 Portable Oxygen
- 705.95 Survival Equipment
- 705.96 Inspection Requirements
- 705.97 Flashlights

PERSONNEL REQUIREMENTS

- 705.103 Designation of Pilot-in-Command and Second-in-Command
- 705.104 Flight Attendant Requirements
- 705.106 Pilot Qualifications
- 705.107 Flight Engineer and Second Officer Qualifications
- 705.108 Crew Pairing
- 705.111 Route and Aerodrome Qualifications
- 705.113 Validity Period

TRAINING

- 705.124 Training Program
- 705.125 Conditional Approval of Training Program
- 705.126 Cabin Emergency Evacuation Trainer
- 705.127 Training and Qualification Records

MANUALS

- 705.136 Distribution of Company Operations Manual
- 705.137 Aircraft Operating Manual
- 705.138 Standard Operating Procedures

SAFETY MANAGEMENT SYSTEM

- 705.151 Requirements
- 705.152 Components of the Safety Management System

INTERFERENCE WITH A CREW MEMBER

- 705.174 Reporting Incidents of Interference with a Crew Member

PROCEDURES

NOTAM

TC AIM

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

AIR TRAFFIC SERVICES AND PROCEDURES

- 1 Air Traffic and Advisory Services
- 2 Flight Information Centre
- 3 Communications Procedures
- 4 Radar Service
- 5 ATC Clearances and Instructions
- 6 ESCAT Plan
- 7 Wake Turbulence Separation
- 8 Airport/Aerodrome
Operations – Uncontrolled
- 9 Airport/Aerodrome
Operations – Controlled
- 10 Mandatory and Aerodrome
Traffic Frequencies
- 11 VFR En Route Procedures
- 12 Land and Hold Short
Operations (LAHSO)

OPERATIONS IN HIGH LEVEL DOMESTIC AIRSPACE

- 1 Altimeter Setting Procedures
- 2 Cruising Altitudes
- 3 Mach Number/TAS Changes
- 4 Profile Descent
- 5 Leaving or Entering
Uncontrolled Airspace
- 6 Uncontrolled Airspace Procedures

CANADIAN MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS (CMNPS) AIRSPACE

- 1 General
- 2 Partial or Complete Loss of
Navigation Capability
- 3 Position Reporting

CANADIAN MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS (CMNPS) CERTIFICATION

- 1 General
- 2 Certification
- 3 Navigation System Requirements
- 4 Transition Between CMNPS Airspace
and the Canadian Domestic Airway
Structure
- 5 Separation Minima

ATC SPECIAL PROCEDURES

- 1 Adherence to Mach Number
- 2 Parallel and Offset Procedures
- 3 Structured Airspace
- 4 Required Navigation Performance
Capability Airspace (RNP)
- 5 Canadian Minimum Navigation
Performance Specifications Airspace
(CMNPS)
- 6 Canadian Domestic Routes
- 7 Canadian Track Structures
- 8 Traffic Alert and Collision Avoidance
Systems (TCAS)

NORTH ATLANTIC OPERATIONS

- 1 General Aviation Aircraft
- 2 North American Routes (NAR)
- 3 NAT Organized Track System
- 4 Flight Rules and
Flight Planning Procedures
- 5 Clearances, Position Reports,
Communications Failure
- 6 Transponder Operation

**REDUCED VERTICAL SEPERATION
MINIMA (RVSM)**

- 1 General
- 2 RVSM Airspace
- 3 RVSM Transition Airspace
- 4 Air Traffic Control (ATC) Procedures
- 5 Aircraft Requirements

**INTERNATIONAL FLIGHT
PROCEDURES**

- 1 Entry, Transit and Departure of Aircraft (TC AIM – FAL 2.0)

OTHER 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)

SECTION 2: AIRFRAMES, ENGINES, PROPELLERS AND AIRCRAFT SYSTEMS

AIRFRAMES

- 1 Flight Controls
- 2 Flaps
- 3 Slots/Slats/Leading Edge Devices
- 4 Spoilers
- 5 Wing Fences
- 6 Winglets
- 7 Canards
- 8 Vortex Generators
- 9 Trimming Devices

ENGINES

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

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 Oil
- 3 Electrical
- 4 Hydraulic
- 5 Pneumatic
- 6 Warning (ice and fire)
- 7 Fire Protection (extinguishing systems)
- 8 Heating
- 9 De-icing and Anti-icing
- 10 Oxygen
- 11 Air Conditioning
- 12 Pressurization
- 13 Landing Gear and Brakes
- 14 Autopilot
- 15 Avionics
- 16 Flight Controls

WARNING AND PROTECTION SYSTEMS

- 1 Master warning systems
- 2 Stall warning identification/protection
- 3 TAWS/GPWS
- 4 ACAS/TCAS
- 5 Altitude alerting systems
- 6 Lighting and weather detection
- 7 In flight configurations warnings
- 8 Take-off/configuration test/warnings

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 Setting
- 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/Condensation
- 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 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 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 Type 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
- 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 Flight Service Stations
- 5 Atmospheric Environment Service Weather Briefing
- 6 Transcribed Weather Broadcasts (TWB)
- 7 DUATS – Commercial Weather Service
- 8 Automatic Terminal Information Service (ATS)
- 9 VOLMET (HF) Broadcast
- 10 Pilots Automatic Telephone Reporting Criteria, Cloud Types and Icing Weather Answering Service (PATWAS)

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
- 3 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 4: INSTRUMENTS

FLIGHT INSTRUMENTS – PRINCIPLES AND OPERATIONAL USE

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

FLIGHT MANAGEMENT INSTRUMENTS

- 1 Flight Management System (FMS)
- 2 Electronic Flight Instrument
System (EFIS)
- 3 Electronic Centralized Aircraft
Monitoring (ECAM)

ENGINE INSTRUMENTS – PRINCIPLES AND USE

- 1 Tachometer
- 2 Manifold Pressure
- 3 Oil Pressure
- 4 Oil Temperature
- 5 Exhaust Gas Temperature
- 6 Cylinder Head Temperature
- 7 Carburetor Air Temperature
- 8 Intake Air Temperature
- 9 Fuel Pressure
- 10 Fuel Flow
- 11 Torquemeter
- 12 Engine Pressure Ratio (EPR)
- 13 Turbine Temperature (ITT/TIT)

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 and High Altitude Charts

TIME AND LONGITUDE

- 1 Time Zones and Relation to Longitude

FLIGHT PLANNING CALCULATIONS AND FORMS

- 1 Heading and True Airspeed
- 2 Wind and Windspeed
- 3 IAS-CAS-EAS-TAS
- 4 Track and Groundspeed
- 5 Mach
- 6 Time
- 7 Weight and Balance
- 8 Flight Planned Fuel Requirements
- 9 Fuel Load/Zero Fuel Weight
- 10 Pay Load/Weight Shift
- 11 Critical Point (CP)
- 12 Equal Time Point (ETP)
- 13 Flight Plans
- 14 Flight Itinerary

COMPUTERIZED FLIGHT PLANS

- 1 Decode
- 2 Analysis and Interpolation

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 Flight Log (Air Position)
- 6 Determination of Wind Velocity

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 DATALINK

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

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 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 (GNSS – GPS)
- 3 Surveillance Radar (ASR & AASR)
- 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

SECTION 7: 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 Weight and Balance – Load Adjustment
- 8 Effect of Changes in Weight and Load Distribution
- 9 Hydroplaning
- 10 Wind Shear – Effects and Avoidance
- 11 Landing Techniques

CHARTS AND GRAPHS

- 1 Weight and Balance
- 2 Take-off
- 3 Climb
- 4 Cruise
- 5 Buffet Boundary
- 6 Descent
- 7 Landing
- 8 Crosswind/CRFI
- 9 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 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 Effects
- 9 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

SECTION 8: 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

WING DESIGN

- 1 Wing Tip Vortices
- 2 Sweepback
- 3 Leading and Trailing Edge Flaps
- 4 Winglets
- 5 Canards
- 6 Vortex Generators
- 7 Wing Fences
- 8 Spoilers

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

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)

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
- 2 Countermeasures
- 3 Undesired Aircraft State

SECTION 10: TABLES AND CHARTS

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

WEIGHT SHIFT FORMULA

WEIGHT OF CARGO MOVED	=	DISTANCE CG MOVED
WEIGHT OF AEROPLANE		DISTANCE BETWEEN ARM LOCATION

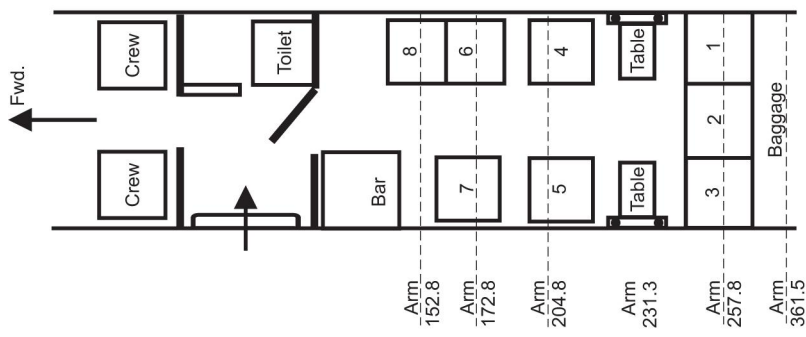
WEIGHT AND BALANCE LOADING DATA
(Page 1 of 2)

Fuel Loading Chart

Fuel Taken as 7.807 lb per Imp. Gal. / Moments are in in.-lb

Fuselage and Wing Tanks			Fuselage and Wing Tanks (Cont.)			Fuselage and Wing Tanks (Cont.)			Fuselage and Wing Tanks (Cont.)		
Imp. Gallons	Wt. (lb)	Mom./1000	Imp. Gallons	Wt. (lb)	Mom./1000	Imp. Gallons	Wt. (lb)	Mom./1000	Imp. Gallons	Wt. (lb)	Mom./1000
10	78	23	300	2,342	682	590	4,606	1,326	880	6,870	1,971
20	156	46	310	2,420	704	600	4,684	1,349	891	6,956	2,000
30	234	68	320	2,498	727	610	4,762	1,370			
40	312	91	330	2,576	748	620	4,840	1,393			
50	390	115	340	2,654	771	630	4,918	1,415			
60	468	137	350	2,732	793	640	4,996	1,438			
70	546	160	360	2,810	815	650	5,075	1,459			
80	625	183	370	2,889	837	660	5,153	1,482			
90	703	205	380	2,967	860	670	5,231	1,504			
100	781	229	390	3,045	882	680	5,309	1,526			
110	859	252	400	3,123	904	690	5,387	1,548			
120	937	275	410	3,201	926	700	5,465	1,571			
130	1,015	298	420	3,279	949	710	5,543	1,593			
140	1,093	321	430	3,357	970	720	5,621	1,615			
150	1,171	343	440	3,435	993	730	5,699	1,637			
160	1,249	366	450	3,513	1,015	740	5,777	1,660			
170	1,327	389	460	3,591	1,038	750	5,855	1,681			
180	1,405	412	470	3,669	1,059	760	5,933	1,704			
190	1,483	435	480	3,747	1,082	770	6,011	1,726			
200	1,561	458	490	3,825	1,104	780	6,089	1,749			
210	1,639	480	500	3,904	1,125	790	6,168	1,770			
220	1,718	503	510	3,982	1,148	800	6,246	1,793			
230	1,796	525	520	4,060	1,171	810	6,324	1,815			
240	1,874	548	530	4,138	1,193	820	6,402	1,838			
250	1,952	570	540	4,216	1,215	830	6,480	1,859			
260	2,030	593	550	4,294	1,237	840	6,558	1,882			
270	2,108	615	560	4,372	1,260	850	6,636	1,904			
280	2,186	638	570	4,450	1,281	860	6,714	1,926			
290	2,264	659	580	4,528	1,304	870	6,792	1,948			

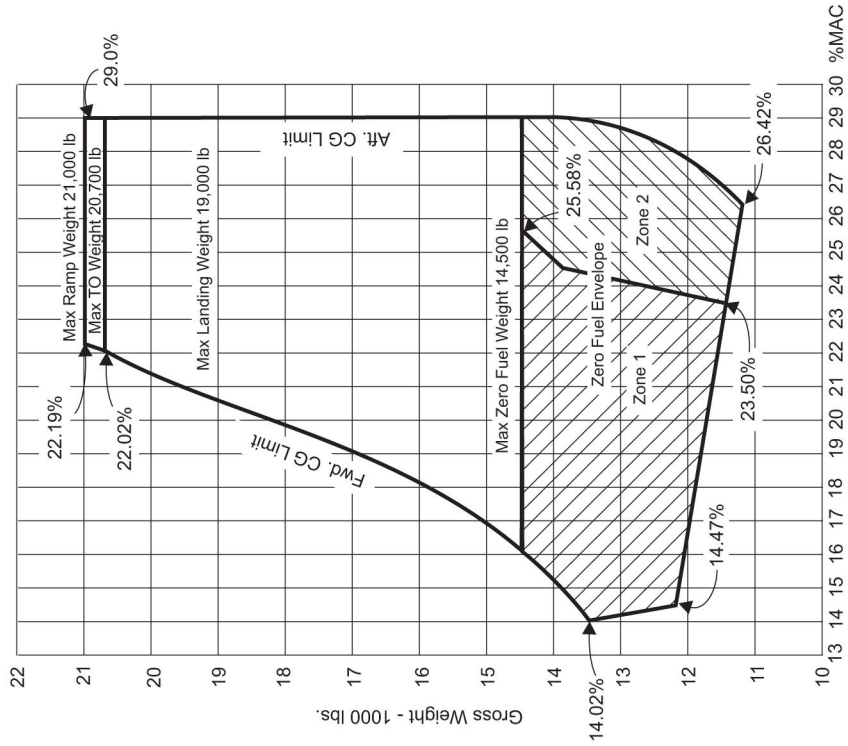
Aircraft Seating Diagram



WEIGHT AND BALANCE LOADING DATA

(Page 2 of 2)

Centre of Gravity Envelope



Zone 1 If the Zero Fuel Weight falls within this zone - fuel can be loaded up to Max Ramp Wt. without exceeding CG limits.

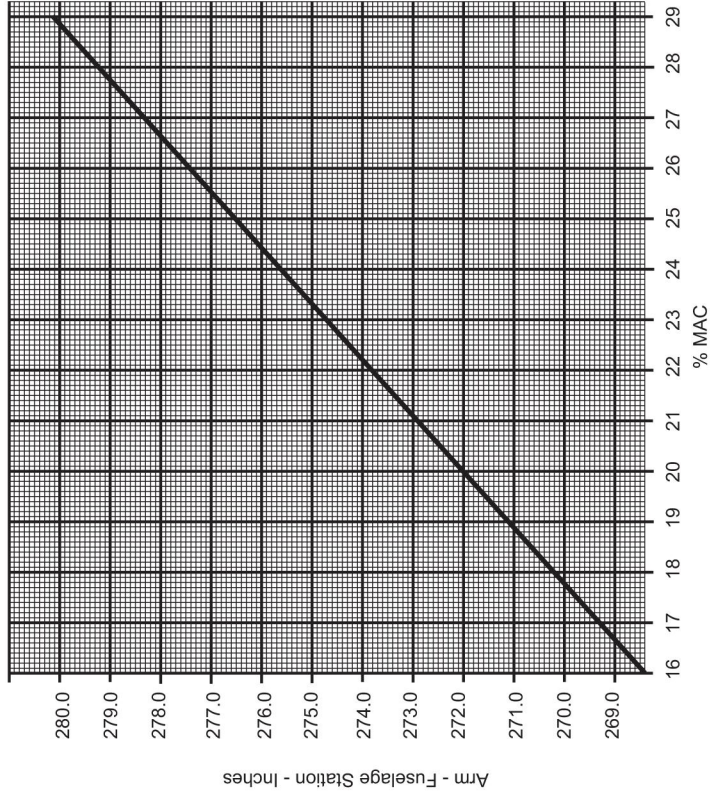
Zone 2 If the Zero Fuel Weight falls within this zone - the fuel quantity that may be added must be restricted such that at take-off the aft CG limit is not exceeded.

MAC is 90.197 inches

L.E. of MAC is 253.964 in. aft of reference datum.

Conversion Formula - Arm to %MAC:

$$\%MAC = \frac{ARM \text{ (in.)} - 253.964}{90.197} \times 100$$



Conversion Chart - Arm to %MAC

TAKE-OFF DISTANCE GRAPH

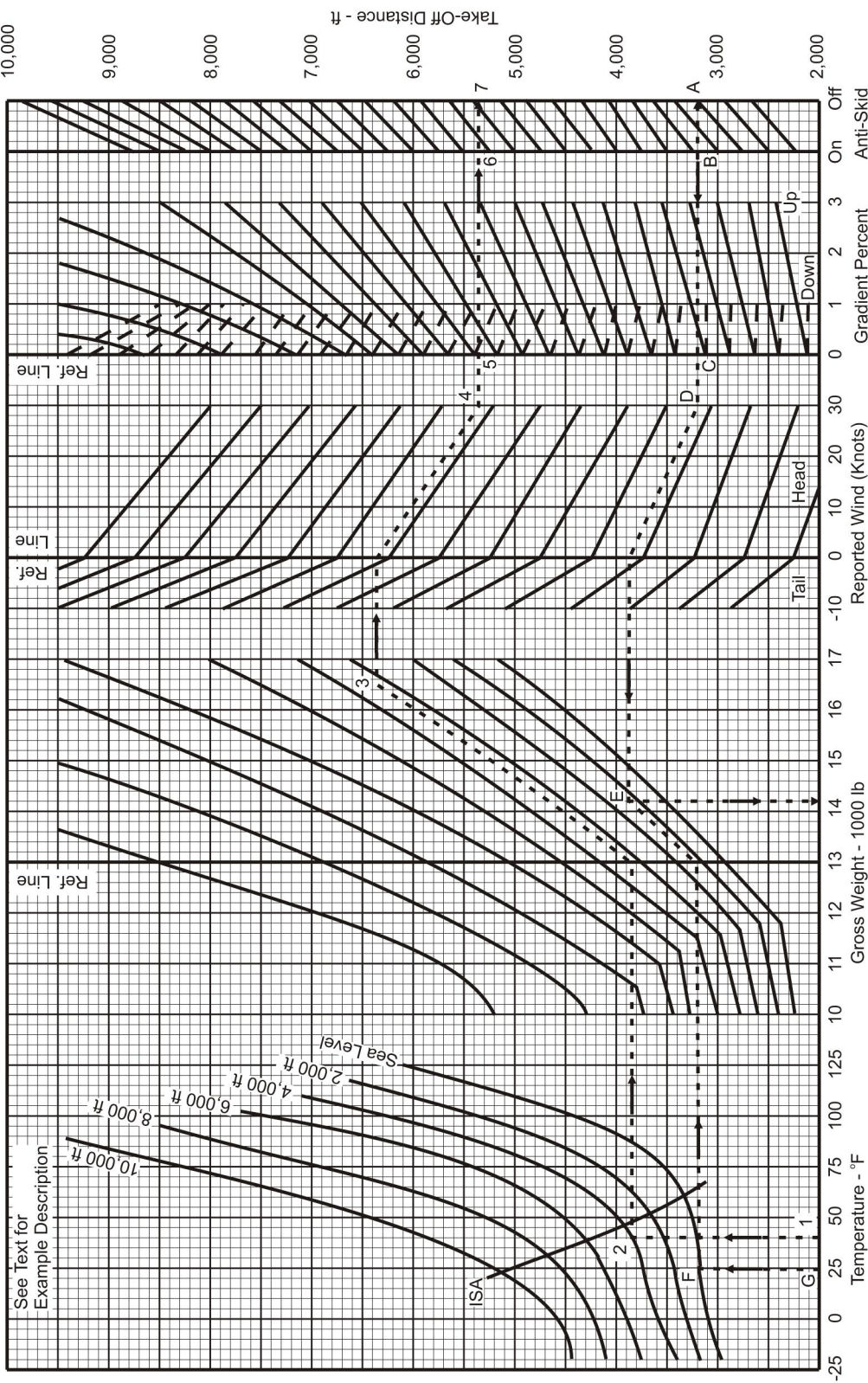
Flaps - 8°

Example 1

1. Temperature 40°F
2. Field Press. Altitude 4,000 ft
3. Gross Weight 16,500 lb
4. Headwind Component 30 kt
5. No Runway Gradient
6. Anti-skid Operative
7. Takeoff Distance 5,380 ft

Example 2

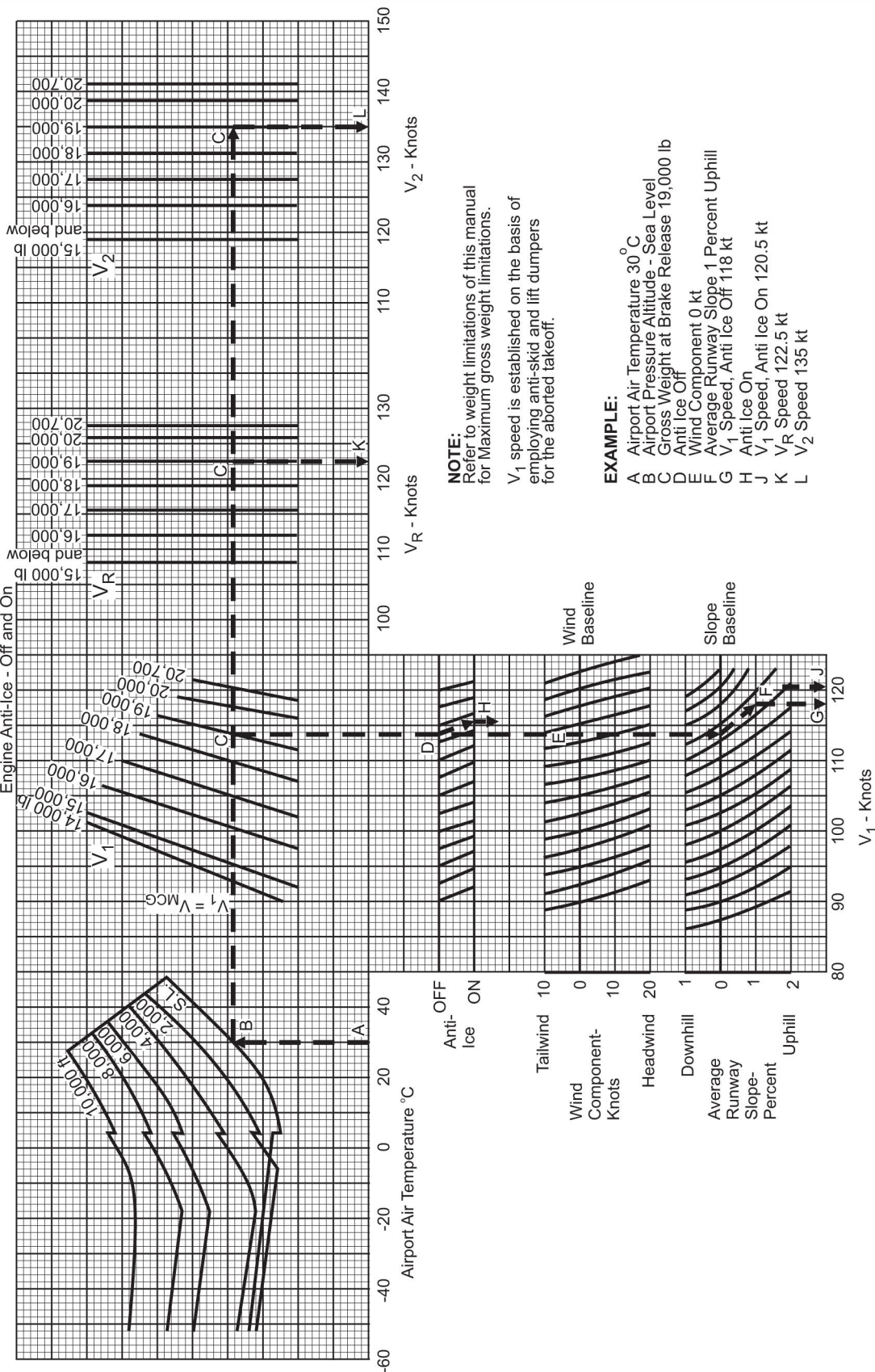
1. Field Length Available 3,200 ft
2. Anti-Skid Operative
3. No Runway Gradient
4. Headwind Component 30 kt
5. Temperature 25°F
6. Pressure Altitude Sea Level
7. Limiting Weight for Takeoff 14,200 lb



TAKE-OFF SPEEDS V_1, V_R, V_2

Take-Off Speeds V_1, V_R, V_2

Flaps 15 Degrees
Cabin Pressurization - Off
Engine Anti-Ice - Off and On



NOTE:
Refer to weight limitations of this manual for Maximum gross weight limitations.

V_1 speed is established on the basis of employing anti-skid and lift dumpers for the aborted takeoff.

EXAMPLE:

- A Airport Air Temperature 30 °C
- B Airport Pressure Altitude - Sea Level
- C Gross Weight at Brake Release 19,000 lb
- D Anti Ice Off
- E Wind Component 0 kt
- F Average Runway Slope 1 Percent Uphill
- G V_1 Speed, Anti Ice Off 118 kt
- H Anti Ice On
- J V_1 Speed, Anti Ice On 120.5 kt
- K V_R Speed 122.5 kt
- L V_2 Speed 135 kt

TAKE-OFF PERFORMANCE

Accelerate-Go - Flaps 0%

Associated Conditions:

- Power Take-off power set before brake release.
- Flaps 0%
- AutoFeather Armed
- Landing Gear Retract after lift-off
- Runway Paved, level, dry surface

- Note: 1. Air distance is 50% of take-off field length.
2. V_1 (engine failure speed) equals V_R (rotation speed).
3. Usable clearway cannot exceed 25% of the runway length.

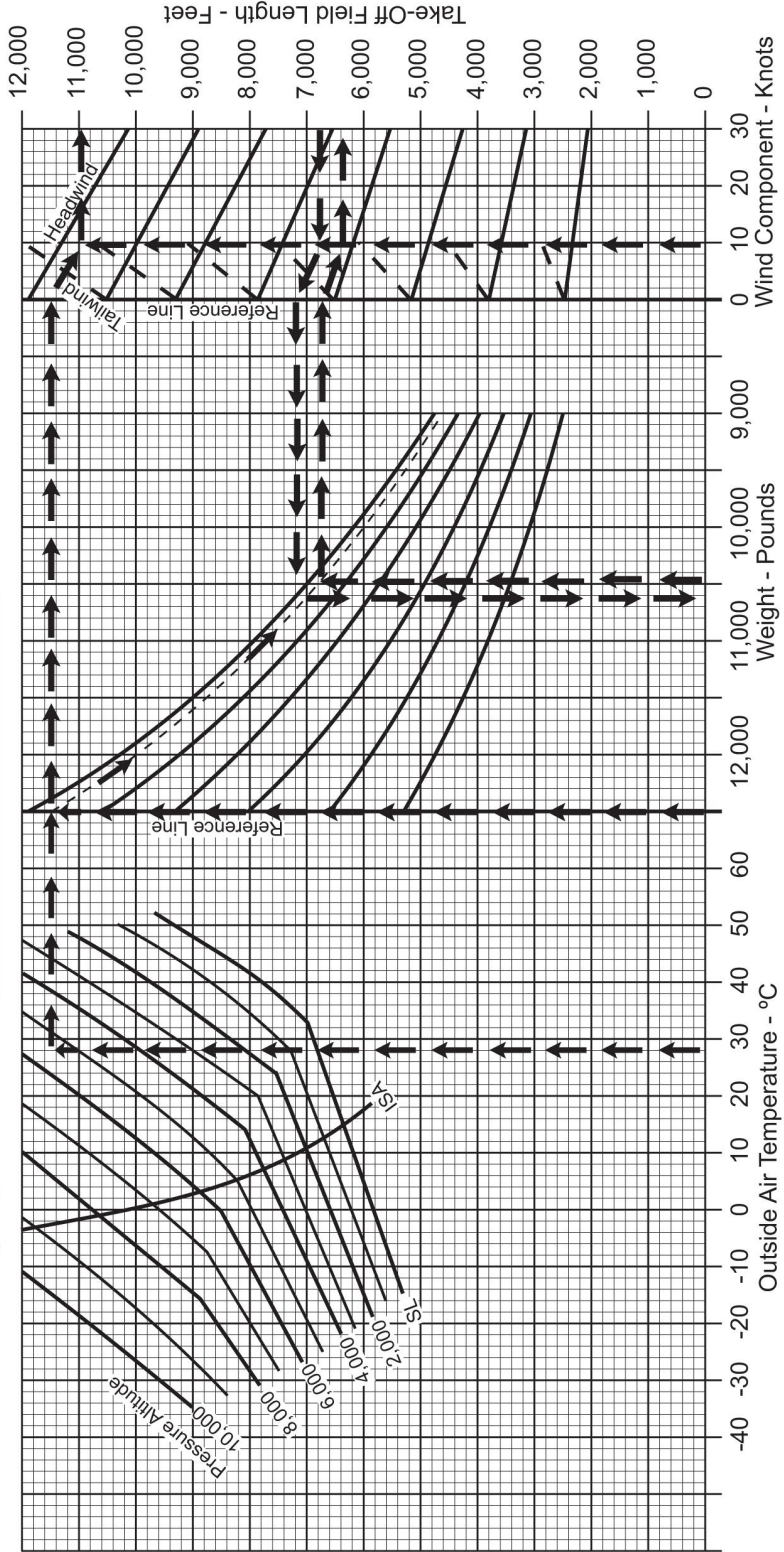
Example:

OAT 28°C
 Pressure Altitude 5,430 Feet
 Headwind Component 9.5 Knots

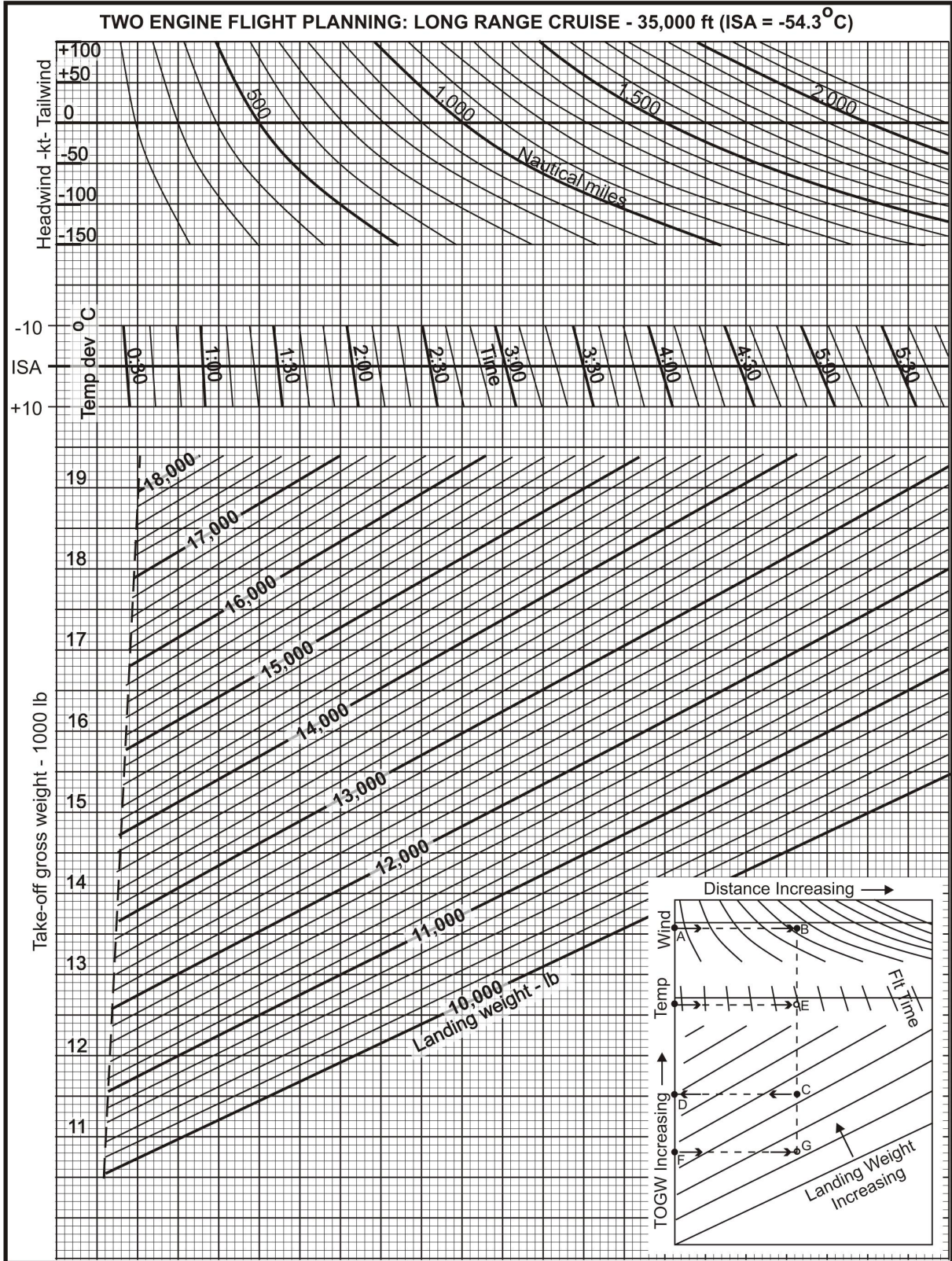
Take-Off Weight - Pounds	Take-Off Field Length - Feet
12,500	10,950
10,650	6,786
10,470	6,370

Speeds (10,470 Pounds) V_R 95 Kt.
 V_{LOF} 101 Kt.
 V_2 113 Kt.

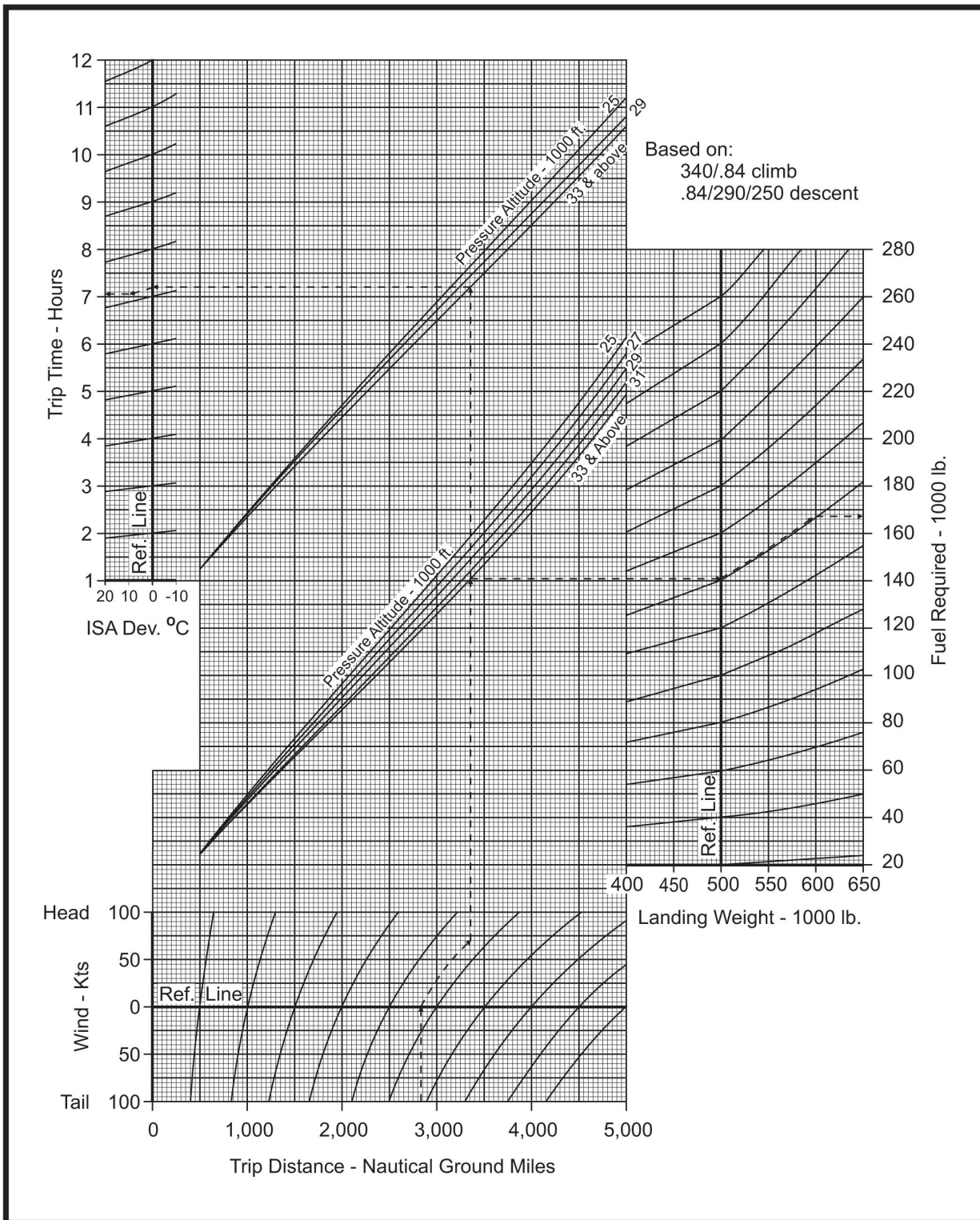
Weight - Pounds	Speed - Knots		
	V_R	V_{LOF}	V_2
12,500	95	101	121
12,000	95	101	119
11,000	95	101	115
10,000	95	101	111
9,000	95	101	108



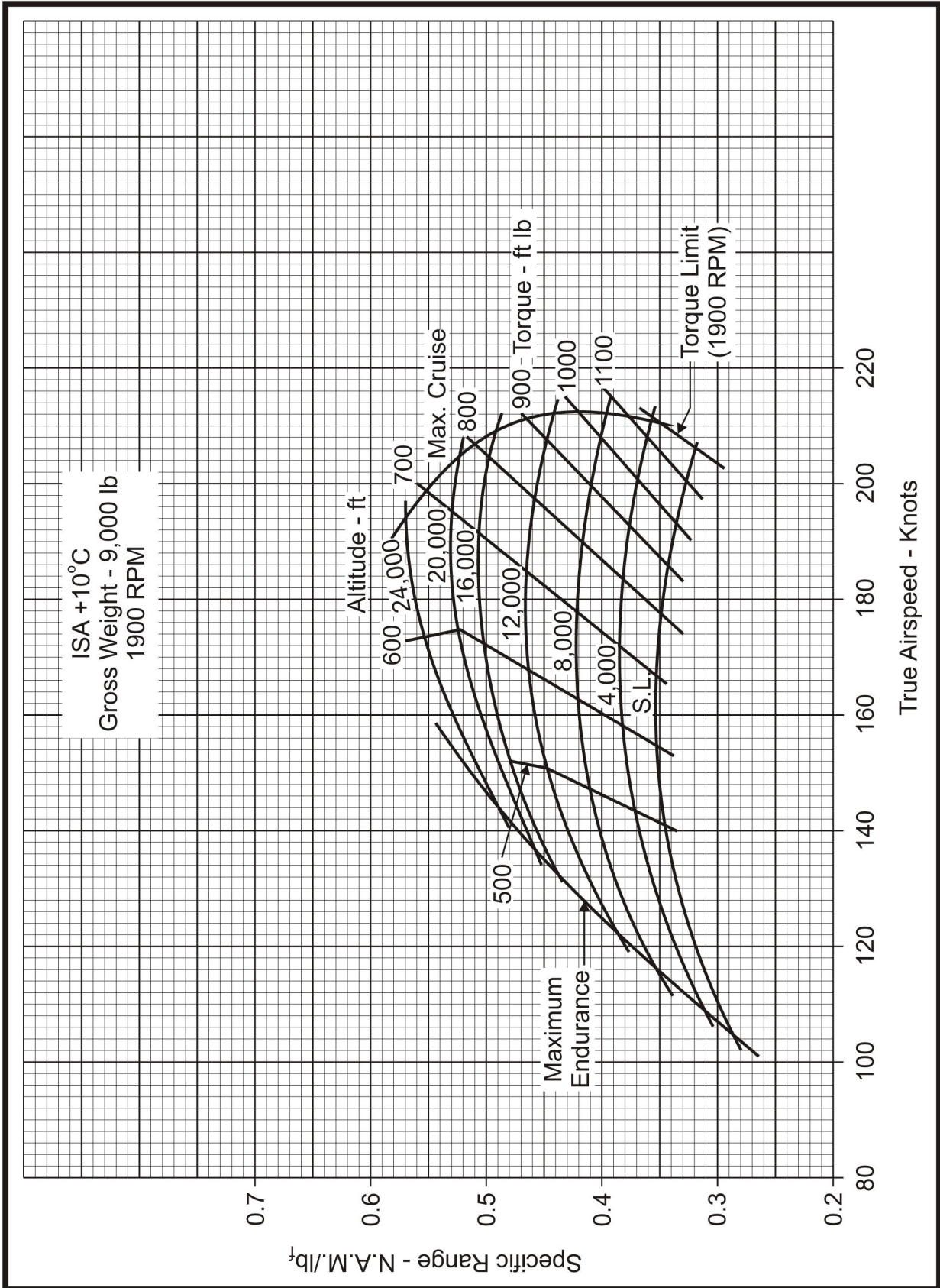
CRUISE PERFORMANCE



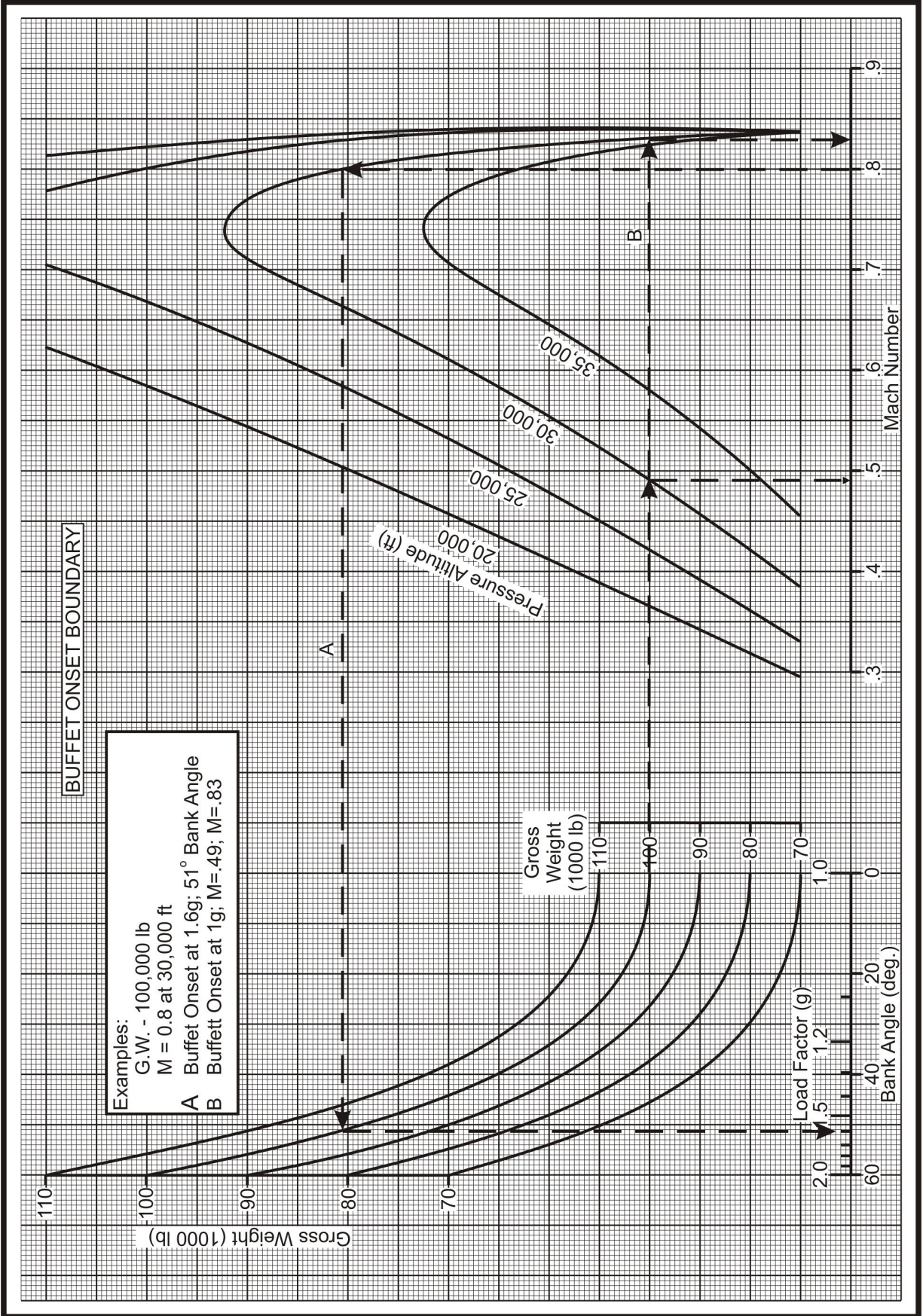
LONG RANGE CRUISE



SPECIFIC RANGE



BUFFET ONSET BOUNDARY



SAMPLE COMPUTER FLIGHT PLAN

PLAN 1510 CYAM TO CYOW CES2 HSC/F IFR 08/24/00
 NONSTOP COMPUTED 1209Z FOR 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	FREM	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/)

INDOWNZFW
 OUTUPR/FUEL
 FLTAIRT/O WT

POA	–	Point of Arrival
ALT	–	Alternate
HLD	–	Holding
RES	–	Reserve
TOT	–	Total
AV PLD	–	Average Payload
OPNLWT	–	Operational Weight

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

CYAM . . . SSM	–	CYAM Direct to SSM
YOW 314 YOW	–	314° Radial to YOW
WIND P035	–	Wind Push of 35 kts
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

RECOMMENDED STUDY MATERIAL

- 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://www.tc.gc.ca/civilaviation/regserv/affairs/cars/menu.htm>
- Transport Canada Aeronautical Information Manual (TC AIM) (TP14371)
<http://www.tc.gc.ca/civilaviation/publications/tp14371/menu.htm>
- Advisory Circulars 700 Series - Commercial Air Services
<http://www.tc.gc.ca/civilaviation/managementservices/referencecentre/acs/700/menu.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 (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-eng.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>).

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
	7.19 – Aerodrome Lighting – (including Aircraft Radio Control of Aerodrome Lighting (ARCAL))
TC AIM - COM	COMMUNICATIONS
	3.13 – ILS
	5.15 – 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 - MAP	AERONAUTICAL CHARTS AND PUBLICATIONS
	3.0 – Aeronautical Information – IFR
	6.0 – Aeronautical Information Circulars – General
TC AIM - LRA	LICENSING, REGISTRATION AND AIRWORTHINESS
	3.9 – Pilot Licensing – Recency Requirements
TC AIM - AIR	AIRMANSHIP
	1.6 – General Information – Canadian Runway Friction Index
	2.12 – Flight Operations – Flight Operations in Winter

The above documents can be located on the Transport Canada web pages
<http://www.tc.gc.ca/civilaviation/regserv/affairs/cars/menu.htm> and
<http://www.tc.gc.ca/civilaviation/publications/tp14371/menu.htm>

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>