



Transport
Canada

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TP 690E
(revised 10/2004)

Study and Reference Guide

Airline Transport Pilot Licence

Aeroplane

Nineteenth Edition

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Canada

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<http://www.tc.gc.ca/CivilAviation/General/Exams/Guides.htm>

GENERAL

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

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).

| Sections with sidebars indicate new topic areas.

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	80	3½ hours	70%

Examination	Questions	Time Limit	Pass Mark
Meteorology, Radio Aids to Navigation and Flight Planning – SAMRA	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).

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

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
- 401.34 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 (MC)
- 404.04 Issuance, Renewal 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
- 601.05 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

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

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

604.01 Application

FLIGHT OPERATIONS

- 604.10 Checklist
- 604.11 Operational Flight Data Sheet
- 604.12 VFR Flight Minimum Flight Visibility – Uncontrolled Airspace
- 604.13 No Alternate Aerodrome – IFR Flight
- 604.14 Take-off Minima
- 604.15 Instrument Approach Procedures
- 604.16 Flight Attendant Requirement
- 604.17 Cabin Safety Procedures
- 604.18 Briefing of Passengers

FLIGHT TIME AND FLIGHT DUTY TIME LIMITATIONS AND REST PERIODS

- 604.26 Flight Time Limitations
- 604.27 Flight Duty Time Limitations and Rest Periods
- 604.28 Split Flight Duty Time
- 604.29 Extension of Flight Duty Time
- 604.30 Unforeseen Operational Circumstances
- 604.31 Delayed Reporting Time
- 604.32 Requirements for Time Free from Duty
- 604.33 Flight Crew Positioning

EMERGENCY EQUIPMENT

- 604.38 Survival Equipment
- 604.39 First Aid Kits
- 604.40 Protective Breathing Equipment
- 604.41 Hand-held Fire Extinguishers

PERSONNEL REQUIREMENTS

- 604.65 Designation of Pilot-in-command and Second-in-command
- 604.66 Crew Member Qualifications
- 604.68 Validity Period
- 604.73 Training Program

MANUALS

- 604.80 Requirements Relating to Operations Manual
- 604.81 Contents of Operations Manual
- 604.82 Distribution of Operations Manual
- 604.83 Aircraft Operating Manual
- 604.84 Standard Operating Procedures

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
- 606.03 Synthetic Flight Training Equipment

PART VII - COMMERCIAL AIR SERVICES

700 - COMMERCIAL AIR SERVICES

- 700.01 Definitions

FLIGHT TIME AND FLIGHT DUTY TIME LIMITATIONS AND REST PERIODS

- 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

702 - AERIAL WORK OPERATIONS

- 702.01 Application

FLIGHT OPERATIONS

- 702.13 Flight Authorization
- 702.14 Operational Flight Plan
- 702.16 Carriage of Persons
- 702.17 VFR Flight Minimum Flight Visibility - Uncontrolled Airspace
- 702.18 Night VFR OTT and IFR Operations
- 702.20 Aircraft Operating over Water
- 702.22 Built-up Area and Aerial Work Zone
- 702.23 Briefing of Persons other than Flight Crew Members

AIRCRAFT EQUIPMENT REQUIREMENTS

- 702.42 Night and IMC Flights
- 702.43 Additional Equipment for Single-pilot Operations
- 702.44 Shoulder Harness

PERSONNEL REQUIREMENTS

- 702.64 Designation of Pilot-in-command and Second-in-command
- 702.65 Flight Crew Member Qualifications
- 702.67 Validity Period

MANUALS

- 702.83 Distribution of Company Operations Manuals
- 702.84 Standard Operating Procedures

703 – AIR TAXI OPERATIONS

- 703.01 Application

FLIGHT OPERATIONS

- 703.17 Flight Authorization
- 703.18 Operational Flight Plan
- 703.20 Fuel Requirements
- 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
- 703.26 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
- 703.30 Take-off Minima
- 703.31 No Alternate Aerodrome – IFR Flight
- 703.32 Enroute Limitations
- 703.33 VFR OTT Flight
- 703.34 Routes in Uncontrolled Airspace
- 703.35 Instrument Approach Procedures
- 703.37 Weight and Balance Control
- 703.38 Passenger and Cabin Safety Procedures
- 703.39 Briefing of Passengers

AIRCRAFT EQUIPMENT REQUIREMENTS

- 703.64 General Requirements
- 703.65 Airborne Thunderstorm Detection and Weather Radar Equipment
- 703.66 Additional Equipment for Single-pilot Operations
- 703.67 Protective Breathing Equipment
- 703.68 First Aid Oxygen
- 703.69 Shoulder Harness

EMERGENCY EQUIPMENT

703.82 Equipment Standards and Inspection

PERSONNEL REQUIREMENTS

703.86 Minimum Crew
 703.87 Designation of Pilot-in-command and Second-in-command
 703.88 Flight Crew Member Qualifications
 703.91 Validity Period

MANUALS

703.106 Distribution of Company Operations Manual
 703.107 Standard Operating Procedures

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
 704.22 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

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
- 704.111 Validity Period

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

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

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

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

MANUALS

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

NOTAM**A.I.P. CANADA**

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

TRANSPORTATION SAFETY BOARD OF CANADA (TSB) - A.I.P. CANADA, 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 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 VFR Holding Procedures
- 13 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 High Level Holding Procedures
- 5 Profile Descent
- 6 Leaving or Entering Uncontrolled Airspace
- 7 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 (RNPC)
- 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 Separation Minima
(RVSM)**

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

SECTION 2: AIRFRAMES, ENGINES, PROPELLERS AND AIRCRAFT SYSTEMS**AIRFRAMES**

- 1 Flight Controls
- 2 Flaps
- 3 Slots/Slats
- 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

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 (e.g. Ice, Fire, GPWS and Altitude Alert)
- 7 Fire Protection
- 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

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
- 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) & FL250-600 (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)

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

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
- 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 Affects
- 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 General

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

INTERPERSONAL RELATIONS

- 1 Communications with Flight 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

CREW RESOURCE MANAGEMENT (CRM)

CONTROLLED FLIGHT INTO TERRAIN (CFIT)

TABLES AND CHARTS

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

WEIGHT SHIFT FORMULA

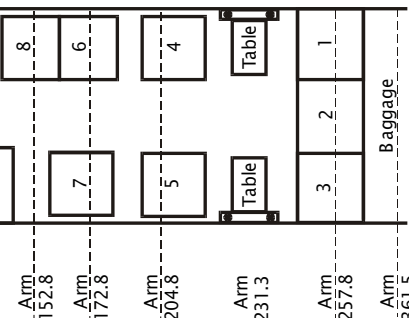
$\frac{\text{WEIGHT OF CARGO MOVED}}{\text{WEIGHT OF AEROPLANE}} = \frac{\text{DISTANCE CG MOVED}}{\text{DISTANCE BETWEEN ARM LOCATION}}$

WEIGHT & BALANCE LOADING DATA
(Page 1 of 2)

Fuel Loading Chart

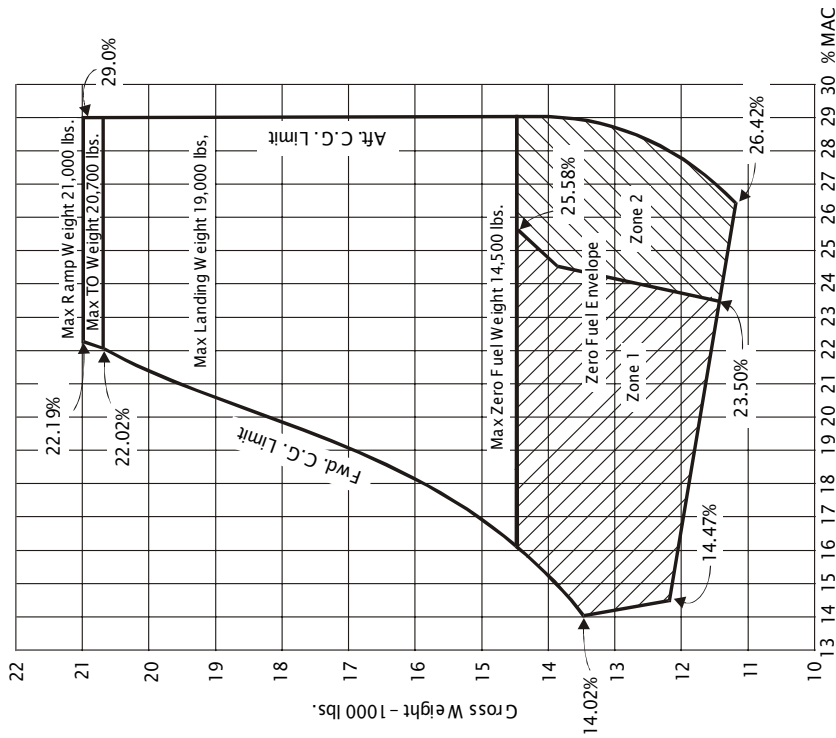
Fuel Taken as 7.807 lb. per Imp. Gal. / Moments are in in.-lb.

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			



WEIGHT & BALANCE LOADING DATA
(Page 2 of 2)

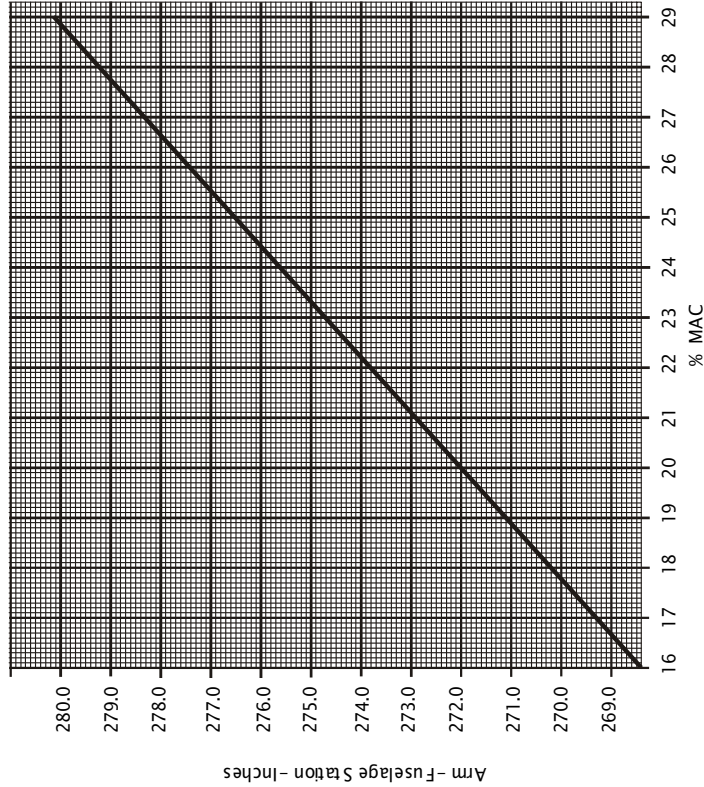
Centre Of Gravity Envelope



- Zone 1 If the Zero Fuel Weight falls within this zone - fuel can be loaded up to Max Ramp Wt. without exceeding C.G. 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 C.G. Limit is not exceeded.

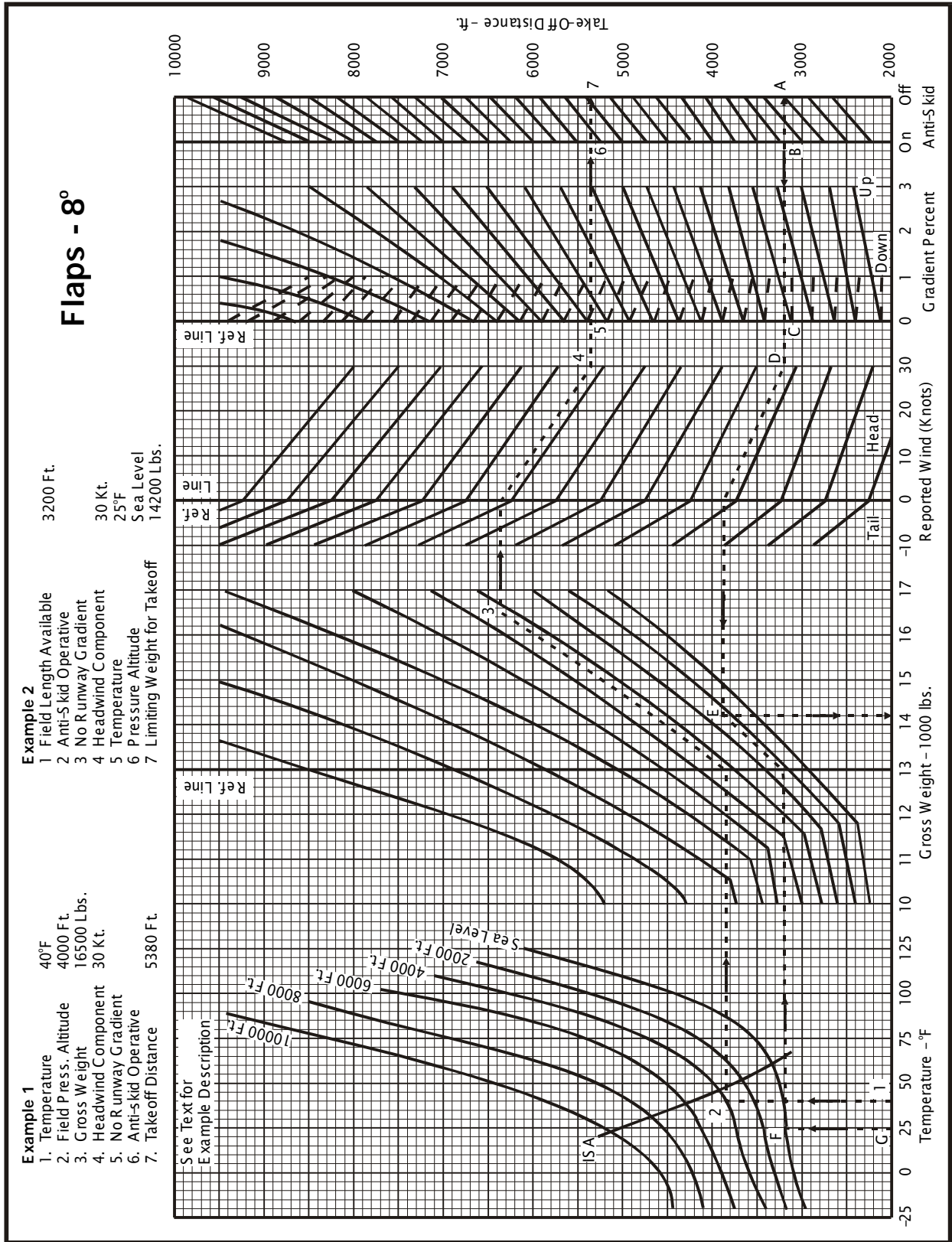
MAC is 90.197 inches
 L.E. of MAC is 253.964 in. aft of reference datum.
 Conversion Formula - Arm to % MAC:

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

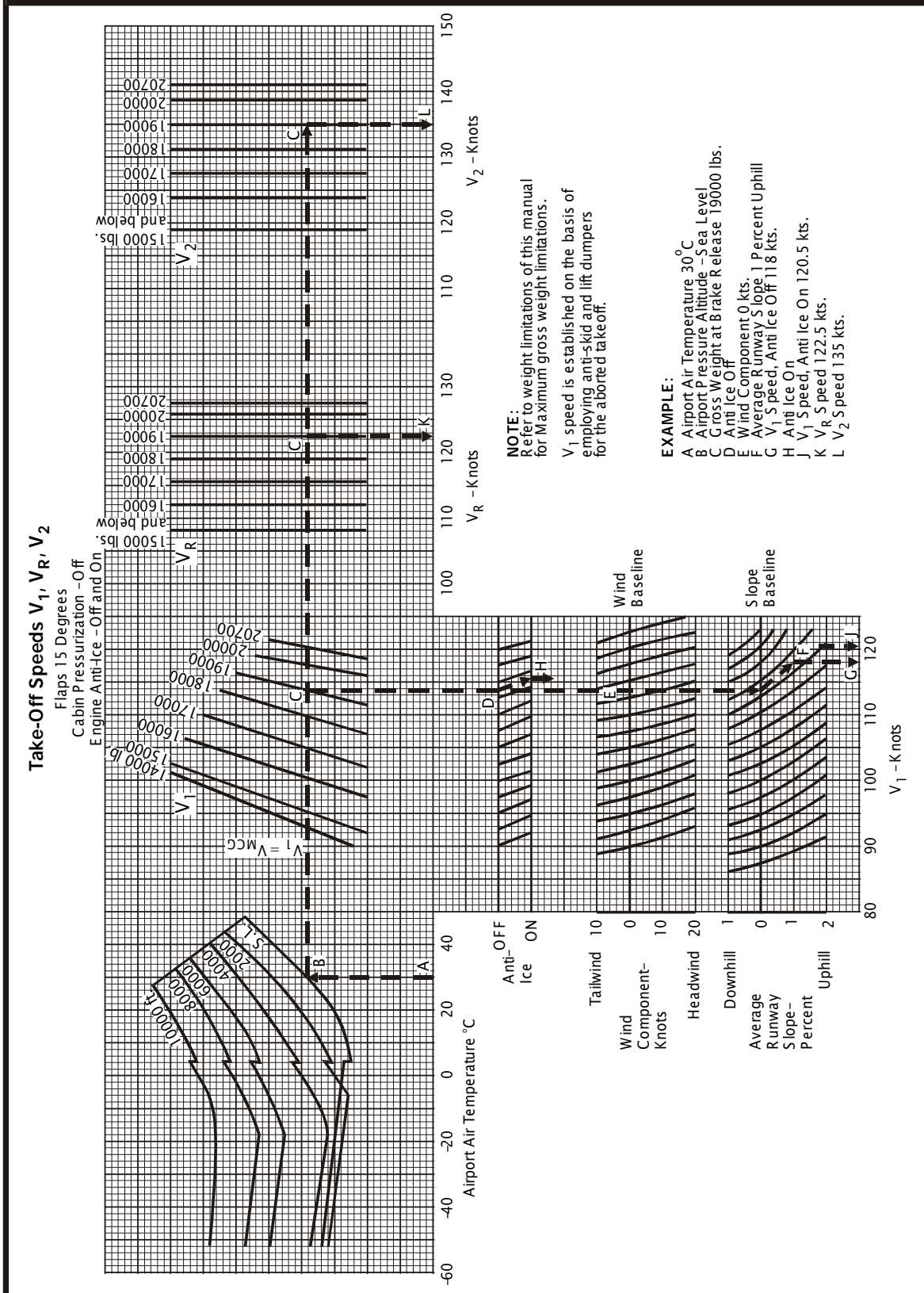


Conversion Chart - Arm to %MAC

TAKE-OFF DISTANCE GRAPH



TAKE-OFF SPEEDS V_1 , V_R , V_2



TAKE-OFF PERFORMANCE

Accelerate-Go - Flaps 0%

Associated Conditions:

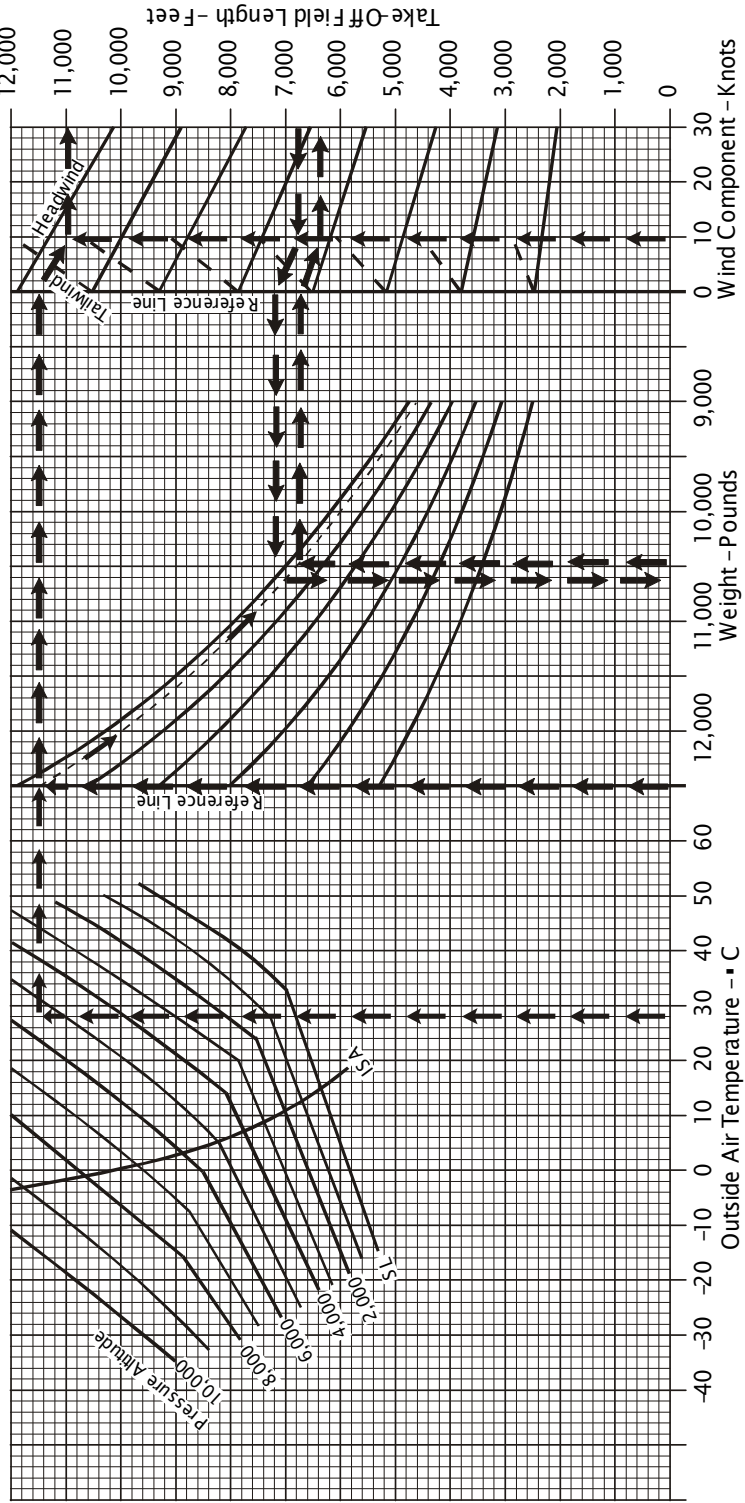
- Power Take-Off power set before brake release.
- Flaps 0%
- AutoFeather Armed
- Landing Gear Retract after lift-off
- Runway Paved, level, dry surface

- 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.

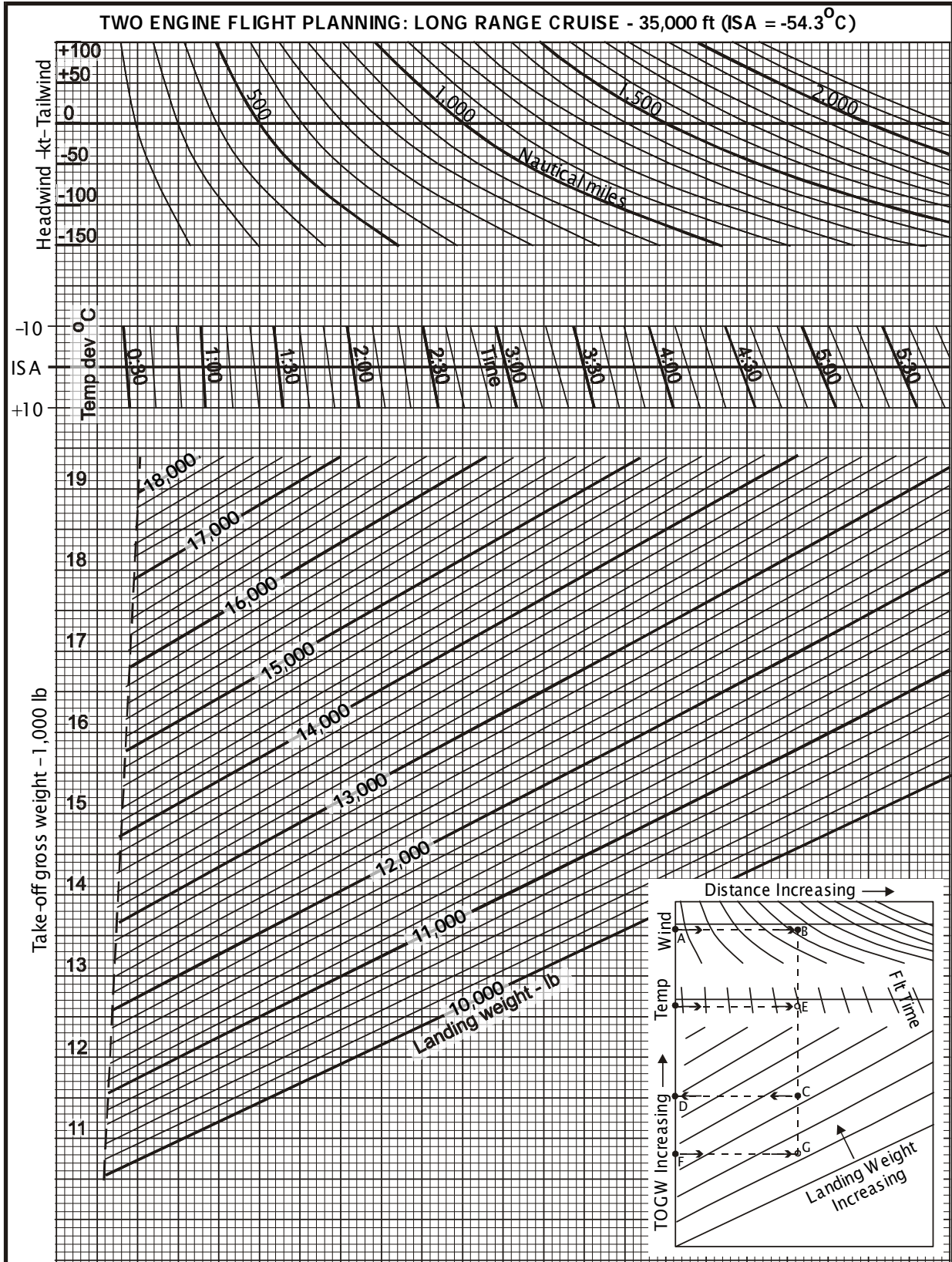
Example:

OAT	28° C
Pressure Altitude	5430 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.	

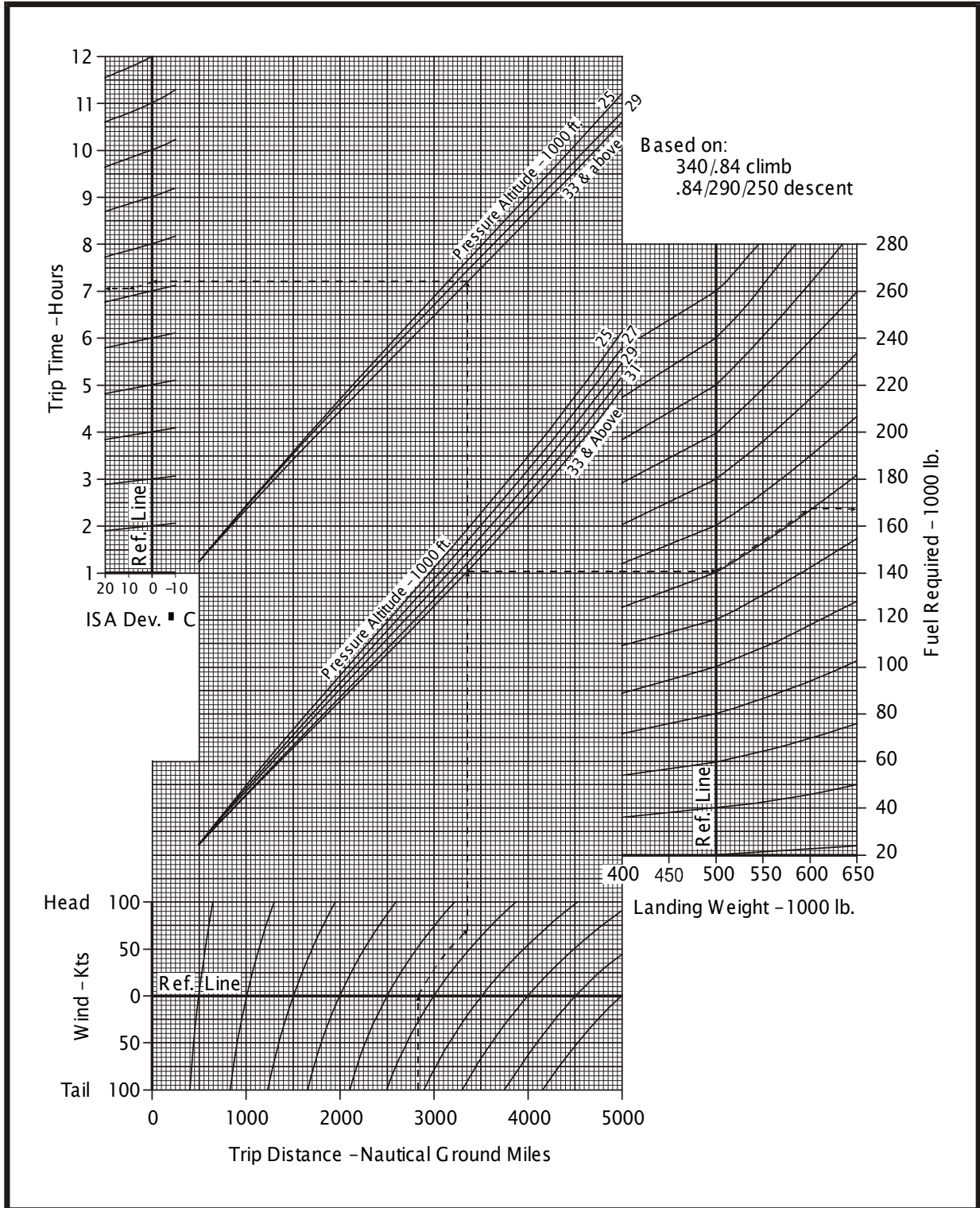
Weight - Pounds	Speed - Knots		
	V_R	V_{LOF}	V_2
12,500	95	101	121
12,000	95	101	119
11,000	95	101	115
10,000	95	101	111
9,000	95	101	108



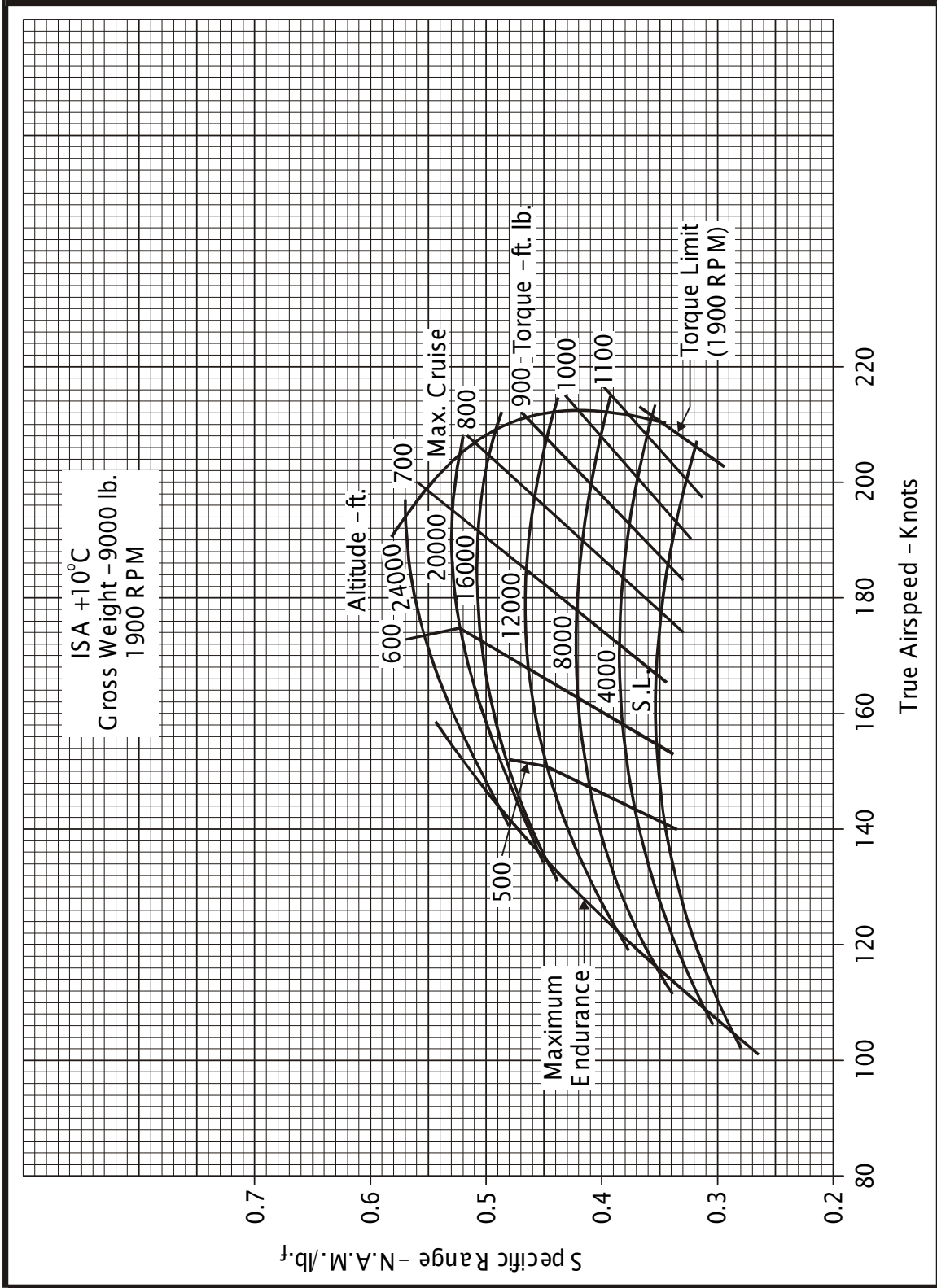
CRUISE PERFORMANCE



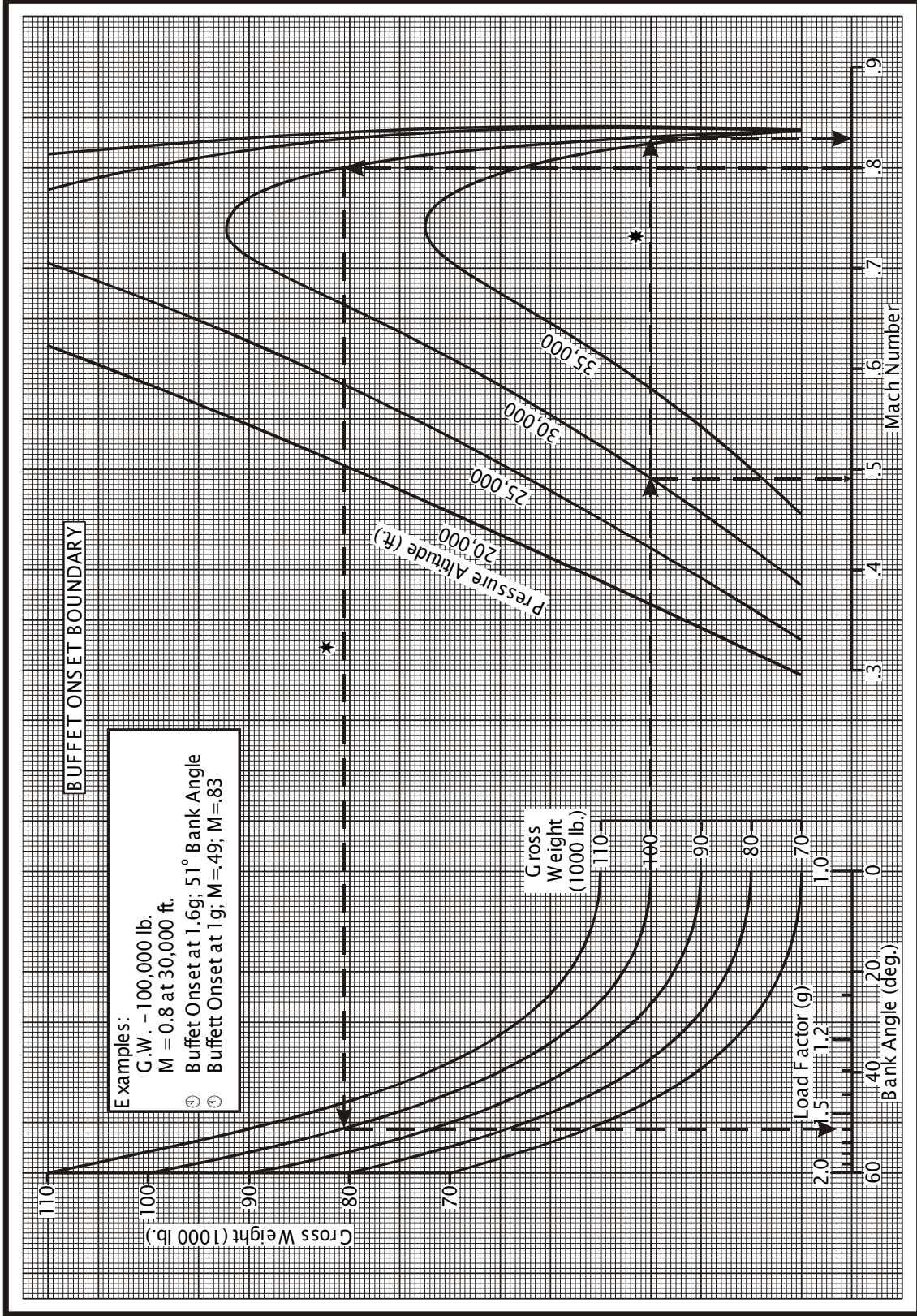
LONG RANGE CRUISE



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

- Finding the Sun's True Bearing (TP 784E).
- 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 Videos.
- Aeronautical Information Publication (A.I.P. Canada) (TP 2300E)
- *Canadian Aviation Regulations* (CARs)
- VFR Navigation Charts (VNC)/VFR Terminal Area Charts (VTA)/World Aeronautical Charts (WAC)
- Canada Flight Supplement
- Enroute 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 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>