Study and Reference Guide

Flight Dispatchers

Third Edition
September 2002
GENERAL

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

EXAMINATIONS

The examinations are as follows:

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<td>Aviation Regulations and Air Traffic Procedures, Aeroplane Operations and General Navigation, Radio aids and Flight Planning</td>
<td>80</td>
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<tr>
<td>Meteorology</td>
<td>100</td>
<td>3½ hours</td>
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Following the completion of generic examinations candidates must complete air operator specific training as approved by Transport Canada.

KNOWLEDGE REQUIREMENTS

Generic training consists of the common body of knowledge required by all flight dispatchers. In order for a flight dispatcher candidate to commence on-the-job training at the air operator of employment, he or she must have passed both Transport Canada's generic examinations, one of which will test the meteorology-related subjects and the other the remaining subjects in this publication.

The proficiency levels used in this document are defined as follows:

1) Denotes a basic knowledge of the subject:
   - The learner will be involved in learning facts. Verbs such as list, recall, name etc. will be used to describe the student's performance.
     Example: list the conditions for the withdrawal of an Air Operator's Certification.

2) Denotes an understanding of the principle:
- The learner will be required to remember and explain principles.
- Verbs such as explain, define, write etc. will be used to describe the student's performance.
  Example: explain how a dispatcher uses the Air Almanac on the job.

3) Denotes knowledge of the subject and the ability to apply it practically:

- The learner will show an understanding of the principle by explaining the procedure used to apply it. Words such as list the steps, put in order, flow chart, will be used to describe the student’s performance.
- Example: explain the dispatcher procedures for handling an aircraft experiencing icing.

3) Denotes a thorough knowledge of the subject and the ability to apply it with speed and accuracy:

- The student will be able to apply procedures to a problem efficiently and accurately.
- Verbs such as select, distinguish, demonstrate, will be used to describe the student’s performance.
- Example: Given a variety of conditions select an appropriate route of flight for a defined aircraft.

5) Denotes extensive knowledge of the subject and the ability to apply procedures derived from it with judgment in light of the circumstances.

- Given a problem with a variety of different solutions the learner will select and apply the most efficient procedures to handle the problem.
- Verbs such as analyze, demonstrate, manipulate, assemble will be used to describe the student’s performance.
- Example: Given an observed weather condition on an aircraft’s performance the student will quickly and accurately amend the take off data for the aircraft.

Sections with sidebars indicate new topic areas.

NOTE: Times stated (time 8 – 10 hrs.) is a suggested minimum to maximum required for study and is for general guidance only.
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.50  705.103  Designation of Pilot-in-command and Second-in-command
.51  705.104  Flight Attendant Requirements
.52  705.106  Pilot Qualifications
.53  705.107  Flight Engineer and Second Officer Qualifications
.54  705.108  Crew Pairing
.55  705.111  Route and Aerodrome Qualifications
.56  705.113  Validity Period

**MANUALS**

.57  705.136  Distribution of Company Operations Manual
.58  705.137  Aircraft Operating Manual
.59  705.138  Standard Operating Procedures
1.6 NOTAM
(proficiency level 5)

1.7 A.I.P. CANADA
(proficiency level 5)
.1 A.I.P. Canada
.2 A.I.P. Supplements
.3 Aeronautical Information Circulars
.4 Aviation Notices
.5 AIRAC Canada
.6 CAP
.7 CFS

1.8 TRANSPORTATION SAFETY BOARD OF CANADA (TSB) – A.I.P. CANADA, GEN 3.0
(proficiency level 2)

1.9 AIR TRAFFIC SERVICES AND PROCEDURES
(proficiency level 5)
.1 Air Traffic and Advisory Services
.2 Flight Service Stations
.3 Communications Procedures
.4 Radar Service
.5 ATC Clearances and Instructions
.6 ESCAT Plan (formerly SCATANA)
.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)
.14 Clearway/Stopway

1.10 OPERATIONS IN HIGH LEVEL DOMESTIC AIRSPACE
(proficiency level 4)
.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

1.11 CANADIAN MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS (CMNPS) AIRSPACE
(proficiency level 5)
.1 General
.2 Partial or Complete Loss of Navigation Capability
.3 Position Reporting

1.12 CANADIAN MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS (CMNPS) CERTIFICATION
(proficiency level 5)
.1 General
.2 Certification
.3 Navigation System Requirements
.4 Transition Between CMNPS Airspace and the Canadian Domestic Airway Structure
.5 Separation Minima
1.13 ATC SPECIAL PROCEDURES
(proficiency level 5)

.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)
.9 Declaring and Emergency

1.14 NORTH ATLANTIC OPERATIONS
(proficiency level 5)

.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

1.15 RVSM
(proficiency level 5)

.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

2.1 AIRFRAMES
(proficiency level 3)

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

2.2 ENGINES
(proficiency level 3)

.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

2.3 PROPELLERS
(proficiency level 3)

.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

2.4 AIRCRAFT SYSTEMS
(proficiency level 4)

.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
.17 Fuel Systems
<table>
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<th>SECTION 3: METEOROLOGY</th>
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<td>(proficiency level 5 for all items in section 3)</td>
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### 3.1 THE EARTH’S ATMOSPHERE

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

### 3.2 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**

### 3.3 METEOROLOGICAL ASPECTS OF ALTIMETRY

- **.1 Pressure Altitude**
- **.2 Density Altitude**
- **.3 True Altitude**
- **.4 Altimeter Setting**
- **.5 Effects of both Pressure and Temperature**

### 3.4 TEMPERATURE

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

### 3.5 MOISTURE

- **.1 Relative Humidity/Dewpoint**
- **.2 Sublimation/Condensation**
- **.3 Cloud Formation**
- **.4 Precipitation**
- **.5 Saturated/Dry Adiabatic Lapse Rates**

### 3.6 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**

### 3.7 CLOUDS

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

### 3.8 TURBULENCE

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

### 3.9 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**
3.10 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

3.11 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

3.12 FRONTS
.1 Structure
.2 Types
.3 Formation
.4 Cross-sections
.5 Discontinuities Across Fronts
.6 Frontal Waves and Oclusions
.7 Frontogenesis and Frontolysis

3.13 FRONTAL WEATHER
.1 Warm Front
.2 Cold Front
.3 Stationary Front
.4 TROWAL and Upper Fronts

3.14 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

3.15 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

3.16 SURFACE BASED LAYERS
.1 Fog Formation
.2 Fog Types
.3 Haze and Smoke
.4 Blowing Obstructions to Vision
3.17 METEOROLOGICAL SERVICES AVAILABLE TO Dispatchers

.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)

3.19 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)

3.18 AVIATION WEATHER REPORTS

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

3.19 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)

3.20 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)
### 4.1 FLIGHT INSTRUMENTS – PRINCIPLES AND OPERATIONAL USE
(proficiency level 3)

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

### 4.2 FLIGHT MANAGEMENT INSTRUMENTS
(proficiency level 3)

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

### 4.3 ENGINE INSTRUMENTS – PRINCIPLES AND USE
(proficiency level 3)

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)

### 4.4 AIRCRAFT COMPASS SYSTEMS
(proficiency level 2)

1. Construction
2. Use
3. Limitations and Faults
4. Gyromagnetic Remote Indicating Compass
### SECTION 5: NAVIGATION – GENERAL

#### 5.1 NAVIGATION TERMS (proficiency level 4)
- .1 Air Position
- .2 Great Circle
- .3 Rhumb Line
- .4 Greenwich Hour Angle

#### 5.2 MAPS AND CHARTS (proficiency level 5)
- .1 Lambert Conformal
- .2 Transverse Mercator
- .3 Enroute Low and High Altitude Charts

#### 5.3 TIME AND LONGITUDE (proficiency level 5)
- .1 Time Zones and Relation to Longitude

#### 5.4 FLIGHT PLANNING CALCULATIONS AND FORMS (proficiency level 5)
- .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
- .15 ICAO Flight Plan
- .16 ETOPS

#### 5.5 COMPUTERIZED FLIGHT PLANS (proficiency level 5)
- .1 Decode
- .2 Analysis and Interpolation

#### 5.6 EN ROUTE NAVIGATION (proficiency level 5)
- .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

6.1 RADIO
(proficiency level 3)

.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

6.2 AIRCRAFT RADIO TRANSCEIVERS
(proficiency level 4)

.1 VHF
.2 HF
.3 DATALINK

6.3 SELECTIVE CALL SYSTEM (SELCAL)
(proficiency level 4)

.1 VHF
.2 HF

6.4 EMERGENCY LOCATOR TRANSMITTER (ELT)
(proficiency level 2)

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

6.5 RADAR
(proficiency level 3)

.1 Elementary Theory
.2 Primary Returns

6.6 NAVIGATION SYSTEMS
(proficiency level 3)

.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)

6.7 APPROACH AIDS
(proficiency level 4)

.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

6.8 TRANSPOUNDERS
(proficiency level 4)

6.9 ACAS/TCAS
### SECTION 7: FLIGHT OPERATIONS

#### 7.1 ATMOSPHERIC EFFECTS IN FLIGHT  
(proficiency level 5)

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

#### 7.2 PERFORMANCE  
(proficiency level 5)

- .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
- .12 Selection of Alternates

#### 7.3 CHARTS AND GRAPHS  
(proficiency level 5)

- .1 Weight and Balance
- .2 Take-off
- .3 Climb
- .4 Cruise
- .5 Buffet Boundary
- .6 Descent
- .7 Landing

#### 7.4 CRITICAL SURFACE CONTAMINATION  
(proficiency level 5)

- .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

#### 7.5 WAKE TURBULENCE  
(proficiency level 5)

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

#### 7.6 FLIGHT MANUAL  
(proficiency level 3)

- .1 Approved Information

#### 7.7 VOLCANIC ASH  
(proficiency level 5)

- .1 Hazards

#### 7.8 AIRMANSHIP/RULES OF THUMB  
(proficiency level 4)

- .1 General
# SECTION 8: THEORY OF FLIGHT

## 8.1 FORCES ACTING ON AN AEROPLANE
(proficiency level 4)

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

## 8.2 WING DESIGN
(proficiency level 3)

| .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

9.1 AVIATION PHYSIOLOGY (proficiency level 3)

.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

9.2 THE OPERATING ENVIRONMENT (proficiency level 1)

.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)

9.3 AVIATION PSYCHOLOGY (proficiency level 4)

.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)

9.4 PILOT – EQUIPMENT / MATERIALS RELATIONSHIP (proficiency level 5)

.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

9.5 INTERPERSONAL RELATIONS (proficiency level 4)

.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

9.6 CREW-DISPATCH RESOURCE MANAGEMENT (CRM - DRM) (proficiency level 5)
EXAMINATION RESULTS – DECODING

Candidates who write an examination will be informed of the Question topics they answered incorrectly by a series of numbers related to the sections and topics contained in this Guide. Questions relating to more than one topic are shown by a slash (/) separating the series of numbers (example 3). The method of decoding these numbers is explained by the examples below.

HOW TO DECODE

Example (1) 1.1.2.3

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Air Law and Procedures
CARs – PART 1 – General Provisions
Administration and Compliance
Record Keeping

Example (2) 3.5.1

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Meteorology
Moisture
Relative Humidity / Dewpoint

Example (3) 3.9.12 / 7.2.10

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Meteorology
Wind
Wind Shear Types and Causes
Flight Operations
Performance
Wind Shear – Effects and Avoidance

TABLES AND CHARTS

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

WEIGHT SHIFT FORMULA

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## Fuel Loading Chart

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

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**Wing Tip Tanks**

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<th>Imp. Gallons</th>
<th>Wt. (lb.)</th>
<th>Mom. / 1000</th>
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<td>100</td>
<td>781</td>
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**Aircraft Seating Diagram**

- Crew
- Crew
- Toilet
- Bar
- Arm 152.8
- Arm 172.8
- Arm 204.8
- Arm 231.3
- Arm 257.8
- Table
- Table
- Baggage
- Fwd.
WEIGHT & BALANCE LOADING DATA
(Page 2 of 2)

MAC is 90.197 inches
L.E. of MAC is 293.864 in., all of reference datum.

Conversion Formulas:
- Arm to %MAC: %MAC = (ARM - 293.864) / 293.864
- %MAC = (ARM - 90.197) / 90.197

Conversion Chart - Arm to %MAC

Centre of Gravity Envelope

- Zero Fuel Weight: 15,500 lbs.
- Max Landing Weight: 19,000 lbs.
- Max Takeoff Weight: 21,000 lbs.

Zones:
- 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 all C.G. Limit is not exceeded.

Gross Weight - 1000 lbs.

Arm - Fuselage Station - Inches
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.

<table>
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<tr>
<th>Weight - Pounds</th>
<th>Speed - Knots</th>
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<tr>
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<td>( V_r )</td>
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<tr>
<td>12,500</td>
<td>95</td>
</tr>
<tr>
<td>12,000</td>
<td>95</td>
</tr>
<tr>
<td>11,000</td>
<td>95</td>
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<tr>
<td>10,000</td>
<td>95</td>
</tr>
<tr>
<td>9,000</td>
<td>95</td>
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Example:

- OAT: 29°C
- Pressure Altitude: 5430 Feet
- Headwind Component: 9.5 Knots

<table>
<thead>
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<th>Take-Off Weight - Pounds</th>
<th>Take-Off Field Length - Feet</th>
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<td>10,650</td>
<td>6,786</td>
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<td>10,470</td>
<td>6,370</td>
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</table>

Speeds (10,470 Pounds):
- \( V_r \): 95 Kt.
- \( V_{off} \): 101 Kt.
- \( V_2 \): 113 Kt.
CRUISE PERFORMANCE

TWO ENGINE FLIGHT PLANNING: LONG RANGE CRUISE - 35,000 ft (ISA = -54.3°C)
LONG RANGE CRUISE

Based on:
340/.84 climb
.84/290/250 descent
SPECIFIC RANGE

ISA +10°C
Gross Weight - 9000 lb
1900 RPM

Specific Range - N.A.M./lb,

True Airspeed - Knots

Altitude - ft

Max. Cruise

900: Torque - ft. lb

1000

1100

Torque Limit (1900 RPM)

Max. Endurance

500

1200

4000

S.L.
BUFFET ONSET BOUNDARY

Example:
G.W. - 100,000 lb.
M = 0.8 at 30,000 ft.
Buffet Onset at 1.6; 51° Bank Angle
Buffet Onset at 1.6; M = 0.49; M = 0.83

Lead Factor (G)
Bank Angle (deg)

Gross Weight (1000 lb)

minimum Trace
### Sample Computer Flight Plan

#### Plan 1510

<table>
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<tr>
<th>POA CYOW</th>
<th>ALT CYND</th>
<th>TIME</th>
<th>DIST</th>
<th>ARRIVE</th>
<th>TAKEO FF</th>
<th>LAND</th>
<th>AV PLN</th>
<th>OPNLWT</th>
<th>HSC/F</th>
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<td>01/09</td>
<td>0386</td>
<td>1809Z</td>
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#### WPT MTR TTR T TAS G/S DR ZD DREM ZT CRT ZF FREM AFF

| 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 N4621|
#### SMARE N46196W078098 YOW N45265W075538 CYOW N4519|
#### 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/
-40438 P/ R/ S/ J/ D/
-A/)

IN  DOWN  ZFW
OUT UP  R/FUEL
FLT AIR  T/OWT
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.

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<td>YOW 314 YOW</td>
<td>314° Radial to YOW</td>
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<td>Wind Push of 35 kts</td>
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<td>Waypoint</td>
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GOVERNMENT OF CANADA PUBLICATIONS

Transport Canada – AARA
Place de Ville, Tower C, Ottawa, Ontario, Canada, K1A 0N8
Telephone (613) 993-7284 1-800-305-2059
Facsimile (613) 957-4208 – ATTN: AARA
Internet Address: http://www.tc.gc.ca/aviation/pubs/index_e.htm

The following publications can be purchased from the above address. The fee is cost plus handling, and applicable mailing charges.

3. Human Factors for Aviation – Basic Handbook (TP 12863E), and Advanced Handbook (TP 12864E).
4. When in Doubt … Aircraft Critical Surface Contamination Training Videos.

   Note: The three videos; Ground Crew, Small Aircraft, and Large Aircraft may be purchased individually or all three combined into a single video.

The accompanying booklets; When in Doubt … Small and Large Aircraft (TP 10643E), When in Doubt … Ground Crew (TP 10647), and Aircraft Critical Surface Contamination Examination Questions (TP 10615E) are available from the General Aviation web site: http://www.tc.gc.ca/CivilAviation/General/Exams/Guides.htm.

If you do not have access to the web, the booklets can be ordered from the above address for a nominal charge.

The publications listed below may be purchased from:

   Canadian Government Publishing
   Ottawa, Ontario, Canada, K1A 0S9
   General Inquiries: (819) 956-4800 or 1-800-635-7943
   Facsimile: (819) 994-1498 or 1-800-565-7757
   Internet Address: http://publications.pwgsc.gc.ca/publishing/pubindex-e.html

1. Aeronautical Information Publication (A.I.P. Canada) (TP 2300E)
2. Canadian Aviation Regulations (CARs)

To find the nearest distributor of the publications listed below, contact:

   Canada Map Office, Geomatics Canada
   615 Booth Street
   Ottawa, Ontario, Canada, K1A 0E9
   Telephone (613) 952-7000 or 1-800-465-6277
   Facsimile (613) 957-8661 or 1-800-661-6277
   Internet Address: http://www.geocan.nrcan.gc.ca/ps/indexe.html
1. VFR Navigation Charts (VNC)/VFR Terminal Area Charts (VTA)/World Aeronautical Charts (WAC)
2. Canada Flight Supplement
3. Enroute Low Altitude Charts


Information on Customs Requirements is available from the Canada Customs and Revenue Agency (internet address: http://www.ccra-adrc.gc.ca/).


**ADDITIONAL REFERENCE MATERIAL**

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

ENQUIRIES

Information as to the location of pilot training organizations and matters pertaining to flight crew licensing can be obtained by writing the appropriate Regional licensing personnel using the information given in the following list.

Pacific Region

Regional Manager General Aviation
Transport Canada
Suite 620
800 Burrard Street
Vancouver, British Columbia
V6Z 2J8

Telephone:  (604) 666-5571
Facsimile:  (604) 666-4839

Prairie and Northern Region

General Aviation
Transport Canada
Canada Place, 11th Floor
1100-9700 Jasper Avenue
Edmonton, Alberta
T5J 4E6

Telephone:  (780) 495-3869
Facsimile:  (780) 495-7449

Regional Manager General Aviation
Transport Canada
344 Edmonton Street
2nd Floor
Winnipeg, Manitoba
R3C 0P6

Telephone:  (204) 983-4341
Facsimile:  (204) 984-2069

Ontario Region

Regional Manager General Aviation
Transport Canada
4900 Yonge Street
Suite 300
Willowdale, Ontario
M2N 6A5

Telephone:  (416) 952-0215
Facsimile:  (416) 952-0196

Quebec

Regional Manager General Aviation
Transport Canada
700 Leigh Capreol
Suite 2001
Dorval, Quebec
H4Y 1G7

Telephone:  (514) 633-3863
Facsimile:  (514) 633-3585

Atlantic Region

Regional Manager General Aviation
Transport Canada
P.O. Box 42
95 Foundry Street
Moncton, New Brunswick
E1C 8K6

Telephone:  (506) 851-7131
Facsimile:  (506) 851-2563

These locations, and others offer flight crew examination service. A complete listing can be found on the internet site http://www.tc.gc.ca/aviation/general/FLTCREW/TCC.htm.