



Transport  
Canada

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**TP 14038E**  
(revised 12/2005)

# **Study and Reference Guide**

## **Aircraft Maintenance Engineer Examinations**

Revision 1 - August 2005

**Canada**

# **STUDY AND REFERENCE GUIDE**

## **AIRCRAFT MAINTENANCE ENGINEER TECHNICAL EXAMINATIONS**

### **INTRODUCTION**

The purpose of this Study and Reference guide is to identify topics/subjects that may be covered by the Transport Canada (TC) technical and regulatory examinations required by Canadian Aviation Regulations (CAR) Standard 566.

It is the responsibility of the candidate to be knowledgeable in all areas of aircraft maintenance required to meet the certification requirements associated with the licence.

### **GENERAL INFORMATION**

This Guide is a generic reference document and is not to be interpreted as an all-inclusive list of subjects and topics necessary to complete a specific examination. TC reserves the right to add or remove topics from the Study and Reference Guide.

The applicant feedback letter (Appendix A) will address current topics that reflect the latest technical information relevant to a particular examination or revision of the Study and Reference Guide.

The List of Suggested References (Appendix B) will assist a candidate by outlining a potential source for study material. Appendices A & B are located at the end of the Study and Reference Guide.

### **EXAMINATIONS**

Technical: (90 questions)

Unless otherwise stated, or obvious from the context, all examination questions relate to a normal situation (e.g. in the case of an aircraft, it should be assumed that it is in an airworthy condition, and if in flight, that it is in stable cruise). Questions may be based on knowledge of: theory, components, testing, operation, inspection or troubleshooting of a system.

The examination questions are designed to test the candidate's knowledge of each subject area. The level of knowledge required includes basic principles of the subject areas and their common applications, plus the capability to summarize, analyze and accurately apply the basic principles to a varied range of circumstances.

Regulatory: (50 questions for the M, E and S ratings)  
(25 questions for the Balloon rating)

Questions may be based on knowledge of application of the applicable regulation or location of a specific regulation.

Multiple-choice questions consist of an introductory statement (the stem) and four optional answers. The options include the correct answer (the key) and three wrong answers (the distracters). The candidate must select the correct answer from the options given. The number of questions indicated for each exam is approximate.

Examinations may be attempted at most TC offices. Candidates are advised to check with the office in question prior to the examination, to ensure that space is available at the desired time and location.

### **APPENDICES**

Appendix A: Candidate Feedback

Appendix B: List of Suggested Reference Publications

# REGULATORY EXAMINATION

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## (REGS or BREGS)

The Regulatory Requirements (**REGS**) examination is applicable to the M, E and S licence ratings. The Regulatory Requirement (**BREGS**) examination is applicable to the Balloon licence rating.

### CARs:

- 1.0 General Provisions - Interpretation
- 2.0 Aircraft Identification and Registration and Operation of a Leased Aircraft by a Non-registered Owner – Aircraft marking and Registration
- 3.0 Personnel Licensing and Training – Aircraft Maintenance Engineering Licenses and Ratings
- 4.0 Airworthiness
- 5.0 General Operating and Flight Rules – Aircraft Requirements
- 6.0 Commercial Air Services – Aircraft Maintenance Requirements for Air Operators

### Standards:

- 7.0 Aircraft Registration
- 8.0 Airworthiness Directives
- 9.0 AME Licensing
- 10.0 Approved Maintenance Organizations (AMO)
- 11.0 Borrowed Parts
- 12.0 Defects
- 13.0 Definitions
- 14.0 Elementary Work
- 15.0 Flight Permits; Flight Authorities
- 16.0 Inspection
- 17.0 Life Limited Parts
- 18.0 Maintenance Activities
- 19.0 Maintenance Control Systems
- 20.0 Maintenance Release / Release Certification
- 21.0 Maintenance Schedules
- 22.0 Modification / Repair
- 23.0 Non-Destructive Testing (NDT)
- 24.0 Out-of-Phase items
- 25.0 Parts Identification
- 26.0 Performance of Work
- 27.0 Person Responsible for Maintenance (PRM)
- 28.0 Restricted Certification Authority (RCA)
- 29.0 Specialized Maintenance
- 30.0 Technical Records
- 31.0 Type/Supplemental Type Certificates
- 32.0 Used Parts
- 33.0 Weight and Balance
- 34.0 (N/A)
- 35.0 General knowledge on CARs/STDs

## 1.1.1 STUDY AND REFERENCE GUIDE “M” RATING TECHNICAL EXAMINATIONS

### STANDARD PRACTICES

The topics contained in this section of the guide are applicable to the SPM - Standard Practices examination for the M rating.

#### 1.0 MATHEMATICS AND PHYSICS

- 1.1 Shop mathematics, graphs and charts - Theory and application
- 1.2 Measurement systems and conversion - Calculation and application
- 1.3 Speed acceleration and motion - Theory and application
- 1.4 Stress and strain - Theory and application
- 1.5 Energy and work - Theory and application
- 1.6 Chemical and physical nature of matter - Theory and application
- 1.7 Gas laws and fluid mechanics - Theory and application
- 1.8 Properties of atmosphere - Theory and application

#### 2.0 ELECTRICITY AND ELECTRONICS

- 2.1 Safety procedures around electrical equipment - Theory and application
- 2.2 Sources of electrical energy - Basic theory
- 2.3 Batteries, primary cells and secondary cells - Theory and application
- 2.4 Magnetism/electromagnetism - Theory and application
- 2.5 DC theory - Application
- 2.6 AC theory - Application
- 2.7 Power distribution - Theory and application
- 2.8 Wiring practices - Theory and application
- 2.9 Digital integrated circuits - Theory and application
- 2.10 Boolean Expression, logic gates and truth tables - Theory and application
- 2.11 Basic semiconductor circuits - Theory and application
- 2.12 AC and DC Motors - Theory and application
- 2.13 Switches and relays - Theory and application
- 2.14 Fuses and circuit breakers - Theory and application
- 2.15 Synchros - Theory and application
- 2.16 Diodes - Theory and application
- 2.17 Transistors - Theory and application
- 2.18 Electrical load analysis - Theory and calculation
- 2.19 Decimal, binary, hexadecimal and octal number systems - Computation and conversion

#### 3.0 AIRCRAFT HARDWARE

- 3.1 Specifications and standards - Basic theory and application
- 3.2 Rivets - Identification and use
- 3.3 Threaded fasteners - Identification and use
- 3.4 Special fasteners - Theory and application - Identification and use
- 3.5 Control cables, terminals and turnbuckles - Identification and use
- 3.6 Bearings and seals - Identification and application
- 3.7 Gears - Identification, proper use and gear ratio calculation
- 3.8 Electrical hardware - Wire, terminals, splices, connectors, switches - Identification and use
- 3.9 Rigid lines, flexible lines and fittings - Characteristics, fabrication, material and size designation
- 3.10 Sealant - Types and application

#### 4.0 AIRCRAFT DRAWING

- 4.1 Types of drawings - Application
- 4.2 Interpretation of drawings, diagrams and charts - Theory and application
- 4.3 Station diagrams - Theory and application

## **5.0 WEIGHT AND BALANCE**

- 5.1 *C of G* design limits and range - Knowledge and application
- 5.2 Weighing procedures and calculations - Knowledge and application

## **6.0 METALURGY AND CORROSION PREVENTION**

- 6.1 Types of corrosion - Identification
- 6.2 Inspection processes - Theory and application
- 6.3 Removal and treatment of corrosion - Theory and application
- 6.4 Heat treatment, annealing and temper designation - Theory and application

## **7.0 NONDESTRUCTIVE TESTING**

- 7.1 Inspection techniques - Theory, types and application

## **8.0 GENERAL SERVICING AND STANDARD PRACTICES**

- 8.1 Fire protection - Types, prevention and extinguishing
- 8.2 Jacking, hoisting and leveling - Theory and application
- 8.3 Ground servicing equipment - Theory and application
- 8.4 Aircraft fueling and defueling procedures - Theory and application
- 8.5 Aviation fluids including fuel and additive - Types and application

## **9.0 TOOLS AND MEASURING DEVICES**

- 9.1 Hand tools - Identification and use
- 9.2 Power tools - Identification and use
- 9.3 Measuring devices - Identification and use
- 9.4 Test equipment - Identification and application

## **10.0 AIRCRAFT SHEET METAL, TUBULAR, WOOD AND COMPOSITE STRUCTURES**

- 10.1 Sheet metal materials - Theory and application
- 10.2 Aircraft fabrics - Theory and application
- 10.3 Wood - Theory and application
- 10.4 Plastics, fiberglass and composite materials - Theory and application
- 10.5 Basic welding - Theory and application
- 10.6 Rivet layout pattern designs and installation - Theory and application

## **AIRFRAME**

The topics contained in this section of the guide are applicable to the AF - Airframe examination for the M rating.

## **11.0 BASIC AERODYNAMICS**

- 11.1 Fixed-wing aircraft - Theory of flight
- 11.2 The atmosphere - Theory and application
- 11.3 Aerodynamic lift - Theory and application

## **12.0 AIRCRAFT STRUCTURES**

- 12.1 Fuselages and aircraft structures - Types, inspection and repair
- 12.2 Structures that produce and control lift - Theory, inspection, repair, servicing and installation
- 12.3 Windows and doors - Inspection, repair, servicing and installation

## **13.0 FIXED WING CONTROLS AND RIGGING**

- 13.1 Mechanical/servo powered flight controls - Theory and application
- 13.2 Symmetry check and adjustments - Theory and application
- 13.3 Control surface rigging - Theory and application

## **14.0 FUNDAMENTALS OF ROTARY-WING AIRCRAFT**

- 14.1 Rotary-wing aircraft - Theory of flight
- 14.2 Types of rotor systems - Characteristics, components, inspection and construction
- 14.3 Rigging of controls - Theory and application
- 14.4 Vibration analysis - Theory and application
- 14.5 Power train - Transmissions and clutches - Theory and operation
- 14.6 Auto rotation - Theory and application

## **15.0 ROTARY WING CONTROLS AND RIGGING**

- 15.1 Flight control system rigging - Theory and application
- 15.2 Rotor tracking/balancing - Theory and application
- 15.3 Gearboxes and drive shaft system - Theory and application

## **16.0 METAL STRUCTURAL**

- 16.1 Sheet metal structures - Theory and application
- 16.2 Types of structural stress - Theory and application
- 16.3 Heat treatment, annealing and temper designation - Theory and application

## **17.0 WOOD AND COMPOSITE STRUCTURE**

- 17.1 Wood components and characteristics - Theory and application
- 17.2 Finishing wood surfaces - Theory and application
- 17.3 Plywood skin repairs - Theory and application
- 17.4 Composite material - Theory and application
- 17.5 Honeycomb structures - Identification and repairs

## **18.0 FABRIC COVERING**

- 18.1 Aircraft fabric - Terminology, specification and application
- 18.2 Repairs and inspection of fabric coverings - Theory and application
- 18.3 Dope and finishing materials - Theory and application

## **19.0 WELDING AND TUBULAR STRUCTURE**

- 19.1 Inspection of welds - Theory and application
- 19.2 Tubular repairs - Theory and application

## **20.0 PAINTING AND FINISHING**

- 20.1 Metal aircraft and parts - Theory and application
- 20.2 Fabric aircraft and parts - Theory and application

## **21.0 ICE AND RAIN PROTECTION**

- 21.1 Ice detection systems - Components, adjustments and operating principles
- 21.2 Anti ice systems - Components, adjustments and operating principles
- 21.3 De-ice systems - Components, adjustments and operating principles
- 21.4 Windshield wiper systems - Components, adjustments and operating principles
- 21.5 Rain repellent systems - Components, adjustments and operating principles

## **22.0 22.0 HYDRAULIC AND PNEUMATIC SYSTEMS**

- 22.1 Safety precautions - Theory and application
- 22.2 High pressure bottles/accumulators - Theory and application
- 22.3 Hydraulic systems - Components, adjustments and operating principles
- 22.4 Pneumatic systems - Components, adjustments and operating principles.....

## **23.0 LANDING GEAR SYSTEMS**

- 23.1 Landing gear systems - Components, adjustment, theory and application
- 23.2 Nose wheel steering systems - Components, adjustments and application
- 23.3 Skids, floats and skis - Components, adjustments and operating principles
- 23.4 Wheels, tires and brakes - Theory, components, adjustments and operating principles

## **24.0 AIRCRAFT CABIN AND ATMOSPHERIC CONTROL SYSTEMS**

- 24.1 Pressurization systems - Theory, inspection and operating principles
- 24.2 Air conditioning systems - Theory, components, inspection and operating principles
- 24.3 Heating systems - Theory, components, inspection and operating principles
- 24.4 Oxygen systems - Theory, components, inspection and operating principles

## **25.0 AIRCRAFT FUEL SYSTEMS**

- 25.1 Gravity and pressure-feed systems - Safety, theory, components, inspection and operating principles
- 25.2 Storage and distribution - Safety, theory, components, inspection and operating principles

## **26.0 AIRCRAFT FIRE PROTECTION SYSTEMS**

- 26.1 Fire detection systems - Components, adjustments and operating principles
- 26.2 Fire extinguishing systems - Components, adjustments and operating principles

## **27.0 AIRCRAFT ELECTRICAL SYSTEMS**

- 27.1 Batteries - Theory, construction, inspection and operating principles
- 27.2 AC and DC electrical systems - Theory, construction, inspection and application
- 27.3 Wiring - Construction and inspection
- 27.4 Aircraft electrical systems - Troubleshooting

## **28.0 AIRCRAFT INSTRUMENT SYSTEMS**

- 28.1 Instrument systems - Theory and application
- 28.2 Pitot-static systems - Theory and application, inspection and operating principles
- 28.3 Compass systems - Theory and application, inspection and operating principles
- 28.4 Air data computer - Theory and application, inspection and operating principles

## **29.0 COMMUNICATION - NAVIGATION AND RECORDING SYSTEMS**

- 29.1 Radio transceivers - Theory, inspection and operating principles
- 29.2 Antennas - Theory, inspection and operating principles
- 29.3 Weather radar - Theory, installation, inspection and operating principles
- 29.4 Navigation systems - Theory, inspection and operating principles
- 29.5 Traffic Collision Avoidance System TCAS - Theory
- 29.6 Emergency frequencies and safety procedures - Application and operating principles
- 29.7 Flight Data Recorder (FDR) - Theory, components and inspection/test
- 29.8 Cockpit Voice Recorder (CVR) - Theory, components and inspection/test

## 30.0 30.0 AUTOPILOT SYSTEMS

- 30.1 Autopilot systems - Theory and operating principles
- 30.2 Flight management systems - Theory and operating principles

## POWERPLANT

The topics contained in this section of the guide are applicable to the PP - Power Plant examination for the M rating.

### 31.0 RECIPROCATING ENGINES

- 31.1 Reciprocating engines - Theory and application, inspection and operating principles
- 31.2 Engine mounts - Theory, construction, and inspection
- 31.3 Corrosion prevention - Theory, types, prevention and inspection
- 31.4 Gear boxes - Theory and operation
- 31.5 Engine instruments - Theory, inspection and operating principles
- 31.6 Trend monitoring - Theory and application

### 32.0 RECIPROCATING ENGINE FUEL AND CONTROL

- 32.1 Carburetion - Theory and operation
- 32.2 Fuel injection systems - Theory and operation
- 32.3 Turbo charger systems - Theory and application
- 32.4 System indication - Theory and application

### 33.0 RECIPROCATING ENGINE IGNITION AND STARTING SYSTEMS

- 33.1 Ignition systems - Types, theory, inspection and operation
- 33.2 Starting systems - Types, theory, inspection and operation

### 34.0 RECIPROCATING ENGINE LUBRICATION AND COOLING SYSTEMS

- 34.1 Engine lubrication - Components, theory, inspection and operation
- 34.2 Engine cooling - Components, theory, inspection and operation
- 34.3 Spectrometric Oil Analysis Program (SOAP) - Theory and application

### 35.0 ENGINE FIRE PROTECTION SYSTEMS

- 35.1 Engine fire detection - Components, theory, inspection and operation
- 35.2 Engine fire extinguishing - Components, theory, inspection and operation

### 36.0 TURBINE ENGINES

- 36.1 Turbine engines - Theory and application, inspection and operating principles
- 36.2 Engine instruments - Theory, inspection and operating principles
- 36.3 Gear boxes, accessory drives and gear reduction - Construction and operating principles
- 36.4 Engine mounts - Design and inspection
- 36.5 Trend monitoring - Theory and application

### 37.0 TURBINE ENGINE LUBRICATION AND COOLING SYSTEMS

- 37.1 Engine lubrication - Components, theory, inspection and operation
- 37.2 Engine cooling - Components, theory, inspection and operation

## **38.0 TURBINE ENGINE FUEL AND CONTROL**

- 38.1 Electronic and hydro-mechanical control - Theory and application
- 38.2 Governors - Theory and application
- 38.3 Manifolds and nozzles - Theory and application
- 38.4 Fuel Heaters - Theory and application
- 38.5 Oil coolers - Theory and application
- 38.6 Filters - Theory and application
- 38.7 System indication - Theory and application

## **39.0 TURBINE ENGINE INDUCTION AND EXHAUST SYSTEMS**

- 39.1 Inlets and inlet screens - Construction
- 39.2 Exhaust - Theory, inspection and operating principles`
- 39.3 Thrust reversers - Construction and operating principles
- 39.4 Anti-ice systems - Theory, inspection and operating principles

## **40.0 POWER PLANT RECORDING AND INDICATING SYSTEMS**

- 40.1 Speed/temperature/pressure indication - Theory and application
- 40.2 Fuel and Oil - Theory and application
- 40.3 Ratio/torque/vibration - Theory and application
- 40.4 Built In Test Equipment (BITE) - Theory and application
- 40.5 Fault detection - Theory and application

## **41.0 WATER INJECTION**

- 41.1 Water methanol injection systems - Theory and application

## **42.0 PROPELLERS AND SYSTEMS**

- 42.1 Propellers - Fixed/controllable pitch types, theory and application
- 42.2 Propeller systems - Components, terminology, theory, inspection and application

# STUDY AND REFERENCE GUIDE “E” RATING - TECHNICAL EXAMINATIONS

## STANDARD PRACTICES - AVIONICS

The topics contained in this section of the guide are applicable to the SPE - Standard Practices Avionics examination for the E rating.

### 1.0 STANDARD PRACTICES

- 1.1 Safety practices
- 1.2 Chemical and physical nature of matter - Theory and application
- 1.3 Gas laws and fluid mechanics - Theory and application
- 1.4 Properties of the atmosphere - Pressure, humidity, density characteristics
- 1.5 Properties of solids and liquids - Theory and application
- 1.6 Velocity, acceleration, mass and force - Theory and calculation
- 1.7 Heat, temperature, heat transfer and measurement - Calculation
- 1.8 Work, energy and power - Theory and calculation
- 1.9 Sound production, reproduction, propagation, speed and quality - Calculation
- 1.10 Light propagation, reflection and refraction - Theory
- 1.11 Aircraft electrical wiring - Lacing, clamping, crimping, splicing and routing, including safety precautions
- 1.12 Aircraft electrical wiring - Grounding, bonding and shielding
- 1.13 Soldering and desoldering techniques
- 1.14 Instrument panel layout and instrument mounting
- 1.15 Measurement systems and conversion – Calculation
- 1.16 Shop mathematics, graphs and charts - Theory and application
- 1.17 Aircraft electrical load analysis - Theory and calculation
- 1.18 ATA Specification 100 - Chapters relevant to maintenance of aircraft systems
- 1.19 Safety wiring (lock wiring) procedures

### 2.0 AERODYNAMICS

- 2.1 Theory of flight - Fixed wing aircraft
- 2.2 Theory of flight - Rotary wing aircraft

### 3.0 AIRCRAFT HARDWARE

- 3.1 Specifications and standards - Basic theory and application
- 3.2 Electrical hardware - Terminals, splices, connectors, switches, protective devices
- 3.3 Aircraft electrical wiring - Types, characteristics, wire sizes
- 3.4 Special fasteners - Theory and application
- 3.5 Rivets - Identification and use
- 3.6 Threaded fasteners - Identification and use
- 3.7 Control cables, terminals and turnbuckles - Identification and use

### 4.0 AIRCRAFT DRAWING

- 4.1 Types of drawings - Application
- 4.2 Interpretation of drawings, diagrams and charts - Theory and application
- 4.3 Station diagrams - Theory and application

### 5.0 WEIGHT AND BALANCE

- 5.1 *C of G* design limits and range - Knowledge and application
- 5.2 Weighing procedures and calculations - Knowledge and application

### 6.0 PITOT STATIC SYSTEMS

- 6.1 Types - Identification

6.2 Inspection processes - Theory and application

## **7.0 METALURGY AND CORROSION PREVENTION**

7.1 Types of corrosion - Identification

7.2 Inspection processes - Theory and application

7.3 Removal and treatment of corrosion - Theory and application

## **8.0 STRUCTURES**

8.1 Aircraft structures - Fixed wing aircraft

8.2 Aircraft structures - Rotary wing aircraft

## **9.0 FLIGHT CONTROLS AND RIGGING**

9.1 Flight control systems - Theory, types and application

## **10.0 NONDESTRUCTIVE TESTING**

10.1 Inspection techniques - Theory, types and application

## **11.0 GENERAL HANDLING AND SERVICING**

11.1 Shop safety - Theory and application

11.2 Fire protection - Types, prevention and extinguishing

11.3 Safety on the flight line – Foreign Object Damage (FOD) and hazardous areas

11.4 Jacking, hoisting and leveling - Theory and application

11.5 Ground servicing equipment - Theory and application

## **12.0 TOOLS AND MEASURING DEVICES**

12.1 Hand tools - Identification and use

12.2 Power tools - Identification and use

12.3 Measuring devices - Identification and use

12.4 Test equipment - Identification and application

## **13.0 SHEET METAL**

13.1 Structural and non-structural repairs - Identification and modification requirements

13.2 Special fasteners - Theory and application

13.3 Scratch inspection - Theory and application

13.4 Sealant - Theory and application

## **14.0 POWERPLANT**

14.1 Piston Engines – Theory and application

14.2 Turbine Engines – Theory and application

## **15.0 FUEL SYSTEMS**

15.1 Storage and Distribution - Theory and application

## **16.0 HYDRAULIC AND PNEUMATIC SYSTEMS**

16.1 Sources and common application - Theory and application

16.2 Operation and components - Theory and application

16.3 Maintenance and service - Theory and application

16.4 Storage and distribution – Theory and application

## **17.0 FIRE PROTECTION**

17.1 Detection, and suppression – Theory and application

## **18.0 IGNITION SYSTEMS**

18.1 Low, high tension - Theory and application

## **19.0 ENVIRONMENTAL CONTROL SYSTEMS**

19.1 Pressurization – Theory, application and function testing

19.2 Air conditioning - Theory, application and function testing

19.3 Ventilation - Theory, application and function testing

19.4 Oxygen - Theory, application and function testing

## **20.0 LANDING GEAR SYSTEMS**

20.1 Assemblies - Theory and application

20.2 Retraction systems - Theory and application

20.3 Indication systems - Theory and application

20.4 Wheels and brakes - Theory and application

20.5 Steering systems - Theory and application

## **21.0 STARTING SYSTEMS**

21.1 Turbine engine starters – Theory, application, inspection and servicing

21.2 Electrical starters - Theory, application, inspection and servicing

21.3 Starter-generators - Theory, application, inspection and servicing

## **22.0 ICE AND RAIN SYSTEMS**

22.1 Ice detection - Theory and application

22.2 Anti-ice - Theory and application

22.3 De-ice - Theory and application

22.4 Rain repellent - Theory and application

## **23.0 ELECTRICITY AND ELECTRONICS**

23.1 Safety procedures around electrical equipment - Theory and application

23.2 Sources of electrical energy - Basic theory

23.3 Batteries, primary cells and secondary cells - Theory and application

23.4 Magnetism/electromagnetism- Theory and application

23.5 DC theory - Application

23.6 AC theory - Application

23.7 Power distribution - Theory and application

23.8 Wiring practices - Theory and application

23.9 Digital integrated circuits - Theory and application

23.10 Solid-state devices - Theory and application

23.11 Basic semiconductor circuits - Theory and application

23.12 AC and DC Motors- Theory and application

23.13 Switches and relays - Theory and application

23.14 Fuses and circuit breakers - Theory and application

23.15 Synchros - Theory and application

23.16 Decimal, binary, hexadecimal and octal number systems - Computation and conversion

23.17 Digital data display - Theory and application

23.18 Boolean expressions, logic gates and truth tables - Theory and application

23.19 Electrical load analysis – Theory and application

## **“E” RATING - AVIONICS**

The topics contained in this section of the guide are applicable to the AV - Avionics examination for the E rating.

### **24.0 24.0 NAVIGATION AND COMMUNICATION SYSTEMS**

- 24.1 Radio waves and radio signals - Theory and application
- 24.2 Antennas - Theory, construction, installation and inspection
- 24.3 Communication - FM, VHF, HF systems - Theory, components and inspection
- 24.4 Radio-Navigation systems - Theory, components and inspection
- 24.5 Radio altimeter systems - Theory, components and inspection
- 24.6 Weather radar – Theory, components and inspection
- 24.7 RMI - Theory, components and inspection
- 24.8 Ground Proximity Warning System - Theory, components and inspection/calibration
- 24.9 Compass systems - Theory, components and inspection
- 24.10 TCAS - Theory, construction and inspection

### **25.0 AUTOFLIGHT SYSTEMS**

- 25.1 Autopilot systems - Theory, components and inspection
- 25.2 Flight Management Computer System - Theory, components and inspection
- 25.3 Autothrottle and thrust management systems - Theory, components and operation
- 25.4 Automatic landing system - Theory, components and operation
- 25.5 Mach trim system - Theory, components and inspection

### **26.0 ELECTRICAL SYSTEMS**

- 26.1 Safety procedures around electrical equipment - Theory and application
- 26.2 DC generation – Theory and application
- 26.3 AC generation – Theory and application
- 26.4 Batteries, nicad and lead acid – Theory, application and maintenance
- 26.5 Power distribution - Theory and application
- 26.6 Digital integrated circuits - Theory and application
- 26.7 Aircraft electrical systems – Troubleshooting and repair
- 26.8 Aircraft electrical systems - Wiring diagram interpretation
- 26.9 Starter generator - Theory and application

### **27.0 RECORDING AND EMERGENCY SYSTEMS**

- 27.1 Cockpit Voice Recorder (CVR) - Theory, components and inspection/test
- 27.2 Flight Data Recorder (FDR) - Theory, components and inspection/test
- 27.3 Emergency Locator Transmitter - Theory, components and inspection/test
- 27.4 Underwater Location Device (ULD) - Theory, components and inspection/test

### **28.0 INSTRUMENT SYSTEMS**

- 28.0 Flight instruments - Theory, construction and inspection
- 28.1 Air Data Computer - Theory, construction and inspection

## **STUDY AND REFERENCE GUIDE**

### **“S” RATING TECHNICAL EXAMINATIONS**

The topics contained in this section of the guide are applicable to the SPS - Standard Practices Structures examination for the S rating.

#### **1.0 STANDARD PRACTICES**

- 1.1 Safety practices
- 1.2 Gas laws and fluid mechanics - Theory and application
- 1.3 Properties of the atmosphere - Pressure, humidity, density characteristics
- 1.4 Properties of solids and liquids - Theory and application
- 1.5 Velocity, acceleration, mass and force - Theory and calculation
- 1.6 Heat, temperature, heat transfer and measurement - Calculation
- 1.7 Work, energy and power - Theory and calculation
- 1.8 Aircraft electrical wiring - Types, characteristics, wire sizes
- 1.9 Aircraft grounding and bonding - Theory and calculation
- 1.10 Instrument panel layout and instrument mounting - Theory and application
- 1.11 Flight control systems - Theory and application
- 1.12 Propulsion systems - Theory and application
- 1.13 Hydraulic systems - Theory and application
- 1.14 Pneumatic systems - Theory and application
- 1.15 Landing gear systems - Theory and application
- 1.16 Environmental systems - Theory and application
- 1.17 Fire protection systems - Theory and application
- 1.18 Safety wiring (lockwiring) procedures
- 1.19 Welding techniques - Theory and application
- 1.20 ATA Specification 100 - Chapters relevant to maintenance aviation maintenance

#### **2.0 AERODYNAMICS**

- 2.1 Aircraft structures and theory of flight - Fixed wing aircraft
- 2.2 Aircraft structures and theory of flight - Rotary wing aircraft

#### **3.0 MATHEMATICS / PHYSICS**

- 3.1 Shop mathematics, graphs and charts - Theory and application
- 3.2 Measurement systems and conversion - Calculation and application
- 3.3 Chemical and physical nature of matter - Theory and application
- 3.4 Stress and strain - Theory and application

#### **4.0 AIRCRAFT HARDWARE**

- 4.1 Specifications and standards - Basic theory and application
- 4.2 Rivets - Identification and use
- 4.3 Threaded fasteners - Identification and use
- 4.4 Special fasteners - Theory and application
- 4.5 Control cables, terminals and turnbuckles - Identification and use
- 4.6 Rigid lines, flexible lines and fittings - characteristics, fabrication, material and size designation
- 4.7 Sealant - Theory and application

#### **5.0 AIRCRAFT DRAWING**

- 5.1 Types of drawings - Application
- 5.2 Interpretation of drawings, diagrams and charts - Theory and application
- 5.3 Station diagrams - Theory and application

## **6.0 WEIGHT AND BALANCE**

- 6.1 *C of G* design limits and range - knowledge and application
- 6.2 Weighing procedures and calculations - knowledge and application

## **7.0 METALURGY AND CORROSION PREVENTION**

- 7.1 Types of corrosion - Identification
- 7.2 Inspection processes - Theory and application
- 7.3 Removal and treatment of corrosion - Theory and application
- 7.4 Heat treatment, annealing and temper designation - Theory and application
- 7.5 Ferrous and non ferrous metals – Types and properties

## **8.0 NONDESTRUCTIVE TESTING**

- 8.1 Inspection techniques - Theory, types and application

## **9.0 GENERAL HANDLING AND SERVICING**

- 9.1 Shop safety - Theory and application
- 9.2 Fire protection - Types, prevention and extinguishing
- 9.3 Safety on the flight line - FOD and hazardous areas
- 9.4 Ground servicing equipment - Theory and application

## **10.0 TOOLS AND MEASURING DEVICES**

- 10.1 Hand tools – Identification and use
- 10.2 Power tools - Identification and use
- 10.2 Measuring devices - Identification and use
- 10.3 Test equipment - Identification and application

## **11.0 AIRCRAFT SHEET METAL, TUBULAR, WOOD AND COMPOSITE STRUCTURES**

- 11.1 Sheet metal materials
- 11.2 Aircraft fabrics
- 11.3 Wood
- 11.4 Plastics, fiberglass and composite materials

## **12.0 MAINTENANCE PROCEDURES**

- 12.1 Inspection and maintenance requirements - Theory and application
- 12.2 Inspections (periodic, annual, progressive, approved maintenance schedules)
- 12.3 Jacking, hoisting and leveling - Theory and application
- 12.4 Basic welding - Theory and application
- 12.5 Rivet layout pattern designs and installation - Theory and application

## **STRUCTURES**

The topics contained in this section of the guide are applicable to the ST - Structures examination for the S rating.

## **13.0 SHEET METAL**

- 13.1 Repairs and fabrication
- 13.2 Assessment methods, techniques and practices - Theory, application and inspection
- 13.3 Repair materials - identification and application

## **14.0 TUBULAR**

- 14.1 Repairs and fabrication
- 14.2 Assessment methods, techniques and practices - Theory, application and inspection
- 14.3 Repair materials - Identification and application

## **15.0 WOOD AND FABRIC**

- 15.1 Repairs and fabrication
- 15.2 Assessment methods, techniques and practices - Theory, application and inspection
- 15.3 Repair materials - Identification and application

## **16.0 COMPOSITE**

- 16.1 Repairs and fabrication
- 16.2 Assessment methods, techniques and practices - Theory, application and inspection
- 16.3 Repair materials - Identification and application

## **17.0 METALURGY AND CORROSION PREVENTION**

- 17.1 Types of corrosion - Identification
- 17.2 Inspection processes - Theory and application
- 17.3 Removal and treatment of corrosion - Theory and application
- 17.4 Heat treatment, annealing and temper designation - Theory and application
- 17.5 Ferrous and non ferrous metals – Types and properties

## **18.0 NONDESTRUCTIVE TESTING**

- 18.1 Inspection techniques - Theory, types and application

## **19.0 FLUID LINES AND CONDUITS**

- 19.1 Rigid lines, flexible lines and fittings - Characteristics, fabrication, material and size designation

## **20.0 THERMOPLASTICS**

- 20.1 Material – Inspection and installation
- 20.2 Storage and surface protection – Theory and application

## Appendix A

### Applicant Feedback

After each examination is written, it will be marked and the candidate will be provided with a "feedback" letter outlining knowledge areas where a candidate is deficient. For example, the letter would state one of the following:

Note: You will need a copy of this publication to decode the numbers shown in example A and B.

#### **EXAMPLE A: WRITTEN EXAMINATION RESULTS:**

Your recently written SPE 001 Examination has been assessed as Pass, 78% and recorded as follows:

Exam Title: AIRCRAFT MAINTENANCE ENGINEER LICENCE -  
STANDARD PRACTICES - E (SPE)  
Date Written: 2002-05-21  
Exam Region: ONTARIO  
Attempt Number: 1

**Examination questions 12.2, 15.1, 15.3, 17.8 & 18.6 which are related to subject areas in TP 14038-E - STUDY AND REFERENCE GUIDE - AIRCRAFT MAINTENANCE ENGINEER LICENCE were answered incorrectly**

You will need a copy of this publication to decode the number shown above.

In addition to the topics identified, a thorough review of all subject areas is recommended. This will ensure that you have covered the required material prior to rewriting, as subsequent examinations may or may not test on the same topics.

You will be eligible to rewrite this examination on or after the following date:

#### **EXAMPLE B: WRITTEN EXAMINATION RESULTS**

Your recently written AF 001 examination has been assessed as Fail, 60% and recorded as follows:

Exam Title: AIRCRAFT MAINTENANCE ENGINEER LICENCE - AIRFRAME  
Date Written: 2002-03-04  
Exam Region: QUEBEC  
Attempt Number: 1

**Examination questions 1.6, 1.8, 2.17, 3.7, 4.12, 5.06, 7.08, 7.09, 11.3, 11.7 which are related to subject areas in TP 14038-E STUDY AND REFERENCE GUIDE - AIRCRAFT MAINTENANCE ENGINEER LICENCE were answered incorrectly.**

You will need a copy of this publication to decode the number shown above.

In addition to the topics identified, a thorough review of all subject areas is recommended. This will ensure that you have covered the required material prior to rewriting, as subsequent examinations may or may not test on the same topics.

You will be eligible to rewrite this examination on or after the following date:

## Appendix B

### 1.1.1.1.1.1.1.1.1 List of suggested reference publications

The following is a list of suggested reference study material which will assist a candidate in the successful completion of all Transport Canada AME technical examinations. However, this reference list should not be interpreted as an absolute list of all reference study material used by Transport Canada.

The latest revision of the following manuals:

A&P Mechanics - General Handbook	AC65-9A
A&P Mechanics - Powerplant Handbook	AC65-12
A&P Mechanics - Airframe Handbook	AC65-15A
Jeppesen	A&P Technician General Textbook
Jeppesen	A&P Technician Powerplant Textbook
Jeppesen	A&P Technician Airframe Textbook
ASA Aviation Maintenance Technician Series	-Dale Crane - General
ASA Aviation Maintenance Technician Series	-Dale Crane - Powerplant
ASA Aviation Maintenance Technician Series	-Dale Crane - Airframe
Aircraft Basic Science	- Kroes /Rardon /Bent/McKinley
Aircraft Maintenance and Repair	- Delp/Bent/McKinley
Aircraft Electricity and Electronics	- Eismin/Bent/McKinley
Aircraft Inspection and Repair	EA-AC 43.13- 1B & 2A
Fundamental of Helicopter Maintenance	EA-HF-2
DC Circuits	EA-DCC
Avionics Fundamentals	EA-AV
Aviation Electronics	EA-352
Electronic Circuit Devices	EA-192-1
Aircraft Radio Systems	EA-356
Basic Electronics and Radio Installation	EA-BEM
Aircraft Electrical Systems - Light & Twin Engine	EA-357
Aircraft Instrument Systems	EA-AIS
Automatic Flight Control - E.H.J. Pallett	
Aircraft Sheet Metal	EA-SM
Aircraft Corrosion Control	EA-CC-1
Aircraft Painting and Finishing	EA-AP-2
Aircraft Bonded Structures	EA-NMR
Aircraft Fabric Covering	EA-ADF
Synthetic Fabric Covering	EA-307
NDT Testing in Aircraft	EA-AP-2
Advanced Composites	EA-358
Standard Aviation Maintenance Handbook	EA-282-0
Aircraft Technical Dictionary	EA-ATD-3
<i>A&amp;P Technician General Textbook</i>	<i>EA-ITP-G2</i>
<i>A&amp;P Technician Powerplant Textbook</i>	<i>EA-ITP-P2</i>
<i>A&amp;P Technician Airframe Textbook</i>	<i>EA-ITP-A2</i>
<i>Aircraft Systems and Components</i>	<i>EA-393</i>
<i>Transport Category Aircraft Systems</i>	<i>EA-363</i>
<i>Aircraft Hydraulic Systems</i>	<i>EA-AH-1</i>
<i>Aircraft Air Conditioning</i>	<i>EA-AAC-1</i>

<i>Aircraft Tires and Tubes</i>	<i>EA-ATT-2</i>
<i>Aircraft Wheels, Brakes&amp;Antiskid Systems</i>	<i>EA-AWB</i>
<i>Aircraft Gas Turbine Powerplants</i>	<i>EA-TEP</i>
<i>Aircraft Reciprocating Engines</i>	<i>EA-ARE</i>
<i>Aircraft Governors</i>	<i>EA-AGV</i>
<i>Aircraft Propeller and Controls</i>	<i>EA-APC</i>
<i>Aircraft Fuel Metering Systems</i>	<i>EA-FMS</i>
<i>Aircraft Ignition and Electrical Power</i>	<i>EA-IGS</i>
<i>The Jet Engine</i>	<i>Rolls-Royce</i>
<i>Aircraft Powerplants</i>	<i>Brent/McKinley</i>
<i>Aircraft Batteries</i>	<i>EA-AB-1</i>
<i>Electrical Systems for A&amp;P</i>	<i>EA-412</i>
<i>Fundamentals of Aircraft Material Factors</i>	<i>EA-340</i>
<i>Intorduction to Flight Test Engineering</i>	<i>EA-225-1</i>
<i>Aircraft Weight and Balance</i>	<i>EA-BAL</i>
<i>Applied Science for the Aircraft Technician</i>	<i>EA-AS</i>
<i>The Best of AMJ Maintenance Tips</i>	<i>EA-341</i>
<i>Aircraft Mechanics Shop Manual</i>	<i>Larry Reighmaier</i>
<i>Aircraft Mechanics Specifications Handbook</i>	<i>Pittsburgh Institute of Technology</i>

Candidates are encouraged to stay abreast of the latest regulatory and technical developments in aviation by learning from as wide a range of aviation publications as possible.