

SAULT COLLEGE
of Applied Arts and Technology
Sault Ste. Marie

COURSE OUTLINE

Navigation

AVT 100-6 b

revised January, 1981

NAVIGATION

AVT 100-6

TEXT:

From the Ground Up -- A.F. MacDonald

Charts - Aeronautical Edition Scale 1:500,000

Charts - World Aeronautical Charts (W.A.C.)

Flying Training Manual -- MOT

VFR Chart Supplement -- MOT

Aeronautical Information Publication - MOT

Navigation Booklet - Sault College

STUDY AND REFERENCE GUIDE:

Sault College Curriculum Directives

Ministry of Transport Study and Reference Guide for Private Pilots Licence

Ministry of Transport Sample Examination for Private Pilots Licence

Ministry of Transport Study Guide for Private Pilots

NAVIGATION
AVT 100-6

GENERAL OBJECTIVE:

To teach in theory and in practice Aviation Technology, with emphasis on study toward the Private Pilot Licence Standard, as required by the Ministry of Transport.

Tool No.	Periods	Topic Description	Reference
1	1	Definitions Form of the Earth Problem Work Sheet	TCU - Air Navigation
2	1	Direction Relative to the True and Magnetic Problem Work Sheet	TCU - Air Navigation
3	1	Magnetism on Earth	TCU - Air Navigation
4	1	Magnetic Compass and Errors Problem Work Sheet	TCU - Air Navigation
5	1	Altitude and Airspeed Problem Work Sheet	TCU - Air Navigation SC Practice
6	1	Review of work to date	TCU - Air Navigation
7	1	Maps and Charts	TCU - Air Navigation SC Practice
8	1	Topographical Maps and Map Reading	TCU - Air Navigation SC Practice
9	1	Triangle of Velocities	TCU - Air Navigation SC Practice
10	3	TCU OR 3 Flight Computer Problem Work Sheet	TCU Computer Operator Manual
11	3	Flight Planner	TCU - Air Navigation
12	1	Mid Term Exam	TCU - Air Navigation
13	3	Navigation Review Cross Country Flight Planning and Navigation General	Study Guide for Private Pilot - N
14	1	Radio Aids to Navigation	TCU - Radio
15	1	FINAL NAVIGATION EXAM	TCU - Radio
16	1	NOT PRIVATE PILOTS WRITTEN EXAMINATION	TCU - Radio

NAVIGATION

AVT 100-6

Topic No.	Periods	Topic Description	Reference
1, 2	1	Definitions Form of the Earth Problem Work Sheet	FGU - Air Navigation SC Precis
3	1	Direction Relative to the Earth True and Magnetic Problem Work Sheet	FGU - Air Navigation
4	1	Magnetism on Earth	FGU - Air Navigation
5	1	Magnetic Compass and Errors Problem Work Sheet	FGU - Air Navigation
6	1	Airspeed and Attitude Problem Work Sheet	FGU - Air Navigation SC Precis
Test	1	Review of work to date	
7	1	Maps and Charts	FGU - Air Navigation SC Precis
8	1	Topographical Maps and Map Reading	FGU - Air Navigation SC Precis
9	1	Triangle of Velocities	FGU - Air Navigation SC Precis
10	3	apr CR 3 Flight Computer Problem Work Sheet	CR Computer Operat Manual
11	3	Flight Planning	FGU - Air Navigation
Test	1	Mid Term Exam	
12	3	Navigation Review Cross Country Flight Planning and Navigation General	Study Guide for Private Pilots - M
13	1	Radio Aids to Navigation	FGU - Radio
Test	1	FINAL NAVIGATION EXAM	
Test	1	MOT PRIVATE PILOTS WRITTEN EXAMINATION	

NAVIGATION
AVT 100-6
First Semester

SPECIFIC OBJECTIVES:

1. Definition: The student is required to know the following definitions -- Great Circle, meridians, prime meridian, equator, parallel of latitude, rhumb line, track, ground speed, heading, airspeed, air position, ground position, drift, wind velocity, isogonall lines agonic line, deviation and bearings

2. Form of the Earth:

The student is required to know:

 - a) Shape of the Earth, the gradical (meridians and parallels) and the nomenclature of specific meridians and parallels;
 - b) Latitude and Longitude in degrees, minutes and seconds, and distance and position associations
 - c) The arc of time, apparent and mean, with reference to time zones; local and greenwich, and their boundaries in Canada specifically, and the world generally.
 - d) Practical problems.

3. Directions relative to the Earth, True and Magnetic:

The student is required to know:

 - a) The compass rose 360 points/degrees;
 - b) Direction on the map, the practical use of the Douglas Protractor and reciprocals;
 - c) The measurement of distance and track angle on Aeronautical Charts;
 - d) The usage of the terms Heading, Track and Bearing;
 - e) The measurement in angle of bearings True or Magnetic and relative True or Magnetic;
 - f) The reference to a great circle, small circle and a rhumb line to current aeronautical charts with reference to straight or curved lines;
 - g) Practical problems.

4. Magnetism on Earth:

The student is required to know:

 - a) The approximate location of magnetic North and the reference to the North and South seeking pole;
 - b) The magnetic meridians resolved vectorally to demonstrate dip;
 - c) The reference to Variation and the magnetic meridian and the true meridian;
 - d) The term "isogonall" and "agonic" lines;
 - e) The reference to residual magnetic error and the term "deviation";
 - f) The aircraft deviation card;
 - g) Practical problems.

5. Magnetic Compass and Errors:

The student is required to know:

- a) The magnetic compass and construction with reference to friction and vibration;
- b) As a result of a practical classroom demonstration, why northerly turning error and acceleration and deceleration error exist;
- c) How and when to read the magnetic compass, the setting of the directional gyro;
- d) The effect of metallic objects and electrical current on the magnetic compass;
- e) Know the make up of the directional gyro, the principal of gyroscopic action and methods of motoring the gyro;
- f) What is meant by real and apparent precession and its application to flight.

6. Airspeed and Altitude Indicators:

The student is required to know:

- a) The construction and theory of pressure measuring devices with reference to the airspeed and altitude indicators;
- b) What dynamic or pitot and static pressure the vents their position and the relation to aircraft instruments;
- c) Standard atmosphere conditions, the temperature and altitude consideration;
- d) The airspeed indicator and errors aligned with the terms indicated, calibrated, rectified, true and equivalent;
- e) The altitude indicator and errors aligned with the terms indicated, calibrated pressure, density, true and absolute;
- f) The computer solution to airspeed and altitude computations;
- g) Practical problems.

7. Maps and Charts:

The student is required to know:

- a) a simple introduction to maps and scaled reproductions.
- b) the basic requirements for maps and charts.
- c) the three basic kinds of charts, cylindrical, conical and azimuthal.
- d) lines on a chart - great circle and rhumb lines.
- e) various types of charts, example Mercator, Lambert Conformal, Transverse Mercator, and Oblique Mercator.
- f) map scales.

8. Topographical Maps and Map Reading:

The student is required to know:

- a) The type of charts used in Canada.
- b) What characteristics a chart should display.
- c) The meaning of aeronautical symbols, Emergency Code and Traffic Control lights - signals.
- d) The location of up-to-date information applicable to aeronautic charts and aeronautical chart symbols.
- e) The usage of the VFR Supplement as well as exposure to the radio facility charts and the IFR Supplement.

9. Triangle of Velocities:

The student is required to know:

- a) The theory and practical application of vectors and definitions.
- b) The conventional symbols - Heading, Track and Wind Direction.
- c) The practical application of Heading, Track and Wind Direction graphically using both the Magnetic and True Compass.
- d) The time and Distance formula as used for DR Navigation
- e) The Max drift formula as used for DR Navigation
- f) The one in sixty rule as used for DR Navigation
- g) And be familiar with the term ground and air position.
- h) What is meant by (WCA) wind correction angle and drift.

10. Introduction and Usage of the Jeppesen CR5 Flight Computer

The student is required to know:

- a) The capability and practical usage of the circular slide rule side of the flight computer including conversions and proportion as applying to formula solved flight problems;
- b) The capability and practical usage of the wind-computing side of the flight computer including all variations variables to information supplied and required;
- c) Practical problems.

11. Flight Planning:

The student is required to know:

- a) The usage of topographical maps and vectors as applies to pre flight planning;
- b) The practical application of types of charts to flight planning including the drawing of the track, distance marks, flaylines, and pinpoints;
- c) The practical application of cruise performance information to flight planning;
- d) The practical application of meterological information to flight planning;
- e) The purpose and reasons for a flight plan/flight notification properly filled out and filed with ATC.

12. Navigation Review -- Cross Country Flight Planning and Navigation General from the Study Guide for Private Pilots - MOT:

The student is required to know:

- a) Cross country flight planning as a review and requisite to the MOT Private Pilots written examination;
- b) Navigation General as a review and requisite to the MOT Private pilots written examination.

13. Radio Aids to Navigation:

The student is required to know:

- a) Basic theory of radio and frequency range;
- b) The propagation of radio waves;
- c) Types of transceivers in use - Collins King Narco Bendex Cessna;

- d) Types of services available in Canada;
- e) Introduction to the Morse Code and "Q" Code;
- f) Introduction to types of equipment and use:
 - i) ADF
 - ii) Radio Range
 - iii) VAR VOR
 - iv) TACAN VORTAC
 - v) RADAR