ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL THREE

INSTRUCTIONAL GUIDE

SECTION 2

EO M337.02 – DETERMINE A POSITION ON A VISUAL FLIGHT RULES (VFR) NAVIGATIONAL CHART (VNC)

Total Time: 30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-803/PG-001, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Create a list of predetermined coordinates that correspond to airports on the VNC to be used in TP 3.

Create a list of locations to be used in TP 4.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

An interactive lecture was chosen for TPs 1 and 2 to introduce basic air navigation terms.

Demonstration and performance was chosen for TPs 3 and 4 as it allows the instructor to explain and demonstrate determining positions and coordinates while providing an opportunity for the cadet to practice under supervision.

INTRODUCTION

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall have determined a position on a VNC.

IMPORTANCE

It is important for cadets to be able to determine a position on a VNC as this is a transferable skill in any type of navigation which uses maps that have a graticule.

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Teaching point 1 **Explain that the Earth is Divided Into Sections by an Imaginary Grid System Called a Graticule**

Time: 5 min Method: Interactive Lecture

GRATICULE

A graticule is a three-dimensional geometrical pattern of intersecting circles. Envision the black lines on a basketball, or a globe with only the black lines. When applied to the earth, either on a globe or a map, we refer to these intersecting lines as parallels of latitude and meridians of longitude.

Parallels of Latitude

Parallels of latitude are a series of concentric circles, which measure north and south. The baseline for measuring is the equator, which is 0 degrees of latitude. As one travels away from the equator the degree of latitude becomes larger, to a maximum of 90 degrees north or south. The southern borders of Canada's Prairie Provinces lie on the 49th parallel of latitude, and are therefore at 49 degrees north latitude. Latitude is expressed in degrees (°), minutes ('), and seconds ("). Though the terms are similar, latitude is not a measurement of time and is actually related to distance. One minute of latitude is equal to one nautical mile (nm).

Meridians of Longitude

Meridians of longitude are a series of circles, which measure east and west. The baseline for measuring is the prime meridian, which runs north to south through Greenwich, England. The prime meridian is 0 degrees of longitude. As one travels away from the prime meridian the degree of longitude becomes larger, to a maximum of 180 degrees east or west. Many meridians of longitude pass through Canada, with one being made famous by the Tragically Hip song "Hundredth Meridian". Longitude is expressed in degrees (°), minutes ('), and seconds ("). Longitude is not a measurement of time, but there is a relationship between time and longitude.

The Equator

The equator is the only parallel of latitude, which divides the earth into two equal halves. It is expressed as 0 degrees of latitude and is the dividing line between the northern and southern hemispheres.

The Prime Meridian

The prime meridian is one half of a circle, which will divide the earth into two equal halves. The other half is the International Date Line. The prime meridian is expressed as 0 degrees of longitude, while the International Date Line is expressed as 180 degrees of longitude. Both lines divide the earth into the western and eastern hemispheres.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

Q1. What is a graticule?

Q2. Which directions do parallels of latitude measure?

Q3. Which directions do meridians of longitude measure?

ANTICIPATED ANSWERS

A1. A graticule is a three-dimensional geometrical pattern of intersecting circles.

A2. Parallels of latitude measure north and south from the equator.

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A3. Meridians of longitude measure east and west from the prime meridian.

Teaching point 2 **Explain Geographical Coordinates**

Time: 5 min Method: Interactive Lecture

GEOGRAPHICAL COORDINATES

The locations of cities, towns, and airports may be designated by their geographical coordinates. These coordinates express where a parallel of latitude intersects with a meridian of longitude. This is similar in principle to the X-and Y-axis on a graph.

Units of Measurement

Both latitude and longitude use the same units of measurement: degrees, minutes, and seconds. There are 60 seconds in a minute and 60 minutes in a degree. For latitude, this means that one degree is equal to 60 nm.

Sequencing

When expressing geographical coordinates, latitude is always shown first and longitude second. Whenever possible, coordinates should be given in the greatest detail. This means using degrees, minutes and seconds of latitude and longitude. The more precise the coordinates, the easier it will be to find a location.

Examples of coordinates include:

- Penticton Airport: N 49° 27' 47" W 119° 36' 08"
- Red Deer Airport: N 52° 10' 43" W 113° 53' 35"
- St. Jean Airport: N 45° 17' 40" W 73° 16' 52"
- Debert Airport: N 45° 25' 07" W 63° 27' 28"

CONFIRMATION OF TEACHING POINT 2

QUESTIONS

Q1. What are geographical coordinates used for?

Q2. How are geographical coordinates expressed?

Q3. What is an example of a coordinate?

ANTICIPATED ANSWERS

A1. Designating the location of cities, towns, and airports.

A2. Latitude is always shown first, longitude second.

A3. Answers may vary. Use examples in TP 2 as a guide.

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Teaching point 3 **Given a Set of Coordinates, Demonstrate and Have the Cadet Determine the Location of an Airport**

Time: 10 min Method: Demonstration and Performance

ACTIVITY

OBJECTIVE

The objective of this activity is to determine the location of an airport using coordinates.

RESOURCES

- Paper,
- Tape or adhesive putty,
- VNC, and
- Predetermined sets of coordinates for airports.

ACTIVITY LAYOUT

Arrange the classroom so that each pair may work with a VNC.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into pairs.
2. Write three sets of coordinates on the whiteboard and cover them with paper.
3. Distribute one VNC to each pair of cadets.
4. Uncover the first set of coordinates, and demonstrate how to find the airport.
5. Have the cadets find the airport at those coordinates. Assist as necessary.
6. Uncover the second set of coordinates and repeat step five.
7. Uncover the third set of coordinates and repeat step five.

SAFETY

N/A.

CONFIRMATION OF TEACHING POINT 3

The cadets' participation in the locating an airport activity will serve as confirmation of this TP.

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Teaching point 4 **Demonstrate and Have the Cadet Determine the Coordinates of a Given Location on a Map**

Time: 5 min Method: Demonstration and Performance

ACTIVITY

OBJECTIVE

The objective of this activity is to determine the coordinates of a given location on a map.

RESOURCES

- Paper,
- Tape or adhesive putty,
- VNC, and
- Predetermined locations on a map.

ACTIVITY LAYOUT

Arrange the classroom so that each pair may work with a VNC.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into pairs.
2. Write two locations on the whiteboard and cover with paper.
3. Distribute one VNC to each pair of cadets.
4. Choose a location on the map and demonstrate how to determine the coordinates.
5. Uncover the first location. Assist cadets by giving them general directions (eg, trace a line with their fingers northeast of city X).
6. Have the cadets determine the coordinates of that location. Assist as necessary.
7. Uncover the second set of coordinates and repeat step five and six.

SAFETY

N/A.

CONFIRMATION OF TEACHING POINT 4

The cadets' participation in the determining coordinates activity will serve as confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' participation in the activities in TPs 3 and 4 will serve as confirmation of this lesson.

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CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

This EO is assessed IAW Chapter 3, Annex B, Aviation Subjects – Combined Assessment PC.

CLOSING STATEMENT

Determining a location on a map is a very useful skill that cadets may use throughout life, not just in aviation. This skill can transfer to survival, outdoor sports, or travel of any kind.

INSTRUCTOR NOTES/REMARKS

VNCs can be ordered through your Area Cadet Officer (ACO), purchased at a local flight training centre, or ordered online at NavCanada.

EO C337.02 (Practice Air Navigation Skills, Section 4) may be conducted to provide extra practice of the skills learned in this EO.

REFERENCES

C3-116 (ISBN 0-9680390-5-7) MacDonald, A. F., & Peppler, I. L. (2000). *From the Ground Up: Millennium Edition*. Ottawa, ON: Aviation Publishers Co. Limited.

C3-139 (ISBN 0-7715511-5-0) Transport Canada. (1999). *Flight Training Manual: 4th Edition Revised*. Ottawa, ON: Transport Canada.

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