CHAPTER 14
PO 337 – DEMONSTRATE AIR NAVIGATION SKILLS

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL THREE

INSTRUCTIONAL GUIDE

SECTION 1

EO M337.01 – MEASURE DISTANCE ALONG A ROUTE

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 slide of the terms located at Annex A.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

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

Demonstration and performance was chosen for TP 3 as it allows the instructor to explain and demonstrate measuring distances while providing an opportunity for the cadet to practice this skill under supervision.

INTRODUCTION

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall have measured distance along a route.

IMPORTANCE

It is important for cadets to learn to measure distance along a route since it is an important skill in all types of navigation. Cadets may travel and being able to determine the distance between points is important. A cadet who continues with flight training will use this skill during flight planning.

Teaching Point 1 **Define Air Navigation Terms**

Time: 5 min Method: Interactive Lecture

AIR NAVIGATION TERMS

Show the slide of the terms located at Annex A.

There are several key terms that must be understood.

Graticule. A three-dimensional geometrical pattern of intersecting circles. Envision the black lines on a basketball, or a globe with only the black lines.

Latitude. Parallels of latitude are imaginary circles on the earth's surface, which lie parallel to the equator. Latitude measures 90 degrees north and 90 degrees south of the equator. Parallels of latitude make up half of the earth's graticule. Latitude is measured in degrees (°), minutes ('), and seconds (").

Longitude. Meridians of longitude are imaginary circles on the earth's surface, which intersect at the true or geographic poles, and join the poles of the earth together. Longitude measures 180 degrees west and 180 degrees east of the prime meridian (0 degrees), which passes through Greenwich, England. Meridians of longitude make up the other half of the earth's graticule. Longitude is measured in degrees (°), minutes ('), and seconds (").

Nautical Miles. A nautical mile (nm) is 6 080 feet and is the average length of one minute of latitude.

Statute Miles. A statute mile is 5 280 feet.

Scale. Scale on a map is the relationship between a unit of distance on the chart to the distance on the earth that the unit represents. For example, a scale of 1 : 250 means that one inch on the map is equal to 250 inches on the ground.

VNC. A visual flight rules (VFR) navigation chart (VNC) is a chart used primarily for visual navigation, at low altitudes (below 18 000 feet) and slower speeds (less than 300 knots). A VNC has a scale of 1 : 500 000, or one inch to eight miles.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

Q1. What is a graticule?

Q2. How many nautical miles are in one minute of latitude?

Q3. How many feet are in a statute mile?

ANTICIPATED ANSWERS

A1. A three-dimensional geometrical pattern of intersecting circles.

A2. One.

A3. 5 280 feet.

Teaching Point 2 **Identify and Describe Types of Navigation**

Time: 5 min Method: Interactive Lecture

TYPES OF NAVIGATION

There are several methods of navigation used by pilots to find their way from place to place. Four of the more common methods used include:

- pilotage,
- dead reckoning,
- inertial navigation, and
- satellite navigation.

Pilotage. This method of navigation is by reference to landmarks only. This is similar to orienteering.

Dead Reckoning. This method of navigation uses predetermined vectors of wind and true airspeed, precalculated heading and groundspeed, and estimated time of arrival. This is the most common method used by private pilots.

Inertial Navigation. This method of navigation is through use of gyroscopic equipment and electronic computers to provide a continuous display of position. This equipment is built into the aircraft.

Satellite Navigation. This method uses position and guidance systems, which transmit to and receive information from orbiting satellites. The global positioning system (GPS) is the most commonly used satellite system with many new aircraft having complex units built into the instrument panel.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS

Q1. What is pilotage?

Q2. Which is the most common navigation method used by private pilots?

Q3. What is the most commonly used satellite navigation system?

ANTICIPATED ANSWERS

A1. This method is navigation by reference to landmarks only.

A2. Dead reckoning.

A3. GPS.

Teaching Point 3 — **Demonstrate and Have the Cadet Determine the Distance Between Two Predetermined Points Along a Route**

Time: 15 min — Method: Demonstration and Performance

MEASURING DISTANCE

International Civil Aviation Organization (ICAO) Ruler

The ICAO ruler is a simple straight edge with four measuring scales embossed into it. The scale used depends on the type of map and unit of measurement desired. For a VNC, the scale would be 1 : 500 000. Since all distances in aviation are given in nm, this is the measurement used when determining distance.

Place the ruler on the map, with the starting point at zero. Be sure to use the 1 : 500 000 side and the nm scale. Adjust the ruler so that the destination point is on the same edge as the start point, and measure across. The value found on the nm scale is the distance between the two points.

Map Scale

The distance can also be measured using the map scale. On the reverse side of the map legend there is a graduated scale for that map. It will show nm, statute miles, and km. Take a piece of paper and line it up on the map between the two points. Use a pencil to mark where the two points are on the paper. Line the paper up with the graduated scale, on the nm line, and determine the distance. If the distance on the map is greater than the graduated scale, simply mark off the end of the graduated scale on the paper, shift the paper down so that the new mark is set to zero and remeasure. Depending on the length of the route, some basic math may be required as the paper may have to be readjusted.

Remember that the distance between minutes of latitude is one nm. This means that if two points are directly north or south of each other, count up the number of minutes of latitude between them and this equals the distance.

ACTIVITY

OBJECTIVE

The objective of this activity is to determine the distance between two points along a route.

RESOURCES

- ICAO ruler,
- VNC,
- Pencil, and
- Eraser.

ACTIVITY LAYOUT

Desks are to be arranged so that cadets can work in pairs.

ACTIVITY INSTRUCTIONS

1. Distribute one VNC to each pair of cadets.

2. Distribute one ICAO ruler to each pair of cadets.
3. Using two predetermined points, demonstrate to the cadets how to use the ICAO ruler.
4. Provide the cadets with a second set of predetermined points.
5. Have the cadets measure the distance between these two points using the ICAO ruler.
6. Provide the cadets with two more sets of points and allow them to practice.
7. If time permits, demonstrate to the cadets how to measure the distance using the scale of the map.
8. Have the cadets use the scale of the map to determine the distances of the previously used sets of points. Confirm with the results of the ICAO ruler.

SAFETY

N/A.

CONFIRMATION OF TEACHING POINT 3

The cadets' participation in the measuring activity will serve as confirmation of this TP

END OF LESSON CONFIRMATION

The cadets' participation in the activity in TP 3 will serve as confirmation of this EO.

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

Measuring a distance along a route is very useful in aviation as well as other methods of travel. Being aware of scale and knowing how to use that information will ensure efficient trip planning.

INSTRUCTOR NOTES/REMARKS

VNCs and ICAO rulers can be ordered through the Area Cadet Officer (ACO), purchased at a local flight training centre, or ordered online at NavCanada (www.navcanada.ca).

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.

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.

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.

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.

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.

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.

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.

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL THREE

INSTRUCTIONAL GUIDE

SECTION 3

EO C337.01 – OPERATE A RADIO FOR AVIATION TRANSMISSION

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 several scripts using the examples located at Annex B as a guide.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

An in-class activity was chosen for TP 1 as an interactive way to review the phonetic alphabet.

Demonstration and performance was chosen for TPs 2 and 3 as it allows the instructor to explain and demonstrate operating a radio while providing an opportunity for the cadet to practice radio transmissions under supervision.

INTRODUCTION

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall have operated a radio for aviation transmissions.

IMPORTANCE

It is important for cadets to be able to operate a radio for aviation transmissions as it will improve their verbal communication skills and add to their comprehension and enjoyment of familiarization flights.

Teaching Point 1 **Review the Phonetic Alphabet and Numbers**

Time: 5 min Method: In-Class Activity

ACTIVITY

OBJECTIVE

The objective of this activity is to review the phonetic alphabet and numbers.

RESOURCES

N/A.

ACTIVITY LAYOUT

N/A.

ACTIVITY INSTRUCTIONS

1. Write the phonetic alphabet and numbers on the whiteboard or flip chart.
2. Have each cadet spell out their first and last name using the phonetic alphabet.
3. Have each cadet count from 1 to 5 or from 5 to 10 using the phonetic numbers.

SAFETY

N/A.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in the phonetics activity will serve as confirmation of TP 1.

Teaching Point 2 **Explain, Demonstrate and Have the Cadet Practice Operating a Radio to Communicate the Arrival of an Aircraft**

Time: 10 min Method: Demonstration and Performance

Arrival messages are transmitted in order to communicate intentions, clearances and instructions. An airport can be a busy place, with many aircraft arriving and departing in short spans of time. This can cause confusion if proper communication is not practiced.

There are normally four parts to a radio message, including:

1. the call-up,
2. the reply,
3. the message, and
4. the acknowledgement or ending.

All parts of the message should be clear, concise and in phonetics where appropriate.

ACTIVITY

Time: 5 min

OBJECTIVE

The objective of this activity is to demonstrate and have the cadet perform operating a radio to communicate the arrival of an aircraft.

RESOURCES

- Hand-held radio, and
- Script of phrases.

ACTIVITY LAYOUT

Arrange the classroom to facilitate small group work over a short distance.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into pairs.
2. Distribute one radio and a script located at Annex B, page 14B-1 to each cadet.
3. Demonstrate the four parts of a radio message that communicate the arrival of an aircraft.
4. Have the cadets practice operating a radio to communicate the arrival of an aircraft.

SAFETY

N/A.

CONFIRMATION OF TEACHING POINT 2

The cadets' participation in the radio activity for communicating the arrival of an aircraft activity will serve as the confirmation of this TP.

Teaching Point 3 **Explain, Demonstrate and Have the Cadet Practice Operating a Radio to Communicate the Departure of an Aircraft**

Time: 10 min Method: Demonstration and Performance

Departure messages are transmitted in order to communicate intentions, clearances and instructions.

All parts of the message should be clear, concise and in phonetics where appropriate.

ACTIVITY

Time: 5 min

OBJECTIVE

The objective of this activity is to demonstrate and have the cadet perform operating a radio to communicate the departure of an aircraft.

RESOURCES

- Hand-held radio, and
- Script of phrases.

ACTIVITY LAYOUT

Arrange the classroom to facilitate small group work over a small distance.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into pairs.
2. Distribute one radio and a script located at Annex B, page 14B-2 to each cadet.
3. Demonstrate the four parts of a radio message that communicate the departure of an aircraft.
4. Have the cadets practice operating a radio to communicate the departure of an aircraft.

SAFETY

N/A.

CONFIRMATION OF TEACHING POINT 3

The cadets' participation in the operation of a radio for communicating the departure of an aircraft activity will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' participation in the operation of a radio for aviation transmission activities will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

N/A.

CLOSING STATEMENT

Proper communication over the radio is essential. Some messages may contain a large amount of information that must be transmitted in a brief message. This skill will assist in developing effective verbal communication while using a radio.

INSTRUCTOR NOTES/REMARKS

Depending on available resources, this EO may be conducted on the familiarization flying day in cooperation with the Technical Training Establishment (TTE).

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.

C3-182 *Study Guide for the Radiotelephone Operator's Restricted Certificate (Aeronautical)*. (1990). Retrieved October 23, 2007, from http://www.ic.gc.ca/epic/site/smt-gst.nsf/en/sf01397e.html.

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL THREE

INSTRUCTIONAL GUIDE

SECTION 4

EO C337.02 – PRACTICE AIR NAVIGATION SKILLS

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.

Develop a list of points and coordinates for airports to be used in TP 1.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

A practical activity was chosen for this lesson so that the cadets may further develop skills learned in EO M337.01 (Measure Distance Along a Route, Section 1) and EO M337.02 (Determine a Position on a Visual Flight Rules [VFR] Navigational Chart [VNC], Section 2).

INTRODUCTION

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall have practiced air navigation skills.

IMPORTANCE

It is important for cadets to practice air navigation skills as each cadet may find an opportunity to use these skills in any trip planning, whether aviation based or not.

Teaching Point 1 **Practice Air Navigation Skills**

Time: 25 min Method: Practical Activity

The following activities are designed to be conducted concurrently. Some cadets may need to practice measuring distance along a route, while others may need to practice determining position on a Visual Flight Rules (VFR) Navigation Chart (VNC). Determine which cadets need practice with which skill, and then divide the cadets accordingly. Cadets working on different activities may share the same map to lessen the strain on resources.

ACTIVITY

OBJECTIVE

The objective of this activity is to practice measuring distance along a route.

RESOURCES

- Predetermined points,
- VNC,
- International Civil Aviation Organization (ICAO) Ruler,
- Pencil, and
- Eraser.

ACTIVITY LAYOUT

The classroom should be arranged to facilitate individual and group work, depending on the skill level of each cadet.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into pairs based on the activity that they will participate in. Two cadets working on different activities may be paired up to use the same map if needed.
2. Distribute one VNC and one ICAO ruler to each pair of cadets.
3. Using two predetermined points, demonstrate to the cadets how to use the ICAO ruler.
4. Provide the cadets with a second set of predetermined points.
5. Have the cadets measure the distance between these two points using the ICAO ruler.
6. Provide the cadets with two more sets of points and allow them to practice.
7. If time permits, demonstrate to the cadets how to measure the distance using the scale of the map.
8. Have the cadets use the scale of the map to determine the distances of the previously used sets of points. Cross-check with the results of the ICAO ruler.

SAFETY

N/A.

ACTIVITY

OBJECTIVE

The objective of this activity is to practice determining position on a VNC.

RESOURCES

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

ACTIVITY LAYOUT

The classroom should be arranged to facilitate individual and group work, depending on the skill level of each cadet.

ACTIVITY INSTRUCTIONS

1. Write three sets of coordinates on the whiteboard and cover with paper.
2. Divide the cadets into pairs based on the activity that they will participate in. Two cadets working on different activities may be paired up to use the same map if needed.
3. Distribute one VNC to each pair of cadets. Cadets who wish to work independently may still share a map.
4. Uncover the first set of coordinates.
5. Have the cadets find the airport at those coordinates. Assist as necessary.
6. Uncover the second set of coordinates and repeat step four.
7. Uncover the third set of coordinates and repeat step four.

SAFETY

N/A.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in the activities in TP 1 will serve as confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' practicing measuring distance along a route and determining position on a VNC will serve as confirmation of this lesson.

CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

N/A.

CLOSING STATEMENT

Measuring distance and determining position on a map are transferable skills to any other method of travel.

INSTRUCTOR NOTES/REMARKS

This EO is designed to complement EO M337.01 (Measure Distance Along a Route, Section 1) and EO M337.02 (Determine a Position on a Visual Flight Rules [VFR] Navigational Chart [VNC], Section 2) as extra time to practice the skills.

REFERENCES

N/A.

AIR NAVIGATION TERMS

Graticule. A three-dimensional geometrical pattern of intersecting circles. Envision the black lines on a basketball, or a globe with only the black lines.

Latitude. Parallels of latitude are imaginary circles on the earth's surface, which lie parallel to the equator. Latitude measures 90 degrees north and 90 degrees south of the equator. Parallels of latitude make up half of the earth's graticule. Latitude is measured in degrees (°), minutes ('), and seconds (").

Longitude. Meridians of longitude are imaginary circles on the earth's surface, which intersect at the true or geographic poles, and join the poles of the earth together. Longitude measures 180 degrees west and 180 degrees east of the prime meridian (0 degrees), which passes through Greenwich, England. Meridians of longitude make up the other half of the earth's graticule. Longitude is measured in degrees (°), minutes ('), and seconds (").

Nautical Miles. A nautical mile (nm) is 6 080 feet and is the average length of one minute of latitude.

Statute Miles. A statute mile is 5 280 feet.

Scale. Scale on a map is the relationship between a unit of distance on the chart to the distance on the earth that the unit represents. For example, a scale of 1 : 250 means that one inch on the map is equal to 250 inches on the ground.

VNC. A visual flight rules (VFR) navigation chart (VNC) is a chart used primarily for visual navigation, at low altitudes (below 18 000 feet) and slower speeds (less than 300 knots). A VNC has a scale of 1 : 500 000, or one inch to eight miles.

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EXAMPLES OF ARRIVAL AND DEPARTURE COMMUNICATIONS

Arrival

1.	The call-up:	Schefferville Radio This is Piper Foxtrot Alfa Bravo Charlie Over
2.	The reply:	Piper Foxtrot Alfa Bravo Charlie This is Schefferville Radio Go ahead Over
3.	The message:	Schefferville Radio This is Piper Foxtrot Alfa Bravo Charlie Four miles at one thousand Landing Schefferville Over
		Piper Foxtrot Alfa Bravo Charlie This is Schefferville Radio Roger Wind – one six zero at one five Altimeter – two niner niner seven Over
4.	The acknowledgement:	Schefferville Radio This is Piper Foxtrot Alfa Bravo Charlie Roger

Departure

1.	The call-up:	Schefferville Radio This is Piper Foxtrot Alfa Bravo Charlie Over
2.	The reply:	Piper Foxtrot Alfa Bravo Charlie This is Schefferville Radio Go ahead Over
3.	The message:	Schefferville Radio This is Piper Foxtrot Alfa Bravo Charlie Holding short of runway Tree Tree on Alfa Ready for takeoff Over Piper Foxtrot Alfa Bravo Charlie This is Schefferville Radio Proceed at your discretion Wind – three two zero at one zero Over
4.	The acknowledgement:	Schefferville Radio Piper Foxtrot Alfa Bravo Charlie Roger