ROYAL CANADIAN SEA CADETS

PHASE FOUR

INSTRUCTIONAL GUIDE

SECTION 6

EO C423.02 – PLOT A POSITION USING A HORIZONTAL ANGLE FIX

Total Time: 60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-604/PG-001, *Phase Four Qualification Standard and Plan*, 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.

Set up the classroom or training area so that cadets can work in pairs at tables suitable for chartwork.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

A demonstration and performance was chosen for TP 1 as it allows the instructor to explain and demonstrate plotting a horizontal angle fix while providing an opportunity for the cadet to practice the skills under supervision.

A practical activity was chosen for TP 2 as it is an interactive way for the cadets to plot a position on a chart using a horizontal angle fix. This activity contributes to the development of navigation skills in a fun and challenging way.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have plotted a position using a horizontal angle fix.

IMPORTANCE

It is important for cadets to how to plot a horizontal angle fix as it is an accurate way of fixing a position by a visual means. Knowing how to plot a fix ensures the small vessel's safety during navigation.

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Teaching point 1 **Demonstrate and have the cadets plot a position on a chart using a horizontal angle fix.**

Time: 25 min Method: Demonstration and Performance

THE STATION POINTER

The station pointer was invented in 1801 by Joseph Huddart of the United States Navy (USN). It is a simple tool used to fix, or locate a position on a chart when the relative bearings are known between three visible, fixed objects.

This type of fix is called a horizontal angle fix as it uses the difference in the angles between three points. Although it is not frequently used today, it can give a navigator an accurate fix when electronic position equipment or a gyrocompass is not available.

Parts of a Station Pointer

The following parts are found on a station pointer (as illustrated in Figure 1):

1. **Body.** A graduated circle.

2. **Position hole.** A hole in the centre of the body used to mark a position with the point of a pencil.

3. **Index arm.** Centre arm that is fixed to the body with its measurement line oriented to zero degrees on the circle. This arm is also referred to as the zero arm.

4. **Rotating arms.** Two arms, attached at the position hole that rotate freely around the body. The measurement lines on the arms overlay the graduated circle on the body.

5. **Graduated scale.** Marked in degrees around the circumference of the body.

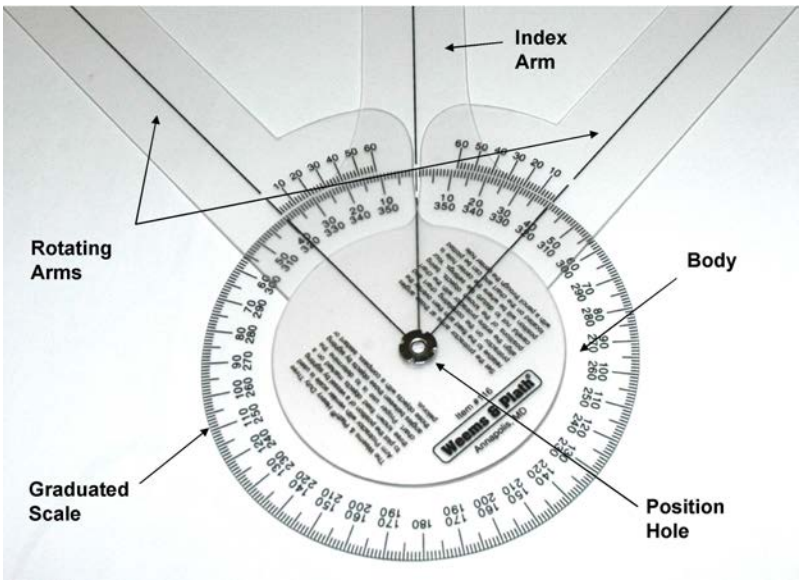

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Figure 1 Parts of a Station Pointer

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To better understand the principles outlined, it is important to know the following terms:

Heading. The direction in which the bow of the small craft is pointing. Headings are expressed in degrees (°)—000 through 360.

Bearing. A line of position sighted from a small craft to another object. Only true bearings can be plotted on charts.

Lines of Position (LOPs). Lines that are plotted on a chart for the bearings taken of objects.

A fix. The intersection of two or more LOPs. While a fix can be made with two LOPs, it is considered more accurate to use three LOPs in every fix. An ideal three-bearing fix should have 60-degree angles between the LOPs.

True bearings are obtained from a gyrocompass. Small craft are not normally fitted with a gyrocompass due to their weight and size.

If taking bearings from a small craft, a handheld magnetic compass may be used to obtain the bearings. However, these bearings must be converted to true bearings before plotting them on a chart.



Throughout this TP, all bearings given in examples and exercises are to be considered true bearings.

HORIZONTAL ANGLE FIX

For the steps listed below, a magnetic compass is used. However, any navigational instrument that measures a bearing of an object can be used.

Use the following directions to plot a position on a chart using a station pointer:

1. Identify three visible, fixed objects that can be found on the chart.

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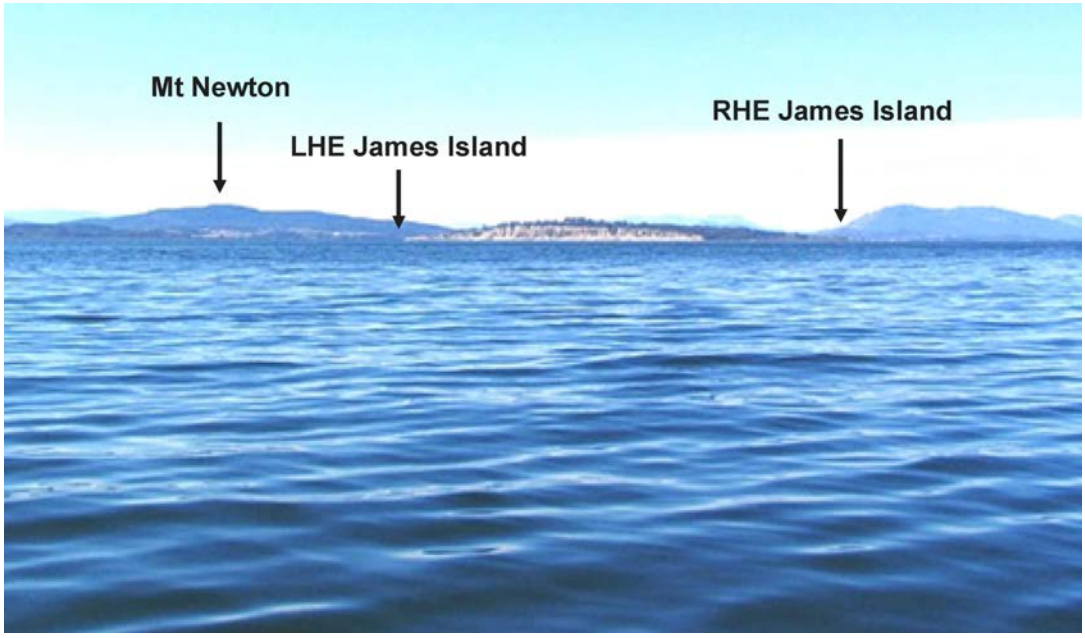

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Figure 2 Horizontal Angle Fix Step 1

2. Using a hand-held compass, measure the bearing to the objects.

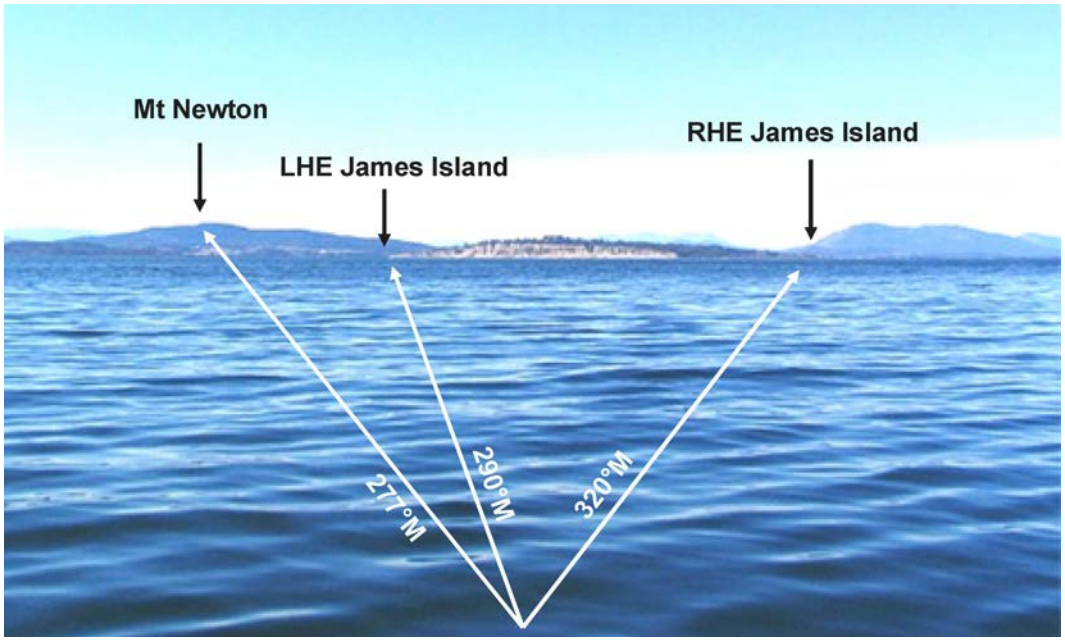

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Figure 3 Horizontal Angle Fix Step 2

3. The angles for the fix will be written as:

Mt. Newton	277°M
LHE James Island	290°M
RHE James Island	320°M

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For the purposes of this TP, the middle bearing will be the index arm of the station pointer.

4. Calculate the two relative bearings between the left and centre and the right and centre objects. These are known as the horizontal angles.

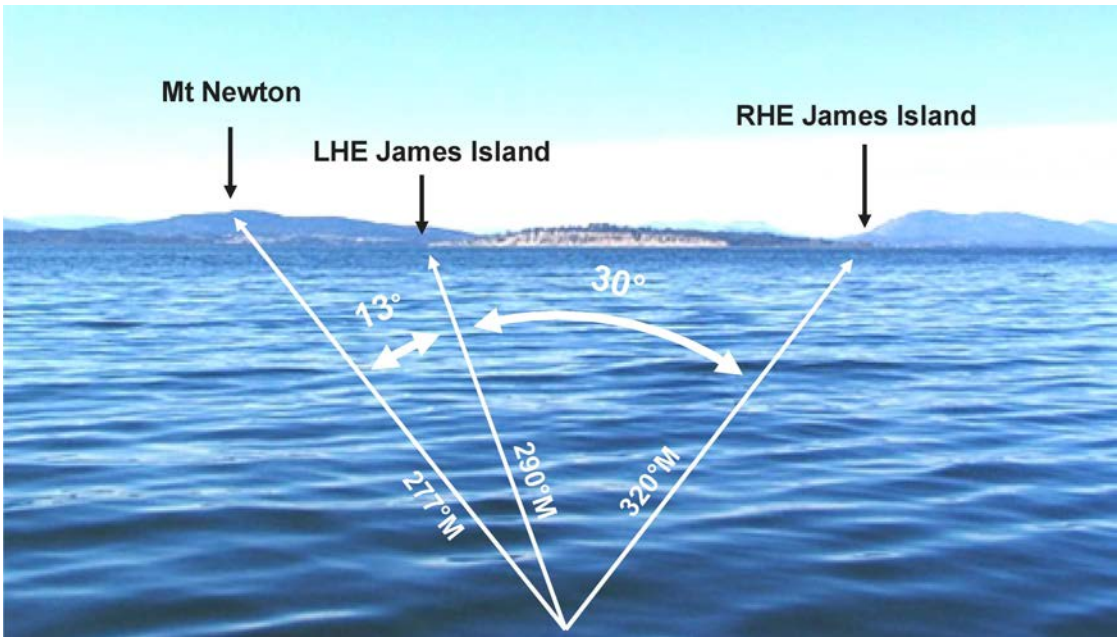

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Figure 4 Horizontal Angle Fix Step 4

5. Set the rotating arms of the station pointer to the relative bearings, calculated in Step 4, using the graduated scale.

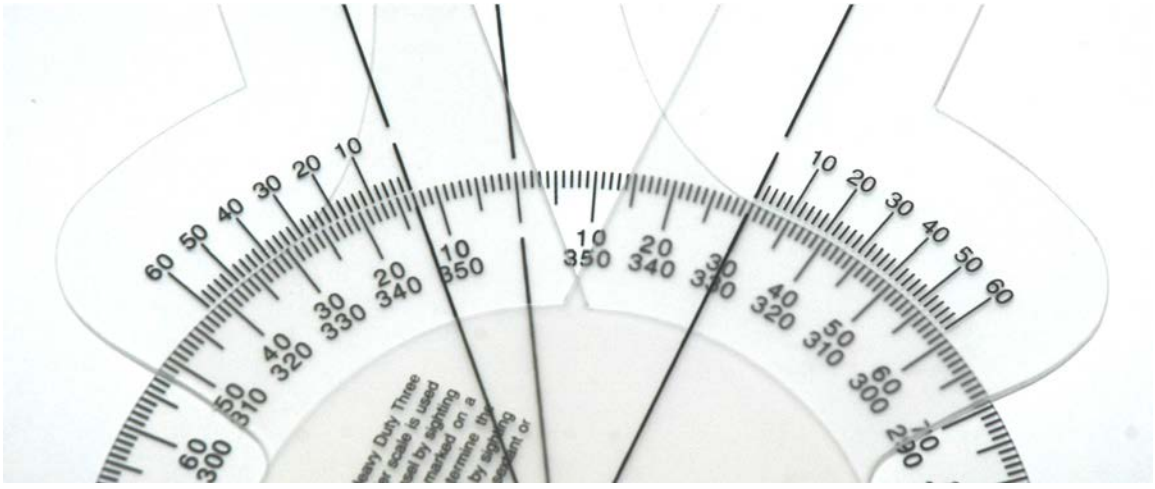

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Figure 5 Horizontal Angle Fix Step 5

6. Place the station pointer on the chart with the index arm passing through the centre object.

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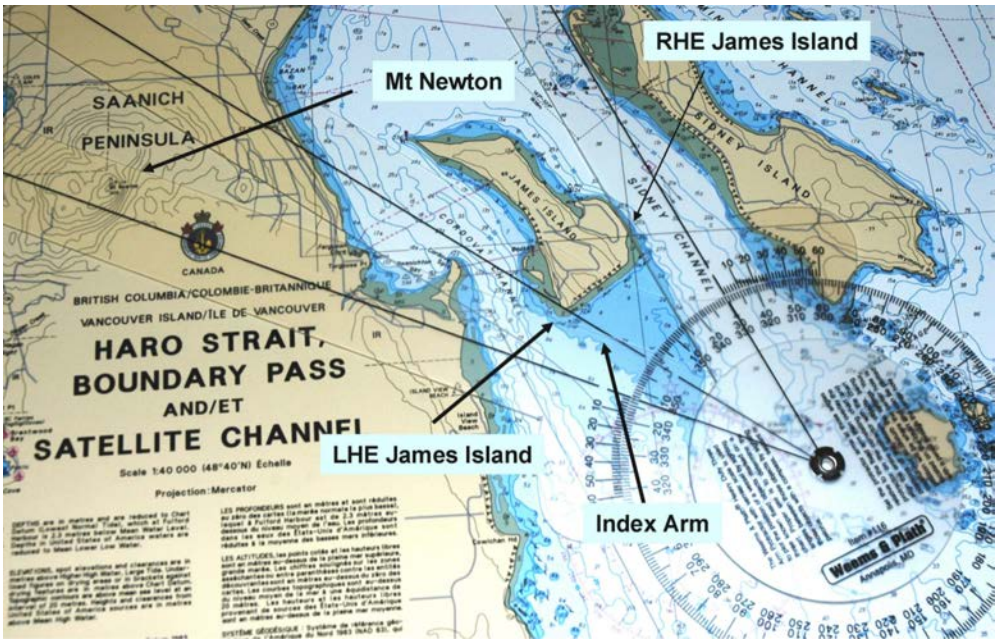

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Figure 6 Horizontal Angle Fix Step 6

7. Slowly move the station pointer until all three arms are aligned with the three objects.

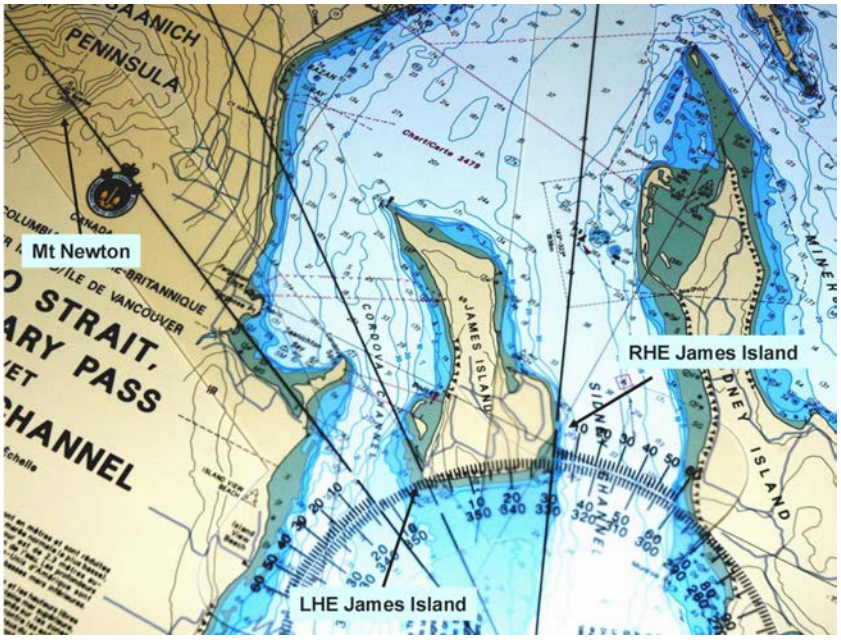

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Figure 7 Horizontal Angle Fix Step 7

8. Using the point of a pencil, mark the position on the chart through the position hole.

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Figure 8 Horizontal Angle Fix Step 8

9. Draw a small circle around the pencil mark and label the fix with 'HA' and the time.

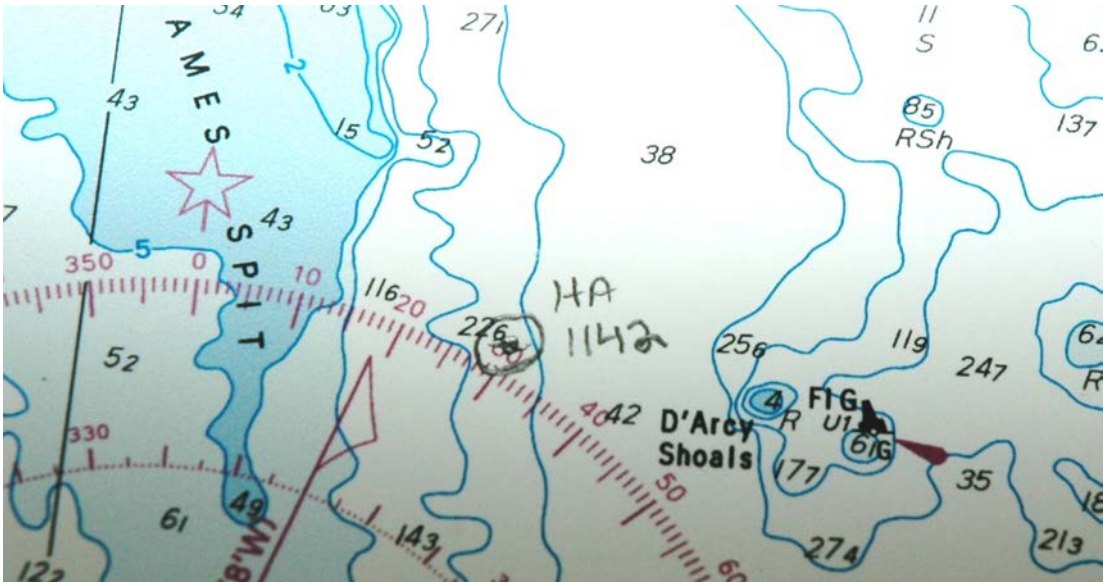

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Figure 9 Horizontal Angle Fix Step 9

The fix is labelled with 'HA' to describe that the fix was obtained using horizontal angles.

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CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. What is the label for a horizontal angle fix?

Q2. How many bearings are taken for a horizontal angle fix?

Q3. What do LHE and RHE mean?

ANTICIPATED ANSWERS:

A1. HA.

A2. Three.

A3. Left-hand edge and right-hand edge.

Teaching point 2 — **Conduct an activity where the cadets will plot positions on a chart using Horizontal Angle fixes.**

Time: 25 min — Method: Practical Activity

ACTIVITY

OBJECTIVE

The objective of this activity is to familiarize the cadets with using LOPs to plot a position using a Horizontal Angle fix.

RESOURCES

- *Chart 3441 Haro Strait, Boundary Pass and / et Satellite Channel*, and
- Navigation Instruments.

ACTIVITY LAYOUT

1. Place *Chart 3441* and navigation instruments on each table.
2. Have cadets sit in pairs at the tables.

ACTIVITY INSTRUCTIONS

Have the cadets calculate the relative bearings and plot the following horizontal angle fixes (the middle bearing will be the index arm):

	Hay Pt.	300°		Arachne Rf Light	230°
1100	Turn Pt. light	340°	1130	Canoe Rk. light	250°
	Wallace Pt.	358°		Beaver Pt. light	280°
	Turn Pt. light	137°			
1200	Tom Pt. light	197°			
	Arachne Rf. light	247°			

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To check the cadets work, the fixes are located at:

1100–Next to 243 degree mark on the compass rose.

1130–In south-bound traffic lane southwest of Gowlland Pt.

1200–Just north of 300 m contour in Swanson Channel.

SAFETY

Nil.

CONFIRMATION OF TEACHING POINT 2

The cadets' completion of the activity will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' completion of the activity will serve as the confirmation of this lesson

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Locating a position on a chart is an important skill that can be used when navigating a small craft.

INSTRUCTOR NOTES / REMARKS

This lesson requires the use of a station pointer, which is a navigation instrument that the cadets have not been introduced to previously.

REFERENCES

C1-164 C-57-007-002/AF-001 Royal Navy. (1987). *Admiralty manual of navigation* (Vol. 1). (Rev. 1987). London, England: Her Majesty's Stationery Office.

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