ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL TWO

INSTRUCTIONAL GUIDE

SECTION 1

EO M260.01 – EXPLAIN ASPECTS OF AIR TRAFFIC CONTROL (ATC)

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-802/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.

Photocopy flash cards located at Annex A. Paste flash cards with light signals on one side of the card and light signal commands on the reverse (e.g. 1-2, 3-4, 5-6, etc.).

Photocopy NORDO light signals matching activity located at Annex B for each cadet.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

An interactive lecture was chosen for this lesson to orient the cadets to ATC, to give an overview of it, and to generate an interest.

INTRODUCTION

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall be expected to have participated in a discussion on ATC.

IMPORTANCE

It is important for cadets to understand the role of ATC at an aerodrome. This lesson will assist in stimulating the cadets' interest in aerospace activities which may lead to future summer training opportunities in the Air Cadet Program.

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Teaching point 1 **Explain the Role of an Air Traffic Controller at an Aerodrome**

Time: 10 min Method: Interactive Lecture

Aerodrome. Any area of land or water designed for the arrival, departure, movement and servicing of aircraft. It includes buildings, installations, and equipment situated therein.

Airport. Any aerodrome with an airport certificate. Some airports are designated "international airports" to support international commercial air transport. An airport certificate testifies that the aerodrome meets airport certification safety standards.

The Role of the Air Traffic Controller

The ATC system is a vast network of people and equipment that ensures the safe operation of commercial and private aircraft.

The air traffic controller's' immediate concern is safety, but controllers must also direct planes efficiently to minimize delays. Their main responsibility is to organize the flow of aircraft into and out of the aerodrome.

Air traffic controllers coordinate the movement of air traffic to make certain that planes stay a safe distance apart. They prevent collisions between:

- aircraft,
- aircraft and obstructions, and
- aircraft and vehicles on the manoeuvring area.

In addition, air traffic controllers keep pilots informed about changes in weather conditions such as wind shear, a sudden change in the velocity or direction of the wind that can cause the pilot to lose control of the aircraft.

ATC Authorization

An ATC clearance is an authorization from an ATC unit for an aircraft to proceed within controlled airspace under specific conditions. Some air traffic controllers regulate traffic through designated airspaces; others regulate airport arrivals and departures.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

Q1. What is the air traffic controller's immediate concern?

Q2. What are the three main things that air traffic controllers prevent collisions between?

Q3. What is an ATC clearance?

ANTICIPATED ANSWERS

A1. The air traffic controller's' immediate concern is safety.

A2. Air traffic controllers prevent collisions between:

- aircraft,

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- aircraft and obstructions, and
- aircraft and vehicles on the manoeuvring area.

A3. An ATC clearance is an authorization from an ATC unit for an aircraft to proceed within controlled airspace under specific conditions.

Teaching point 2 **Provide a Basic Overview of Radar Technology Used in ATC**

Time: 5 min Method: Interactive Lecture

RADAR

The name “RADAR” is an abbreviation for “radio detection and ranging”. To operate, radar requires a highly directional radio transmitter/antenna and a scope, or screen, to display the information received by the antenna.

The principle uses of radar in aviation are:

- ATC;
- fixing positions of airplanes in flight;
- detecting thunderstorm activity; and
- approaching and landing guidance to airplanes.

The use of radar in ATC greatly increases the utilization of the airspace and permits expansion of flight information services such as traffic and weather information and navigational assistance.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS

Q1. What does the abbreviation “RADAR” mean?

Q2. What are the principle uses of radar in aviation?

Q3. What does the use of radar in ATC increase?

ANTICIPATED ANSWERS

A1. “RADAR” is an abbreviation for “radio detection and ranging.”

A2. The principle uses of radar in aviation are:

- ATC;
- fixing positions of airplanes in flight;
- detecting thunderstorm activity; and
- approaching and landing guidance to airplanes.

A3. The use of radar in ATC increases the utilization of the airspace.

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Teaching point 3 **Explain NORDO (Without Radio) Procedures at a Controlled Airport**

Time: 10 min Method: In-Class Activity

NORDO

Aircraft without radio (NORDO) are not permitted to operate at most large controlled airports served by the scheduled air carriers. Where they are permitted to operate (less busy controlled airports), they are directed by visual signals. A pilot must be alert to the light signals from the tower letting you know what to do.

Prior to initiating a NORDO flight, the pilot should contact the control tower to inform the controllers of their intentions and to secure a clearance for operation within the airspace. The tower will then be expecting the pilot and will be prepared to give the pilot light signals.

AUTHORIZED LIGHT SIGNALS (DEPARTING AIRCRAFT)

Flashing Green. Cleared to taxi.

Steady Green. Cleared for take-off.

Flashing Red. Taxi clear of runway in use.

Steady Red Light. Stop.

Flashing White. Return to starting point on airport.

Blinking Runway Lights. Vehicle and pedestrians are to vacate the runway immediately.

AUTHORIZED LIGHT SIGNALS (ARRIVING AIRCRAFT)

Steady Green Light. Clear to land.

Steady Red Light or Red Flare. Do not land. Continue in circuit. Avoid making sharp turns, climbing or diving after you receive the signal.

Flashing Green Light. Recall signal. Return for landing (usually to recall an airplane which has taken off or has been previously waved off with a red light). This will be followed by a steady green light when the approach path and landing area is clear.

Alternating Red and Green Light (U.S.). Danger. Be on alert. This signal may be used to warn you of such hazards as danger of collision, obstruction, soft field, ice on runways, mechanical failure of your undercarriage, etc. The danger signal is not a prohibitive signal and will be followed by a red or green light as circumstances warrant.

Flashing Red Light. Airport unsafe. Do not land.

Red Pyrotechnical Light. The firing of a red pyrotechnical light, whether by day or night and notwithstanding any previous instruction means “Do not land for the time being”.

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ACTIVITY

Time: 5 min



Choose one activity from the following.

Cadets will use flash cards and state the correct command for the appropriate light signal on the flash card, or they will complete the NORDO signal handout by matching the light signal to the appropriate command.

OBJECTIVE

The objective of this activity is to familiarize the cadets with light signals used in NORDO communication.

RESOURCES

Flash cards located at Annex A.

ACTIVITY LAYOUT

N/A.

ACTIVITY INSTRUCTIONS

1. Request a volunteer to stand in front of the class and select a flash card.

2. Once the cadet has selected the flash card ask them to confirm the answer on the back and hold up the flash card to the front of the class.

3. The class must determine the correct command of the light signal.

4. Once the class determines the command of the light signal. Have another volunteer come to the front of the class and select a flash card and repeat the activity.

SAFETY

N/A.

ACTIVITY

Time: 5 min

OBJECTIVE

The objective of this activity is to familiarize the cadets with light signals used in NORDO communication.

RESOURCES

Handout located at Annex B.

ACTIVITY LAYOUT

N/A.

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ACTIVITY INSTRUCTIONS

1. Distribute the NORDO Signals located at Annex B to each cadet.
2. Allow the cadets 4 min to match the light signals to the correct command.
3. Verify the correct answers with the cadets.

SAFETY

N/A.

CONFIRMATION OF TEACHING POINT 3

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

END OF LESSON CONFIRMATION

The cadets' participation in the NORDO communication activity will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

N/A.

CLOSING STATEMENT

Participating in a discussion on ATC will help the cadet learn about ATC and gain an appreciation of the role ATC plays in an aerodrome. Stimulating the cadets' interest in aerospace activities may lead to future summer training opportunities in the Air Cadet Program.

INSTRUCTOR NOTES/REMARKS

N/A.

REFERENCES

C3-096 (ISBN 1715-7382) Transport Canada. (2006). *Aeronautical Information Manual.* Ottawa, ON: Her Majesty the Queen in Right of Canada.

C3-097 U.S. Department of Labour. (2007). *Air Traffic Controllers.* Retrieved 9 February 2007, from http://www.bls.gov/oco/ocos108.htm.

C3-116 A-CR-CCP-263/PT-001/(ISBN 0-9680390-5-7) MacDonald, A. F. and Peppler, I. L. (2000). *From the Ground Up: Millennium Edition.* Ottawa, ON: Aviation Publishers Co. Ltd.

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LIGHT SIGNALS/COMMANDS FLASH CARDS

FLASHING GREEN

(DEPARTING AIRCRAFT)

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Cleared to taxi.

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STEADY GREEN
(DEPARTING AIRCRAFT)

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Cleared for take-off.

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FLASHING RED
(DEPARTING AIRCRAFT)

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Taxi clear of runway in use.

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STEADY RED
(DEPARTING AIRCRAFT)

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Stop.

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FLASHING WHITE
(DEPARTING AIRCRAFT)

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Return to starting point on airport.

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BLINKING RUNWAY LIGHTS (DEPARTING AIRCRAFT)

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Vehicle and pedestrians are to vacate the runway immediately.

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STEADY GREEN LIGHT (ARRIVING AIRCRAFT)

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Clear to land.

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STEADY RED LIGHT OR RED FLARE (ARRIVING AIRCRAFT)

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Do not land. Continue in circuit. Avoid making sharp turns, climbing or diving after you receive the signal.

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FLASHING GREEN LIGHT (ARRIVING AIRCRAFT)

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Recall signal. Return for landing.
(Usually to recall an airplane which has taken off or has been previously waved off with a red light).

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ALTERNATING RED AND GREEN LIGHT (U.S.)

(ARRIVING AIRCRAFT)

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Danger. Be on alert. This signal may be used to warn you of such hazards as danger of collision, obstruction, soft field, ice on runways, mechanical failure of your undercarriage, etc.

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FLASHING RED LIGHT (ARRIVING AIRCRAFT)

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Airport unsafe. Do not land.

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RED PYROTECHNICAL LIGHT

(ARRIVING AIRCRAFT)

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The firing of a red pyrotechnical light, whether by day or night and notwithstanding any previous instruction means “Do not land for the time being”.

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NORDO SIGNALS

Match the NORDO Signal to the correct command.

DEPARTING AIRCRAFT 1. Flashing green. 2. Steady green. 3. Flashing red. 4. Steady red light. 5. Flashing white. 6. Blinking runway lights. **ARRIVING AIRCRAFT** 7. Steady green light. 8. Steady red light or red flare. 9. Flashing green light. 10. Alternating red and green light (U.S.). 11. Flashing red light. 12. Red pyrotechnical light.	a. _____ Danger. Be on alert. This signal may be used to warn you of such hazards as danger of collision, obstruction, soft field, ice on runways, mechanical failure of your undercarriage, etc. The danger signal is not a prohibitive signal and will be followed by a red or green light as circumstances warrant. b. _____ Cleared to taxi. c. _____ The firing of a red pyrotechnical light, whether by day or night and notwithstanding any previous instruction means, “Do not land for the time being”. d. _____ Taxi clear of runway in use. e. _____ Vehicle and pedestrians are to vacate the runway immediately. f. _____ Stop. g. _____ Return to starting point on airport. h. _____ Clear to land. i. _____ Do not land. Continue in circuit. Avoid making sharp turns, climbing or diving after you receive the signal. j. _____ Airport unsafe. Do not land. k. _____ Cleared for take-off. l. _____ Recall signal. Return for landing (usually to recall an airplane which has taken off or has been previously waved off with a red light). This will be followed by a steady green light when the approach path and landing area is clear.

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NORDO SIGNALS – INSTRUCTOR ANSWER KEY

1. b
2. k
3. d
4. f
5. g
6. e
7. h
8. i
9. l
10. a
11. j
12. c

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