**ROYAL CANADIAN AIR CADETS**

**PROFICIENCY LEVEL THREE**

**INSTRUCTIONAL GUIDE**

**SECTION 5**

# EO C331.04 – DEMONSTRATE ATTITUDES AND MOVEMENTS IN A FLIGHT SIMULATOR

Total Time: 90 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 scenario for the computer simulator IAW the manual provided with the software. The guidelines for this scenario should be using a local airport, no weather, and a starting altitude of 5 500 feet ASL.

### PRE-LESSON ASSIGNMENT

N/A.

### APPROACH

An interactive lecture was chosen for TPs 1 and 2 to give direction on procedures and present basic or background information about flight simulation.

A simulation was chosen for TP 3 as it is an interactive way to allow the cadet to experience attitudes and movements in a safe, controlled environment. This activity contributes to the development of principles of flight skills and knowledge in a fun and challenging setting.

## INTRODUCTION

### REVIEW

N/A.

### OBJECTIVES

By the end of this lesson the cadet shall be expected to demonstrate attitudes and movements and read pitot static instruments in a flight simulator.

### IMPORTANCE

It is important for cadets to apply this knowledge in a flight simulator to enhance the learning value of attitudes and movements. This will also serve as a solid foundation for any cadet who participates in flight training in the future.



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**Teaching point 1** **Explain Safety Considerations Related to the Location or Design of the Flight Simulator**

Time: 5 min Method: Interactive Lecture



Arrange the cadets so they can hear the safety briefing prior to using the flight simulator.



This briefing is being conducted to pass on safety considerations for use of the flight simulator. The actual content of the briefing will vary by region and squadron based on the squadron's assets, the location of the assets, and other environmental factors. The following should be covered:

- DND regulations concerning the appropriate use of computers, including:
  - CATO 11-07 (Internet Acceptable Use – Cadet Program),
  - DAOD 6001 (Internet),
  - Regional Orders, and
  - Squadron Standing Orders;
- location of the nearest fire exit in case of fire;
- awareness of any moving parts of the simulator; and
- proper entry and exit techniques to avoid damage to assets.

**CONFIRMATION OF TEACHING POINT 1**

Confirmation of this TP will depend on the actual content covered.

**Teaching point 2** **Explain How to Manipulate the Necessary Control Inputs and the Location of Necessary Instruments**

Time: 15 min Method: Interactive Lecture

**CONTROL COLUMN OR YOKE**



Using a control column or yoke in a flight simulator is preferable. Accordingly, the following will need to be adjusted if a control column is used instead.

The control yoke is located directly in front of the pilot in the centre of the pilot's side of the instrument panel. The control yoke is very much like the steering wheel of a car, both in look and function. The yoke is designed to move on two planes of motion.



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The first plane of motion is left and right. The standard yoke will usually move to approximately 45 degrees left or right of centre when moved like a steering wheel. This motion is what controls the ailerons of the simulated airplane. To roll left, turn the wheel left. To roll right, turn the wheel right. Remember, this must be used as well as the rudder in order to properly turn the aircraft.

The control yoke also moves back and forth. The steering column of the yoke moves in and out of the main assembly. This controls the elevator of the simulated aircraft. To pitch up, pull back (towards the pilot). To pitch down, push forward (away from the pilot).



Pitch will change your altitude, but more importantly your airspeed.

**RUDDER PEDALS**

On the floor of the simulator there are two pedals. If you push forward on the left pedal, the right one moves back and vice versa. These pedals control the rudder of the simulated aircraft. To yaw left, push on the left pedal. To yaw right, push on the right pedal.



Rudder pedals move in different directions so pressure must be taken off the opposite pedal in order for the movement to take place.

**LOCATION OF INSTRUMENTS**

The instruments of the simulated aircraft will be displayed in front of the pilot, laid out on what is called an instrument panel. The three instruments that are of significance are the pitot static instruments: the airspeed indicator (ASI), vertical speed indicator (VSI), and altimeter. They are usually located just above the control yoke in a cluster of six instruments.

**ASI.** The ASI is located on the top row of the instrument panel on the far left.

**VSI.** The VSI is located on the bottom row of the instrument panel on the far right.

**Altimeter.** The altimeter is located on the top row of the instrument panel on the far right, just above the VSI.



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*"Design a Virtual Cockpit Instrument Panel", Ngee Ann Polytechnic, 2007. Retrieved October 31, 2007, from http://www.learnerstogether.net/avionics-project-design-problem-based-learning/56*

Figure 1 Cessna Flight Instrument Panel




There is no need to go in to any detail about the other three instruments located in the diagram.

## CONFIRMATION OF TEACHING POINT 2

### QUESTIONS

Q1. Where is the control yoke located?

Q2. Where are the pitot static instruments located?

Q3. How is pitch controlled?

### ANTICIPATED ANSWERS

A1. In front of the pilot centred on the instrument panel.

A2. Clustered together, just above the control yoke.

A3. By moving the yoke towards or away from the pilot.



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**Teaching point 3** **Supervise the Cadets as They Practice Attitudes and Movements Using the Flight Simulator**

Time: 60 min Method: Simulation

## ACTIVITY

### OBJECTIVE

The objective of this activity is to allow the cadet to practice attitudes and movements and witness their effect on the pitot static instruments.

### RESOURCES

- Computer flight simulator (Microsoft flight simulator, computer, control yoke, and rudder pedals), and
- Scenario using local airport, no weather, and a starting altitude of 5 500 feet ASL.

### ACTIVITY LAYOUT

This will depend on the location of the simulator.

### ACTIVITY INSTRUCTIONS

1. Start the simulator with the scenario created prior to the lesson.

2. Allow the cadets to take turns in the simulator, practicing attitudes and movements.

3. Each cadet should be given an equal amount of time. This means that the 60 minutes should be divided as evenly as possible by the number of cadets in the class.

4. If a cadet is quickly grasping the concepts, move on to the next cadet. This will allow some flexibility in the event a cadet does not grasp the concepts quickly.

### SAFETY

N/A.

## CONFIRMATION OF TEACHING POINT 3

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

## END OF LESSON CONFIRMATION

The cadets' participation in the flight simulator, practicing attitudes and movements, will serve as confirmation of this lesson.

## CONCLUSION

### HOMEWORK/READING/PRACTICE

N/A.



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## METHOD OF EVALUATION

N/A.

## CLOSING STATEMENT

It has been stated by many flight instructors that a significant difference can be seen in the skill quality of students who used a flight simulator compared to those who did not. The military is a large user of computer-based flight simulators, as are Air Canada and WestJet. Cadets are encouraged to train on flight simulators as it will enhance their preparation for future flight training.

## INSTRUCTOR NOTES/REMARKS

Concurrent activities may be required based on the number of simulators available.

All staff should be familiar with the operation of the flight simulator prior to the EO. This will better prepare them to troubleshoot and instruct.

## REFERENCES

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

C3-156 *Computerized Aircraft Simulation Center*. (2007). Retrieved October 2, 2007, from http://www.regions.cadets.forces.gc.ca/pac/aircad/flight/casc_lessons_e.asp.



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