EO M232.02 – IDENTIFY THE COMPONENTS OF PISTON-POWERED INTERNAL COMBUSTION ENGINES

1. **Performance**: Identify the Components of Piston-Powered Internal Combustion Engines

2. **Conditions**:

   a. Given:

      (1) List of questions and answers at Annex E;

      (2) Coin;

      (3) One large die;

      (4) Coloured poster board;

      (5) Masking tape;

      (6) Supervision; and

      (7) Assistance as required.

   b. Denied: N/A.

   c. Environmental: Suitable classroom facilities or training area large enough to accommodate the entire group.

3. **Standard**: In accordance with specified references, the cadet shall identify the components of piston-powered internal combustion engines, to include:

   a. stationary engine parts;

   b. moving engine parts;

   c. timing system components;

   d. fuel/air delivery components; and

   e. electrical spark distribution system components.

4. **Teaching Points**:

TP	Description	Method	Time	Refs
TP1	Identify and explain the operation of the major components of a piston-powered four-stroke internal combustion engine, to include: a. the cylinder; b. the piston; c. the connecting rod; d. the crankshaft; e. the camshaft; f. the distributor; g. the carburetor; and h. the oil sump.	Interactive Lecture	25 min	C3-116 (pp. 41–71) C3-086

TP	Description	Method	Time	Refs
TP2	Explain that some early aircraft engines used rotary engines in which the cylinders themselves rotated around the central crankshaft. These were different than the later radial engines in which the stationary cylinders were arranged around the rotating crankshaft.	Interactive Lecture	5 min	C3-087
TP3	Describe other piston-powered engine arrangements that have been used in aircraft, to include: a. engines with in-line cylinders; and b. engines with horizontally-opposed cylinders.	Interactive Lecture	10 min	C3-116
TP4	Play a game of piston-powered baseball.	In-Class Activity	15 min	C3-003 (p. 70)

5. **Time**:

a.	Introduction / Conclusion:	5 min
b.	Interactive Lecture:	40 min
c.	In-Class Activity:	15 min
d.	Total:	60 min

6. **Substantiation**:

a. An interactive lecture was chosen for TP1 to TP3 to introduce the components of internal combustion engines and give an overview of them.

b. An in-class activity was chosen for TP4 as it is an interactive way to provoke thought and stimulate interest among cadets.

7. **References**:

a. C3-003 (ISBN 0-943210-44-5) Pike, B. and Busse, C. (1995). *101 More Games for Trainers.* Minneapolis, MN: Lakewood Books.

b. C3-086 NASA Glenn Research Center. *Engines 101.* Retrieved 21 February 2007, from http://www.grc.nasa.gov/WWW/K-12/airplane/icengine.html.

c. C3-087 NASA Glenn Research Center. *Propulsion Index.* Retrieved 21 February 2007, from http://www.grc.nasa.gov/WWW/K-12/airplane/shortp.html.

d. 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. Limited.

8. **Training Aids**: Presentation aids (e.g. whiteboard/flipchart/OHP) appropriate for the classroom/training area.

9. **Learning Aids**: N/A.

10. **Test Details**: N/A.

11. **Remarks**:

    a. It is recommended that the two periods required for this EO be scheduled consecutively.

    b. If a computer and projector are available, software to demonstrate engine operation can be found at the Websites listed under reference para 7c.

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