ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL THREE

INSTRUCTIONAL GUIDE

SECTION 6

EO C370.03 – IDENTIFY BASIC POWER TOOLS USED IN AIRCRAFT MANUFACTURING AND MAINTENANCE

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 slides of figures located at Annexes Q to S.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

An interactive lecture was chosen for TPs 1–3 to identify basic power tools used in aircraft manufacturing and maintenance and to give an overview of them.

An in-class activity was chosen for TP 4 as it is an interactive way to confirm the cadets' comprehension of the material.

INTRODUCTION

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet will have identified basic power tools used in aircraft manufacturing and maintenance.

IMPORTANCE

It is important for the cadets to know about basic power tools used in aircraft manufacturing and maintenance because this will enhance their knowledge of aircraft construction and the aviation maintenance field.

Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

Teaching point 1 **Describe the Characteristics and Methods of Application for Power Hand Tools Used With Aircraft**

Time: 5 min Method: Interactive Lecture

POWER HAND TOOLS

Power hand tools were originally developed to speed up work. However, some hand tools have improved to the point that they allow a novice to produce a degree of precision and excellence that was previously only attainable by expert master craftsmen.

Power hand tools also create safety concerns. Their power allows them to do a lot of damage in a very short time and their power also makes them hard to control. A twisting or reciprocating power tool can easily cause the user to lose their balance when it is first applied to the work piece. This loss of balance can result in damage to the work piece and injuries to the worker.



Show the cadets the slide of each tool at Annex Q, as they are discussed.

Drill. If there were no restrictions on technician's space or movement, there would only need to be one type of drill. However, when working in and around aircraft, drill requirements become more complex, which has given rise to various types and shapes of drills, to include:

- electric,
- pneumatic,
- right angle,
- flexible drive right angle,
- flexible drive straight, and
- long drill bit.

The drills in Figure 17Q-1 look like dentists' tools because the functions are similar. Aircraft construction and maintenance has very confined, hard-to-reach spaces that need to be worked on and worked in.

Electric hand drills can perform a number of tasks. They can drill small round holes using drill bits and they can drill large round holes using hole saw bits. There are many specialty attachments, such as screwdriver bits and sanding disks.

Reciprocating Saw. A reciprocating saw is used to make rough cuts. Reciprocating saw blades are easily replaced. They come in a variety of grades for different materials and cutting speeds. When blades are worn, they are recycled appropriately and replaced.

Sander. A disk sander is used to trim curved cuts in sheet metal, wood or plastic after they have been rough cut. Disks for sanders are easily replaced and they come in a variety of grades and materials for different applications. When worn they are discarded.

Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

Q1. Why are there many different styles of drills?

Q2. What is a reciprocating saw used for?

Q3. What materials can a disk sander be used for?

ANTICIPATED ANSWERS

A1. Drills have to be used in confined, hard-to-reach spaces.

A2. It is used to make rough cuts.

A3. A disk sander can be used on metal, wood or plastic.

Teaching point 2 **Describe the Characteristics and Methods of Application for Shop Equipment Used With Aircraft**

Time: 5 min Method: Interactive Lecture

Aircraft are characterized by smooth curved and rounded streamlined shapes intended to reduce turbulence and drag. To form the skin of the aircraft into these shapes, sheet metals must be formed very carefully. A number of tools have developed, which allow fast, accurate metal cutting and forming.



Sheet metal gauges are numbered so that the thicker materials have lower designation numbers. Therefore, 12 gauge metals are thicker than 24 gauge metals.



Show the cadets the slide of each tool at Annex R, as they are discussed.

FORMING TOOLS

Bar Folding Machine. A bar folding machine is used to bend the edges of relatively light sheet metal stock, up to 22 gauge thickness.

Cornice Brake. Cornice brakes, or leaf brakes as they are sometimes called, are used for bending sheet metal of a wide range of thicknesses, including heavier materials up to 12 gauge.

Slip Roll Former. A slip roll former is used to make gentle bends and to fabricate parts such as contoured fuselage skin.

COMPOUND CURVE TOOLS

Mechanical Compound Curve Tools. Large volumes of smaller compound curve components can be fabricated in a hydropress, which uses a rubber blanket and water pressure to form the component from a carefully shaped die.

Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

Manual Compound Curve Tools. Sandbags and hammers are often used when only one compound curve component is to be formed.

CUTTING TOOLS

Squaring Shear. A squaring shear is used to make straight cuts across sheet metal.

Scroll Shear. Scroll shears are used to make irregular cuts on the inside of a sheet of metal without cutting through to the edge.

Band Saw. A band saw is used for cutting curved lines in metal, wood or plastic. The blade speed can be varied for each material.

Drill Press. A drill press is used to increase accuracy and straightness beyond what a hand-held drill can accomplish.

Lathe. A lathe is used for spinning objects so that they can be cut into a circular shape. A lathe makes circular objects in the way that a drill press makes circular holes.

Rotary Punch Press. A rotary punch press is used to punch holes or make circular cuts in metal parts.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS

Q1. What are scroll shears used for?

Q2. What is another name for a cornice break?

Q3. What are two tools used to make components with compound curves?

ANTICIPATED ANSWERS

A1. Scroll shears are used to make irregular cuts on the inside of a sheet of metal without cutting through to the edge.

A2. A cornice break is also called a leaf break.

A3. A hydropress or a sandbag and hammer can be used for compound curves.

Teaching point 3 — **Describe the Characteristics and Methods of Application for Fastening Tools and Associated Fasteners Used With Aircraft**

Time: 5 min — Method: Interactive Lecture



Show the cadets the slide of each tool at Annex S, as they are discussed.

FASTENING TOOLS

Rivet Gun. Most rivets in aircraft construction are driven by a rivet gun. This is because a rivet gun is fast and can get into tight spaces. However, a rivet gun does less perfect riveting than a compression riveting tool.

Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

Lighter rivet guns are used for placing rivets with small diameter shanks and heavier rivet guns are used for rivets with large shanks.

Rivet Cutter. Rivet cutters have holes for common-size rivet shank diameters. If a rivet is too long for the intended application, the rivet cutter is used to shorten the shank length. To reduce stocking requirements, some shops only stock rivets with long shanks and then cut them to the desired length. A rivet cutter has holes for common shank diameters and leaves that can be selected for the desired shank length.

Bucking Bar. Bucking bars are placed against the opposite end of the rivet from the rivet gun or hammer during the riveting operation. The rivet is flattened between the bucking bar and the hammer or rivet gun. The bucking bar gets its name from the way it bucks, or jumps, on the end of the rivet. There are many shapes and sizes of bucking bars and one of the important challenges of this work begins with the careful selection of the correct bucking bar. It must clear the structure and yet fit perfectly squarely on the end of the rivet.

Squeezer. A squeezer, or compression riveter, is used in place of a rivet gun or hammer. The squeezer is fast and produces a more uniform riveting shape than either hammers or rivet guns, but a squeezer can only operate on easily accessible locations near the edge of the material.

ASSOCIATED FASTENERS

Rivet. Rivets have been used since sheet metal was first used in aircraft construction and they remain the single most common aircraft fastener. Rivets change in dimension to fill their hole during riveting. This makes for a very solid attachment. The rivet part number designation conveys much information, including the style of rivet head, the material it is made from, the shank diameter and the shank length.

CONFIRMATION OF TEACHING POINT 3

QUESTIONS

Q1. What tool places most aircraft rivets?

Q2. What tool is fastest and produces the best rivet shapes?

Q3. How did the bucking bar get its name?

ANTICIPATED ANSWERS

A1. The rivet gun.

A2. The compression riveting tool, sometimes referred to as a squeezer.

A3. Bucking bars are called that because of the way they buck, or jump, during riveting.

Teaching point 4 **Conduct a Tool Identification Activity**

Time: 10 min Method: In-Class Activity

ACTIVITY

OBJECTIVE

The objective of this activity is to give the cadets an opportunity to test their knowledge of basic power tools used in aircraft manufacturing and maintenance.

RESOURCES

Pictures of shop tools located at Annexes Q to S, with titles blocked out (with sticky notes).

Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

ACTIVITY LAYOUT

N/A.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into two teams on opposite sides of the room.
2. Display a picture of a shop tool.
3. Have one team attempt to identify the tool and its use in 10 seconds.
4. Award one point for the tool's name and another for the tool's use.
5. If the first team is unable to name the tool or its use, offer an opportunity to the second team.
6. Award two points for successful tool or application naming by the second team.
7. Alternate the successive pictures and opportunities between the two teams.
8. The team with the most points after 10 minutes is the winner.

SAFETY

N/A.

CONFIRMATION OF TEACHING POINT 4

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

END OF LESSON CONFIRMATION

The cadets' participation in the tool identification activity will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

N/A.

CLOSING STATEMENT

Tools and equipment used in aircraft manufacturing and maintenance have developed over the years to increase the speed of the work to be done and to allow a more consistent product. The variety of these tools presents both a challenge and an opportunity to aviation technicians.

INSTRUCTOR NOTES/REMARKS

N/A.

Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

REFERENCES

C3-136 (ISBN 0-88487-207-6) Sanderson Training Systems. (2001). *A&P Technician Airframe Textbook*. Englewood, CO: Jeppesen Sanderson Inc.

C3-137 (ISBN 0-88487-203-3) Sanderson Training Systems. (2000). *A&P Technician General Textbook*. Englewood, CO: Jeppesen Sanderson Inc.

Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

THIS PAGE INTENTIONALLY LEFT BLANK

Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.