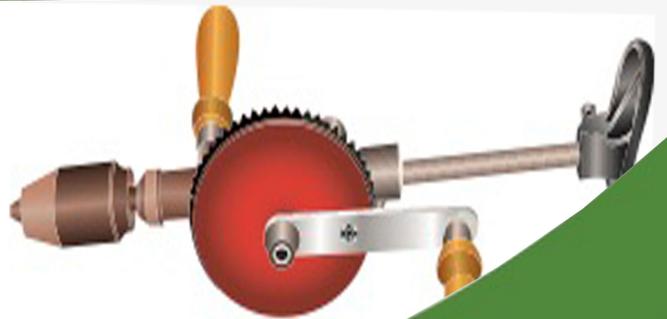
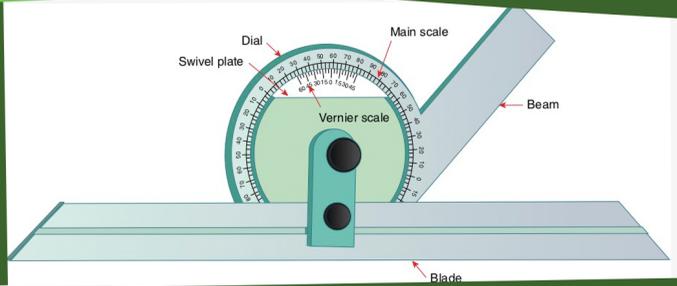
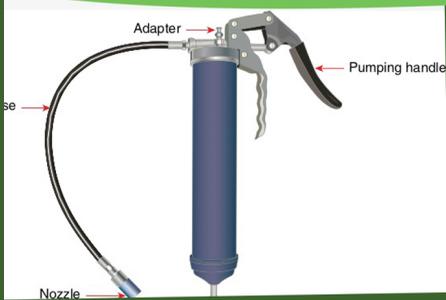


AIRCRAFT TOOLS AND EQUIPMENT

Book 1



PREM MAHENDRANATHAN

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Tools and Equipment

Aircraft maintenance personnels use a wide range of hand and machine tools in their career. A person who desires to become an aircraft mechanic should develop his/her skills to properly select and use appropriate tool for job he/she intended to carry out.

Good understanding of usage and maintenance of tools will help you to complete the task on time with limited or no mistakes.

Whenever you are assigned a job to use tools that you are not familiar with, read the description, illustration, general rules, and maintenance procedure for the tools involved. Practice using the tool few times until you are confident to use.

Do not mishandle or use a wrong tool for the task.

TOOLS

Tools can be classified as hand tools, machine tools, and further classified as power tools, electrical tools and electronic tools

Hand Tools

Following are the common hand tools used for various task:

Hammers

Hammer is mainly used to deliver a blow to an object, usually used to drive nails. The common hammer features a heavy metal head attached to a handle.

Hammers are generally classified based on the type of head and weight. Metal head hammers are the hard ones that are made up of high carbon steels.

Parts of a typical hammer

The typical hammer is made of a wooden handle and metal head.

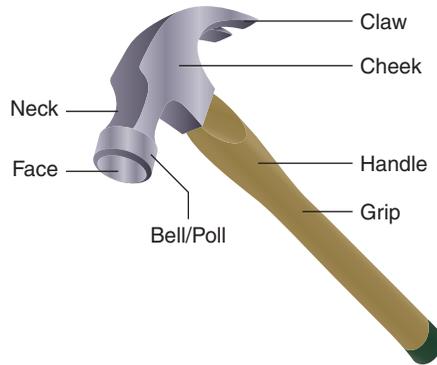


FIGURE 1 Common parts of hammer

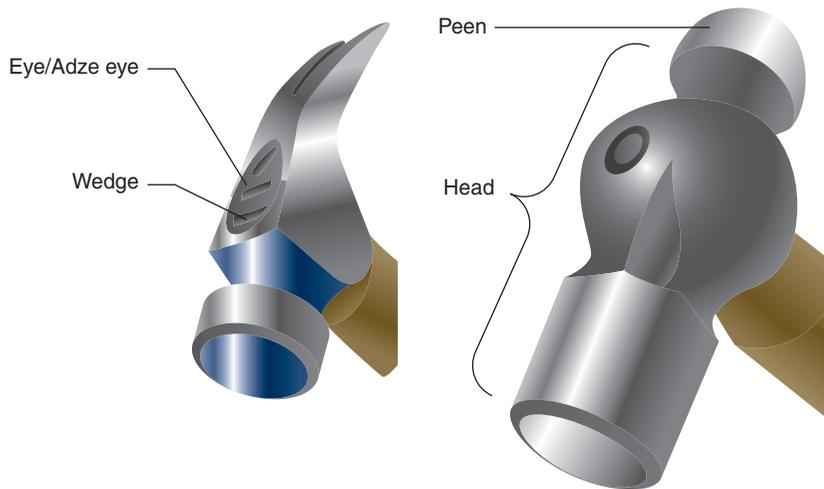


FIGURE 2 Parts of hammer head

Types of Hammer

Claw Hammer: This is the common type and can be used for various tasks such as pounding nails into and extracting nails. The claw is curved and has a V-cut that draws the nails out.



FIGURE 3 Claw hammer

Ball Peen Hammer: This hammer is also known as mechanist's hammer or engineer's hammer. It is a peening hammer with one end shaped like an ordinary hammerhead while the other end is ball shaped. It is mainly used in striking and shaping metals especially in metal fabrication. It is the best choice to set rivets in metal by hand.



FIGURE 4 Ball peen hammer

Cross Peen Hammer: This hammer is used for starting panel pins and tacks, especially for use where the working area access is limited. The

peen is at right angles to the shaft and allows you to tap the nail between your fingers without striking a finger.



FIGURE 5 Cross peen hammer

Straight Peen Hammer: This hammer is mainly used for shaping metal and the peen is in-line with the shaft.

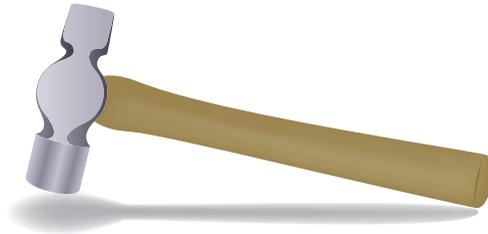


FIGURE 6 Straight peen hammer

Riveting Hammer: This hammer is used for swaging down rivets and beating metal sheets. It has a flat face and a narrow peen.

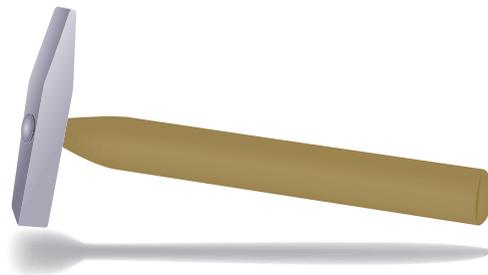


FIGURE 7 Riveting hammer

Nylon Faced Hammer: This hammer is used to deliver blows to the work without causing damage to the surface.

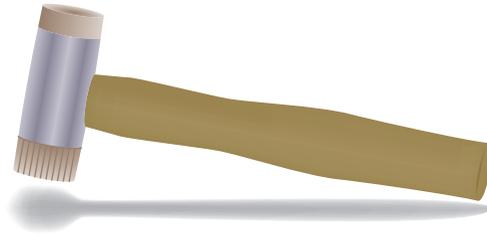


FIGURE 8 Nylon faced hammer

Recommended practices when using a hammer

The following are the aspects that must be ensured when using hammers.

- Always use the correct hammer that is best suited for the job.
- Ensure that the handle is fitted tight.
- Ensure the hammer faces are free from chips and dents.
- Wear safety goggles when using a metal hammer.
- Hold the handle at the farthest position away from the head.
- Use the forearm as an extension of the handle when striking a blow.
- Swing the hammer by bending the elbow, not the wrist.

Mallet

A mallet is a hammer like hand tool with a striking surface made of wood, hickory, hard rubber, plastic or rawhide. These hammers should not be used for striking hard metals, as it will damage the hammerhead. The wooden mallets must be used when pounding a wood chisel.



Screwdrivers

The screwdrivers are used for loosening or tightening screws or screw head bolts. The handles are usually made of wood or plastic. There are different types of screwdrivers available based on its shape, blade type and blade length.

The main types of screwdrivers are given below.

Common Screwdriver: It is a flat bladed type screwdriver and is used only where slotted head screws or fasteners are found on aircraft. The blade is made up of high carbon or alloy steel. The end is ground flat to fit the slot cut in the head of the screw.

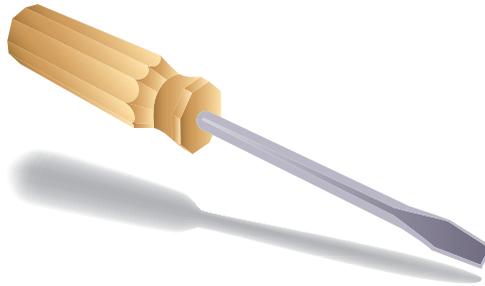


FIGURE 9 Common screwdriver

Ratchet Screwdriver: A useful tool with a user-friendly selection of bits in a screwdriver set. It has a selector that allows the ratchet to be locked and removed.

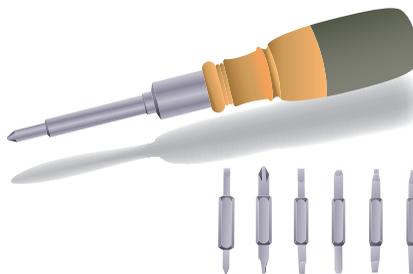


FIGURE 10 Ratchet screwdriver

Pump Screwdriver: It is operated based on the Archimedes principle. When the handle is pumped, the screwdriver turns accordingly.



FIGURE 11 Pump screwdriver

Offset Screwdriver: It has the blade at right angles to the shaft and is used when vertical space is limited. By using alternate ends, most screws can be seated or loosened even when the swinging space is limited.



FIGURE 12 Offset screwdriver

Watchmaker's Screwdriver: It has a long thin blade with a flat plastic handle and used for smaller screws such as in electric work.



FIGURE 13 Watchmaker's screwdriver

Electric Screwdriver: These are usually re-chargeable and are battery-operated. The electric motor can be controlled in such a way it can provide varying speed and torque output. The screw bits are supplied in different shapes and sizes that fit into an adapter.



FIGURE 14 Electric screwdriver

The following are some of the screw heads of commercial screwdrivers available in the market.

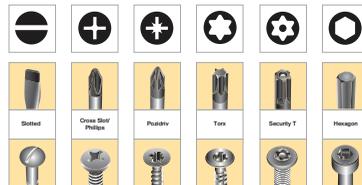


FIGURE 15 Types of screw heads

The following are the aspects that must be ensured when using screwdrivers.

- Always use the correct screwdriver that is best suited for the job.
- All screw slots should be cleared of dirt/paint before applying the screwdriver head.
- Make sure the shaft is aligned with the screw during use.
- Never grind the flat blade to a chisel head.
- Ensure that a common screwdriver fills at least 75% of the screw slot.
- Always use a correct sized screwdriver, as the use of wrong sized blade may damage adjacent structures.

- Do not use the screwdrivers for chiseling or prying.
- Do not use a screwdriver to check an electric circuit as it burns the tip.
- Always rest the screwdriver on a workbench when using it on a small part.
- Extra care must be taken when using electric screwdrivers. For best usage, the screw should be started by hand and carried on using the machine.

Pliers

Pliers are usually made of high carbon steel with the jaws hardened and tempered. They are used for twisting and cutting wires and for holding objects firmly. Also useful for compressing a wide range of materials. The overall length of pliers usually ranges from 5 to 12 inches.

The main types of pliers that are used more frequently in aircraft repair work are discussed below.

Diagonal Cutting Plier: They are referred as *diagonals* or *dikes* and are used to cut soft wire, rivets, small screws and split pins. It is a short-jawed cutter with a blade set at a slight angle on each jaw. The diagonal cutting pliers are used extensively in aviation safety systems.



FIGURE 16 Diagonal cutting plier

Round Nose Plier: These snip pliers are used for twisting metal wires and not intended to use in heavier tasks.

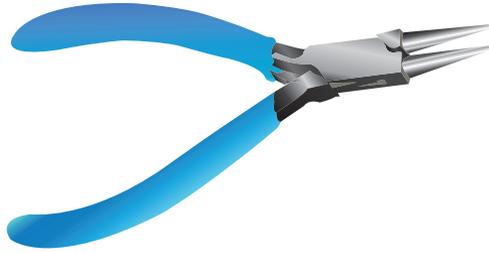


FIGURE 17 Round nose plier

Needle Nose Plier: It has half round jaws of varying lengths and are used to hold objects to make adjustments in limited access areas.



FIGURE 18 Needle nose plier

Cable Stripping Plier: It is used to remove the insulation from electrical cables.



FIGURE 19 Cable stripping plier

Duckbill Plier: Its jaws are thin, flat and resemble a duck's bill. These types of pliers are exclusively used for twisting safety wire.



FIGURE 20 Duckbill plier

Circlip Plier: It is used for removing/refitting both internal and external circlips. Straight and reversible bent circlips are available.



FIGURE 21 Circlip plier

The following are the main aspects that must be ensured when using pliers.

- Do not make pliers work beyond their capacity.
- Do not use pliers to turn nuts as it can damage them.

Punches

Punches are used to punch holes in metal sheet, to locate centers for drawing circles, to start holes for drilling, to transfer location of holes in patterns and to remove damaged rivets and pins.

They are generally classified according to the shape of their points as discussed below.

Center Punch: It is made of high carbon steel hardened and tempered. It has a point ground to an angle of 60° and are used to make large indentations in metal, which necessary to start a twist drill. The titanium should not be center punched as it sets up high internal stresses. Never use a center punch to remove objects from holes because the point of the punch will spread the object causing it to bind even more.

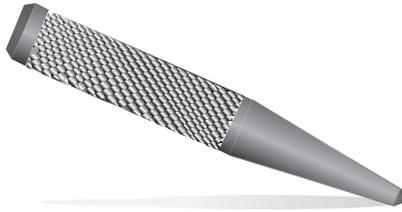


FIGURE 22 Center punch

Prick Punch: It is used to place reference marks on metal to transfer dimensions from a paper pattern directly on to the metal. To do this, first place the paper pattern directly on the metal. Then go over the outline with the punch, tapping it gently with a small hammer thus making slight indentations on the metal at the major points. These indentations serve as reference marks for cutting the metal. Never strike a heavy blow with the hammer as it may cause the prick punch to bend or cause major damage to the work material.



FIGURE 23 Prick punch

Pin Punch: It is used to drive the pin or bolt the way out of the hole. Stubborn pins may be started by placing a thin piece of scrap copper, brass or aluminium directly against the pin and striking it with a hammer until the pin begins to move. The *parallel pin punch* or *drive punch* is used to drive out rivets, bolts, split pins and shackle pins. The *tapered punch* or *drift punch* is used to deliver a blow to a part where access to a hammerhead would be difficult.