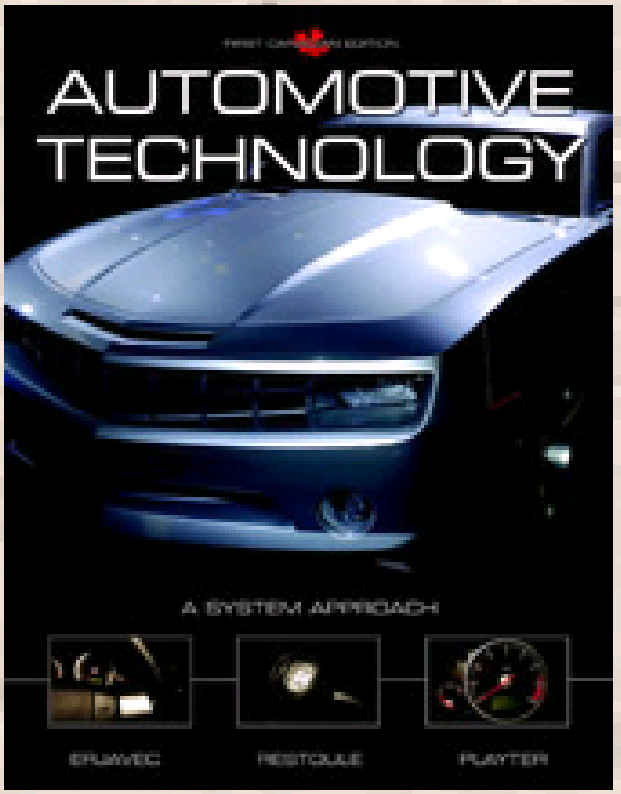
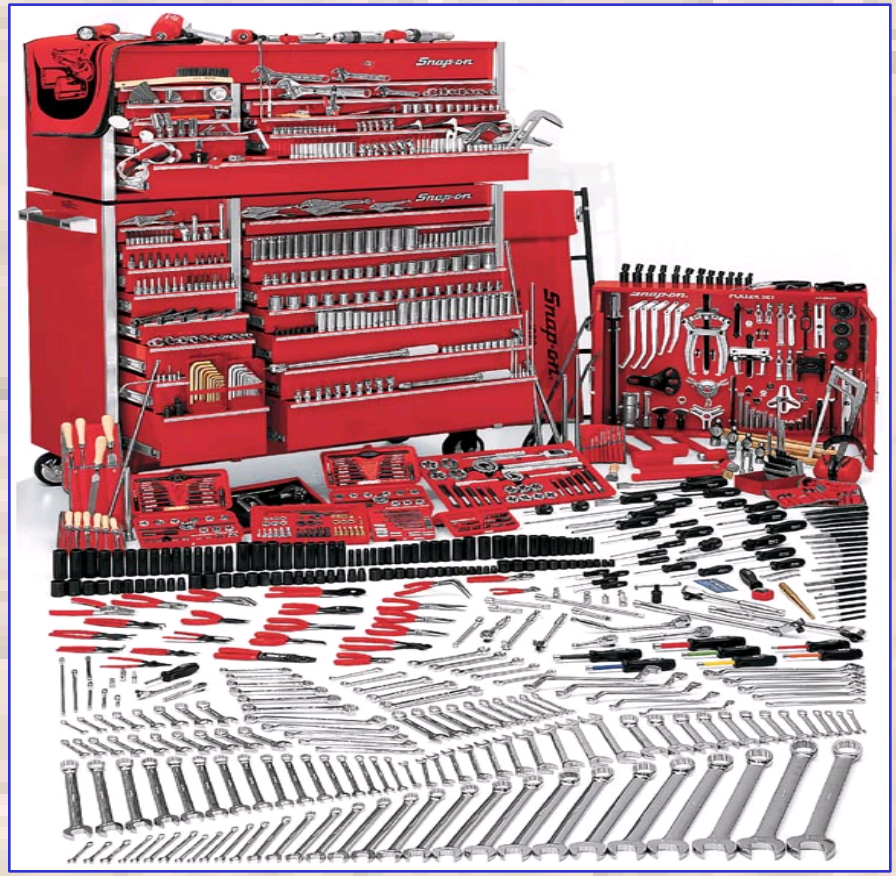


Hand Tools and Shop Equipment

Objectives

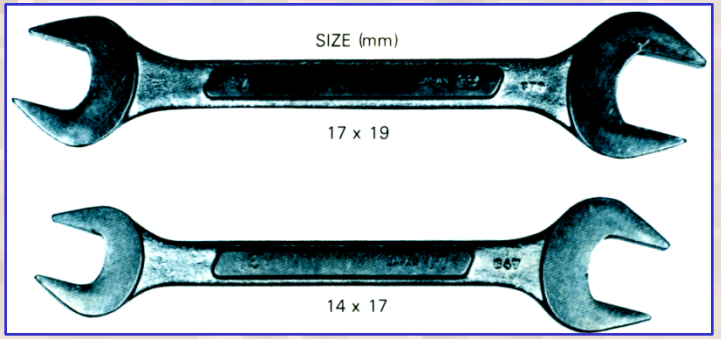
- State some of the hand tools used in auto repair.
- Explain the usage of hand tools.
- State the common types of shop equipment and state their purpose.
- State some hand tools safety.

A Typical Set of Hand Tools



Hand Tools

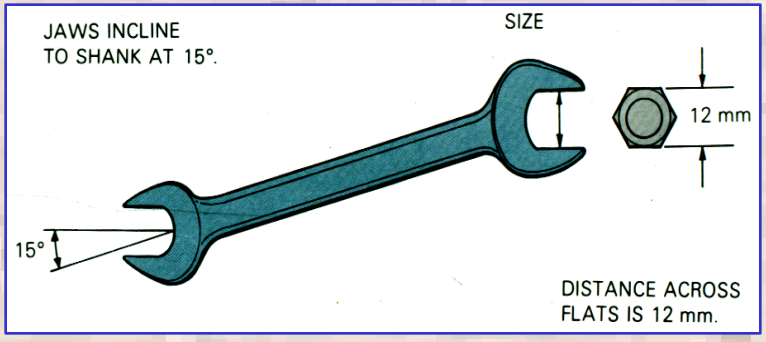
- **Open-end Wrenches (Spanners)**
- Used for tightening and loosening nuts & bolts.

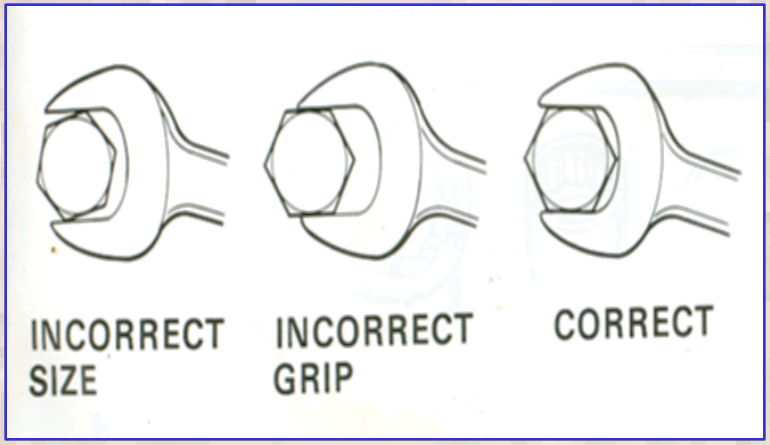


continued...

Hand Tools

- **Points for use**
- Choose correct size in relation to the nut or bolt. Insert it deep into the jaw- do not just grip the edge.

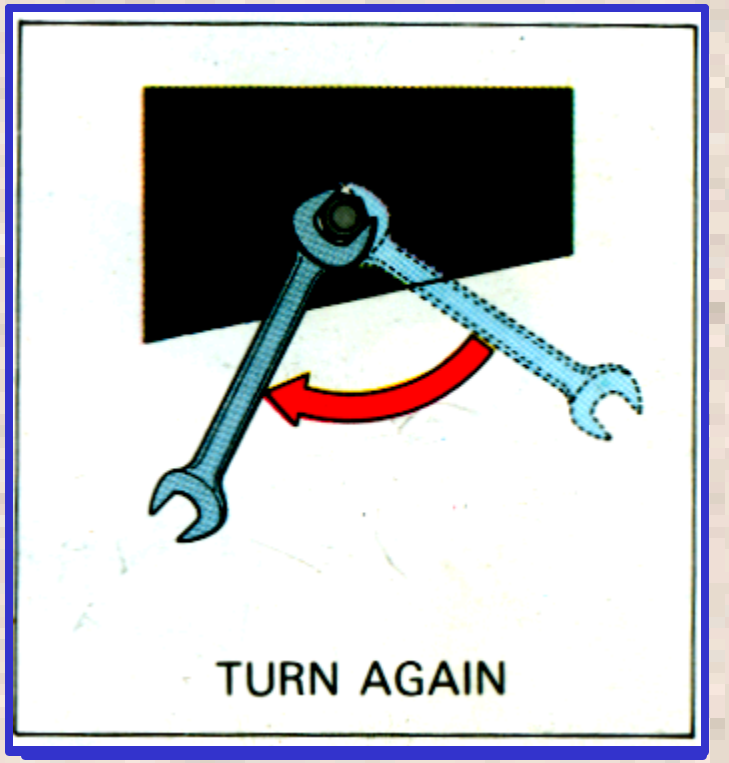




continued…

Hand Tools

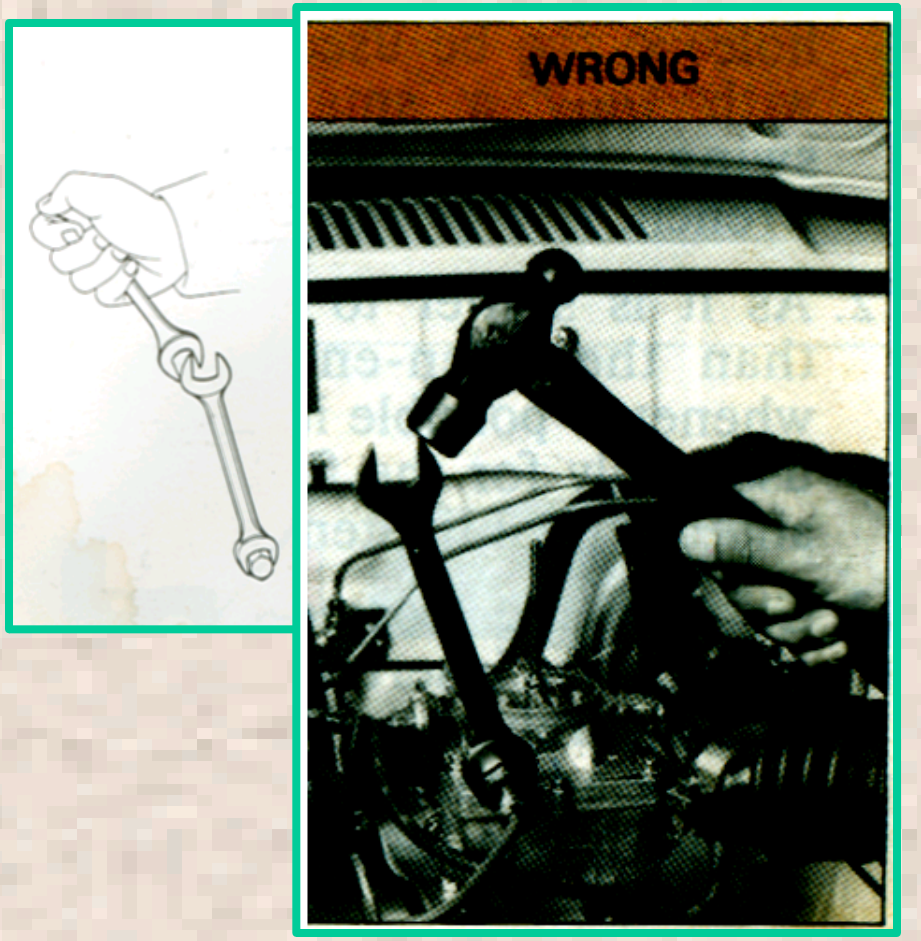
- **Points for use**
- The jaws of the spanner incline to the shank at an angle of 15^0 so it can be used upside down in narrow spaces.



continued...

Hand Tools

- **Points for use**
- Do not extend the length of a wrench with something or strike it, for example, with a hammer, for loosening work.
- When a stronger tightening or loosening force is needed, use a box-end wrench or socket wrench. A spanner may slip off and damage the nut or bolt.



continued...

Hand Tools

- **Ring spanner(Box end wrenches)**

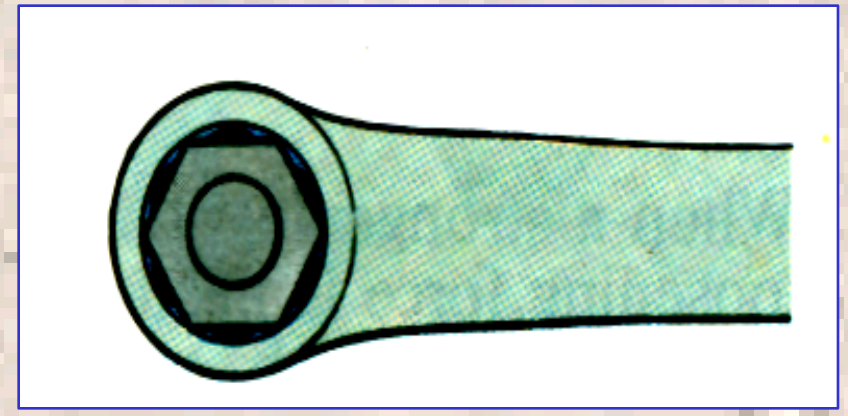
- Used for tightening and loosening nuts and bolts. Unlike the D.E spanner the ring spanner grips the nut or bolt on all six sides to turn it securely without slipping when strong tightening or loosening is required.

continued…

Hand Tools

- **Points for use**

- **Used for tightening and loosening nuts and bolts. Unlike the D.E spanner, the ring spanner grips the nut or bolt on all six sides to turn it securely without slipping when strong tightening or loosening is required.**

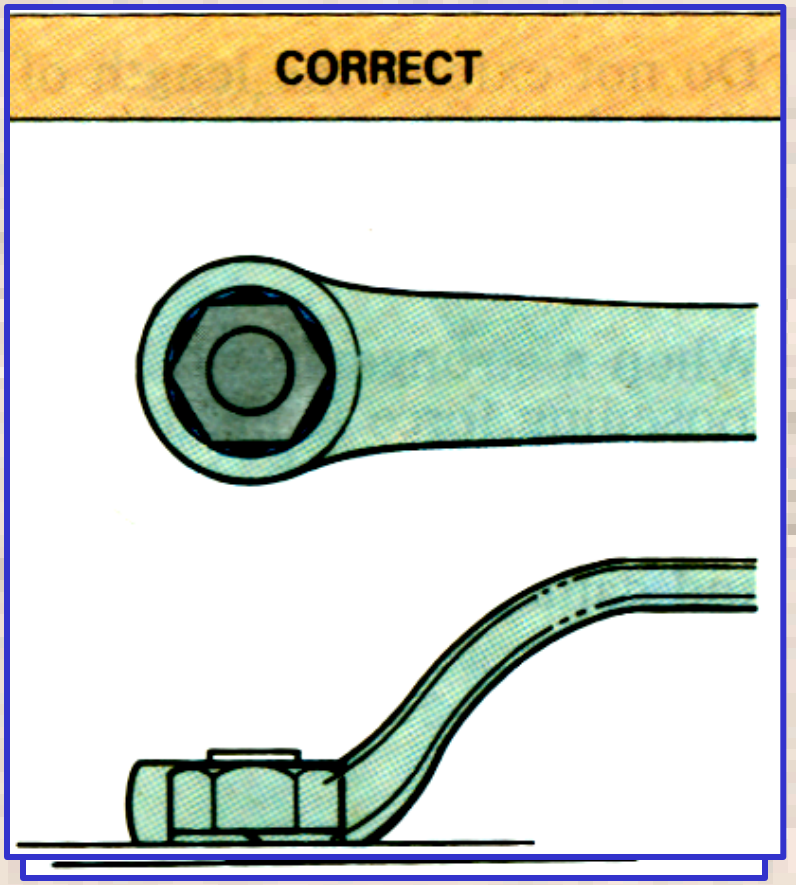


continued...

Hand Tools

- **Points for use**

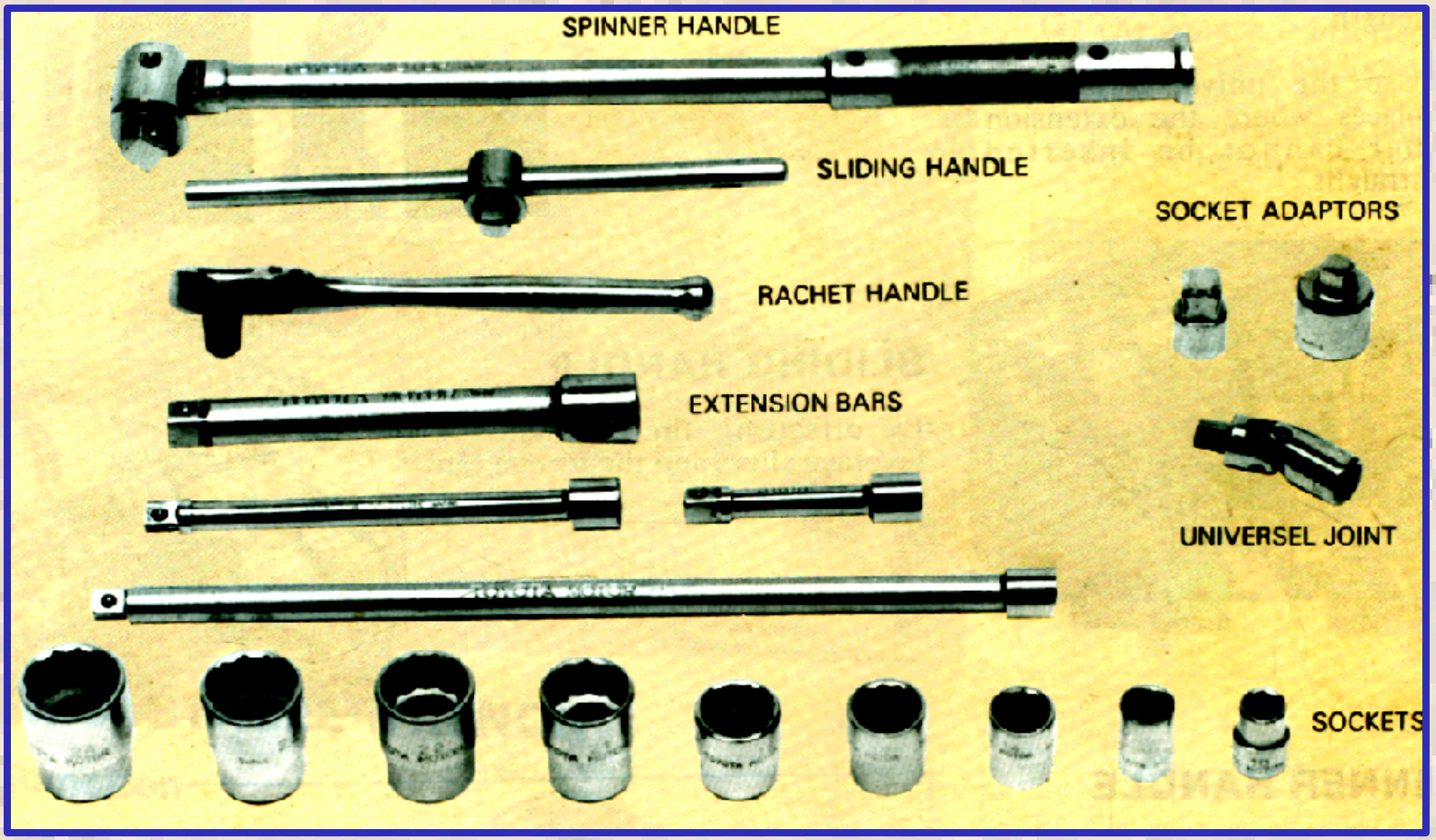
- **Since it has a twelve-sided hole, it can be used in places with only a small turning swing, unlike the D.E spanner.**
- **Whenever possible it should be used only for the first tightening and the final tightening.**
- **Choose the correct size of wrench.**



continued...

Hand Tools

- **Socket wrench sets**



continued…

Hand Tools

Function:

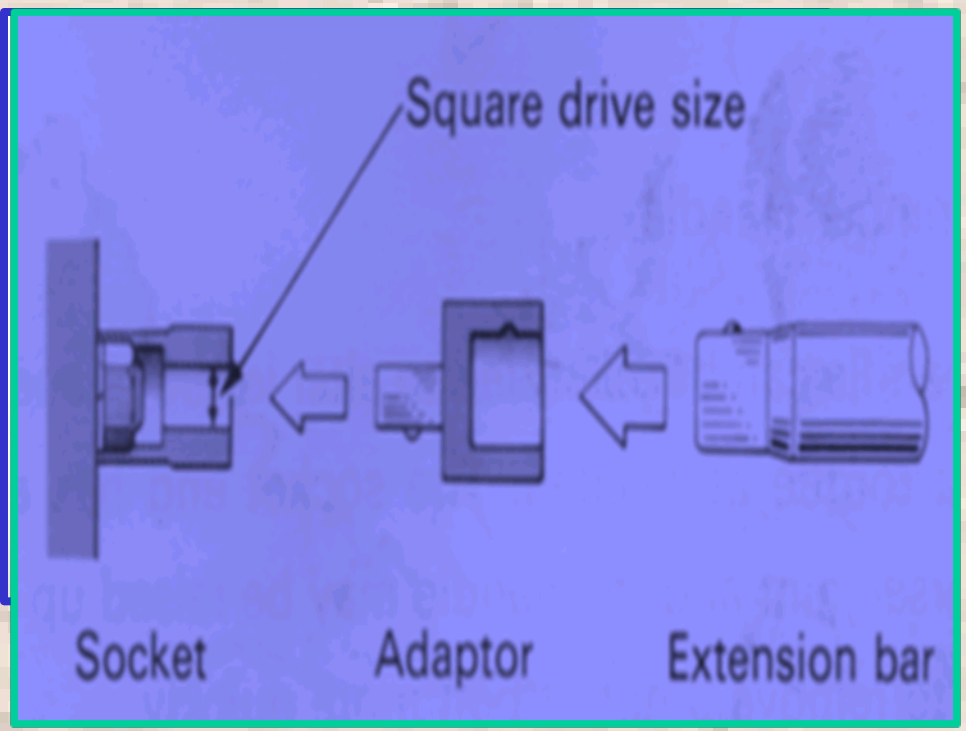
- Used in combination with different types of handles and extension bars for safe and speedy loosening and tightening work in different positions.

continued...

Hand Tools

- **Points for use**

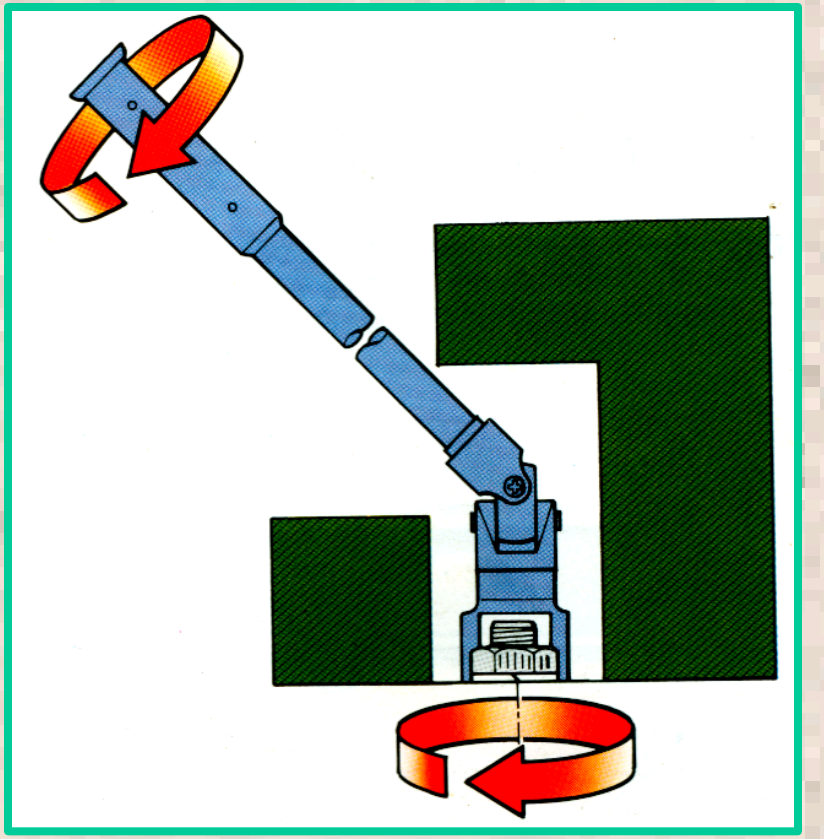
- Choose the correct size in relation to the nut or bolt. Insert it completely and squarely over the nut or bolt.
- Connect it to the extension bar with a socket adapter which fits the socket “square drive” size.



Hand Tools

- **Extension bar & universal joint**

- When the nut is deeply recessed and the handle cannot move freely, add an extension bar of suitable length.
- Use the universal joint in places where the extension bar cannot be inserted straight.



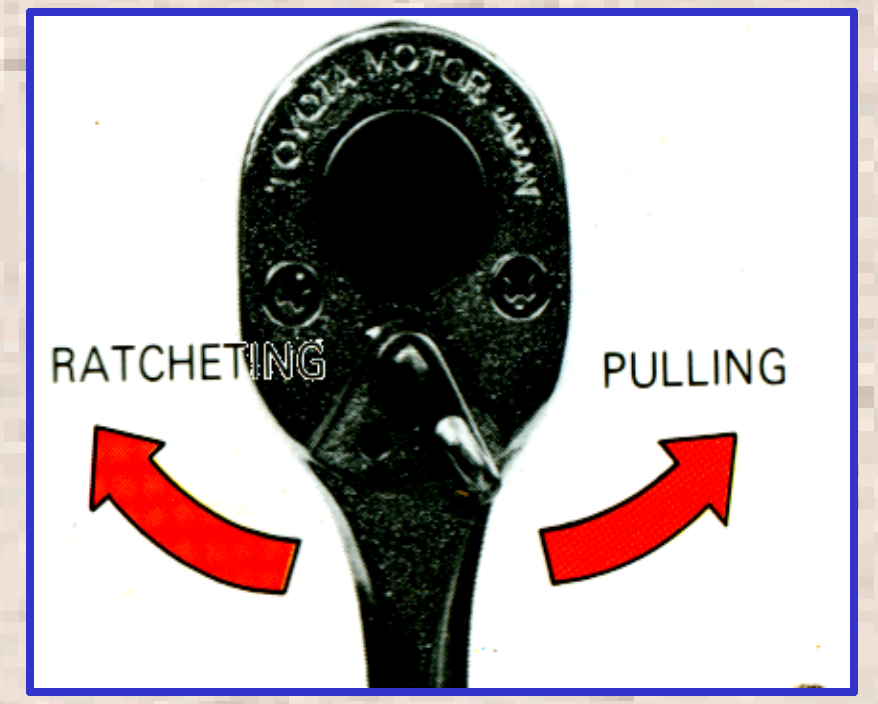
Hand Tools

- **Sliding handle**
  - By offsetting the handle, the leverage alters and the torque can be adjusted.

Hand Tools

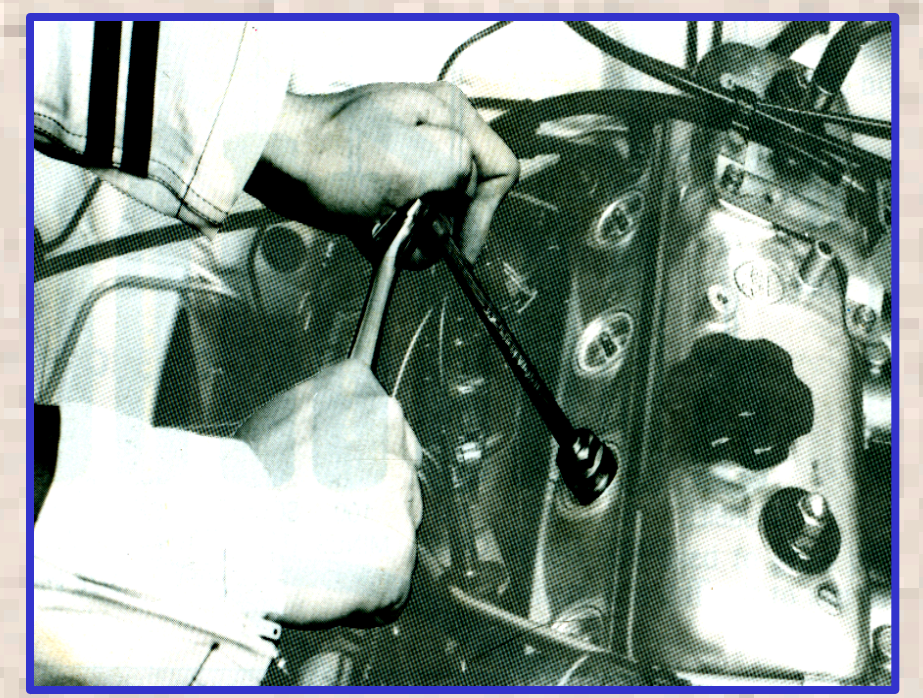
- **Ratchet handle**

- Due to the ratchet mechanism the socket can be turned in one direction, but since it cannot be turned in the opposite direction, the work can be done quickly, without lifting the socket from the nut or bolt.
- The ratchet direction can be changed by the ratchet lock lever.



Hand Tools

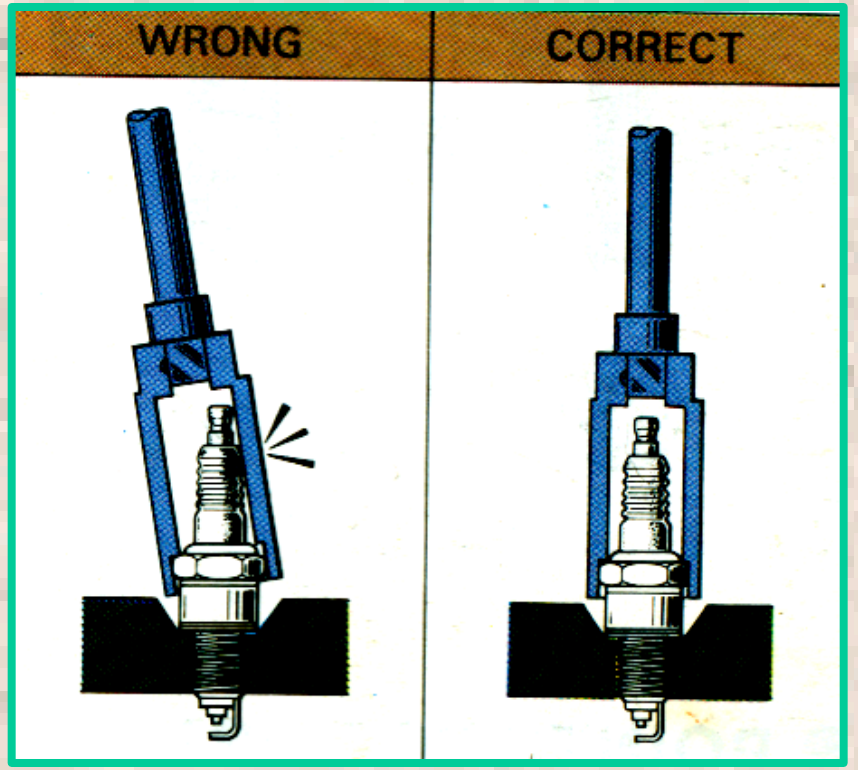
- **Spark plug wrench**
- **It is used for fitting and removing engine spark plugs. A magnet is incorporated into the wrench to facilitate the fitting and removal of plugs.**



Hand Tools

- **Points for use**

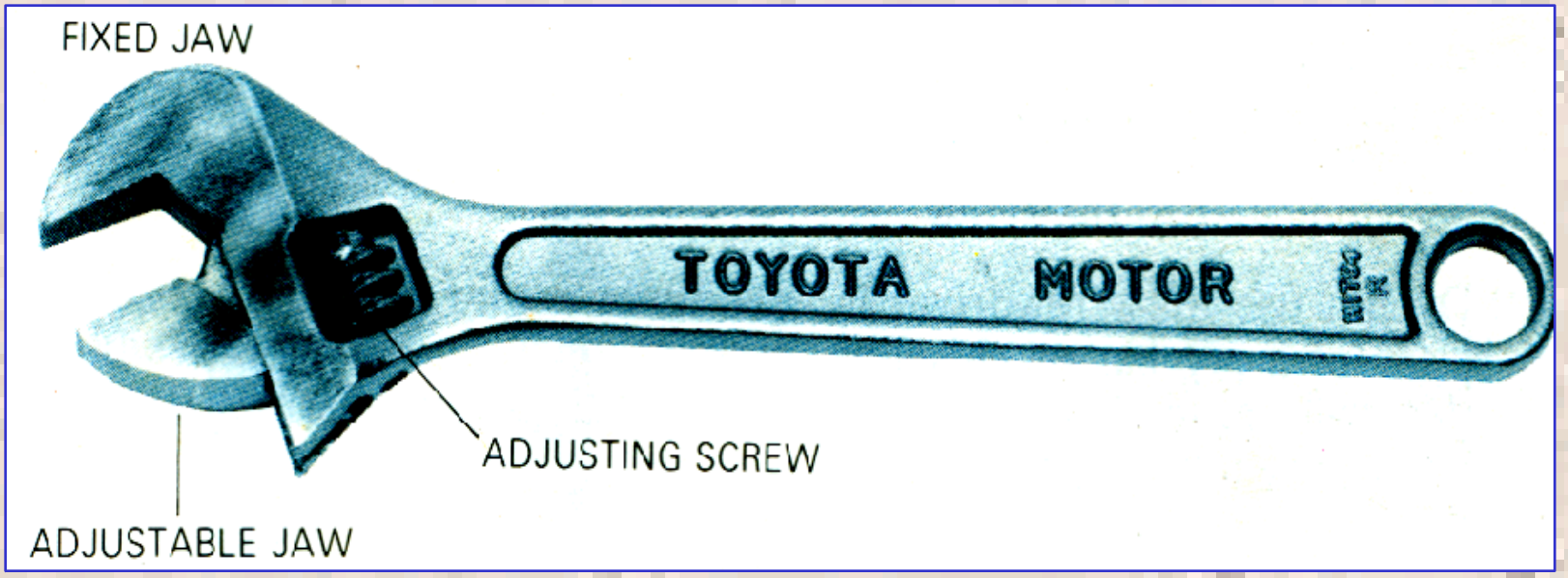
- Choose an extension bar of suitable length to use in combination with a ratchet handle.
- The ratchet is inserted straight into the plug for loosening and tightening. Do not use at an angle, it will damage the plug insulator.



Hand Tools

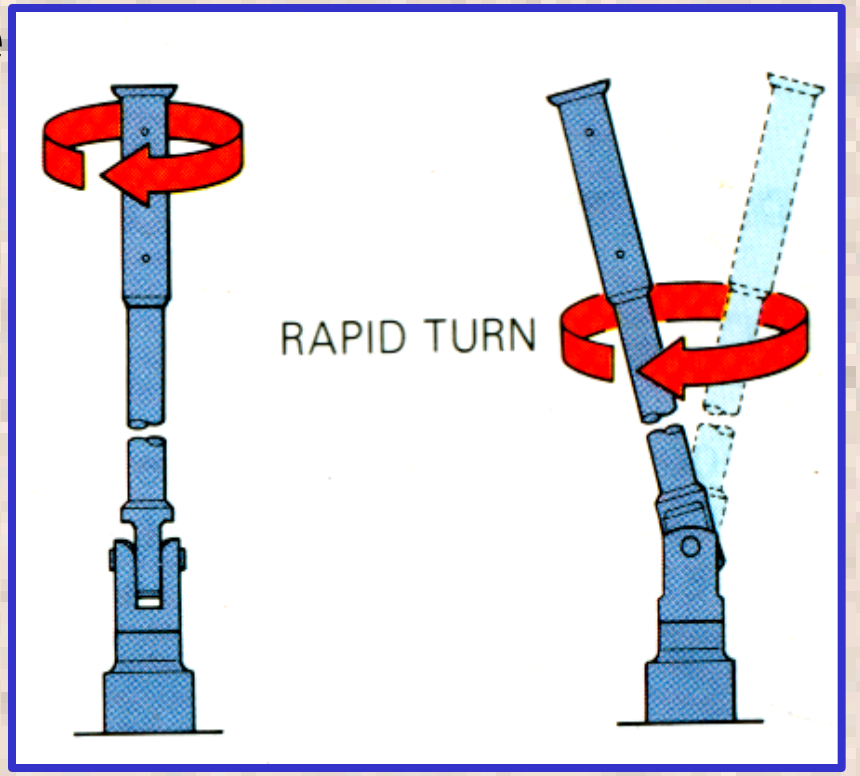
- Adjustable wrench

- It is used for loosening and tightening the nut or bolt. It can be adjusted to fit the size of nut or bolt.



Hand Tools

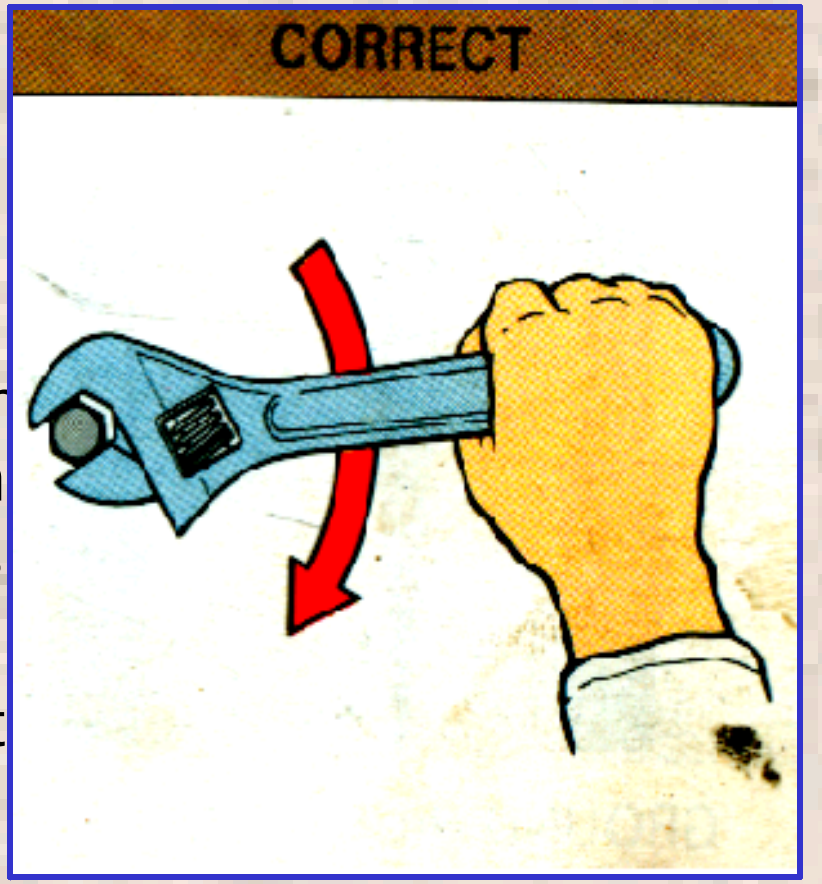
- To ensure a longer life of the ratchet mechanism, avoid using a strong pulling force.
- when a greater force is required, use a spinner handle.



Hand Tools

- **Points for use**

- Use it only when you do not have a spanner wrench of the correct size.
- It can also be used for tightening the joints and nuts or air conditioner piping and so on where strong tightening force is needed.
- It must be adjusted to fit the nut exactly. If used with a loose grip, the corners of the nut or bolt will become rounded, making it hard to loosen.



Hand Tools

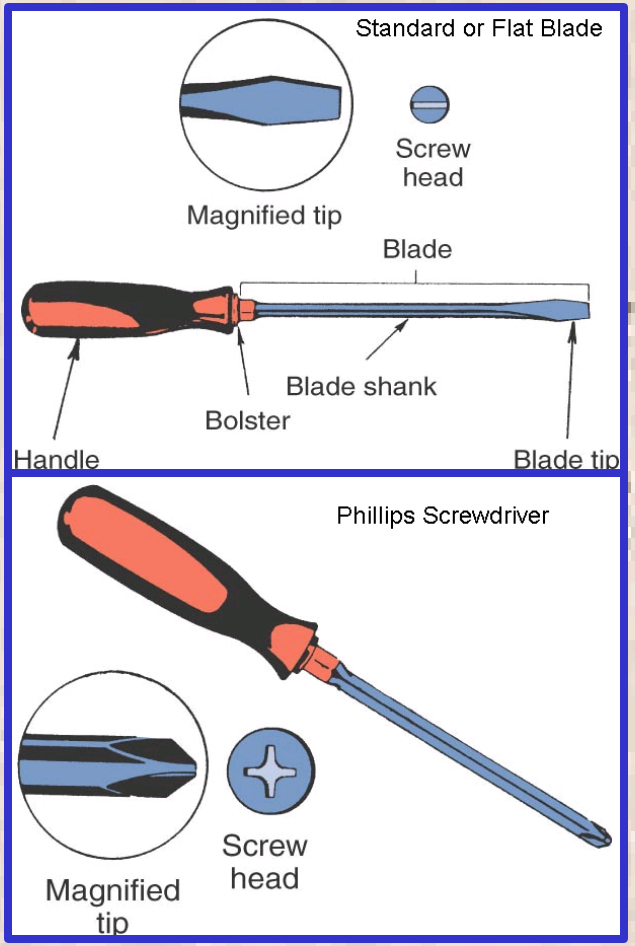
Screw drivers

- Used for tightening and loosening screws.

continued...

Hand Tools

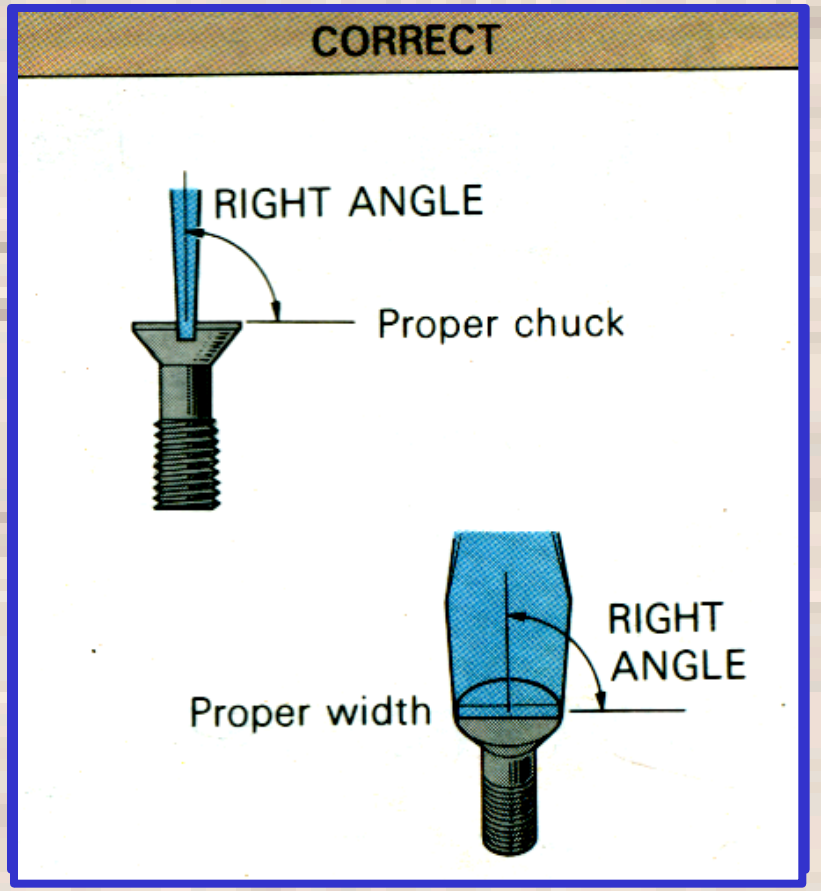
- **Screwdrivers**
  - A variety of tips and sizes are available to fit the various types of screws used.
  - Standard (flat blade) and the Phillips screwdrivers are commonly used in the automotive industry.



continued…

Hand Tools

- **Points for use**
  - Choose a screwdriver of a suitable dimension which precisely fits the length and width of the screw groove.
  - When turning, keep the screwdriver perpendicular to the screw.



continued...

Hand Tools

- Do not use the screwdriver in place of a pry bar or chisel as this will cause damage. Also, do not use it by gripping it with pliers.
- When loosening very tight screw, do not hit the head of the screwdriver.

Hand Tools

- **Pliers**
  - Used for gripping and turning work, and cutting wires.

continued…

Hand Tools

- **Pliers**
  - Different sizes and jaw shapes are available for various tasks.
  - Also available with standard, locking and slip joint handles.

continued…

Hand Tools

- **Needle nose pliers**

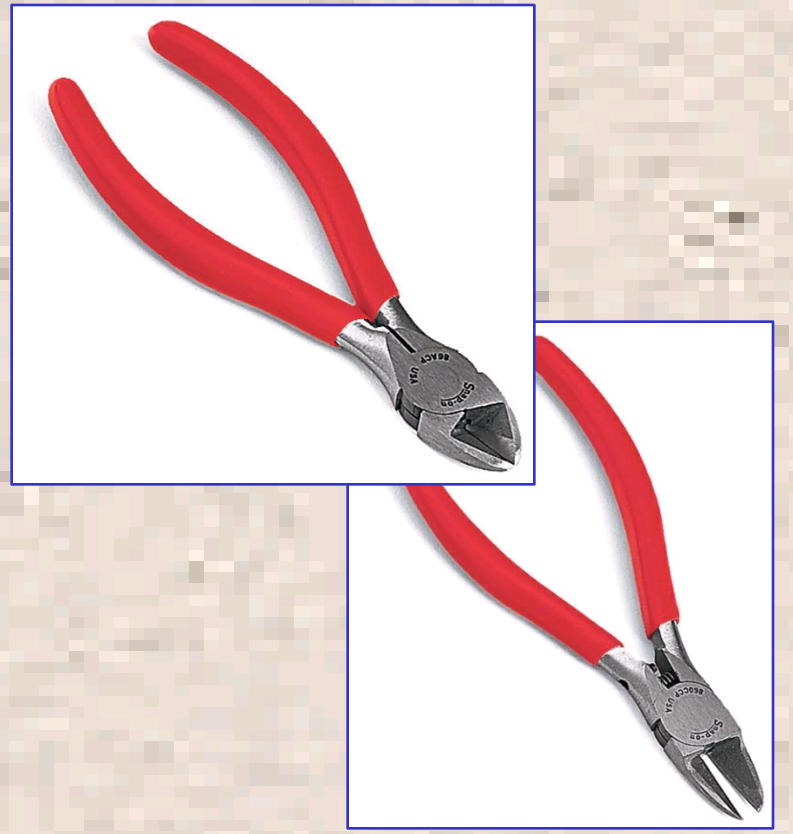
- These are used to grip pins etc. in small or long and narrow holes where it is difficult to use the combination pliers.

Hand Tools

- **Vice grip pliers**
  - These are used when an extremely strong grip is required, when the corner of the nut is hard to grip, or to grip the edge of a broken bolt to pull it out.

Hand Tools

- **Side Cutting Pliers**
  - Used for cutting wires or removing plastic sheath from wiring. Also used for pulling out cotter pins.
  - Do not use cutting pliers to cut spring wire because it will damage the cutting edge.



continued…

Hand Tools

- **Vice grip pliers**
  - These are used when an extremely strong grip is required, when the corner of the nut is hard to grip, or to grip the edge of a broken bolt to pull it out.

Hand Tools

- **Combination pliers**

- Used for gripping and turning work, and cutting wires.
- Do not use combination pliers in place of a spanner wrench for loosening and tightening nut and bolts.

Hand Tools

- **Monkey pliers**
- The jaw can be set in positions to fit the size of the item being held.

Hand Tools

- **Hammers**
  - Used for removing or driving in parts.
  - Several models of soft headed hammers are used for preventing damage to the parts.

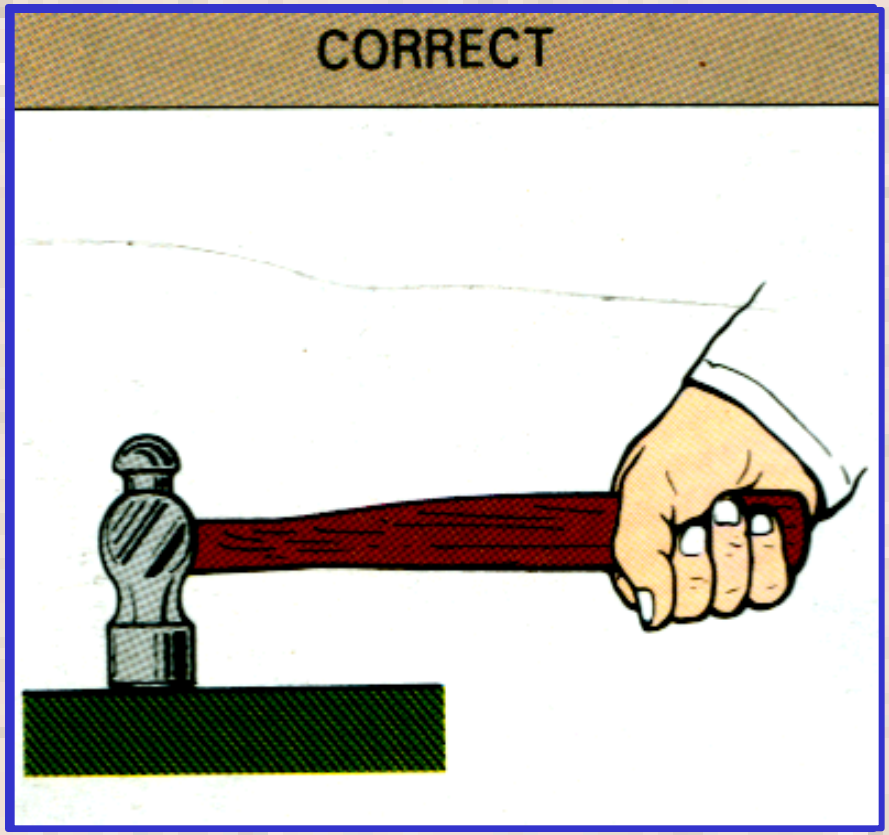
CAUTION - Do not strike soft surfaces with hardened steel hammers.

continued…

Hand Tools

- **Points for use**

- Hold the hammer at the end not in the middle, and strike squarely on the item to be hit. If used incorrectly the face will easily develop a mush room shape.
- Before using the hammer, be sure to check the head is not loose. If it is , strike the wedge firmly to make it secure.



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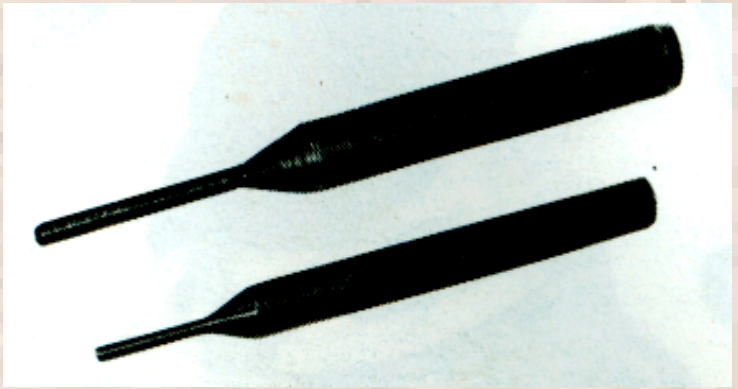
Hand Tools

- **Punches**
  - Used for driving out pins, rivets, or shafts; aligning holes in components; and marking the starting point for drilling a hole.



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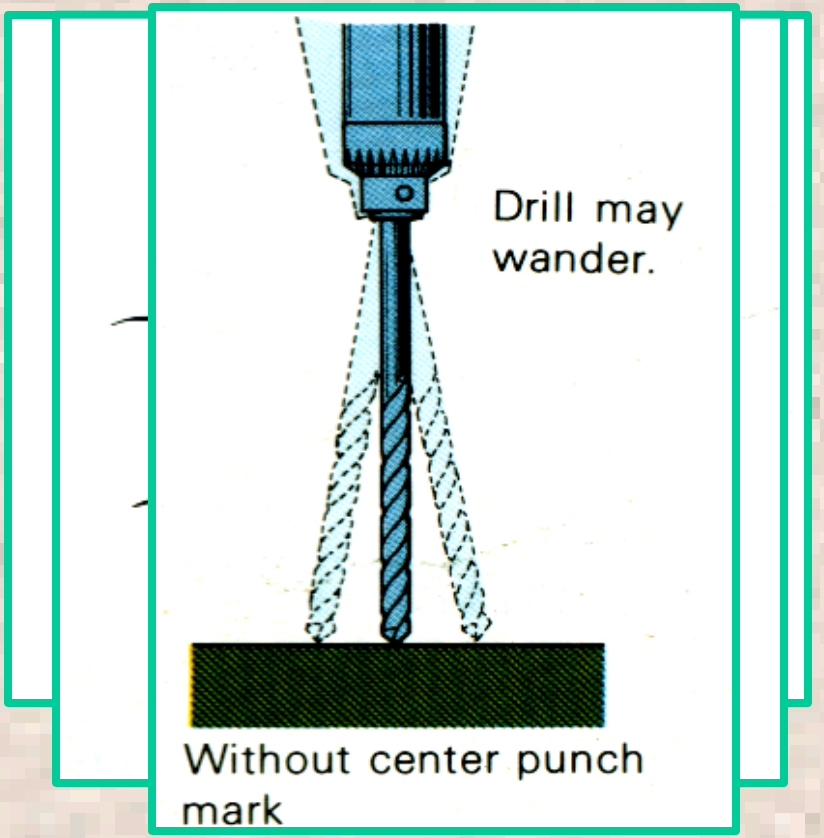
Hand Tools

- **Usage of center punch**
- When drilling a hole make a punch mark on the working surface to prevent drill from wandering



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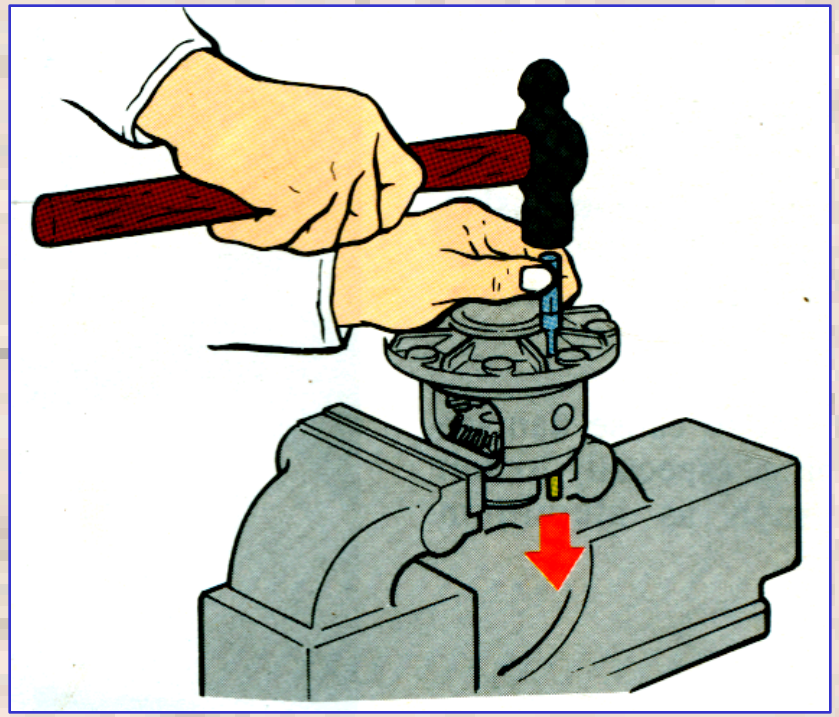
Hand Tools

- **Usage of Pin punch**
- Use for knocking out rivets and pins
- Select the size of punch which fits the diameter of pin to be knocked out.



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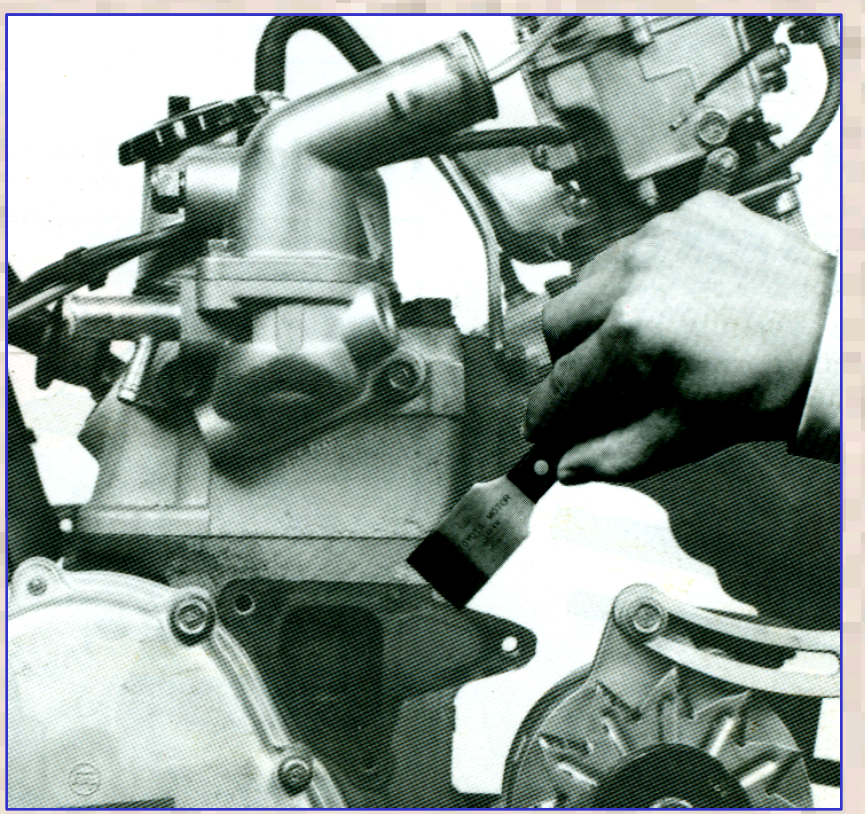
Hand Tools

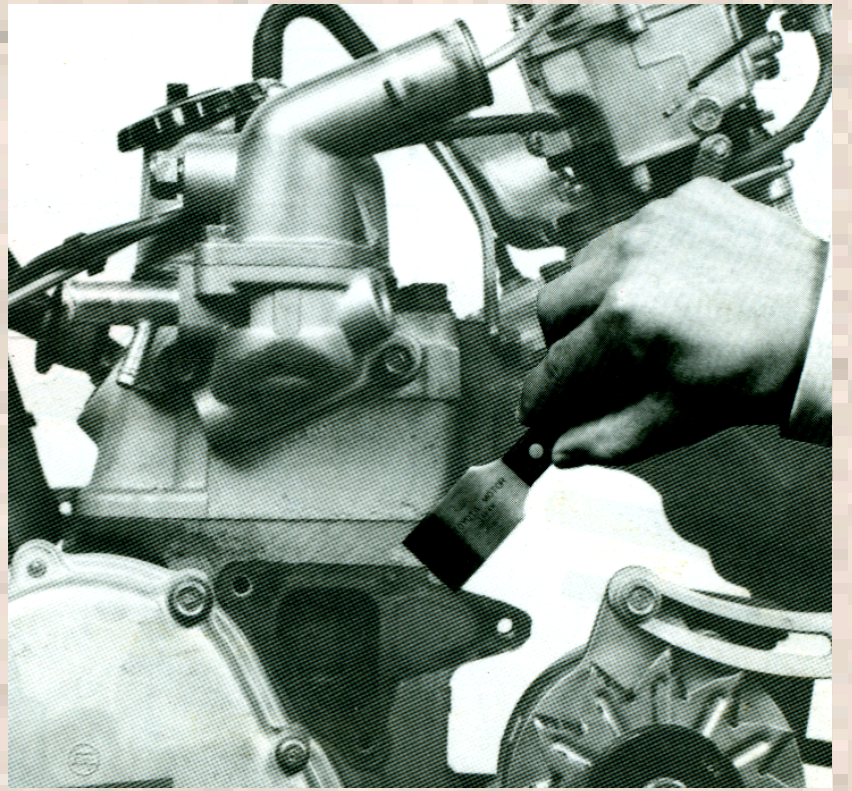
- Gasket scrapper
  - When old gaskets are removed, the gasket scraper is used to clean the surface below the gasket.



continued...

Hand Tools

- **Points for use**
  - Use the scraper on the gasket installation surface, with the edge of the scraper flat to the surface not at an angle.
  - Be careful not to cause damage when scraping, specially to soft materials such as aluminum parts.



continued...

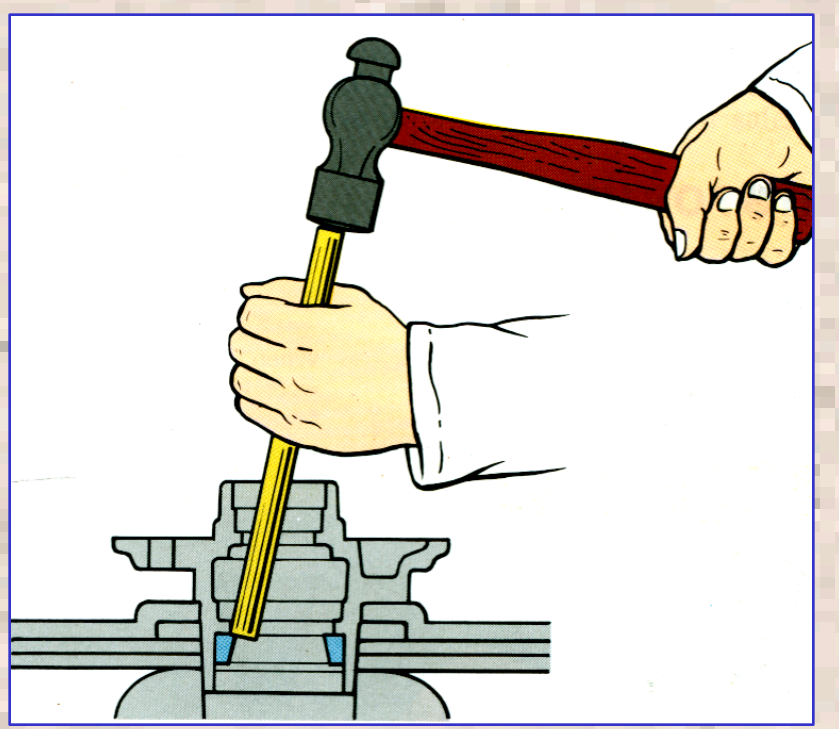
Hand Tools

- **Chisels**
  - Used for cutting metal when driven by a hammer. Can be used to shear off bolt and rivet heads.

    CAUTION – Always keep the striking end free from burrs and mushrooming.

Hand Tools

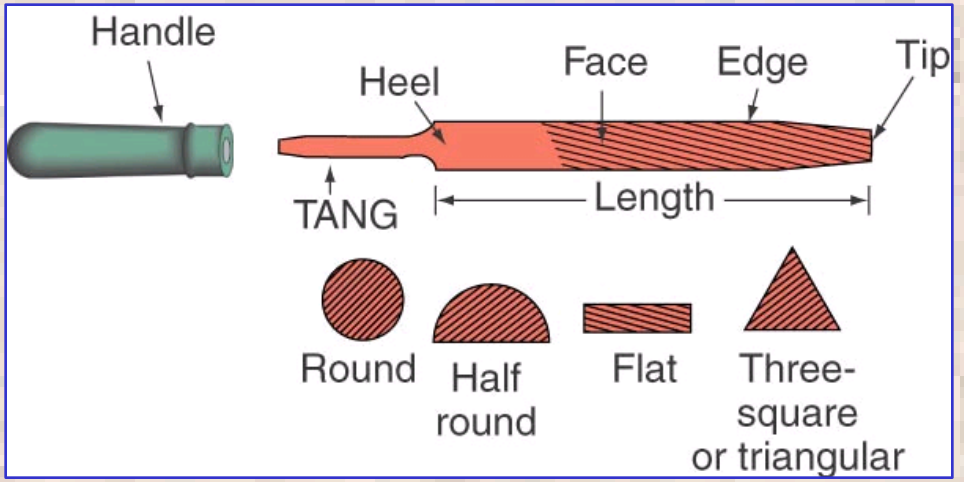
- **Brass bar**
  - When it is necessary to hit parts with a hammer for fitting or removal, a brass bar may be inserted in between to prevent damage to the part from direct striking.



continued…

Hand Tools

- **Files**
  - Commonly used to shape or smooth metal edges and surfaces.
  - They vary in size and coarseness depending on the shape and material being filed.



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Torque Wrenches

- The torque wrench is used as a gauge for measuring the torque and tightening nuts and bolts to the correct torque as specified by the factory.
- If the torque of the nut or bolt is too weak, it will become loose during use & vice versa.

continued...

Types of Torque Wrenches

- Beam
- Older and not very accurate.
- Dial
- A dial indicates the amount of torque exerted.
- Digital read out
- Is usually the most accurate design.

- “Click”
- When the handle reaches the preset torque, the wrench clicks.

Hand Tool Safety

- Use the proper tool for the job.
- Use the correct size wrench or socket.
- Use box-end wrench or socket whenever possible.
- Always pull on a wrench.
- Repair or replace when the head of a tool is blunt, loose or damaged.
- Always keep the tools in top condition.

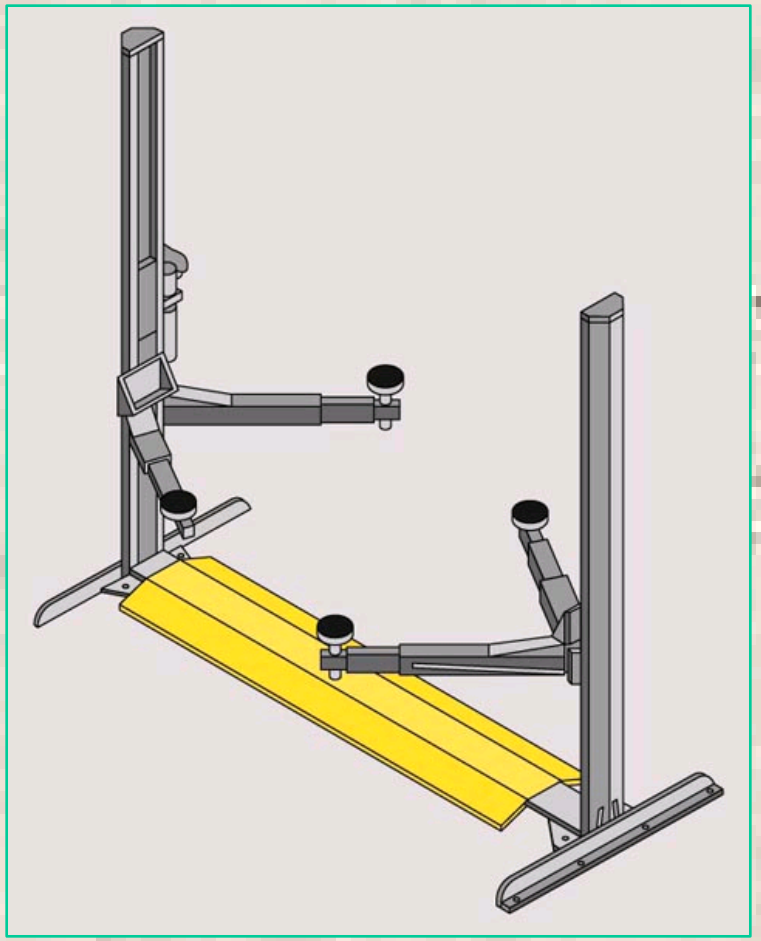
Lifting Tools

- Hydraulic floor jack
  - Is used to raise vehicle off the ground.
  - Is used with safe
- Safety stand
  - Is used to suppo a vehicle when raised.

continued…

Lifting Tools

- **Vehicle Lifts or Hoists**
  - Can be pneumatic (air pressure) or hydraulic controlled.
  - Most modern lifts use electric motor driven cables or screws.



continued…

Lifting Tools

- **Engine hoist**
  - Is sometimes called a cherry picker.
  - Uses hydraulic pressure to lift an engine from a vehicle.

Summary

- Repairing the modern automobile requires the use of many different hand and power tools.
- It is crucial to use the proper amount of torque when tightening fasteners on any part of a vehicle, particularly the engine.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