

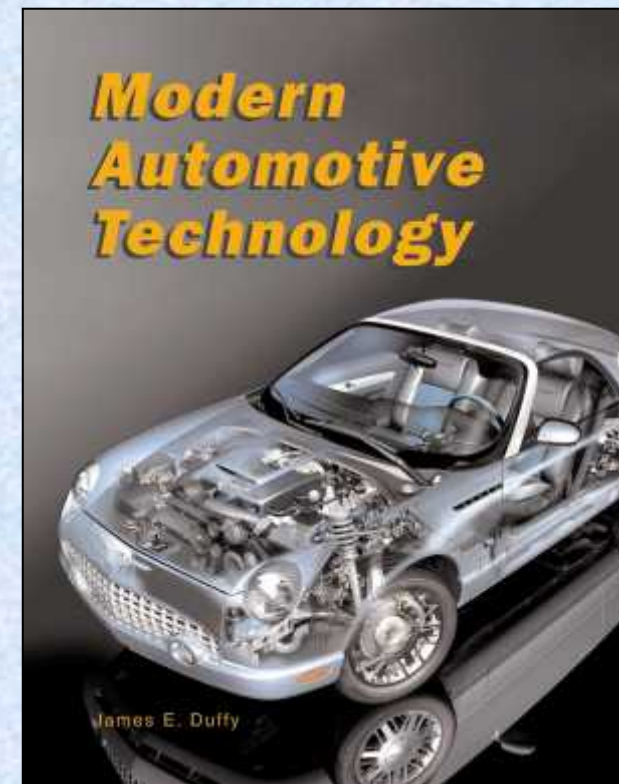
powerpoint for

Modern Automotive Technology

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Chapter 4

Power Tools and Equipment

Contents

- ☐ Compressed-air system
- ☐ Air tools
- ☐ Electric tools
- ☐ Hydraulic tools
- ☐ Shop equipment

Power Tools and Equipment

- Power tools

- tools driven by compressed air, electricity, or pressurized liquid

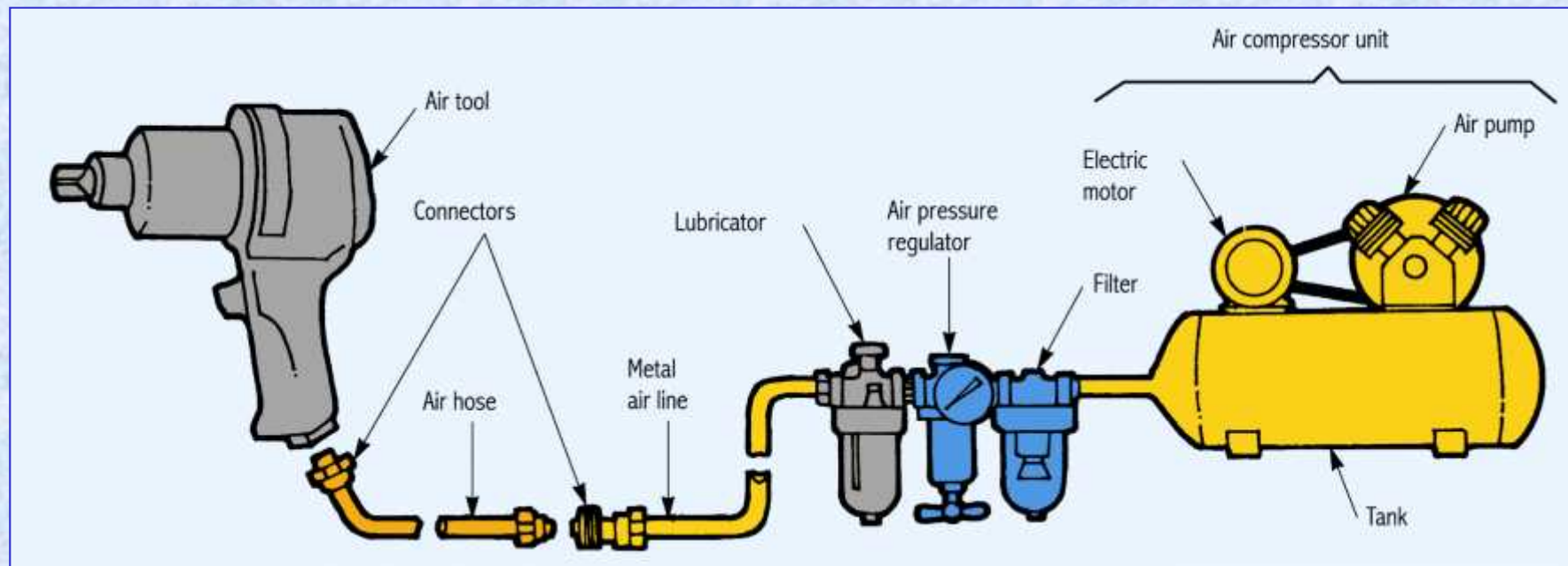
- Shop equipment

- large shop tools such as floor jacks, parts cleaning tanks, and steam cleaners

Compressed-Air System

- ❑ Components include:
 - air compressor
 - air hoses and lines
 - pressure regulator
 - filter and lubricator
- ❑ Air tools are driven by the compressed-air system

Compressed-Air System



Air Compressor

- ❑ Source of compressed air for an automotive service facility
- ❑ Turns on and off automatically to maintain a preset pressure in the system
- ❑ Metal air lines feed compressed air to several locations in the shop

Air Hoses

- ❑ Made of flexible, high-pressure hose
- ❑ Connected to the metal lines from the air compressor
- ❑ Allow the technician to take a source of air pressure to the vehicle being serviced
- ❑ Quick-disconnect couplings allow a technician to connect or disconnect hoses or tools without using a wrench

Other Components

☐ Pressure regulator

- used to set a specific pressure in the system (100-150 psi, or 689-1034 kPa)

☐ Filter

- removes water from the compressed air

☐ Lubricator

- introduces oil into the airstream
- increases the life of air tools

Air Tools

- ❑ Use air pressure for operation
- ❑ Labor-saving devices that are well worth their cost
- ❑ Always lubricate an air tool before and after use
 - a few drops of oil protects the internal parts of the tool

Air (Impact) Wrench



Provides a very fast means of installing or removing threaded fasteners— $\frac{3}{8}$ ", $\frac{1}{2}$ ", and $\frac{3}{4}$ " drive sizes are used

Air Ratchet



Impact wrench designed to work in a
limited space

Impact Sockets and Extensions

- ☐ Must be used with air wrenches
- ☐ Case hardened, thicker, and much stronger than conventional sockets and extensions
- ☐ Impact tools are flat black, instead of chrome
- ☐ Using a conventional chrome tool on an impact wrench can be unsafe

Air Hammer (Chisel)

- ❑ Useful during various driving and cutting operations
- ❑ Capable of producing about 1000–4000 impacts per minute
- ❑ Several cutting or hammering attachments are available

Air Hammer (Chisel)



Always wear safety glasses when
using an air hammer

Blowgun

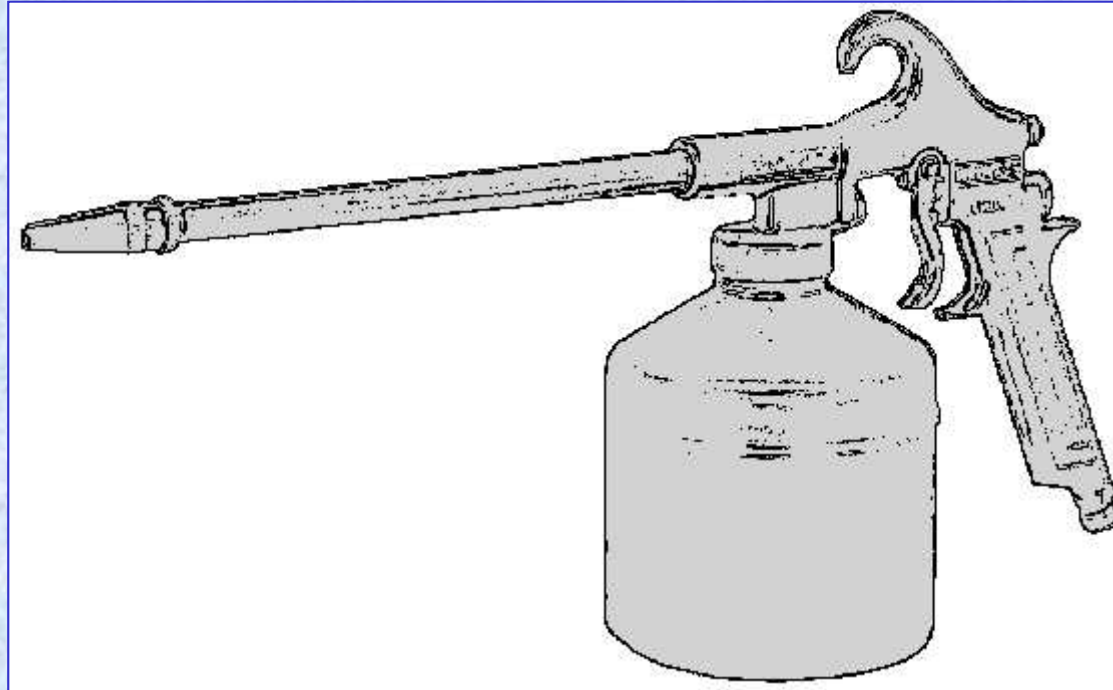
- ❑ Commonly used to dry and clean parts washed in solvent
- ❑ When using a blowgun:
 - wear eye protection
 - direct the blast of air away from yourself and others
 - do not blow brake and clutch parts clean, as the dust from these parts may contain asbestos

Blowgun



Drying a part after cleaning it in solvent
A blowgun may also be used to blow dust
and dirt from parts before disassembly

Solvent Gun



Used to wash parts that will not fit into a cleaning tank

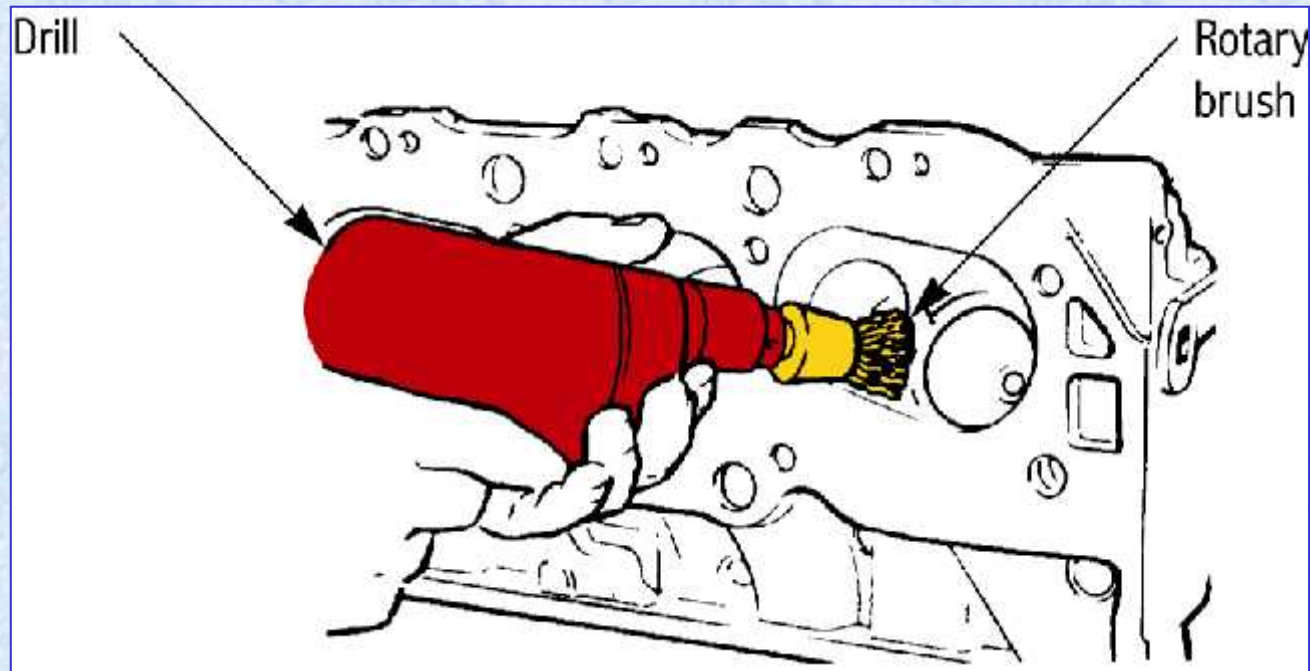
Air Drill



Used to drill, grind, polish, and clean parts

Power and rotating speed can be set to
match the job at hand

Rotary Brush



Used in a drill for cleaning off carbon deposits, rust, or old gaskets

Abrasive Pad

- ☐ Cleaning tool that can be used in a drill
- ☐ Used for removing old gasket material
- ☐ Will not scratch aluminum like a rotary brush can

Rotary File (Stone)

- ☐ Used in a drill or die grinder
- ☐ Handy for removing metal burrs and nicks
- ☐ Maximum speed is printed on the file or stone container

Rotary File (Stone)



Using a die grinder equipped with a
high-speed stone

Electric Tools

- ❑ There are many electric tools that can be useful to a technician
- ❑ These may include a drill press, grinder, or portable drill

Bench Grinder

- ❑ Used for grinding, cleaning, or polishing
- ❑ Usually has two wheels:
 - grinding wheel—used for sharpening and deburring
 - wire wheel—used for cleaning and polishing

Using a Bench Grinder



Bench Grinder Rules

- ☐ Always wear eye protection and keep your hands away from the wheel
- ☐ Make sure the grinder shields are in place
- ☐ Keep the tool rest adjusted close to the wheel
- ☐ Do not use a wire wheel to clean aluminum or brass parts

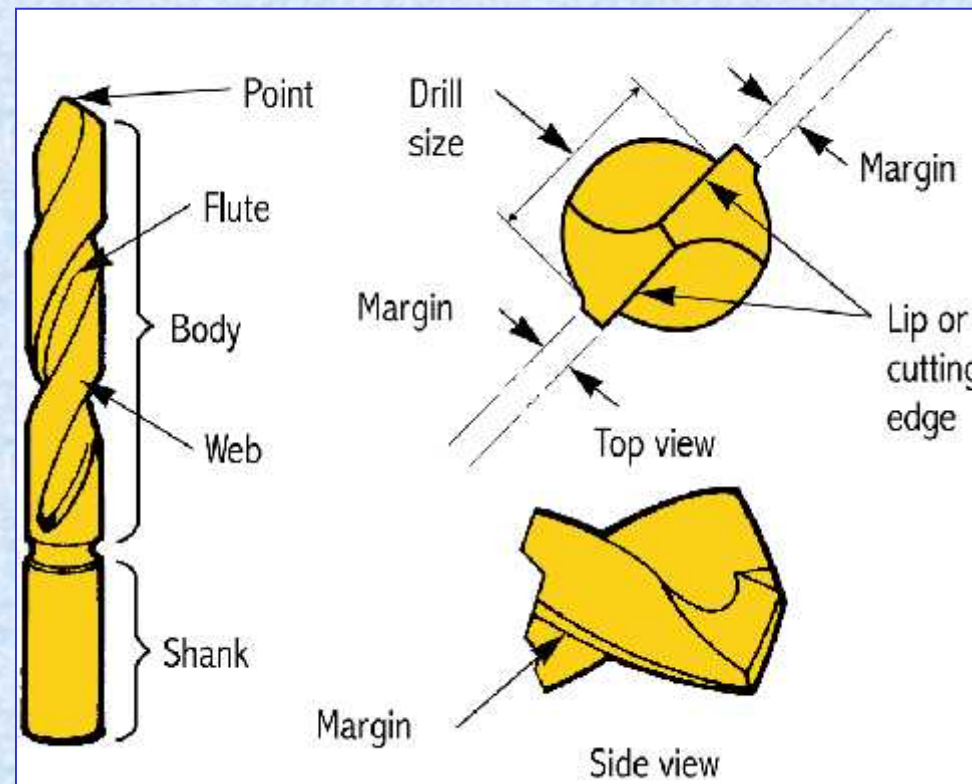
Drills

- ❑ Used to create holes in metal and plastic parts
- ❑ May be portable or mounted on a workbench or the floor

Bits

- ❑ Drills use drill bits, or twist drills, to drill holes in metal and plastic parts
- ❑ Made of carbon steel or high-speed steel
- ❑ High-speed steel is better than carbon steel because of its resistance to heat

Drill Bit



Chuck Key



May be needed to tighten the drill bit in
the drill chuck

Portable Electric Drill

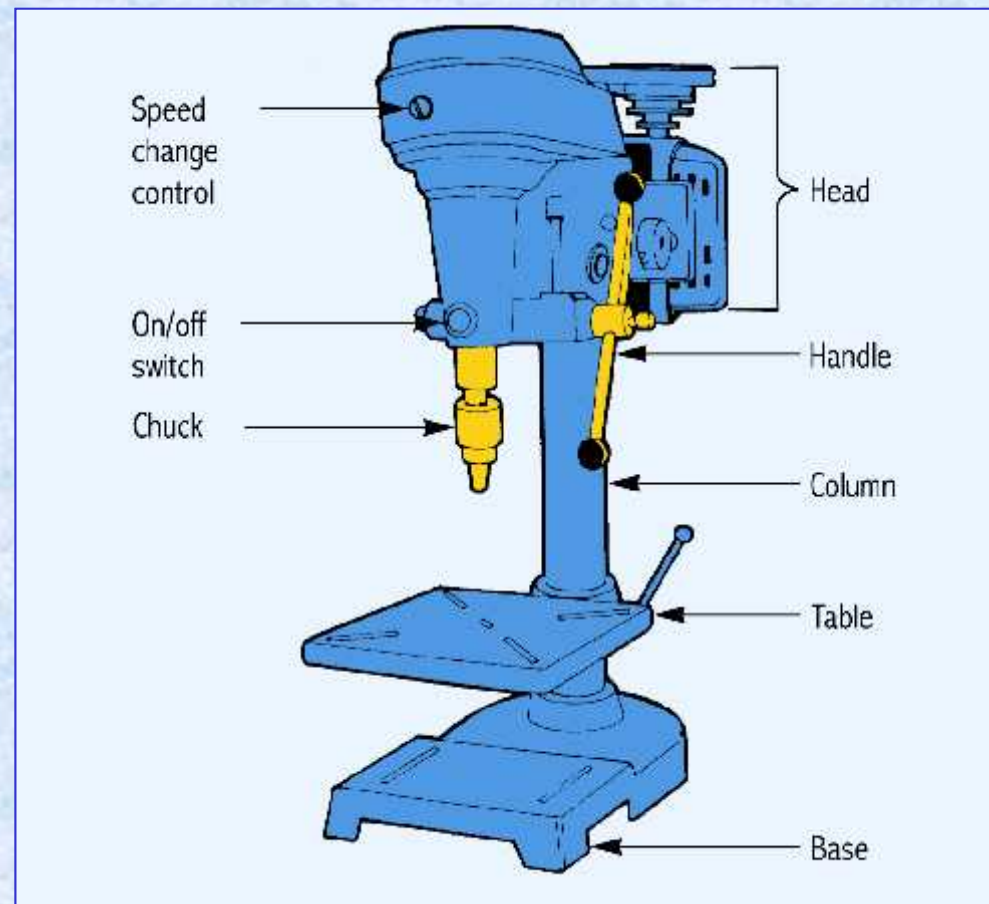


The size of a drill is an indication of the capacity of its chuck—common sizes are $\frac{1}{4}$ ", $\frac{3}{8}$ ", and $\frac{1}{2}$ "

Drill Press

- ❑ Large, floor-mounted or bench-mounted drill needed for drilling large holes, deep holes, or a great number of holes in several parts
- ❑ Handle allows the bit to be pressed into the work with increased force

Drill Press



Drill Press Rules

- ☐ Remove the key from the chuck before turning on the drill press
- ☐ Use C-clamps or other holding fixtures to secure the part to be drilled
- ☐ Use a center punch to indent the part and start the hole
- ☐ Release pressure right before the bit breaks through the bottom of the part
- ☐ Oil the bit as needed

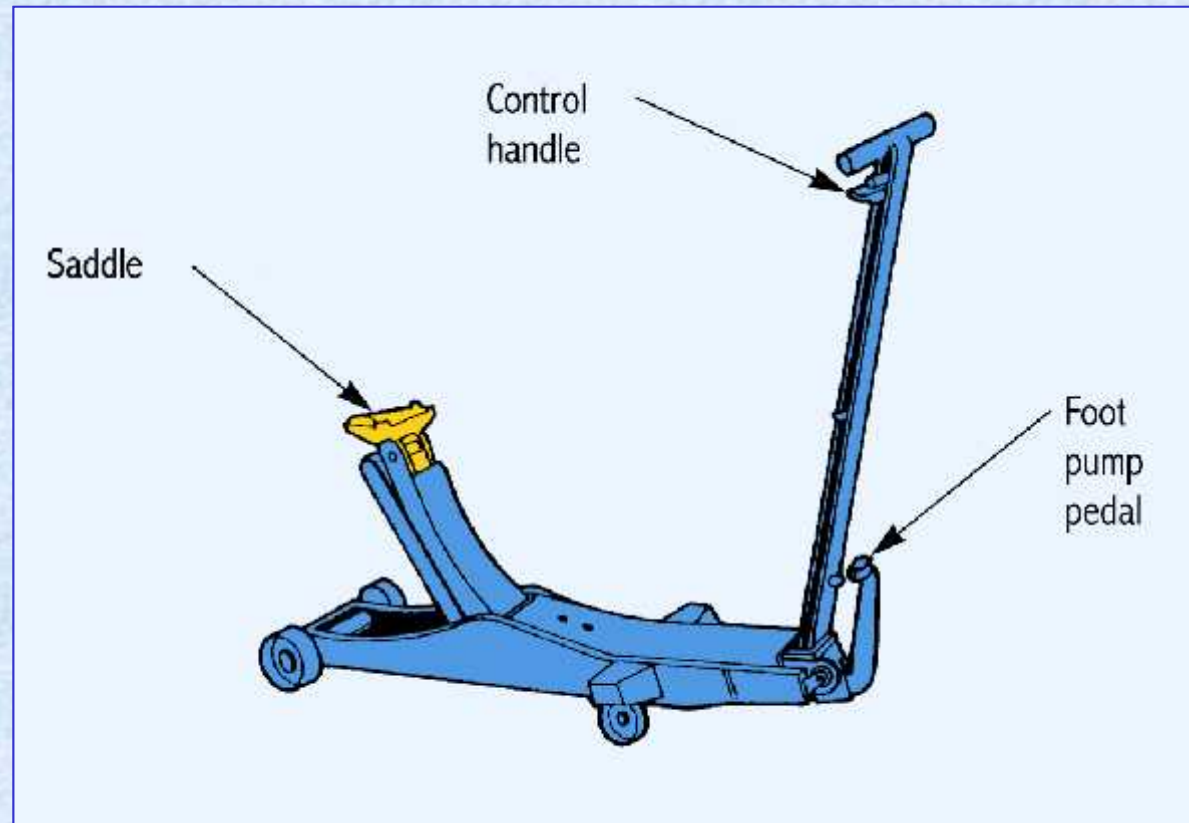
Hydraulic Tools

- ❑ Tools powered by pressurized liquid
- ❑ Typical hydraulic tools used in the automotive shop:
 - jacks
 - cranes
 - presses

Floor Jack

- ❑ Used to raise either the front, sides, or rear of a vehicle
- ❑ To avoid vehicle damage, place the saddle under a solid part of the car, such as the frame, suspension arm, or axle housing

Floor Jack



Raising a Vehicle

- ❑ Place the transmission in neutral and release the parking brake
 - allows the vehicle to roll, preventing it from pulling off the jack
- ❑ Turn the jack handle clockwise and pump the handle
- ❑ After raising, secure vehicle on jack stands, shift it into park, apply the parking brake, and block the wheels

Lowering a Vehicle

- ☐ Use the jack to lift the vehicle off the jack stands
- ☐ Remove the jack stands, shift the vehicle into neutral, release the parking brake, and remove the wheel chocks
- ☐ Turn the handle counterclockwise slowly to release the pressure-release valve

Transmission Jack

- ❑ Designed to hold transmissions and transaxles during removal and installation
- ❑ May be similar to a floor jack (low)
- ❑ May use a long post that can reach high into the air for use when a car is on a lift

Transmission Jack

This hydraulic stand
can be extended to
a height of 72"



Engine Crane



Uses a hydraulic hand jack for raising engines and a pressure-release valve for lowering engines

Hydraulic Press

- ❑ Used to install or remove gears, pulleys, bearings, seals, and other parts requiring a high pushing force
- ❑ A hydraulic ram extends as the pump handle is worked
- ❑ The ram presses the parts against a table

Hydraulic Press



Shop Equipment

- ❑ There are various pieces of shop equipment that a technician may find useful
- ❑ These include:
 - tire changers
 - stands
 - cleaners
 - welders
 - lights and creepers

Arbor Press

- ❑ Creates pressing force by mechanical means
- ❑ Operating pressure is much lower than that created by a hydraulic press
- ❑ Suited for smaller jobs

Tire Changer

- ☐ Used to remove and replace tires on wheels
- ☐ May be pneumatic or hand operated
- ☐ Do not attempt to operate a tire changer without training and supervision
- ☐ Follow the manufacturer's directions

Jack Stands



After raising a vehicle with a jack, always support it with jack stands placed under the frame, axle housing, or suspension arm

Engine Stand

- ❑ Used to hold an engine once it is removed from the vehicle
- ❑ The engine bolts to the stand
- ❑ The engine can usually be rotated and held in different positions, making it easy to work on

Cold Solvent Tank



Contains a pump, reservoir, and solvent—
used to remove grease and oil from parts

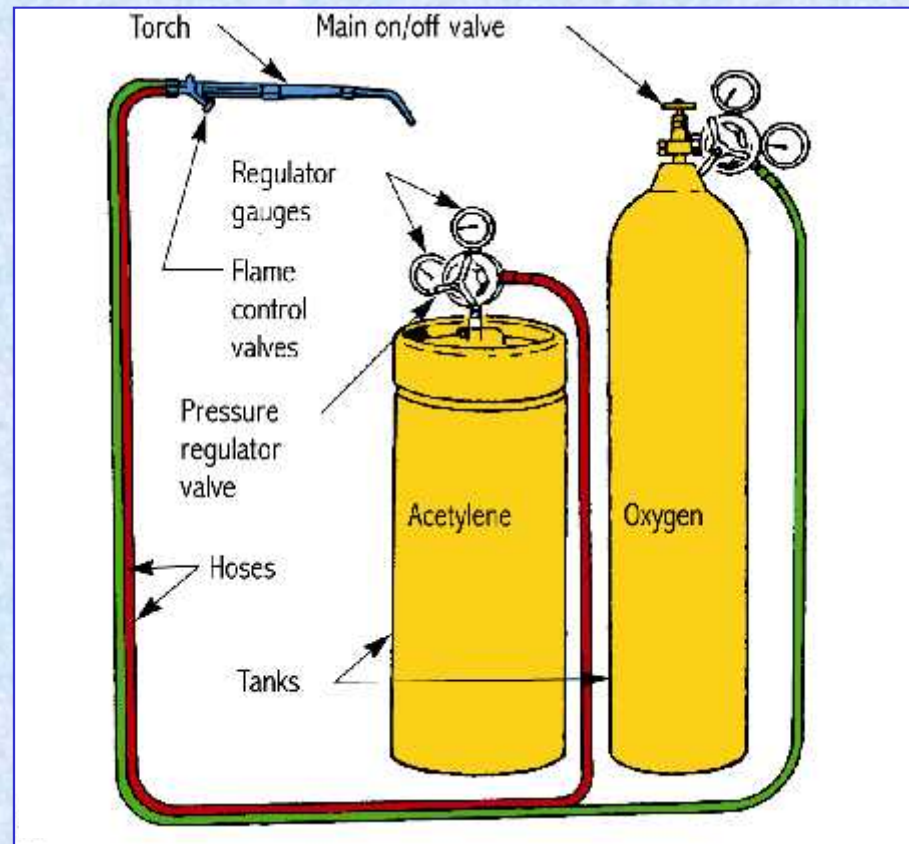
Steam Cleaner and High-Pressure Washer

- ☐ Used to remove heavy deposits of dirt, grease, and oil from the outside of large assemblies, such as engines, transmissions, and transaxles
- ☐ Wire brush the item to be cleaned and collect oil-soaked dirt before washing
- ☐ Dispose of the oil-soaked material properly

High-Pressure Washer



Oxyacetylene Torch

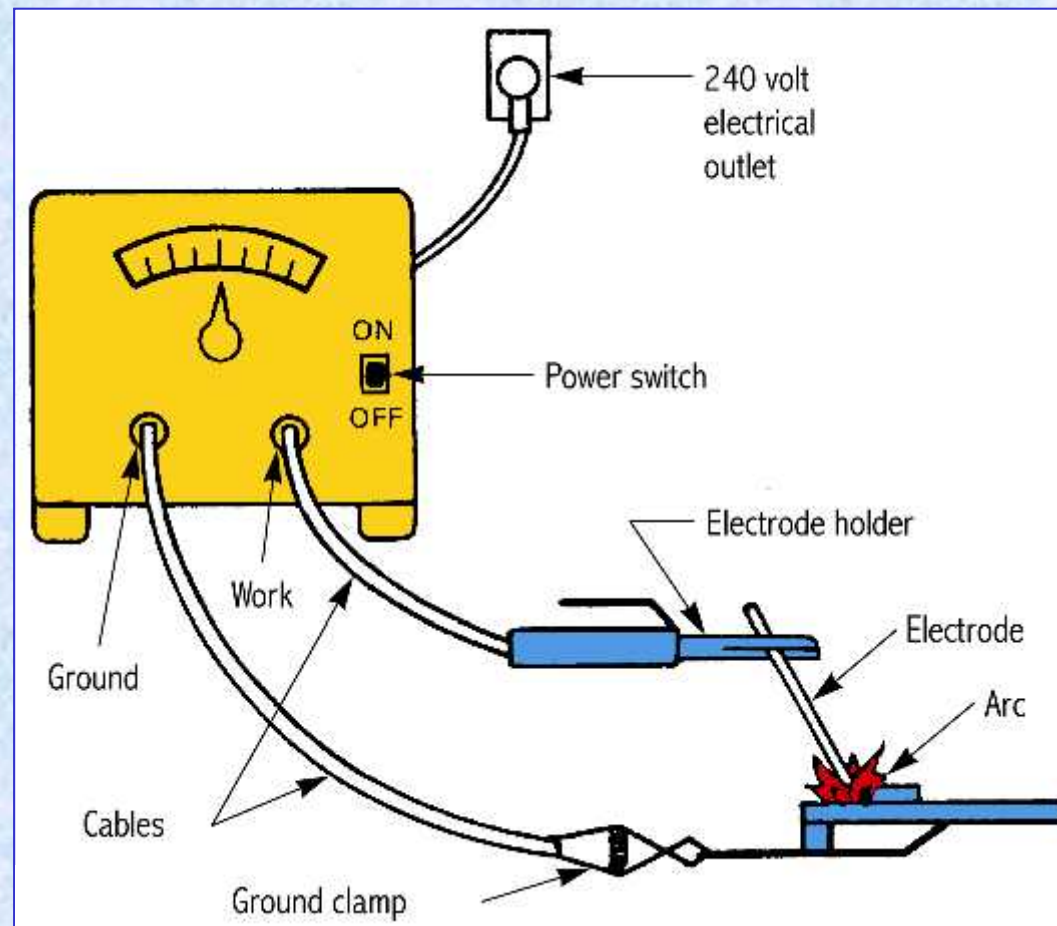


Used to cut, heat, weld, or
braze metal parts

Welder

- ☐ Uses high current to create an electric spark, or arc
- ☐ The arc is hot enough to melt and fuse metal parts together
- ☐ Be sure to complete proper training before attempting to weld

Arc Welder

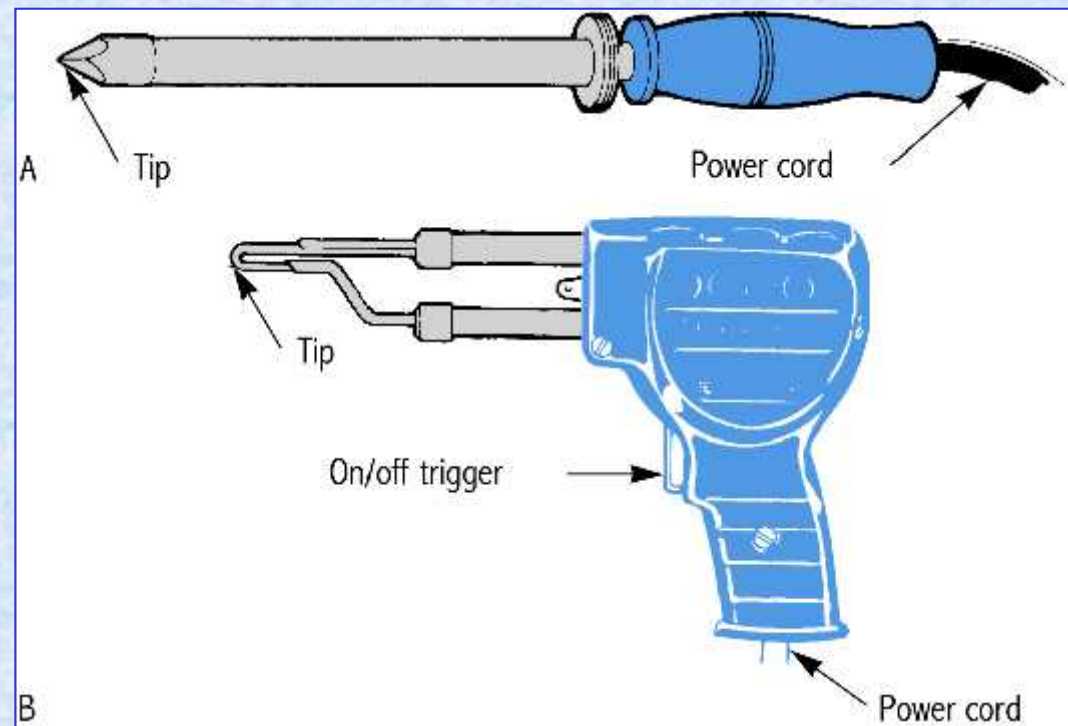


Soldering Gun (Iron)

- ❑ Used to join wires
- ❑ Electric current heats the tip of the gun
- ❑ The hot gun tip is used to heat the wires
- ❑ Solder is applied to the hot wires and it melts
 - solder is a lead-tin alloy
- ❑ When the solder cools, it hardens into a strong, solid connection

Soldering Gun (Iron)

- A. Soldering iron
- B. Soldering gun



Battery Charger

- ☐ Used to recharge a dead car battery
- ☐ Forces current back into the battery to recharge the plates and battery acid
- ☐ The red charger lead connects to the positive (+) battery terminal
- ☐ The black charger lead connects to the negative (-) battery terminal
- ☐ Connect the leads before turning on the charger to avoid arcing

Droplight

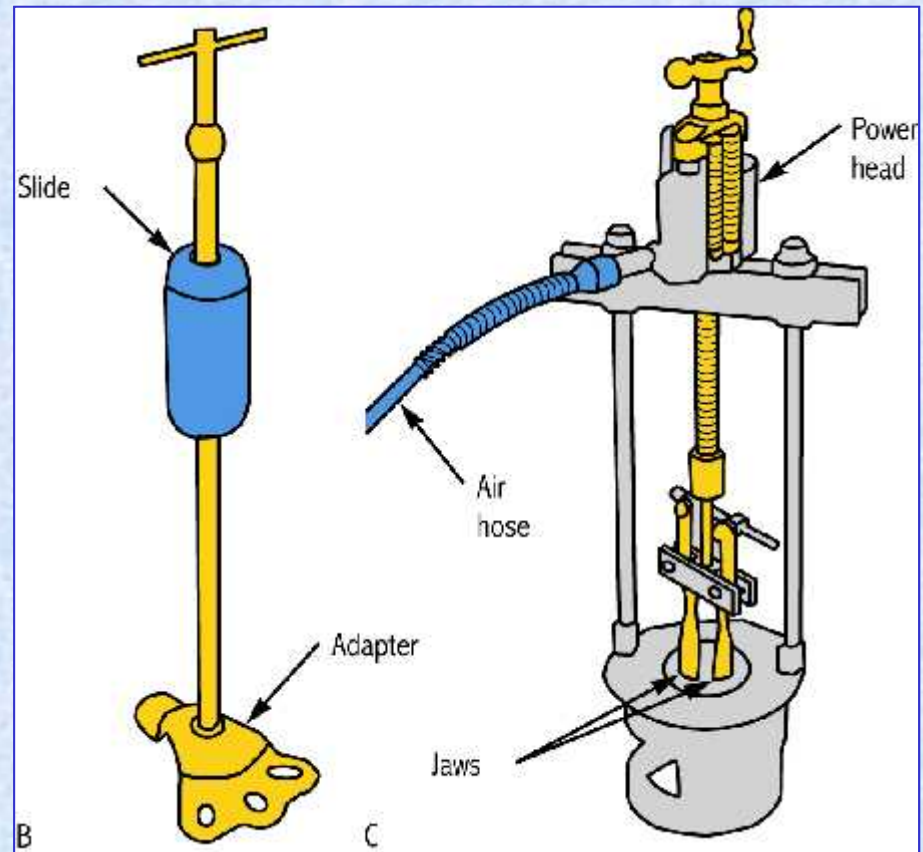
- ❑ Provides a portable source of light that can be taken to the repair area
- ❑ Beware of an electric shock hazard when working on a wet vehicle
- ❑ Use caution when using a droplight around fuel
 - if you drop a light on the floor, a bursting bulb can ignite gasoline

Pullers

- ❑ Used to remove seals, gears, pulleys, steering wheels, axles, and other pressed-on parts
- ❑ Always wear safety glasses when using pullers
 - pullers exert tons of force, which can cause parts to break and allow pieces to fly off

Types of Pullers

- A. Three-way puller
- B. Slide hammer puller
- C. Power puller



Jumper Cables

- ❑ Used to start a vehicle that has a dead battery
- ❑ Cables are connected between the dead battery and another battery
- ❑ Once the cables are connected, the car with the dead battery can be started

Jumper Cables



Using Jumper Cables

- ☐ Connect the red jumper to the positive terminal on the dead battery
- ☐ Connect the red jumper to the positive terminal on the good battery
- ☐ Connect the black jumper to the negative terminal on the good battery
- ☐ Connect the black jumper to a ground on the vehicle with the dead battery
- ☐ Remove the cables in reverse order

Creepers

- Creeper

- useful when working under a car supported by jack stands

- Stool creeper

- allows the technician to sit while working on parts that are near the ground

Creepers



A. Creeper

B. Stool creeper

Roll-Around Cart



Handy for taking a number of tools
to the job

Fender Covers



Placed over body sections to protect the paint or finish from nicks, scratches, and grease

Seat Covers



Placed over seats to protect them from
dirty work clothes