

TECHNICAL RESCUER

TR; General Series
Rescue Equipment

OBJECTIVES

- × Describe /demonstrate the basic non-powered (hand-operated) equipment.
- × Describe or demonstrate use of basic powered rescue equipment.
- × Describe and demonstrate inspecting, servicing, and maintaining rescue apparatus, equipment, and tools.
- × Describe and discuss Portable Fire Extinguishers

OBJECTIVES

- × Describe in the function of software equipment including ropes used for rope rescue operations.
- × Describe in the function of hardware equipment used for rope rescue operations.

INTRODUCTION TO RESCUE EQUIPMENT

- ✘ Rescue skills and techniques have changed very little over the years.
- ✘ The development of newer and lighter equipment is making rescue operations easier and safer.
- ✘ Maintain a working knowledge inspecting and using our equipment so that we can rapidly adapt to a particular emergency scene.

RESCUE DISCIPLINES

(LIST NON-POWERED EQUIPMENT USED IN EACH)

- × Confined Space Rescue
- × Trench Rescue
- × Water & Ice Rescue
- × Low/High Angle Rescue
- × Large Animal Rescues
- × USAR/ Structural Collapse
- × Motor Vehicle Extrications
- × Big Rig & Agricultural Rescues



HAND TOOLS

HAND TOOL CATEGORIES

- × Striking tools
- × Cutting Tools
- × Snipping tools
- × Prying Tools
- × Pulling Tools
- × Stabilization / Lifting Tools

STRIKING TOOLS

FLAT HEAD AXE



- × 6 pound and 8 pound models
- × 8 pound version is much more efficient
- × Ability to strike another tool or an object is advantageous

SLEDGEHAMMER, MALLET



- 8, 10, 12, & 16 pound varieties
- Handle length varies

- ✘ Can be used to drive another tool
- ✘ Breaching masonry
- ✘ Breaking down doors
- ✘ Limited use tool

PUNCH

- × Used to break tempered auto glass
- × Spring Loaded
- × Seat Belt Cutter
- × Striking Punch



BATTERING RAM



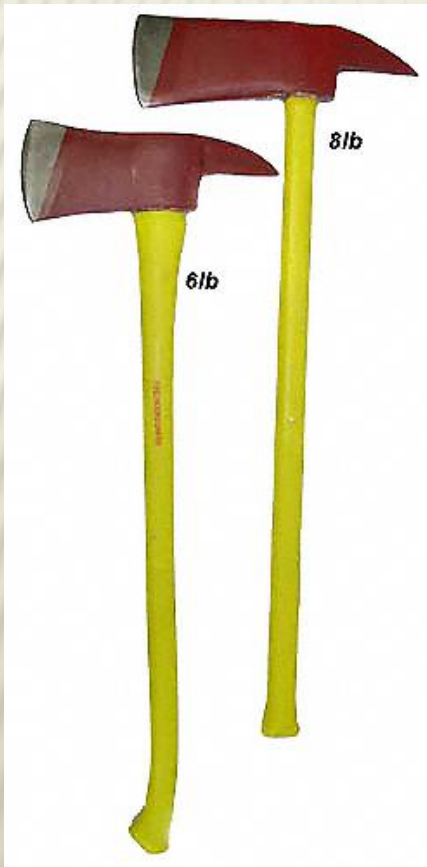
- × The original forcible entry tool, dates back to biblical times
- × Used to batter down doors
- × Can be used to breach walls
- × Takes practice and teamwork
- × Modern hydraulic tools have made this tool almost obsolete

STRIKING TOOL MAINTENANCE

- ✘ Striking tool handles should be solid and well set into the head.
- ✘ Handles can be protected from fracturing by securing rubber tubing or tape (duct tape or electrical tape) around the handle near the head.
- ✘ Striking surfaces should be routinely serviced.
- ✘ Axes or pointed tools should be kept sharp, but not be razor sharp.
- ✘ Blunt striking surfaces should be kept free of chips or cracks.
- ✘ Lightly oil head of striking tool. Never Paint!

CHOPPING TOOLS

CHOPPING TOOLS; PICK HEAD AXE



- × 6 pound and 8 pound varieties
- × Primarily a cutting tool
- × Proper use takes lots of practice
- × Pick can be used to start a hole
- × 8 pound version is much more efficient

FLAT HEAD AXE



- × 6 pound and 8 pound models
- × 8 pound version is much more efficient
- × Ability to strike another tool or an object is advantageous

CHOPPING TOOL MAINTENANCE

- ✘ Chopping tool heads should not be re-painted.
- ✘ Chopping tool heads should be covered with a thin coat of light grade oil such as silicone lubricant or light machine oil.
- ✘ Chopping tool head should have a slightly sharp edge but NOT razor sharp.
- ✘ Chopping tool handles should be checked for fractures, looseness and warping.

CUTTING /SNIPPING TOOLS



CUTTING TOOLS



HAND SAWS



KNIVES

WARTECH
USA



BOLT CUTTERS



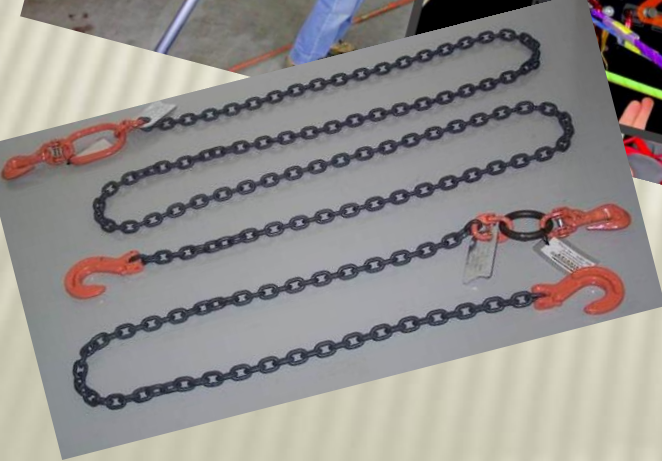
- × Used to cut chain, padlocks, shackles, and fencing
- × Long handled versions provide better leverage
- × Not suitable on case hardened or high security locks

CUTTING TOOL MAINTENANCE

- ✘ All handsaws should be free of rust, kept sharp or replaced when dulled and lightly oiled.
- ✘ Knife blades should be sharpened or replaced after each use.
- ✘ A thin coat of lubricant/oil can be used to extend the life of hand saws

PULLING TOOLS

PULLING TOOLS



PULLING TOOL MAINTENANCE

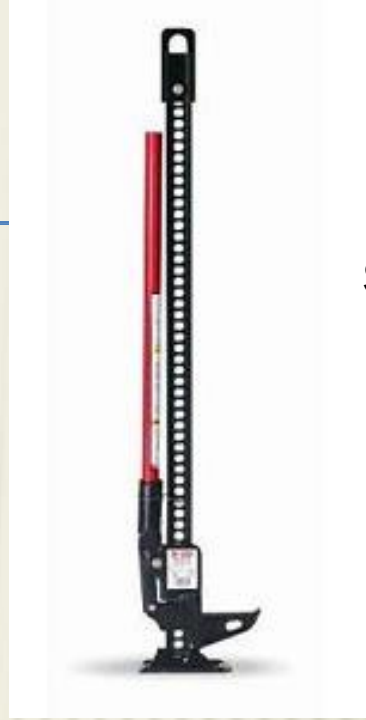
- × Cables and chains should be periodically inspected especially after being subjected to high stress and or heavy loads.
- × Chains and cables should be rated for pulling a specific load.
- × Check manufacturer's recommendations for rated capacity.
- × Check for bad weld points, cracked chain, heavy oxidation, frayed or broken cable strands, severe nicks, elongation, and bent links.
- × Destroy and discard damaged cables and chains.
- × Point out that according to the National Safety Council there is a maximum allowable wear (MAW) for chains.
- × Chain size- 1" MAW= $7/32$ ".
- × Chain size- 1 1/2" MAW= $5/16$ ".

JACKS; LIFTING/STABILIZATION



Cribbing

WARNING:
Watch For Knots in Wood.
Affects Strength



High Lift “Ratcheting Jack”



Screw Jack

Trench Rescue Struts



Stabilization strut



*“Give me a lever long enough and a fulcrum strong enough,
and single-handedly I can move the world.”*

-Archimedes

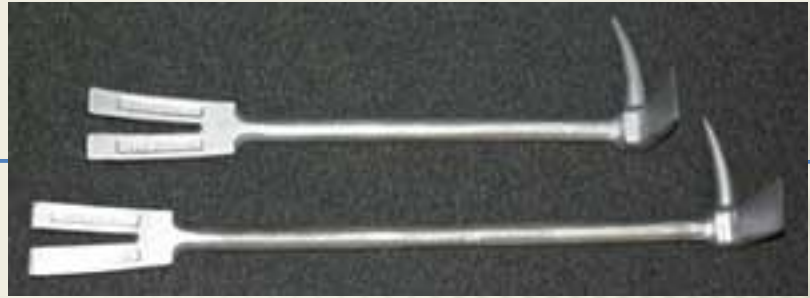
PRYING TOOLS

PRY BAR



- × Range in size from 3 feet to 5 ½ feet
- × Can have a pinch bar or a wedge-point bar
- × Pinch bar (top) has a sloping chisel like bevel
- × Wedge point (bottom) has a bevel on both sides
- × Used mostly for moving heavy objects during collapse rescue, heavy rescue, or industrial situations

HALLIGAN BAR



- × Developed by Deputy Chief Hugh Halligan of FDNY in the 1940's
- × Mainstay forcible entry tool, the other half of “the irons”
- × Range in length from 20-42 inches, with 30 inches being the best for daily use
- × Has a fork end, an adze, and a pick

HALLIGAN BAR

× Special uses

- + Adze end can cut bolt heads
- + Pick end can break padlocks, lift manhole covers
- + Fork end can cut metal, break padlocks
- + Self-defense
- + Self-rescue

× Limitations

- + There are few, if any, limitations to a true halligan bar

THE IRONS



- ✘ Flathead axe married with a halligan bar
- ✘ Preferably an 8 pound axe and a 30” halligan
- ✘ The mainstay of every engine and ladder company
- ✘ All forms of forcible entry, breaching walls, ventilation, overhaul, search, utility control, salvage, and forcible exit
- ✘ Nearly all firefighting operations can be completed with a set of irons

KELLY TOOL/BAR

- × Similar to Halligan
- × Does not have a pick or spike.
- × Can be used as a striking or prying tool.



ELEVATOR KEYS



- × Used to open elevator doors without causing damage
- × Many different styles of lock
- × Communities may only use one key

POWERED RESCUE EQUIPMENT

POWERED RESCUE EQUIPMENT USES:

- ✘ Structural Collapse
- ✘ Vehicle Accidents
- ✘ Industrial Accidents
- ✘ Agricultural Accidents



POWER TOOLS

Hydraulics



Air Compressors



Generators



Saws



Lighting



Blowers





SPREADERS



RAMS



**JUNCTION
BLOCK**

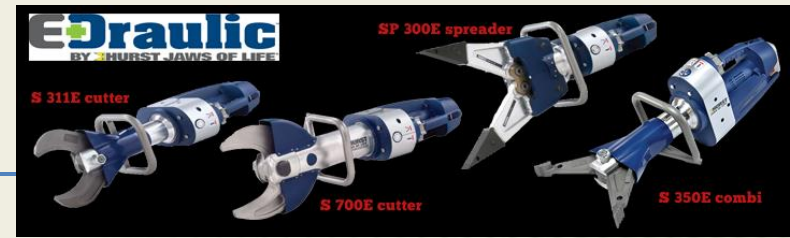
CUTTERS



HOSES

HYDRAULICS!!!

HYDRAULICS



- × Spreaders.
- × Shears.
- × Combination spreader/shears.
- × Extension rams.
- × Porta-power tools.
- × Hydraulic jacks.



HYDRAULIC RESCUE TOOLS

HYDRAULIC SPREADERS



HYDRAULIC SPREADERS

- × Used for:
 - + Stabilizing, Lifting, Displacing, & Pulling
- × Weighs about 35-50 lbs.
- × Weakest as it begins to open
- × Maximum Capacity at widest spread
- × Spreads 24-40"
- × Fluids Phosphate Ester; Glycol
- × Greater force when spreading
- × 50% loss of power when pulling

- ✘ Gain Purchase Point First To Permit Tips To Get Leverage.
- ✘ When Displacing A Door, Use Either Hinge First Or Bolt First Method.
- ✘ Single (Boss Tool) Or Double Action
- ✘ Do Not Spread Directly On The Hinges. Only Above Or Below.
- ✘ When Using The Spreader To Pull A Steering Column, Shackles Must Face Up.
- ✘ Avoid Bringing Shackles Together.

HYDRAULIC SPREADERS

- + Inspection and cleaning should follow each use.
- + Check for proper fluid levels.
- + Check for cracks and dents in the body and arms of the spreader.
- + Check alignment of the arms.
- + Follow the manufacturer's guidelines for any additional maintenance requirements.



HYDRAULIC SHEARS/CUTTERS



HYDRAULIC CUTTERS

- × ~~Single Action (Spring retracts blade)~~
- × Double Action (Hydraulics retracts blade)
- × Curved blades (O-Cutter)
- × Straight blades (SB Cutter)
- × Serrated blades
- × ALWAYS CUT AT RIGHT ANGLES
- × MAXIMUM CUTTING FORCE IS APPLIED AT THE NOTCH,
- × CUT POSTS AS LOW AS POSSIBLE
- × Will shear objects & launch them!!

HYDRAULIC SHEARS/CUTTERS

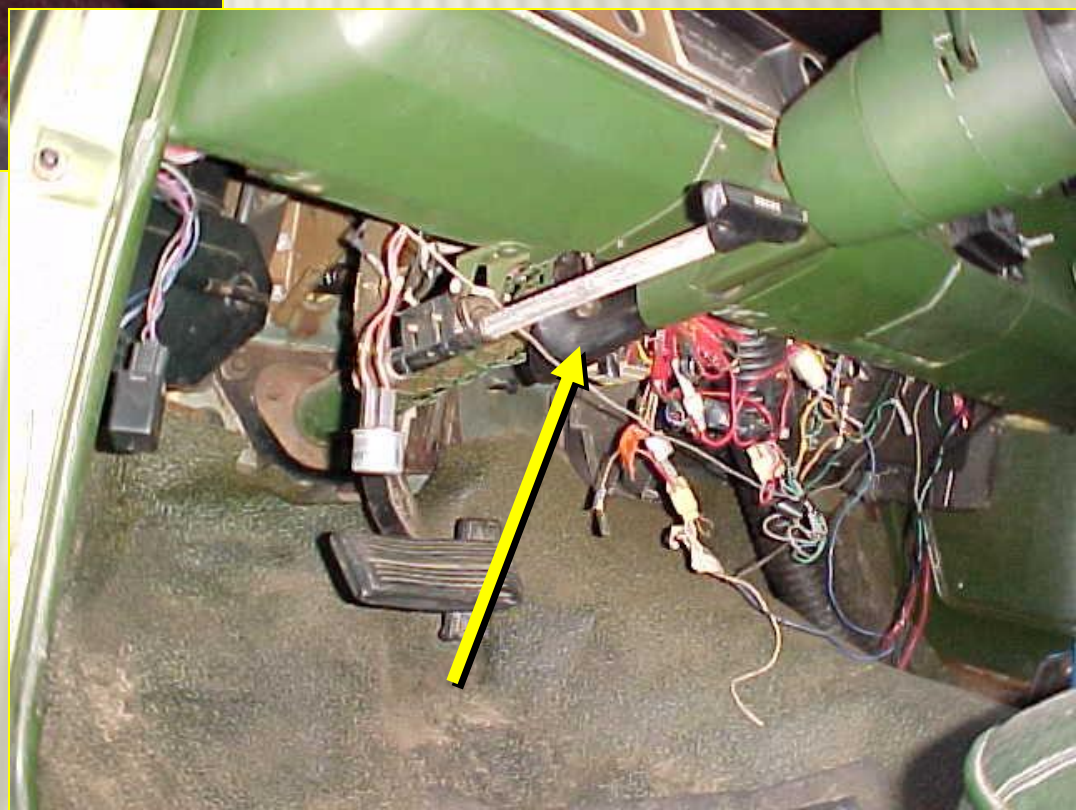
- + Inspection And Cleaning Should Follow Each Use.
- + Check For Proper Fluid Levels.
- + Check For Cracks And Dents In The Body And Blade.
- + Check Alignment Of The Arms.
- + Check That All Nuts, Bolts, Retainer Rings, Screws, Pins Are In Place And Secured.
- + Follow The Manufacturer's Guidelines For Any Additional Maintenance Requirements.



✘ AVOID STEERING COLUMN PULLS ON FRONT WHEEL DRIVE VEHICLES.



✘ UNIVERSAL JOINTS UNDER DASH MAY FAIL CAUSING THE COLUMN TO VIOLENTLY STRIKE PATIENT



3 Types of Metal NOT to Cut!!!



Cast Iron



Case Hardened



Cold Rolled Steel

Refer To Manufacturer's guidelines for what you can cut!!

HYDRAULIC RAMS



HYDRAULIC RAMS

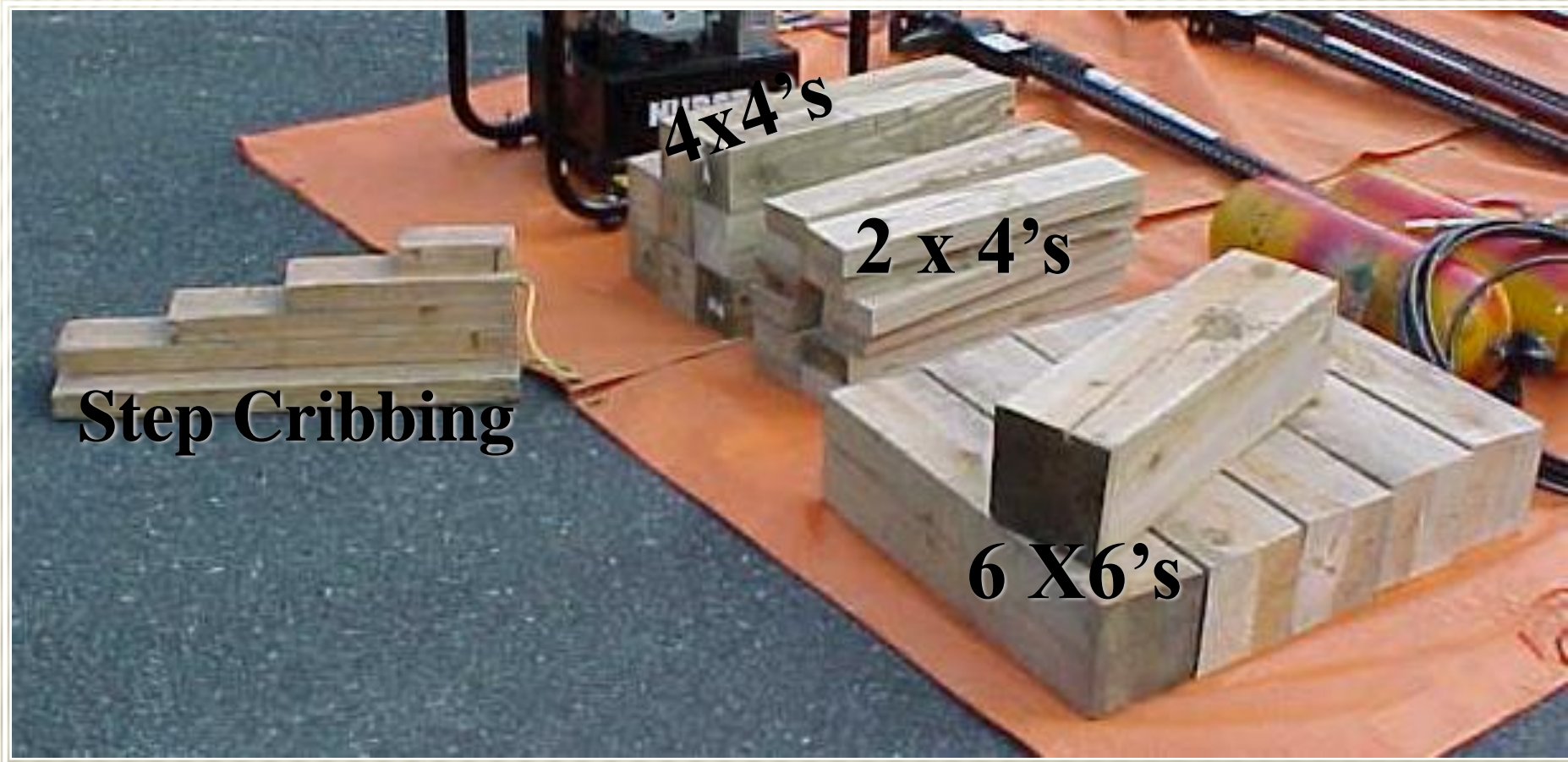
- + Inspection And Cleaning Should Follow Each Use.
- + Check For Proper Fluid Levels.
- + Check For Cracks And Dents In The Body And Plunger.
- + Check The Controller For Proper Operation.
- + Check That All Nuts, Bolts, Retainer Rings, Screws, Pins Are In Place And Secured.
- + Follow The Manufacturer's Guidelines For Any Additional Maintenance Requirements.

HYDRAULIC RAMS



- ✘ Provides An Alternate Dash Push As Opposed To A Column Pull.
- ✘ Can Be Used To Pull Columns, Shore Vehicles For Stabilization
- ✘ Can Produce Forces Up To 40,000 Lbs.
- ✘ Lengths Range From 18" To 60".
- ✘ Dash Roll-up Must Have Relief Cuts In A Post In Order To Hinge.

VEHICLE STABILIZATION



4x4's

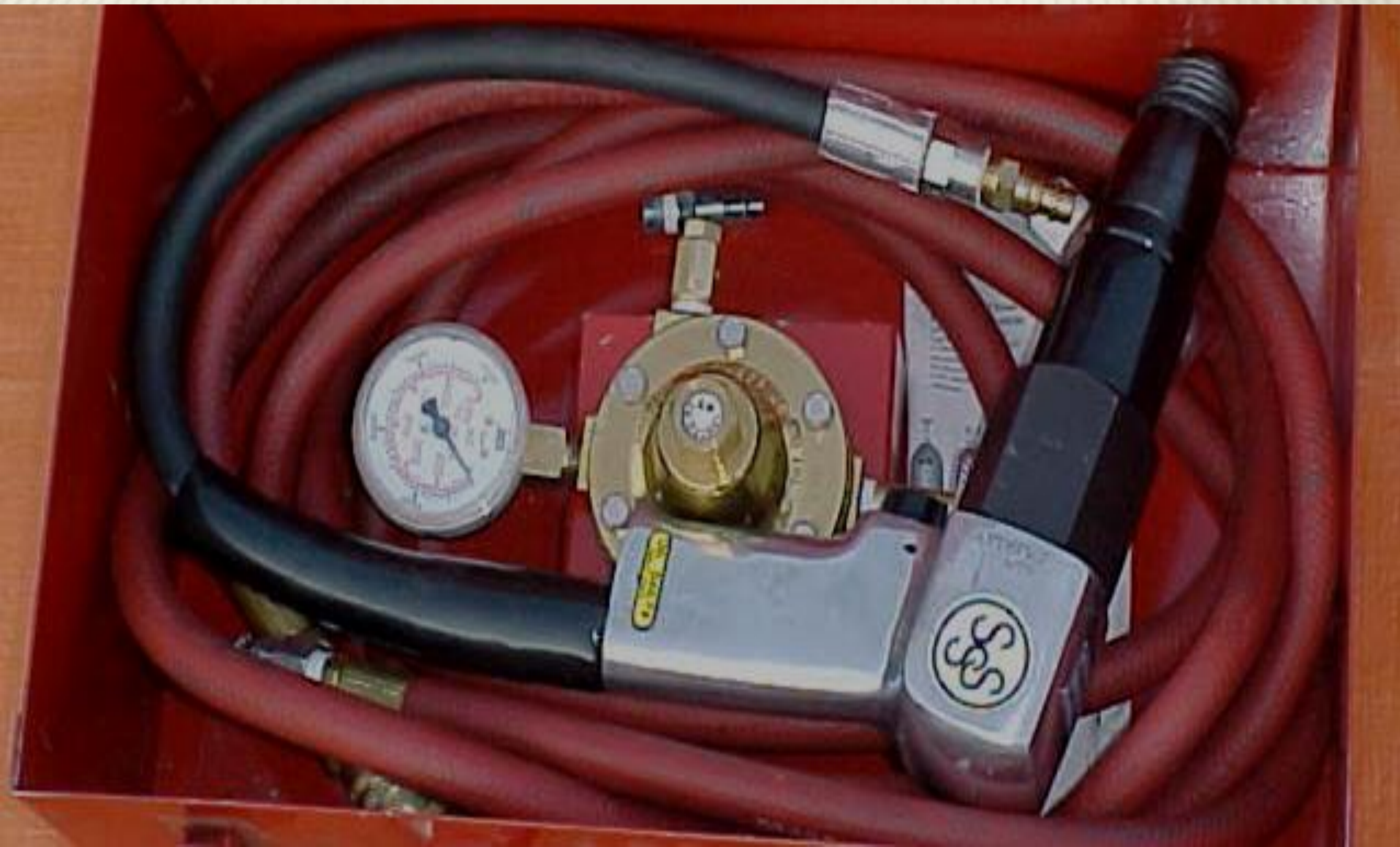
2 x 4's

Step Cribbing

6 X6's

(AIR) PNEUMATIC RESCUE TOOLS

AIR CHISELS



GENERAL INSPECTION PROCEDURES FOR PNEUMATIC AIR CHISELS

Lubricate all internal parts prior to putting tools into service.

- + Inspection and cleaning should follow each use.
 - + Check for proper fluid levels.
 - + Tighten all loose parts.
 - + Keep inlets and exhaust free of debris.
 - + Keep all bits sharpened.
- ✘ Follow the manufacturer's guidelines for any additional maintenance requirements.

AIR CHISELS

OPERATING PRESSURES

- ✘ SHEET METAL
100-150 PSI
- ✘ CORNER POST & SUPPORTS
120- 160 PSI



-
- ✘ CONCAVE & PANEL CUTTER BLADES
 - ✘ SECURE THE BIT AGAINST AN OBJECT
 - ✘ NEVER EXCEED 200 PSI
 - ✘ TREAT THE CHIESEL AS A LOADED GUN !!!!

PNEUMATIC NAIL GUNS

- × Requires Air Compressor
- × Hoses
- × Fittings...
- × USAR Incidents
- × Trench Incidents
 - + Used For Shoring Lumber



AIR BAGS

PNEUMATIC LIFTING BAGS

HIGH PRESSURE BAGS



HIGH PRESSURE BAGS

× Designed To:

- + Stabilize
- + Lift (Large Weight Short Distances)
- + Displace
- + Operating Pressure 90-120 Psi.
- + Lifts Up To 20 Tons 12 Inches

HIGH PRESSURE BAGS

✘ Lifting Capacity:

+ L x W x PSI

+ 30"x 30"x 118 Psi. = 106,200 Lbs.

+ 1 Ton = 2000 Lbs. $106,200 \div 2000 = 53\text{tons}$

+ Operating Pressure 90-120 Psi.

✘ Lifts Up To 20 Tons 12 Inches

HIGH PRESSURE BAGS

- ✘ Always Utilize Cribbing In Conjunction With Lifting.
- ✘ Stack 2 Bags Even If One Will Do The Job!
- ✘ **Follow Manufacturer's Guidelines When Stacking**
- ✘ Never Stack More Than 2 Bags.
- ✘ Maximum Lift Is Based Upon Smallest Bag. Why?
- ✘ The Higher The Lift The More Instability.
- ✘ Crib Simultaneously On Both Sides
- ✘ Largest Bag On Bottom
- ✘ Lift Lower Bag First Then Upper Bag

HIGH PRESSURE BAGS

- ✘ Avoid Hot Objects Around 220 Degrees.
- ✘ 25' Safe Zone
- ✘ Avoid Sharp Objects
- ✘ Avoid Contact With Chemicals.
- ✘ Terminology When Lifting.

LIFTING BAGS OPERATION

- × Plan the lifting operation.
- × Be familiar with equipment.
- × Follow manufacturer's guidelines.
- × Position bags on solid surface.
- × Top Layer for Air Bag Ops. should be a solid surface
- × A solid layer across top of crib tower and under.
- × Not spaced apart. Doing so will result in the bag pushing cribbing apart and collapsing.
- × Support load with cribbing.
- × When stacking bags follow the manufacturer's guidelines

PNEUMATIC LIFTING BAGS

LOW PRESSURE BAGS

- LIFTS SMALL QUANTITIES LONGER DISTANCES
- 7- 15 PSI
- LIFTS 10,000 LBS OR MORE 48 IN.



POWERED CUTTING RESCUE TOOLS

POWERED CUTTING SAWS

SAWS!



Chainsaw



Miter/ Cut Off



Circular



Reciprocating



Concrete Hydraulic



Wizzer

SAFETY WHILE OPERATING SAWS

- × PPE
 - + Eye Protection *OSHA Requirement
 - + Helmet *OSHA Requirement
 - + Ear Protection *OSHA Requirement
 - + Leather Gloves
 - + Chaps *OSHA Requirement (Chain Saws)
 - + Steel Toed Shoes
- × Fire Extinguisher (metal cutting)
- × Correct Blade for Operation
- × Follow Manufacturer Guidelines
- × Protect Patient from debris/sparks
- × Secure Blades
- × Avoid Flammable or Explosive atmosphere (gas meter)

CHAINSAWS

- × Fuel & Lubricants
- × Chain Characteristics
- × Chain Brake
- × Cleaning
- × Chain Saw Safety Training



WHIZZER SAW

- ✘ Can cut case harden locks and steel up to $\frac{3}{4}$ inches in diameter.
- ✘ Pneumatic or Electrical



RECIPROCATING SAWS

- ✘ Good Application For Corner Post Removal
 - ✘ Optimum For Heavy Gauge Metals
 - ✘ 10-14 tpi (Teeth Per Inch) Demolition Blade
 - ✘ 5-8 tpi for Wood Blade
 - ✘ 6-9" Blade Lengths
- 

RECIPROCATING SAWS

- ✘ Cuts Metal, Steel, Aluminum, Glass ...
- ✘ Various Methods Of Applications
- ✘ Blades Subject To Breakage
- ✘ Use Soap & Water Solution To Lubricate Blade



CIRCULAR SAWS

- × Used for Cutting:

- + Metal
- + Concrete
- + Wood

- × Safety Issues:

- + No Safety Brake
- + Sparks/ Flammable areas/ Extinguisher
- + ***When operating will rotate torsional***
- + Eye protection
- + Respiratory PPE when cutting concrete
- + Hose on saw allows for garden hose connection or use 2 ½ Gal. Water extinguisher.



CUTTING AND BURNING EQUIPMENT



TORCH TOOLS

- × **Oxyacetylene**

 - Look up properties in DOT Guidebook

- × MAPP Gas.

- × Exothermic torch.

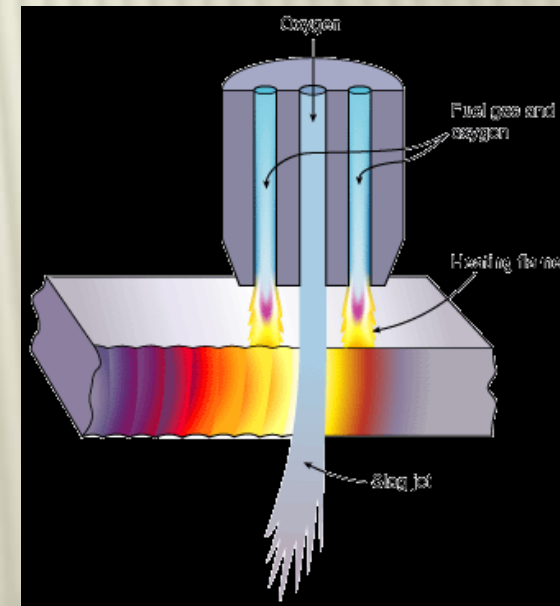
- × Petrogen torch.

- × Plasma cutter.

- × Propane torch.

GAS CUTTING EQUIPMENT

- × **Oxyacetylene**
- × Oxygen & Acetylene
- × Metal Cutting
- × Fire Hazards
- × *Acetylene (Unstable Gas)*
 - + *Never allow Acetylene on its side*
 - + *Unstable Gases Flammable Range*
 - + *LEL: 2.5% UEL: 100%*



GAS CUTTING EQUIPMENT

- × **Propane & MAPP gas.**
- × Used for preheating metal
- × MAPP Little more heat than Propane
- × MAPP 3,670 °F



CUTTING EQUIPMENT

- × **Exothermic torch.**
- × Works by feeding oxygen through an exothermic carbon steel cutting rod that is charged by the 12-volt battery.
- × The rod is put in contact with a steel striker that creates a short circuit arc causing the tip of the rod to heat and spark.
- × By feeding oxygen through the rod when this is happening, the carbon steel rod ignites and the cutting operation can begin.
- × The approximate temperature that a rod produces is over 10,000 degrees Fahrenheit
- × As the rod cuts.. the length shortens



GAS CUTTING EQUIPMENT



- × Petrogen torch
- × Take Fuel From the tank & Oxygen from the cylinder in separate hoses and combines them in the cutting tip.
- × The pressurized gasoline expands rapidly cooling the inside of the tip.
The high velocity of the oxygen moving through the tip creates the flame which burns through the material.

GAS CUTTING EQUIPMENT

- × Plasma cutter
- × The plasma arc formation begins when a gas such as oxygen, nitrogen, argon, or air is forced through a small nozzle orifice inside the torch.
- × An electric arc (220 V) generated from the external power supply is then introduced to this high pressured gas flow, resulting in what is commonly referred to as a “plasma jet”.
- × The plasma jet temperatures are up to **40,000° F**, quickly piercing through the work piece and blowing away the molten material.



POWER-GENERATING / LIGHTING EQUIPMENT

- × Capabilities
- × Safety rules
- × Inverters are Power Plants:
- × Power plants like inverters and generators can convert a vehicles 12 or 24 volt DC current to 110 or 220 volts of AC current.
- × Power Plants support:
 - + fixed lights and portable lights.
 - + Auxiliary lighting equipment such as electrical cables, extension cords, twist lock receptacles, and junction boxes.
 - + Rescue, ventilation equipment



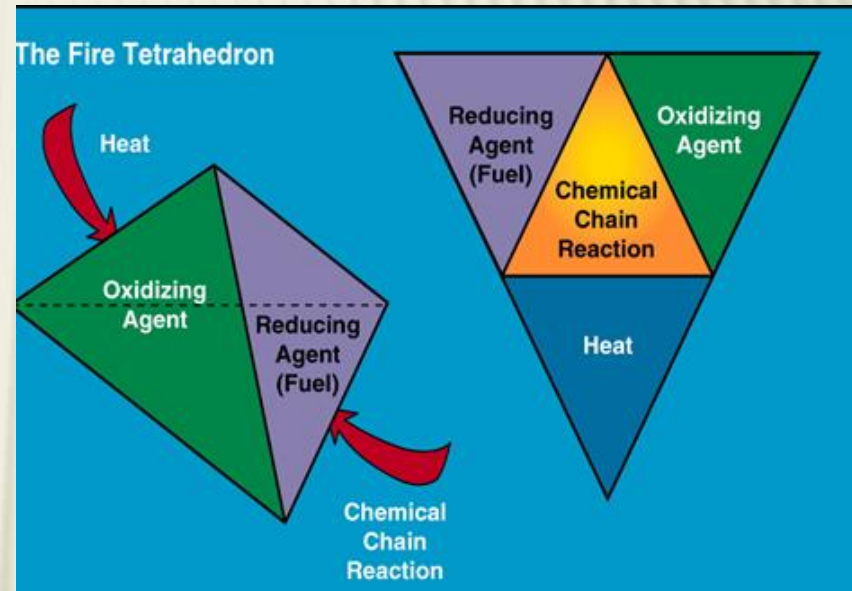


PORTABLE FIRE EXTINGUISHERS



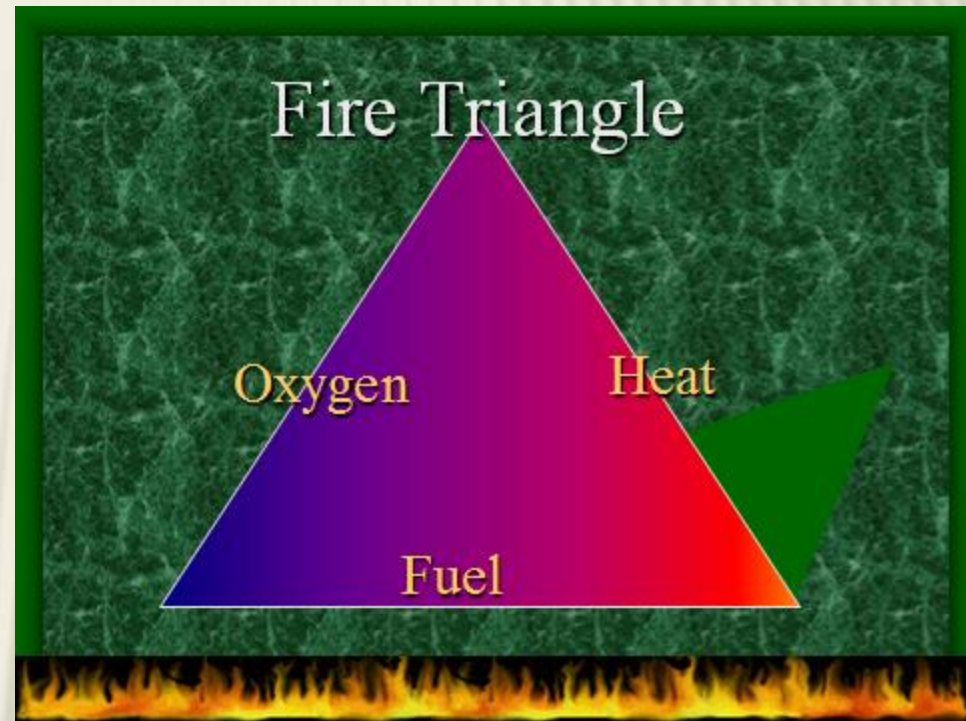
FIRE TETRAHEDRON

- ✘ Chemical chain reaction between three elements.
- ✘ Removal any one of the four elements extinguishes the fire.
- ✘ It is important to use the correct extinguisher for the type of fuel.
- ✘ Using the incorrect agent can allow the fire to reignite after apparently being extinguished successfully.



THE FIRE TRIANGLE

- × Three elements that must be present for a fire to exist.
- × **Heat** to raise the material to its ignition temperature
- × **Fuel** to support the combustion
- × **Oxygen** to sustain combustion,



5 CLASSES OF FIRES



× Class A



× Class B



× Class C



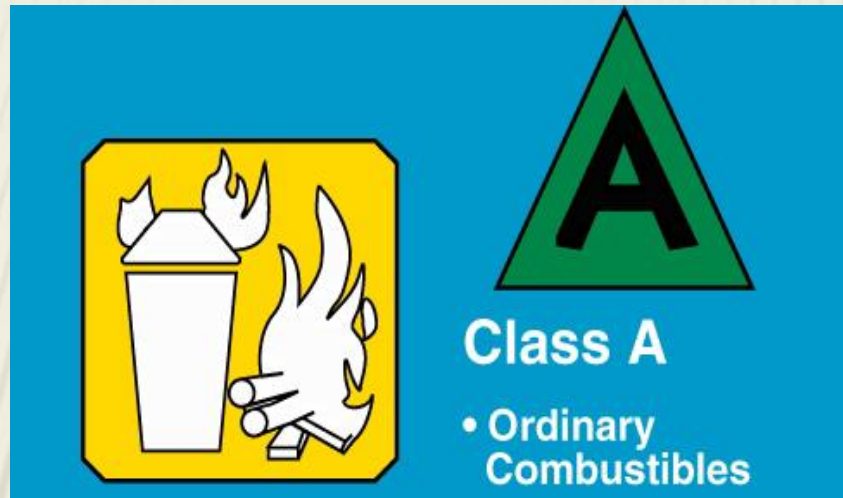
× Class D



× Class K



CLASS A



Plastics

Woods

Paper

Clothing

Rubber

**Most Household
Products**

CLASS B



Class B

- Flammable Liquids and Gases

Gasoline

Diesel Fuel

Flammable Liquids

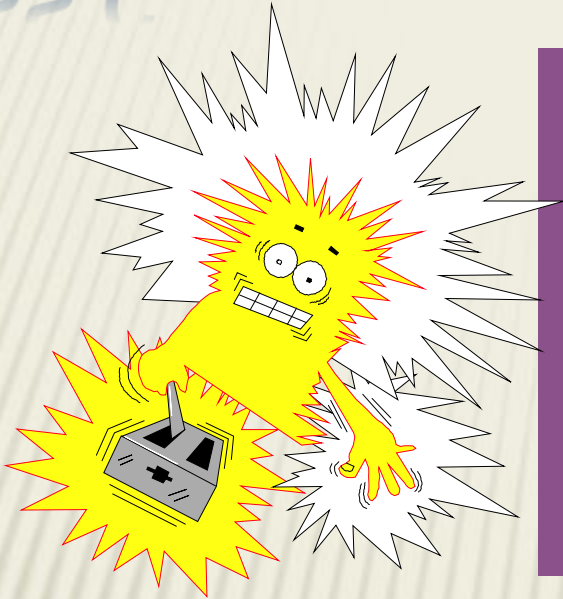
Combustible

Liquids

Solvents

Alcohols

CLASS C

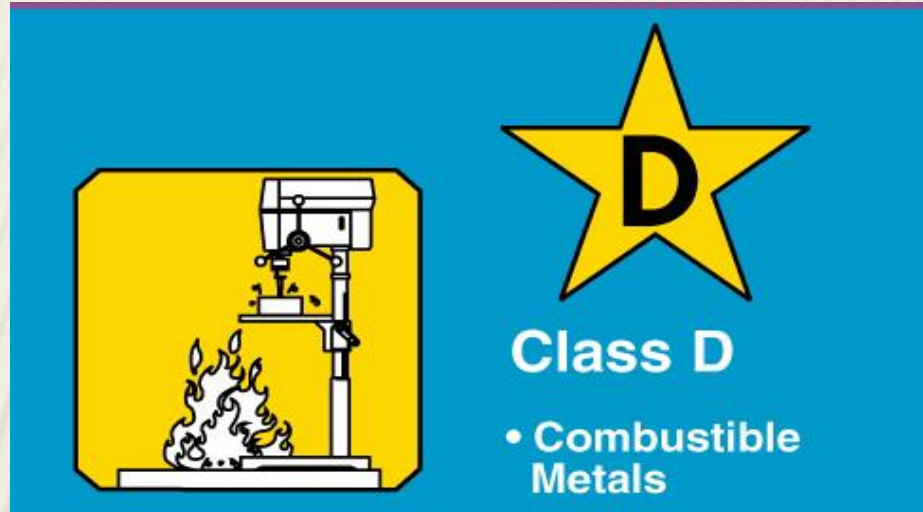


**Must be
ENERGIZED!!**

**Motors
Transformers**

**Batteries
Electrical panels
Meters**

CLASS D



**Specialized
Metals
Magnesium**

**White flames
Intensified
by: H₂O**

CLASS K

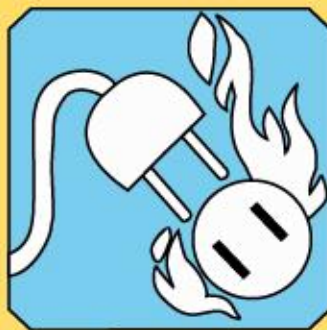


- × Involved Cooking Oils.
- × Wet chemical is a new agent that extinguishes the fire by removing the heat of the fire triangle
- × Prevents re-ignition by creating a barrier between the oxygen and fuel elements.
- × Used primarily in Kitchens
- × Pre-piped commercial hood systems



TYPICAL PICTOGRAPHS

5-11



Pictographs for extinguishers suitable for Class B and Class C fires, but not for Class A fires



Pictographs for extinguishers suitable for Class A fires, but not for Class B and Class C fires



Pictographs for extinguishers suitable for Class A and Class B fires, but not for Class C fires

EXTINGUISHER RATING SYSTEM

5-9

LETTERS indicate the fuel class on which the extinguisher will be effective.



Ordinary
Combustibles



Flammable
Liquids



Electrical
Equipment



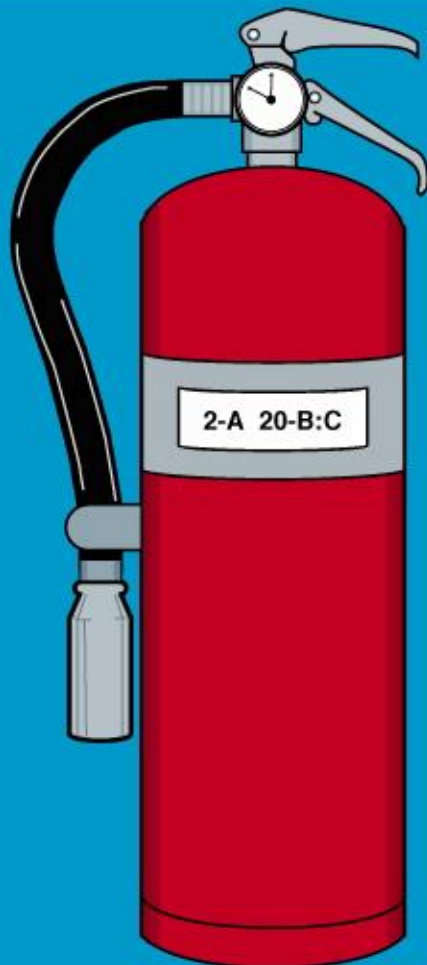
Combustible
Metals

NUMBERS indicate the relative effectiveness of the extinguisher:

For example,

- A 2-A extinguisher extinguishes twice as much fuel as a 1-A extinguisher.
- A 20-B extinguisher extinguishes 20 times as much fuel as a 1-B extinguisher.

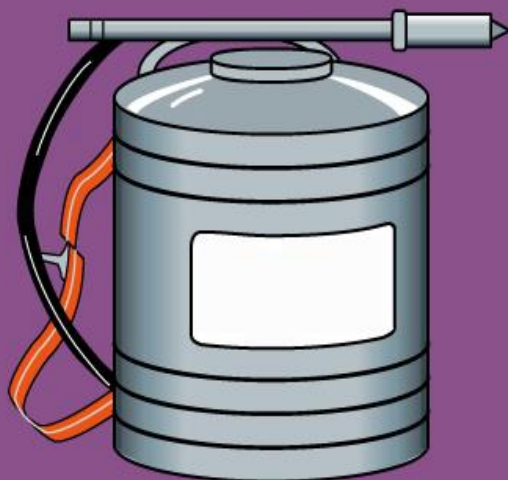
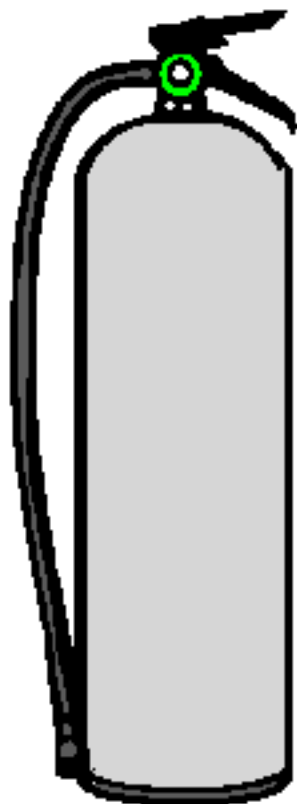
Numbers are used with letters on Class A and Class B extinguishers only.



CLASS A EXTINGUISHER – RATED 1-A THROUGH 40-A.

PUMP-TANK WATER

5-1



Backpack



Pump Can

Size

1½ gal to 5 gal
(6 L to 20 L)

Application

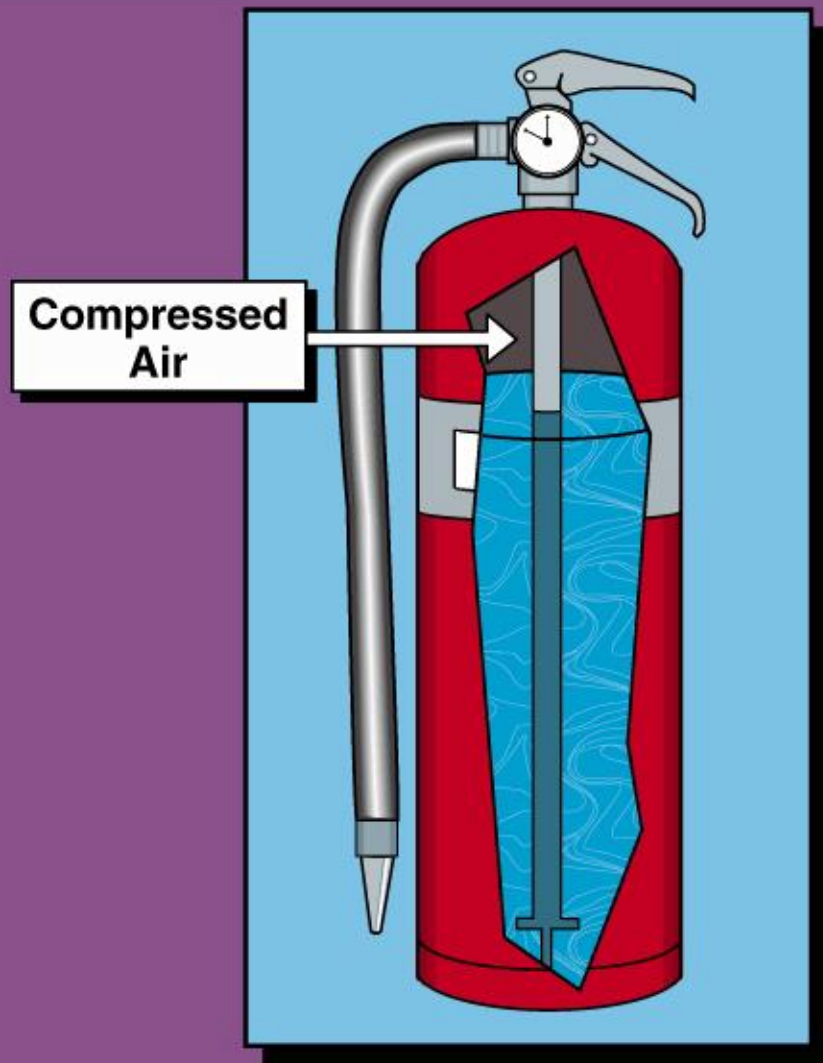
Class A Only

Operating Principle

Hand Pump

CLASS A EXTINGUISHER – STORED-PRESSURE WATER

5-2



Size

1¼ gal to 2½ gal
(5 L to 10 L)

Application

Class A Only

Operating Principle

Air Pressure

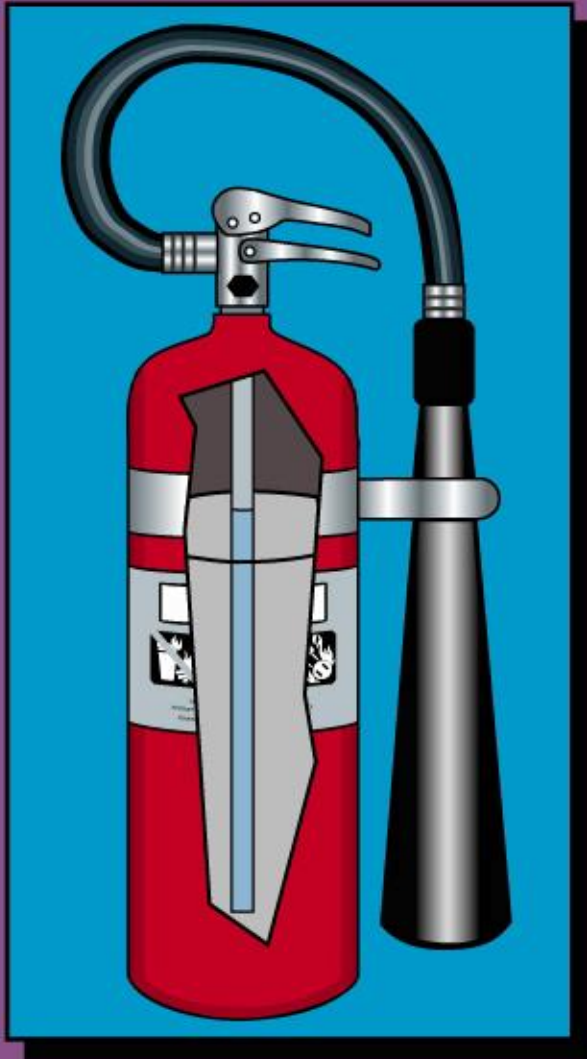
CLASS B EXTINGUISHER – RATED 1-B THROUGH 640-B.



- Are Very Rare
- Located in Areas Where the Specific Hazard Exist
- Similar to the ABC
- Dry Powder

CARBON DIOXIDE

5-5



Size

2½ lb to 20 lb
(1 kg to 9 kg)

Application

Classes B and C

Operating Principle

Liquefied
Compressed Gas

CO2 FIRE EXTINGUISHER

- × Carbon Dioxide fire extinguishers extinguish the fire by taking away the oxygen element of the fire triangle.
- × Also removes the heat with cold discharge.
- × Carbon dioxide can be used on Class B and C fires.
- × Ineffective on Class A fires.

CLASS B&C EXTINGUISHER

- Utilized for Energized Electrical Equipment
- Excellent Cooling Capabilities
- Distinguished by the Discharge Horn
- Static Electricity

HALON

5-4



Size

2½ lb to 20 lb
(1 kg to 9 kg)

Application

Classes B and C

Operating Principle

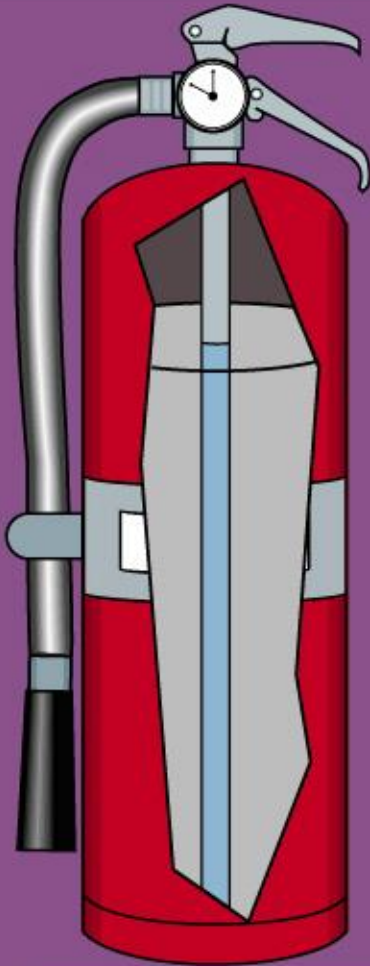
Liquefied
Compressed Gas

HALON EXTINGUISHERS

- × Halogenated or Clean Agent extinguishers include the halon agents as well as the newer and less ozone depleting halocarbon agents.
- × Extinguish the fire by interrupting the chemical reaction of the fire triangle.
- × Clean agent extinguishers are primarily for Class B and Class C fires. (FM 200)
- × Some larger clean agent extinguishers can be used on Class A, Class B, and Class C fires.

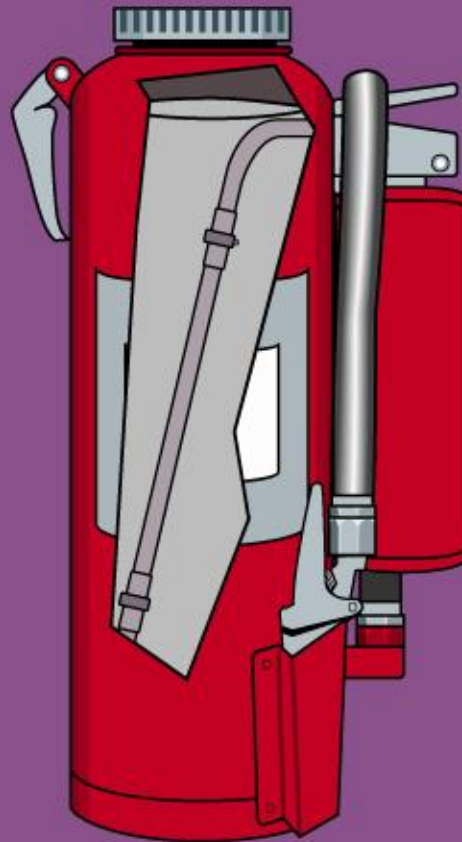
DRY CHEMICAL

5-6



Stored-Pressure

Cartridge-Operated



Size

2½ lb to 30 lb
(1 kg to 14 kg)

Application

Ordinary Base —
Classes B and C

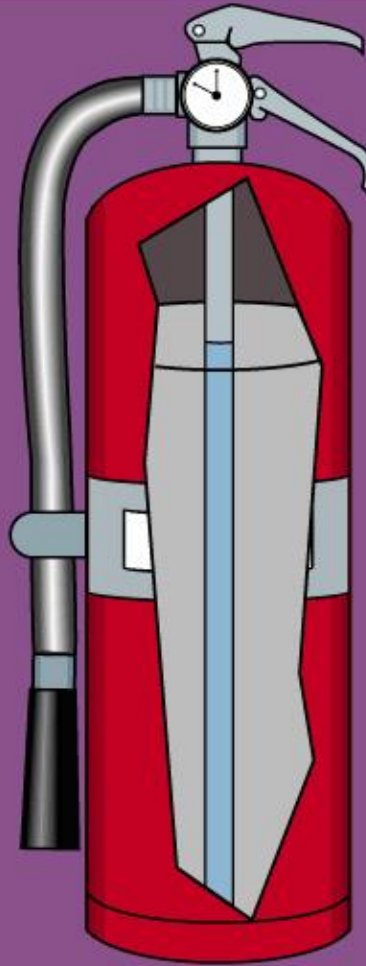
Multipurpose —
Classes A, B, and C

Operating Principle

Stored Pressure
or Gas Cartridge

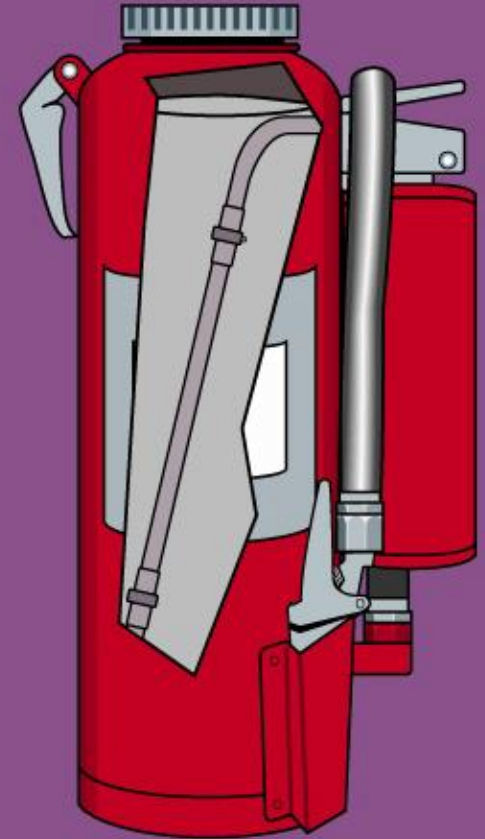
DRY CHEMICAL

- ✘ Extinguish the fire primarily by interrupting the chemical reaction.
- ✘ Ordinary dry chemical is for Class A B and Class C fires



Stored-Pressure

Cartridge-Operated



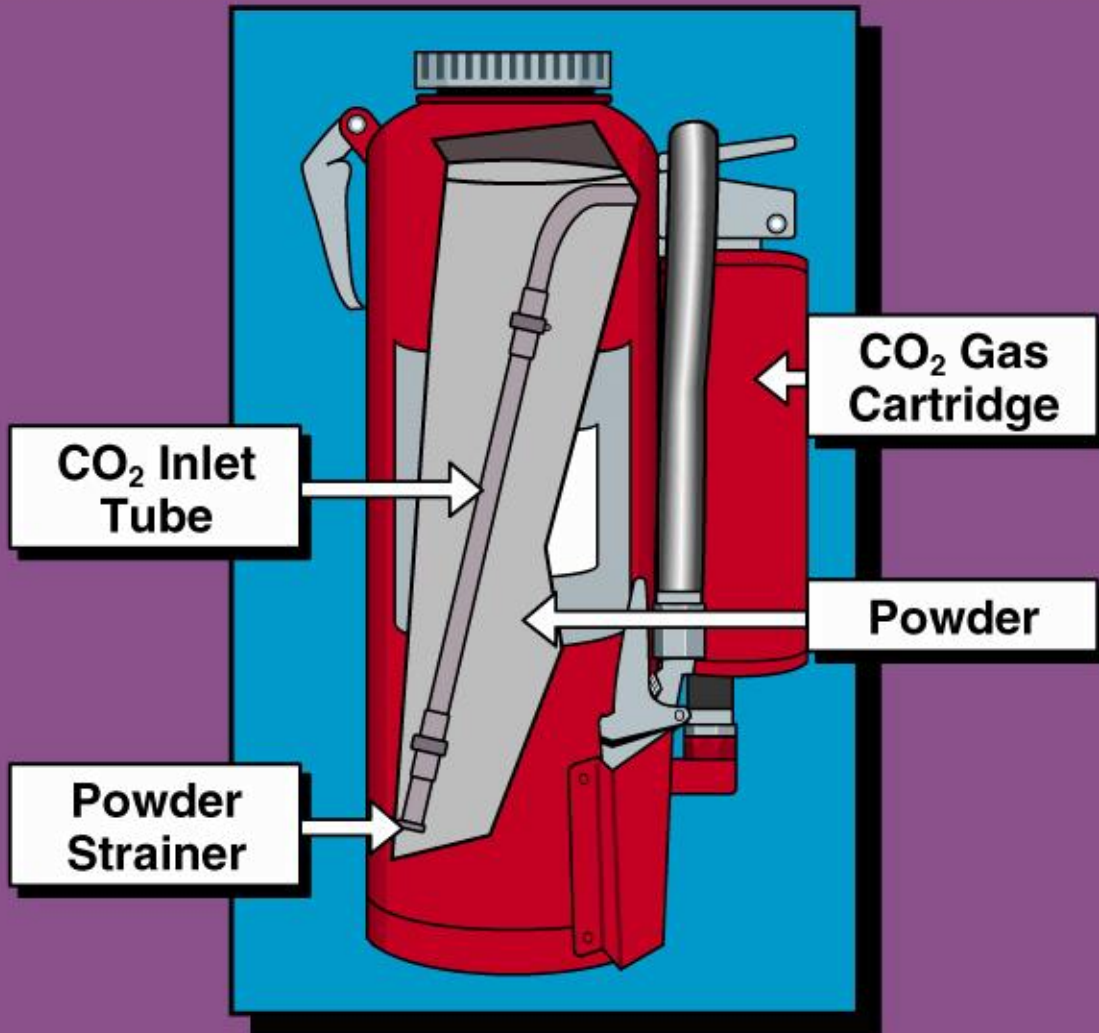
INSPECTION, CARE, MAINTENANCE OF PORTABLE FIRE EXTINGUISHERS.

- × Inspect Monthly
- × Tag should be in-date
- × Pressure should be in green
- × Ring around neck indicates hydrostatic test.
- × Inspect hose
- × Pull Pin has seal
- × Flip extinguisher to loosen powder
- × Weight CO2 extinguishers
- × Check Hydro test date



DRY POWDER

5-7



Size
30 lb
(14 kg)

Application
Class D Only

Operating Principle
Gas Cartridge

DRY POWDER

- × Dry powder extinguishers are similar to dry chemical except that they extinguish the fire by separating the fuel from the oxygen element or by removing the heat element of the fire triangle.
- × Dry powder extinguishers are for Class D or combustible metal fires, only.
- × They are ineffective on all other classes of fires

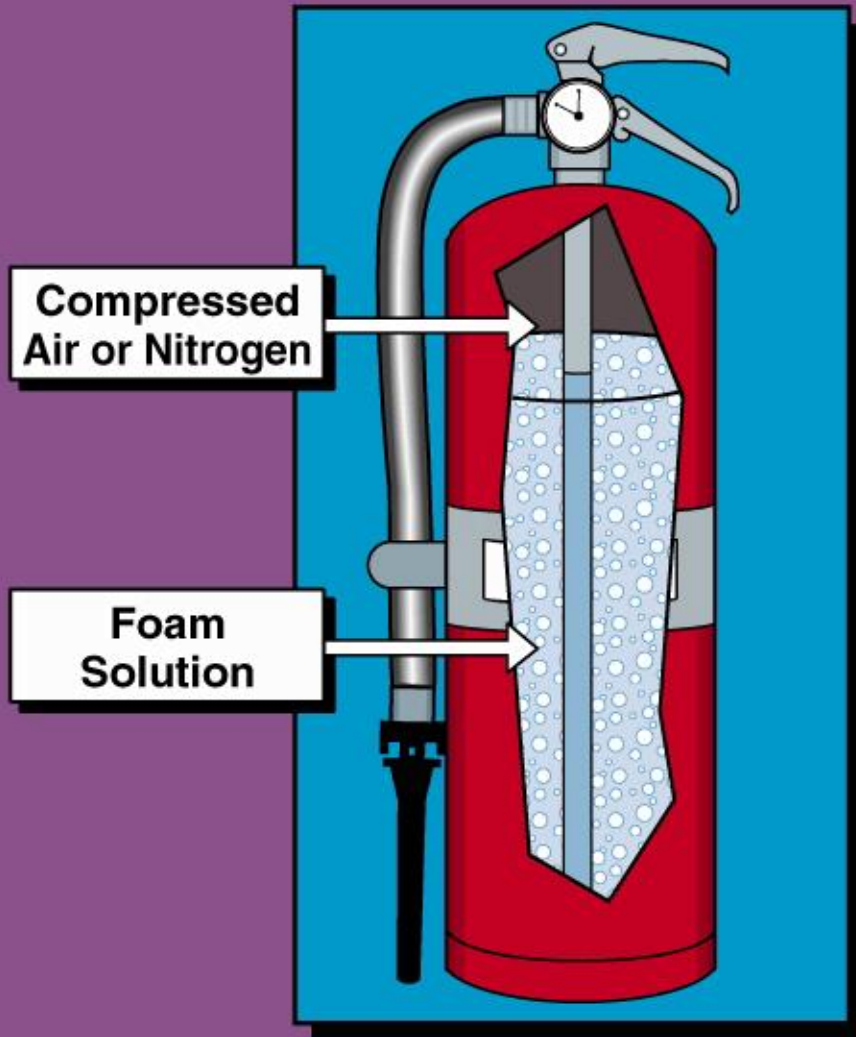
A,B,C FIRE EXTRINUGUISHER

- ✘ Today's most widely used type of fire extinguisher is the multipurpose dry chemical that is effective on Class A, Class B, and Class C fires.
- ✘ This agent also works by creating a barrier between the oxygen element and the fuel element on Class A fires



AFFF

5-3



**Most Common
Size**

2½ gal
(10 L)

Application

Classes A and B

Operating Principle

Stored Pressure

FOAM EXTINGUISHERS

- ✘ Water and foam fire extinguishers extinguish fire by taking away the heat element of the fire triangle.
- ✘ Foam separate the oxygen element from the other elements.
- ✘ Foam extinguishers can be used on Class A and B fire only.

AGENTS USED IN FIRE EXTINGUISHERS

- × Pump Tank & Backpack Pump (Water).
- × Stored Pressure (Water).
- × AFFF (Aqueous Film Forming Foam).
- × Halon 1211 (Bromochlorodifluoromethane).
- × Halon 1301 (Bromotrifluoromethane).
- × CO₂ (Liquefied Compressed Gas).
- × Dry Chemical (Ordinary and Multipurpose).

PORTABLE FIRE EXTINGUISHER VALUES

Three important factors that determine the value of a fire extinguisher:

- × Serviceability.
- × Accessibility.
- × Users ability to operate.

SELECTION FACTORS

- × Hazards to be protected.
- × Severity of the fire.
- × Atmospheric conditions.
- × Personnel available.
- × Ease of handling.
- × Life hazard or operational concerns.

NFPA 10

- + Standard Used For Inspection, Care And Maintenance.
- + All Portable Extinguishers Shall Be Hydrostatically Tested In Accordance With NFPA 10.
- + Test Results On High And Low Pressure Cylinders Are Recorded Differently.
- + Inspection Includes ;
 - × Checking The Discharge Nozzle For Obstructions
 - × Cracks
 - × Dirt Or Grease Deposits
 - × Checking Cylinder Shell For Any Deformity
 - × Operating Instructions On Name Plate Are Legible
 - × Check For Presence Of Lock Pins And Tamper Seals
 - × Cylinder Is Full By Checking Pressure Gauge Or Weighing Cylinder (CO2)
 - × Check The Inspection Tag For Date Of Previous Inspection
 - × Maintenance, Or Charging.

IF ANY EXTINGUISHER IS DEFICIENT IN WEIGHT BY TEN (10%) PERCENT OR MORE, IT SHOULD BE REMOVED FROM SERVICE AND REPLACED

Fight or Flight Video

USING THE EXTINGUISHER!!!

PASS

Pull

Aim

Squeeze

Sweep



APPARATUS MAINTENANCE



IMPORTANCE OF PROPER MAINTENANCE

- × What is the importance of:
 - + Proper Maintenance of equipment and apparatus?
 - + Developing proper SOGs for maintenance?
 - + Accurate record keeping

TYPES OF INSPECTIONS REQUIRED FOR APPARATUS.

- × Battery check.
- × Braking systems.
- × Coolant system.
- × Electrical system.
- × Fuel.
- × Hydraulic fluids.
- × Lubrication.
- × Oil.
- × Tire care.
- × Steering system.
- × Belts.
- × Tools, appliances, and equipment.

CAUTION

- × In order to perform certain apparatus component inspections for the verification of operational capability, appropriate testing equipment may be required.
- × Consult the manufacturer's maintenance manuals to determine the appropriate test methods, instruments, and test parameters.

TYPES OF INSPECTION / MAINTENANCE

× Time-frequency records:

- + Daily
- + Weekly
- + Monthly
- + Quarterly
- + Periodic records.



× Component replacement records due to mechanical failure of a part.

× Engine lubrication system

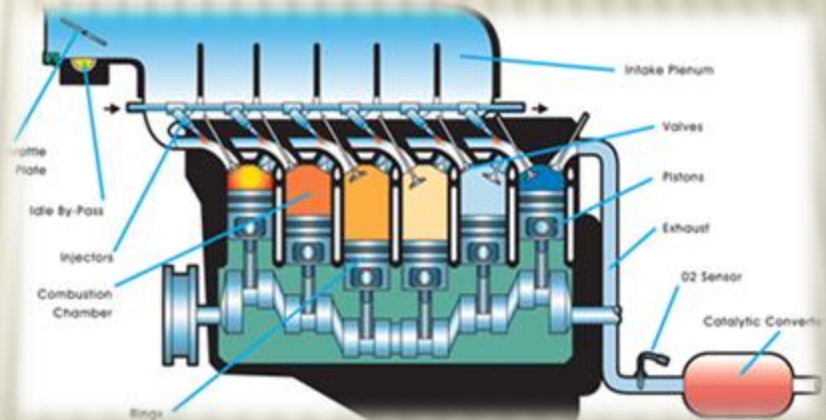
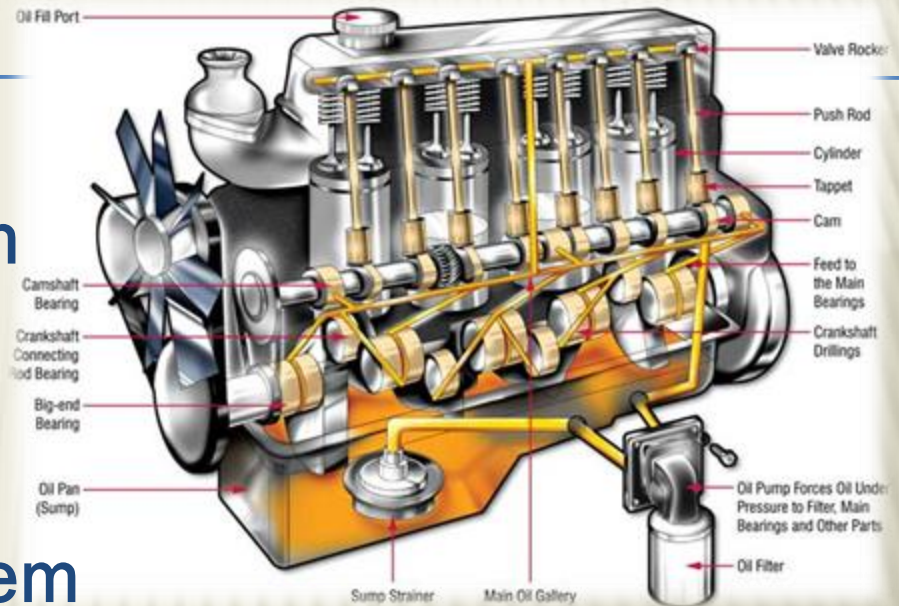
- + Engine oil.
- + Oil filters.
- + Oil pumps.

× Engine air induction system

- + Cartridge type filters.
- + Oil bath type.

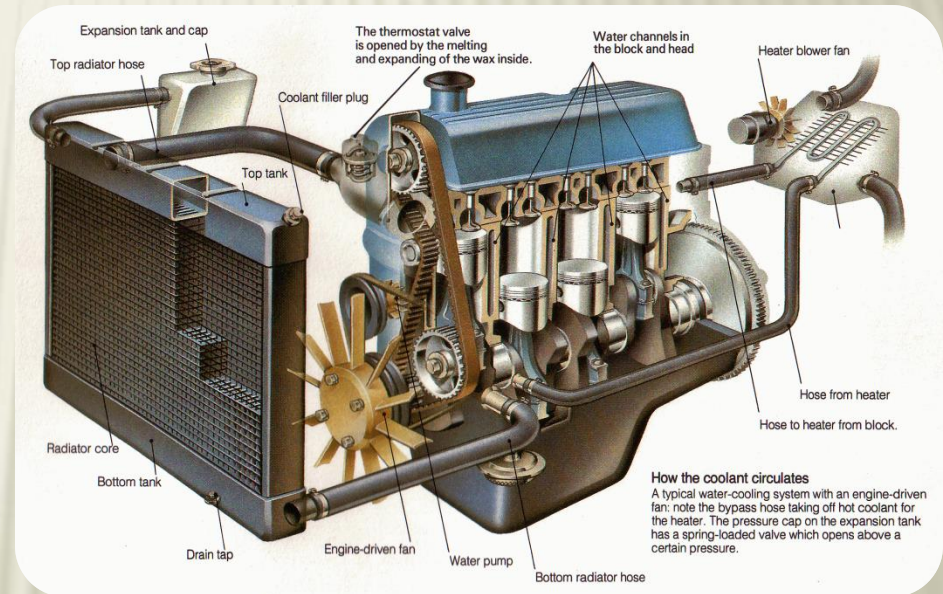
× Fuel system

- + Fuel filters.
- + Fuel lines.
- + Fuel tank.
- + Fuel pumps, electrical, and mechanical.



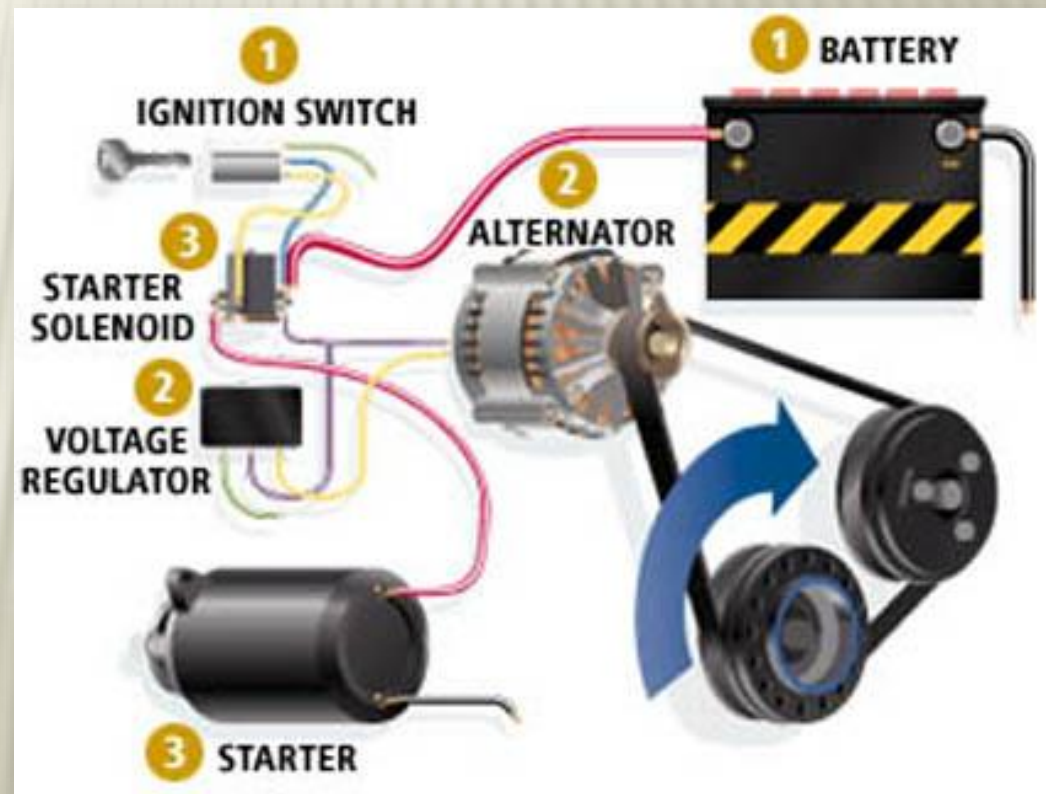
COOLING SYSTEM

- ✘ Radiators.
- ✘ Coolant pump, water pump.
- ✘ Coolant hoses.
- ✘ Thermostats.
- ✘ Belts.
- ✘ Heat exchangers.
- ✘ Freeze plugs.
- ✘ Coolant requirements.
- ✘ Coolant overflow reservoir.



ELECTRICAL SYSTEM

- × Batteries.
- × Generators and alternators.
- × Voltage regulator.
- × Electrical motors.
- × Lighting systems.



× Brake System

- + Hydraulic systems.
- + Air systems.
- + Parking brake.

× Steering System

- + Manual steering systems.
- + Power assisted steering systems.

× Driveline components

- + Transmission.
- + Drive shafts and support bearings.
- + The differential.
- + The universal joints.



× Exhaust system

- + Exhaust manifold.
- + Muffler.
- + Tail pipe.
- + Catalytic converters.

× Tires and wheels

- + Tire pressure.
- + Tire condition
 - × Depth of tread
 - × Type of tread
 - × Wear points.
- + Lug nuts; torque in place at the correct footpounds.
- + Rim condition; single or split rim design.

