# Hand Tools

## Hand tools have a variety of uses in the shop; each has its own specific design.

## It is important to understand what tools are designed to do certain jobs and to make sure to use them in that manner.

## Any abuse, damage or theft of tools will result in their being taken away. You will find that the more tools I take away the harder your job becomes.

# Hammers

## One of the basic tools of the shop.

## Check all hammers before use to make sure the head is secure and that it is not cracked or damaged.

## Types

### Hard face – The material being struck absorbs the blow and is deformed. The hammer does not change its shape. Examples = ball peen, claw, forming, etc.

### Soft face – The hammer absorbs the blow and is deformed. Examples = Mallets (wood, leather, plastic, etc), as well as dead blow hammers (brass, copper, rubber).

## Remember that hammers have different names and uses, it is important to use the appropriate hammer for the job.

#  Wrenches

## There are many different types of wrenches for all sizes of nuts and bolts. Most of the time we will use an adjustable wrench, one that moves to fit many sizes.

## Mechanics and others who fix equipment and machines will use specific sized wrenches made especially for 1 purpose these are known as: open end wrenches, box end wrenches, combination wrenches etc.

## Plumbers and pipe fitters need special wrenches that can grip round objects known as pipe wrenches. There are several sizes of these as well.

# Vice Grips

## Vice grips are pliers that can be locked in position.

## These can come in many shapes and sizes.

## Look at the design to see their use.

## Do not drop, throw or leave in the quenching tanks.

## Vice grips must be used when grinding, using a drill press or carrying hot metal.

# Files

## Files are used to shave metal off of a piece.

## File CutsShapes – Flat, round, triangular, ½ round, square, are the most common styles. There are 12 shapes in all.

## File cuts –

## File grades of coarseness – smooth, second cut and bastard.

## The file only cuts on the forward stroke, not on the back stroke.

## Use two hands on the file at all times to ensure proper pressure.

## Do not drop or try to bend files, they are very brittle and will snap.

## Use a file card to clean non ferrous metals out of a file.

# Chisels

## A chisel is used to dent or cut metal when used with a hammer.

## A chisel should have a 45 degree ground on it, if not regrind.

## If the chisel starts to dent or chip, it must be re tempered.

# Punches

## Prick Punch - 60° point. Used for locating intersections or points of reference on sheet metal.

## Center Punch - 90° point. Used for enlarging prick punch mark. To be used when drilling a hole.

# Rivet Gun

## Rivet guns set rivets in sheet metal.

## The rivet is placed in the end of the gun and the handles are then squeezed together until the rivet breaks off.

## Do not change out tips without checking with me first.

# Whitney Punch

## The Whitney Punch is used to punch holes through metal.

## Various sizes can but used to get different sized holes.

## Do not try to use on any metal thicker than 24 gauge, or two pieces together.

## Do not drop or bang around these will break easily.

# Pliers

## Pliers are used to grip metal or small pieces so they do not slip.

## Always use pliers to carry hot metal, not your gloves.

## Pliers are not to be used to hold metal on the grinders, wire wheel or drill presses, only vice grips.

## Many different styles of pliers are out there, they all have different names and uses. A few of these are: needle nose pliers, adjustable pliers, slip joint pliers, lineman pliers, diagonal cutters, etc.

# Combination Square Set

## A steel rigid rule that has sliding attachments that have several uses. There is a thumb screw that tightens the square on the ruler. Do not lose this!

## Three attachments

### Combination 90/45 – Allows for accurate measurement of 90˚ and 45˚ angles. Also can be set for repeated measurements.

### Center finding – “V” shape will line up the ruler edge with the center of any round object.

### Protractor – locates any angle up to 180˚

## Level bubble and Scribe

### Can be used as a level and a small scribe in the base can be used to mark lines in metal.

# Portable Hand Drill

## The drill can be fit to any drill bit that is up to ½” in diameter.

## When drilling through metal, drill slowly only pulling the trigger ¼ of the way.

## Do not put excess pressure on the drill especially with smaller drill bits.

# Angle Grinder

## A portable hand held grinder that can be used anywhere in the shop.

## Watch where you place your hands so that they do not get caught in the wheel.

## Sparks will always fly to your right so be sure the area is clear and that you are not showering someone.

## Wheels must be changed when worn.

# Scribe

## A scribe is also known as a scratch awl or scratch tool.

## These tools are ground to a 60 degree point and are very sharp.

## These tools never leave the shop as they can be seen as a weapon in school.

## These tools are used to scratch lines into metal instead of using a pen or pencil.

# Linear Measuring Tools

## Types:

### Semi precision – Steel scales / rules

#### Flexible – 6” or 12” Machinist scale in 64ths of an inch.

#### Tape Measure- A flexible measuring device available in any lengths from 6’ to 30’. Make sure that the metal attachment on the end is not loose or your measurements can be off.

### Rigid

####  Combination square set or hook rules are the most common types.

#### Circumference rule, large like a yard stick, has conversions for diameters to circumference

## Reading the scale

### Divides the inch into 1/8, 1/16, 1/32, & 1/64ths. These are the 4 most common divisions of the inch.

### Ruler

# HACKSAWS

## Teeth point away from the handle – cuts on forward stroke.

## Slight pressure on the forward stroke and none on the backstroke.

## Use the whole blade, not just the middle.

## At least 3 teeth should be on the work at all times.

## Keep the work as close to the vise as possible.

## Do not cut hot metal.

## Cut made is referred to as the “kerf”.

## HacksawRaker and wavy are most common teeth sets. 24 TPI is considered a combination blade. 48 TPI is for hard metals.

# Gauge

##  Used for determining the thickness of sheet metal in gage size and thousandths of an inch.

#  Snips

##  Used for cutting light gage sheet metal. To prevent over-cutting, place end of snips at end of the line to be cut. An over-cut is called a crow’s foot.

### Curved (Rights, Lefts, and Straight)

### Seamers

### Aviation

### Offset

#  Levels

## Levels come in different lengths from 6” to 6’ the smallest have magnets on them and are called torpedo levels.

**XXX. Squares**

1. Framing squares come in 1’ and 2’ lengths and can be made of steel or aluminum. Usually used in construction.
2. Speed Squares are triangular in shape and are used to make quick guided measurements and markings. Usually have conversions used in construction.

**XXXI. C –Clamps**

1. Shaped in the form of the letter C with a screw mechanism used to clamp pieces together.

**XXXII. Screwdrivers**

1. The main screw drivers that we have are the Philips head and standard flat head. There are many different types, always make sure that the one you use fits the screw completely; otherwise you will strip the screw.