

# Drafting Tools

## DRAWING BOARD

The DRAWING BOARD, fig. 3-1, provides the smooth, flat surface needed for drafting. The tops of many drafting tables are designed for this purpose. Individual drawing boards are manufactured in a variety of sizes. The majority of them are made from selected, seasoned basswood.

The right-handed draftsman will use the left edge of the board as the working edge; the left handed draftsman the right edge. The working edge should be checked periodically for straightness.

Draftsmen often tape a piece of heavy paper or a special vinyl board cover to the working face of the drawing board to protect its surface. The vinyl surface is easily cleaned.

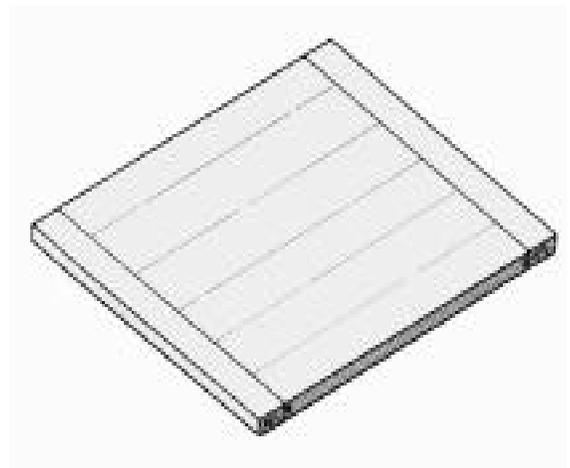


Fig 3-1. Drafting Board

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## T-SQUARE

Horizontal lines are drawn with the T-SQUARE, Fig. 3-2. It also supports triangles when they are used to draw vertical and inclined lines.

The T-square consists of two parts, the head and the blade or straight edge. The head is usually fixed solidly to the blade; however, a T-square with a protractor head and adjustable blade is also available.

Clear plastic strips inserted in the blade edge of some T-squares makes it easier to locate reference points and lines.

The blade must never be used as a guide for a knife or other cutting tool.

If accurate line work is to be done, it is essential that

the head of the T-square be held firmly against the working edge of the board.

It is recommended that the blade be left flat on the board or suspended from the hole in its end. This will keep warping or bowing of the blade to a minimum.

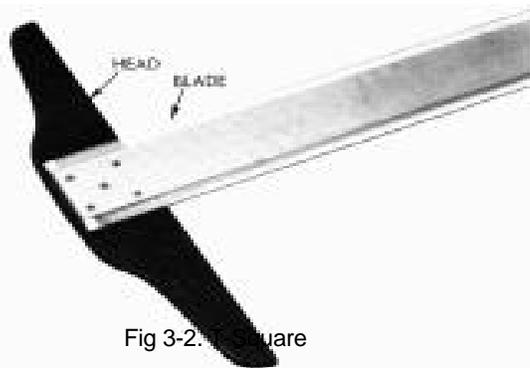


Fig 3-2. T-square

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## TRIANGLES

When supported on the T-square blade, the 30-60 deg. and 45 deg. TRIANGLES, Fig. 3-3, are used to draw vertical and inclined lines. They are made of transparent plastic and are available in a number of different sizes.

To prevent warping, the triangle should be left flat on the drawing board when not being used.

Angles of 15 and 75 deg. can be drawn by combining the triangles as shown in Fig. 3-4.

To draw vertical lines accurately, rest triangle solidly on the T-square blade while holding the T-square head firmly against the working edge of the drawing board.

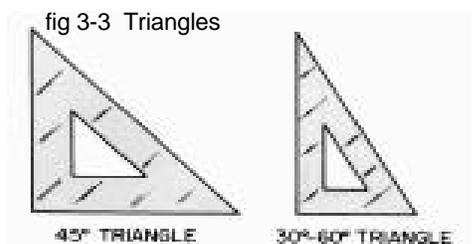


fig 3-3 Triangles

45° TRIANGLE

30°-60° TRIANGLE



Fig. 3-4. Drawing 75 deg. and 15 deg. angles.

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## COMPASS



Fig.3-6 Large and Small Bow Compass

In drafting, circles and arcs are drawn with a COMPASS, Fig. 3-6. For best results the lead should be adjusted so that it is about 1/32 in. shorter than the needle. Both legs will be the same length when the needle penetrates the paper. Fit the compass with lead that is one grade softer than the pencil used to make the drawing. The lead must be kept sharp.

Several attachments are available for use with the compass.

To set the compass to size, draw a line on a piece of clean scrap paper and measure off the required radius. Set the compass on this line. Avoid setting a compass on a scale. "Sticking" the compass needle into the scale will eventually destroy its accuracy. You will probably use a circle template instead of a compass.



Fig.3-10 Dividers

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## DIVIDERS

Distances are subdivided and measurements are transferred with DIVIDERS, Fig. 3-10. Careful adjustment of the divider points is necessary.

Be careful where you place the dividers or compass after use. It is very painful to accidentally run the point into your hand.

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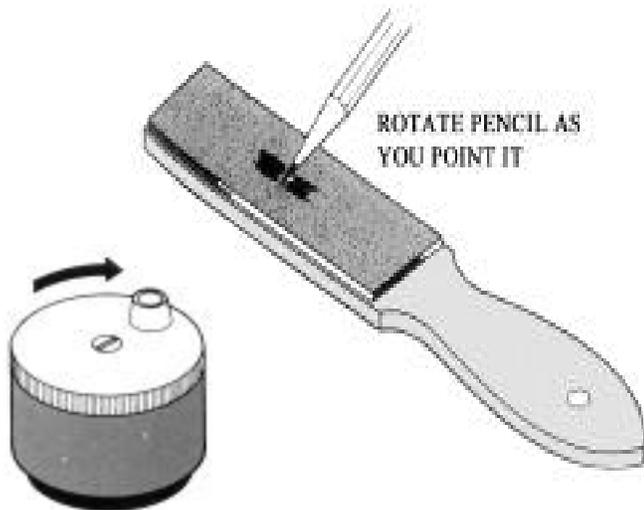
## PENCIL POINTER

It is not necessary to sharpen your drawing pencil every time it starts to dull.

It can be repointed quickly with a PENCIL POINTER, Fig. 3-11. Use the pencil sharpener only when the point becomes very blunt, or when it breaks.

Many commercial pencil pointers are available. The sand paper pad, Fig. 3-12, is most frequently found in the school drafting room. A piece of styrofoam cemented to the back of the pad is used to wipe graphite dust from the freshly pointed pencil.

Keep the pencil pointer clear of the drawing area when repointing your pencil. The graphite dust will smudge your paper when you attempt to wipe it off.



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## ERASERS

Many shapes and kinds of ERASERS, Fig. 3-13, are manufactured for use in the drafting room. The type of material being drawn upon - paper, film or vellum, will determine the kind of eraser to be used. Brush away eraser crumbs before starting to draw again.



# Drafting Tools

## ERASING SHIELD

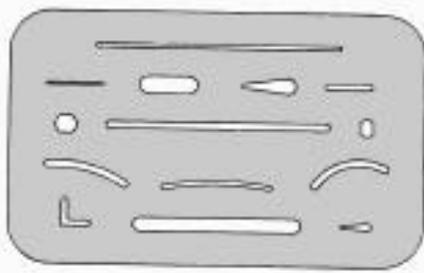


Fig. 3-14. Erasing shield.

Small errors or drawing changes can be erased without soiling a large section of the drawing if an ERASING SHIELD is employed, Fig. 3-14. Place an opening in the shield of the proper shape and size over the area to be changed and then erase. The erasure is made without touching other parts of the drawing.

A popular shield is made from stainless steel. This metal can be made very thin and still be strong. It is also wear resistant and does not stain or "smudge" the drawing.

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## FASTENERS

Three methods of attaching paper to the drawing board are :

**Tape** is the most desirable of the methods. It does not puncture the paper or the drawing board.

**Staples** may be used but their continued use will tear up the working surface of the drawing board. They are often difficult to remove.

**Thumb tacks** are least recommended. They quickly destroy the smooth working surface of the board.

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## DUSTING BRUSH



Fig. 3-16. Removing erasure crumbs from the drawing with a dusting brush.

No matter how careful you are, some erasing crumbs and dirt particles will collect on the drawing area. These should be removed by using a DUSTING BRUSH, Fig. 3-16, rather than your hands. Using your hands may cause smudges and streaks.

Dusting brushes are available in a number of sizes and with natural and man made bristles.

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## PROTRACTORS

A PROTRACTOR, Fig. 3-17, is used to measure and lay out angles on drawings. They are usually made of clear plastic and may be either circular or semicircular in shape. The degree graduations are scribed or engraved around the circumference of the protractor.

When measuring or laying out an angle, place the center lines of the protractor at the point of the required angle as shown in Fig. 3-18. Read or mark the angle from the graduations on the circumference of the tool.

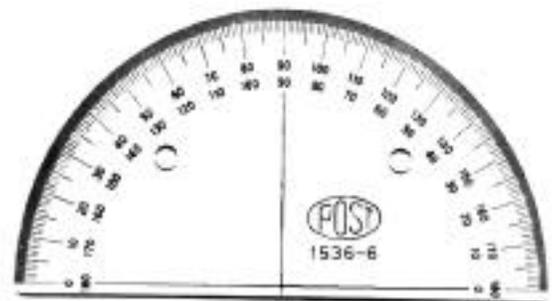


Figure 4-16. Protractor used in the drafting room.

# Drafting Tools

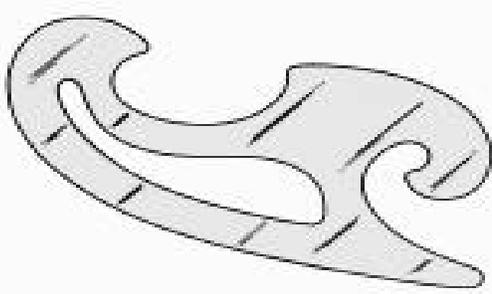


Fig. 3-19. French Curve.

## FRENCH CURVES

Curved lines that are not exactly circular in form are drawn with a FRENCH CURVE, Fig. 3-19. After the curved line is carefully plotted, it is drawn using a French Curve as shown in Fig. 12-6, page 152.

The curves are made of transparent acrylic plastic. They range in size from a few inches to several feet in length and may be purchased individually or as a set.

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## TEMPLATE

Much time can be saved in drawing standard symbols and figures if TEMPLATES are used, Fig. 3-20. Made of thin plastic, these tools are available in a large number of styles and sizes.

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## DRAFTING MEDIA

Drawings are made on many different materials - paper, tracing vellum, film, etc. A heavyweight opaque paper that is white, buff or pale green in color is used in many school drafting rooms.

While this paper takes pencil lines well, it is difficult to erase because the pencil point makes a depression in the paper when a line is drawn. If this material is used, take special care to prevent mistakes.

Industry make much use of vellum and film because reproductions or prints must, be made of all drawings.

Drawing media is available in either sheet or roll form. Standard sheet sizes are identified by letter size:

A - 8 1/2 x 11 or 9 x 12

B - 11 x 17 or 12 x 18

C - 17 x 22 or 18 x 24

D - 22 x 34 or 24 x 36

E - 34 x 44 or 36 x 48

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## PENCILS

As most drawings are prepared with a pencil, it is important that the proper pencil be selected. The drawing media used will determine the type of pencil that should be used. The conventional graphite lead pencil is satisfactory with most papers and tracing vellums, while a pencil with plastic lead is necessary if the drawing is made on film.

The draftsman can select from 17 grades of pencils that range in hardness from 9H (very hard) to 6B (very soft).

Many draftsmen use a 4H or 5H pencil for layout work and a H or 2H pencil to darken the lines and to letter. In general, use a pencil that will produce a sharp, dense black line because this type of line reproduces best on prints.

Avoid using a pencil that is too soft. It will wear rapidly, smear easily and soil your drawing. Also, the lines will be



Fig. 3-23

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"fuzzy" and will not produce usable prints.

A conical shaped pencil point is preferred for most general purpose drafting. To sharpen the pencil, cut the wood away from the unlettered end. Use a knife or mechanical sharpener and point the lead on a pencil pointer.

A semiautomatic pencil, Fig. 3-23, is usually preferred to a wood pencil. With this type pencil it is not necessary to cut away the wood to expose the lead. The extended lead is shaped on a pencil pointer.

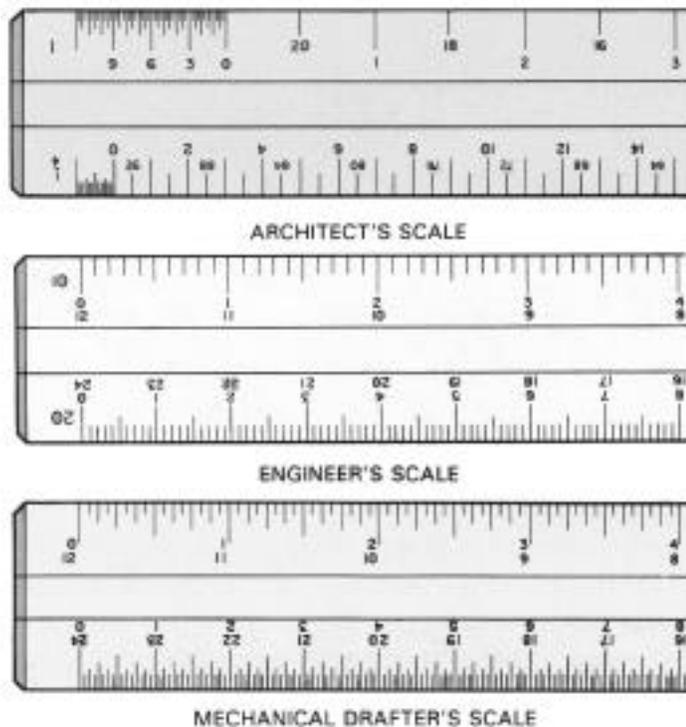


Fig. 3-24

## SCALES

SCALES. Fig. 3-24, are in constant use on the drawing board because almost every line on a mechanical drawing must be of a measured length. Accurate drawings require accurate measurements.

Because of the diversity of the work that must be drawn, the scales used by the draftsman are made in many shapes, lengths and measurement graduations. They may be made of wood, plastic, or a combination of both materials. Graduations are printed on inexpensive scales, and are machine-engraved on the more costly ones.

For convenience, scales are classified according to their common uses:

### **ARCHITECTS' SCALE.**

Each division represents one foot and is divided into twelve parts, each part being equal to one inch.

**ENGINEERS' SCALE.** Used mostly where large reductions are required. It is divided into 10, 20, 30, 40, 50, 60, 80 and 100 units (each represents one foot) per inch.

### **MECHANICAL DRAFTSMEN'S SCALE.**

Most commonly divided into the following graduations: full size, and  $\frac{3}{4}$ ,  $\frac{1}{2}$ ,  $\frac{1}{4}$  and  $\frac{1}{8}$  in. to 1 foot.

# Drafting Tools

## TEST YOUR KNOWLEDGE -UNIT 3

1. The drawing board provides the \_\_\_\_\_
2. A piece of heavy drawing paper or a special vinyl board cover is sometimes attached to the working surface of the board to:
  - a. Provide a drawing surface.
  - b. Protect its surface.
  - c. Provides a surface to work out problems.
  - d. All of the above.
  - e. None of the above.
3. The T-square is used to \_\_\_\_\_
4. Vertical and inclined lines are drawn with \_\_\_\_\_
5. The compass is used in drafting to draw \_\_\_\_\_
6. The \_\_\_\_\_ is used to repoint a pencil when it starts to show signs of dullness.
7. The erasing shield is used to \_\_\_\_\_
8. The three methods used to attach drawing paper to the drawing board are \_\_\_\_\_ Which method causes the least damage to the board?
9. Angles can be measured and laid out on drawings by using a \_\_\_\_\_
10. The \_\_\_\_\_ or pencil is recommended for layout work.
11. An \_\_\_\_\_ or \_\_\_\_\_ pencil is used to darken the lines and for lettering.
12. Scales are important to the draftsman because \_\_\_\_\_
13. List the three classifications of scales:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_