TOOLS OF THE TRADE 9



Figure 1-9. Lead holder has nonslip, nonturn replaceable metal clutch that holds lead firmly in position. Button at top, when depressed, releases clutch for extending lead. (Courtesy of Koh-I-Noor Rapidograph, Inc.)

inch in diameter, imprinted with hardness degree markings for quick identification, and available in 19 degrees from 7B to 10H. One manufacturer claims that their lead diameter varies according to degree of hardness as follows:

DEGREES OF HARDNESS	DIAMETER, IN INCHES
9H through 2B 3B 4B and 5B	0.079
6B	0.118

Softer leads have a larger diameter for greater breaking strength.

Flat lead in degrees from 2B to 4H is available for use with flat-lead holders. Such lead is excellent for straight-line layout work as it never needs sanding or pointing.

Plastic (polymer) leads for drawing on coated polyester films are available in the more common degrees of hardness generally used in drafting.

Leads in lead holders may be pointed on sandpaper blocks or with various hand-held and fixed lead pointers.

c. Mechanical Pencils and Lead

Mechanical pencils are precision instruments for holding fine-line graphite and plastic-based leads 0.020 inches (0.5 mm) in diameter (Fig. 1-10). They are great time savers for doing fine-line drafting and lettering. The lead never needs pointing.

The leads are inserted at the cap end and automatically moved forward (extended) simply by clicking the push-button mechanism, making it easier for the user to advance the lead during work.

Mechanical pencils with features similar to the above except that they accommodate 0.036 inch (0.91 mm) (or other) diameter leads are available for heavier line work and lettering.

A fixed metal sleeve protects the lead. Some mechanical pencils have a sliding sleeve that retracts into the pencil tip gradually as the lead wears down to provide added protection for the lead during use



Figure 1-10. Mechanical pencil for very fine drawing leads. Continuous push-button feed with positive action lead advance. Lead never needs to be pointed. (Courtesy of Koh-I-Noor Rapidograph, Inc.)

20 I / DRAFTING BASICS

A 60° triangle is measured on the longest cathetus, LC, and a 45° is measured on the length of the two equal sides, C.



Two triangles are considered a set if LC for a 60° is two inches longer than C for a 45°

Figure 1-24. A set of fixed triangles. (Courtesy of Koh-I-Noor Rapidograph, Inc.)

about 20 inches as measured on the longest cathetus, LC. A 60° triangle is measured on the LC, and a 45° is measured on the two equal sides, C. Two triangles are considered a set if the LC of a 60° is 2 inches longer than C for a 45° triangle. For the student a set with an LC of 12 inches is usually sufficient. Professionals frequently have several sets, one small, one medium, and one large (Fig. 1-24).

The adjustable triangle has a closed position of 45° and can be opened and locked into any position up to 90° (Fig. 1-25).

A set of fixed triangles used alone or in combination can provide 15° , 30° , 45° , 75° , 90° , 120° , 135° , 150° , 165° , and 180° (any angle divisible by 15°). The adjustable triangle can be set at any angle from 45° to 135° when used alone and from 0° to 180° when used with another triangle.

The student should have one set of fixed and one adjustable triangle. It is



Figure 1-25. Adjustable triangle is used for intermediate angles. (Courtesy of Koh-I-Noor Rapidograph, Inc.)



Figure 1-33. Mayline professional drawing kit includes solid basswood, metal edge drawing board with clear lacquer finish and parallel ruling device. Phantom views show cable and blade attachment for parallel ruling straightedges. Left—above board attachment; right—underboard attachment, cable on underside of board. (Courtesy of MAYLINE Company, Inc.)

cable may be run over or under the board. Some straightedges have a breaking mechanism for locking it into position for use with lettering sets or inking. A counterbalance may be added when necessary with tables used at highly elevated angles.

c. Drawing Boards

Drawing boards are portable devices made of kiln-dried basswood, about ³/₄ inch thick, with or without steel end cleats. Because lumber is a living substance, drawing boards should be stored in a cool dry place to ensure complete stability. They are available in sizes from about 12 by 17 inches to 30 by 42 inches and may be used with a T-square or parallel ruling straightedge that have cable attachments above or under the board (Fig. 1-33).

d. Drafting Tables

The pedestal drawing table is made from kiln-dried hardwood and is ideal for home, school, factory office, field office, trailer, art studio, or wherever a table is needed. It is available with or without a parallel ruling straightedge. Table tops

Chapter 2 Basic Drafting Skills

Basic drafting skills are essential for the development of quality building construction drawings. These drawings must be clean, the line work sharp, and the lettering legible. Drafters must learn to use mechanical aids where necessary for hard line work and should become proficient in freehand sketching. Once basic drafting skills are developed, drafters need to learn how to use those skills for making drawings. Anyone can learn to make straight lines with a straightedge and curved lines with a french curve, but this is only the beginning. The next step is to be able to combine these various lines to properly and adequately illustrate a building and all its essential components. This too can be learned, with practice. While quality line work is essential, neat and legible lettering is far more important. Lettering is the element that gives meaning to the myriad of lines that graphically depicts the building structure. Well executed lettering contributes more than any other single factor to the development of quality building construction drawings, conversely, sloppy lettering detracts from a good hard line drawing.

Architectural and engineering drawings are usually developed in three phases: schematics, preliminaries, and working drawings. While all three phases of drawing development are important, the first two are usually development drawings, and unfortunately, all too frequently, less attention is paid to exacting details. The working drawings, also known as construction drawings, and are, as the name implies, *construction drawings*. These are used by the contractor to erect the structure, and for that purpose, the line work must be sharp and the lettering legible.,

Anyone interested in pursuing a career in building drafting and design must develop basic drafting skills. This includes freehand and hard line work, and freehand and mechanical lettering. In building construction drafting, sketches are usually freehand and drawings are hard line; that is, line work is made with a mechanical aid.

1. DRAFTING TECHNIQUES

Building construction drawings consist of a wide variety of straight and curved lines assembled in such a fashion that the end result is the *picture* of a building. Freehand lines may be used for sketching and schematic drawings, but preliminaries and working drawings consist of hard line work. Hard line drawings refer to drawings made with the aid of mechanical devices such as a ruling straightedge, T-square, triangles, french curves, etc.

Drafters and designers are not artists, but artistic ability is helpful and good