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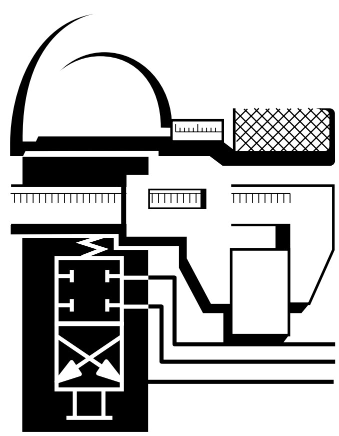
READING BLUEPRINTS

Lesson One

Introduction to Blueprints



TPC Training Systems

10101

Lesson

1 Introduction to Blueprints

TOPICS

Importance of Blueprints
Purpose of Blueprints
Types of Information on Blueprints
Supplementary Spaces
Detail Drawings
Interpreting a Detail Drawing
Assembly Drawings
Orthographic Projections
Auxiliary Views
Sections
Pictorial Drawings

OBJECTIVES

After studying this lesson, you should be able to…

- Identify details, markings, and machine parts from an assembly drawing.
- Identify an object from an orthographic drawing.
- Identify elements located within the title block of a detail drawing.
- Explain why more than one orthographic projection is needed to show an object on a blueprint.

KEY TECHNICAL TERMS

Chamfer 1.45 cutting an edge at an angle
Orthographic 1.52 method of drawing that shows true shapes on all surfaces
Auxiliary 1.59 extra
Perspective 1.66 three-dimensional drawing with reduced scale for distant parts
Isometric 1.67 three-dimensional drawing with equal scale everywhere

Blueprints are widely used in industry. They convey ideas about the design, construction, and operation of buildings and equipment.

A blueprint is a copy of an original drawing. The original has dark lines, made by pencil or ink, on a white background. Early blueprints were made by a process that produced a negative copy, with white lines on a dark blue background. Today, most original drawings are copied by other methods that produce a positive copy, with dark lines on a white background.

Blueprints are very important in industry. They provide specific information for building, installing, maintaining, operating, and repairing equipment and buildings. They can also acquaint you with the systems and equipment in your plant.

This lesson explains the basic ideas and terms you must know in order to use blueprints.

Importance of Blueprints

1.01 An automatic lathe at the Apex Manufacturing Company jammed, and its motor overloaded. The overload tripped a main circuit breaker, cutting off power to a whole department.

1.02 The lack of electricity left 30 workers unable to produce anything. Every minute of lost production cost the company money. It also caused scheduling problems for other departments that needed the output from the affected department.

1.03 The maintenance department had electrical power back into the department in five minutes. And the troublesome machine was back in operation the next morning. That is good service from the maintenance department.

1.04 People who can provide such good service are valuable employees. They move up quickly, and they make more money than the average worker. How did the maintenance department at Apex do such a good job?

1.05 When the call came into the maintenance shop, the supervisor asked two questions: "How extensive is the power failure?" and "Do you know what caused it?" The supervisor said the whole department was down and that there was a loud noise from the automatic lathe when the trouble started.

1.06 The maintenance supervisor sent out four people. An electrician went to the service entrance equipment to check for damage and to reset the circuit breaker. Two more electricians and a mechanic went to the affected department. One electrician cut the individual power switches to all equipment before the main circuit breaker is reset. Then the electrician put the machines back on line one by one, saving the suspected trouble spot until last.

1.07 In the meantime, the mechanic found that the lathe was indeed jammed. The other electrician examined the lathe's own circuit breaker built into the motor control box. This breaker should have opened, so that the jammed machine would have been isolated and the only one losing power. Something apparently had happened to this circuit breaker to make it malfunction.

1.08 Five minutes to get the department running again was good time. Even though these workers were all highly skilled, they needed a lot of information to get this job done—and they needed it quickly.

1.09 The information came from blueprints.

- The supervisor located the department and service entrance equipment on a plant layout.
- The electrician who went to the service entrance equipment had an electrical utilities plan showing what equipment was installed there and how it should look.
- The mechanic had a set of drawings showing how to disassemble the machine. The drawings also showed the identification number of the part that failed—a pinion gear on the drive mechanism—so that a replacement could be obtained from stock.

1.10 You will find blueprints used almost everywhere in a plant. Blueprints are among the most important forms of communication among people involved in technical work.

Purpose of Blueprints

1.11 People who design buildings and equipment must communicate their ideas to other people. The designers may never meet the workers who build or maintain the buildings and equipment. For this reason, it is important to include all necessary information on the drawings. The information must also be presented in such a way that good understanding is possible.

1.12 Blueprints must communicate ideas to many different people. The buyer of a building or piece of equipment must understand what the designer had in mind in order to decide whether the idea is acceptable. The builder needs enough information to build the equipment so that it will perform as the designer intended. The maintenance workers must be able to interpret the designer's idea if the equipment should need major repairs.

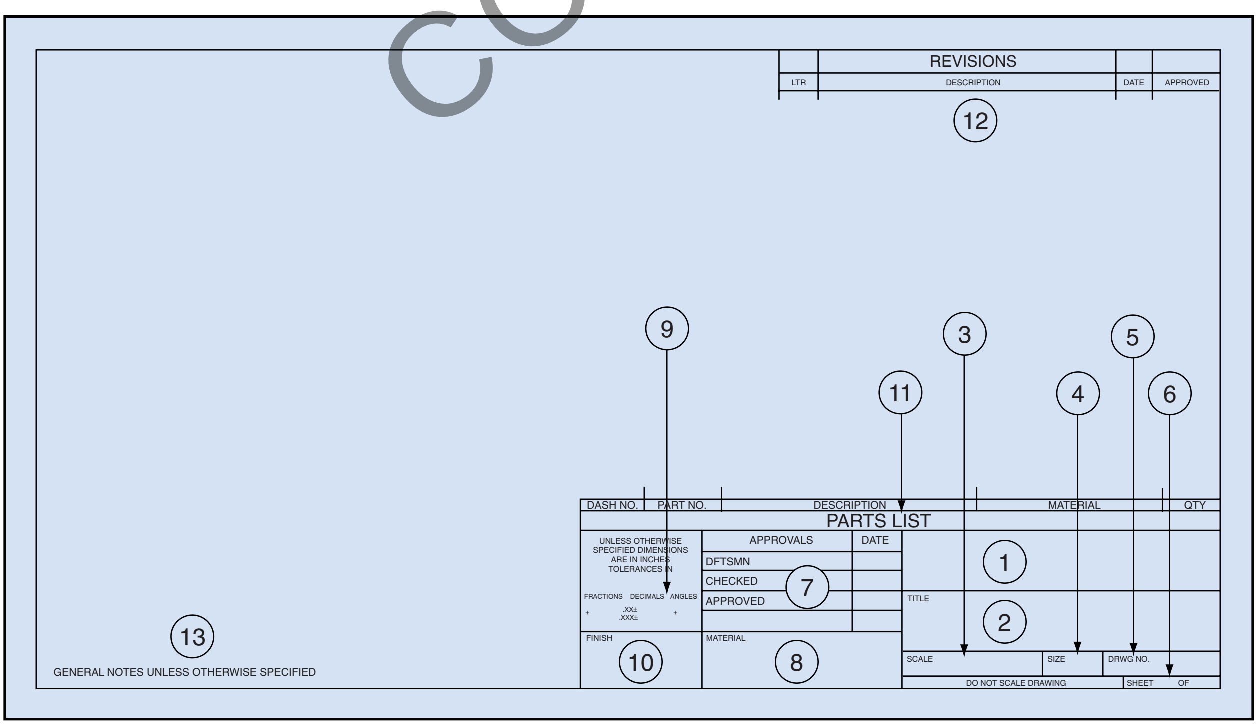
1.13 Blueprints must contain a lot of information. All this information takes space. Using "technical shorthand" helps keep this space to a minimum. One example is the use of standard abbreviations. Another is the use of drawing conventions. *Conventions* are agreements among people. *Drawing conventions* are standard ways of drawing things so that everyone understands the information being conveyed.

1.14 To read blueprints, you must know the conventions and where to look for information. The purpose of this course is to show you how to find the information you need in blueprints. With this skill, you can understand what the designer intended when he expressed his idea on a blueprint.

1.15 Even though the designer uses technical shorthand, there generally is too much information to be included in a single sheet. For this reason, several blueprints are often assembled to make a set of *working drawings.*

1.16 Working drawings include two different kinds of drawings: *detail drawings* (drawings of individual parts) and *assembly drawings* (showing how the parts fit together). Assembly drawings also include a *parts list,* which identifies all the pieces needed to build the item. A parts list is also called a *bill of material.*

Fig. 1-1. Blank drafting sheet



Types of Information on Blueprints

1.17 The first place to look for information on a drawing is in the *title block,* located in the lower right-hand corner of the sheet. Figure 1-1 shows a blank blueprint sheet, with its title block and other features keyed to the following description. Although there is some variation among title blocks used by different organizations, certain information is basic. The following paragraphs describe the information you will almost always find in a title block. The numbers after the descriptions refer to the example in Fig. 1-1.

1.18 **Company name.** The space above the title is reserved for the name and address (by city and state) of the designing or manufacturing firm (1).

1.19 **Title of drawing.** This box identifies the part or assembly illustrated (2).

1.20 **Scale.** The relationship between the size of the image and the size of the actual object is called the *scale* of the drawing. Some parts are either too big or too small to show conveniently at full size. For example, you could not show a building full size on an ordinary sheet of paper. The designer has the choice of drawing a mechanical part either full size, or larger or smaller than actual size (3).

1.21 When the drawing is larger or smaller than full size, the designer states the scale. Three slightly different conventions have been established by three different groups of people who make drawings—mechanical engineers, architects, and civil engineers. Table 1-1 lists examples of how scales are stated by each group.

1.22 **Drawing size.** This section gives a letter designation for the overall size of the sheet on which the drawing has been made. Table 1-2 lists the standard sizes with their corresponding designations (4).

1.23 **Drawing number.** The drawing number is the basic identification assigned to the drawing, which usually becomes the number of the part itself. This number is also used to file the drawings, making it easier to locate them later on (5).

1.24 **Sheet number.** This space is used to designate how many sheets were used to complete the drawing, and which one of the series this particular drawing happens to be (6).

Table 1-1. Scales on blueprint

If a drawing is prepared by a...	and the SCALE box says...	...it means object is drawn at...
Mechanical engineer	1 (or FULL size)	its true size.
	1/4 (1/2, 1/8, etc.)	1/4 (1/2, 1/8, etc.) of true size
	2 (3, 4, etc.)	2, 3, 4, etc. times true size
Architect	12" = 1'-0"	its true size
	6" = 1'-0"	1/2 its true size
	3" = 1'-0"	1/4 its true size
	1 1/2" = 1'-0"	1/8 its true size
	1" = 1'-0"	1/12 its true size
	3/4" = 1'-0"	1/16 its true size
	1/2" = 1'-0"	1/24 its true size
	3/8" = 1'-0"	1/32 its true size
	1/4" = 1'-0"	1/48 its true size
	3/16" = 1'-0"	1/64 its true size
	1/8" = 1'-0"	1/96 its true size
	3/32" = 1'-0"	1/128 its true size
Civil engineer	1" = 1'	1/12 true size
	1" = 10'	1/120 true size
	1" = 100'	1/1,200 true size
	1" = 2 miles	1/63,360 true size

1.25 **Approvals block.** Sometimes referred to as the "sign-off block," this area provides space for the signatures or initials of the persons involved in drafting, checking, and approving the drawing. Each person signs the document and fills in the date on the appropriate line when his or her portion of the work is finished or approved (7).

1.26 **Material block.** This block specifies what the part is made of—for example, the exact type of steel to be used. Also included in this space might be the size of the raw stock to be used (8).

1.27 **Tolerance block.** Nothing can ever be made to the exact size specified on a drawing. Normal machining and manufacturing processes allow for slight deviations. Many times, the amount of devia-

Table 1-2. Standard size of blueprints

Letter	Width	Height
A	8 1/2	11
B	11	17
C	17	22
D	22	34
E	34	44
F	28	40

tion that is allowed is critical to the proper operation of the part.

1.28 *Tolerance* is defined as the difference between the highest and lowest allowable limits on a dimension. The designer must work out dimensions and tolerances very carefully so that all the parts will fit together and function smoothly when assembled. The tighter the tolerances, the more time consuming and costly it is to make a part. So, a special space is provided in every detail-drawing title block to key the most desirable tolerance to each specific dimension (9). Two examples of tolerances are ±1/64 and ±0.005.

1.29 **Finish block.** This space gives information on how the part is to be finished. That is, will it be buffed, plated, painted, anodized, or what? Added to this requirement might be the type of heat treatment (conditioning of the metal) to be applied after the part has been machined (10).

Supplementary Spaces

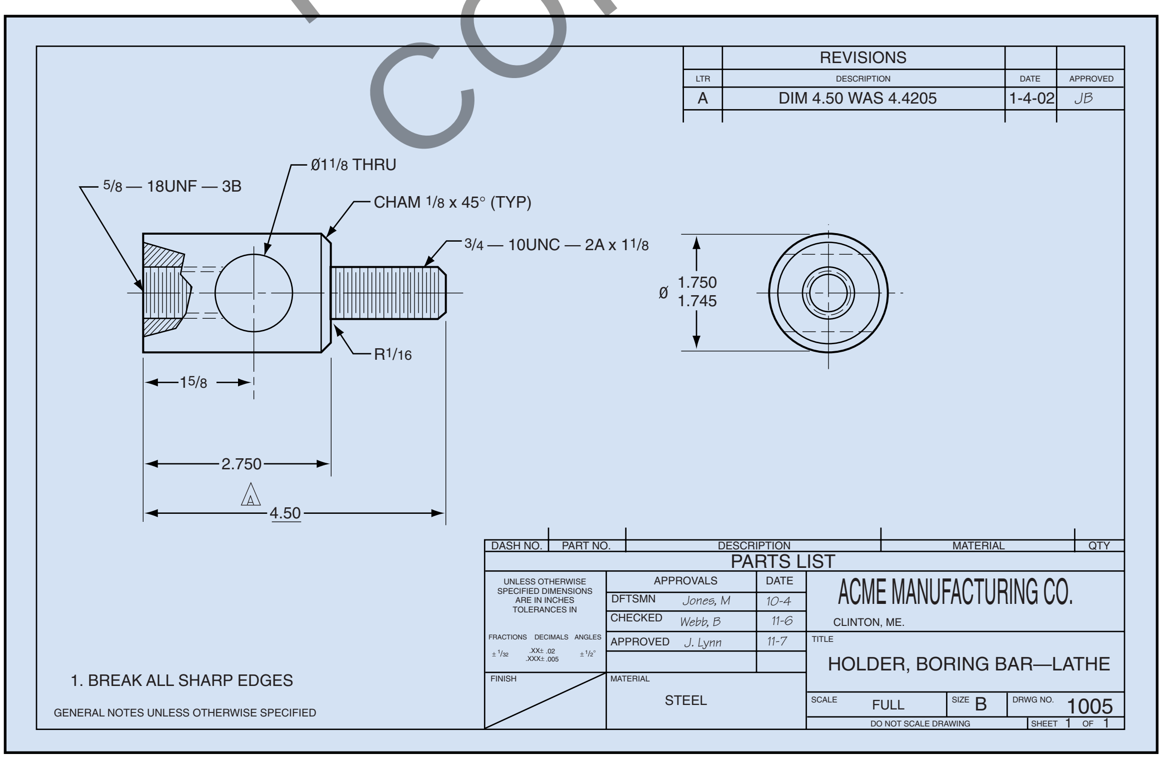
1.30 **Parts list.** Used only on assembly drawings, this space is usually positioned right above the title block. Individual component parts, their part numbers, and the quantity required for each unit are listed. Take special note that this list is built *from the bottom up.* The columns are labeled at the bottom (just above the words "parts list"), and parts are listed in reverse numerical order above these categories. This allows the list to grow into the blank space as additional parts are added (11).

1.31 **Revision block.** The revision block is a separate block positioned in the upper right-hand corner of the drawing. It is used to note any changes that have been made to the drawing after its final approval. It is placed in a prominent position, because you need to know which revision you are using and what features have been revised. You also need to know whether the changes have been approved (12).

Detail Drawings

1.32 A machinist's detail drawing is intended to provide all the information needed to make a specific part. Figure 1-2 shows a detail drawing for the center post of a boring bar holder assembly. A boring bar holder is a common device used in most machine shops. It holds the tool used to cut away the inside of a piece of metal, as shown in the photograph, Fig. 1-3.

Fig. 1-2. Detail drawing



1.33 In Fig. 1-2, the overall shape of the part is outlined with solid, heavy lines. The part is shown in both a front view and a side view. These views indicate what you would see if you were to look at the real part from the front and from the side. The post is shown to be a short bar having two different diameters, with a large hole through the larger end. The smaller end is threaded.

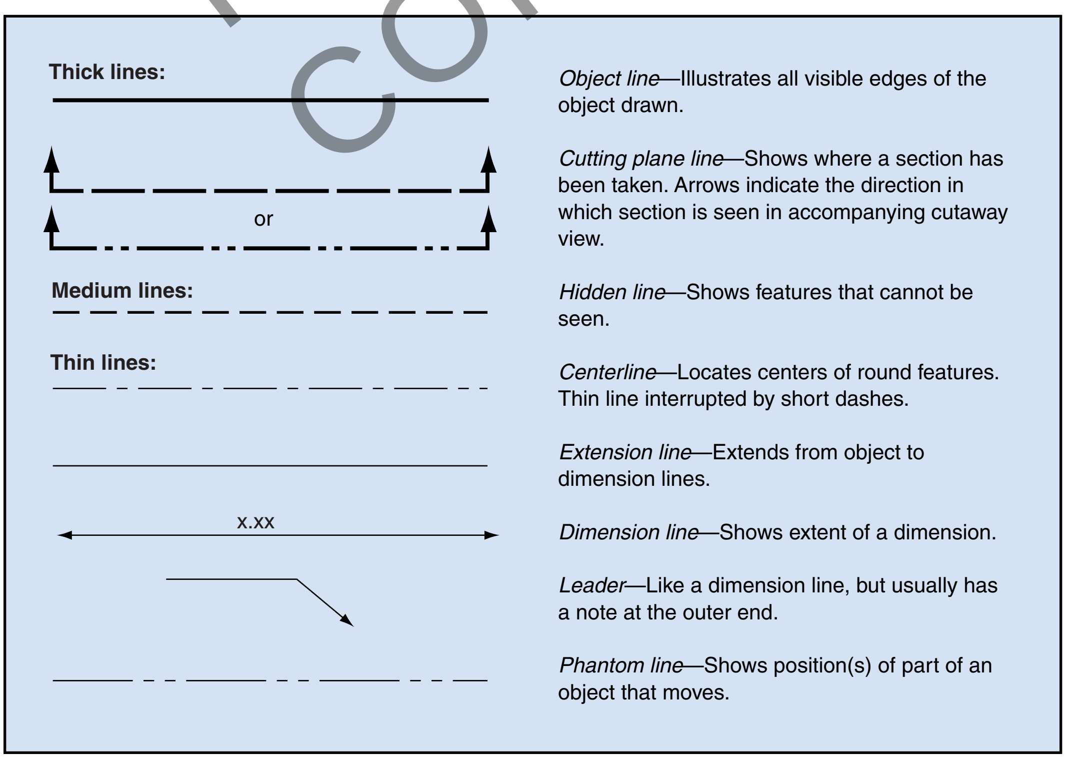
Interpreting a Detail Drawing

1.34 Notes on detail drawings convey many kinds of information. For example, the hole in the post in Fig. 1-2 is identified with a special note. The note states that to make the hole, the machinist should use a 1$\frac{1}{8}$ in. diameter drill, and drill the hole all the way through. Specific notes like this one are tied by *leaders* directly to specific features. General notes refer to the whole drawing. They are located at the bottom of the drawing, to the left of the title block.

Fig. 1-3. Boring bar holder

1.35 If the hole were supposed to be drilled only part way into the piece, the print would indicate how deep the hole should be. The fact that the hole *does* go all the way through is also shown in the side view by the two dashed lines across the top and bottom of the circular profile. Dashed lines, known *as hidden lines,* show features hidden from view by the material of the part itself.

Fig. 1-4. Drafting symbols



1.36 Other lines on the drawing have special meanings too. A *centerline* is an imaginary line running through the center of an object from one end to the other. It is shown by a light line interrupted at regular intervals by short dashes. It indicates that the object is cylindrical rather than flat. Figure 1-4, on the previous page, shows the symbols commonly used for a centerline and other lines found in mechanical drawings. Notice that the *weight* of a line (heavy, medium, or thin) can be very important to its meaning.

1.37 The location of a hole in a part is identified not by the edges of the hole, but by the position of its center. In Fig. 1-2, two centerlines are shown in the front view. The centerpoint for drilling the large hole is located precisely where the two centerlines cross.

1.38 One unique characteristic of detail drawings, as opposed to assembly drawings, is the inclusion of dimension lines. Every measurable dimension is shown. Usually, there are no duplicate entries of the same dimension. Any dimension not noted can be found by simple subtraction from a larger dimension. Running from the part to the dimension lines are very light lines, called *extension lines.* These lines come close, but do not actually touch the edges of the part.

1.39 Note the revision block in Fig. 1-2. The letter "A" in the revision block refers to the letter "A" within the triangle on the drawing. The revision block states that this dimension (4.50) was 4.4205 before 1/4/02. The heavy line under the dimension 4.50 in the print proper signifies that this dimension is not to scale.

1.40 Note also the use of fractional dimensions, in addition to two- and three-place decimal dimensions. This is the manner in which the designer controls tolerances as listed within the tolerance block. For example, according to the tolerance block, any fractional dimension will indicate a tolerance of $\pm\frac{1}{32}$ of an inch. Since the distance from the hole to the left side of the post is expressed as $1\frac{5}{8}$ in., you know that this dimension is not very critical, and can range from $1\frac{19}{32}$ to $1\frac{21}{32}$ in.

1.41 On the other hand, you see that the length of the larger section of the post is given as 2.750 in. By using three places to the right of the decimal, the designer tells us that a tolerance of ±0.005 is the maximum allowed (as shown in the tolerance block). In other words, the length of this section must fall between 2.745 and 2.755 in.

1.42 The overall diameter of the post is indicated a different way. It has two dimensions (1.750 and 1.745), indicating that this measurement is the most critical of all. By calling off an upper and lower allowable limit, an even tighter tolerance can be indicated than is listed in the tolerance block. In this case, the allowable tolerance is only ±0.0025. Now you see the reason for the statement "unless otherwise specified" in the tolerance block. Also note that a diameter is usually indicated by the Greek letter phi (ϕ).

1.43 The front view shows a broken-out section, revealing a threaded hole going from the left end of the post to the transverse hole. This feature is labeled with a specific note that indicates the hole will have a $\frac{5}{8}$-18 UNF-3B screw thread cut into it. The "$\frac{5}{8}$" indicates the nominal diameter of the thread, the "18" indicates 18 threads per inch, and "3B" is the fit. Similarly, the other end of the bar has an external $\frac{3}{4}$-10 UNC-2A thread that is $1\frac{1}{8}$ in. long. The circular hidden line in the side view confirms the presence of the external screw thread.

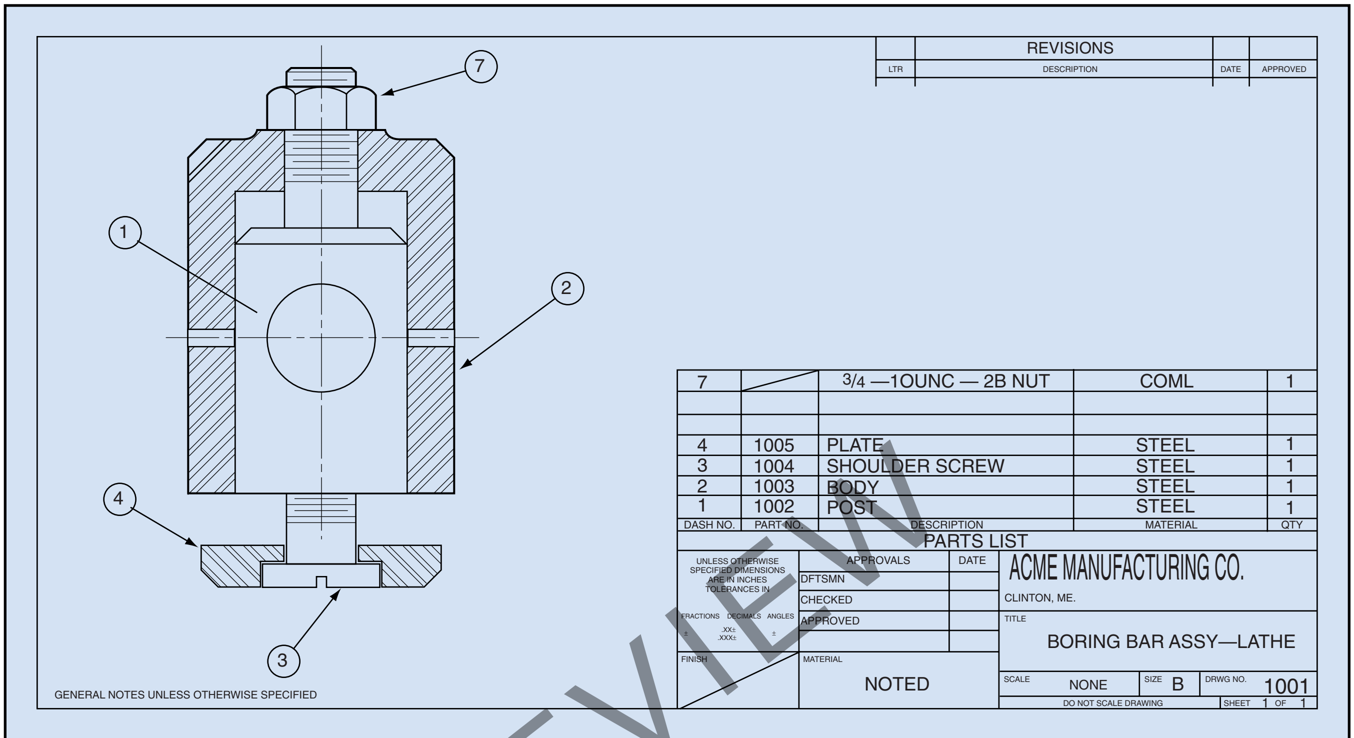
1.44 In the front view, you can see a slight curve where the small diameter meets the large diameter. This curve is labeled with the specific note, "R$\frac{1}{16}$." This note prescribes the radius of the curve to be $\frac{1}{16}$ in. Many part prints will show a small curve like this (called a *fillet)* where two straight surfaces meet. The fillet makes the part stronger and easier to make.

1.45 Another specific note reads "CHAM $\frac{1}{8} \times 45°$ (TYP)." CHAM is the abbreviation for *chamfer*, meaning to cut off the edge. This note indicates that the sharp edge should be cut at the "typical" 45° angle, so that $\frac{1}{8}$ in. of it is cut away. Sharp edges are often chamfered on parts that fit into other parts. Edges are also chamfered on parts that must be handled frequently.

Assembly Drawings

1.46 Figure 1-5 shows an assembly drawing of the boring bar holder. Notice that no dimensions are given. Instead, the various parts are shown fitted together. Each part is identified by a *dash number,*

Fig. 1-5. Assembly drawing



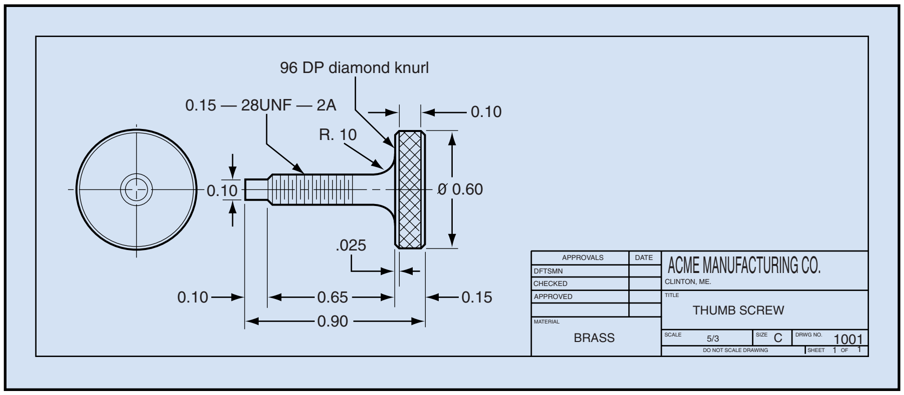
which keys the part to a parts list. If it has many items, the parts list may be on a separate sheet.

1.47 Two of the major parts in the assembly drawing have been sectioned—the body and the plate. A section drawing allows us to see how the piece would look if part of it were cut away. The slanted cross-hatch lines show the cut surfaces.

1.48 By sectioning the plate, the drawing shows how the screw head fits into the plate. An unsectioned plate would have shown the details of the screw head with hidden lines. The body has also been sectioned to show the post more clearly.

1.49 So, after having seen the details of the post, you now see the post as part of a boring bar holder. Thus, the set of detail drawings of all the components of any given assembly, plus an assembly drawing showing how it all fits together, make up the set of working drawings you use in the shop.

The Programmed Exercises on the next page will tell you how well you understand the material you have just read. Before starting the exercises, remove the REVEAL KEY from the back of your book. Read the instructions printed on the Reveal Key. Follow these instructions as you work through the Programmed Exercises.



1-1. The part number for this thumb screw probably is ________.	1-1. 1001 Ref: 1.23
1-2. Is this an assembly drawing or a detail drawing?	1-2. DETAIL DRAWING Ref: 1.32
1-3. How many centerlines are shown in the two views?	1-3. 3 Ref: 1.36
1-4. The length of this part from end to end is ________.	1-4. 0.90 IN. Ref: 1.38
1-5. How many threads to the inch in the threaded portion?	1-5. 28 Ref: 1.43
1-6. What is the radius of the fillet on this part?	1-6. 0.10 IN. Ref: 1.44

Orthographic Projections

1.50 A basic problem that must be faced when drawing an object is that objects are three-dimensional. That is, they have height, width, and depth. A drawing has only two dimensions—height and width.

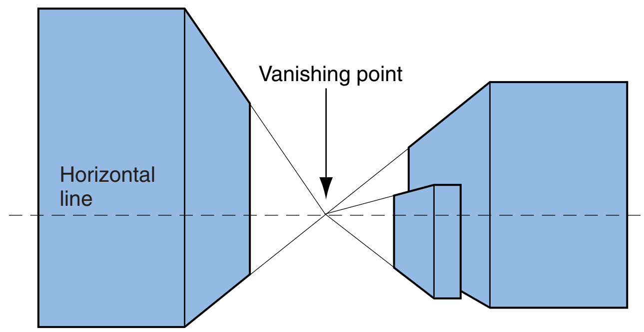
1.51 Artists solve this problem by using *perspective*. Perspective is a way of drawing things as the eye sees them. Figure 1-6 shows an example of perspective. You know the blocks have square corners, but the drawing does not show them that way. The drawing distorts the blocks.

1.52 Designers have invented a way to avoid distortion and draw the surfaces of blocks in their true size and shape. The method used is called *orthographic* projection. *Ortho* is rooted in a Greek word meaning "square" or "true." *Graphic* comes from another Greek word meaning "writing." *Projection* is the special technique used in making this type of drawing.

1.53 An orthographic projection is actually a right-angle projection that eliminates the distortions in shape and size caused by perspective. It does so by ignoring the fact that things farther from the eye appear smaller.

1.54 An orthographic projection shows an object from different views. For example, Fig. 1-7 shows a notched block inside an imaginary, transparent box. The shape of the block is projected out to each side of the box. The projection on each side shows the true size and shape of the block as seen from that direction.

Fig. 1-6. Perspective drawing



1.55 If the imaginary box were cut open and laid flat, you would see all six views of the block at once. Because only two dimensions are shown in any single view, you need at least two views that are 90° apart in order to show all three dimensions. Such views are called *related views.*

1.56 Any two related views will show all three dimensions. But two views may not show enough detail to make the intentions of the designer completely clear. Therefore, a set of three related views has been established as the usual standard for engineering drawings.

1.57 The three views normally shown are the *top (*or *plan)* view, *front* view (or *front elevation),* and *right side* view (or *right elevation).* The object is usually drawn so that its most important feature appears in the front view.

Fig. 1-7. Orthographic projection

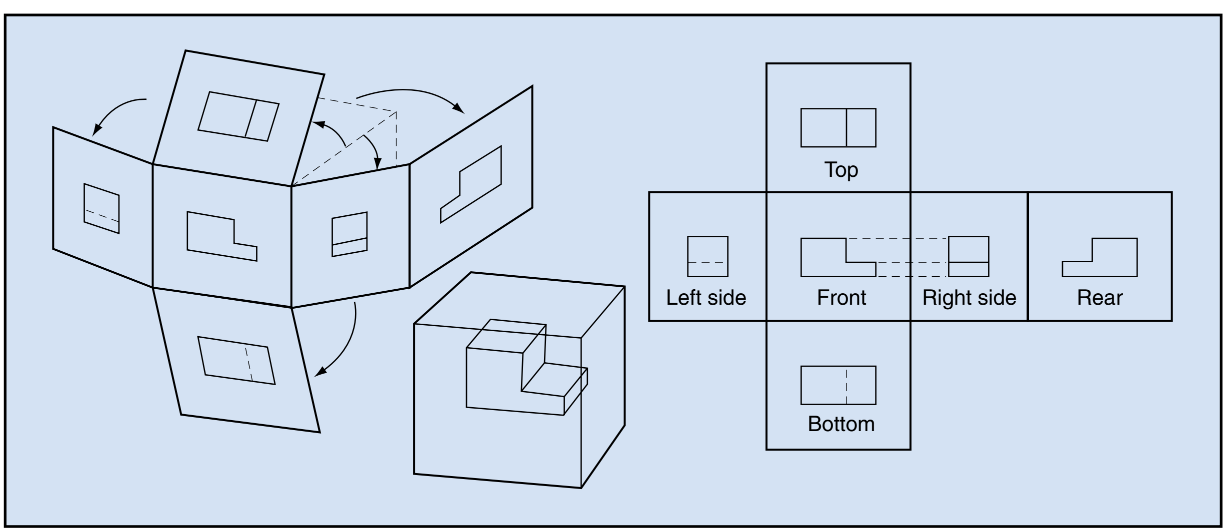


Fig. 1-8. Auxiliary view

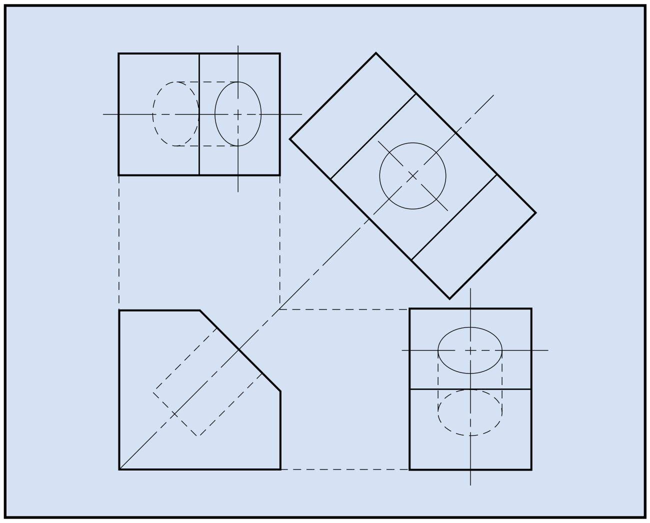
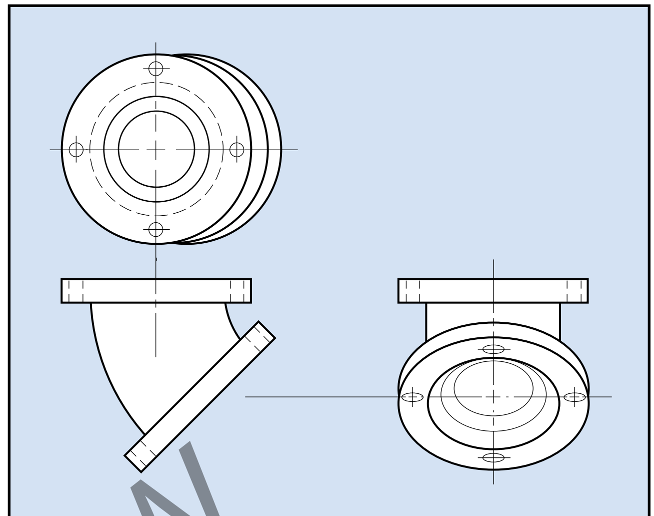


Fig. 1-9. Orthographic projection of 45° elbow

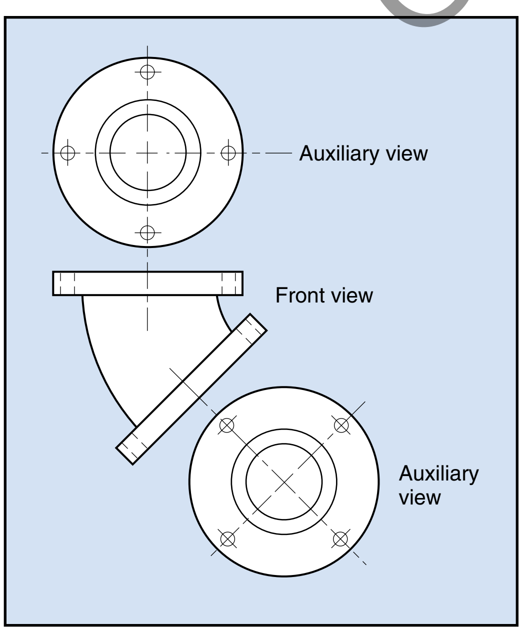


1.58 If the third view adds no useful information, there is no need to show it, especially for round objects. That is why the designer did not show three views of the post for the boring bar holder in Fig. 1-2.

Auxiliary Views

1.59 Sometimes three views are not enough. The purpose of the drawing is to show the size and shape of each surface. If a surface is not at a 90° angle from the other surfaces, the drawing will not show its true size and shape. The designer overcomes this problem by using an auxiliary view that is not one of the related views. The *auxiliary view* shows the special surface without distortion.

Fig. 1-10. Partial auxiliary views of a 45° elbow



1.60 Figure 1-8 shows the three standard views of an object. None of the views shows that the hole in the inclined surface is round. To show this, the designer draws an auxiliary view of the inclined surface. This view shows the surface in its true shape. The plane of projection is shown by the line parallel to the inclined surface.

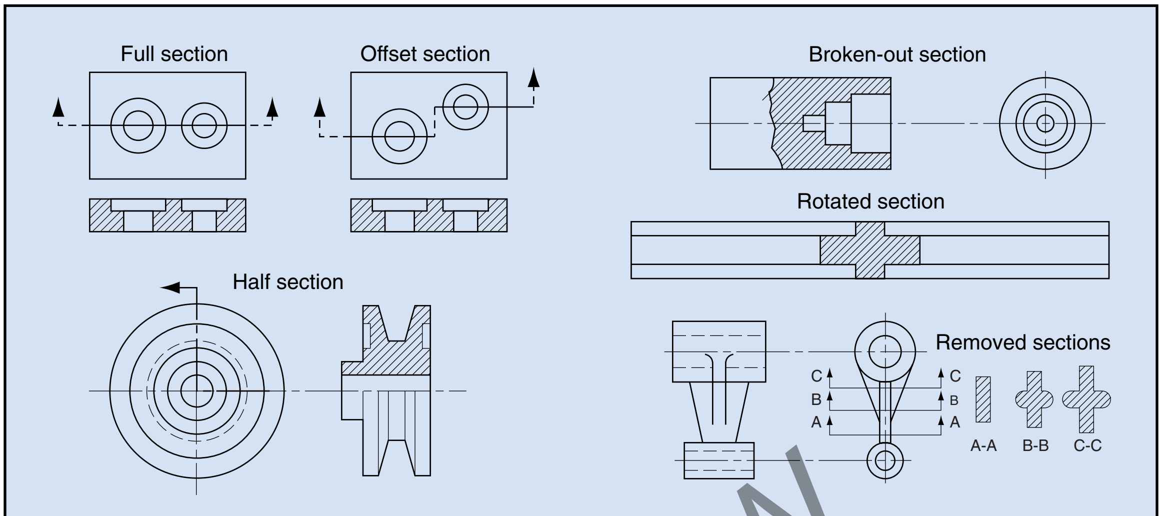
1.61 The remaining surfaces in the auxiliary view will not appear in their true shape. Therefore, the designer may show only part of the object in an auxiliary view. Such a view is called a *partial auxiliary view.*

1.62 Figure 1-9 shows a regular orthographic drawing of a 45° pipe elbow. Notice how complicated this drawing looks. Figure 1-10 shows the same elbow with just one regular orthographic view and two partial views. Note how much simpler the elbow appears. Imagine how much easier it would be to make the elbow from this drawing.

Sections

1.63 There are times when even auxiliary views cannot show the information clearly enough. This often happens when a part has a special cross-section-

Fig. 1-11. Types of sections



al shape that cannot be shown clearly using standard orthographic views. To overcome this problem, the designer shows a *section*.

1.64 To make a section, the designer draws a cutting-plane line through the object. The cutting-plane line shows where the object is cut to reveal what is inside. The arrows on the cutting-plane line show which cut surface you are looking at. Several kinds of sections are shown in Fig. 1-11.

Pictorial Drawings

1.65 There are many occasions when an orthographic projection will not show an object clearly. In these instances, pictorial drawings are useful. The pictorial drawings you are most likely to see are the *perspective* and *isometric*. Figure 1-12 compares these two kinds of drawings.

1.66 **Perspective drawings.** These drawings are used mostly by architects. The advantage of a perspective drawing over other drawings is that it most closely represents an object as we see it. Its disadvantages, however, are that it does not show the true shapes of all surfaces, and not all parts of the object are drawn to the same scale.

1.67 **Isometric drawings.** The word *isometric* means "equal measure." In this case, the name refers to equal *angle* measurements. Isometric drawings are based on three isometric axes, which join to form three equal angles (each 120°), as shown in Fig. 1-13. You know the sides of this cube are square, and the circles are circles, but they are not shown that way. The positioning of the object changes corner angles, makes certain dimensions seem larger than they are, and changes circles into ellipses. However, each dimension is held to scale along its isometric axis.

Fig. 1-12. Pictorial drawings

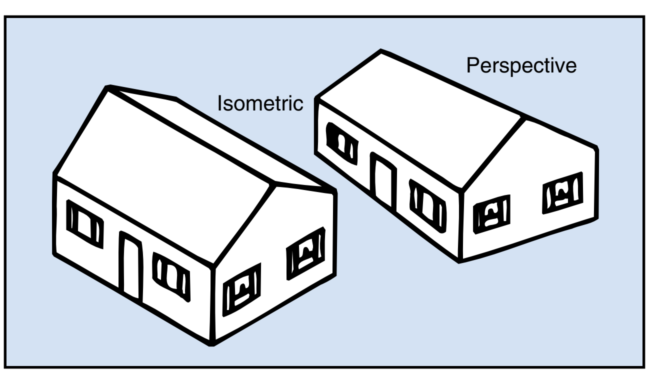
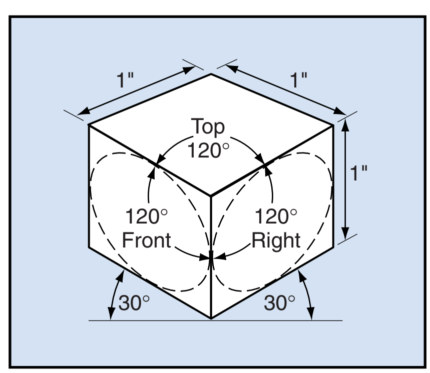
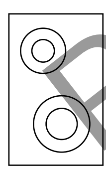
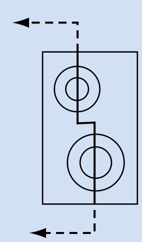


Fig. 1-13. Isometric drawing of a one-inch cube



1-7. In general, how many views are needed in an orthographic drawing to show the three dimensions of an object?	1-7. AT LEAST TWO Ref: 1.55
1-8. The names given the three major related views in an orthographic drawing are ________, ________, and ________.	1-8. TOP, FRONT, RIGHT SIDE Ref: 1.57
1-9. A(n) ________ view is selected to show a slanted surface without distortion of its shape or dimensions.	1-9. AUXILIARY Ref: 1.59
1-10. To show where an object has been sectioned, a draftsman uses a(n) ________ line.	1-10. CUTTING PLANE Ref: 1.64
 1-11. On the blueprint above, draw the cutting-plane line for a section that includes the centerline of each hole.	1-11.  Ref: Fig. 1-11
1-12. The two types of pictorial drawings described in this lesson were ________ and ________ drawings.	1-12. PERSPECTIVE; ISOMETRIC Ref: 1.65
1-13. The angle between one isometric axis and another is ________.	1-13. 120° Ref: 1.67

Answer the following questions by marking an "X" in the box next to the best answer.

1-1. Blueprints are an important form of

- ☐ a. art
- ☐ b. building
- ☐ c. communication
- ☐ d. design

1-2. In a standard title block, the size of the drawing is indicated by

- ☐ a. a code letter printed in a box
- ☐ b. a set of dimensions printed in a box
- ☐ c. a two-digit number following the drawing number
- ☐ d. the scale of the object represented

1-3. The "sign-off block" is used to indicate

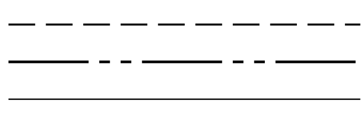
- ☐ a. a drawing that is obsolete
- ☐ b. approval of the original drawing
- ☐ c. revision of the drawing
- ☐ d. the end of a complete set of drawings

1-4. Revisions to a drawing are usually noted

- ☐ a. in the lower left-hand corner of the sheet
- ☐ b. in the upper right-hand corner of the sheet
- ☐ c. inside the title block, under the approvals
- ☐ d. on the back of the sheet

1-5. Which line below is a centerline?

- ☐ a.
- ☐ b.
- ☐ c.
- ☐ d.



1-6. In an assembly drawing, you almost never find

- ☐ a. a break-away or sectioned view
- ☐ b. a title block
- ☐ c. dimensions
- ☐ d. fasteners of any kind

1-7. A sectioned surface is shown by

- ☐ a. a thin dashed line
- ☐ b. an auxiliary view
- ☐ c. blue lines
- ☐ d. crosshatching

1-8. Most blueprints show more than one orthographic projection of an object because

- ☐ a. convention requires as many related projections as possible
- ☐ b. dimensions and tolerances cannot be shown in a single view
- ☐ c. each print must show both a *front* view and a *right side* view
- ☐ d. each projection can show only two dimensions at one time

1-9. The orthographic view that shows the most important features of an object is usually labeled the ________ view.

- ☐ a. bottom
- ☐ b. front
- ☐ c. side
- ☐ d. top

1-10. By using an auxiliary view, the draftsman overcomes problems of

- ☐ a. distorted appearance
- ☐ b. hidden features
- ☐ c. too many inner surfaces
- ☐ d. too small a scale

SUMMARY

Blueprints are valuable sources of information for maintenance workers. Some of the information on a blueprint appears in the title block. The remaining information appears in the drawing.

Orthographic projections show three-dimensional objects upon two-dimensional surfaces, such as paper or a computer screen.

Auxiliary views are used to show the slanted surfaces of an object, which would look distorted in a normal orthographic projection.

Sections show views of internal structure, as though part of the object were cut away.

Perspective drawings are pictorial drawings that closely represent three-dimensional views of objects, because the objects appear to recede (grow smaller) toward the horizon.

Isometric drawings are pictorial drawings in which lines and planes are organized around three symmetric axes of projection, each 120° apart from the other two.

Answers to Self-Check Quiz

1-1. c. Communication. Ref: 1.10

1-2. a. A code letter printed in a box. Ref: 1.22

1-3. b. Approval of the original drawing. Ref: 1.25

1-4. b. In the upper right-hand corner of the sheet. Ref: 1.31

1-5. d. —— – —— – —— – —— – –

Ref: Fig. 1-4

1-6. c. Dimensions. Ref: 1.46, Fig. 1-5

1-7. d. Crosshatching. Ref: 1.47

1-8. d. Each projection can show only two dimensions at one time. Ref: 1.55

1-9. b. Front. Ref: 1.57

1-10. a. Distorted appearance. Ref: 1.59

Contributions from the following sources are appreciated:

Figure 1-3. Sandvik Coromant Co.