

Orthographic Projection

Objectives:

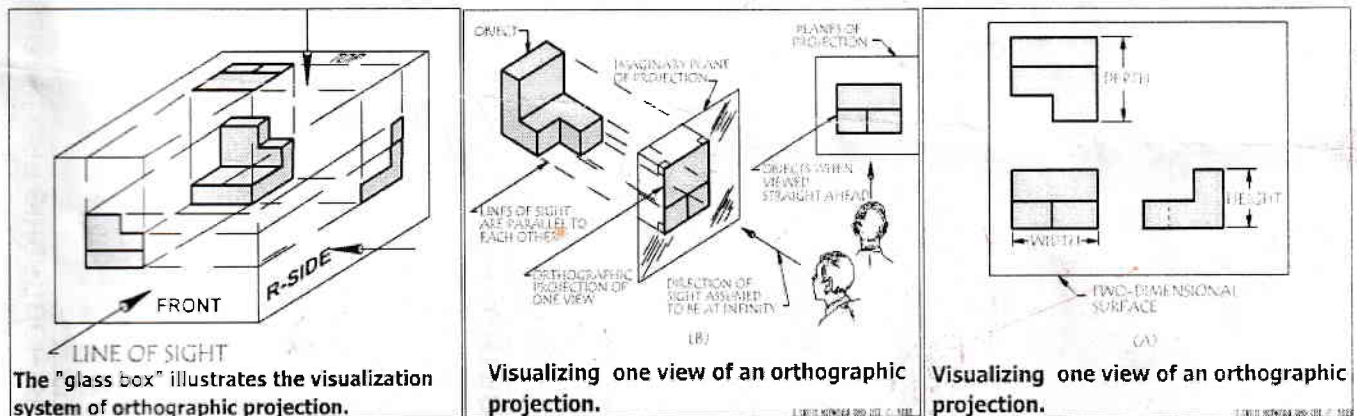
Upon completion of this lesson, the student/trainee must be able to:

- Define orthographic projection.
- Explain the importance of orthographic projection.
- Enumerate the six principal views.
- Give the function of planes of projection.
- Draw orthographic projection drawing.
- Identify when to draw one-view drawing, two-view drawing and three-view drawing.

Introduction

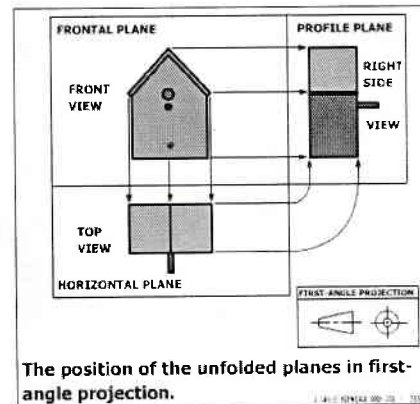
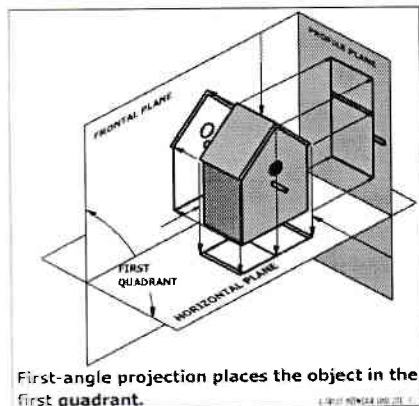
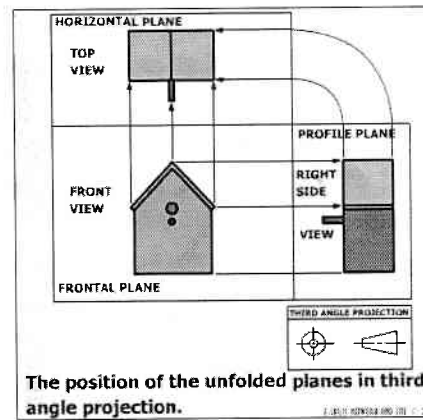
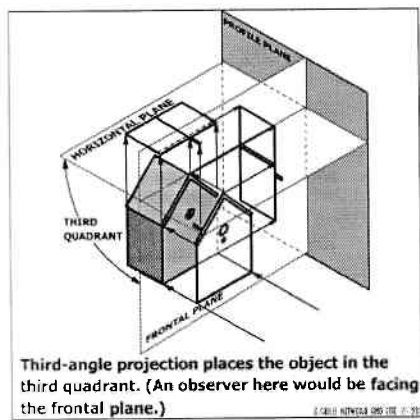
An orthographic projection is a presentation of the separate views of an object on a two dimensional surfaces, it reveals the width, depth, and height of the objects.

The projection is achieved by viewing the object from a point assumed to be an infinity. The lines of sight are parallel to each other and perpendicular to the plane of projection (b) the word "orthographic" is derived from the two Greek words: Orthos, meaning straight, correct, and right angles to; and graphikos, meaning to write or describe by drawing lines. The word "projection" is also taken from a Greek word projectori, meaning to throw forward.



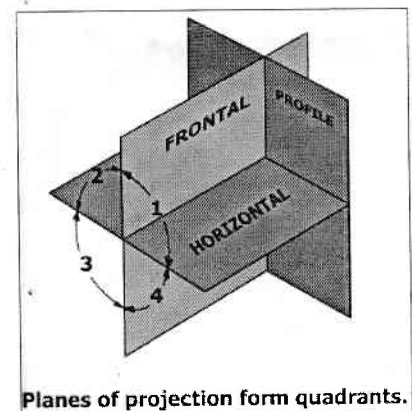
Orthographic System

Two system of orthographic projection, known as first and third-angle projection, are used. Third angle projection is used in the United States, Canada, and many other countries throughout the world. First angle projection, is used mainly in European and Asiatic countries. As world trade has brought about the exchange in engineering drawing as well as the end products, draftspersons are now called upon to communicate in, as well as understood, both types of orthographic projection.



Planes of Projection

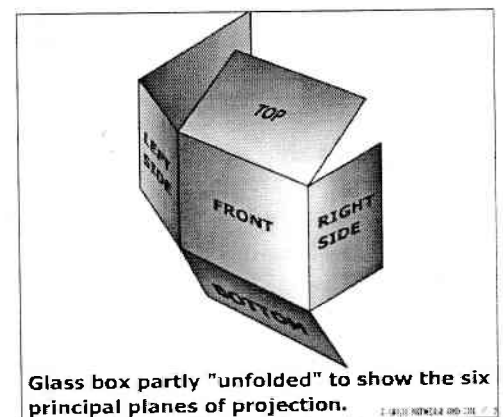
Three planes of projection are used in orthographic projection. These are called the horizontal, frontal and profile planes. These planes join and form quadrants. The quadrants called first, second, third and fourth angles. The first and third quadrants are used for drafting purposes.



Principal Views

As was mentioned earlier, It is the job of a drafting technician to completely describe an object. To do this it may be necessary to look at the object from several directions. The system of multi-view projection provides for six principal views. To visualize this, imagine the object is inside a glass box. The planes in the third angle form the box. The following discussion is therefore about third angle projection.

Notice how the views of the object are projected perpendicular to the sides of the box. The side represents the planes of projection. The top of the box is the horizontal



plane. The bottom is parallel with the top and therefore another horizontal plane. The box front is the frontal plane. The rear is another frontal plane. Each side (end) is a profile plane.

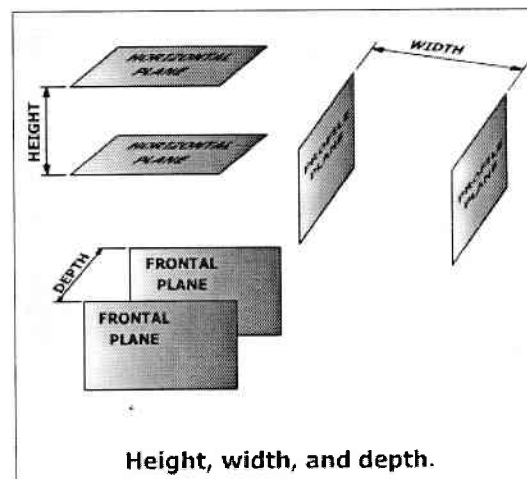
In order to show the views of the object on a flat surface (a sheet of paper), the box is unfolded and laid flat. The top of the box is folded up. This forms the top view of the object. The bottom of the box folds down. The front view of the object is projected on the front of the box. The right side of the box unfolds to the right. This forms the right side view. The left side unfolds to the left. The rear view of the object is projected on the back of the box. It normally unfolds to the left side.

Height, Width, and Depth

When referring to the overall size of an object, the terms height, width, and depth are used. Height is the perpendicular distance between horizontal planes. Width is the perpendicular distance between profile planes. Depth is the perpendicular distance between frontal planes.

In the front view, the width and height of the object are shown. The height projects to the sides and rear views and the width to the top and bottom views.

The side view shows the depth and height of the object. The depth is most easily transferred to the top, bottom, and left side view using dividers or scale.



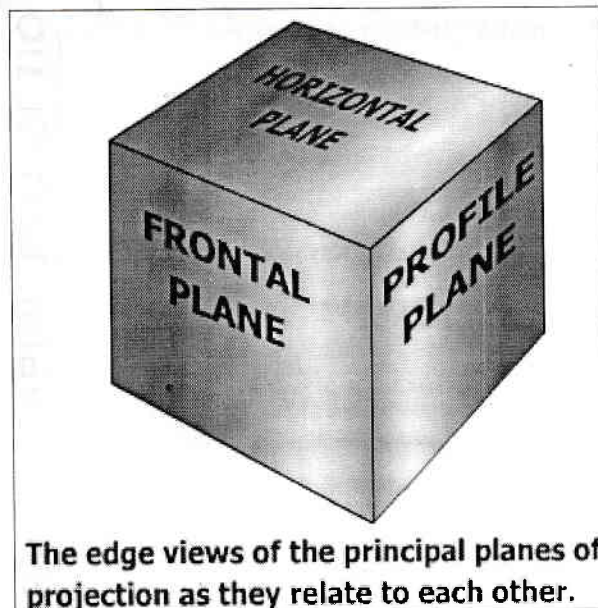
Identifying the Edge Views of the Planes of Projection

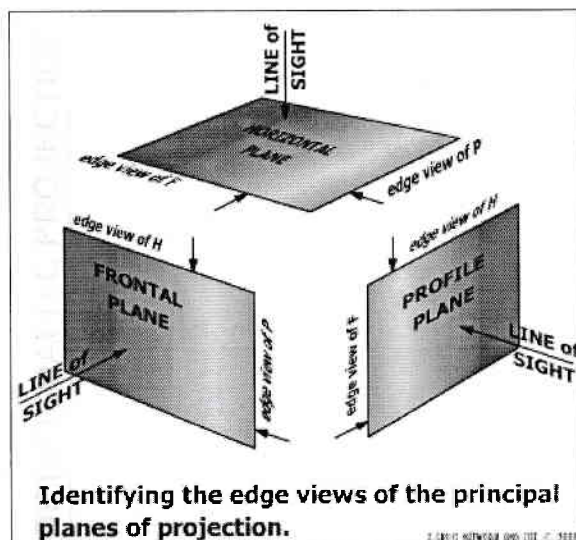
Basic to understanding orthographic projection is understanding of the planes of projection. In complex problems it is necessary to label these planes and their edge views properly so that projection distances can be measured.

When the line of sight is perpendicular to the horizontal plane, the profile plane and the frontal plane appear in edge view.

When the line of sight is perpendicular to the profile plane, the horizontal plane of the projection (H) and the frontal plane of projection (F) appear in edge view.

When the line of sight is perpendicular to the frontal plane, the horizontal plane of projection and the profile plane of projection appear in edge view. The planes are unfolded into one plane. After the identification system is understood, it is not necessary to label the planes on every drawing. It is a good practice to follow until the system is understood.





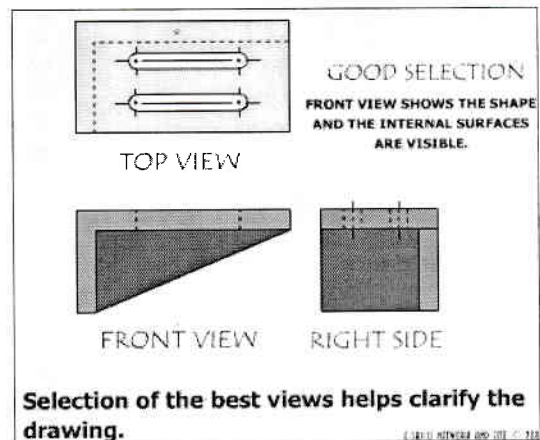
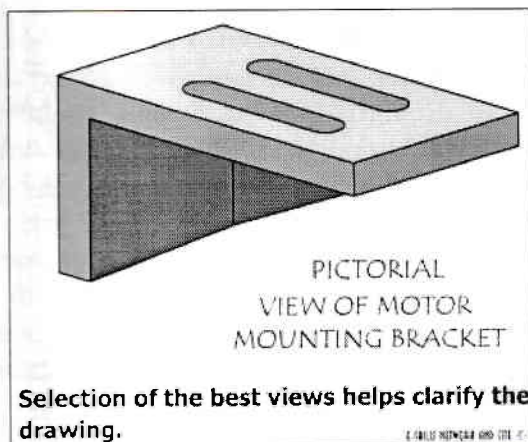
Selecting the Views

Before drawing an object, the number of views needed, usually the top and front and right-side views are used. In a three-view drawing usually the top, front, and right side are used.

The first view to be selected is the one that is to be the front view. It is the most important view of the object and usually the one that shows the shape most clearly. It is usually the longest view.

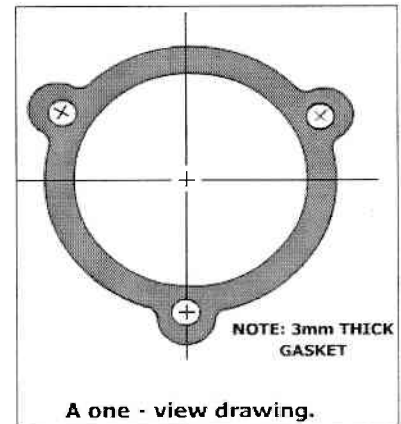
The front view should be located so that the least number of hidden lines is needed. When the motor mounting bracket was drawn with the open side to the front, the edges became visible.

The object should be drawn in a normal position. The cup drawn in the other position would be quite unnatural.



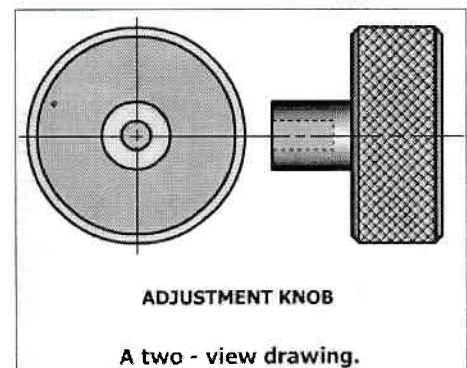
One View Drawing

Some objects can be fully described by drawing one view and dimensioning. The draftsman must decide if the drawing gives all the information needed to make the article. Sometimes a simple note can remove the need for a view.



Two View Drawing

Most symmetrical, conical, and pyramidal objects can be described in two views. A top view of the adjustment knob would be identical to the side view, and therefore unnecessary.



Three View Drawing

Most objects require three views for complete shape description. Therefore, the three-view drawing is most common. The front and right side views give all the information needed except the shape of the vertical handle. The top view shows it to be rectangular.

Not all three-view drawing use the top, front, and right-side views. Any of the six regular orthographic views can be used. A three-view drawing using right and left sides and a front view. A top view would be exactly like the front view and is unnecessary.

