LINETYPE , LAYER & BLOCK

OBJECTIVES

At the end of the unit you will be able to :

➢ State the method to load and setting the linetype.

➢ Explain the benefit of Layer for AutoCAD drawing.

➢ Use the dialog box to control the drawing layer.

➢ Create a drawing after setting the layer.

➢ Use the Block command to transform a group of objects into one object that is stored in the current drawing's block definition table;

➢ Use the Insert and Minsert commands to bring Blocks into drawings;

➢ Convert Blocks to individual objects with Explode

➢ Use Wblock to prepare .DWG files for insertion into other

drawings;

➢ Redefine and globally change previously inserted Blocks;

8.0   Introduction.

The default *linetype* in AutoCAD is continuous. Everything you draw is shown with a continuous *linetype*. The *linetype* can be change by changing a setting at the *Layer and Linetype Properties.* The step to using a *linetype* are, firstly, the linetype must be loaded from a library and secondly it must be set to 'current' status. Once a *linetype* is loaded into AutoCAD you are ready to use it by making it current. That can be done in one of the following ways:

- Assign it to a layer   -   this is called the *Bylayer* method
- Assign it to a block   -   this is called the *Byblock* method
- Assign it to an object   -   to do this you just make the *linetype* current
                                            and draw.

8.1 Load and setting type of line

Methods for invoking the *Linetype* include:

Toolbar   :

Pull-down menu : **Format > Linetype**

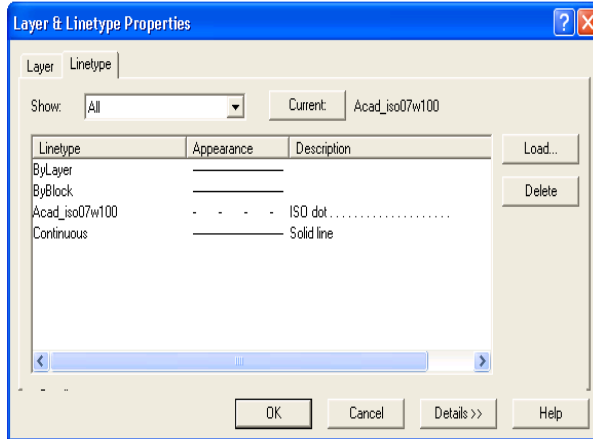Command   : **Linetype**

F*igure 8.1 : Layer & Linetype Properties dialog box (Linetype)*

To load a linetypes, just PICK the *Load* button to view and select from the list of available in the *Load or Reload Linetype* dialog box.
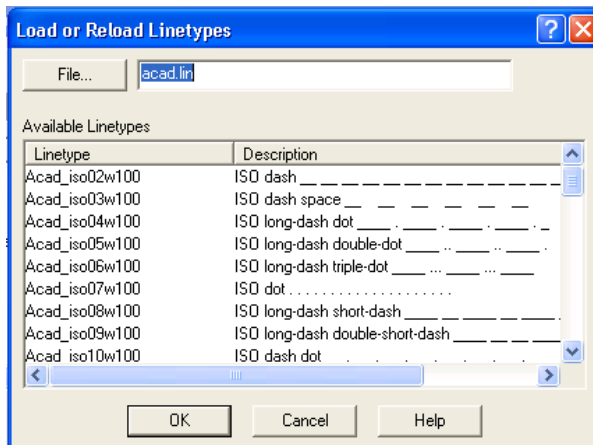

F*igure 8.2 : Load or Reload Linetype dialog box*

Linetype- ByLayer

You can associate a *linetype* with a layer so that the *linetype* automatically becomes current when the layer is current. To do this, follow these steps:

1.   Open the *Layer and Linetype Properties* dialog box by clicking on the icon [icon] or Format > Layer.
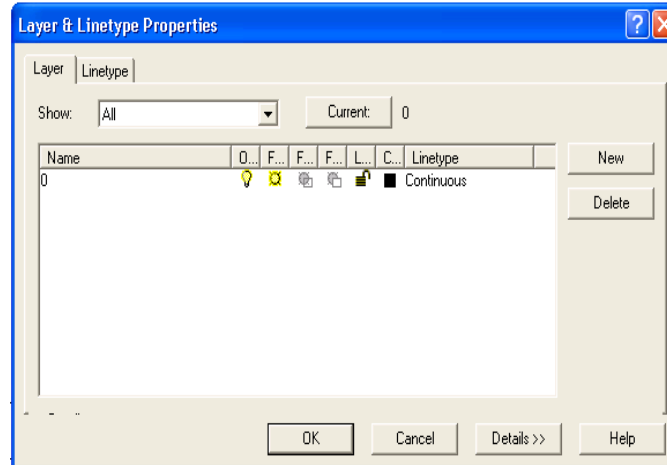
figure 8.3 : Layer & Linetype dialog box (Layer)

2.   In the *Layer & Linetype* dialog box, click on *Continuous* under Linetype.

3.   The *Select Linetype* dialog box opens. Select the linetype you want and click on OK. If it is not listed, click on *Load* and follow the procedure for loading a linetype.
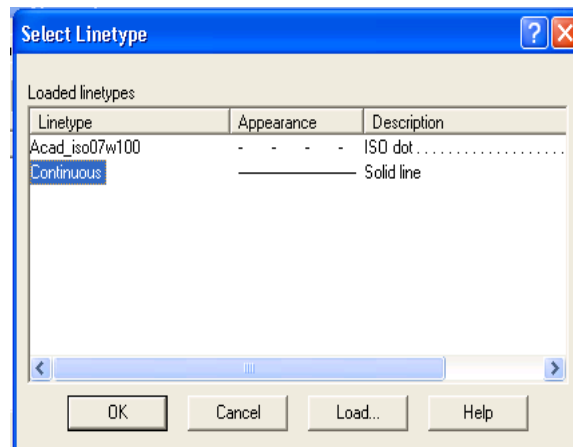
Figure 8.4 : Select Linetype dialog box

Linetypes by Object.

It is possible to draw different objects on the same *layer* with different *linetype*. Simply draw the object and use the grips to apply the loaded *linetypes* to them.

1.   Pick on the object whose *linetype* you want to change. It will then display the grips.

2.   In the Object Properties toolbar click on the *Linetype* control down arrow.
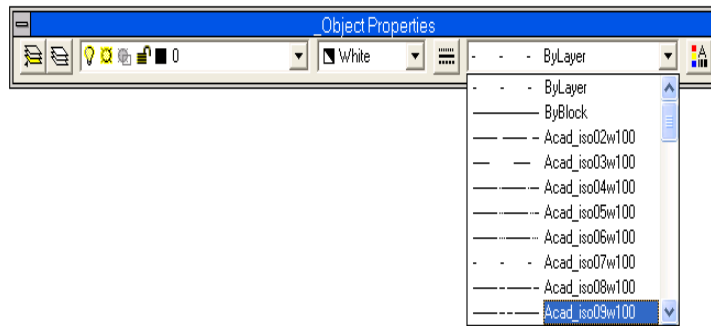
Figure 8.5 : Object Properties Dialog Box

3.   Highlight the Linetype you want to use. All the loaded *linetype* will be displayed here.

4.   Press the *Esc* twice. This removes the grips from the selected object and applies the selected linetype.

8.2   Benefit of Layer

Layers are invisible elements in an AutoCAD drawing. They are equivalent to sheet of transparent film laid on top of one another. *Layers* allow you to compose a drawing from a selection of drawing elements. For example, a building plan may contain details of air-ducting, electrical wiring, piping, flooring furniture etc, Each of these details form individual drawing elements, which can be drawn on individual *Layers* (known as overlay in manual drafting). These *Layer* in turn allow you to produce separate electrical, piping and air-ducting plans for the building. You achieve this by laying the appropriate *Layer* over the floor plan of the building, and printing the resultant composite drawing.
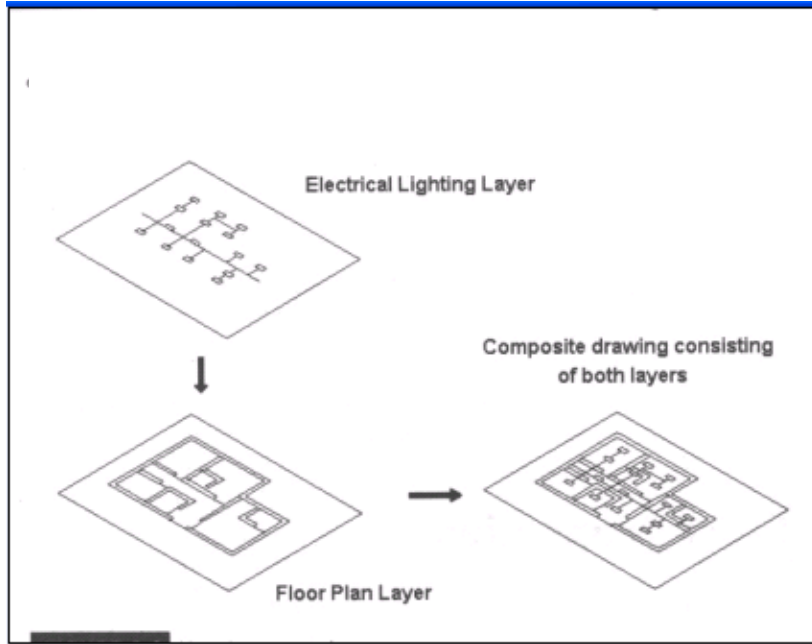
figure 8.6 : How Layers work

8.3 Layer Command

The easiest way to gain complete layer control is through the Layer tab of the Layer & Linetype Properties dialog box. Methods for invoking the Layer include:

Toolbar:

Pull-down menu: **Format > Layer**
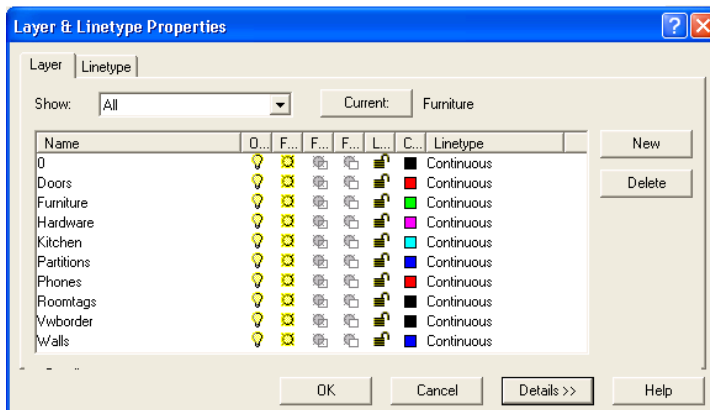
Command: **Layer**

Figure 8.7 : Layer tab of Layer and Linetype Properties

This dialog box allows full control for all layers in a drawing. Layer existing in the drawing appear in the list at the central area (only Layer 0 will appear foe new drawing created from standard templates such as ACAD.DWT). New layer can be created by selecting the *New* button near the upper-right corner of the dialog box.

8.4   Layer Control by using Dialog box

Figure 8.8 : Layer Control

Current or Set

To Set a layer as the Current layer is to make it the active drawing layer. Any object created with draw commands are created on the Current layer. You can, however, edit objects on any layer, but draw only on the current layer. To set the current layer with the *Layer* tab of the *Layer & Linetype Properties* dialog box, select the desired layer from the list and then select the Current tile. Since only one layer can be current, it may be necessary to "deselect" highlight layer names from the list until only one is highlighted. Alternately, if you are typing, use the Set option of the layer command to make a layer *OFF*.

ON, OFF

If layer is ON, it is visible. Objects on visible layers can be edited or plotted. Layers that are OFF are not visible. Objects on layers that are OFF will not plot and cannot be edited (unless the ALL selection option is used, such as Erase, All). It is not advisable to turn the current layer OFF.

Freeze, Thaw

Freeze and Thaw override ON and OFF. Freeze is a more protected state than OFF. Like being OFF, a frozen layer is not visible nor can its object be edited or plotted. Objects on a frozen layer cannot be accidentally erased with the All option. Freezing unused layers speeds up computing time when working with large and complex drawings. Thawing reverse the Freezing state. Layers can be Thawed and also turned OFF. Frozen layers are not visible even though the light bulb icon is on.

Lock, Unlock

Layers that are *Locked* are protected from being edited but are still visible and can be plotted. Locking a *Layer* prevents its objects from being changed even though they are visible.

Objects on Locked layer cannot be selected with the All selection option. Layers can be *Locked* and OFF.

Freeze in Current Viewport, Freeze in New Viewports.

These options are used when paper space viewports exist in the drawing. Using these options, you can control what geometry (layers) appears in specific viewports.

Color and Linetype Properties

Layers have properties of Colors and Linetype such that an object that is drawn on, or changed to, a specific layer assumes the layer's linetype and color. Using this scheme enhances your ability to see what geometry is related by layer. It is also possible, however, to assign specific color and linetype to objects that will override the layer's color and linetype.
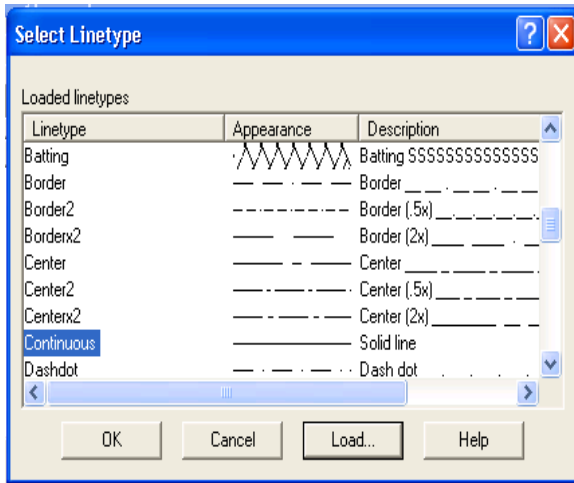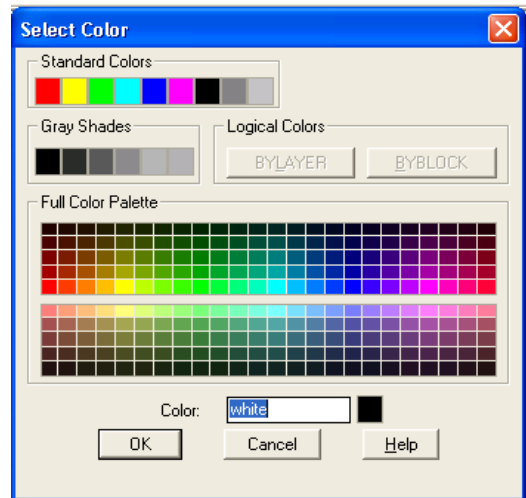
Figure 8.9 : *Select Linetype Dialog box*   F*igure 8.10 : Select Color Dialog Box*

8.5   BLOCK

A *Block* is a group of objects that are combined into object with the Block command. The typical application for Blocks is in the use of symbols. Many drawings contain symbols, such as doors and windows for architectural drawings, capacitors and resistors for electrical schematics, or pumps and valves for piping and instrumentation drawings. In AutoCAD, symbols are created first by constructing the desired geometry with objects like Line, Arc, and Circle, then transforming the set of objects comprising the symbol into a Block. A description of the objects comprising the Block is then stored in the drawing's "block definition table." The Blocks can then each be Inserted into a drawing many times and treated as a single object. Text can be attached to Blocks (called Attributes) and the text can be modified for each Block when inserted.

Figure 8.11 compares a shape composed of a set of objects and the same shape after it has been made into a Block and Inserted back into the drawing. Notice that the original set of objects is selected (highlighted) individually for editing, whereas, the Block is only one object.
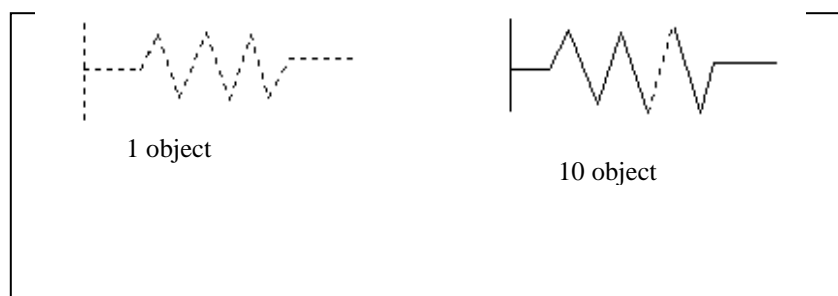

1 object

10 object

Figure 8.11

Since an inserted Block is one object, it uses less file space than a set of objects that is copied with Copy. The Copy command creates a duplicate set of objects, so that if the original symbol were created with 10 objects, 3 copies would yield a total of 40 objects. If instead the original set of 10 were made into a Block and then Inserted 3 times, the total objects would be 13 (the original 10 + 3).

Upon Inserting a Block, its scale can be changed and rotational orientation specified without having to use the Scale or Rotate commands (Fig. 8.12). If a design change is desired in the Blocks that have already been Inserted, the original Block can be redefined and the previously inserted Blocks are automatically updated. Blocks can be made to have explicit Linetype and Color regardless of the layer they are inserted onto, or they can be made to assume the Color and Linetype of the layer onto which they are Inserted.
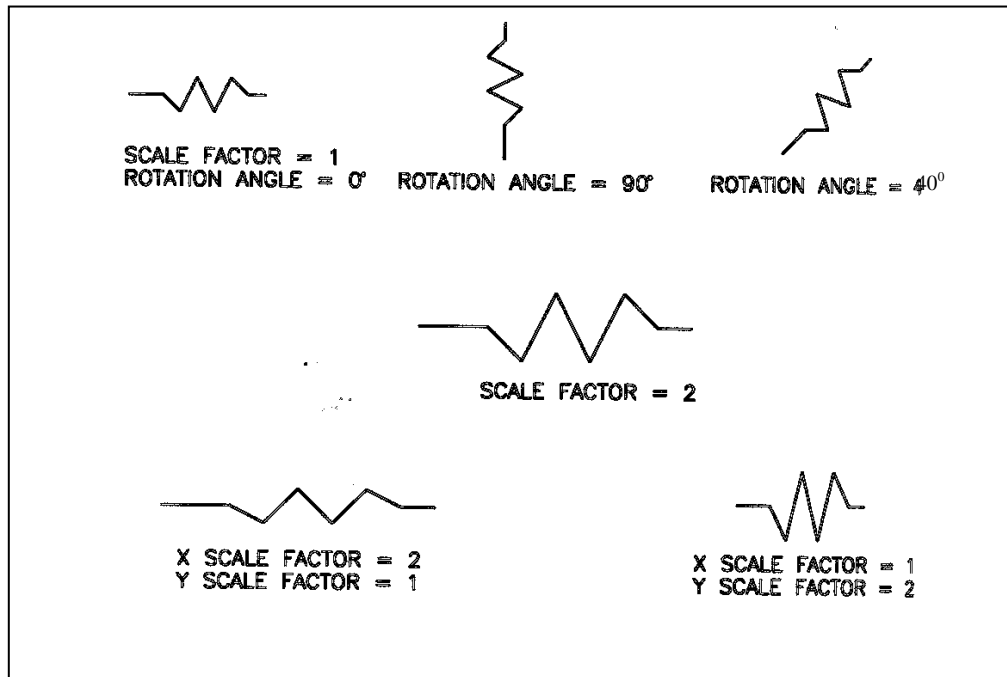
Figure 8.12

Blocks created within the current drawing can be copied to disk as complete and separate drawing files (,DWG file) by using the Wblock command (Write Block). This action allows you to Insert the Blocks into other drawings. Specifically, when you use the Insert command, AutoCAD first searches for the sup plied Block name in the current drawing's block definition table. If the designated Block is not located there, AutoCAD searches the directories for a .DWG file with the designated name.

Commands related to using Blocks are:

Bmake - Invokes a dialog box for creating *Blocks*

Block - Creates a Block from individual objects

Insert - Inserts a Block into a drawing

Ddinsert- Invokes a dialog box for inserting a Block

Minsert- Permits a multiple insert in a rectangular pattern

Explode - Breaks a Block into its original set of multiple objects

Wblock - Writes an existing Block or a set of objects to a file on disk

Base - Allows specification of an insertion base point

Purge - Deletes uninserted Blocks from the block definition table

Rename - Allows renaming Blocks

COMMANDS BLOCK and BMAKE

Methods for invoking the Block or Bmake include:

Toolbar :

Pull-down menu: **Draw > Block…. make**

Command : **Block**

Selecting the icon button, using the pull-down or screen menu, or typing Bmake produces the Block Definition dialog box shown in Figure 8.14. This dialog box provides the same functions as using the Block command (command line equivalent).
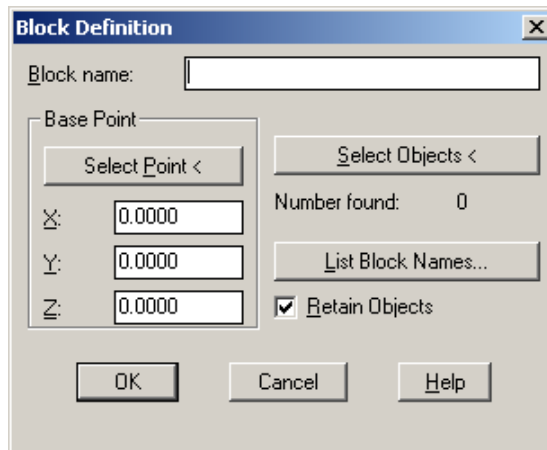
Figure 8.14

To make a *Block*, first create the *Lines, Circles, Arcs*, or other objects comprising the shapes to be combined into the Block. Next, use the *Bmake* or *Block* command to transform the objects into one object—a *Block*.

If you are using the *Block Definition* dialog box, enter the desired Block name in the *Block name* box. Then use the *Select Objects* tile to return to the drawing temporarily to select the objects you wish to comprise the *Block*. After selection of objects, the dialog box reappears. Use the *Select Point* button in the *Base Point* section of the dialog box if you want to use a point other than the default 0,0 as the "insertion point" when the *Block* is later inserted (usually select a point in the center or corner of the set of objects). When you select OK, the objects comprising the *Block* disappear and the new *Block* is defined and stored in the drawing's block definition table awaiting future insertions. A check appearing in the *Retain Objects* checkbox forces AutoCAD

to retain the original "template" objects (similar to using Oops after the Block command), even though the definition of the Block remains in the table.

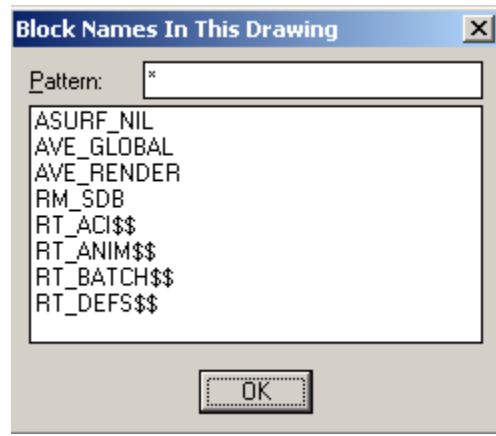The *List Block Names* tile can be chosen to list all existing Blocks. (refer to figure 8.15)

Figure 8.15.

If you prefer to type, use *Block* to produce the command line equivalent of

Bmake. The command syntax is as follows:

> Command: **Block**
>
> Block name (or ?): (**name**) (Enter a descriptive name for the Block up to 31 characters.)
>
> Insertion base point: **PICK** or (**coordinates**) (Select a point to be used later for insertion.)
>
> Select objects: **PICK**
>
> Select objects: **PICK** (Continue selecting all desired objects.)
>
> Select objects: **Enter**

The *Block* then <u>disappears</u> as it is stored in the current drawing's "block definition table." The Oops command can be used to restore the original set of "template" objects (they reappear), but the definition of the Block remains in the table. Using the **?** option of the Block command lists the Blocks stored in the block definition table.

Block Color and Linetype Settings

The c and linetype of an inserted *Block* are determined by one of the following settings when the *Block* is created:

1.   When a Block is inserted, it is drawn on its original layer with its original Color and Linetype (when the objects were created) regardless of the layer or color and linetype settings that are current when the Block is inserted (unless conditions 2 or 3 exist).

2.   If a Block is created on Layer 0 (Layer 0 is current when the original objects comprising the Block are created), then the Block assumes the color and linetype of any layer that is current when it is inserted (Fig. 8.16).
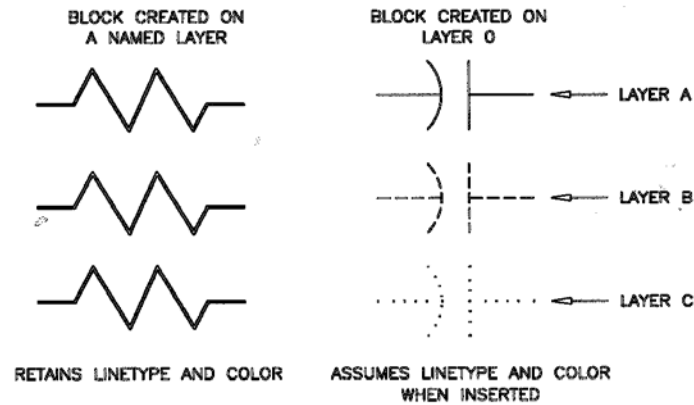

Figure 8.16

3.   If the *Block* is created with the special *BYBLOCK linetype* and *color* setting, the *Block* is inserted with the *Color* and *Linetype* settings that are current during insertion whether the BYLAYER or explicit object *Color* and Linetype settings are current.

INSERT and DDINSERT

Once the Block has been created, it is inserted back into the drawing at the desired location(s) with the Insert command. Insert also allows the Blocks to be scaled or rotated upon insertion. The command syntax is given here:

Command: **insert**

Block name (or ?): **name** (Type the name of an existing block or .DWG file to insert.)

Insertion point: **PICK** or (**coordinates**) (Give the desired location of the Block.)

X scale factor <1>/Corner/XYZ: **PICK** or (**value**) (Specifies the size of the Block in the X direction.)

Y scale factor (default=X): (**value**) or **Enter** (Specifies the size in the Y direction.)

Rotation angle: **PICK** or (**value**) (Enter an angle for Block rotation.)

Selecting the "X scale factor" with the cursor specifies both X and Y factors. The rotation angle can be forced to 90 degree increments by turning ORTHO (F8) On.

Methods for invoking the Insert include:

      Toolbar :

      Pull-down menu : **Insert > Block**

      Command   :   **Insert**

The *Insert* dialog box can be invoked by using the pull-down menu, icon buttons, or tablet menu or by typing Ddinsert.
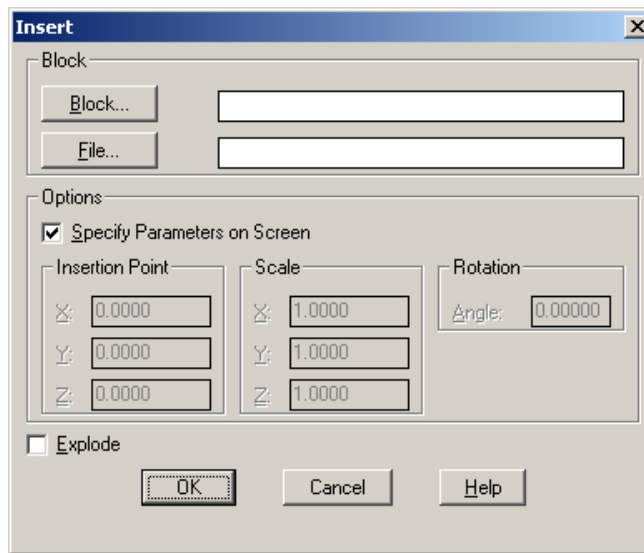
Figure. 8.17.

Selecting the *Block* tile causes another box to pop up, listing the *Blocks* previously defined in the drawing's block definition table.
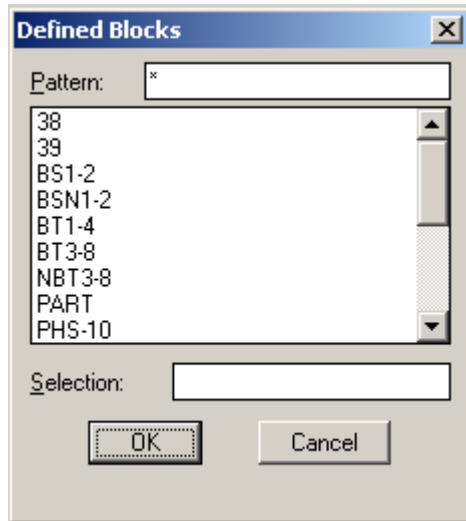
Figure. 8.18

The desired *Block* is selected from the list. Selecting the File tile causes a box to pop up, allowing selection of any drawing (.DWG files) from any accessible drive and directory for insertion. The *Insert* dialog box provides explicit value entry of insertion point coordinates, scale, and rotation angle. Explode can also be toggled, which would insert the *Block* as multiple objects (see INSERT with *).

Insert Presets

Sometimes it is desirable to see the Block in the intended scale factor or rotation angle before you choose the insertion point. Insert presets allow you to specify a rotation angle or scale factor before you dynamically drag the *Block* to PICK the insertion point. (Normally, you have to select the insertion point before the prompts for scale factor and rotation angle appear.) Presets can be used with the Insert command or Insert dialog box. To do this, type in one of the following characters at the "Insertion point:" prompt:

R	rotation angle
S	scale factor (uniform)
X	X scale factor only
Y	Y scale factor only
Z	Z scale factor only

For example, to insert a *Block* at a 45 degree angle using the Insert dialog box, the command syntax reads as follows:

Command: **ddinsert** (select Block name from the list)

Insertion point: **R** (specifies Rotation preset)

Rotation angle: **45** (rotates the Block to 45 degrees during dynamic insertion)

Insertion point: X scale factor <1> / Corner / XYZ: **Enter** or (**value**)

Y scale factor (default=X): **Enter** or (**value**)

Command:

This action allows you to see the Block at the prescribed rotation angle as you dynamically drag it to PICK the insertion point.

MINSERT

This command allows a multiple insert in a rectangular pattern (Fig. 8.19). Minsert is actually a combination of the Insert and the Array Rectangular commands. The Blocks inserted with Minsert are associated (the group is treated as one object) and cannot be edited independently (unless *Explode*). Examining the command syntax yield the similarly to a Rectangular Array.

Command : **Minsert**

Block name (or ?) : **name**

Insertion Point : **PICK** or (**coordinates**)

X scale factor <1>/corner/XYZ : (**value**) or **PICK**

Y scale factor (default =X) : (**valu**e) or **Enter**

Rotation Angle: (**value**) or **PICK**

Number of Row (---) : (**value**)

Number of Column (III) : (**value**)

Unit cell or distance between rows : (**value**) or **PICK** (value specifies Y distance from *Block* corner to *Block* corner; PICK allows drawing a unit cell rectangle).

Distance between Columns : (**value**) or **PICK** (Specifies X distance between *Blocks* corner).
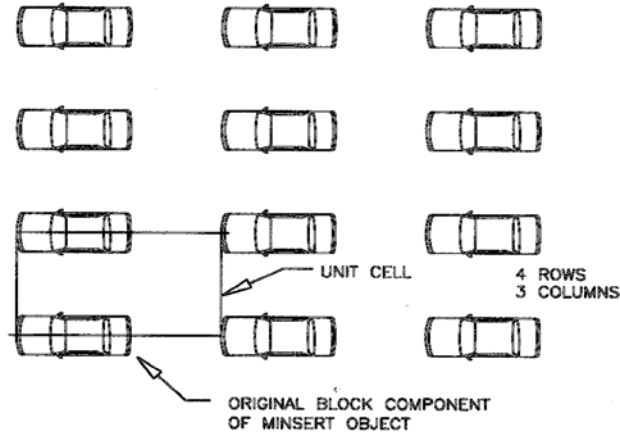
Figure 8.19

EXPLODE

Explode breaks a previously inserted Block back into its original set of objects (figure 8.20), which allows you to edit individually objects comprising the shape. Blocks that have been inserted with differing X and Y scale factor or Blocks that have been Minserted can be exploded in Release 14. There are no option for this command.

Methods for invoking the Explode include:

Toolbar :

Pull down menu : **Modify > Explode**

Command   :   **Explode**

Inserting with an* (asterisk) symbol accomplishes the same goal as using *Insert* normally, then *Explode.*

*INSERT with ***

Using the Insert command with the asterisk (*) allows you to insert a Block, not as one object, but as the original set of objects comprising the Block. In this way, you can edit individual objects in the Block, otherwise impossible if the Block is only one object (Fig. 21-10). The normal Insert command is used; however, when the desired Block name is entered, it is prefaced by the asterisk (*) symbol:

Command: *insert*

Block name (or ?): * (**name**) (Type the * symbol, then the name of an existing block or .DWG file to insert.)

Command:

This action accomplishes the same goal as using *Insert*; then *Explode.*

WBLOCK

The *Wblock* command writes a *Block* out to disk as a separate and complete drawing (.DWG) file. The *Block* used for writing to disk can exist in the current drawing's *Block* definition table or can be created by the *Wblock* command. Remember that the *Insert* command inserts *Blocks* (from the current drawing's block definition table) or finds and accepts .DWG files and treats them as *Blocks* upon insertion.

If you are using an existing *Block*, a copy of the *Block* is essentially transformed by the *Wblock* command to create a complete AutoCAD drawing (.DWG) file. The original block definition remains in the current drawing's block definition table. In this way, *Blocks* that were originally intended for insertion into the current drawing can be inserted into other drawings.

If you want to transform a set of objects to be used as a *Block* in other drawings but not in the current one, you can use *Wblock* to transform (a copy of) the objects in the current drawing into a separate .DWG file. This action does not create a Block in the current drawing.

As an alternative, if you want to create symbols specifically to be inserted into other drawings, each symbol could be created initially as a separate .DWG file. Figure 21-11 illustrates the relationship among a *Block*, the current drawing, and a *WBlock.*
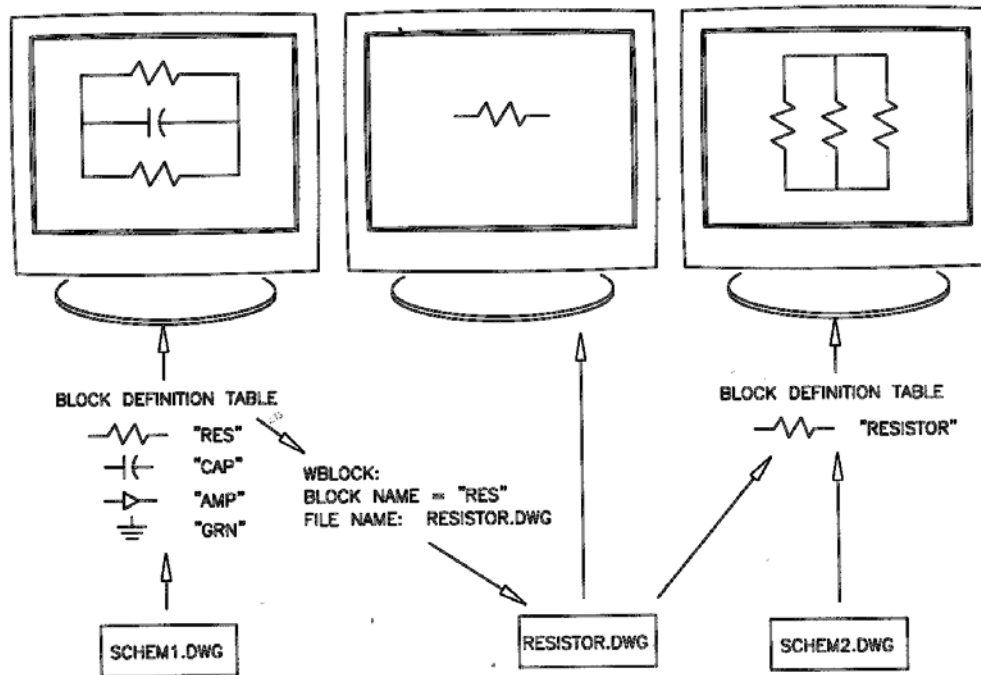

figure 8.21

To create *Wblocks (.DWG files)* from existing *Blocks* follow this command syntax:

Command: **wblock**

(At this point, the Create File dialog box appears, prompting you to supply a name for the .DWG file to be created. Typically, a new descriptive name would be typed in the edit box rather than selecting from the existing names.)

Block name: (**name**) (Enter the name of the desired existing Block. If the file name given in the previous step is the same as the existing Block name, an "=" symbol can be entered at this prompt.)

Command:

A copy of the existing Block is then created in the current or selected directory as a *Wblock* (.*DWG file*).

To create a Wblock (.DWG file) to be used as a *Block* in other drawings but not in the current drawing follow the same steps as before, but when prompted for the "*Block name:*" press Enter or select *blank* from the screen menu. The next steps are like the Block command prompts:

Command : **wblock**

(The Create Drawing File dialog box appears, prompting you to supply a name for

the .DWG file to be created.)

Block Name : (**Enter**) or (**blank**)

Insertion Base Point : **PICK** or (**coordinates**) (Pick a point to be used later for

insertion)

Select Object : **PICK**

Select Object : **Enter** (Press Enter to complete selection)

Command :

Settings current when the original objects comprising the Wblock were created. The three possible settings are the same as those for Blocks (see the Block command, Color and Linetype Settings).

When a Wblock is Inserted, its parent (original) layer is also inserted into the current drawing. Freezing either the parent layer or the layer that was current during the insertion causes the Wblock to be frozen.

REDEFINING BLOCKS

If you want to change the configuration of a Block, even after it has been inserted, it can be accomplished by redefining the Block. In doing so, all of the previous Block insertions are automatically and globally updated.

AutoCAD stores two fundamental pieces of information for each *Block* insertion—the insertion point and the *Block* name. The actual block definition is stored in the block definition table. Redefining the *Block* involves changing that definition.

To redefine a *Block*, use the *Block* command. First, draw the new geometry or change the original "template" set of objects. (The change cannot be made using an inserted *Block* unless it is Exploded because a *Block* cannot reference itself.) Next, use the Block command and select the new or changed geometry. The old *Block* is redefined with the new geometry as long as the original *Block* name is used.

Command: **block**

Block name (or ?): **name** (Enter the original Block name.)

Block (name) already exists.

Redefine it? <N>: **Yes** (Answering Y or yes causes the redefinition.)

Insertion base point: **PICK** or (**coordinates**) (Select a point to be used later for insertion.)

Select objects: **PICK**

Select objects: **PICK** (Continue selecting all desired objects.)

Select objects: **Enter**

Command:

The *Block* is redefined and all insertions of the original *Block* display the new geometry.

The Block command can also be used to redefine *Wblocks* that have been inserted. In this case, enter the *Wblock* name (.DWG filename) at the "*Block name*:" prompt to redefine (actually replace) a previously inserted *Wblock*.