

## XII. Blocks

### **BLOCK AND WBLOCK**

A block is a collection of objects you can associate together to form a single object, or block definition. You can insert, scale, and rotate a block in a drawing. You can explode a block into its component objects, modify them, and redefine the block. AutoCAD updates all current and future instances of that block based on the block definition.

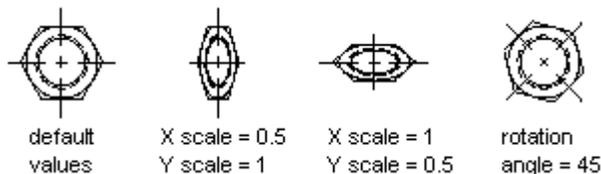
Blocks streamline the drawing process. For example, you can use blocks to:

Build a standard library of frequently used symbols, components, or standard parts. You can insert the same block numerous times instead of re-creating the drawing elements each time.

Revise drawings efficiently by inserting, relocating, and copying blocks as components rather than individual geometric objects.

Save disk space by storing all references to the same block as one block definition in the drawing database.

When you insert a block in your drawing, you are creating a block instance. Each time you insert a block instance; you assign a scale factor and rotation angle to the inserted block. You can also scale a block instance using different values in any coordinate (X, Y, Z) direction.



Blocks make it possible for you to organize your drawing tasks in a systematic way, so that you can set up, redesign, and sort the objects in your drawings and the information associated with them.

You can group objects to create block definitions in the current drawing, or you can save the block as a separate drawing file. When you define a block, you specify the base point, the objects to group, and whether to retain or delete the objects or convert them to a block in the current drawing. You can also enter a text description and specify an icon used to help identify the block definition in AutoCAD Design Center. Block definitions are one of many non-graphical objects saved in a drawing.

### **To create a block definition**

- 1 From the Draw menu, choose Block → Make. 
- 2 In the Block Definition dialog box, enter a name for the block.
- 3 Under Objects, choose the Select Objects button to use the pointing device to select objects for the block definition.

The dialog box closes temporarily while you select objects for the block. Press ENTER when you are done selecting blocks. The dialog box reopens.

- 4 If you want to create a selection set, use the Quick Select button to create or define a filter for your selection set.

- 5 Under Objects, specify whether to retain, convert to a block, or delete the selected objects.
  - Retain: Keeps selected objects in the current drawing, in their original state.
  - Convert to Block: Replaces selected objects with an instance of the block.
  - Delete: Removes selected objects after the block is defined.
- 6 Under Base Point, enter the coordinate values for the insertion base point or choose the Specify Insertion Base Point button to use the pointing device.
- 7 Under Description, enter text to help identify the block for easy retrieval.
- 8 Under Icon, specify whether to create an icon from the block definition.
  - Do not include an icon: Omits preview image from block definition.
  - Create icon from block geometry: Saves preview image with the block definition.
- 9 Choose OK.

The block definition is saved in the current drawing.

#### Command line BLOCK

Related –BLOCK creates block definitions on the command line.

NOTE To generate preview images for blocks you created with Release 14 or earlier, use the BLOCKICON command. The command works on your current open drawing and prompts you for the names of blocks that you want updated with preview images. For information about preview images (or block icons),

### To save a block or object as a separate drawing file

- 1 At the Command prompt, enter WBLOCK.
- 2 In the Write Block dialog box, specify a block or an object to write out as a file.
  - Block: Specifies a block to save as a file.
  - Entire Drawing: Selects current drawing as a block.
  - Object: Specifies objects to be saved as a file.
- 3 Under Block, select a name from the list to save as a file.
- 4 Under Base Point, use the Pick Point button to define the base point.
- 5 Under Objects, use the Select objects button to select the object for the block file.
- 6 Enter a name for the new file.
  - If a block is selected, WBLOCK automatically uses that block's name for the new file.
- 7 In the Insert Units list, select an insert unit to use in AutoCAD Design Center.
- 8 Choose OK.

The block definition is saved as a drawing file. This option is handy for inserting parts of one drawing into another, especially when proper coordinate locations are important (i.e., bringing roads from one drawing into another, and have them overlay existing drawing entities).

## Block Objects

A block is a collection of objects you can associate together to form a single object. When you insert a block in your drawing, you are creating a block instance. Each time you insert a block instance; you assign a scale factor and rotation angle to the inserted block.

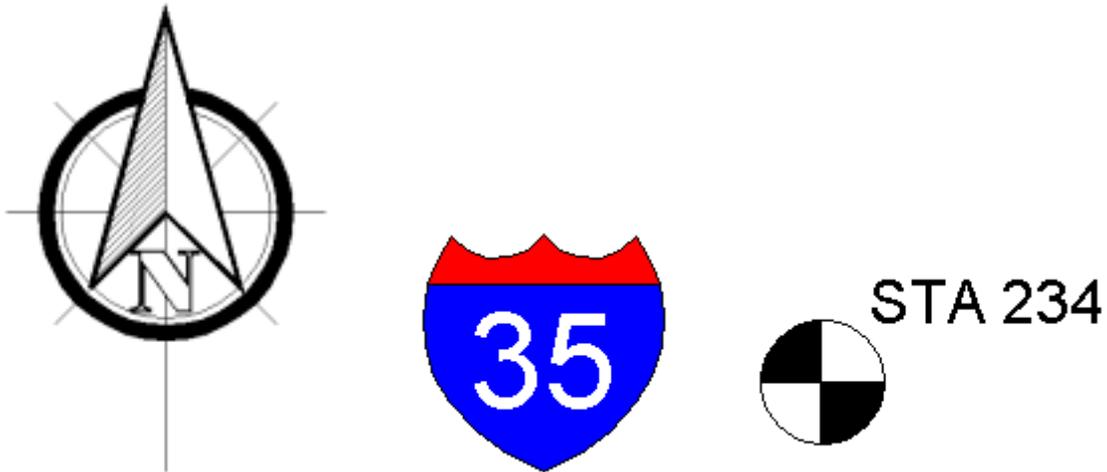
Blocks streamline the drawing process.

Build a standard library of frequently used symbols.

Revise drawings efficiently.

Save disk space by storing all references to the same block as one block definition in the drawing.

You can group objects to create block definitions in the current drawing, or you can save the block as a separate drawing file. When you define a block, you specify the base point, the objects to group, and one or more optional attribute tags.

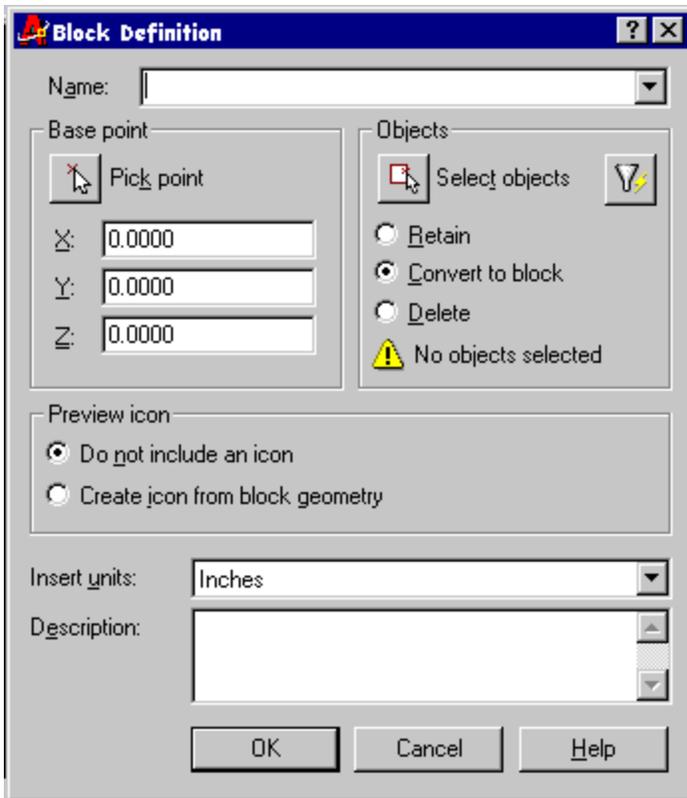


## Typical Mapping Blocks

### Block; Make

Blocks can be defined from objects that were originally drawn on different layers with different colors, linetypes, and lineweights.

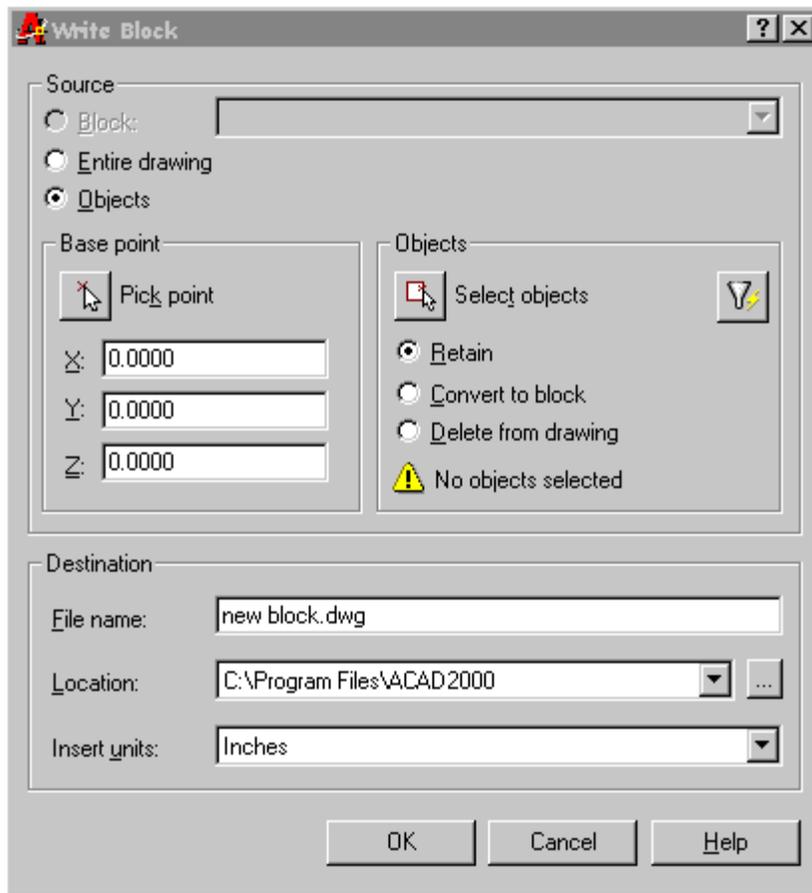
When a block that consists of objects drawn on layer 0 and assigned the color, linetype, and lineweight BYLAYER is placed on the current layer, it assumes the properties of the current layer.



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## WBLOCK

WBLOCK writes selected objects from the current drawing to a new drawing file. Objects may be in the form of a block, or individual drawing objects. To copy objects from one drawing to another, a common base point (usually 0,0) must be used in both drawings.

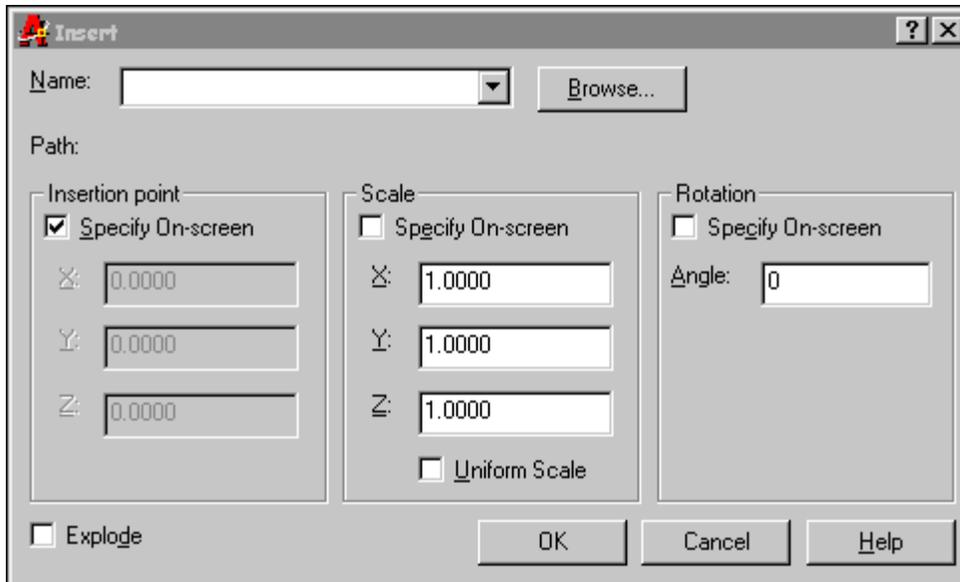


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## Using Blocks

### Insert

Block instances are inserted into drawings, providing the location, scale (x,y,z) and rotation angle To insert block data "un-grouped", check the explode option



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## Blocks with Attributes

An attribute provides a label or tag for you to attach text to a block. Whenever you insert a block that has a variable attribute, AutoCAD prompts you to enter the data to be stored with the block.

Extract attribute information from a drawing to use in a spreadsheet or database

Associate one or more attributes with a block

AutoCAD prompts you for the value of each attribute when you insert the block

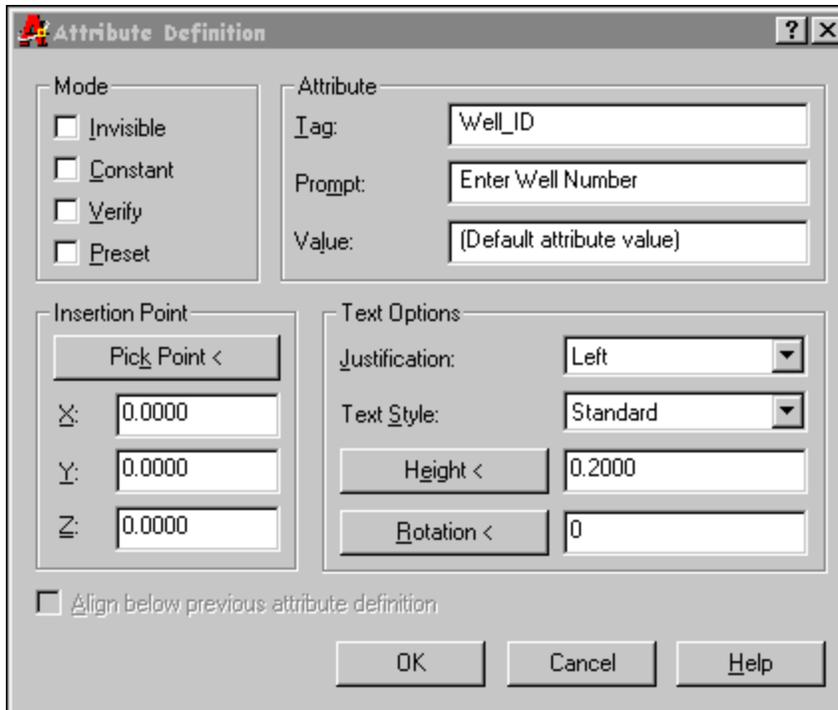
Or, you can define constant attributes: because they have the same value in every occurrence of the block

Attributes can be invisible, which means the attribute is not displayed or plotted.

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**Attdef**





## Blocks

A block is a collection of objects associated together to form a single object. When you insert a block in your drawing, you are creating a block instance. Each time you insert a block instance, you assign a scale factor and rotation angle to the inserted block.

Drawings external to your working drawing, may be inserted as block objects. Block symbol libraries are created in this manner.

## Exercises

### Exercise (4a)

Create a drawing to be used as a block, that once inserted, the block uses the current layer properties. When objects are created on Layer 0, with color and linetype properties set to "ByLayer", and the drawing inserted as a block, the block inherits the current layer properties.

#### Create a new drawing (from scratch)

##### Layer

- Current layer = 0

**PL** ↵ (*digitize a polyline using typed coordinates*)

- -50,-50 ↵
- 50,50 ↵
- Enter (↵)

**PL** ↵

- -50,50 ↵
- 50,-50 ↵
- Enter (↵)

**Save the drawing**

- Drawing name: X1

**Close the drawing.**

Insert X1 as a block into a new drawing and observe the block properties.

**Create a new drawing (from scratch)**

**Open the Layer Properties dialog box**

- Click the “New” button
- Layer Name: Blue
- Layer Color: Blue
- Set Blue as current layer
- Click OK

**Insert** ↵

- Block Name: X1 (Click the browse button and navigate to the file created in the previous exercise)
- Insertion point: Check specify on screen
- Scale (xyz): 1
- Rotation: 0

**Open the Layer Properties dialog box**

- Click the “New” button
- Layer Name: Green
- Layer Color: Green
- Set Green as current layer
- Click OK

**Insert** ↵

- Block Name: X1 (Click the browse button and navigate to the file created in the previous exercise)
- Insertion point: Check specify on screen
- Scale (xyz): 1
- Rotation: 0

**Save drawing**

- Drawing name: Bx1

**Close the drawing.**

*(Teaching point: insertion point of block, 0,0 from X1; inherited properties of inserted block)*

## **Exercise (4b)**

Create a drawing to be used as a block, that once inserted, the block objects retain their color and layer properties as set.

**Create a new drawing (from scratch)**

**Set the following on the object properties toolbar.**

- Current layer = 0
- Color = Bylayer

**PL** ↵ *(digitize a polyline using typed coordinates)*

- **-50,-50** ↵
- **50,50** ↵
- Enter (↵)

**Open the Layer Properties dialog box**

- Click the “New” button
- Layer Name: Red
- Layer Color: Red
- Current layer: Red
- Click OK

**PL** ↵

- **-50,50** ↵

- 50,-50 ↵
- Enter (↵)

**Save the drawing**

- Drawing name: X2

**Close the drawing**

Insert X2 as a block into a drawing Bx1 and observe the block properties.

**Open drawing Bx1**

**Set the following on the Object Properties toolbar**

- Current layer: Blue

**Insert ↵**

- Block Name: X2 (Click browse and navigate to the drawing created in the previous exercise)
- Insertion point: Check specify on screen
- Scale (xyz): 1
- Rotation: 0

**Set the following on the Object Properties toolbar**

- Current layer: Green

**Insert ↵**

- Block Name: X2 (Click browse and navigate to the drawing created in the previous exercise.)
- Insertion point: Check specify on screen
- Scale (xyz): 1
- Rotation: 0

**Layer**

- Freeze layer: red

**Save the drawing**

**Close the drawing**

*(Teaching point: properties of inserted block)*

**Exercise (4c)**

Create a drawing to be used as a block, that once inserted, the block objects retain their color properties as set.

**Create a new drawing (from scratch)**

**Set the following on the Object Properties toolbar**

- Current layer = 0
- Color = Bylayer

**PL ↵ (digitize a polyline using typed coordinates)**

- -50,-50 ↵
- 50,50 ↵
- Enter (↵)

**Set the following on the Object Properties toolbar**

- Color = Red

**PL ↵**

- -50,50 ↵
- 50,-50 ↵
- Enter (↵)

**Save**

- Drawing name: X3

**Close the drawing**

Insert X3 as a block into a drawing Bx1 and observe the block properties.

### Open drawing Bx1

#### Set the following on the Object Properties toolbar

- Current layer: Blue

#### Insert ↵

- Block Name: X3 (Click browse and navigate to the drawing created in the previous exercise)
- Insertion point: Click specify on screen
- Scale (xyz): 1
- Rotation: 0

#### Set the following on the Object Properties toolbar

- Current layer: Green

#### Insert ↵

- Block Name: X3 (Click Browse and navigate to the drawing created in the previous exercise)
- Insertion point: Click specify on screen
- Scale (xyz): 1
- Rotation: 0

#### Freeze layer: red (from the Object Properties toolbar)

#### Save the drawing

(Teaching point: properties of inserted block)

### Exercise (4d)

Objects may be grouped to create a block within your current drawing. Unlike the method used to build a symbol library, these blocks are only available for use within that drawing.

Create a block by grouping objects within source drawing Bx1.

#### Open Drawing Bx1 if it is not already open

#### Set the following on the Object Properties toolbar

- Current layer 0
- Set color = ByLayer

#### Circle ↵ (draw a circle)

- Pick the center point of the circle
- Diameter = **50** ↵

Create a crosshair through the circle's center

#### PL ↵

- **Quad** ↵ (snap to the quadrant of the circle)
- **Quad** ↵ (snap to quadrant opposite first point)
- Enter (↵); to end polyline

#### PL ↵

- **Quad** ↵ (snap to quadrant perpendicular to previous line)
- **Quad** ↵ (snap to quadrant opposite previous point)
- Enter (↵); to end polyline

Create a block from the newly created objects.

#### Block ↵

- Name = CX
- Click *Pick Point*; using the Intersection setting of Osnap, select middle of symbol.
- Click *Select Objects*; select objects to be grouped.
- Click Retain
- Click OK

Insert CX as a block into a drawing.

#### Set the following on the Object Properties toolbar

- Current layer: Blue

**Insert ↵**

- Block Name: CX
- Insertion point: Click specify on screen
- Scale (xyz): 1
- Rotation: 0
- Click OK
- Click a point on the screen for the insertion point of the block

**Set the following on the Object Properties toolbar**

- Current layer: Green

**Insert ↵**

- Block Name: CX
- Insertion point: Click specify on screen
- Scale (xyz): 1
- Rotation: 0
- Click OK
- Click a point on the screen for the insertion point of the block

**Save the drawing****Close the drawing**

*(Teaching point: Creating a block within a source drawing)*

**Exercise (4e)**

Blocks and or other drawing objects may be extracted to a separate drawing using Wblock, making them available for use in other drawings.

**Create a new drawing (from scratch)****Open the Layer Properties dialog box**

- Click the “New “ button
- Layer Name: BlockCX
- Set layer BlockCX = current

**Insert ↵**

- Block Name: CX
- Block CX cannot be found. Block CX only exists in drawing Bx1 and is not currently available outside of drawing Bx1. To make CX available to other drawings, use Wblock (write block) to create a new drawing.

**Exit drawing****Open Drawing Bx1****Wblock ↵**

- Source: Objects
- Click Pick point, Use the intersection setting of Osnap to select the intersection of the crosshairs
- Click Retain
- File Name: BlockCX.dwg
- Location: ... \cadclass
- Click OK

**Save the Drawing****Close the Drawing**

Block CX has now been saved as a separate drawing, and is available as a block to other drawings.

**Create a new drawing (from scratch)****Open the Layer Proprieties dialog box**

- Click the “New” button

- Layer Name: BlockCX
- Set layer BlockCX = current

**Insert** ↵

- Block Name: Block CX (Click browse and navigate to the drawing created in the previous exercise)
- Insertion point: Click specify on screen
- Scale (xyz): 1
- Rotation: 0
- Click OK
- Click a point on the screen for the insertion point of the block

**Save the drawing**

- Drawing name: wblockcx

**Close the drawing**

*(Teaching point: Extracting a block to a separate drawing)*

**Exercise (4f)**

An attribute provides a label or tag for you to attach text to a block. Whenever you insert a block that has a variable attribute, AutoCAD prompts you to enter the data to be stored with the block. You can associate more than one attribute with a block, provided that each attribute has a different tag.

**Create a new drawing**

**Set the following on the Object Properties toolbar**

- Current layer = 0
- Color = ByLayer

**Circle** ↵ (draw a circle)

- **0,0** ↵ (center point)
- Diameter = **50** ↵

**Attdef** ↵ (attribute definition)

- Tag: Well\_ID
- Prompt: Enter Well Number
- Justification: Left
- Text Style: Standard
- Height; 75
- Insertion Point: Pick Point
- Pick a point to the upper right of the circle for attribute text entry
- OK

**Save the drawing**

- Drawing name: Well

**Close the drawing**

**Exercise (4g)**

Inserting a block with attributes.

**Create a new drawing (from scratch)**

**Open the Layer Properties dialog box**

- Click the “New “ button
- Layer Name: Water\_wells
- Layer Color: Blue
- Current layer: Water\_wells

**Insert** ↵

- Name: Well (Click browse and navigate to the drawing created in the previous exercise)
- Insertion Point: Click specify on screen

- Scale (xyz): 1
- Rotation: 0
- Click OK
- Pick a point to insert well
- Enter Well Number: **1234**

**Save the drawing**

- Drawing name: well2

**Close the drawing**