# Layer Management: Concepts and Tools

Layering is automatic in ADT as long as you are working with Objects and/or the Design Center. Automatic layering is a good thing in that you do not have to set the layers all the time, and it provides a good amount of consistency between drawings. On the other hand, if your office has special layering schemas, are working with standard lines and ACAD entities, the automatic layering may be a pain. Luckily it is a function of ADT that you may customize to meet your office needs once then forget about it.

Layer Terminology and Concepts:
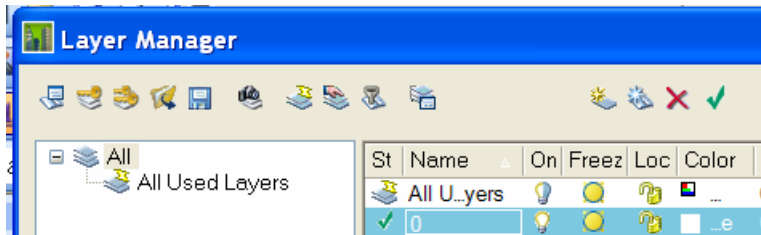
Icons from left to right in the layer manager dialog box give access to:

 Layer Standard is used to:

- Establish the structure of the layer name:
- Override layer names as objects are added (Layer Key Override)
- Create new layers with layer manager
- R3.3 uses the older AIA 1-4-4-4 Discipline-Major-Minor-Status format.
- 04/05/06 uses the newer 2-4-4-4-1 Discipline-Major-Minor1-Minor2-Status format.

 Layer Key - is everything.

- Every object has a layer key.
- A layer key style is a chart that maps each layer key to a layer name, color linetype etc.
- If this layer does not exist in the drawing when an object is placed, the layer will be created according to the setting in the layer key style.
- If the layer name exists in the drawing (and differs in color from the key), it will not be changed by the layer key style.

 Layer Key Override

- Pick from standard values stored in the layer standard, or type in your own value

 Load and Save Filter Groups

Stores filter groups in external .lft file. Useful if you create a filter group in a construct and want to import it into a view or reverse.

 Layer Snapshots

- Same as ACAD, but you can edit the snapshot. Takes a picture of the layer states in the drawing – on, off, frozen, thawed, color, linetype etc, everything.
- Useful for capturing original layer states in consultant or owner drawings.
- Use for switching between rcp and floor plan and furnishing plan if you don't use display configs, but use display configs. Sometimes needed in addition to display configs.
- Layer snapshots can be imported into a new drawing to establish a set of office standard layers. This can be one fell swoop – all layers that should be in the drawing, or as needed. If you want incremental layers, just create different layer snapshots (elevations.ssl, Details.ssl, Plans.ssl, Rcp.ssl etc)

Property filter

- Filter layers based on color, name, or state. Use in Views to isolate what you want to see by layer

Group Filter

- Establishes a manual group
- Same as filter groups, but instead of a filter to create the list of layers, just drag the layers you want to control in one fell swoop.
- The whole purpose of filter or user groups is to give you one control point to turn on or off, freeze or thaw a group of layers with one command. – Right click on the group to operate on the whole group.

Layer Standard Group

- Creates layer groups based on layer standard established in the drawing

Layer States Manager

- ACAD layer states manager

New Layer

- Creates a new layer

New Layer from Standard

- New Layer is used to create layers according to layer standard (name only). Pick field names from list of values stored in the layer standard.
- Layer names created this way do NOT read the layer key.
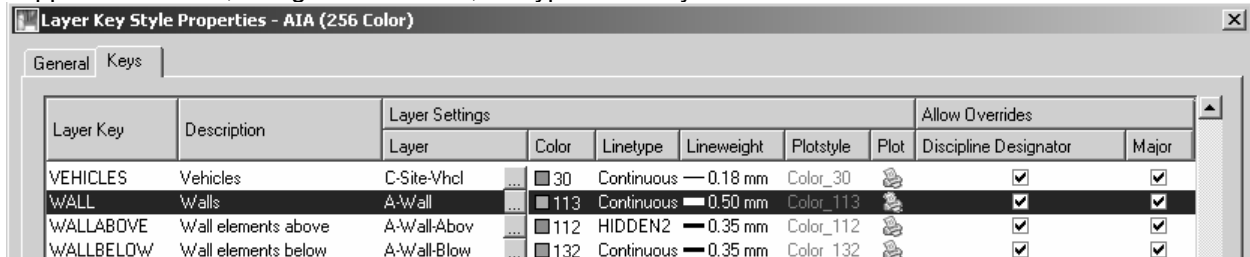
Delete layer   **Set Layer Current**

Layer Keys and Layer Standards: Functionality

The simple explanation of ADT layering is this:
Inherent in each AEC object is a value called a layer key. When an object is created in the drawing, it looks at a table (called a layer key style). The table has the values for the layer name the object is supposed to be on, along with the color, linetype of the layer.

Layer Key Style Properties - AIA (256 Color)

General | Keys

Layer Key	Description	Layer Settings						Allow Overrides	
		Layer	Color	Linetype	Lineweight	Plotstyle	Plot	Discipline Designator	Major
VEHICLES	Vehicles	C-Site-Vhcl	☐ 30	Continuous	— 0.18 mm	Color_30		☑	☑
WALL	Walls	A-Wall	■ 113	Continuous	■ 0.50 mm	Color_113		☑	☑
WALLABOVE	Wall elements above	A-Wall-Abov	■ 112	HIDDEN2	■ 0.35 mm	Color_112		☑	☑
WALLBELOW	Wall elements below	A-Wall-Blow	■ 132	Continuous	■ 0.35 mm	Color_132		☑	☑

If the layer **exists** in the drawing, fine, the object is placed on that layer AND all the settings here are ignored - the layer key does nothing other than tell the object to go to that layer. It does not change the existing layer color, linetype etc.

If the layer returned from the layer key style **does not exist** in the drawing already, the layers is created on the fly. The layers values (color, linetype etc) are read from the data in the layer key style.
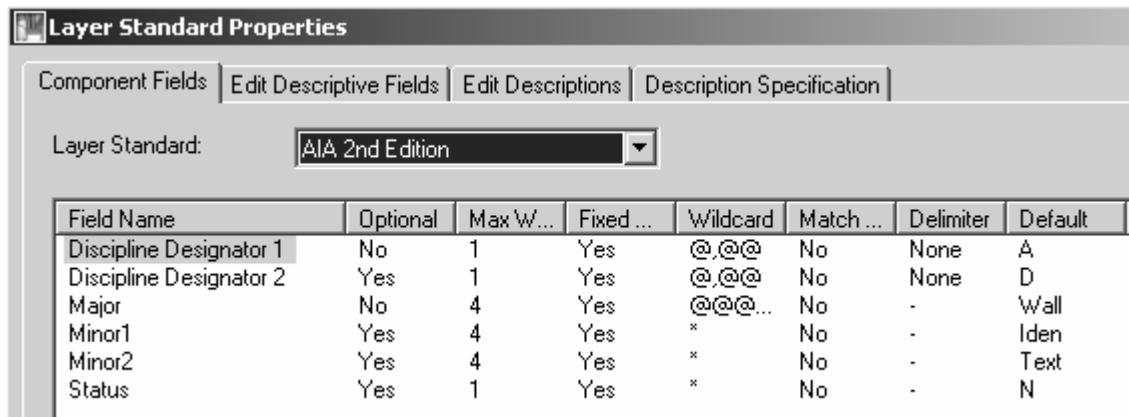
It is the layer key style that does the automatic layering, not the layer standard. The Layer Standard just provides a framework or structure for the layer name. The more complex explanations look like this:

Layer Standard:

Any layer standard is just a naming convention. Every layer standard uses fields (grouping of certain characters) in a set format (AIA and ADT4 now have 5 fields, Discipline, Major, Minor, Minor and Status). While at first glance, ADT appears to use this Layer Standard when it automatically creates layers. However, this is only because the names of the layers held in the Layer Key style were created in that format.

In ADT, the layer standard is used for the following functions
- When you manually create a new layer using the ADT layer manager, you can choose from preset values for each of the fields stored in the layer standard.
- Layer Key Overrides use the format of the layer standard.
- You may create filters and groups to manage your layers (turn off/on, freeze/thaw) based on the layer standard.

Layer Standard Properties

Component Fields | Edit Descriptive Fields | Edit Descriptions | Description Specification

Layer Standard: [AIA 2nd Edition ▼]

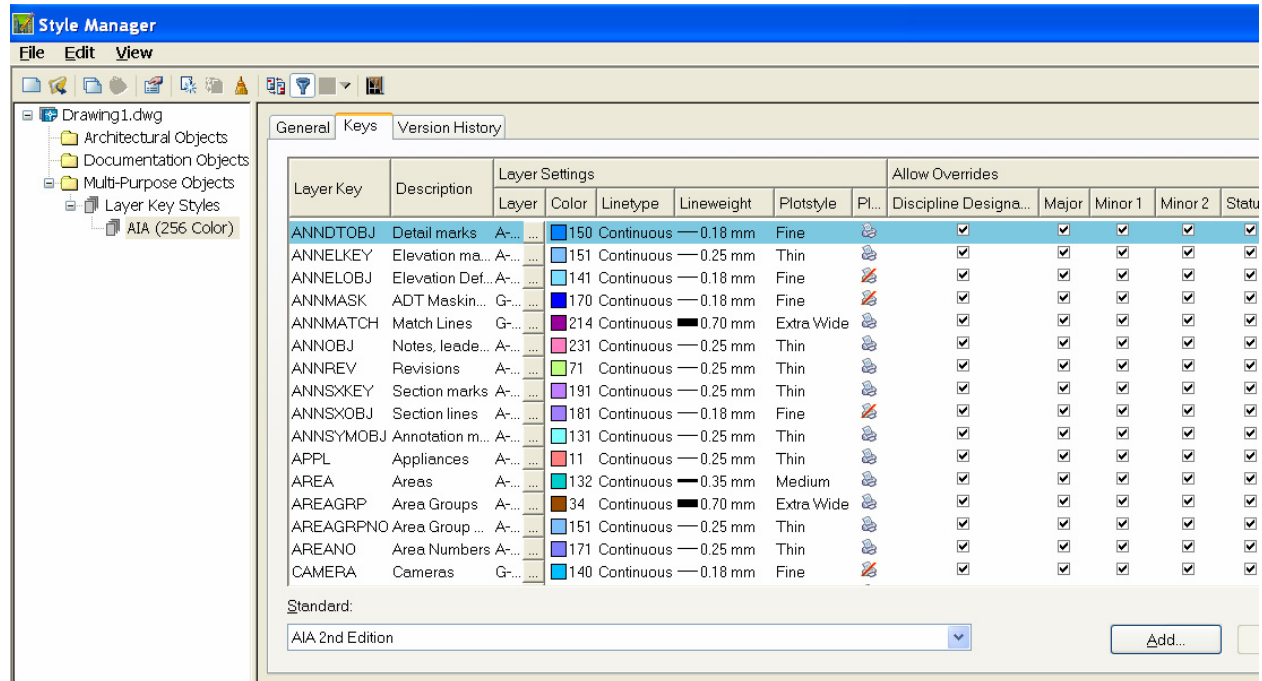| Field Name	Optional	Max W...	Fixed ...	Wildcard	Match ...	Delimiter	Default
Discipline Designator 1	No	1	Yes	@,@@	No	None	A
Discipline Designator 2	Yes	1	Yes	@,@@	No	None	D
Major	No	4	Yes	@@@...	No	-	Wall
Minor1	Yes	4	Yes	˟	No	-	Iden
Minor2	Yes	4	Yes	˟	No	-	Text
Status	Yes	1	Yes	˟	No	-	N

The two Discipline fields are combined into one field by the layer standard

Note: The first line in this dialog box must have the **None** delimiter applied to it (you cannot have –A-wall as a valid layer)

Layer Key Style:

A layer key style is a set of values used by ADT to both generate and control the layers to which AEC objects are assigned. The layer key style is the crucial part of the automatic layering function in ADT. Each of the 53 different objects has a layer key hardwired into them. An example of a hardwired layer key is a wall. A wall will be placed on the layer that the 'wall key' points to (A-Wall in the imperial AIA system, A210G7 in the BS1192 AUG version). If the layer does not exist in the drawing, the layer is created for you with the properties defined in the layer key style. For layer key wall in both systems, the layer is created using color 50 and linetype continuous.

Style Manager

File   Edit   View

Drawing1.dwg
- Architectural Objects
- Documentation Objects
- Multi-Purpose Objects
  - Layer Key Styles
    - AIA (256 Color)

General | Keys | Version History

Layer Key	Description	Layer	Color	Linetype	Lineweight	Plotstyle	Pl...	Discipline Designa...	Major	Minor 1	Minor 2	Statu
ANNDTOBJ	Detail marks	A-... ...	150	Continuous	0.18 mm	Fine		✔	✔	✔	✔	✔
ANNELKEY	Elevation ma...	A-... ...	151	Continuous	0.25 mm	Thin		✔	✔	✔	✔	✔
ANNELOBJ	Elevation Def...	A-... ...	141	Continuous	0.18 mm	Fine		✔	✔	✔	✔	✔
ANNMASK	ADT Maskin...	G-... ...	170	Continuous	0.18 mm	Fine		✔	✔	✔	✔	✔
ANNMATCH	Match Lines	G-... ...	214	Continuous	0.70 mm	Extra Wide		✔	✔	✔	✔	✔
ANNOBJ	Notes, leade...	A-... ...	231	Continuous	0.25 mm	Thin		✔	✔	✔	✔	✔
ANNREV	Revisions	A-... ...	71	Continuous	0.25 mm	Thin		✔	✔	✔	✔	✔
ANNSXKEY	Section marks	A-... ...	191	Continuous	0.25 mm	Thin		✔	✔	✔	✔	✔
ANNSXOBJ	Section lines	A-... ...	181	Continuous	0.18 mm	Fine		✔	✔	✔	✔	✔
ANNSYMOBJ	Annotation m...	A-... ...	131	Continuous	0.25 mm	Thin		✔	✔	✔	✔	✔
APPL	Appliances	A-... ...	11	Continuous	0.25 mm	Thin		✔	✔	✔	✔	✔
AREA	Areas	A-... ...	132	Continuous	0.35 mm	Medium		✔	✔	✔	✔	✔
AREAGRP	Area Groups	A-... ...	34	Continuous	0.70 mm	Extra Wide		✔	✔	✔	✔	✔
AREAGRPNO	Area Group ...	A-... ...	151	Continuous	0.25 mm	Thin		✔	✔	✔	✔	✔
AREANO	Area Numbers	A-... ...	171	Continuous	0.25 mm	Thin		✔	✔	✔	✔	✔
CAMERA	Cameras	G-... ...	140	Continuous	0.18 mm	Fine		✔	✔	✔	✔	✔

Standard:

AIA 2nd Edition   Add...

When you look at the layer key style, you will find more than 53 layer keys. This is because ADT use a different mechanism to assign layers to MvBlocks (the content stuff you drag and drop from the DesignCenter). These blocks will represent many different items (plumbing fixtures, appliances, annotation marks) that will be on different layers. When you drag a piece of content from the Design Center into your drawing, the layer key is read from the content drawing, and the block is placed on that layer. The MvBlock once in the drawing does not have a 'native layer key' imbedded in the object. It is the action of dragging it into the drawing that assigns the layer. When a piece of content is created, part of the process is to assign the content a layer key. Whatever layer that key points to will be assigned to the content as it is placed in the drawing.

> In keeping the Layer Key style and the Layer standard separate, the confusion lies in the fact that the names used in the layer key styles provided with the software are set up to use the corresponding layer standard. So even though a wall comes in on layer A-Wall that happens to conform to the AIA Layer standard, it is the layer key style that is doing this, and NOT the layer standard. The Layer standard dictates that the first field is NOT optional, so when you create a new single layer key, the layer name you create for the key must have a discipline designation. (A for Architectural, C for Civil, M for Mechanical etc.)

Layer Key and Plot Style Tables

At first glance it may appear that the layer key style uses too many colors. It uses about 25 (rough estimate). The colors it uses are matched to ACAD Plot Style Tables created by the ADT team. You can tell these by their date, they were created after the basic ACAD ones. They are:
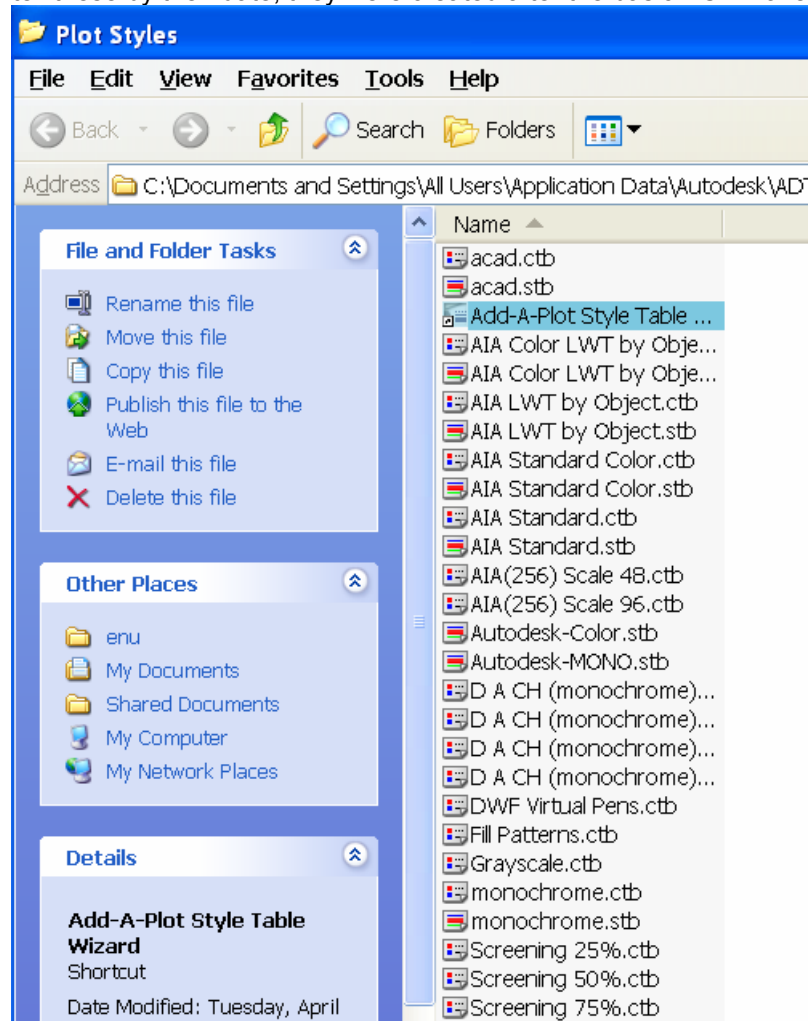
AIA Standard.ctb
For explicit compliance with the Tri-Services Plotting Guidelines (National CAD Standard version 2.0). Use with the AIA (256 Color) layer key style. Colors are mapped to explicit lineweights and screens, all colors plot black.

AIA Standard. Color.ctb
For conceptual compliance with the Tri-Services Plotting Guidelines (National CAD Standard version 2.0), but to achieve a color plot. Use with the AIA (256 Color) layer key style. Colors are mapped to explicit lineweights and screens according to NCS, however all colors plot by object color.

AIA Color LWT by Object.ctb
For compatibility with the AIA (256 Color) layer key style, which is based on the Tri-Services Plotting Guidelines (National CAD Standard version 2.0), but to achieve a color plot with lineweights by object. All colors plot by object color and lineweights with explicit screens.

AIA Color LWT by Object.stb
For compatibility with the AIA (256 Color) layer key Style, which is based on the AIA Layer Guidelines (2nd Edition) Tri-Services Plotting Guidelines (National CAD Standard version 2.0). All plot styles plot by object color and lineweights with explicit screens.

AIA(256) Scale 48.ctb and AIA(256) Scale 96.ctb
Are from ADT3
Colors 1-9 are not used in the layer key styles as they are assumed in use by any office.

Layer Key Overrides:

A layer key override integrates the Layer Key Style and the layer Standard. Any specific field of a layer standard may be overridden. When a layer key override is active, the override will be applied each time the key is used.

Example. Metric: the wall key by default points to A210G7 an override may be set up using 'X' for the Status field indicating that this is an existing wall. A wall drawn with the override active will be assigned to the layer A210G7X

Example. Imperial: the wall key by default points to A-Wall an override may be set up using 'Exst' for the Status field indicating that this is an existing wall. A wall drawn with the override active will be assigned to the layer A-Wall-Exst
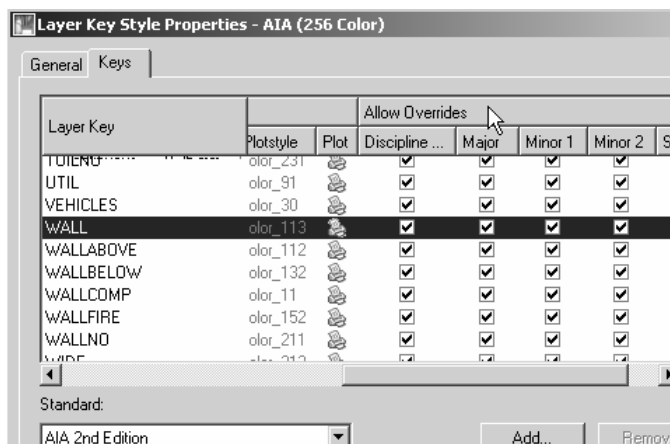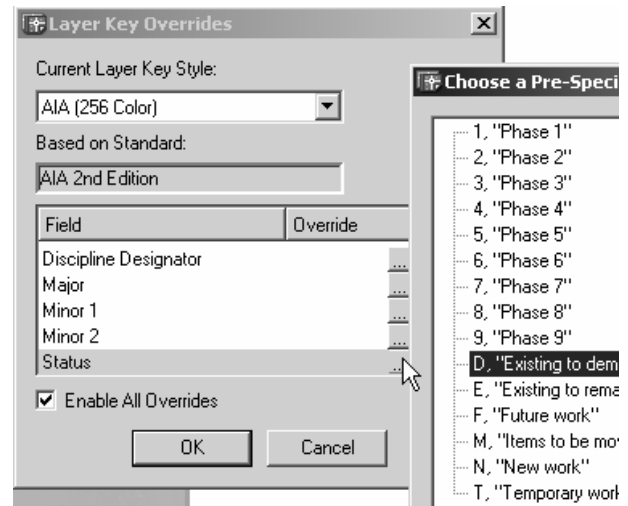
Within the Layer Key style is a series of check boxes. These check boxes either Allow (checked) or turn off (unchecked) the ability to override layers on the fly. If a layer key style is created that has a layer name that does not match the layer standard, the line of check boxes will be grayed out and not accessible because the layer key overrides are dependent on the layer standard.

## Layer Manager Tools: Groups and Snapshots

Layer Snapshots:

Layer snapshots record the layer states (on, off, frozen, thawed, color, linetype etc) at a point in time. This is available in standard ACAD, but Layer Manager gives you the ability to edit the snapshot. Useful for:

- Changing sets of layers on and off in large batches.
- Exploring consultant's drawings (snapshot, turn everything on, find what you need, restore snapshot, go from there).
- Turning on and off layers of one drawing to show different plot plans. If your office has standard lists of layers that should be used for each type of plan, you can create office standard snapshots to apply before plotting (snapshots maybe exported and imported between drawings).

Layer Filters and Groups:

Layer Manager has three tools to help sort and manipulate collections of layers. Filters and Groups allow you to control their visibility with a right click. The Filters accept a condition (on, frozen) or a property (color, Linetype) and lists just the layers that meet that criteria. Layer groups are user defined sets of layers. Layer groups may be Filter types of groups (Static or Dynamic) or User type. Static layer groups keep all the layers in the group even if the status of the layer changes. A dynamic filter group will include only layers that match the filter – if a layer changes outside the filter rules; it is removed from the group. A user layer group allows you to manually include or exclude layers. Filtering also is available in the ACAD layer manager, but the ADT filter groups are more graphic and encompassing.
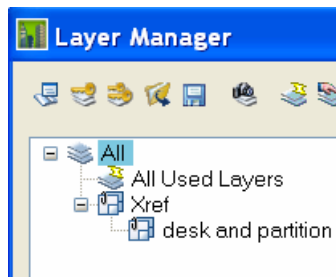
Special layer Groups:

All and Xref are special layer groups that are provided as part of the ADT Layer Manager. All groups exist by default, and will always show all of the layers in the current drawing. Xref group will appear in any drawing with external references attached and list as subgroups each external reference.

You may drag and drop layers from either of these groups into user groups and static filter groups

Layers: Etcetera

Remapping of object layers:

Pull down Format>Layer Management>Remap Object Layers
Allows you to either put all objects back onto their respective layers as determined by their layer keys or put all chosen objects onto the layer designated by a single layer key. Note MvBlocks do not have a 'native key' and will not remap automatically

Enter layer key
? To list current keys in the drawing
O for byObject to return objects to their current key. Only objects, not MultiView blocks or other blocks from design center
Any active layer Key Overrides will apply to an object when remapped (useful for putting a "-exst" at the end of everything in the drawing for example)

Layers May Exist that are not Keyed and cannot be Purged

Example: In R3 A-Wall-Patt is a layer created in the drawing because it exists as part of the wall style definition. The hatch for wall components is hardwired to this layer (in the Entity Display). You may not purge this layer until all the wall styles in the drawing that have this hardwired layer are purged.

Layering is automatic in ADT as long as you are working with Objects and/or the Design Center. Automatic layering is a good thing in that you do not have to set the layers all the time, and it provides a good amount of consistency between drawings. On the other hand, if your office has special layering schemas, are working with standard lines and ACAD entities, the automatic layering may be a pain. Luckily it is a function of ADT that you may customize to meet your office needs once then forget about it.

Setting Layers up for your office:

Layer Keys and New Drawings from Template:
In the Drawing Setup, there is a tab called Layering. On this tab, you can browse to a drawing and point to a layer key style in that drawing.
Any new drawing started with a template *that does not already have a layer key style defined in it* will use the layer key style pointed to by this tab.
If your template already has a layer key style, then this setting will be ignored and no amount of tweaking will make this setting work. Anything you do that launches an ADT command will put at least the standard layer key style (everything assigned color 7) in the drawing.
To remove a layer key style, the drawing must be empty, and then use the command **PurgeLayerStyles.** At the command line, it looks like this:

> *Command:* **PurgeLayerStyles**
> *This will remove all Layer Key Styles and Layer Standards from the drawing.*
> *Do you wish to continue? [Yes/No] <Yes>:* **y**
> *Layer Key Styles and Layer Standards have been removed.*
> *Any Desktop command will re-import these, so save and close the drawing now if you want it free of Layer Key Styles and Standards*

Voila, there are no layer standards or key styles in the drawing. Obviously do this in the template file as the last thing you do.

The rest of this chapter takes you through the steps of creating a layer standard and layer key style that you can use as this default layer key style to work in all new drawings created from a template that does not already have a layer key style in it. The steps for doing this are roughly:

- Create a "MyOfficeLayers.dwg" from scratch and save into the folder C:\Documents and Settings\All Users\Application Data\Autodesk\Autodesk Building Systems 2004\R16.0\enu\Layers
- Create or import a Layer Standard.
- Create or modify the layer key styles and saveas "MyOfficeLayerKeyStyle"
- Coordinate the Plot style tables with the layer key styles
- Locally on each computer (or in the network image), open drawing setup, browse to MyOfficeLayers.dwg and point to MyOfficeLayerKeyStyle, and saveas default.

Layers Exercise

Process:

- Create a layer standard (or copy and modify one of the given ones)
- Create (or copy and modify) a layer key style that uses you new layer standard
- Save this new layer standard as the default.

Create Layer Standard to Work with Levels

This standard will have 3 fields
<Object>-User1>-<Level#>

Create a new drawing.

1. Start new drawing form ACAD template.

2. Check Layer standard, it is probably set to AIA 256 color.

3. Saveas MyOfficeLayers.dwg in the Content\Layers folder on the server.

4. Format>Layer Management>LayerManager>, Pick the layer standard icon (Upper Left).

5. Create new, rename to "Levels", Pick edit icon or Right Click Edit.

Create Fields

6. Pull arrow down to choose Levels as the layer standard to edit in the upper line of the edit dialog box.

7. Change field name to Object

8. Optional = No, (does it HAVE to be in the name to be "standard")

9. Wildcard (alpha, numeric etc.) = *

10. (Note if you use Alpha or Numeric, it will place the number of characters here and fixed width will rule regardless of the fixed width setting)

11. Match Description = no

12. Delimiter = none

13. Default = A

14. Add two more fields (Add fields by picking the 'add below' icon Lower left)

Add another field Rename the field to 'User1' Optional = yes Max width = 4 Fixed = Yes Wildcard = * Match Description = no Delimiter = - (hyphen) Default = Neww (new work, MUST be 4 characters)	Add another field Rename to Level Optional = no Max width = 1 Fixed = Yes Wildcard = * (anything, so we can use C for Common) Match Description = no Delimiter = - (hyphen) Default = 1

Edit Descriptive fields

Descriptive fields allows you to designate multiple meanings to one field. If your layer standard is AWA5034, in on field meaning A = Architectural, WA = Wall, 50=Stud, 034 = Interior demising, you can add all that info here. This information will be created in the layer manager in the description field when working with layers

1. Pick the Add below icon; change the field name to Object and the component to Object
2. Pick the Add below icon; change the field name to User1 and the component to User1
3. Pick the Add below icon; change the field name to Level and the component to Level

4. Change descriptions
5. Go to the descriptions tab, Verify the layer standard says Levels, field to edit says Level
6. Edit the default (edit button at lower left
7. Give 1 the description 1st floor

8. Pick the new description to add:
9. Value = 2, Description = 2nd Floor
10. Value = C, Description = Common

11. Change field to User1, Add: Neww = New Work, Exst = Existing, and Prtn = Partition walls
12. Change filed to Object, Add: Dims = Dimensions, Notes = Text notes

13. OK back to drawing
14. Save the drawing

Create a Layer Key Style
Create a layer key that uses the **Levels** layer standard

1. Pull down Format>Layer Management>Layer Key styles

2. Create new Layer key style with New Icon and Rename new layer key to MyOffice

3. RC edit

4. Change the layer standard to levels

Overrides are in place, but are grayed out. Overrides will be gray if the default layer name for the key does not match the layer standard settings.

5. Because the field 'Level' is a required field in the layer standard, we must add "-C" to the layer name…Or make the field Level an optional field…for this exercise, go back to the Layer standard and edit to change levels to not be required.

6. Go back now into the layer key style, the overrides should be available to check or not check.

7. Check in the box (right side of layer key style) if you want the user to be able to apply an override to this field – for each layer key.

8. Remove the check disables running overrides for the field. Remove the checks for the door level; make sure the wall and window levels are checked

9. Change the walls key to red, and the windows key to cyan.

10. Save and close this drawing

Saving as default:

Now that you have create a layer standard drawing, you still need to tell ADT that you want it to be the standard each time you start from a template

11. New drawing from template

12. [Lower left popup] Drawing Setup>Layering tab

13. Point layer standard layer keystyle to auto import to the drawing you created above.

14. Select MyOffice as the layer key style

15. Pick Save as Default check box at the lower left

16. Pick apply

Now your layer key style will be activated whenever a drawing is created from scratch or a template.
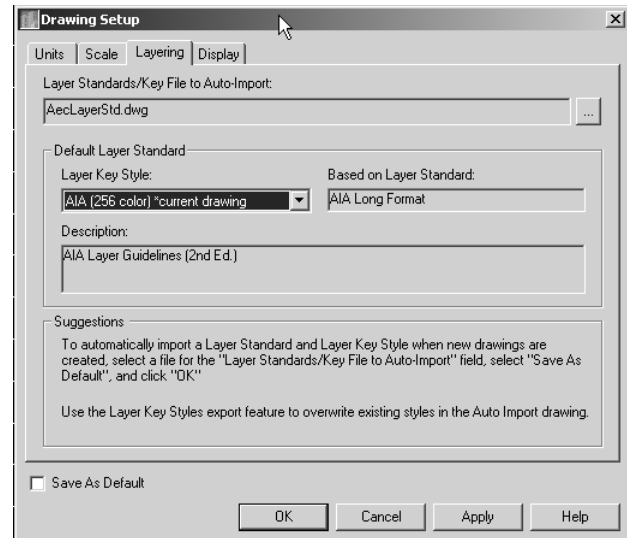
Testing

New drawing from an ADT template. Add a wall, it should be red. Add a window, it should be cyan. The layer key style and the standard are imported automatically

Set an Override
Desktop>Layer Management>Layer Key Overrides
Pick the levels button and pick 2 for the second floor

Draw a Wall and window and a door, select these objects one at a time, the wall and window should have the –2 appended to their layer name, the door should not because we disallowed overrides by removing the check from the override box in the layer key style.