DoomED Deluxe

User Guide

First Edition

Renegade Graphics™ inc.

First Edition February 1995. By Joe Pantuso

 This document is a users guide for the Renegade Graphics Doom Editor, or DoomED Deluxe.

Introduction

This guide is for the *Renegade Graphics Doom Editor*, or *DoomED Deluxe*. While many of the principles expressed in this guide are universal to Doom level editing, the text concentrates on usage of this particular editor.

If you do not already have the DoomED Deluxe editor, you can obtain a sample version of it from Renegade Graphics BBS at 615/337-9145 in the US. The sample version is limited, it will only allow the creation of levels with up to 25 sectors. You can order the commercial version of the editor by mail, BBS or CompuServe. There is also a CD-ROM available from Renegade Graphics containing the commercial editor plus more than 1000 user created Doom levels, utilities and other Doom related items.

DoomED Deluxe is a very powerful tool. It could be compared to an art program or a word processor, it does a lot of powerful things that will make what you do possible and easier. It will not however make you into a great Doom Level Artist, anymore than the other programs could make you a great artist or writer (though they may claim to).

The editor makes it a lot easier to work on levels, and lets you worry about design rather than technical aspects of Doom. You will never even see a sector, line or vertex number let alone have to worry about keeping track of them. Creating a new room is as simple as drawing a box. Every sector you ever insert is ready to use instantly, no fooling around. Modifications are easy, the editor intelligently limits it's displays to what is currently appropriate for what you are doing. The interface is clean, fast and logical.

You will learn by doing and looking. Learn from the great things that the guys at id designed into their levels. Look at levels that have been created by other people. This is where you will learn tricks. Then go get your hands dirty, experiment.

The Book

The author of this guide has also written a comprehensive guide to Doom editing, "The Doom Editing Book." It is published by J. Wiley (McGraw Hill) and will be available in late March or early April. Ask your favorite book or computer store about it.

Chapter 1
Getting Started

Orientation

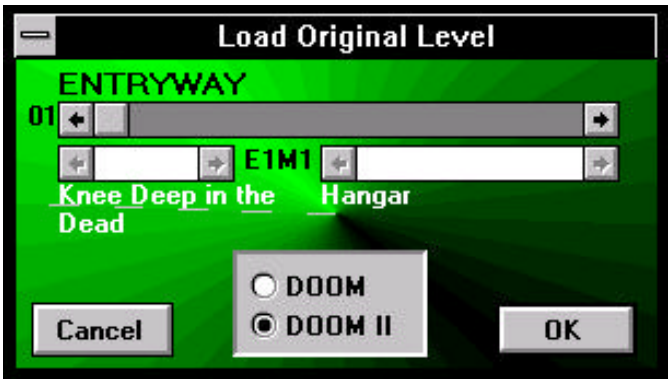
Let's begin with something familiar—the first level of Doom II. (Note that while MAP01 of Doom II is used as the example, the principles are applicable to any level.) After you enter the editor, select Original from the four choices displayed.

You will be presented with a dialog that lets you choose which original Doom level you want to load. The editor will, by default, load E1M1 of Doom or MAP01 of Doom2 depending upon what version(s) you have on your computer. Hit OK.

The level will be loaded, and will be displayed centered and at the default level of magnification (the display may appear somewhat different on your screen. Use the driver for your specific video card and *set it to more than 256 colors if your card supports it*, 64000 colors recommended.).

Take a moment to orient yourself. The colored circles represent monsters and items ("things"). Move your pointer around the screen. Notice that the help bar at the bottom of the screen is constantly updated with various kinds of status information. When you are over the map, it displays coordinates or information about the nearest thing. When you are over a control, it displays information about what that control does.

Move around the map a bit. Notice that there are no scroll bars for the map. This has been done to save screen space—a valuable commodity at any screen resolution. Try moving around the map using the arrow keys on your keyboard. Pressing the arrows will move the screen one quarter of its width at a time.



Now try another method of moving: by centering on the cursor. This is done by pressing C and then clicking on the new center of the display. As soon as you press C the cursor will change to crossed arrows. The next location you click will become the center of the display. If you hold the Shift key when you press C, the map will also zoom in a little.

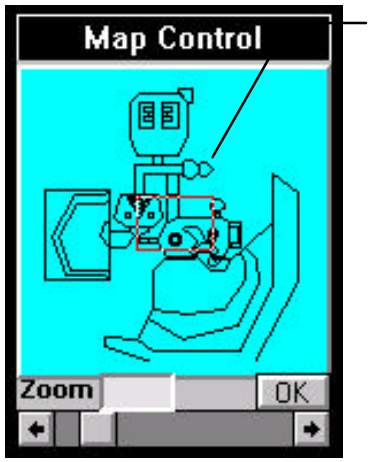
The map has many different possible levels of zoom. The simplest way to change the current zoom for the display is with the + and - keys. Normally the zoom level will change by 10%. To zoom more quickly, hold down the Shift key for a zoom factor of 20, the Ctrl key for a zoom factor of 30, and the Alt key for a zoom factor of 40.

There is also a miniature map control. This control shows a small version of the map and allows you to relocate the display simply by clicking on it.

The map control is summoned by pressing Ctrl+X. The first time you use it in each session it will appear in the center of the screen. You may move it off to one side if you prefer; if you have

a large display, you may choose to resize the main window so that you can see the map control all the time.

The map control is simple to use. You can see the entire map at one time and click on the area you wish to move to. The rectangle on the display always reflects the currently viewed area on the main display.



Practice using these methods to move the display.

The editor has three basic modes: Object editing, Special/Texture editing, and Structure editing. The simplest way to change between these modes is with the buttons on the toolbar. The leftmost of these three icons selects Object editing, the middle icon selects Special/Texture editing, and the rightmost icon selects Structure editing. Use them now and switch between the modes to see how the map display changes in appearance.

Monsters and Items

When you are in Object editing mode you are concerned only with the objects themselves. The structure of the map is secondary and only needs to be indicated, not manipulated. The objects are displayed as circles of various sizes and colors.

Thing Sizes

Radius	Height	Type of Thing
16	56	Player
20	56	Trooper
20	56	Sergeant
20	56	Imp
30	56	Demon/Specter
24	64	Hell Baron
31	56	Cacodemon
16	56	Lost Soul
10	42	Green Barrel
40	110	Cyber-demon
128	100	Spider-demon

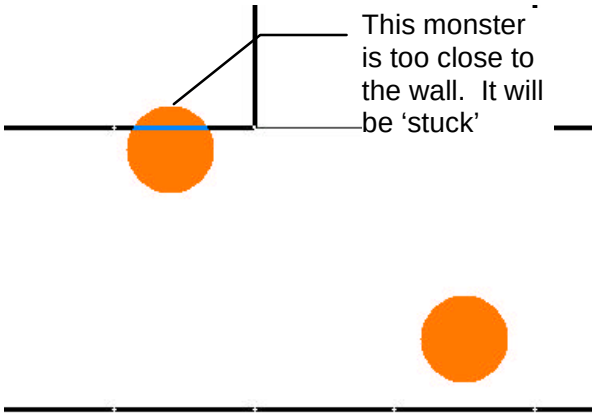
The sizes indicate the actual sizes of the objects within the game. Size must be considered together with placement to avoid problems in the game. Monsters placed too close to each other or to a wall will be stuck and unable to attack. If two monsters are placed too close to each other, when one monster is killed the survivor will become unstuck. If a monster is too close to a wall, however, it will never be able to move or attack.

Seeing the size of things is also helpful when you are fitting them into small places. Monsters cannot traverse hallways that are not wider than they are. Things like lamps and barrels will look bad if placed so close to a wall that the graphics are clipped.

Manipulating Objects

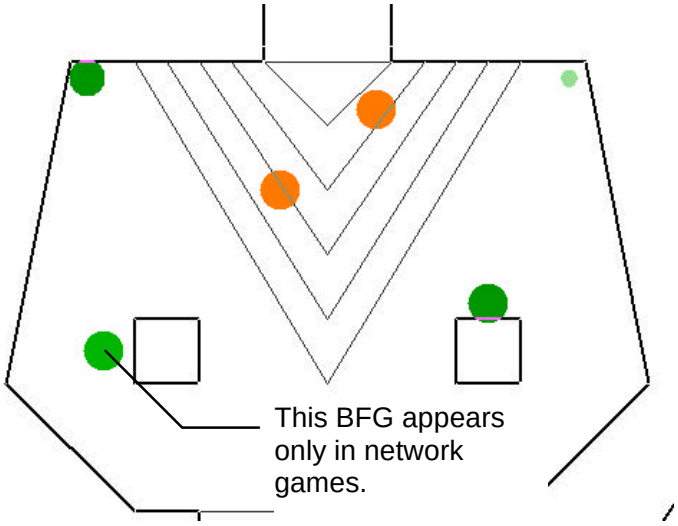
To move a thing on the display, simply grab it with your pointer and drag it to the new location (Make sure you are in Move/Inspect Object mode by clicking on the Object mode icon or pressing T on the keyboard). If objects overlap, a combination of the display colors will be shown in the overlapping area so that you can be precise about placement.

Monsters should not be placed too close to each other, but other items do not suffer the same limitations. A monster and an item can be placed right on top of each other with no adverse effects. Items such as lamps and potions can be packed as tightly as you like, the only problem being their appearance in the game.



Center the display on the first room of MAP01. Move the pointer around and look at the changing information displayed in the help bar. The precise coordinates of each object are given, as well as a plain English description of the item and when the item will appear in the game.

There are six items in the room;two of them are monsters.Of the other four items, only one will appear in a DeathMatch showdown.The BFG9000 next to the left-hand column is stock, to make network play a little more interesting.



Try moving things by clicking and dragging. Be careful not to leave something poking into a wall or, in the case of monsters, into another object.

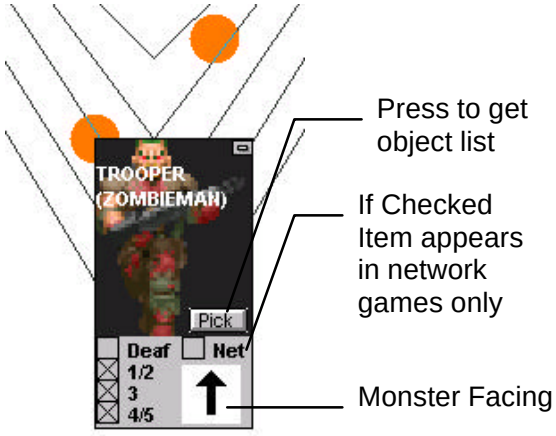
Now let's change an object. To inspect or modify an existing item, click on it with the second mouse button. An inspection window will appear over the item.

The description of the thing is given, as well as the graphic used to represent the thing in the game. Several attributes

are also shown for this thing. The arrow indicates the direction the thing will be facing. This is important only in the case of monsters and player start locations; other types of things are not affected by their facing.

To change the facing of this monster, click on the side of the arrow you want him to face. There are eight directions used in Doom.

The other attributes are shown as checkboxes. The numbered checkboxes indicate which difficulty levels the item will appear on. The difficulty levels “I’m Too Young to Die” and “Hey, Not Too Rough”are represented by 1-2, “Hurt Me Plenty” is 3, and “Ultraviolence” and “Nightmare” are difficulty levels 4-5.



The remaining two attributes are Deaf and Net. The Deaf attribute causes a monster to completely ignore sound. The only way a monster with this attribute set will “wake up” is if you shoot it or it sees your shots impact on a wall in its view. This is very useful for setting up a monster that can surprise a player by charging from around a corner when it sees gunfire.

The Net setting indicates that the item will appear in network games only. This attribute takes effect regardless of what other switches are set for the item. This means that any item with the Net switch set will not appear when you are testing or playing your level in a single-player game. This setting is used to stock a level with extra goodies for DeathMatch, like Big Guns (We need bigger guns!, Big Freaking Guns!) and more ammo.

To change the object type of the currently inspected thing, click on the Pick button. A list of categories of things will be displayed. Choosing from this list is much easier than wading through a list of 120 or so types.

After you select a category, a list of things in that category will be displayed. As you scroll through the list, the graphic used to represent each thing is displayed along with its description. When you find the type of thing you want to change to, double-click on it. The thing type is changed.

Inserting and Deleting Objects

Object editing has two sub-modes: Move/Inspect and Insert/Delete. Whenever you switch to Object editing by using the icon on the toolbar, you will be in Move/Inspect mode. Switch to Insert/Delete mode by pressing I on your keyboard. You can also go directly to inserting and deleting objects by pressing this key from Structure mode or any other mode.

When you are in Insert/Delete mode, you can switch back to Move/Inspect by pressing T or the Object Mode Icon.

When you start Insert/Delete mode, the box used to inspect things will appear in the upper left corner of the screen. Select the type of thing and the attributes you want. Next, click anywhere on the map to insert the thing. You may insert as many things as you like, moving around the map and clicking to insert them. Make sure you have selected the correct attributes.

To delete an item, click on it with the second (right) mouse button. You may move around the map and remove as many things as you like simply by right-clicking on them.

Sector Specials

The sector special is completely independent of any line special or tag relationship. The special attribute affects the entire sector, and only one such value may be assigned to a sector.

Sector specials are mainly used for lighting effects and to cause damage to the player. Damage-causing specials are generally used in non-water pools so that the player can avoid them, but can be used anywhere you see fit.

Sector Special Values

Behavior	Sector Special ue
Nothing	0
-5% Health per second (Nukage)	7
-10% Health per second (Hell Slime)	5
-20% Health per second (Super Hell Slime)	16
Light blinks randomly (Light Flickering)	1
Light pulses each 1/2 second (Light Fast Strobe)	2
Light pulses each second (Light Slow Strobe)	3
-20% Health and Light pulses 1/2 second (Damage SuperStrobe)	4
Light varies between FULL brightness and adjacent (Light Glowing)	8
SECRET Counter credit (affects end level stats only)	9
-20% Health--used in ExM8 to end the episode (Exit Super Damage)	11
Pulsates between assigned brightness and 0 (Light Synch Strobe Slow)	12
Light blinks each 1/4 second (Light Synch Strobe Fast)	13
Ceiling Crush and Raise	6
Door closes in 30 seconds	10
Door raises in 5 minutes	14
Light Fire flickering	17

Getting Started

Start the editor and select “Doom” or “Doom II” at the first dialog. If you already have the editor running pick File/New or the blank page icon.

The zoom level is reset to 100% when you start a new level, and you are put in Structure mode with the Sector Tool selected since adding sectors is the first thing you will want to do.

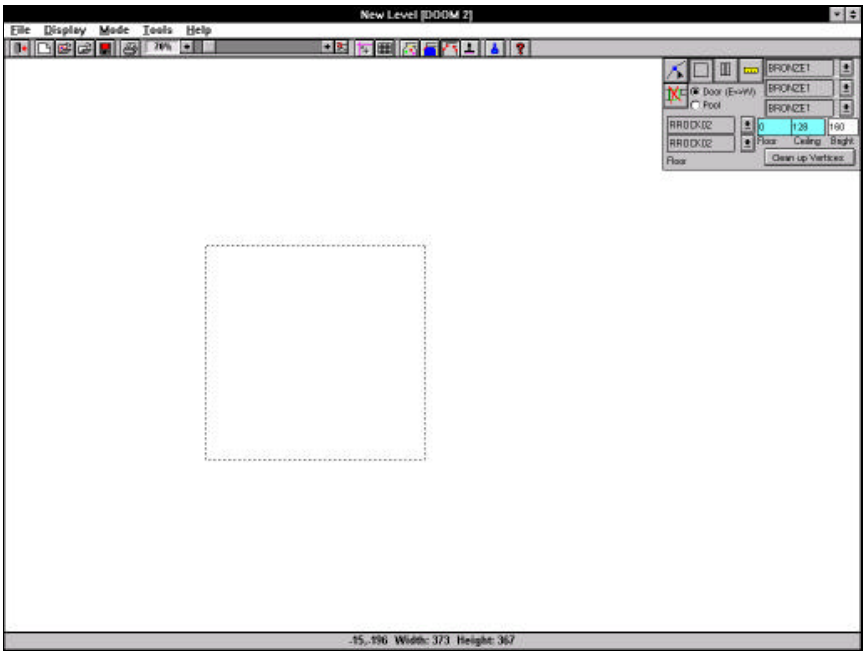
The zoom level is calculated relative to actual pixels on your screen. When the map is at 100% zoom, each pixel on your screen corresponds exactly to one pixel (measurement unit) in the game. Because of this, if you are using a 640 x 480 screen at the same zoom level, you will see approximately 1/4 as much of the map as I do at 1024 x 768. The same amount of detail is visible, though, and that is what is important. Calculating the zoom in this fashion keeps the feel of the editor the same at any screen resolution.

I usually keep the grid on when I am designing the structure and turn it off at other times. I find a visible grid size of 32 convenient because it fits the size of typical structures well; a small door is

64 wide and a large door is 128 wide. When I am aligning things to the flat textures, I set the grid to 64. At that size, one grid square is exactly aligned with the flats.

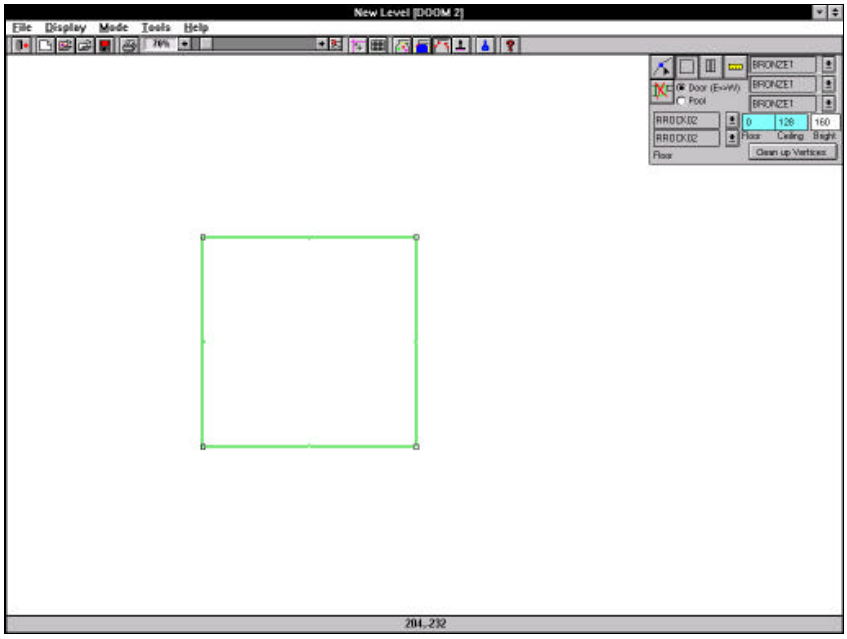
Don't worry if you don't create the shapes and sizes of the structures precisely as they are shown here. The process itself is the most important thing. Just be sure you connect the sectors properly and pay attention to the process..

Start the editor and choose the version of Doom you are going to create a level for. If you only have one version of Doom, the editor will default to that one. You should be in Structure mode. If you aren't, change to it by pressing S.



Drag out a new sector. To do this hold down the mouse button and drag the dashed square down and to the right.

When you release the mouse button, a new sector is inserted. Your display should now look something like this:



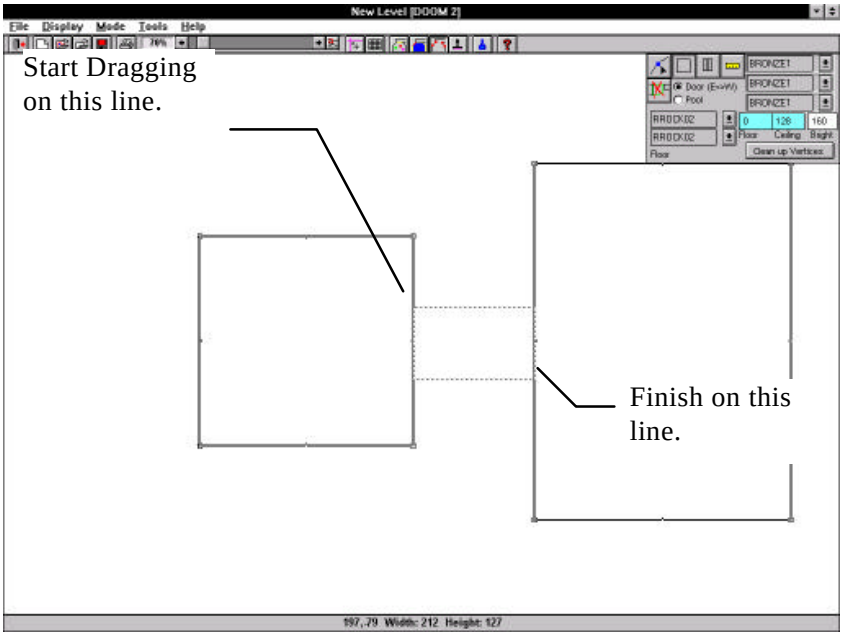
Next, create a larger room to the east (right). Make it about twice as large as the first room. Then let's put a hallway between these two rooms.

Once you have the two rooms, draw the hallway between them by starting about the middle of the right side of the room to the left. Hold down the mouse and start dragging, make sure that the corner of the box that you started with is on the line of the left room.

If the dotted line of the

new sector you are dragging out is not exactly on the line of the left room, start over. Do this by moving the mouse (without letting go of the mouse button!) until the dashed line has either a zero width or height. Now when you release the mouse button nothing will happen.

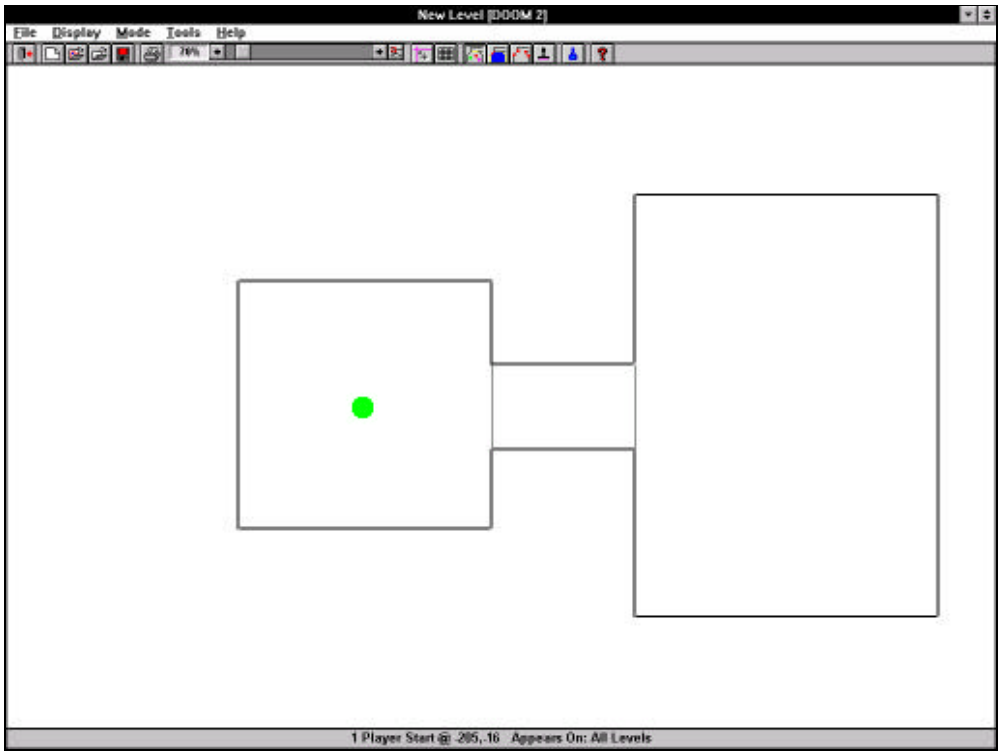
When you get it so that the sector starts at the right place, continue to drag out the sector until it hits the room on the right exactly. When the new sector looks like it is in just the right place, let go of the mouse button and it will be inserted and automatically joined to the two rooms.



Move the pointer to the question mark on the toolbar and click on it with the right mouse button. Information about the current level will be displayed.

Now you must insert a place for the player to start out. Press I for insert and then click in the middle of the room on the left. The default object for inserting is a player one start position, a small green circle will appear where you click.

Now that a player one start has been inserted, you can save and run the level.


New Level [DOOM 2]
File Display Mode Tools Help
1 Player Start @ 265,-16 Appears On: All Levels

Chapter 2

Running a Level

BSP Processing

Before a level can be used with Doom, it has to be processed by a BSP program.

There are several command line BSP programs available. These programs expect as input a WAD or BSP file with valid THINGS, LINEDEFS, SIDEDEFS, VERTEXES, and SECTORS. The program will generate the rest of the level data and output a new file.

There are two different BSP programs now included with the editor. **`TBSP.EXE`** tends to be the faster of these, and should work fine on all systems. If you can't get TBSP to work, try **`BSP.EXE`**.

If you do not have TBSP you can download it from the Renegade Graphics BBS at 615-337-9198. The archive name is **`TBSP22.ZIP`**

You must have a batch file called **`RUNBSP.BAT`** present in the directory where you save your WAD files in order for the editor to be able to BSP your levels automatically. The editor looks for this batch file and runs it. This lets you modify the settings easily, or change BSP programs simply by changing the batch file. You can also modify this batch file to do things like make a backup copy.

If you are unable to get the BSP working automatically from the editor, you can run it manually from DOS. The command line for either BSP is simply:

```
TBSP infile.bsp outfile.wad
```
or
```
BSP infile.bsp outfile.wad
```

If you do not specify an outfile name, **`TMP.WAD`** will be created.

Occasionally you may receive an error message from the BSP program and it will abort. If the BSP program normally works for you, such an occurrence indicates something is wrong with the .WAD or .BSP file. For instance, it may contain lines that cross each other illegally, which would cause a floating point exception.

The BSP program will report the number of vertexes found, how many were used, and how many it output. A large number of new vertexes created by the BSP indicates that lots of breaks are being created due to the sector shapes, this is normal.

Command Line Usage for External wads

To load your WAD into Doom, use the -file option on the command line.

DOOM -FILE mylevel.wad

This would load the WAD file called MYLEVEL. Doom will ignore any file that does not have the .WAD file extension. Always make sure your level has passed through a BSP with no errors before running it with Doom.

To start a multi-player game across a network, all the players must first have loaded ipx support for their network card. To load an external WAD file from the command line, enter:

IPXSETUP -NODES n -FILE mylevel.wad

where **n** is the number of players.

To play a two-player modem game with an external WAD, use the command line:

SERSETUP -DIAL xxxxxxx -COMn -FILE mylevel.wad

where **xxxxxxx** is the number to be dialed and n is the number of your modem's com port. The answering player must have exactly the same WAD file and use the command

SERSETUP -ANSWER -COMx -FILE mylevel.wad

where **COMx** is whichever COM port your modem or serial link is on.

See the README.EXE that came with Doom or Doom II for more information on command line parameters.

NOTE

In order for Doom to be able to load an external level, it must be processed with a BSP program. The WAD file must be in the DOOM or DOOM2 directory, and have an extension of .WAD or Doom will not read it properly.

NOTE

SERSETUP.EXE and IPXSETUP.EXE are included with Doom and Doom2.

Cheat Codes and Useful Options

When you are testing a level, you don't always have the time or inclination to actually play the level. To save you time, you can use these "cheat" codes while within the game:

IDSPISPOPD	(Doom)Turns off the blockmap so you can walk through walls.
IDCLIP	(Doom II) Same as IDCLIP, but for Doom II.
IDFA	Freaking Ammo: gives you all of the weapons and ammo so you can cut through the monsters faster.
IDKFA	Killer Freaking Ammo: like IDFA but includes keys

When starting Doom, these may be useful on the command line:

-NOMONSTERS	Turns off the monsters on the level, so you can enjoy the scenery
-NOSOUND might	Turns off sound (if running Doom in a DOS session under Windows, this be required)

Chapter 3
Level Problems

Make sure that you process your level with the Tools/Validate Level command before saving. This will help you to track down errors.

Graphics Problems

Since Doom is so graphics-intensive, you're likely to encounter some of the following errors as you begin editing your own Doom levels.

Engine Limitations and WAD Errors

If you see messed-up graphics when you enter your level, it is most likely because of an error in how the graphics were assigned, bad line attributes, or an engine limitation.

The Incorrect Two-Sided attribute will cause a texture problem. Any outside line (shown thick on the map display) should not have the two-sided attribute checked. If it is checked, the wall will draw incorrectly (a variation of the HOM effect). Players will not be stopped by the wall, and can pass through it into the nothingness beyond the map. . . .

Tutti-Frutti appears when a texture is used that is shorter than the wall space it is in, or a texture with transparent areas is used on a one-sided line or an upper/lower portionof the wall. Portions of the texture will display properly but will be bordered on the top or bottom with colorful garbage.

The Doom engine will only repeat a wall texture vertically every 128 units. If you fill a space with a texture that is too short, it will most likely display this effect. If a texture with transparent areas is used on a wall that is one-sided (an upper or lower texture must be one-sided by definition, even if the line itself is two-sided), the engine has nothing to put in the transparent spots, and random garbage appears.

HOM (Hall Of Mirrors) is caused by missing textures on the wall. All one-sided walls must have a texture assigned to the normal or center portion of the SIDEDEF. If no texture is assigned, the engine will have nothing to draw there, leaving whatever graphics were there before the movement of the player.

The **Medusa Effect** is called such because it your character turns to stone when you look at the wall. It is caused by incorrect normal textures on two-sided walls. A texture assigned to a two-sided wall in the area that can be walked through must be a texture consisting of only one patch such as ASHWALL or BFALL. The Wall Texture dialog will show you the number of patches a given texture is made of.

FOB (**Flash Of Black**) is caused by huge changes in ceiling height. This is a limitation of the Doom engine caused by the mathematics used in calculations. If there is a difference in height of more than 1024 between the observer (player) and the area being observed, errors will occur in texture mapping. This problem has been fixed in versions of the engine 1.666 and above.

Poor Texture Alignment

When using a texture that crosses multiple lines but is wider than the lines themselves, you should adjust the X offsets of the lines so that all the textures match up with each other. This gives the wall a much nicer appearance when complex textures are being used, such as PIPES, or

a texture that uses faces, signs, or view screens. Taking care to align textures vertically and horizontally will pay off in much nicer looking levels as well, and can be particularly effective along stairs.

Poor Texture Pegging

Textures are “pegged” to the wall space; if the wall moves the texture moves with it. Lines have attributes that allow the wall normal or step texture to be unpegged or to “float.” This prevents the texture from moving with the wall during a change in height of the sector it faces. If you forget to set this attribute, the texture will move and may look strange (although in some cases this appearance is desirable and is done deliberately). The textures in a door track are unpegged automatically by the editor if you use the automatic structure (AutoStruct) tool; in all other cases you must remember to set the appropriate attributes yourself.

Missing Player Starts

The editor will automatically warn you of this, but keep it in mind as you design the level. You should have a player start for each player in cooperative mode, as well as a minimum of four DeathMatch start locations. Usually it is better to have even more start positions on a DeathMatch level to reduce the odds of someone predicting where another player will reappear.

Line Crossing

Never allow two lines to cross each other. The crossing of two lines means the overlapping of two sectors, which cannot be handled by the Doom engine and will cause Doom to crash.

Impassable Sectors or Steps

If the difference in height between the floor and ceiling is less than 56, the player will not be able to enter the sector. Similarly, for passage from one sector to another; if the floor of the higher sector and the ceiling of the lower are too close together (less than 56), there will be insufficient space for the player to pass.

Stuck Monsters

If monsters are placed too close to each other, too close to a wall, or in a sector that is too short, they will be stuck. Players will also become stuck for the same reasons.

You can determine if an object is too close in the editor. Since the size of an object is represented accurately by its circle, any overlap with a line or another object is visible on the map display.

Bad or Missing Tags

If you accidentally tag a sector incorrectly, the LINEDEF you intended to be affected will not be, while another LINEDEF might. Far worse (but easily done!), if you leave the tag at 0 for a LINEDEF that requires a tag number, you are in effect causing that LINEDEF to affect every sector in the level. This can be disastrous!

Slow Game Play

Large numbers of items in a level will slow down the game. This can be a problem in multi-player games, since the locations of all the items in the level must constantly be communicated between computers. At one time people who played DeathMatch games for hours on end in the same level were piling up tons of bodies and slowing Doom to a crawl, so early on Doom was revised to clean up dead bodies after a certain number were lying around . You still must be

careful not to overdo it with monsters and objects. If you are designing your level on a decently fast machine, like a 486/66 or a Pentium, don’t forget to try out your level on a slower machine once in a while. It would be wise to process the final version of your level with the Rejects utility. See the file REJECT.TXT in REJECT11.ZIP for instructions on using the Rejects utility (on disk).

Chapter 4

Sector Drawing Techniques

A high level of proficiency in drawing sectors is vital when creating levels. The manner in which things are drawn is important to maintaining an uncorrupted level. To get the most out of the descriptions and suggestions that make up this chapter, follow along by drawing as you read.

Practice drawing sectors alot, until you understand when sector joins will occur automatically, and when they must be performed manually.

Canceling Sector/Void Drawing

If you begin dragging out a new sector or void and find that your starting point is not where you intended it to be, you can easily cancel the process by moving the mouse so that the box you are drawing has a zero width or height. The sector or void will not be drawn.

Automatic Sector Joins

A new sector will automatically join itself to an existing sector if it is drawn with one of its lines close enough to the line of the other sector, the two lines are parallel, and the new line falls within the length of the existing line.

If a new sector is drawn with one or both of its ends falling outside the existing sector, then the join will not be performed automatically.

Vertex/Line Manipulation

Vertexes can be grabbed and moved about with the mouse when the editor is in vertice mode. Press V to enter this mode or select the Vertice Tool icon. As you move the vertexes around the lines that attach to them move at the same time.

You can break a line to insert a new vertex by clicking on it anywhere with the second button. a vertice will be inserted wherever the pointer is, and the line breaks into two. Strange shaped rooms and structures can be created with breaks and by moving the vertexes.

Lines and sectors can be joined by dragging vertexes together. If two lines are moved into the same space by vertex movement, they will be joined automatically, and an opening between sectors is created.

Merging of vertexes is much simpler if you turn on the grid snap. You can adjust the size of the grid snap by clicking on the icon with the second mouse button, or pressing Shift+G.

Nested Sectors

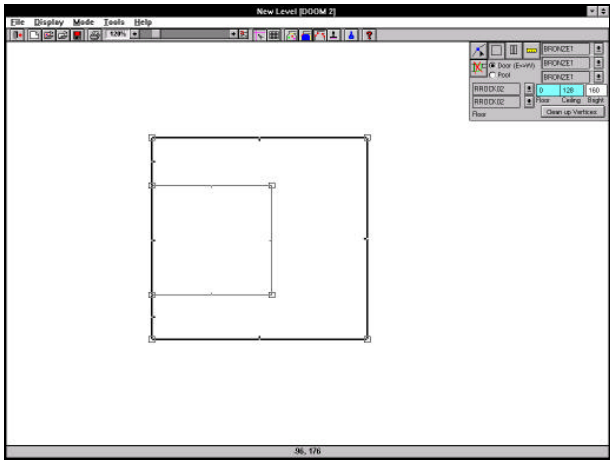
Sectors within sectors, or nested sectors, are recognized automatically by the editor as they are drawn. A typical nested sector might be used to create a pool, a pedestal, a teleporter pad, or a step. A more complex object such as a boat or a couch can be built up by nesting sectors.

To create a sector inside of another, simply draw it in where you want it. Just be careful to keep the new sector entirely within its container sector.

Notice that the inner sector has thin lines all around. This signifies that the lines are two-sided.

If you want a sector to be inside another but to share a common wall, the sector should be drawn attached to the wall. You can also attach a nested sector to an outer sector by breaking the outer

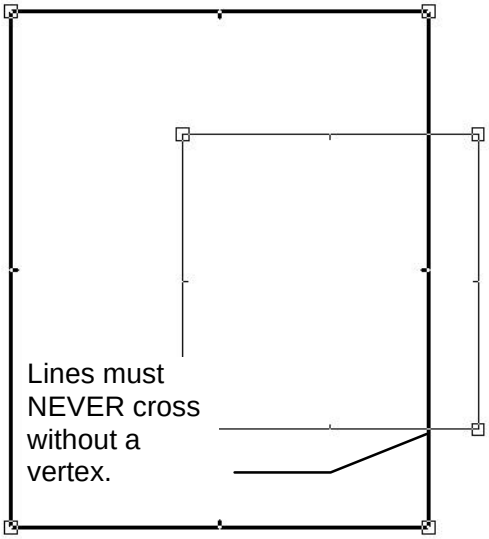
line in two places and then dragging the corner vertexes of the inner sector to meet the outer sector vertexes.



Never allow a sector being drawn inside another to cross over the lines of that sector. If this happens, the newly drawn sector will cause major errors in the BSP or in Doom. Two lines should never cross each other. The only valid "crossing" of two lines is actually created with four lines joined at a single vertex.

An improperly drawn nested sector will cause major errors in Doom.

Two-sided lines like those produced by sectors within sectors are not solid. Even though you can assign a texture to them and give them the "block player" and "block monster" attributes, they are still not considered solid by the engine for the purpose of projectiles. There is also the matter of paper-thin walls looking a bit unreal. In the situation where a solid wall is needed within a sector, a void should be used.



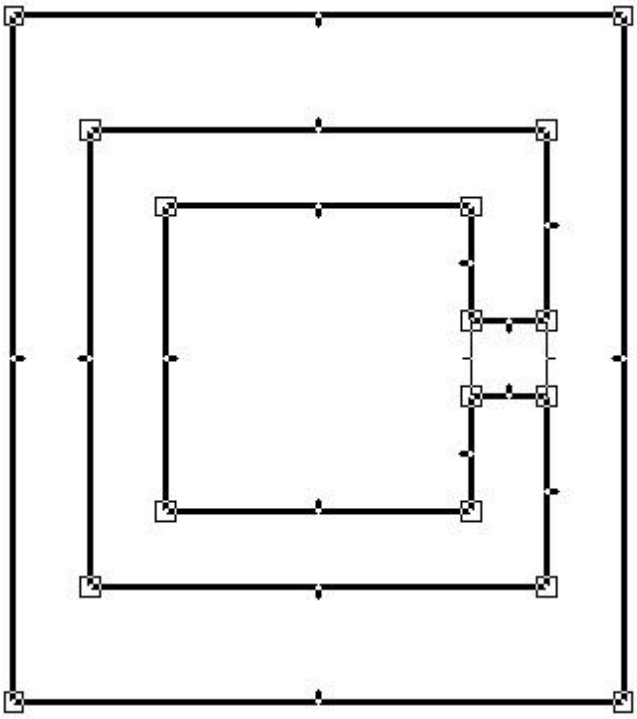
Voids and Columns

A void is simply a space within a sector, defined by lines, with no sector inside it. Voids are most typically used to create columns and so are sometimes referred to as columns.

Voids are drawn in the same manner as sectors, but using the second mouse button. Notice that the lines defining the void appear thick to signify that they are one-sided. If you click inside the void, nothing happens, as there is no sector there to select.

Lines defining a void can be broken, reshaped, and generally abused in the same manner as other sector lines.

There is no limit to the size of a void, as long as it is properly contained by the sector it is in. The same rule applies to voids as to sectors: Never cross sector lines while drawing or manipulating a void .



The structure shown here is composed of a void within a sector and a sector within that void. Another sector joins the inside sector to the outside one. The void forms a solid C-shaped wall with thickness inside of the area. Without the void, the wall would seem paper thin and be unable to block projectile weapons.

The thin lines indicate the connection between sectors (two-sided lines) and the thick lines are one sided.

Deleting Sectors

To delete a sector, you must have the Sector tool selected. Click in the sector you want to delete and it will be highlighted. Press the D key or click on the Delete Sector icon (with the red X). Do not use the Del key, which is reserved for lowering the floor height.

When the sector is deleted, the vertexes are left behind. This is done for two reasons: so you can see where the sector was in case you are replacing it with something else, and to speed up editing by skipping the time it takes to clean up the vertexes. To clean up the vertexes right away or at any time, click the Clean Up Vertices button.

Deleting Lines

If a sector is more complex than you want, you can selectively remove lines. This is done by moving vertexes together. If two vertexes on either end of a line meet, the editor determines that the line is no longer needed. Like all other operations involving vertexes, this is easier if the grid snap is turned on.

Never allow a sector to be reduced to fewer than three lines.

Deleting Nested Sectors and Voids

When a nested sector is deleted, a void in the shape of the deleted sector is left behind. This void can be left or removed. If you decide to leave the void there, you must remember to remove the two-sided attribute from the lines and to assign textures to the walls.

To remove the void you must delete all the lines it is made of. Start moving vertexes together, simplifying the shape, until all you have left is a line. Never leave a line like this in your map, as

it will cause a math failure in the BSP. Move the ends of the line together so that all you have is an orphaned vertex. The vertex can be cleaned up or left for the BSP to remove.

Line Attributes

Each line may have any of nine different attributes assigned to it. The attributes affect everything from the way in which textures are drawn to the ability the line has to block passage of objects, sight, and sound. Attributes are switches—they are either on or off.

Block Player

Motion of players and monsters is blocked by a line with this attribute. This has nothing to do with being able to see through a line. For example, you might draw a window that has a window sill low enough for the player to be able to walk through the window, but wish to prevent it; to do so, use this attribute. The windows in the first room of E1M1 are blocked in this manner. Setting this attribute does not block shooting if the line also has the two-sided attribute set.

Although the original levels of Doom have Block Player set on all the outside walls, this was not necessary, since the game engine will not allow the player to wall though a line that does not have the two-sided attribute set.

Block Monster

Monsters cannot walk through a line with this attribute. This is mostly used to prevent monsters from doing possibly stupid things like walking off the side of a staircase or into a pit. It might also be used to confine monsters to a particular room, or to prevent monsters from entering a room.

Two Sided

If a line has two SIDEDEFS, and both of them are completely transparent (-), then this attribute must be selected or the graphics for that wall will not refresh properly. Setting this attribute also allows shooting through the line even when Block Player is set.

Be careful not to have this attribute set on a one-sided wall. If you leave it set, the wall will display the wrong texture or another graphic error which will cause Doom to slow down considerably when the wall is on the screen, even on a Pentium.

If you assign a graphic to the normal (middle) portion of a wall that is two-sided, you must take care. If you use a graphic that is made up of more than one patch, the Doom engine will be unable to display it properly and you will see what is known as the Medusa Effect: The wall texture will display as colorful garbage and Doom will slow down drastically; on many machines it will almost stop. Only single-patch textures such as ASHWALL or BLOODWAL can be used on a two-sided line. This is due to a limitation of the Doom engine and must be lived with.

Float Texture

If this attribute is not selected, the texture on a wall will move up and down with the ceiling. In the case of a door frame texture (usually DOORTRAK), this attribute is set. This causes the texture to “float” at the same position on the wall and not move with the rest of the sector as its ceiling or floor height changes.

Sometimes you will want to leave this attribute off to create a special effect. One such effect is used in E1M3: There is a secret door right across from the Player 1 start location. After a bridge

is raised across the acid pool, the player can reach the secret door; when it opens, the entire hallway goes up and the walls move with it.

Float Bottom

This is the same as Float Texture, but applies to the “step” (lower) texture.

Secret Map

This has nothing to do with something being secret as far as the game engine is concerned. What this attribute does is cause the AutoMap to display secret doors as normal walls. This prevents them from being found simply by looking at the color of the map lines.

Sound Block

Despite the name of this attribute, it only blocks sound under special circumstances.

Sounds you make (such as shooting) travel to every part of the sector you are currently in, then travel into sectors that are adjacent to the sector you are in, and then to sectors adjacent to those sectors.

Sound stops in only two places: at a line that has only one side, and at boundaries between two sectors that have no overlap in their heights. This would obviously include closed doors. If the heights of the two sectors overlap at all, sound will travel between them.

If sound passes a line between sectors where sound would carry normally but the line has this attribute set, the sound level is cut by half. If the sound passes two lines with the attribute set, the sound is blocked.

Note that the sound block attribute only affects what monsters hear, and not players. Players can always hear any sound made in sectors that have a continuous connection between them.

No Draw

This causes a line not to be drawn on the map. This attribute is generally set for lines that do not affect the real structure of the level from the player’s point of view, such as a line used to separate two sectors or to create a shadow through differing brightness levels.

Line Specials and Tags

This is where 90 percent of the action in Doom level design is. Clever or not-so-clever use of line specials is what makes or breaks a level, and knowing how to make good use of them is essential. Without them you can’t even have a door.

Every structure you ever see in Doom is a sector or a side of a sector. However, even though doors, stairs, and crushing ceilings are all just sectors that are behaving in different ways, you will tend to think of them as different structures. For this reason, the line specials are described by the type of desirable behavior they give you: Doors, Platforms, and so on.

You will often see the term adjacent used in descriptions of attributes. A sector is adjacent to another sector if they share a line. This would by definition include that very sector, so remember that every sector is adjacent to itself.

This also means that adjacent sectors do not have to literally be adjacent; one sector can actually be nested inside the other.

Some line specials—most noticeably, doors and teleporters—are sensitive to the direction the line is "facing." In the case of teleporter lines, facing affects the direction of travel through a line that causes teleportation. Manual doors with the wrong line facing simply do not work. A line that faces the wrong way can just be flipped in the editor.

You can have a lot of fun experimenting with using specials in different ways: apply a Crushing Ceiling special to a Door sector and use a Door special on an entire hallway.

Tags

All line specials, with the exception of the scrolling effect special, must be associated with a sector. All line/sector pairs must be associated with each other through use of a tag, except for a line special of the Manual type, which is automatically associated with the sector behind it (usually a door).

A line is associated with a sector by assigning the line and sector identical tag numbers. The particular number used has no meaning (with the exception of 999, which is used in staircases). You must never leave a required tag number set to 0. Doing so will cause that line special to affect every sector on the level. This can be rather exciting, but is not what you want.

In most cases multiple sectors can be affected by the same line by using the same tag for all of them. However, in the case of teleporter sectors, having two or more destinations for one line will cause Doom to crash. You can, however, have multiple lines that teleport to a single sector.

Activation Types

Action Activation	Description
Switches	Action will occur only once when player presses wall. If a texture that begins with SW (switch) is used, it will be automatically animated.
Buttons	Action will occur every time player presses wall. If a switch texture is used, it will be automatically animated.
Manual	Activates doors that don't need a tag. The sector behind the line is the sector affected by the special.
Trigger	Action happens only once when the player walks over it.
ReTrigger	Action happens every time the player walks over it.
Impact	Shoot/punch to activate.
Effect	Used only in the case of a scrolling wall.

Action Types

Action Type	Description
Door	Used primarily for Door type sectors. Doors that "raise" will re-close after 5 seconds. Doors that "open" will stay open.
Lift	Used primarily for Lift/Platform sectors. A lift should be built in the level at its upper height. The sector will "remember" its starting height and return to it when it comes back up. A lift always goes down to the lowest adjacent sector.
Crush	These are floors or ceilings that puree players and monsters.

Light	Creates one of many possible lighting effects in the sector.
Floor to	Floors go up/down, change texture, etc. Floors that go down usually go the next lowest adjacent sector.
Ceiling	Ceilings go up/down, etc.
Exit	Anything that ends a level. Note that the exit to secret level switches are only meaningful in the appropriate version of Doom.
Stairs	Related to staircases that raise from the floor automatically.
Teleport	Used for teleporting players or monsters or both.
Misc	Everything else.

Automatic Stairs

Automatic stairs appear flush to the floor when you first enter a Doom level. After the stairs are activated by a line special they raise up. Look at the original Doom levels listed with the relevant line specials for an example.

All the steps of an automatic staircase begin at floor level except for the highest step. The building of automatic stairs is started with a line special that acts on the first step sector. That sector has a tag matching the line that activates it. The next step has a tag of zero, and the following step has a tag of 999. Step sectors follow this alternating pattern of tags until the last step that moves, which can have a tag of 999 or 0. The sector beside it is set to the final height; it has no tag and does not move.

All the steps that rise are set to a height equal to the floor. When they are activated, the steps will rise to the heights of 8, 16, 24, 32 . . or 16, 32, 48, 64. . . . The final non-moving component of the staircase is set to its final height, so in a staircase composed of nine sectors that move with each rising 8, the final sector would have a height of 80 above the floor.

Lifts

Lifts are simply sectors that travel between the heights of two other sectors. The lift must be built so that it starts at the upper height. The lift will “remember” this height and return to it after it lowers.

If a lift sector is to be activated by a button or switch special, it must be constructed in the same manner as a door sector so that the line facings are correct for activation by pressing. For this reason, a lift sector should always be created by drawing it between two existing sectors; it should never be created first.

Creating a lift is very simple. A lift works and looks best if it has a slight buffer sector between it and the room it faces. Draw in the buffer sectors followed by the lift sector. Set the floor height of the lift to be equal to the floor height of the higher room. Tag the lift sector and assign a matching tag to the outside line on the upper room side. This line is assigned a line special type 88 or some similar type. This will cause the lift to be activated when the line is crossed.

A line special that is activated as a switch or button can be assigned to the side of the lift that is visible when the lift is in the upper position. This then allows a player to call the lift down by pressing the side of it in the same manner as a door. The special could also be used on a switch beside the door at the top or the bottom. of the lift.

Secrets

Secret areas in Doom are created through a combination of attributes and level planning. In some cases you may want to use the map itself as a hint that a secret area exists, by making it clear that there is a blank area on the map.

Secret Sector Attribute

The secret counter that is displayed at the end of each level reflects how many sectors with the "secret" attribute were located and entered by the player. The "secret" attribute must be assigned to sectors located in areas that you consider to be secret in order for this counter to accurately reflect what percentage of the secret areas were located by the player.

Secret Line Attribute

Lines also have a secret attribute, but it is not related to the secret counter. The secret attribute on a line causes the line to be displayed normally on the AutoMap. If this attribute is not used, a secret line that is designed to appear as a plain wall in Doom will display as a different color on the AutoMap and will thus no longer be a secret.

Secret Areas

The overall key to secret areas in Doom levels is this: What makes an area secret is that it is designed that way in the level; use of attributes is secondary. In the original Doom levels, most secret areas are marked in some way. Typical markings include blinking lights and strange or misaligned textures. Some secret areas have doors triggered remotely so that you hear them or see them if you go into the area quickly enough. Others have windows that you can see through, but that leave you wondering how to get to the other side.

It is usually a good idea to follow a similar style in creating any secret areas in your levels. The player should never be reduced to pushing on every wall in the level trying to find the last secret level. There should be a logical way to locate all secrets, either by appearance or by careful inspection of the shape of the AutoMap.

Challenge but never frustrate the player. A frustrated player is not enjoying the level, and will eventually stop playing.

Chapter 5

Editor Control Reference

The Keyboard

The keyboard controls of the Doom Editor do not always follow typical Windows program usage. For example, the Del key is never used for deleting. The keyboard commands are shown below.

Although some of the key commands may seem odd to you at first, users find that it does not take long to learn them, and to make very efficient use of the editor.

DOOM Editor Keyboard Controls

Key	Effect
All Modes	
T	Go to Thing (Object) mode and/or set to object Move/Inspect mode
I	Go to Thing mode and/or set to Object Insert/Delete mode
V	Vertex mode. Go to Structure mode or switch to Vertex tool
P	Go to Special/Line(paint) mode
L or S tool	Go to Structure mode with the Sector tool active, or switch to the Sector if already in Structure mode
Spacebar	Refresh map display
Ctrl+S	Quicksave to QUIKSAVE.BSP in editor directory
G	Toggle display of map grid
Shift+G	Change size of grid snap
Ctrl+Y	Toggle Snap-to grid
+ -	Zoom the map display in and out (holding Shift and/or Alt makes Zoom work in larger increments)
Arrows	Pan map display 1/4 screen in selected direction
C	Center map on next selected point
Shift+C	Center map and zoom on next selected point
Thing/Object Mode	
I	Set Insert/Delete object mode
T	Set Move/Inspect object mode
Ctrl+O	Toggle on-screen object labels

Special/Texture Mode

The floor/ceiling heights and brightness of the currently selected sector can be changed with keyboard controls for speed. All of these normally increment by 8, but holding Shift causes the increment to be 1, and Alt causes it to be 32.

[and]	Decrease/increase sector brightness
Ins Del	Raise/lower floor height
Home End	Raise/lower ceiling height
PgUp PgDn	Raise/lower floor and ceiling height, moving entire room up or down
Ctrl+1,2,3,4	Switch to the corresponding palette(See Managing Palettes below)

Structure Mode

The same controls used to modify the current sector in Special/Texture mode can be used to modify the settings of the next sector to be drawn.

D	Delete the currently selected sector

With a sector selected (highlighted green):

[and]	Decrease/increase sector brightness
Ins and Del	Raise/lower floor height
Home and End	Raise/lower ceiling height
PgUp and PgDn	Raise/lower floor and ceiling height, moving entire room up or down

With no sector selected, these affect the next sector to be drawn:

[and]	Decrease/increase brightness of next sector to be drawn
Ins and Del	Raise/lower floor height of next sector to be drawn
Home and End	Raise/lower ceiling height of next sector to be drawn
PgUp and PgDn	Raise/lower floor and ceiling height, moving entire room up or down for next sector to be drawn

You will probably be most efficient in editing by using the arrow keys to pan around the display and the + and - to zoom in and out. Be aware that holding the Alt key while zooming in and out increases the amount of change in zoom level; the Shift key also increases the amount of zoom, but by a lesser amount.

The Screen

The toolbar controls from left to right

DOOM Editor Toolbar Controls

Command	Effect
Exit	Quits the editor
New	Start working with a blank map
Open Level	Get one of the original Doom levels
Open WAD	Open a .BSP or .WAD file
Save	Save the current work to a .BSP file
Print	Get print options and print the current map

Zoom%	Show current map zoom level
Zoom Bar	Change map zoom level (slider bar)
Map Tool	Call up mini map tool
Snap	Toggle Snap-to grid; select with second mouse button to change snap size
Grid	Toggle grid lines; select with second mouse button to change grid spacing
Object	Switch to Object mode (Move/Inspect)
Paint	Switch to Special/Texture mode
Structure	Switch to Structure mode
Quick Paint	Turn on Quick Paint tool for rapid assignment of line and sector attributes
Bitmap	View the bitmap fiddler
Help	Call up help or the map statistics

The map display is designed to be as easy to read as possible. One-sided lines, which are the outside of the level or a void, are shown as thick lines. This makes it easier to visualize the space. Lines with a special are shown in blue.

Object color is related to the Thing type. Monsters are orange, with more powerful monsters being a slightly lighter shade. Player objects are green. Keys are their appropriate color. Inert objects like Gore and Furniture are shown in gray. The names and colors of the display can be customized by editing the OBJECTS.DAT file. An explanation of the fields is at the top of the file.

Object Mode

In Object mode there are four possible actions. The actions are performed with the first or second mouse buttons from two different modes within Object mode. The different actions are:

Move Object	First button, Move/Inspect mode (press T)
View/Change Object	Second button, Move/Inspect mode (press T)
Insert Object	First button, Insert/Delete mode (press I)
Delete Object	Second button, Insert/Delete mode (press I)

To *move an object*, drag it with the first mouse button. To view an object and possibly change its attributes or type, click on it with the second mouse button.

To *insert an object*, change to Insert/Delete mode by pressing I. Select the attributes and object type to insert. Click anywhere on the map to insert the object.

To *delete an object*, change to Insert/Delete mode and then click on the object to be deleted with the second mouse button.

Don’t forget to change back to Move/Inspect mode before attempting to move an object or you may get undesired results. You will always be in Move/Inspect mode when you go back to Object mode from one of the other major modes.

Special/Texture Mode

The display in this mode is contextual; you will see information boxes about whatever you have selected.

You will usually have a sector, line, and side selected, but at times you will have only a sector or only a line selected. A selected sector is highlighted in green. A selected line is highlighted in red. A selected side is the side of the red line that faces the green sector.

Make a selection by clicking on the map. If you click in a sector away from any lines, you will select just the sector. If you select a line from the outside of the sectors, you will select only the line. Clicking near a line on the side of it that faces a sector selects that sector, line, and side.

If the line you are clicking on has an opposite side, you can select it with the second mouse button in the same manner you would select its first side. In the case of a one-sided line, you can select the sector that line faces while clicking on the outside. You can toggle back and forth between the two sides of a two-sided line in this way. You should experiment in the editor with a pre-made level, clicking with both mouse buttons to get a feel for how this works.

Controls and Information Displayed in Special/Texture Mode

Name	Meaning
Information for the Current Sector	
C_Height	Height of the ceiling (upper blue box)
F_Height	Height of the floor (lower blue box)
C_Texture in	Texture of the ceiling; name is shown in white on the upper texture box the upper-left corner of the display.
F_Texture	Texture of the floor
Brightness	Light level of the sector (white box)
Sector Special	Special attribute of this sector, if any (left green box)
Sector Tag	Tag of this sector to associate with a line, if any (right green box)
Total Height	Total distance between the floor and ceiling of this room (must not be negative)
Additional Controls on the Current Sector Information Box	
Texture List	Contains flats from current palette
Texture Box on	Displays appearance of current flat choice; drag this texture and drop it the floor or ceiling to assign a new texture
Palette Icon	Displays the Floor/Ceiling texture palette editor
Special one	Shows the current special value and allows easy selection of a different
Get Tag	Assigns the next available (unused) tag number to this sector
Find Tag	Highlights any line with the same tag value
Information for the Current Line	
Line Attributes	Select the attributes for this line

Line Special	Special attribute of this line, if any (left red box)
Line Tag	Tag of this line to associate it with a sector, if any (right red box)

Additional Controls on the Current Line Information Box

Special one	Shows the current special value and allows easy selection of a different
Get Tag	Assigns the next available (unused) tag number to this line
Find Tag	Highlights any sector with the same tag value

Information for the Current Side

Line Width	The total width of this line—used for determining texture size and offset (number to right of Palette icon)
Texture Names	The textures assigned to the upper, lower, and normal of the side (white boxes)
X and Y offsets boxes)	The amount by which to shift the texture within the wall space (gray

Additional Controls on the Current Side Information Box

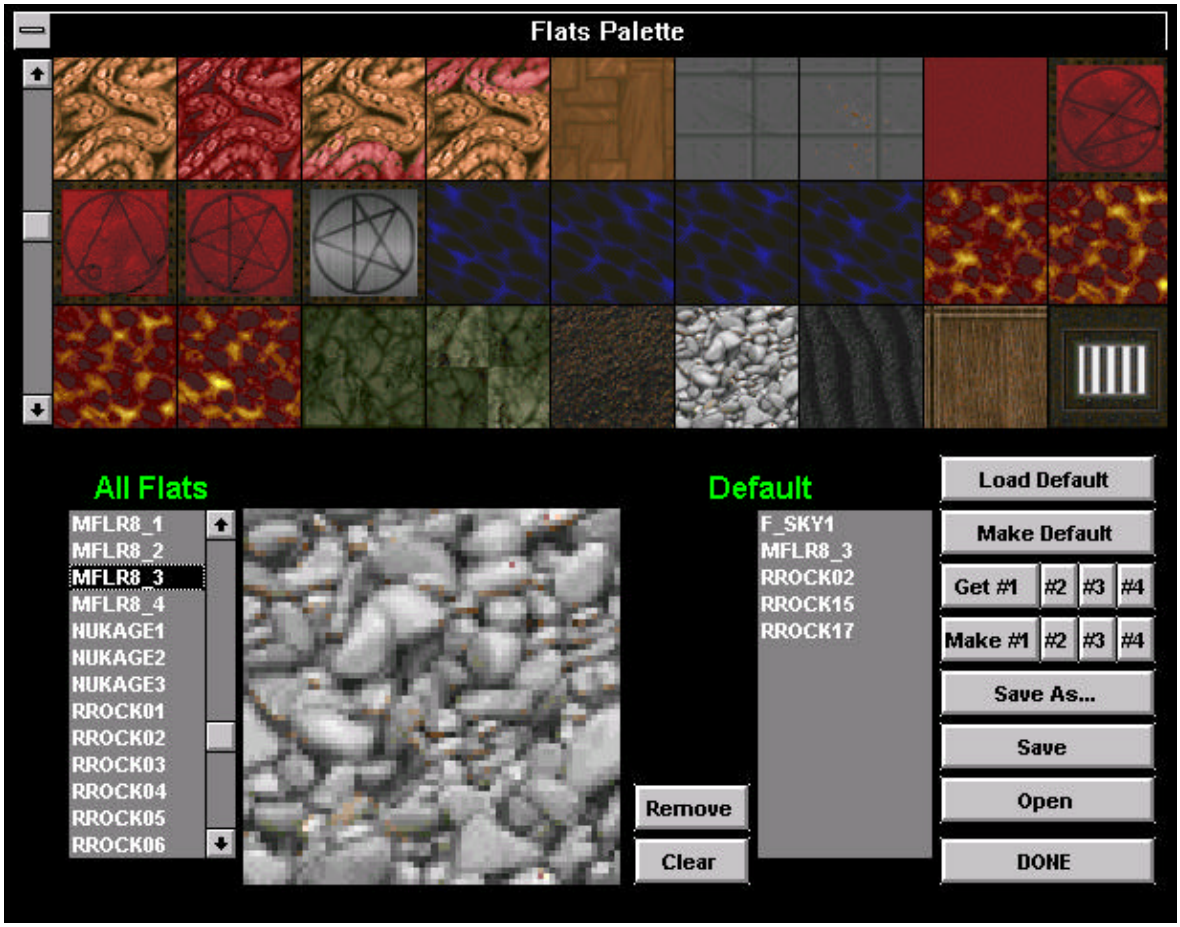
Palette Icon texture	Displays the Wall Textures palette editor for palette editing or visual picking
Texture List	The wall textures from the current palette
Use the	Assigns currently displayed texture from the Texture List to this part of side, or displays hidden texture name
- (button)	Assign a blank texture to this part of the side

Working with Textures

There are hundreds of textures available in Doom. To make working with this large number of textures manageable, the editor works with texture palettes.

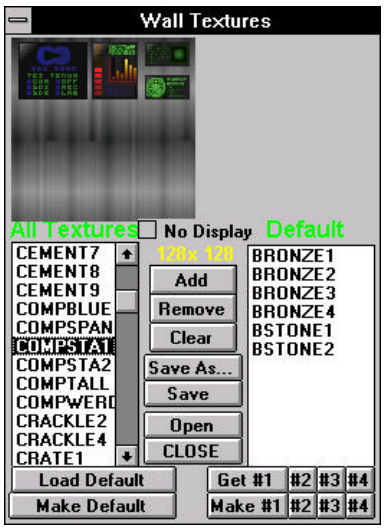
A texture palette is simply a list of texture names. Each palette file contains a group of wall and flat textures. Palettes are created, loaded, and managed with the palette editors.

The Flats palette editor is very simple to use. The textures are shown to you as you scroll through their names. When you want to add a texture to the palette you are creating or editing, you drag its name from the list box at the left into the list at the right.



In order for you to use a given texture, it must first be added to the current palette, or be part of a palette that you switch to. You can create as many palettes as you want to, containing any textures. They may be saved to any name you see fit.

The Wall Texture palette is a little more complex, because the textures themselves are. When you select a texture from the list, you see it drawn onto the palette box. Notice how it appears in sections. These sections are the patches. Each texture may be made of one or more textures; some textures in Doom are made of as many as forty patches.



To add the displayed texture to the palette, click on the Add button.

If the display of wall textures slows you down you can select the 'No Display' box which will turn off drawing of textures.

Managing Palettes

When the editor starts up, it will load a palette by the name of DEFAULT. You can change the default palette from the palette editor by pressing the Make Default button; this will simply save the current palette to the name DEFAULT.

The best way to work with textures is to determine what textures you want to use on the level you are currently working on, and then create a few palettes containing all the textures you will need. Create up to four palettes and save them under names that will help you remember what the textures are for. For example, you might create DOORS, MARBLE, STONE, and METAL.

You then can assign each one to one of the four palette slots. This is done by having a palette loaded and pressing the appropriate Make button. Load the DOORS palette and press Make #1, then load MARBLE and press Make #2, and so on. When you return to the editor, you can switch between these four lists of textures by pressing Ctrl+1, 2, 3, or 4. The settings for these palettes will be remembered from session to session.

Picking Single Textures

The Wall Textures palette editor is very versatile. In addition to allowing you to modify your palette list, you can also use it to pick individual textures. When you click on a texture in the palette list, it appears ready for use in the list on the SideDef information display. You can then assign the texture you are viewing to the current line by pressing the Use button.

Quick Paint

The Quick Paint tool allows you to rapidly modify the attributes of lines, sides, and sectors. To use the Quick Paint tool, you must first be in Special/Texture mode and set the attributes you want to paint with.

Pick a line, side, and/or texture and assign the attributes you want to set. Select the Quick Paint tool with the button on the toolbar. A list of attribute types appears, and you can select which items you intend to change. Now you can assign those attributes to any line, side, or sector by clicking on the map.

This is a very powerful tool and can be dangerous if used indiscriminately so you may want to save the level first. Be very careful when choosing what attributes to modify. In particular, pay attention to line attributes.

Structure Mode.

The display in this mode is as clean as possible. Only lines and vertexes are displayed on the screen and the tools are simple but powerful.

Drawing Tools

There are two main tools used in Structure mode: the Vertex tool and the Sector tool. The Vertex tool allows you to move vertexes and insert new vertexes. Vertexes are moved simply by dragging them. New vertexes are inserted on lines by clicking on them with the second mouse button. The line will break and snap to where you clicked the mouse.

The Vertex tool can also be used to delete lines. To delete a line, drag the vertex at one end of the line until it is over the vertex at the other end of the line. The vertexes will join and the line will be removed.

The Sector tool is used to draw new sectors and voids, and to delete sectors.

To draw a new sector, select the Sector tool and drag out a box. If you draw the new sector so that it lies on top of or nearly on top of an adjacent sector, the editor will try to join the sectors. In order for this to work properly, the line of the new sector that is next to the adjacent (older) sector must be equal to or shorter than the existing sector side. This will become clear after you use the tool a few times.

To delete a sector, highlight it (green) and then press D. If you are deleting a sector within a sector, you will be left with a void. (Voids are spaces within sectors, and can only be created within sectors; they are drawn using the second mouse button.) If you decide to retain the void, be certain to clear any left-over two-sided line attributes. To remove the void, use the Vertex tool to drag lines together. You will eventually have one line; drag the ends of the line together until you have only a vertex. The void is now gone.

The two secondary tools used in Structure mode are the AutoStruct tool and the Ruler. The AutoStruct tool is used in much the same way as the Sector tool. To change the settings of the AutoStruct tool, select its icon with the second mouse button.

File Management

When you save a level, it is written to a .BSP file. This file contains all the level data minus the part generated by the BSP program. The file is then processed by a BSP program and copied to a file with the extension .WAD.

The editor has a safety feature to avoid overwriting a file previously saved under the same name. When the editor saves a .BSP file, it first looks for a file by the same name with the .WAD extension. If it finds it, it copies that .WAD to a file with the extension .X1. If there is already a file with the name .X1, it is renamed as .X2, .X2 is renamed to .X3, and so on up to .X9.

This means you have up to nine backup copies of the level you are working on. To load the .X files from within the editor, in the file dialog choose Auto Backup for the type of file; files with .X? extensions will be shown.

If you edit an .X file and then save it by the same name, the editor will remember that you were editing a backup file and will not create additional backups. This serves to protect you from losing your good version of a level.

You should occasionally clear out the extra .X files. You can remove all of them with the command

```
del *.X?
```

To delete only the oldest ones, specify *.X9 or *.X8 and *.X9 in your command.

```
del *.X9
del *.X8
```