Renegade Graphics DoomED
The Best Doom Editor
Version 1.1

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This document is the manual for Renegade Graphics Doom Editor. The editor is distributed as a .ZIP archive with the name RGDMEDxx.ZIP where xx is the version number. If the version you are looking at is more than a month old, and it is not 1996, then there is probably a newer version available.

This is solely a product of Renegade Graphics. All inquiries about this editor should be made to them. id software is in no way related to or responsible for this program or any of its documentation.

DOOM is a trademark of id software. id is not pronounced I.D. It comes from id, ego and super-ego and it is always lower case.

Introduction

Here it is, the latest and greatest version of the editor. First a moment of silence for the great work the guys at id have done. Next three cheers for Doom: Hell on Earth, id's next Doom release which will be available some day.

What you have here 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.

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. Don't expect to create great things the first day, you have to learn technique first. But within a week or two, you should be making complete levels with confidence.

Even aside from the creative aspects of level creation, there are serious technical questions to consider. The Doom engine cannot handle every eventuality, and you must design your level around this. Haphazard level design will result in garbage. According to John Carmack of id software, over a year of work hours went into the editing of the original 27 levels for Doom. That works out to a bit over 70 hours work **each**.

I believe that this editor has a couple advantages over the editor that they used at id to design those levels, and you will benefit from that. A lot of the time above was spent just learning what could be done, and trying to come up with new ideas. Using this version of the editor you can put together a simple level in just a couple hours, and a great level in a few days.

So take your time, study what others have done before you. Enjoy yourself and learn this as an art.

Technical Info

WAD files. This is what it's all about. Doom comes with a WAD file, called DOOM.WAD strangely enough. This is the main WAD file and is generally referred to as *the* WAD file. Other WAD files are called **PWAD** files for *patch* WAD file.

The WAD file contains most of the important things about Doom. Some of the things contained in it are:
    The color palette
    The music that is played during each level
    ALL the graphics for monsters, walls, weapons and title screens. Everything.
    ALL the sound effects (there are 63 of them)
    The original Doom Levels E1M1-E3M9

Anything which is in the WAD file can be replaced by a similar entry in a PWAD file. Entries in a PWAD file 'overwrite' the original WAD file entries *in memory*. This is great because that means you can use new sounds or graphics in the game without having to modify your original game. Not to mention new levels!

These things are NOT contained in the WAD file and therefore cannot be modified with PWAD files:
    Monster behavior
    Weapon damage/types
    Special effects behaviors

Each level is represented in the WAD file by a bunch of information. This information can be broken into two parts, that which actually defines the level, and that which is needed by Doom in order to process the level in the game. Because of the huge amount of information that Doom has to handle when it is playing, and because of the importance of making Doom as fast as possible because of this, a lot of information is generated ahead of time by the BSP.

You only have to worry about part of this data. This is the data that really defines the level. The rest of this data is taken care of by the editor and the BSP. The information that you have to handle is broken into four items:
    Objects (Monsters etc.)
    Lines
    Side Definitions
    Zone Definitions

Everything that a player experiences in Doom is controlled by those four items. You are already familiar with Objects so we'll leave them until later.

Lines and Zones

A **line** may have one or two side definitions (**sidedefs**). A **zone** is an area between lines that is surrounded by sidedefs. This can be confusing so follow closely. A line can be a trigger, it may cause some sort of action when you walk across it, shoot it or touch it. A line might also block the player from walking through it, hearing sound through it and much more. Some lines can only be seen from one side, some lines are seen from both sides. So a line has a sidedef associated with it for the side that you can see. If you can see it from two sides it has two sidedefs.

A zone is an area where a player can or could see. This could be a room. Each step of a staircase is an individual zone, a teleporter pad is a zone, a door is a zone. There are some areas that are surrounded by lines but are not zones. The inside of a column is not a zone. No one will ever see the inside of a column, the lines that define the column are only ever seen from the outside, there is no sidedef for the other side, and there is no zone inside the column.

So a zone is defined by the sidedefs, not the lines. When you select a line in the editor, the zone that the first sidedef belongs to is shown. Selecting a line with the second mouse button will select the second sidedef (and it's zone) if there is a second side. Try this on lines that are parts of stairs, then try it with an 'outside' wall. See the difference? There is just one side to an outside wall.

The sidedef only describes the appearance of the wall. This is done with three textures. The zone describes the appearance of the floor and ceiling, the amount of light in that zone, and any special attribute that might affect the zone such as blinking light or damage when you are standing there.

So the sidedef is three textures, what are they? In the editor they are shown as top, wall and step. Each is defined as either a particular texture name or nothing (-). Not all sidedefs need all three textures defined, and in many cases no texture at all needs to be defined.

The **top** texture defines what texture will be painted onto the wall above the junctions between two zones if the ceiling height is different between them. This applies to the sidedef that faces the zone with the higher ceiling height. Assume you are standing in zone A looking into zone B. If the ceiling in zone B is lower than A, there will be some wall between the two ceilings that you can see. If you are standing in B then you cannot see any wall, you see the ceiling of B and then it cuts off and you see the ceiling of A above it. So for the sidedef that faces zone A, a texture must be defined, for B there is nothing, a -.

The exact same situation is true for the floor. If the floor in B is higher than A, there is a **step** that must be painted. (Note that a 'step' can be any height... not just something you can walk over).

The **wall** texture is the texture in between. If you are defining a line that is meant to be walked through, then there is generally a corridor there and there will not be a wall texture. Wall textures are usually defined only on lines that are being used as walls... In these situations there is also usually not a step or top texture needed.

This is a good place to point out that DOOM IS FLAT. You may not have noticed it because of how cleverly designed the original levels are, but it is not possible to have more than one room in the same place, you cannot have multiple 'floors' in a single level.

So now you know what a sidedef is. In the editor you simply select a line, then choose the front or the back of it to edit the appropriate sidedef.

The textures for the floor and ceiling are called 'flats'. This is because they are a flat texture, they always appear in the same perspective to the player view. As you turn, the flat bitmaps are rotated. This is very different from the way that the walls are handled.

Each zone defines it's own floor and ceiling texture. Each zone also has it's own brightness setting. The maximum brightness level is 255, the lowest is 0 (total darkness). Even though you can control this value in increments of 1, there are only 34 different levels of brightness to choose from, roughly every 8 points of value. You should experiment with this to get a feel for what the value means.

Each zone can also have a special attribute (referred to as specials). This special only controls a few things, lighting quality and damage from standing in the zone. The zone special is also used to indicate the 'secrets'. The total number of zones on a level that are marked as secret with the special determines how many secrets there are to be found. A player receives credit for finding a secret by entering a zone with the special.

The lines are where the action is though. Lines have *attributes* and *specials*. Attributes are like switches, they are on and off. There are 9 different attributes for lines, 8 of which are supported by version 1.0b of the editor. Line specials have a specific value which corresponds to a 'special effect'. This is stuff like the switch at the end of a level, a teleporter, a door, etc.

The line attributes are:

Block Player Players and monsters are blocked by a line with this attribute. This has nothing to do with being able to see through a line. Weapons are blocked by this line *unless* the Two Sided attribute is set.

Block Monster Monsters cannot walk through a line with this attribute. This is mostly used to prevent monsters from doing stupid things like walking off the side of a staircase, but can also be used to create different effects.

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 though Block Player may be selected. This is what allows you to have windows that cannot be walked through, or 'bars' blocking the way that can still be shot through.

Float Texture If this attribute is not selected, the *top* texture on a wall will move up and down with the floor or ceiling. Two examples of this would be the texture on the inside of a door frame, and the texture on the walls of the room that appears when you press the skull switch in Argh! level 1. In the case of door frame textures (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 zone as it's ceiling or floor height changes. In the case of the appearing room the walls move with the ceiling. I did this because I think it looks cool. The same effect is also 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 you 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' texture.

Secret Map This has nothing to do with something being secret or not as far as the game is concerned. What this attribute being set 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 Sound will travel between sectors unless this attribute is set or the two zones are at totally different heights. If the heights of the two zones overlap at all then sound will travel between them if this attribute is not set. This includes otherwise 'solid' walls.

No Draw This causes a line to not be drawn on the map. This attribute is generally set for lines that do not affect the real structure of the level from the players point of view, such as a line used to separate two zones and create a shadow through differing brightness levels.

Now we get to the last and most important item, the line specials. All of Doom's tricks are handled with line specials. A line will have a special assigned to it and be associated with a zone. When the special on this line is activated, something happens to the zone. What happens to the zone, and how the special is activated are determined by the value of the special.

There are a little more than a hundred different line special values. The actions of these specials are predetermined, it is part of the Doom executable and cannot be changed. While Doom was being created, the level creators at id could make up almost any line special they wanted. Those are all now in Doom. You have to select the existing line special that matches the effect you need. Fortunately, almost anything you could want has been covered. (There will be additional line specials in *Doom:Hell on Earth*, along with new monsters and textures etc.).

The special of a line is activated in one of three ways. The first is through a switch/space action. This type of special must be placed on a line that has the block player attribute. If a switch 1 texture (SW1...) is placed on the sidedef for that line, it will be animated automatically (i.e. it will switch to the corresponding SW2... texture when the player hits the spacebar). The specials that activate doors are also switch/space activated actions.

The second activation type is Impact. This means that if the line is hit (or passed through) by a weapon the special activates.

The third type is the trip wire. A trip wire special is activated when a player walks through the line (Some are also activated by monsters passing through). Obviously this type of special is only useful on a line that a player can pass through and should not be used on a line with the block player attribute.

So the line special triggers something that happens to a zone, how does Doom know what zone is affected? This is done through tag numbers. All the tag number does is relate lines to zones. When a line special is triggered, Doom looks for the zone(s) with the matching tag number and then performs the action on them that was determined by the line special value. The tag number itself has no meaning (well, there are two exceptions but I won't go into them now, once you have mastered everything else in here go looking for tag values 999 and number-of-the-beast).

Every line special acts on a zone with two exceptions. Those two exceptions are the end of level switch, and the line special that causes the effect of a horizontally scrolling texture. You can see this scrolling effect on E1M1, the pedestal with the green armor in the room on the left.

Every line special that acts on a zone must have a tag number to associate it with the zone it affects with one exception, Doors. Because the line special for a door (normal doors and key doors) is always on the zone that is the door, the tagging is 'automatic'. The zone that is the door is obviously the zone on the other side of this line from the player.

So with the exceptions just mentioned in mind, you now know that every line special affects a zone, and that the tag number has no meaning except to identify what line goes with what zone. Every tag number pair should be unique. Start with one and go up... You can have the same tag number assigned to more than one line or more than one zone deliberately, it is possible to have two zones affected by the same line special, or have one zone affected by multiple line specials. There is an example of one zone being affected by two line specials in Argh! level 1.

Measurement

You might well wonder what all these number mean for the floor and ceiling heights, the size of the flat textures and so on. Well it's wonderfully simple, one unit of measurement is one pixel both horizontally and vertically. A wall that is 64 wide uses a texture that is 64 pixels wide. A 128x128 area of floor will repeat the 64x64 flat texture four times. Most monsters and the player are about 55 pixels height, the Demon Lord is 70 pixels high and the Cyber Demon and Spider Demon are 110 pixels high.

Large doors are 128 wide. Small doors are 64 wide. A typical teleporter pad is 64x64 and columns are about that size on average as well.

There is no real limit to the height values used for floors and ceilings. A word of caution however: The

Doom engine cannot handle a difference greater than 512 between the point of view of the player and the wall or floor being viewed. Avoid this, only use huge changes in height in places like lifts where the player cannot see out.

Flat Textures

The 'flat' textures used for the floor and ceiling are very different from the ones used on walls. With wall textures you have total control over their placement. The flat textures however are aligned to a 64x64 grid. If a graphic such as a teleporter pad is designed to fit within this grid, then the zone to which it is applied must be aligned to the grid or it will not be drawn properly.

Be aware of this property of flat textures and try to use it to your advantage instead of letting it hinder you. Avoid using square aligned textures in rooms with odd angles or rooms that are at an angle to the grid.

Sky Textures

There are three sky textures in among the wall textures. Do not ever use these, they will look awful. These simply represent the bitmaps that are used to fill in the sky. Sky textures in the game are created using the SKY1 flat texture. The sky will be filled in wherever this is used and it will be the sky appropriate to the episode number automatically.

Editor Overview

When the Level Editor is first opened it will be in Object Editing mode and the map will be displayed at the 50% zoom level. The scroll bars can be used to move about the level when it is zoomed larger than the display window.

Navigating Maps

To be proficient with the editor you must master map navigation. It is quite simple really, there are three control keys you must remember.

Control+C will cause the next point on the map that is selected to become the center of the map display. This is very handy for moving around the map in a natural fashion.

Control+F will freshen (redraw) the map display in case it has become messed up by a dialog box or movement of an object or line was not handled smoothly.

Control+X will call up the mini map tool. This is very handy for moving around the map by large increments, much handier in fact than the scroll bars. You should try to make a practice of using this. Note that you don't need to close it when you are finished using it, just select the map display again and leave the map tool handy for the next time you need it.

When in the Level Editor you have a choice of three editing modes: Object, Wall Texture & Zone Attributes, and Structure. (The Structure mode is not 100% complete in this release).

The three modes allow you to:
Add, delete, move and change monsters, weapons and other objects.
Change the height of the ceiling and floor, appearances, switches and special things like crushing ceilings.
Modify the walls of existing levels and create new levels.

Each of the three map modes has it's own tools that are only used for that one type of level editing.

The Tool Bar

There is a tool bar below the menu. This makes commonly used features quickly accessible.

The toolbar is displayed at all times with the text menu.
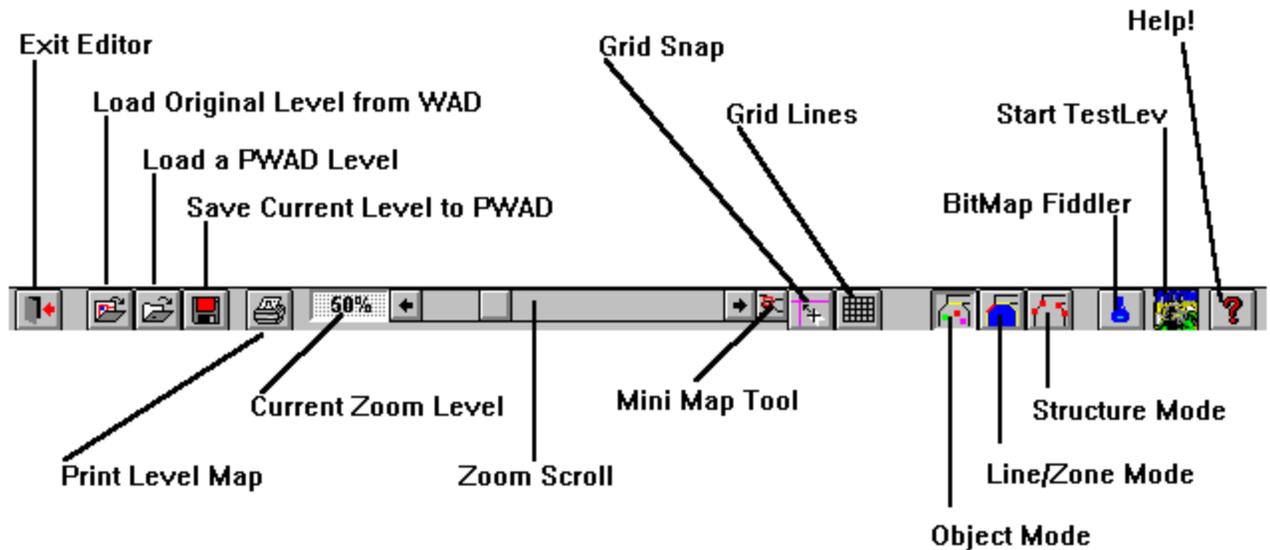
The Tools are:

Exit	Exit the editor completely
Open Map	Load a level from a PWAD file
Open Folder	Load a different level
Red Disk	Save current level to a PWAD file
Printer	Print the current level to the WAD file (objects only!)
Percent	Shows current level of map zoom (10-200%)
Scroll Bar	Allows simple selection of new zoom level
MiniMap	Calls up Map Display Tool (zoom/pan)
Pink Grid	Turns on and off snap to grid for **objects**
Grid	Turns on and off grid lines
First Map	Object Edit Mode
Second Map	Wall Texture & Zone Attribute Edit Mode
Third Map	Structure Edit Mode
Potion	Load BitMap Fiddler
Doom	Launches Doom with file TESTLEV.WAD
?	Get Help

The size of the grid lines and grid snap can be changed by clicking on the appropriate button with the second mouse button.

Editing Modes

Object Editing

In Item editing mode the entire display can be used to view the map. The tools needed to alter or insert objects are activated with the second mouse button. Multiple objects can be selected by either drawing a box around a group, or by clicking on them while holding the shift key. Attributes and object types can be changed this way, and a group of objects can be deleted.

There are three operational modes when editing objects. These are **View**, **Insert** and **Delete**. They are activated by pressing Control+V, Control+I or Control+D respectively. When the editor is first run it will be in View mode. If you change to another *map* mode (line/zone or structural) and switch back to Object editing mode, the editor will be in the View mode regardless of what mode the object editor was in when you left it.
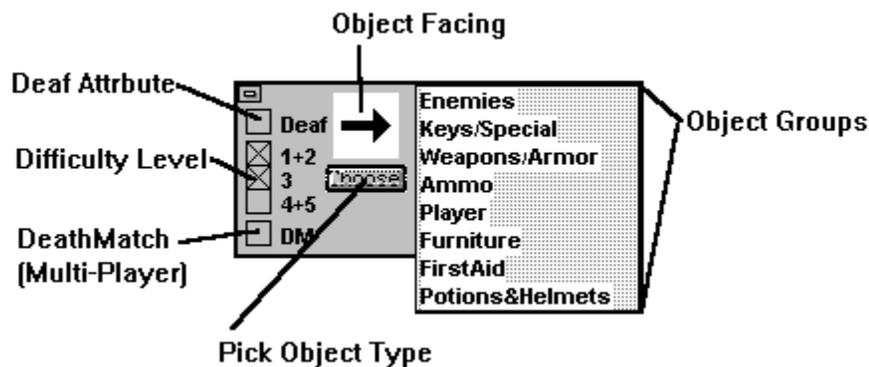
View Mode:

To **view** an object click on it.   A small map key will appear next to the object for 1.5 seconds with the name.

To **change** an object select it with the **second** mouse button. Press the **Choose** button. A menu of object categories will appear, choose the one you want. Next select the new item type from the list. The object will change instantly and the new object time will be reflected by the map key.

To **change** the **facing** of an object select it with the second mouse button and then click on the arrow. The arrow will face toward your mouse click (click toward the edges of the arrow, clicking on the center will have no effect since it cannot determine the direction you want from that). Only the facing of player and monster objects is important, other objects are not affected by facing. There are 8 possible facings.

To **move** an object, press and hold the **first** mouse button while over the object. Now drag the button to the new desired location and release the button. Occasionally the map display will get messy from moving lots of objects, or if an object was overlapping a map line. To clean up the map display select Display/Refresh from the menu or press Control+F.

Insert Mode:

To **insert** an object press Control+I or choose Mode/Object/Insert from the menu. Set the attributes desired for the new object and then select the desired object type from the list. Then click on the map where you want to place it. As many objects as you like can be inserted at one time simply by clicking.

IMPORTANT: The attributes of the objects to be inserted are set by not only the type in the list, but also the check boxes and the direction arrow. If you insert objects with no level attributes checked they will not appear in the game! Also objects with the **DM** attribute (Death Match/Network Play) will not appear in single-player games.

Delete Mode:

Delete mode is now rather useless. It is still held over from the previous versions of the editor.

To **delete** an object select the object you want to delete, it will be removed instantly. As many objects as you like can be deleted in succession.

Objects can also be deleted with the Del key when in view mode. The currently hilighted object(s) will be deleted.

OPTIONS

The option box has five different check boxes, any or all may be selected.

The first three determine what difficulty levels the object is present on. Note that the same monsters and objects are present on levels 1 and 2, just the amount of damage done is different in the game. **Levels** 4 and 5 (Nightmare) are also the same, just the monster behavior is different. (Not to mention the random teleporting!).

The next checkbox is **'Def'**. This sets the **DEAF** attribute for monsters. If a monster has this attribute set, it will not react to your presence and will not come running when it hears you shoot. It will only wake up and chase you if it sees you or sees your bullets impact on a wall in it's field of view. Of course if you shoot at it...

The last checkbox is **'DM'**. This sets the **DeathMatch** attribute. If this is set the object will appear in DeathMatch games only. This is very useful for scattering extra weapons and first aid around the level.

Important Note: Make sure you have at least FOUR DeathMatch start objects on the level. More is even better.

Wall Texture & Zone Mode

This mode allows you to alter the attributes of Lines and Zones. This is the heart of Doom level editing and creation. Things that can be modified and created in this mode include:

Lighting (including blinking, etc.)
Damage effects like acid pools
Texture of floor and ceiling
Appearance of walls
Special effects like crushing ceilings, stairs that come out of the floor, teleporters etc.
Switches for exiting the level

Flat Texture Picker

Ceiling Height

Ceiling Texture

Palette Tools

CEIL3_5

Total: 72

Total Zone Height

Floor Height

Floor Texture

FLOOR4_8

Brightness
Zone Special
Pick Zone Special

Get Next Tag Number
Tag Number for this Zone
Highlight Matching Line

Block Player
Block Monster
Two Sided
Float Texture
Float Bottom
Secret Map
Sound Block
No Draw

Line Attributes

Get Next Tag Number
Tag Number for this Line
Highlight Matching Zone

Line Special
Pick Line Special
Front/Back Text.

Front   Back

X/Y offset for texture

Textures

BIGDOOR2

Blank Texture
Use Texture from Picker

Wall Texture Picker

The controls for this mode are simple, but the results are complex. After you switch to this mode you will see only the map lines. Each of these lines has a white control point located in it's center, this is used to select it. When you select a line it is highlighted in red, and the zone that it is part of is highlighted in yellow.

Some line segments border two zones. To select the second zone bordered by that segment click the second mouse button.

The floor and ceiling textures, heights, lighting level and special effects like blinking lights and damage are controlled by zone attributes. All other special effects, such as switches, teleporters, crushing ceilings and so on are controlled by line attributes.

Palettes

Textures for the flat surfaces and wall segments are selected from a palette of textures. Palettes can be loaded and saved, allowing you to have different ones for different occasions. It greatly simplifies the selection of textures because you can plan ahead as to which textures you want to use in a level or area of a level and then only have to select from a list of those textures instead of wading through the hundreds available.

Both the flat and wall textures are stored together in one palette. There are separate editors for adding and removing textures. Select the palette shaped picture to get a dialog box that will let you pick which editor you want to use.

Flat textures are added to the palette by grabbing them with the mouse and dragging them into the list. Wall textures are added by double-clicking. Note that in order to view the wall textures, you must first have extracted all the Wall Patch textures. If you have not done this, an empty box will be displayed.

A feature which will allow you to print out thumbnail pictures of the textures with their names is planned, but was not working in time for this release.

A palette named 'default.pal' will be loaded automatically when the editor is run. You can alter this palette to your liking.

Sector Definition

To select a zone click on any line that is surrounding that zone. Always click on the center of a line segment. Some lines are between two zones. Use the second mouse button to select the zone that is on the 'back' side of the line.

Once you have selected a line/zone, a great deal of information will be displayed in the tool window. Values in the yellow boxes are altered by editing directly. Click on the value that is present and then type the new value.

Floor and Ceiling height may be anywhere between -264 and 264. The maximum difference in floor height that can be crossed by the player is 30, if the difference in floor heights between two zones is greater than this the player will not be able to get up to the higher zone.

The minimum difference between floor and ceiling height for a player to be able to pass is 16. The total height of the zone will be displayed between the Ceiling and Floor heights.

The brightness of the zone is a number between 0 and 255. 0 is complete darkness and 255 is the brightest possible. Light effects like flickering are achieved with zone specials.

To assign a new texture, first select it from the top list, then drag the texture name onto the box that represents the floor or ceiling texture.

Line Definition

The checkboxes and Special and Tag values correspond to the line, the textures apply to a single side of the line. The 'front' side of the line faces the sector that is highlighted when selecting the line with the first mouse button, the 'back' side faces the other sector. Most line segments are on a wall that has nothing behind it, i.e. no sector is defined there. These line segments only have one side.

To alter a line attribute simply click the checkbox. The special and Tag values can be changed by clicking on the contents of the box and typing a new value. Pressing the 'list' button will bring up a help file which contains a listing of all the known special values.

Use the 'Block Monster' attribute to keep monsters from behaving stupidly, like walking off the edge of staircases etc. The 'Block Player' attribute is used to make walls solid. By changing this attribute you can change existing levels to have very different paths through them. Watch out for areas where no Zone is defined, such as the inside of a column. If you allow a player to get into there the display will be screwed up.

For each side of a line segment there are five things defined:

X offset,Y offset
These are an offset for the mapping of the texture onto the surface. These are used to center or otherwise shift bitmaps around on the wall surface.

Top   Texture mapped onto an 'overhang' if any
Wall   Texture mapped onto the main part of the wall
Step   Texture mapped onto the front of 'step' if any

Assigning Wall Textures
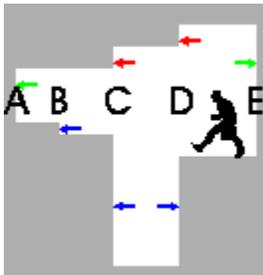
Consider the situation illustrated above. This is a side view of an area with five lines crossing it, breaking it into four zones:
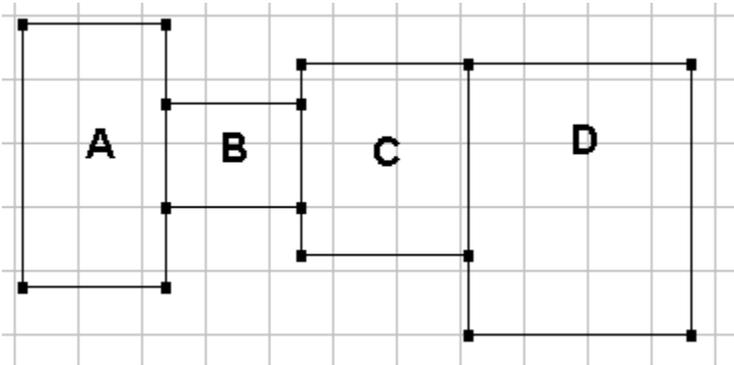
Walls A and E each border only a single zone, so they would only have one 'side' defined. Each of the other lines has borders two zones and so has a front and back.

The Red arrows indicate portions of the wall texture that would be in the 'top' part of the texture description for the line side. The Green arrows indicate the 'wall' portions and the Blue arrows indicate the 'step'.

A texture of 'nothing' is indicated by a - in the texture name box. This is used where no texture would need to be displayed, such as above and below the wall sections, or where you want the wall to be transparent, like a window or corridor.

Consider the side of Line B that faces Zone 1. From this side all you see at the point of the line is the ceiling and floor. There is no change in ceiling height between the zones and the floor gets lower from one so an observer on that side would not be able to see the 'step'. So the texture defined for B1 would be: -, -, -.

If you were standing in Zone 2 looking at Line B, you would see the step. From this side the texture for the step would need to be defined. The texture defined for B2 could be: -, -, STEP6.

Other sample textures:

```
C2      -, -, -
C3      STARTAN3, -, TEKWALL1
D3      -, -, TEKWALL1
D4      STARTAN3, -, -
E       -, STARTAN3, -
```

Note that the line and sector designations used in the example are only to explain which line is being referred to and have nothing to do with the editing.

Structure Mode

Doom levels area composed entirely of Zones. A room is a zone, a teleporter pad is a zone, a door is a zone. Every place that you can see is within a zone. Zones are defined by the lines that border them.

Doom level creation is accomplished by building up a structure of zones which will be made into the level. Everything needed can be accomplished using the three tools provided in the Structure editing mode. These three tools are the Vertice tool, the Zone tool and the Automatic Structure tool. The AutoStruct tool is really just a more powerful version of the Zone tool.
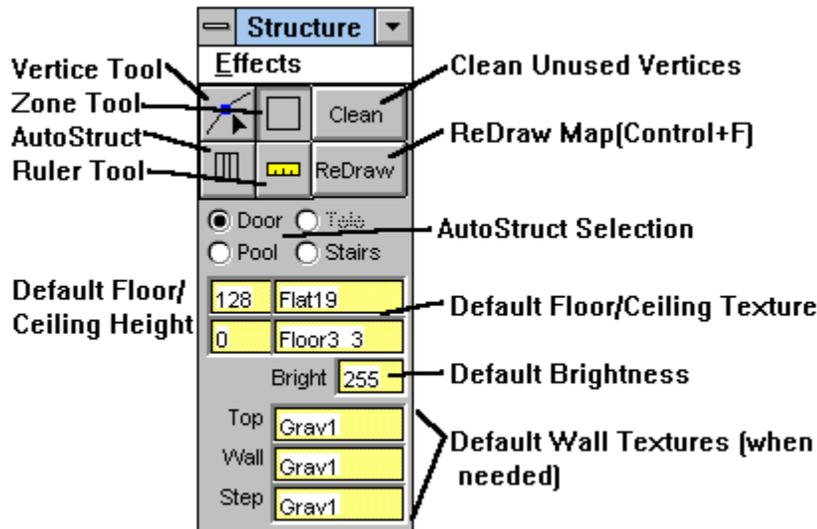
Vertice Tool

The Vertice tool has two functions: inserting new vertices on existing lines, and moving vertices. To move a vertice simply click on it and drag it to its new location. If you drop a vertice on top of another vertice it will be merged. (At present the left over vertice will still be there as well, it will be stripped off the next time the level is run through a BSP, you can safely ignore these extra vertices, and just move them to the side if they bother you).

Inserting a new vertice is really breaking a line in half. This is done by clicking on a line **in the center** with the second mouse button. The inserted vertice will be aligned to the grid snap, and may not be directly on the line if it is at a diagonal. (Refresh the display with Control+F if this is the case).

If by moving vertices you cause two lines to take up the exact same space, they will be merged and the sectors on either side will become adjacent to each other.

Zone Tool

There are two kinds of zones, those that stand alone and those that are inside other zones. A stand alone zone has nothing outside it, though it may have other zones attached to it. A zone within a zone is surrounded on most or all sides by the inside of another zone.

To insert a stand alone zone simply draw it out. The zone will be created. The new zone can then have its lines broken and moved with the vertice tool if desired.

To insert a zone within a zone, select the zone that will contain the new zone by holding the shift key and clicking on the center of one of the zones lines (just as you would in line/zone mode). The zone will be highlighted in green. Now draw the new zone within it.

Zones can also contain voids, empty spaces surrounded by walls but containing no zone. These are created in the same manner as zones within zones. Follow the same procedure but use the second mouse button to draw the void.

While it is perfectly acceptable to join zones by drawing them next to each other and then moving the vertices together so they meet, it is not the best or fastest way. The fast way to do it is to break the line on the side of the zone(s) that will be joined to the new zones, align the vertices to where the corners of the new zone will meet that line, then draw the new zone in being careful to hit the vertices with the corners.

To **cancel** the drawing of a new zone or void, return the mouse pointer close to the start point of the box so that it is zero in one dimension (it appears as a line). When you release the mouse button nothing will be added.

It is important to note that at present there is no tool provided for removing lines or zones. Everything you put in stays, so make sure the box is exactly right before releasing the button, if the start point is wrong, abort it by making it zero width.

If you do create a zone that you don't want, there are two procedures to follow for this release:
If it is a stand alone zone, drag it off to one side, make it very small, and ignore it. If it is a zone within a zone, make it small and blend it into the surrounding zone by keeping the textures and heights of the floor and ceiling the same. The next release of the editor will provide a clean method for removing things. (it's also wise to keep revision copies of your level).

AutoStruct Tool

The AutoStruct tool will create the desired structure zones automatically. The available structures are pools, doors and stairs.

The location of an AS is drawn in the same manner as a zone. Vertices are inserted where zones will be adjacent to each other, a box is drawn that will contain the zone, and it is inserted.

The AS's can be inserted as stand alone zones or within a zone. Select the container zone with the shift key just as you would for a zone within a zone.
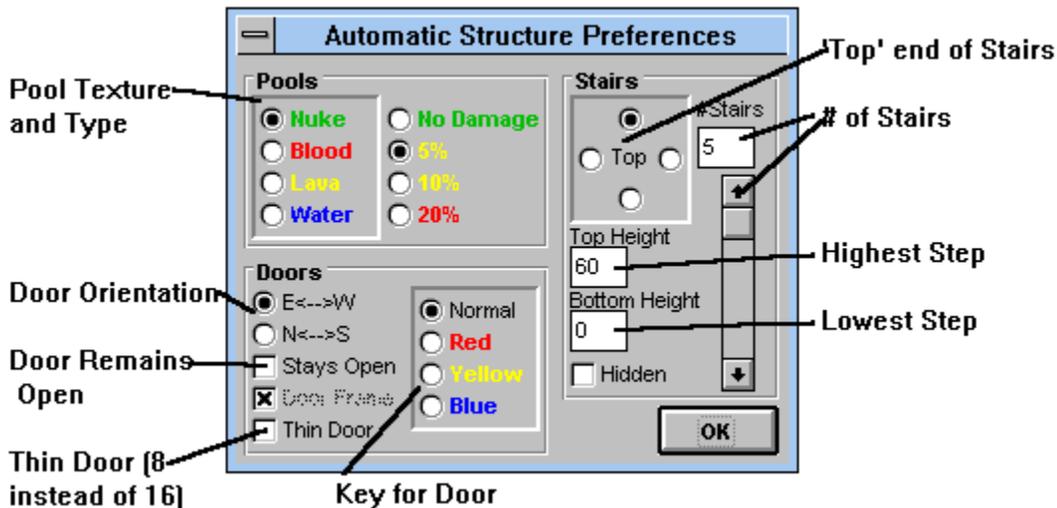
AS Attributes are set by selecting the AS tool button with the second mouse button.

Pools are inserted at a depth of 16 below the current zone's floor. Pools **must** be inserted as a zone within a zone.

Doors should be drawn with a width of 64 or 128. Other widths will be accepted by the results will look strange. The 'frame' zones on either side of the door can be any length, and in many cases will in fact be hallways. The frame zones are useful in placing a door in a room with a high ceiling, as the zones on either side of the door should generally be between 72 and 128 in height.

Stairs are fairly simple and can be either within a zone or stand alone.

Creating Levels

The creation process is the same for any level, whether it is a modification of an existing level or an original level. The recommended steps to take are:

1. Plan the general layout of the level
2. Set zone heights
3. Set line attributes and specials
4. Assign wall and flat textures
5. Assign brightness and zone specials
6. Stock with objects
7. Stock with monsters, paying attention to each difficulty level.

At each step you will need to enter the level with Doom several times to check your progress.

Doors

The way that doors work is that when the door is closed the ceiling of the zone is at the same height as the floor, when the door opens the ceiling height is raised by 88 points. The door cannot be passed through when it is 'closed' because of the change in ceiling height, when the door is open you can pass freely. The texture of the door is really the texture of the 'top', since that is what you are seeing when the door is closed. The center portion of the door is blank.

Because the door goes up by 88 points, that is the typical height of the door textures. The zones on either side of the door should be about this height in order for the door to look right. For this reason a door which is in the wall of a very tall room will be inset back into the wall by a short zone. Many doors even have a zone on both sides of it to provide the proper ceiling height on either side, and sometimes to provide a place to put the colored texture which indicates a key door.

Teleporters

The line special for a teleporter is 97. When a player or monster crosses this line they are teleported to the sector with the matching tag. There is a second component required for a teleporter to work. This is the teleporter destination object. (You will find this object in the "furniture" item listing near the end). This object must be placed in the zone that receives teleporters. This object determines the location and facing of a teleporting person. In this way a huge zone can be used as a teleport destination zone. An example of how this works is the first teleporter on the Argh! level (lower right room). This teleports you to the middle of the long hallway in the upper left of the map.

Experiment with this special a bit. Make sure that there is only one zone with the same tag as the teleporting line. Also don't forget to put a teleporter destination object in the target zone.

One important note about the teleporter special. It only works from one side. If you think about it a minute this is obviously needed, otherwise you would never be able to get out of a teleporter pad!

Lifts

The way that a lift works is that a zone between two other zones is the lift, and on each side the appropriate special is used. Both lines have the same tag as the zone that acts as the lift. The line special used on the higher side of the lift is 88, the special on the lower side is 62.

Automatic Stairs

An automatic staircase is triggered with a special, and the first 'step' is tagged. Every other step in the staircase is tagged 0, the others are usually tagged 999. Take a look at the staircase in the original level E2M1 for a detailed look (lower left corner room).

Basic Zone Techniques

There are a number of techniques which must be mastered in order to create levels. Here is a simple guide to them.

Zone within a Zone

The first step is to create a stand alone zone. This is done by simply drawing out a box, you must then select the zone that will have a zone within it. Do this by holding the shift key and clicking on the center of one of the zone line segments. Just as you would do in line/zone mode :
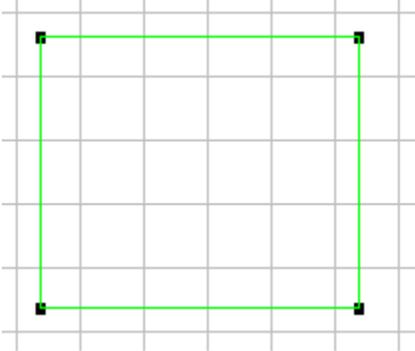
Now simply draw out the zone that goes within:
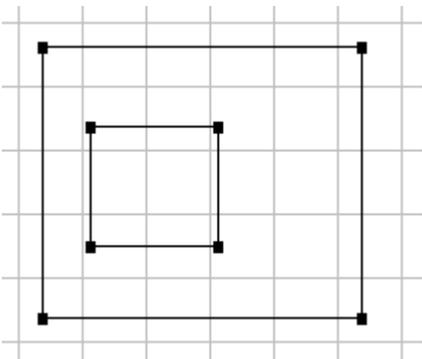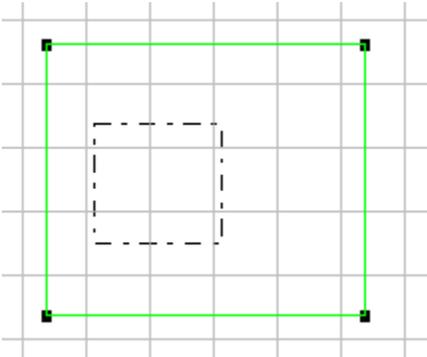
If you now switch to line/zone mode you will see that the lines making up the inner zone have a front and back sides and are contained.

Vertice Joining

In most cases you will need to join up several zones to build rooms, hallways, etc. If the zones to be joined are already created but separate from each other, they may be joined simply by moving vertices on top of each other.
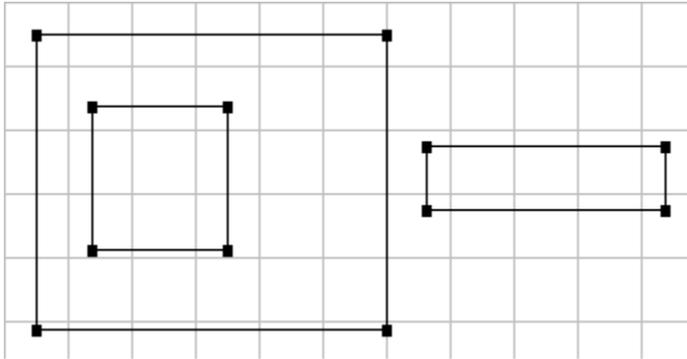
Assume in this case we want the zone on the right to be a hallway leading from the zone on the left. The hallway zone should join the room zone at about the location it is in now. The line facing the hallway zone will need to have vertices added to it where they can be joined together. This is done by clicking on the center of the line with the second mouse button while in vertice mode. First select the center, then the center of one of the two new lines.
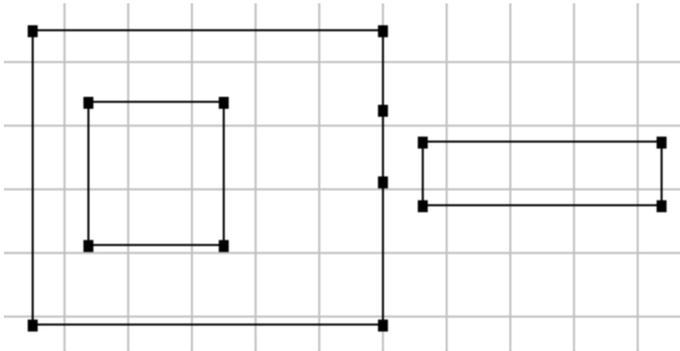
Now move the new vertices until they are lined up with where you want them to be. Then drag the vertices from the hallway zone onto the vertices you just created.
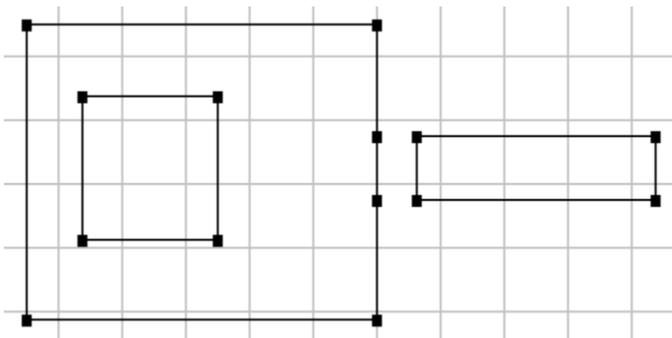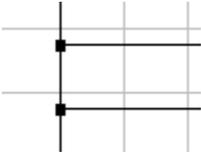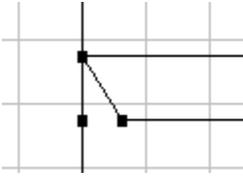
That is all there is to it. A simpler method would be to first create the vertices on the room zone where the hall will be joined, and then draw the hall zone right on top of those vertices. The two zones will be joined from creation.

Observe this method being used in the creation of a door. First two rooms will be created and vertices inserted where the door will join the two.
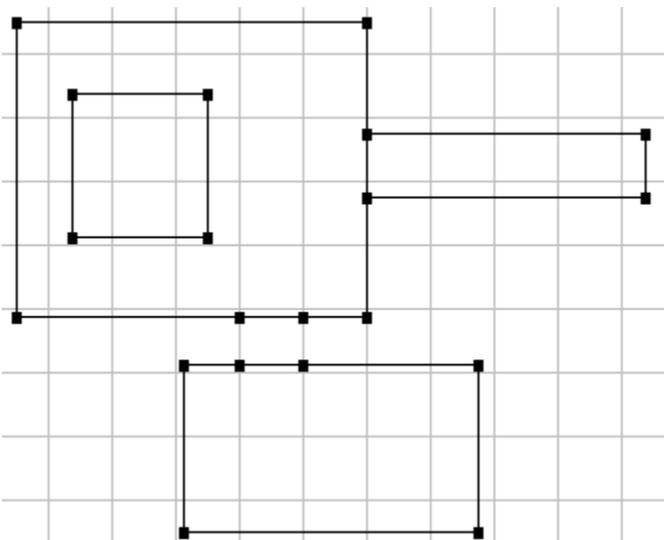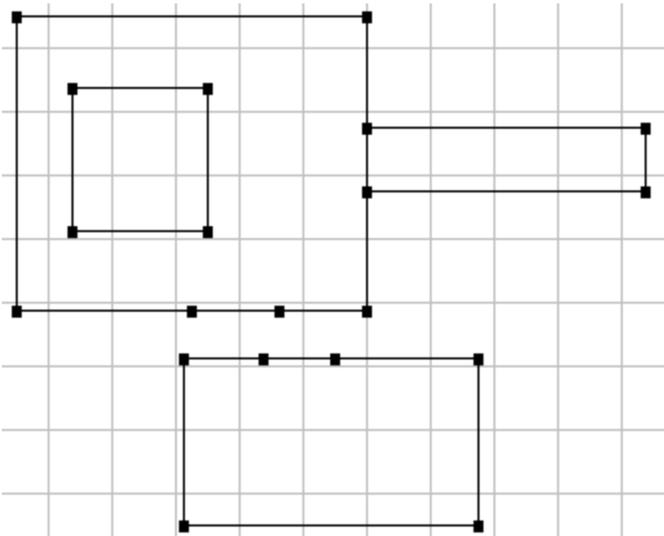
You can verify that the vertices are lined up perfectly by zooming in closer and using the ruler tool to draw a box between the vertices. Remember that you can always abort the drawing of a zone or automatic structure by making the width zero.

The attributes are set for the new door, it will go North to South etc. and it is drawn in place.
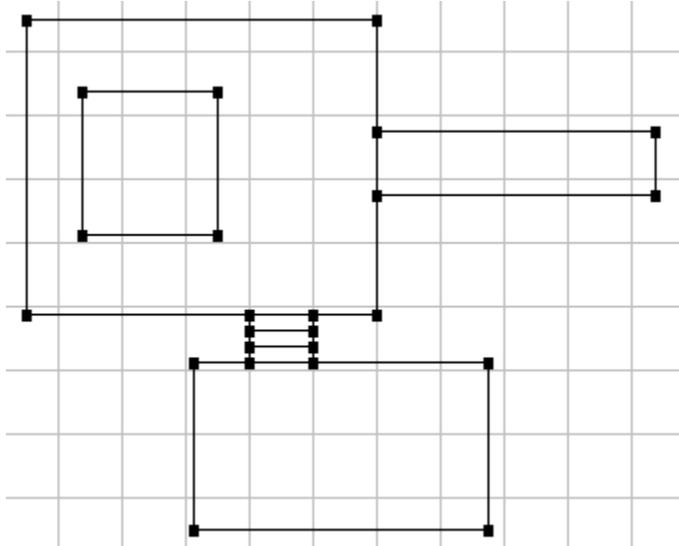
The last technique is an introduction to zone drawing. The zones that you place are very simple. They will usually need to be altered a great deal to fit your level design. Remember that you can insert and move vertices, and merge lines between different zones.

The steps we will take here are to wrap a zone around two sides of another one. We will start with a zone within a zone, then a second zone within a zone that is drawn adjacent to the first. Note that you need to select the container zone both times.
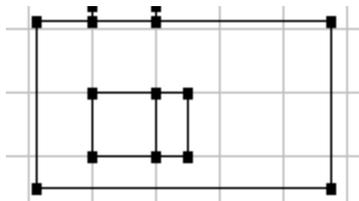

We want the zone on the right to wrap around the left zone in an L shape. First we will move the top right vertice up to where the new corner will be.
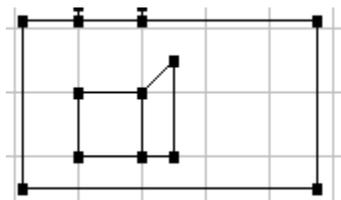

Then create a new vertice in the middle of the line that is now diagonal, and drag this vertice to join it with the top left vertice of the left zone.
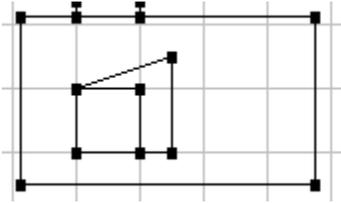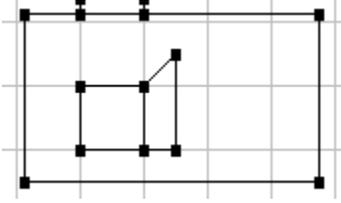
The last step would be to create another vertice in the middle of the diagonal line and drag to the new upper left corner position.
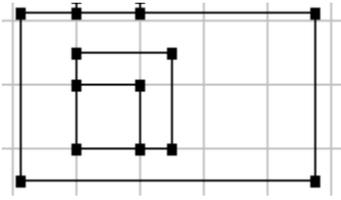
Printing Maps
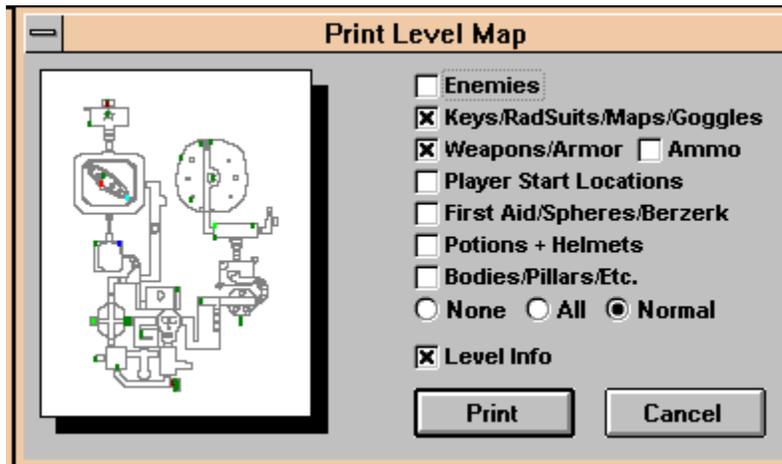
When you choose the PRINT button a dialog box will show you a preview of the printed page. Check boxes allow you to select which items you want to appear on the printed map. Items are indicated on the printed map as such:

Monsters

Small circle with a small letter:

T	Trooper
F	Former Human Sergeant
C	Cacodemon
I	Imp
D	Demon
S	Specter
L	Lost Soul
H	Hell Baron
!	Spider Demon/Cyber Lord

Key Cards/Skulls

Large **Sold** Circle with Large Letter

R	Red Card/Skull
B	Blue Card/Skull
Y	Yellow Card/Skull

Rad Suits/Goggles/Maps

Large **Hollow** Circle with Large Letter

R	Rad Suit
L	Light Amplification Goggles
C	Computer Map

Weapons/Ammo Boxes/Armor

Large Shaded Circle

Ammo

Small Shaded Circle

Start Locations

Small Hollow Circle

First Aid/Spheres etc.

Large Shaded Box

Potions/Helmets
       Small Shaded Box
Bodies and Junk
       Very small shaded circle

The Level number, name and author may be optionally printed at the top. The radio buttons may be used to print all or none of the objects, with normal allowing the individual checkboxes to be used.

Known Bug: While the print dialog does allow you to print either portrait or landscape maps, it will only allow you to print to the orientation the printer was in when you entered the editor. Future releases will allow you to change the orientation from the Print Dialog.

The Bitmap Fiddler

This screen will allow you to view any of the graphics contained in DOOM.

Extract

This will extract just the currently viewed picture to a BMP file.

EXTRACT ALL

This option will cause all of the pictures in the currently selected group to be generated as BMP files in a directory called BMPS under the directory DOOMED is in.

In order to use the Wall Texture palette preview ability you must extract all of the Wall Patch graphics.

Known Bug: Not all bitmaps in the first and last groups extract properly with the current algorithm. These bitmaps will not be displayed. This is not a problem at present because the editor does not make use of those groups.

PWAD Files

The data file used by Doom is called a WAD file. The main data file is some 10mb. Thanks to the foresight of id Software, and this editor, you can use secondary data files called PWAD files.

A PWAD file has a .WAD extension, but contains only one level. When you start Doom you must specify on the command line what file(s) you want to load. Any levels contained in the PWAD files you specify will be overlaid on top of the levels in the main data file.

For example, to use a PWAD file called MYLEVEL.WAD enter:

       DOOM -FILE MYLEVEL.WAD

That is all there is to it.

Multiple PWAD files may be used:

       DOOM -FILE E1M1.WAD E1M2.WAD E1M3.WAD...

PWAD files are created by saving your edited level with the PWAD save icon on the toolbar.

The PWAD file contains an Episode and Level number that it replaces. When you save a PWAD file you

are given the choice of what level to save it as. If you plan to load multiple PWAD files it is important that they have different internal level numbers (set the level number with the scroll bars on the Level Info box when you load or save a PWAD file).

Common Problems

When Running Doom with a PWAD, an error about textures is received such as TextNumForName

This is caused by a typo in the name of a texture. Always be very careful when entering texture names by hand not to mispell.

Bizarre Flickering Wall Texture in Doom

Often described as a 'Hall of Mirrors' effect. This is usually caused by not having a texture assigned where there should be one. Often this will occur on step and ledge textures, but can occur on wall textures as well. Simply assign a texture to the place needed.

Bizarre Wall Texture Slows Doom to a Crawl

If you experience a situation where the wall texture is very distorted, and Doom slows down a great deal, it is caused by mis-use of the Two-Sided attribute. When creating new textures the editor is fairly good about preventing textures from being where they shouldn't, but in some situations a texture will sill be assigned to the main wall portion even though it is a passage. When this occurs you will have the problem. Simply alter the texture of that line.