FX Overhaul

A manual of explaining the functionality of this patch

Introduction

Installation

!WARNING! Make a backup before applying this patch!
Once the patch is applied, all rooms in your current hack project with FX settings are changed! They will not crash your game, but when opening through quickmet, you will have pitchblack rooms, rooms where the effects don't work or with totally different behavior.
In this manual there are ways explained to modify the settings to their vanilla point.

The ASM file "FX_Overhaul.asm" is the patch itself. It must be patched with ASAR.

The IPS file "FX_Overhaul_Adjustments.ips" is a "romhack" of the original game with the patch and all FX effects adjusted to it.

If using SMILE RF:
There is a file called "fx1_entries.txt". This contains an edited version of all effects and layer configurations for the FX editor. First go to your directory where your SMILE RF editor is and then go to "Files" and "Custom". Copy the folder "Rom_Name" and rename it to the name of the ROM of your current project (if not already done). Next go to your copy and then "Data". Make a save copy of "fx1_entries.txt" (if something goes wrong) and replace the original with the txt file provided with the patch. Open or restart SMILE RF and open the ROM with the changed folder name to make the changes take effect. If everything goes right, when opening the FX Editor and selecting effects are layer configurations, you will see text changes in the entries. The meanings of these entry words will be explained in "Adjust layer with changes".

If using SMART:
Go to your project folder and "ASM" (if no ASM folder exists, make one), and drag the patch file into the folder. Open SMART, go to "Config" and set the "Assembler" directory to the asar compiler. Press OK and go to "Tools" and "Scan ASM files for used space".
If an error occurs, go back to config and paste under "Extra Arguments" this line: "--no-title-check --fix-checksum=off". Press OK and retry.
If no collision is found you can apply the patch with "Apply ASM files to ROM".

Explaining Keywords

In this manual there will be some words thrown around which need some explaining. Here are a few of them:

Vanilla	Referring to the original, unmodified game
Layer / BG	Layers are "images" which get put together to produce the frame displayed on the screen. The number not only indicates their index, but also their priority over other layers. BG is short for background, which is a different word for layer. BG1 is used for the foreground, aka. the interactable layer. BG2 is used for the background. BG3 is used for effects (like liquids, rain, spores, fog) and the HUD. And Sprites is the layer to display Samus, enemies, projectiles, drops, particles, etc.
Mainlayer	Which layers should be visible on the screen. Everything set to it will be displayed in solid colors.
Sublayer	Same thing as the main layer with the key difference that it will be transparent on the screen using color math.
Color Math	The process of adding/subtracting color values onto the mainlayer.
Window Masking	The process of "cutting" out parts of layers

"Effect Slots"

One thing I want to explain is "Effect Slots". The Super Nintendo uses HDMA channels to make all the effects shown in Super Metroid possible. However, most of them are defined for specific actions, making only some channels flexible for FX effects. "Effect Slots" is just a fancy word for the available HDMA channels left.
In vanilla there are only 2 effect slots available. This patch gives you 3 free effect slots.
When using the "Improved Power Bomb Explosion" patch by MFreak, you can have 4 effect slots available.
If you think you are using too many effect slots, then save your current FX settings, start quickmet and then plant a power bomb in the room. If the power bomb explodes normally then you are fine. However if the power bomb explosion causes visual anomalies or doesn't explode at all, then you have to disable some effects.

FX Settings

This is similar to explaining keywords, but specifically for the FX settings.
Here are some definitions to clarify things.

Door settings	Door settings are unchanged and behave as normal.
FX effect	Type of effect to load into the room.
Color option	By default palette $18 is used to determine the effect color. You can change the palette used in the config of this patch. Palette $18 - $1C can be controlled via the palette blend index in the FX settings. In SMILE RF in the FX setting changing the palette blend index won't show the color used for the effect, because the editor covers it with a black color. So you have to kinda know what color gets used.
FX values	To set up the behavior of the effect. The meaning of each value will change depending on the FX Layer Type and its functions will be explained down below.
FX flags	To set up the behavior of the effect. The meaning of each flag will change depending on the FX Layer Type and its functions will be explained down below.
FX color math	Controls the color effect of the room with presets, which background layer to affect with color and the behavior of color, rather to darken the effect. It also controls the colors in windows to restrict sections for color or even set them to black.
FX layer type	Controls the layering of the room with presets, which background to set to the main- or sublayer. It also can affect the color layering of power bombs and X-Ray, and the masking for each individual layer.

"Animated Tiles FX" and "Palette FX" have no changes currently and behave as normal.

Below are the keywords that are shown on the page of an image of the FX settings window of the respective editor.

FX Setting Window Of "SMILE RF"

FX effect
Color option

FX values

FX flags

FX color math
FX layer type

FX Editor

Door FX Select
`$0000` `+` `$0000` `▼` `...`

FX Layer Type
`00 - No FX1` `▼` FX Type
`$00` Palette Blend

Liquid Options
`$0000` Liquid Height --> `$0000`
`$0000` Speed   Delay `$00`
☐ Flowing Left   ☐ BG Heat FX
☐ BG Liquid   ☐ Unused
☐ Unused   ☐ Unused
☐ Large Tide   ☐ Small Tide
FX Transparency
`02 - "Default"` `▼`
`02 - "Default"` `▼`
Save FX Data | Reload FX Data

FX Setting Window Of "SMART"

FX flags

FX values

Color option
FX color math
FX layer type

FX effect

Bitflags	
animationflags	0x00
liquidflags_C	0x00
paletteflags	0x00
Liquid	
surfacedelay	0x00
surfacenew	0xFFFF
surfacespeed	0x0000
surfacestart	0x00B0
Transparency	
paletteblend	0x00
transparency1_A	0x02 Normal
transparency2_B	0x02 Normal
Trigger	
fromdoor	None
Type	
type	0x00 None

Adjust Layer Configurations To Vanilla

Due to the structure of this patch, the vanilla layer settings will screw over the layering of your rooms if FX settings are applied. This list will help you to restore them to their original state. Use the vanilla layer configuration value and apply it to the "Layer Index" in the list. Then change the "FX color math" and "FX layer type" configuration to the values provided. Note that you only need to take the influenced vanilla index into account and not the default 02 value.

Layer Index	Color Math	Layer Type	Vanilla Usecase
00	00	00	Should never be used
02	02	02	Default layer setting
04	04	04	Used by Phantoon for invisible phase
06	08	06	*unused*
08	0A	06	Used by dark wrecked ship
0A	06	02	Used by spores
0C	18	02	Used by fireflea effect
0E	02	02	*same as default* Used by rain
10	1A	02	Used by eye laser effect
12	1A	02	*same as 10* Used by suit upgrade cutscene
14	0C	02	Used by darkened maridia water
16	0C	08	Used by maridia rooms with waterfall
18	02	0C	Used by water
1A	04	08	Used by Phantoon for transparent phase
1C	04	0A	*unused*
1E	02	0C	*same as 18* Used by liquid
20	02	02	*same as default*
22	0C	02	*unused* *same as 14*
24	1C	02	Used by mother brain rainbow laser attack
26	10	02	*unused*
28	16	02	Used by dark crateria/wrecked ship Set color option to "R:5, G:0 ,B:0"

2A	16	02	*same as 28* Used by dark brinstar Set color option to "R:6, G:2 ,B:0"
2C	14	02	*unused*
2E	16	02	*unused*
30	02	0C	*same as 18* Used by fog
32	0E	02	*unused*
34	02	10	Used by mother brain fight and tourian entrance

FX Layer Configurations

Color Math

The configuration value of the first layer (FX A) will influence the calculation of color and in some circumstances the behavior of windows. Notice the labels with the name "Mode" as these are important for some FX effects.

Index	Description	Functionality
00	*nothing*	Blank setting
02	"Default"	Default configuration (Color math is set to addition and gets applied to all layers)
04	(C2) off	Color math doesn't get applied to layer 2
06	(C1) off	Color math doesn't get applied to layer 1
08	(CSprite) off	Color math doesn't get applied to sprites
0A	(C1/CSprite) off	Color math doesn't get applied to layer 1 and sprites
0C	Subtract	Color math is set to subtraction
0E	Subtract, (C1) off	Color math is set to subtraction and doesn't get applied to layer 1
10	Halved	All affected layers get their color halved after addition
12	Halved, (C2/CBackdrop) off	All affected layers get their color halved after addition, Color math doesn't get applied to layer 2 and backdrop

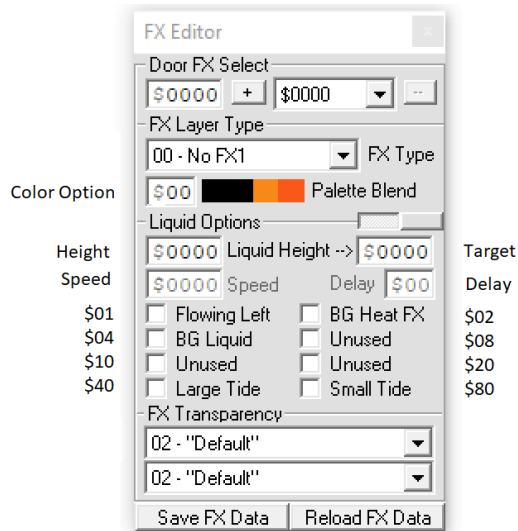|		
14	ColorMode "CM"	All affected layers only get one specific color added, Sublayer gets disabled by that.
16	CM, Subtract	All affected layers only get one specific color subtracted
18	CM, Subtract, (C1/CSprite) off	All affected layers only get one specific color subtracted, Color math doesn't get applied to layer 1 and sprites
1A	WindowMode "WM"	Enables window masking.
1C	"Mother Brain"	Only used by Mother Brain. Same as WindowMode, but color math only gets applied inside the window
Here are presets, which are not getting used by vanilla:		
1E	Subtract, (C2/CBackdrop) off	Color math is set to subtraction and doesn't get applied to layer 2 and backdrop
20	CM, (C2/CBackdrop) off	All affected layers only get one specific color added, color math doesn't get applied to layer 2 and backdrop
22	CM, Subtract, (C2/CBackdrop) off	All affected layers only get one specific color subtracted, Color math doesn't get applied to layer 2 and backdrop
24	WM, (C2) off	Enables window masking and color math doesn't get applied to layer 2
26	WM, (CSprite) off	Enables window masking and color math doesn't get applied to sprites
28	WM, (C1/CSprite) off	Enables window masking and color math doesn't get applied to layer 1 and sprites
2A	WM, Subtract	Enables window masking and color math is set to subtraction
2C	WM, Subtract, (C1/CSprite) off	Enables window masking, color math is set to subtraction and doesn't get applied to layer 1 and sprites
2E	WM inverted	Enables window masking, but it will mask the outer area of the layer instead
30	WM inverted, Subtract	Enables window masking, but it will mask the outer area of the layer instead. Also color math is set to subtraction

Layer Type

The configuration value of the second layer (FX B) will determine the layering of BGs as well as disable the effect of the power bomb explosion and the effect of window masking on layers.

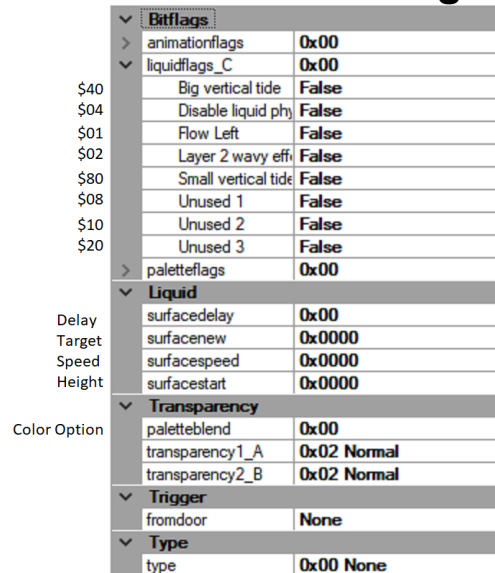| Index	Description	Functionality
00	*nothing*	Blank setting
02	"Default"	Default configuration (Layer 1,2 and sprites are set to main layer, layer 3 is set to sub layer)
04	(L2) off	Layer 2 gets disabled
06	add (Sprite) to Sublayer	Sprite layer gets added to the sub layer
08	change (L2) to Sublayer	Layer 2 gets disabled in main layer and enabled in sub layer
0A	(L2) Sublayer / (L3) Mainlayer	Layer 2 and 3 switch roles, layer 2 gets set to sub layer and layer 3 gets set to main layer
0C	"Liquid"	Switching layers between main and sub layer, so enemies can also be affected by color math
0E	PowerBomb "PB" (L2) off	Power bomb explosion effect gets unaffected by layer 2
10	"Liquid" + PB (L2) off	Switching layers between main and sub layer and power bomb explosion effect gets unaffected by layer 2
Here are presets, which are not getting used by vanilla:		
12	PB (L1) off	Power bomb explosion effect gets unaffected by layer 1
14	change (L1) to Sublayer	Layer 1 gets disabled in main layer and enabled in sub layer
16	(L1) Sublayer / (L3) Mainlayer	Layer 1 and 3 switch roles, layer 1 gets set to sub layer and layer 3 gets set to main layer
18	set (L2) to Maskout	Layer 2 get masked out instead of layer 3, if window mode in "color math" setting is enabled
1A	add (L1/Sprites) to Maskout	Layer 3 and also layer 1 and sprites get masked out, if window mode in "color math" setting is enabled

All FX Effects

In terms of effect types, all the common effects have been extended in functionality compared to vanilla. To illustrate the meaning and position of anything that can be changed, the options are labeled in keywords, which are shown in the images below.

SMILE RF FX Settings

SMART FX Settings

No FX1 (Type: 00)

The default effect when using FX settings. It doesn't use Effect Slots when selected. Although it says that no effects can be loaded, you can still set some flags to enable background effects.

$01	*no function*	
$02	Effect on background	Will activate the water/heat effect on background [Uses 1 Effect Slot]
$04	*no function*	
$08	Change effect type	Will change the background and BG3 layer effect from water to heat
$10	*no function*	
$20	*no function*	
$40	*no function*	
$80	*no function*	

Liquid (Type: 02, 04, 06)

Water, lava and acid are background effects with environmental abilities. Some features of the liquid effect type have been extended. When selected it uses 1 Effect Slot by default. For liquids to be displayed, the color math cannot be set to ColorMode.

Default value definitions	
Height	Starting liquid level (vanilla)
Target	Liquid level to rise/lower to
Speed	Speed in which the liquid level will rise/lower to. High byte is speed in pixel per frame and low byte is sub pixel per frame. It doesn't matter if the speed value is positive or negative, as long as "Height" and "Target" have different values
Delay	Rising/lowering delay in frames

Flag definitions		
$01	Flowing liquid	Liquid will scroll in a fixed speed set in the config (set to vanilla behavior by default)
$02	Effect on background inside liquid	Will activate the effect on background inside the liquid layer [Uses 1 Effect Slot, unless "Effect on background outside liquid" is set]
$04	Spawn Object	Spawns an HDMA object depending on block BTS [Uses 1 Effect Slot]. More information under External Object
$08	Change effect type	Will change the background and liquid effect from water to heat
$10	Effect on liquid	Will activate the effect on liquid
$20	Effect on background outside liquid	Will activate the effect on background outside the liquid layer [Uses 1 Effect Slot, unless "Effect on background inside liquid" is set]
$40	Custom tides	Enables the possibility to create custom tides (see below for more information)
$80	Fixed sized tides	Creates tides set in the config (set to vanilla behavior by default). If "Custom tides" is set, then this option gets overwritten by custom tide values

In vanilla, setting "BG Liquid / disable liquid physics" will disable water physics. Now this option has changed to spawn a HDMA object instead. However, you still can disable water physics if the n00b tube PLM is present in the room. You can change the required PLM to disable water physics in the configs of this patch.

If the "Custom tides" flag is set, the value section has changed to create your own tides. However, the possibility for liquid rising/lowering will be disabled when set.

Custom tides value definitions	
Height	Starting liquid level (unchanged)
Target	Custom flowing liquid speed ("Flowing liquid" must be set) (When set to a negative value, the liquid will flow to the right) (To have custom flowing liquid without tides, set "Tide size" to $01)
Speed	Tide speed $xxyy (High byte = xx: tide speed if the tide is above the base height, Low byte = yy: tide speed if the tide is below the base height)
Delay	Tide size (For comparison, vanilla small tides are half blocks big ($08) and vanilla large tides are 2 blocks big ($20)) (should not be zero)

These flags need to be changed to make them look like vanilla:

Vanilla flag changes		
$01	Flowing liquid	Vanilla
$02	Effect on background inside liquid	Vanilla
$04	Spawn Object	Never
$08	Change effect type	Needs to be set for lava and acid
$10	Effect on liquid	Needs to be set for water
$20	Effect on background outside liquid	Needs to be set for lava and acid, if "Effect on background inside liquid" is enabled, too
$40	Custom tides	Vanilla
$80	Fixed sized tides	Vanilla

If "Custom Tides" is enabled, these values need to be changed to make it vanilla:

Custom tides vanilla value changes	
Height	Vanilla
Flowing speed	If "Flowing liquid" is set: $0040
Tide speed	$080E
Tide size	$20

BG3 Effect (Type: 08 - 1E)

BG3 Effect is similar to the vanilla effect types (spores, rain, fog). A third layer will be added into the room, but you have a lot of control over the behavior of the layer. When selected it uses 1 Effect Slot by default. For BG3 effects to be displayed, the color math cannot be set to ColorMode.

Default value definitions	
Height	BG3 X auto scroll speed {BG3 X position offset}
Target	BG3 Y auto scroll speed {BG3 Y position offset}
Speed	Scroll speed (set to $0100 for 1:1 scroll speed)
Delay	*unused*

Flag definitions		
$01	Follow Samus	BG3 layer will scroll depending on Samus's position
$02	Effect on background	Will activate the water/heat effect on background [Uses 1 Effect Slot]
$04	Spawn Object	Spawns an HDMA object depending on block BTS [Uses 1 Effect Slot]. More information under External Object
$08	Change effect type	Will change the background and BG3 layer effect from water to heat
$10	Effect on liquid	Will activate the effect on BG3 layer
$20	Disable auto scrolling	The BG3 layer will not auto scroll anymore. The X/Y values will instead set the offset for the layer (High byte: pixel offset, Low byte: sub pixel offset)
$40	Custom tides	Enables the possibility to create custom tides, which can be stacked with auto scroll speed (see below for more information). If "Fixed sized tides" is set, then the tide effect will occur horizontally instead of vertically. Scrolling speed will be set to 1:1
$80	Fixed sized tides	Creates tides set in the config, which can be stacked with auto scroll speed. Tides cannot be set horizontally with fixed sized tides.

If the "Custom tides" flag is set, the value section has slightly changed to create an additional scroll effect for BG3.

Custom tides value definitions	
Height	BG3 X auto scroll speed {BG3 X position offset} (unchanged)
Target	BG3 Y auto scroll speed {BG3 Y position offset} (unchanged)
Speed	Tide speed $xxyy (High byte = xx: tide speed if the tide is above the base height, Low byte = yy: tide speed if the tide is below the base height)
Delay	Tide size (For comparison, vanilla small tides are half blocks big ($08) and vanilla large tides are 2 blocks big ($20)) (should not be zero)

To achieve the spores, rain and fog effect the same way as vanilla, then change the effect values listed below:

Spores (Type: $08) effect vanilla value changes	
X autoscroll speed	$0000
Y autoscroll speed	$FFC0
Global scroll speed	$0100

Rain (Type: $0A) effect vanilla value changes	
X autoscroll speed	$FA00/$0600/$FC00/$0400 (in vanilla, the auto scroll gets selected at random. In this patch it's not possible. You have to select one of these values)
Y autoscroll speed	$FA00
Global scroll speed	$0100

Fog (Type: $0C) effect vanilla value changes	
X autoscroll speed	$0050
Y autoscroll speed	$FFC0
Global scroll speed	$0100

Vanilla flag changes
Vanilla doesn't use any flags for its layer 3 background effects

Object (Type: 22)

Object is a new effect type added by this patch. It allows you to mask out sections in a specific shape. A lot of options are present to change its size, scroll speed and color. When selected it uses 1 Effect Slot by default. For the object to be displayed, the color math <u>must</u> be set to WindowMode.

Default value definitions	
Height	Object X position
Target	Object Y position
Speed	Scroll speed {object size alternative value}
Delay	Object size {grade of detail} (should not be zero)
Color	Color will be applied in the masked out area, if "Apply color" is enabled

Flag definitions		
$01	Follow Samus	The object will scroll depending on Samus's position
$02	Effect on background	Will activate the water/heat effect on background [Uses 1 Effect Slot]
$04	Apply color	The color set by the color index will be applied to the object
$08	Change effect type	Will change the background effect from water to heat
$10	change shape to (tilt)	Change the shape of the object to a rhombus
$20	change shape to (round)	Change the shape of the object to a circle
If both shape flags are set, then the shape of the object will be a 4 pointed star.		
$40	Apply alternative size on X factor	Will use the "Speed" value to change the size of the object's width. Scrolling speed will be set to 1:1
$80	Apply alternative size on Y factor	Will use the "Speed" value to change the size of the object's height. Scrolling speed will be set to 1:1
If both size factor flags are set, then "Delay" will change the grade of detail on the object. The default grade of detail is $1F (range: $00 - $7F, going over will roll back to $00).		

One thing to note: Be careful when using the object with the layer setting "Liquid", as this can mess with the HUD!

External Object

If you set "Spawn Object" in any effect type listed as an option, you will spawn a HDMA object. For the object to be displayed, the color math has to be changed to WindowMode. The effect set in the FX setting will still be visible in the object. Because all the flags and values are occupied by the selected FX effect type, to customize the object you have to use preset values, which can be edited in the patch under "Config List" with the name "Table_Object_ExternalData". They are structured as follows:

DW <X position>, <Y position>, <"Speed"> : DB <"Delay">, <Object flags>

The meaning of all these values can be read above.

A total of 16 presets are available. Selecting one of them can be achieved by setting the first block BTS in the room to the index number in the config list. The range of index is 00 - 0F, going over that number will roll back to zero again.

You can change the read block BTS value by changing the value in the patch's configuration under "Object Effect" if you don't want the index number to be the first block BTS in the room.

BG Glow (Type: 24)

BG Glow, also known as Fireflea effect, gives off a pulse effect to the color set in the settings. It will transition to the target color back and forth in a speed depending on delay and gradient steps. For each fireflea/enemy killed, a set amount of color gets added onto the effect. When selected it uses 1 Effect Slot by default. For the effect to be displayed, the color math needs to be set to ColorMode.

Default value definitions	
Height	Sub value color intensity increase on enemy kill
Target	Full value color intensity increase on enemy kill
Speed	Transition delay in frames (should not be zero)
Delay	Gradient amount (maxed at $4F [80])
Color	Target color

Flag definitions		
$01	*no function*	
$02	Effect on background	Will activate the water/heat effect on background [Uses 1 Effect Slot]
$04	Spawn Object	Spawns an HDMA object depending on block BTS [Uses 1 Effect Slot]. More information under External Object
$08	Change effect type	Will change the background effect from water to heat
$10	All enemy types allowed	The intensity of the BG glow effect will increase from every enemy type, not just firefleas
$20	X-Ray allow effect	The effect still continues even if X-Ray is active
$40	*no function*	
$80	*no function*	

These values need to be changed to make a vanilla fireflea effect:

Fireflea effect vanilla value changes	
Sub value color	$0000
Full value color	$18C6 (Red: +$06 ; Green: +$06 ; Blue: +$06)
Transition delay	$0006
Gradient steps	$06
Color value	Red: $06 ; Green: $06 ; Blue: $06

Vanilla flag changes
Vanilla doesn't use any flags for its fireflea effects

Haze (Type: 2C)

Haze will draw a smooth color transition from top to bottom depending on the color set. Compared to vanilla this patch gives you much more options. When selected it uses 1 Effect Slot for every non-zero color component set by the color option, for a total of 3 Effect Slots! For the effect to be displayed, the color math needs to be set to ColorMode.

Default value definitions	
Height	Haze starting position
Target	Haze transition size (range: $1F - [value of the smallest color intensity in the haze color * $80])
Speed	Scroll speed (set to $0100 for 1:1 scroll speed)
Delay	*unused*
Color	Haze color

Flag definitions		
$01	Scroll through X position	Haze will scroll depending on the screen X position instead of the Y position
$02	Effect on background	Will activate the water/heat effect on background [Uses 1 Effect Slot]
$04	Spawn Object	Spawns an HDMA object depending on block BTS [Uses 1 Effect Slot]. More information under External Object
$08	Change effect type	Will change the background effect from water to heat
$10	Force scroll to zero	Haze will not transition on screen position
$20	X-Ray allow effect	The effect still continues even if X-Ray is active
$40	Custom tides	Enables to create specific tides (see below for more information). Scrolling will be set to 1:1
$80	Fixed sized tides	Creates tides set in the config (set to vanilla behavior by default). If "Custom tides" is set, then this option gets overwritten by custom tide values

If the "Custom tides" flag is set, the value section has changed to create a dynamic tides effect with the haze.

Custom tides value definitions	
Height	Haze starting position (unchanged)
Target	Haze transition size (unchanged)
Speed	Tide speed $xxyy (High byte = xx: tide speed if the tide is above the base height, Low byte = yy: tide speed if the tide is below the base height)
Delay	Tide size (For comparison, vanilla small tides are half blocks big ($08) and vanilla large tides are 2 blocks big ($20)) (should not be zero)

These values need to be changed to make a vanilla haze effect:

Fireflea effect vanilla value changes	
Starting position	$0040
Haze size	$0070
Scroll speed	$0000
Color value	For Ridley alive: Red: $00 ; Green: $00 ; Blue: $0F For Ridley dead: Red: $0F ; Green: $00 ; Blue: $00

Vanilla flag changes
Vanilla doesn't use any flags for its haze effects

Bomb Torizo also has a haze effect, which you can closely achieve by setting these values:

Fireflea effect vanilla value changes	
Starting position	$0048
Haze size	$0096
Scroll speed	$0000
Color value	Red: $05 ; Green: $05 ; Blue: $08

However, this patch will do it automatically.

Other Effects

Scrolling Sky:
As the name says, it will create a scrolling effect on the background for a moving clouds effect. When selected it uses 1 Effect Slot by default. Only Crateria Landing Site, West Ocean, East Ocean and the small bridge before Wrecked Ship use the scrolling sky effect. Left untouched, it will cause a mess on your background.

If you want to remove the scrolling sky effect:
- set the "Background" pointer to $0000
- set the "Setup ASM" and "Main ASM" pointer to $0000

If you want to adjust the scrolling sky effect:
- set the "Background" pointer to $0000
- set background to "Layer 2" and both scrolls to 100%
- you can safely set the "Main ASM" pointer to $0000 if you want

What can you change in scrolling sky effect:
- the scrolling of the coral background can only be changed in the config of this patch under "Scrolling Sky"
- only the column of the background will be loaded, depending on which door you enter the room from

Tourian Entrance:
This effect uses extra code specific for the statue room before Tourian. In addition, in terms of setting, it is set in the same way as the water effect type to control the liquid functionality (See Liquid for more information). When selected it uses 2 Effect Slots by default.

Ceres Elevator/Ridley:
These effects use extra code specific for their called rooms. In addition, in terms of setting, it is set in the same way as the haze effect type (See Haze for more information). Ceres Elevator uses 1 Effect Slot plus the slots used by Haze and Ceres Ridley uses 2 Effect Slots plus the slots used by Haze. Be careful not to use too many effect slots, as this can be easily achieved.

Miscellaneous

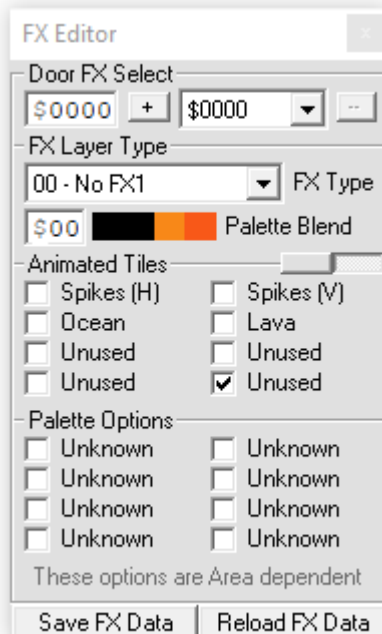The "disable power bomb layer" option controllable in the layer type also affects X-Ray.

If a room is set to ColorMode you can use the color option to add/subtract a set color onto the room. This is used by vanilla configuration 28 and 2A as an example.

By default the color set by the color option gets applied outside of the message boxes. In the haze effect the color effect can appear saturated when opening a message box. You can remove this functionality in the config of this patch under "Message Box".

The offset for the water and heat effect can be edited in the config list of this patch. Both the background and the liquid layer use the same effect values. For the water effect "Table_WaterFX_Offset" gets used and for the heat effect it is "Table_HeatFX_Offset". The values represent the offset per pixel.

The requirements for rooms to not show X-Ray blocks has been changed. Now to disable the functionality of X-Ray you have to set the last flag in the palette FX list. This is useful as during X-Ray layer 2 will be changed to a copy of the current layer 1 screen position with the block types revealed. Meaning some rooms which are built mostly with layer 2 can be screwed over when activating X-Ray. In some boss rooms X-Ray will be disabled as usual. The flag necessary to disable X-Ray is shown in the images below.

SMILE RF FX Settings

SMART FX Settings

Custom layers/effects

Having all the possibilities with the extended effect options is nice and good, but the layer types and color math types don't give you enough options for their full potential. You can make custom layer configurations with a few value changes. Here each bit will be explained what will be activated. Later on it will be explained where you can add custom backgrounds for layer 3.

Custom Layer Types

The list of all layer type configurations can be found in the config list of this patch under Layer Config with the label "LayerTypeConfiguration". Anything commented "Custom" and *empty* can be edited safely as these configurations aren't used by vanilla. You can extend the list even further, but I advise the stick with the predetermined size.

By default ($02), layer 1,2 and sprites are enabled in the main layer with the value $13.

Mainlayer	
$80	Disable color math in sprites during power bomb and X-Ray
$40	Disable color math in layer 2 and 3 during power bomb and X-Ray
$20	Disable color math in layer 1 during power bomb and X-Ray
$10	Enable sprites in main layer
$08	"Liquid" bit, swaps mainlayer with sublayer during power bomb and X-Ray
$04	Enable layer 3 in main layer (liquid, BG3 effect)
$02	Enable layer 2 in main layer (background)
$01	Enable layer 1 in main layer (foreground)

Disable color math during power bomb explosion and X-Ray is pretty self explanatory. It will prevent the power bomb explosion effect and the darkening effect of X-Ray to apply on the selected layer/sprites.

The "Liquid" functionality will be explained below.

By default ($02), only layer 3 is enabled in the sub layer with the value $04.

Sublayer	
$80	Mask out sprites inside window
$40	Mask out layer 2 inside window
$20	Mask out layer 1 inside window
$10	Enables sprites in sub layer
$08	Disable masking for layer 3
$04	Enable layer 3 in sub layer (liquid, BG3 effect)
$02	Enable layer 2 in sub layer (background)
$01	Enable layer 1 in sub layer (foreground)

Mask out will enable layers being affected by window mode. $08 will disable masking for layer 3, as this is enabled by default. At least one mask from a layer must be active, otherwise window mode has no effect.

"Liquid" allows enemies to be submerged in the sublayer as well. Normally when setting the layer type to default, enemies don't get affected by the sublayer at all. This is not a problem with the game, this is more a limitation by the console itself.
As a solution a trick gets used to swap the main layer configuration with the sub layer one (Mainlayer: $04 and Sublayer: $13).
However, a problem arises when a power bomb explosion is activated or when X-Ray is used, as this will delete parts of the sublayer to achieve their effects. That's why the "Liquid" bit in the main layer setting must be set in order to not have any unintended side effects.
So the final configuration of this is: Mainlayer: $0C and Sublayer: $13.
Another issue is that this is very limited in terms of the versatility of color math options. You can't use the liquid setting in subtraction, can't disable color math on individual layers and in some circumstances, can't use window mode when layer 3 is set in the main layer, as this can mask out parts of the HUD.

Custom Color Math

The list of all color math configurations can be found in the config list of this patch under Layer Config with the label "ColorMathConfiguration". Anything commented "Custom" and *empty* can be edited safely as these configurations aren't used by vanilla. You can extend the list even further, but I advise the stick with the predetermined size.

By default ($02), only the sub layer is enabled in the modes with the value $02.

Modes	
$80	Set color to black inside window
$40	Set color to black outside window
$20	Do not apply color math inside window
$10	Do not apply color math outside window
$08	Invert window (only applies, if window mode is set)
$04	Enable window mode
$02	Enables sub layer
$01	*no effect*

The first 4 options are WindowMode exclusive and do nothing if this mode isn't activated.

Invert window will mask out the outside of the window instead of the inside. WindowMode must be enabled for it to take effect.

Enabling sub layer will show layers set in sublayer in a transparent form. Not enabling it will set it in so called ColorMode, where only one specific color gets applied in the affected layers. This mode is needed for some effects to work properly.

By default ($02), all layers are enabled in the designation with the value $37.

Designation	
$80	subtract color instead of adding them
$40	halves color after calculation
$20	Enable color math on backdrop
$10	Enable color math on sprites
$08	*no effect*
$04	Enable color math on layer 3 (liquid, BG3 effect)
$02	Enable color math on layer 2 (background)
$01	Enable color math on layer 1 (foreground)

Halved will take the sum of it and divide it by 2 at the end. Layers not set by color math are unaffected.

Enabling color math on sprites has some restrictions. The first 4 palettes for sprites don't get affected by color math, which means the damage flash and first 3 enemy palettes show no effect on color math. The other sprite palettes (Samus, projectiles, pickup, trails, explosions) still get affected by it.

Enabling color math on layers where they are only set in sublayer don't have an effect on them. But you also don't have to create custom color math layers just to disable layers there when they are set in the sublayer.

Custom BG3 Background

In the BG3 Effect type you can pick up to 12 different tilemaps. You can edit them in bank $8A (PC: 50xxx - 57xxx) These are the following pointers:

Type	Position	Type	Position
08	$98C0 (PC: 518C0) Spores	14	$CA40 (PC: 54A40)
0A	$A100 (PC: 52100) Rain	16	$D280 (PC: 55280)
0C	$A940 (PC: 52940) Fog	18	$DAC0 (PC: 55AC0)
0E	$B180 (PC: 53180)	1A	$E300 (PC: 56300)
10	$B9C0 (PC: 539C0)	1C	$EB40 (PC: 56B40)
12	$C200 (PC: 54200)	1E	$F380 (PC: 57380)

Notice the tilemaps are 33x32 tiles big. That's because the first line is used by liquid for the lava bubbles. For the BG3 effect the first line will be ignored, so you should start drawing your tilemap one line lower.

The tiles used for layer 3 are located at $9AB200 (PC: D3200). Be aware of the priority bit in the tiles, as if it is set, the tile will be drawn on top of every other layer. If the bit is not set, the tile will be behind every other layer. This only applies if layer 3 is set to mainlayer.

One thing to note, at $8AB180 in vanilla, the tilemaps are used for the scrolling sky effect. This patch changed the behavior of the scrolling sky effect, so the tilemap there doesn't get used anymore. You can delete the tilemaps in the patch under "Cleanup" and remove the semicolon in the last line.

Custom Animated Tiles For BG Effect

Animated tiles are very useful if you want to add some dynamism to your background or to draw a complex background with a lot of custom tiles, but don't want to waste a bunch of tile slots in the tileset just for that.
The "Table_BG3Effect_AnimatedTilePointer" in the config list of this patch contains the pointer to the animated tiles setup sorted by BG3 effect index. Everything related to animated tiles are located at bank $87 (PC: 38xxx - 3Fxxx).

The pointer of this list leads to object setups which consist of 6 bytes. The first 2 are the pointer to the instruction list for what tiles to draw. Second 2 are the size/amount of tiles to draw, which is scaled at $10 per tile. And the last 2 are in which location in VRAM to load the tiles. This should be like: $4000 + (tile index * $8). For reference, spores and rain animated tiles have the value $4280, which means tile index $50.
The setup will look like this in a hex editor: xx yy s0 00 aa 4b

xx = low byte of pointer to instruction list
yy = high byte of pointer to instruction list
s = tile amount
aa = low byte of graphics location in VRAM
b = high byte of graphics location in VRAM

The layout of the animated tiles: 4 bytes per instruction. 2 bytes for delay and 2 bytes for pointer to the GFX of the tiles. The tiles pointed to in the instruction have to be the same amount listed in the setup. If you want to loop back to the start, then write B7 80 and the instruction pointer again.
A typical instruction list looks like this: tt 00 gg hh tt 00 gg hh … B7 80 xx yy

tt = delay (time in frames for the tile GFX to stay) (00 will be treated as $10000)
gg = low byte of pointer to the tile GFX
hh = high byte of pointer to the tile GFX

Let's do an example with fog. We search for a free spot in bank $87 to write our instruction (let's say $D000 for instance). Go to "Table_BG3Effect_AnimatedTilePointer" in the config list of this patch and change the first $0000 with $D000. This will be our pointer to the custom fog setup. At $87D000 (PC: 3D000) we write 06 D0 D0 00 00 44. This means our instruction pointer is right after our setup (D006), the amount of tiles to draw is 13 ($0D tiles) and for the position to load the fog graphics we write at $4400, which is the tile index $80.
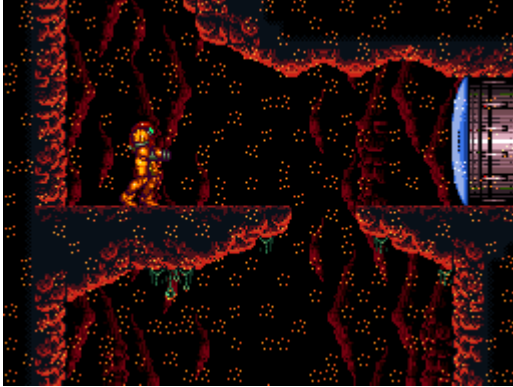
In the instruction at $D006 we write xx 00 00 D1 xx 00 00 D2 xx 00 00 D3 D7 80 06 D0, where X is a random amount of delay to choose from. 00 D1, 00 D2 and 00 D3 are the locations for our GFX to load, aka $D100 (PC: 3D100), $D200 and $D300.
Now we draw our fog graphics in these positions. You can copy the graphics from $9ABA00 (PC: D3A00) to the positions listed at our instruction list. Make some notable changes between them and save. Note that only the specific amount listed in the setup gets taken for the animation, so drawing more tiles onto it doesn't matter.

Examples

Here are some examples of FX settings to show what this patch is capable of:

Additional heat effect with layer 3:

Height	X autoscroll	$0000
Target	Y autoscroll	$0100
Speed	Scroll speed	$0100
Delay	BG index	$01 (rain)
Color	Palette blend	$02

Flags used: effect on background, change effect type
Color Math: "Default"
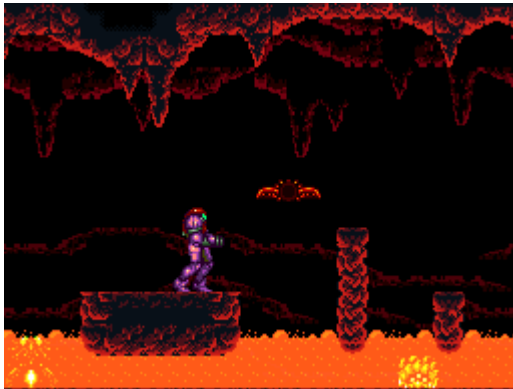Layer Type: "Default"

Alarm glow with BG Glow:

Height	+Subcolor	$0000
Target	+Color	$0000
Speed	Delay	$0002
Delay	Index	$0F
Color	Effect color	R: $0F ;G: $00 ;B: $00

Color Math: $00, $01 (ColorMode active, only layer 1 is affected)
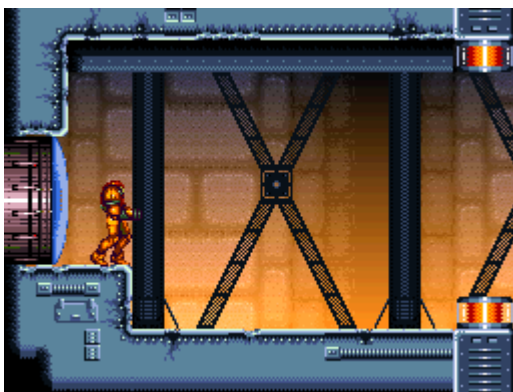Layer Type: "Default"

Liquid layer without affecting layer 1:

Liquid settings		Normal
Color	Palette blend	$02

Flags used: effect on background, change effect type
Color Math: $02, $36 ("Default" but layer 1 isn't affected)
Layer Type: $0D, $13 ("Liquid" bit set, Mainlayer: layer 1 and 3, Sublayer: layer 1, 2 and sprites) Thing to note: Layer 1 will appear saturated during power bomb explosion or X-Ray.

Tide effect on Haze:

Height	Height	$0080
Target	Haze size	$0080
Speed	Tide speed	$0C12
Delay	Tide size	$40
Color	Effect color	R: $1F ;G: $11 ;B: $03

Flags used: custom tide
Color Math: $00, $26 (ColorMode, layer 1 and sprites aren't affected by color math)
Layer Type: "Default"

Restricting vision with WindowMode:

Effect type		Water
Liquid settings		Normal
Color	Palette blend	$48

Flags used: flowing liquid, effect on background inside liquid, spawn object (index $00), effect on liquid

Color Math: $0E, $37 (WindowMode + inverted)
Layer Type: $13, $A4 (layer 1 and 3 mask out added)