Insert Manually a Song Available on the Forum

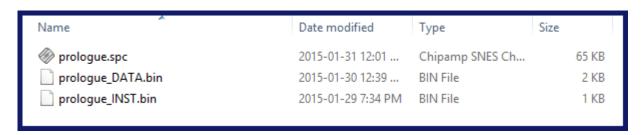
In this tutorial we'll be importing in FF3us a song that is already in FF6 music format. There is no need for musical knowledge to be able to complete the following steps. The only things that will help is being familiar with the hexadecimal system as well as some basic ROM hacking knowledge like what is an offset, the difference between an absolute and HiROM offset and how to use an hex editor.

1. Getting the file and tool

We'll be using the FFIV song "The Prologue" from our Song Database. The other thing you will need is a hex editor. There are many you can choose from but I'd suggest one that has a copy selection, paste-write and paste-insert functionalities. One good all purpose hex editor is HxD and this is what has been used to take the screenshots below.

2. Files we will be importing

Extract the files from **FF4_prologue.7z** and you will see the following files:



prologue.spc is the song in SNES format. Those can be played with a SPC player or with winamp and a plug-in. For more info on SPC file and how to play them, use Google or check the great extracted music tutorial at FantasyAnime.com. The DATA ans INST files are two binary files, the first has the music data in FF6 format and the other the instruments used in the song. The DATA and INST files do not contain instrument samples, those are in the game.

All songs in our song database have the three same files. Some songs, mostly done by tsushiy and having a "p" next to their title need the instrument patch, available in the same thread. This patch install new BRR samples in the game, giving access to a wider range of instruments to use in songs. Some songs instrument file use those added instruments. This is not the case of our prologue song.

3. Choosing the right spot

The first thing that you have to ask yourself is "do I want to replace an existing song or expand the number of existing songs?" If you only want to replace a existing song you can skip to section 4. To expand the number of songs there are few thing to do. First you have to move the \$C53E96-\$C53F94 song pointers block because there is no room to add an extra one. To find a spot in non-expanded ROM, you can look here. The offsets in this list take in account the ROM header though while my whole tutorial assume you have a headerless ROM, so substract 0x200 from the offset you choose. You can also expand your ROM and put the pointers in the \$FX banks.

I decided for the example to take the \$EEAF01 spot, which has 767 free bytes, which is more than enough. As shown in the image below, I select with the mouse the pointer block, I do Ctrl+C, Ctrl+G to enter my destination (you can scroll a long time for the same result) and then $Right-Click\rightarrow Paste$ write. Now let's say I would put my song at \$F30540 in expanded ROM, I would type **40 05 F3** at \$EEB0000 (see right picture). You would use song ID \$56 for your new song in game events as an example. As you have guessed pointers are always inverted whether they are two or three bytes long. As for the old pointer data copied, you can blank with 00 or FF all the data since you moved it, giving you room for other things if needed.

Offset(h)	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00053E80	FF	E0	FF	E0	FF	ΕO	FF	ΕO	FF	E0	FF	E0	FF	E0	FF	E0
00053E90	FF	E0	FF	EC	FF	ΕO	7A	5C	C8	A0	5C	C8	DB	83	C9	9D
00053EA0	В4	C8	82	C8	C8	1E	64	C8	33	67	C8	69	6D	C8	C5	70
00053EB0	C8	BF	74	C8	F8	78	C8	AF	7C	C8	28	80	C8	38	84	C8
00053EC0	9A	88	C8	ED	8B	C8	56	8F	C8	6F	95	C8	29	98	C8	62
00053ED0	9B	C8	D4	A5	C8	36	AD	C8	В8	В7	C8	E8	BF	C8	4C	C2
00053EE0	C8	C1	CE	C8	30	DЗ	C8	56	DA	C8	BF	DD	C8	6B	E1	C8
00053EF0	57	EЗ	C8	E2	ЕЗ	C8	48	EA	C8	A6	EF	C8	72	F4	C8	15
00053F00	FA	C8	43	FE	C8	4B	05	C9	E9	05	C9	66	0A	C9	В6	90
00053F10	C9	A2	93	C9	9C	14	C9	14	8E	C9	5F	97	C9	4C	1A	C9
00053F20	DD	1E	C9	8F	26	C9	97	29	C9	0B	2E	C9	58	32	C9	FF
00053F30	37	C9	AE	ЗF	C9	65	44	C9	ВЗ	4A	C9	6F	4D	C9	16	53
00053F40	C9	DB	53	C9	C5	54	C9	57	55	C9	C9	62	C9	CD	63	C9
00053F50	03	69	C9	6E	6A	C9	19	6B	C9	C2	6B	C9	DA	70	C9	C9
00053F60	71	C9	06	7A	C9	EB	7C	C9	7C	7F	C9	42	88	C9	99	8C
00053F70	C9	E8	8C	C9	85	8D	C9	DF	97	C9	BF	9D	C9	4F	A2	C9
00053F80	D8	АЗ	C9	51	AC	C9	9F	ΑE	C9	7A	5C	C8	В9	В9	C9	F9
00053F90	BA	C9	3F	DF	C9	00	00	00	00	00	00	00	00	00	00	00
00053FA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
Offset(h)	00	01	02	03	0.4	0.5	06	07	08	09	40	0B	00	OD	OF	T 0
Offset(h)	00	01	02										0C			
002EAEF0	Α9	D0	50	8F	5C	В8	7E	Α9	90	ΕO	8F	5E	В8	7E	E2	20
002EAEF0 002EAF00	A9 60	D0 7A	50 5C	8F C8	5C A0	B8 5C	7E C8	A9 DB	90 83	E0 C9	8F 9D	5E B4	B8 C8	7E 82	E2 C8	20 C8
002EAEF0 002EAF00 002EAF10	A9 60 1E	D0 7A 64	50 5C C8	8F C8 33	5C A0 67	B8 5C C8	7E C8 69	A9 DB 6D	90 83 C8	E0 C9 C5	8F 9D 70	5E B4 C8	B8 C8 BF	7E 82 74	E2 C8 C8	20 C8 F8
002EAEF0 002EAF00 002EAF10 002EAF20	A9 60 1E 78	D0 7A 64 C8	50 5C C8 AF	8F C8 33 7C	5C A0 67 C8	B8 5C C8 28	7E C8 69 80	A9 DB 6D C8	90 83 C8 38	E0 C9 C5 84	8F 9D 70 C8	5E B4 C8 9A	B8 C8 BF 88	7E 82 74 C8	E2 C8 C8 ED	20 C8 F8 8B
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30	A9 60 1E 78 C8	D0 7A 64 C8 56	50 5C C8 AF 8F	8F C8 33 7C C8	5C A0 67 C8 6F	B8 5C C8 28 95	7E C8 69 80 C8	A9 DB 6D C8 29	90 83 C8 38 98	E0 C9 C5 84 C8	8F 9D 70 C8 62	5E B4 C8 9A 9B	B8 C8 BF 88 C8	7E 82 74 C8 D4	E2 C8 C8 ED A5	20 C8 F8 8B C8
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30 002EAF40	A9 60 1E 78 C8 36	D0 7A 64 C8 56 AD	50 5C C8 AF 8F C8	8F C8 33 7C C8 B8	5C A0 67 C8 6F B7	B8 5C C8 28 95 C8	7E C8 69 80 C8 E8	A9 DB 6D C8 29 BF	90 83 C8 38 98 C8	E0 C9 C5 84 C8 4C	8F 9D 70 C8 62 C2	5E B4 C8 9A 9B C8	B8 C8 BF 88 C8 C1	7E 82 74 C8 D4 CE	E2 C8 C8 ED A5 C8	20 C8 F8 8B C8
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30 002EAF40 002EAF50	A9 60 1E 78 C8 36 D3	D0 7A 64 C8 56 AD C8	50 5C C8 AF 8F C8 56	8F C8 33 7C C8 B8 DA	5C A0 67 C8 6F B7 C8	B8 5C C8 28 95 C8 BF	7E C8 69 80 C8 E8 DD	A9 DB 6D C8 29 BF C8	90 83 C8 38 98 C8 6B	E0 C9 C5 84 C8 4C E1	8F 9D 70 C8 62 C2 C8	5E B4 C8 9A 9B C8 57	B8 C8 BF 88 C8 C1 E3	7E 82 74 C8 D4 CE C8	E2 C8 C8 ED A5 C8 E2	20 C8 F8 8B C8 30 E3
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30 002EAF40 002EAF50 002EAF60	A9 60 1E 78 C8 36 D3 C8	D0 7A 64 C8 56 AD C8 48	50 5C C8 AF 8F C8 56 EA	8F C8 33 7C C8 B8 DA C8	5C A0 67 C8 6F B7 C8 A6	B8 5C C8 28 95 C8 BF EF	7E C8 69 80 C8 E8 DD C8	A9 DB 6D C8 29 BF C8 72	90 83 C8 38 98 C8 6B F4	E0 C5 84 C8 4C E1 C8	8F 9D 70 C8 62 C2 C8 15	5E B4 C8 9A 9B C8 57 FA	B8 C8 BF 88 C8 C1 E3 C8	7E 82 74 C8 D4 CE C8 43	E2 C8 C8 ED A5 C8 E2 FE	20 C8 F8 8B C8 30 E3 C8
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30 002EAF40 002EAF50 002EAF60 002EAF70	A9 60 1E 78 C8 36 D3 C8 4B	D0 7A 64 C8 56 AD C8 48 05	50 5C C8 AF 8F C8 56 EA C9	8F C8 33 7C C8 B8 DA C8 E9	5C A0 67 C8 6F B7 C8 A6 05	B8 5C C8 28 95 C8 BF EF C9	7E C8 69 80 C8 E8 DD C8 66	A9 DB 6D C8 29 BF C8 72 0A	90 83 C8 38 98 C8 6B F4 C9	E0 C5 84 C8 4C E1 C8 B6	8F 9D 70 C8 62 C2 C8 15 90	5E B4 C8 9A 9B C8 57 FA C9	B8 C8 BF 88 C8 C1 E3 C8 A2	7E 82 74 C8 D4 CE C8 43 93	E2 C8 C8 ED A5 C8 E2 FE C9	20 C8 F8 8B C8 30 E3 C8
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30 002EAF40 002EAF50 002EAF60 002EAF70 002EAF80	A9 60 1E 78 C8 36 D3 C8 4B 14	D0 7A 64 C8 56 AD C8 48 05 C9	50 5C C8 AF 8F C8 56 EA C9	8F C8 33 7C C8 B8 DA C8 E9 8E	5C A0 67 C8 6F B7 C8 A6 05 C9	B8 5C C8 28 95 C8 BF EF C9 5F	7E C8 69 80 C8 E8 DD C8 66	A9 DB 6D C8 29 BF C8 72 0A C9	90 83 C8 38 98 C8 6B F4 C9 4C	E0 C9 C5 84 C8 4C E1 C8 B6 1A	8F 9D 70 C8 62 C2 C8 15 90 C9	5E B4 C8 9A 9B C8 57 FA C9 DD	B8 C8 BF 88 C1 E3 C8 A2 1E	7E 82 74 C8 D4 CE C8 43 93 C9	E2 C8 C8 ED A5 C8 E2 FE C9 8F	20 C8 F8 8B C8 30 E3 C8 9C
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30 002EAF40 002EAF50 002EAF60 002EAF70 002EAF80 002EAF90	A9 60 1E 78 C8 36 D3 C8 4B 14 C9	D0 7A 64 C8 56 AD C8 48 05 C9	50 5C C8 AF 8F C8 56 EA C9 14	8F C8 33 7C C8 B8 DA C8 E9 8E C9	5C A0 67 C8 6F B7 C8 A6 05 C9	B8 5C C8 28 95 C8 BF C9 5F 2E	7E C8 69 80 C8 E8 DD C8 66 97 C9	A9 DB 6D C8 29 BF C8 72 0A C9 58	90 83 C8 38 98 C8 6B F4 C9 4C 32	E0 C9 C5 84 C8 4C E1 C8 B6 1A C9	8F 9D 70 C8 62 C2 C8 15 90 C9 FF	5E B4 C8 9A 9B C8 57 FA C9 DD 37	B8 C8 BF 88 C1 E3 C8 A2 1E C9	7E 82 74 C8 D4 CE C8 43 93 C9 AE	E2 C8 C8 ED A5 C8 E2 FE C9 8F 3F	20 C8 F8 8B C8 30 E3 C8 9C 26
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30 002EAF40 002EAF50 002EAF60 002EAF70 002EAF80 002EAF90 002EAFA0	A9 60 1E 78 C8 36 D3 C8 4B 14 C9 65	D0 7A 64 C8 56 AD C8 48 05 C9 97	50 5C 8F 8F C8 56 EA C9 14 29 C9	8F C8 33 7C C8 B8 DA C8 E9 8E C9	5C A0 67 C8 6F B7 C8 A6 05 C9 0B 4A	B8 5C C8 28 95 C8 BF C9 5F 2E C9	7E C8 69 80 C8 E8 DD C8 66 97 C9	A9 DB 6D C8 29 BF C8 72 0A C9 58 4D	90 83 88 98 68 6B F4 C9 4C 32 C9	E0 C9 C5 84 C8 4C E1 C8 B6 1A C9	8F 9D 70 C8 62 C2 C8 15 90 C9 FF 53	5E B4 9A 9B C8 57 FA C9 DD 37 C9	B8 C8 BF 88 C1 E3 C8 A2 1E C9 DB	7E 82 74 C8 D4 CE C8 43 93 C9 AE 53	E2 C8 ED A5 C8 E2 FE C9 8F 3F C9	20 C8 F8 8B C8 30 E3 C8 9C 26 C9
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30 002EAF40 002EAF50 002EAF60 002EAF70 002EAF80 002EAF90 002EAFA0 002EAFB0	A9 60 1E 78 C8 36 D3 C8 4B 14 C9 65 54	D0 7A 64 C8 56 AD C8 48 05 C9 97 44 C9	50 5C C8 AF 8F C8 56 EA C9 14 29 C9	8F C8 33 7C C8 B8 DA C8 E9 8E C9 B3 55	5C A0 67 C8 6F B7 C8 A6 05 C9 0B 4A C9	B8 5C C8 28 95 C8 BF C9 5F 2E C9 C9	7E C8 69 80 C8 E8 DD C8 66 97 C9 6F	A9 DB 6D C8 29 BF C8 72 0A C9 58 4D C9	90 83 C8 38 98 C8 6B F4 C9 4C 32 C9 CD	E0 C9 C5 84 C8 4C E1 C8 B6 1A C9 16	8F 9D 70 C8 62 C2 C8 15 90 C9 FF 53 C9	5E B4 C8 9A 9B C8 57 FA C9 DD 37 C9	B8 C8 BF 88 C1 E3 C8 A2 1E C9 DB	7E 82 74 C8 D4 CE C8 43 93 C9 AE 53 C9	E2 C8 ED A5 C8 E2 FE C9 8F 3F C9 6E	20 C8 F8 8B C8 30 E3 C8 9C 26 C9 C5 6A
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30 002EAF40 002EAF50 002EAF60 002EAF70 002EAF80 002EAF90 002EAFA0 002EAFB0 002EAFB0	A9 60 1E 78 8 36 D3 C8 4B 14 C9 65 54 C9	D0 7A 64 C8 56 AD C8 48 05 C9 97 44 C9	50 5C C8 AF C8 56 EA C9 14 29 C9 57 6B	8F C8 33 7C C8 B8 DA C8 E9 8E C9 B3 55	5C A0 67 C8 6F B7 C8 A6 05 C9 0B 4A C9 C2	B8 5C C8 95 C8 BF EF C9 5F 2E C9 6B	7E C8 69 80 C8 E8 DD C8 66 97 C9 6F 62 C9	A9 DB 6D C8 29 BF C8 72 0A C9 58 4D C9 DA	90 83 C8 38 98 C8 6B F4 C9 4C 32 C9 CD 70	E0 C5 84 C8 4C E1 C8 B6 1A C9 16 63 C9	8F 9D 70 C8 62 C2 C8 15 90 C9 FF 53 C9	5E B4 C8 9A 9B C8 57 FA C9 DD 37 C9 03 71	B8 C8 BF 88 C1 E3 C8 A2 1E C9 DB 69 C9	7E 82 74 C8 D4 CE C8 43 93 C9 AE 53 C9 06	E2 C8 C8 ED A5 C8 E2 FE C9 8F 3F C9 6E 7A	20 C8 F8 8B C8 30 E3 C8 9C 26 C9 C5 6A C9
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30 002EAF40 002EAF50 002EAF60 002EAF70 002EAF80 002EAF90 002EAFA0 002EAFB0 002EAFC0 002EAFD0	A9 60 1E 78 36 D3 C8 4B 14 C9 65 54 C9 EB	D0 7A 64 C8 56 AD C8 48 05 C9 97 44 C9 19 7C	50 5C C8 AF 8F C8 56 EA C9 14 29 C9 57 6B C9	8F C8 33 7C C8 B8 DA C8 E9 8E C9 B3 55 C9 7C	5C A0 67 C8 6F B7 C8 A6 05 C9 0B 4A C9 C2 7F	B8 5C C8 28 95 C8 EF C9 5F C9 6B C9	7E C8 69 80 C8 E8 DD C8 66 97 C9 6F 62 C9 42	A9 DB 6D C8 29 BF C8 72 0A C9 58 4D C9 DA 88	90 83 C8 98 C8 6B F4 C9 4C C9 CD 70 C9	E0 C5 84 C8 4C E1 C8 B6 1A C9 16 63 C9 99	8F 9D 70 C8 62 C2 C8 15 90 C9 FF 53 C9 C9 8C	5E B4 C8 9A 9B C8 57 FA C9 DD 37 C9 03 71 C9	B8 C8 BF 88 C1 E3 C8 A2 1E C9 DB 69 C9 E8	7E 82 74 C8 D4 CE C8 43 93 C9 AE 53 C9 06 8C	E2 C8 C8 ED A5 C8 E2 FE C9 8F C9 6E 7A C9	20 C8 F8 8B C8 30 E3 C8 9C 26 C9 C5 6A C9 85
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30 002EAF40 002EAF50 002EAF60 002EAF70 002EAF80 002EAF90 002EAFA0 002EAFB0 002EAFC0 002EAFC0 002EAFD0	A9 60 1E 78 36 D3 C8 4B 14 C9 65 54 C9 EB 8D	D0 7A 64 C8 56 AD C8 48 05 C9 97 44 C9 19 7C C9	50 5C C8 AF C8 56 EA C9 14 29 C9 57 6B C9 DF	8F C8 33 7C C8 B8 DA C8 E9 8E C9 B3 55 C9 7C 97	5C A0 67 C8 6F B7 C8 A6 05 C9 0B 4A C9 C2 7F C9	B8 5C C8 28 95 C8 BF C9 6B C9 BF	7E C8 69 80 C8 E8 DD C8 66 97 C9 6F 62 C9 42 9D	A9 DB 6D C8 29 BF C8 72 0A C9 58 4D C9 DA 88 C9	90 83 88 98 68 64 C9 4C 32 C9 CD 70 C9 4F	E0 C9 C5 84 C8 4C E1 C8 B6 1A C9 16 63 C9 99 A2	8F 9D 70 C8 62 C2 C8 15 90 C9 FF 53 C9 C9 8C C9	5E B4 C8 9A 9B C8 57 FA C9 DD 37 C9 03 71 C9 D8	B8 C8 BF 88 C1 E3 C8 A2 1E C9 DB 69 E8 A3	7E 82 74 C8 D4 CE C8 43 C9 AE 53 C9 06 8C C9	E2 C8 C8 ED A5 C8 E2 FE C9 8F 3F C9 6E 7A C9 51	20 C8 F8 8B C8 30 E3 C8 9C 26 C9 C5 6A C9 85 AC
002EAEF0 002EAF10 002EAF10 002EAF20 002EAF30 002EAF40 002EAF50 002EAF60 002EAF70 002EAF80 002EAF80 002EAFA0 002EAFB0 002EAFB0 002EAFC0 002EAFD0 002EAFD0 002EAFE0	A9 60 1E 78 36 D3 C8 4B 14 C9 65 54 C9 EB 8D C9	D0 7A 64 C8 56 AD C8 48 05 C9 97 44 C9 19 7C C9 9F	50 5C 8F 68 56 EA C9 14 29 57 6B C9 DF AE	8F C8 33 7C C8 B8 DA C8 E9 B3 55 C9 7C 97 C9	5C A0 67 C8 6F B7 C8 A6 05 C9 0B 4A C9 C2 7F C9 7A	B8 5C C8 28 95 C8 BF C9 C9 6B C9 BF 5C	7E C8 69 80 C8 E8 DD C8 66 97 C9 6F 62 C9 42 9D C8	A9 DB 6D C8 29 BF C8 72 0A C9 58 4D C9 DA 88 C9 B9	90 83 88 98 68 64 C9 4C 32 C9 CD 70 C9 4F B9	E0 C9 C5 84 C8 4C E1 C8 B6 1A C9 16 63 C9 99 A2 C9	8F 9D 70 C8 62 C2 C8 15 90 C9 FF 53 C9 C9 FF 57	5E B4 C8 9A S7 FA C9 DD 37 C9 03 71 C9 D8 BA	B8 C8 BF 88 C1 E3 C8 A2 1E C9 DB 69 C9 E8 A3 C9	7E 82 74 C8 D4 CE C8 43 93 C9 AE 53 C9 06 8C C9 3F	E2 C8 C8 ED A5 C8 E2 FE C9 6E 7A C9 51 DF	20 C8 F8 8B C8 30 E3 C8 9C 26 C9 C5 6A C9 85 AC
002EAEF0 002EAF00 002EAF10 002EAF20 002EAF30 002EAF40 002EAF50 002EAF60 002EAF70 002EAF80 002EAF90 002EAFA0 002EAFB0 002EAFC0 002EAFC0 002EAFD0	A9 60 1E 78 36 D3 C8 4B 14 C9 65 54 C9 EB 8D C9	D0 7A 64 C8 56 AD C8 48 05 C9 97 44 C9 19 7C C9	50 5C 8F 68 56 EA C9 14 29 57 6B C9 DF AE	8F C8 33 7C C8 B8 DA C8 E9 B3 55 C9 7C 97 C9	5C A0 67 C8 6F B7 C8 A6 05 C9 0B 4A C9 C2 7F C9 7A	B8 5C C8 28 95 C8 BF C9 C9 6B C9 BF 5C	7E C8 69 80 C8 E8 DD C8 66 97 C9 6F 62 C9 42 9D C8	A9 DB 6D C8 29 BF C8 72 0A C9 58 4D C9 DA 88 C9 B9	90 83 88 98 68 64 C9 4C 32 C9 CD 70 C9 4F B9	E0 C9 C5 84 C8 4C E1 C8 B6 1A C9 16 63 C9 99 A2 C9	8F 9D 70 C8 62 C2 C8 15 90 C9 FF 53 C9 C9 FF 57	5E B4 C8 9A S7 FA C9 DD 37 C9 03 71 C9 D8 BA	B8 C8 BF 88 C1 E3 C8 A2 1E C9 DB 69 C9 E8 A3 C9	7E 82 74 C8 D4 CE C8 43 93 C9 AE 53 C9 06 8C C9 3F	E2 C8 C8 ED A5 C8 E2 FE C9 6E 7A C9 51 DF	20 C8 F8 8B C8 30 E3 C8 9C 26 C9 C5 6A C9 85 AC

The next thing to do is to change the following code. It's the only place pointers are read and you have to modify each LDA instruction so new base offset, new base offset + 1, new base offset + 2. This is not an ASM course so I'm not explaining further except only mentioning you have a total of 9 bytes to change.

Original code

C5/0538: BF963EC5	LDA \$C53E96,X (SPC pointer low byte)
C5/053C: 8510	STA \$10
C5/053E: BF973EC5	LDA \$C53E97,X (SPC pointer middle byte)
C5/0542: 8511	STA \$11
C5/0544: BF983EC5	LDA \$C53E98,X (SPC pointer high byte)
C5/0548: 8512	STA \$12

Modified code

C5/0538: BF01AFEE C5/053C: 8510	LDA \$EEAF01,X (SPC pointer low byte) STA \$10
C5/053E: BF02AFEE C5/0542: 8511	LDA \$EEAF02,X (SPC pointer middle byte) STA \$11
C5/0544: BF03AFEE C5/0548: 8512	LDA \$EEAF03,X (SPC pointer high byte) STA \$12

Last thing to do is changing the total number of songs. The offset is \$C53C5E. It's a single byte that should be \$55. Increase it of one each time you add a new song (replacing an existing one does not count). So congratulation you have not expanded pointer and can add as much songs as you want up to a limit of 255!

4. Verifying the song length

The next thing to do is verifying if your song fit in the spot you have chosen. If you expanded the song pointers and put your song in expanded ROM, you'll likely won't have to consider the following but some info is still important. Open the DATA file with HxD. The first two bytes (inverted) are the amount of bytes the song take. In our case it is 0x044C bytes, as seen below.

```
Offset(h) 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 000000000 4C 04 26 00 4C 04 26 00 E6 00 63 01 02 02 8B 02
```

You have to verify the song will not "hit" the next song or the data after. If you locate your song in regular non-expanded ROM but outside the songs block, refer to the ROM map to verify. All you have to do is add to your song offset the song length and verify it is lower than next data. If you only replace a song by *The Prelude*, check the song list. Song are in order that they appear in the ROM. You need to consider the song following yours. I decided we are replacing "Another World of Beast".

\$21	\$C8EFA6	Another World of Beasts
\$22	\$C8F472	Grand Finale #2

\$C8F472 - \$C8EFA6 = 0x04CC

We are below the limit with our 0x044C bytes for *The Prelude* so we are ready to insert the song!

5. Copying the song data

Copy all the content of **prelude_DATA.bin** (Ctrl+C) go to your ROM do Ctrl+G and enter "08EFA6". You'll land on the offset you need to paste the song data ($Right-click \rightarrow Paste-write$). The below two screenshots are the beginning and ed of the song pasted.

```
Offset(h) 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
0008EF60 53 53 C4 32 4C B3 C4 1E 53 53 C4 32 4E 4E 4E 4C
0008EF70 B3 C4 1E 53 53 C4 32 47 E3 E2 01 C4 0A C5 60 46
0008EF80 E2 1F 53 E3 C5 60 0A E2 1F 53 E3 C4 32 4C B3 C4
0008EF90 1E 53 53 C4 32 4C B3 C4 1E 53 53 C4 32 47 E3 B6
0008EFA0 B6 B6 B6 F6 18 EF 4C 04 26 00 4C 04 26 00 E6 00
0008EFB0 63 01 02 02 8B 02 48 03 B9 03 E8 03 26 00 E6 00
0008EFC0 63 01 02 02 8B 02 48 03 B9 03 E8 03 F2 32 D4 D9
0008EFD0 01 F0 78 C4 3C C6 1E DC
                                  20 D6 05 47 AC 4F
0008EFE0
         4F B3 4A 4A 4A 4A 71 AC
                                 79 B3 79 79 B3 74 74
0008EFF0 74 D7 01 AC 09 B3 09 09 B3 04 04 04 04 01 AC 09
Offset(h) 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
0008F3B0 A9 51 4F 51 51 4F 51 4A B6 A8 A8 A8 A8 A8 A8 A8 A9
0008F3C0 51 4F 51 51 4F 51 74 B7 4A 74 B7 51 4F 51 51 4F
0008F3D0 51 74 BA 4A BA 74 B7 51 4F 51 51 4F 51 74 B7 4A
0008F3E0 74 B7 4A 74 BA 74 BA 82 B7 51 4F 51 51 4F 51 F6
0008F3F0 02 04 B9 B7 B9 B7 B9 B7 B9 B7 B9 B7 B9 B7 B9 B7
0008F400 B9 B7 B9 B7 B9 B7 B9 B7 B9 B7 B9 B7 B9 D6 05 2B
0008F410 AB A9 AB A9 AB A9 AB 2B AB A9 AB A9 AB A9 AB F6
0008F420 E5 F3 C4 50 DC 24 C6 40 D4 C9 30 12 EF DD 0A E0
0008F430 08 B7 B9 B7 B9 D6 04 2B AB A9 AB 2B AB A9 AB 2B
0008F440 AB A9 AB 39 AB A9 AB 2B AB A9 AB 2B AB A9 AB 2B
```

You can optionally put 00 or FF at the place of the rest of the old song. This way you can easily see where there is unused space.

6. Changing the song pointer

If you have to put your song elsewhere in the ROM, you need to modify the pointer and you can

calculate its position will the below formula. It's simply pointers base offset + (song ID multiplied by 3). The other method is doing a hex search in HxD with the old offset of the song. In the case of as an example \$C8EFA6, search for A6EFC8.

$$C53E96 + (0x21 * 0x03) = C53EF9$$

```
Offset (h) 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 00053EE0 C8 C1 CE C8 30 D3 C8 56 DA C8 BF DD C8 6B E1 C8 00053EF0 57 E3 C8 E2 E3 C8 48 EA C8 A6 EF C8 72 F4 C8 15 00053F00 FA C8 43 FE C8 4B 05 C9 E9 05 C9 66 0A C9 B6 90
```

7. Changing the instruments

Now the other part of the job is changing the song channels instruments. It's the same logic to calculate the beginning of a song instruments, except you multiply your song ID by 32 (0x20). The instruments file is 32 bytes in size (16 channels times 2 bytes per instruments). First byte is instrument ID, second byte is always 00.

$$C53F95 + (0x21 * 0x20) = C543B5$$

Once the instruments data is pasted, save your ROM. Note that you can save (Ctrl+S) anytime during the tutorial, it does not matter.

You'll notice *The Prelude* has 6 instruments. As mentioned previously some songs downloaded from the forum (not a majority) might have incorrect instruments. In such an event, you'll need to assign the correct instruments. There is a complete list of original instruments here. You'll need to identify each channel instrument and replace what you think are the wrong ones. A bit trial and error but you'll develop your music skills. If you have instruments IDs in your file from \$40 and above it mean your song require the instrument patch available in the same thread as the songs. The songs requiring will have a "p" next to their name. The wrong assigned instruments are often those, because the author added more instruments in his hack without noticing the admins, resulting in instrument indexes above the limit of the patch.

8. Details on song channels

A thing that differs between songs available on the forum and original songs are the channel pointers in the song. Below is a channel of *The Prelude* and the song at the end loop toward the beginning of the blue section. The last command is F6 02 04 which mean continue by going back to 0x0402 byte after the start of the song. Every song in the original game have these command relative to their offset in the ROM meaning this F6 command would look like as F6 8E F3 (\$C8F38E). It would not be exactly this because a song don't redo the first channel commands twice but I talk about this because such a tutorial would not have been possible with an unmodified original song, because when you move it you need to change all the song loop commands and channel pointers at beginning of song data. By having the custom song channel pointers start at 00 00 and not the song offset last two bytes, we easy the process a lot.

Below, a loop command of an original song pointing at \$C8F9B9. In the case of a custom song, we would see more or less F6 0X YZ, likely something below 0x0A00.

```
Offset (h) 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 0008F9E0 9E D7 3C D8 9E 4A B7 4A 58 B9 58 5B E2 07 74 D7 0008F9F0 2E D8 E3 E3 BA 9E BA 9E BA 9E BA 9E TE 9A D7 0E 0008FA00 D8 7E BA 9E BA 9E BA 9E BA 9E D7 00 D8 8C 62 D7 0008FA10 00 D8 66 B9 69 2C 04 3B FA 43 FE 3B FA BC FA 35 0008FA20 FB CD FB 62 FC C3 FC 28 FD 99 FD 3B FA BC FA 35 0008FA30 FB CD FB 62 FC C3 FC 28 FD 99 FD FO 49 F4 F8 F7
```

9. Conclusion

This tutorial was aimed at beginners. The rest of music hacking is harder and require some practice.

However it is in the range of anyone having the time and patience to learn. As a conclusion I've made a small video showing the import and at the same time did a little tribute to those who contributed to the song database.

Result in-game

sd-result.mp4

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