1 WAV Audio

WAV files inside compressed PAKs cannot be opened with conventional audio players because they have custom header and modified audio data. You can see structure of normal and PS2 HL WAV headers below.

Normal WAV header: (source: http://soundfile.sapp.org/doc/WaveFormat/)

struct sWAVHeader
{
        ulong RiffSignature;   // "RIFF" (LE: 0x46464952) chunk signature
        ulong RiffSize;   // Riff chunk size (File size - 8)
        ulong WaveSignature;   // "WAVE" (LE: 0x45564157) chunk signature
        ulong FmtSignature;   // "fmt " (LE: 0x20746d66) subchunk signature
        ulong FmtSize;   // Fmt subchunk size (16 for PCM)
        ushort Format;   // Audio format (1 for PCM)
        ushort Channels;   // Number of channels (1 for mono, 2 for stereo)
        ulong SamplingFreq;   // Sampling frequency
        ulong ByteRate;   // Byte rate (SamplingF * Channels * BitsPerSample / 8)
        ushort BytesPerSample;// Bytes per sample for all channels (Channels * BitsPerSample / 8)
        ushort BitsPerSample;   // Bits per sample for each channel (8, 16, etc)
        ulong DataSignature;   // "data" (LE: 0x61746164) subchunk signature
        ulong DataSize;   // Data subchunk size
                                  // (SamplesNum = DataSize / (Channels * (BitsPerSample / 8)))
}

Custom PS2 HL WAV header:

struct sPS2WAVHeader
{
        ulong DataSize;   // Same as in normal WAV file
        ulong LoopStart;   // 0xFFFFFFFF – not looped, other values – loop start sample
        ulong SamplingF;   // Same as in normal WAV file
        ulong Magic1;   // = 1, number of channels?
        ulong Magic2;   // = 0, signature?
};

You can open custom PS2 HL WAV's by replacing its header with normal one. However, sound would be terrible because audio data is recalculated by adding (or subtracting - no difference) 128 (0x80) to each sound sample. To fix audio data you can use this approach:

for (Sample = 0; Sample < DataSize; Sample++)
        SoundData[Sample] += 0x80;

Once you done that you can play PS2 HL WAV with conventional programs.

Written by Alexey Leushin, Novosibirsk, 2017-2018

2 VAG music

File extension of PS2 HL music and GUI sounds is *.VAG.

Files with *.VAG extension are usually represent Sony PlayStation audio format (widely used in PS1 and PS2 games). VAG files can be converted with Awave Studio or Video Game Sound Converter programs.

GUI sounds (confirm.vag, cancel.vag, select.vag) are perfectly compatible with listed programs. However, PS2 HL music files are missing header:

VAG audio file header: (source: http://www.psdevwiki.com/ps3/Multimedia_Formats_and_Tools)

(note that variables in VAG file are in big endian format)

```
struct sVAGHeader
{
        char Signature[4];    // "VAGp" signature
        ulong Version;        // Should be 0x20 for PS2 HL
        ulong Magic1;         // = 0
        ulong DataSize;       // Size of file without header
        ulong SamplingF;      // Sampling frequency. Should be 44100 (0xAC44) for PS2 Half-life
        uchar Magic2[10];     // Filled with zeroes
        uchar Channels;       // 0-1 – one channel (mono), 2 – two channels (stereo)
                              // PS2 HL supports mono only
        uchar Magic3;         // = 0
        char Name[16];        // Internal file mane
}
```

If you want to open music files with conventional programs you can fix them by adding missing header in HEX editor (write VAG file size in big endian instead of red bytes):

56 41 47 70 00 00 00 20 00 00 00 00 12 34 56 78

00 00 AC 44 00 00 00 00 00 00 00 00 00 00 00 00

73 6F 6D 65 61 75 64 69 6F 00 00 00 00 00 00 00

If you want to convert some music to PS2 version, remember that input audio should be 44100 Hz mono. Then you can use Awave studio to perform conversion to VAG format. After conversion, remove VAG header in hex editor. Now you can put file on PS2 HL disc.

If you want to disable certain music tracks in game, you can just delete corresponding music files (that is safe and would not crash the game).

Written by Alexey Leushin, Novosibirsk, 2017-2018

2.1 List of PS2 music files

Music files are located at "MUSIC" folder on PS2 HL disc.

Interesting fact: there is no "TRACK29" file: is one more music track was planned to be in the game?

Track # (OST/Game)	Name (OST)	PC file name	PS2 file name	Length	Description
-	-	-	FELOOP.VAG	1:20	Menu music
1 / 2	Adrenaline Horror	Half-Life01.mp3	TRACK2.VAG	02:10	Present in PC version
2 / 3	Vague Voices	Prospero01.mp3	TRACK3.VAG	02:12	Present in PC version
3 / 4	Klaxon Beat	Half-Life12.mp3	TRACK4.VAG	01:00	Present in PC version
4 / 5	Space Ocean	Half-Life07.mp3	TRACK5.VAG	01:36	Present in PC version
5 / 6	Cavern Ambience	Half-Life10.mp3	TRACK6.VAG	01:40	Present in PC version
6 / 7	Apprehensive	Suspense01.mp3	TRACK7.VAG	00:23	Present in PC version
7 / 8	Bass String	Suspense03.mp3	TRACK8.VAG	00:09	Present in PC version
8 / 9	Hurricane Strings	Half-Life09.mp3	TRACK9.VAG	01:33	Present in PC version
9 / 10	Diab. Adrenaline Guitar	Half-Life02.mp3	TRACK10.VAG	01:44	Present in PC version
10 / 11	Valve Theme [Extended]	Half-Life13.mp3	TRACK11.VAG	01:23	Present in PC version
11 / 12	Nepal Monastery	Half-Life04.mp3	TRACK12.VAG	02:08	Present in PC version
12 / 13	Alien Shock	Half-Life15.mp3	TRACK13.VAG	00:36	Present in PC version
13 / 14	Sirens In The Distance	Half-Life14.mp3	TRACK14.VAG	01:13	Present in PC version
14 / 15	Nuclear Mission Jam	Half-Life16.mp3	TRACK15.VAG	02:00	Present in PC version
15 / 16	Scared Confused Short	Suspense02.mp3	TRACK16.VAG	00:16	Present in PC version
16 / 17	Drums & Riffs	Half-Life03.mp3	TRACK17.VAG	02:04	Present in PC version
17 / 18	Hard Technology Rock	Half-Life08.mp3	TRACK18.VAG	01:40	Present in PC version
18 / 19	Steam In The Pipes	Prospero02.mp3	TRACK19.VAG	01:56	Present in PC version
19 / 20	Electric Guitar Ambience	Half-Life05.mp3	TRACK20.VAG	01:25	Present in PC version
20 / 21	Dimensionless Deepness	Prospero04.mp3	TRACK21.VAG	01:25	Present in PC version
21 / 22	Military Precision	Half-Life11.mp3	TRACK22.VAG	01:21	Present in PC version
22 / 23	Jungle Drums	Half-Life06.mp3	TRACK23.VAG	01:50	Present in PC version
23 / 24	Traveling Through Limbo	Prospero03.mp3	TRACK24.VAG	01:17	Present in PC version
24 / 25	Credits Closing Theme	Half-Life17.mp3	TRACK25.VAG	01:39	Present in PC version
25 / 26	Threatening Short	Prospero05.mp3	TRACK26.VAG	00:37	Present in PC version
26 / 27	Dark Piano Short	Suspense05.mp3	TRACK27.VAG	00:17	Present in PC version
27 / 28	Sharp Fear Short	Suspense07.mp3	TRACK28.VAG	00:06	Present in PC version
-	-	-	TRACK30.VAG	00:10	Heavy breathing of two persons (used at the end of Decay's "Dual Access" chapter)

3 Intro video

PS2 Half-Life demo contains intro video just like the PC version. As far as I know playback of intro video is hardcoded to the executable file. But maybe there is still a way to enable it in retail version of game.

File extension of PS2 HL intro video is *.PSS. Video format of these files is generic MPEG. You can change extension to *.mpg and watch it on PC. However, audio is likely in VAG format so you would not hear anything if you are playing this video on PC.

You can see full info on "GEARBOX.PSS" intro video file on fig 1 (file analyzed with "MediaInfo" program).
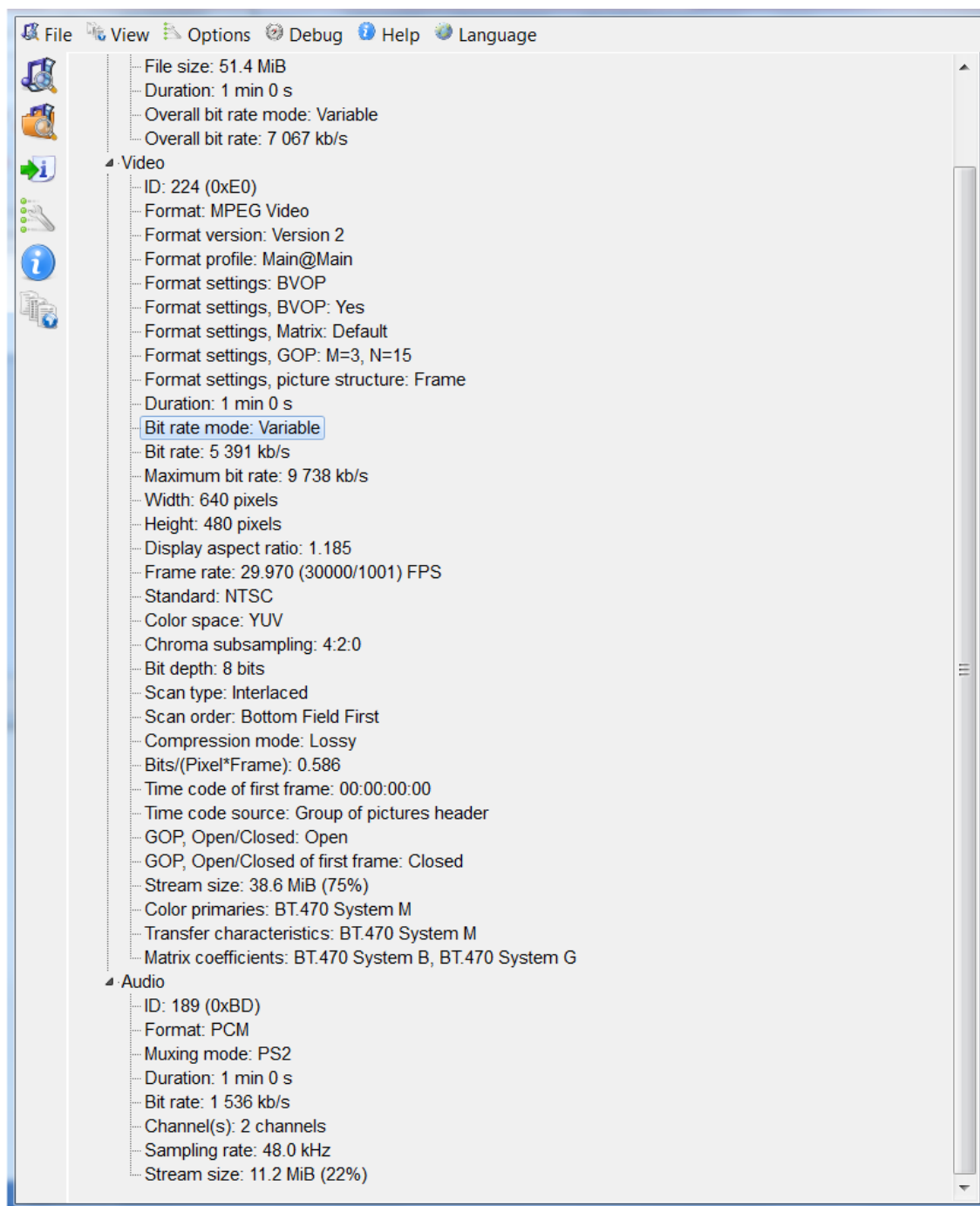

Fig. 1

Written by Alexey Leushin, Novosibirsk, 2017-2018