

The Ensoniq EPS/EPS16+/ASR-10 Bank Format

documented by Thoralt Franz

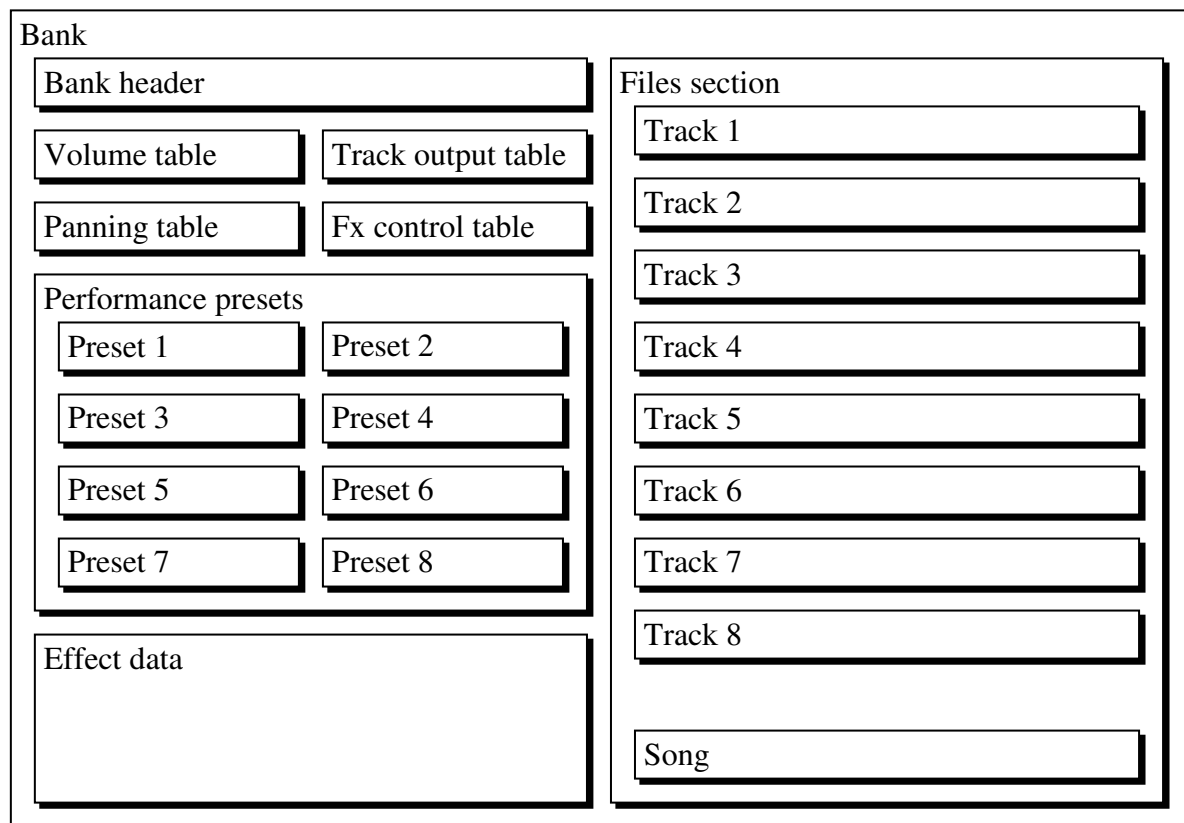
The Ensoniq Bank Format

This document describes the structure of sound banks for the Ensoniq EPS, EPS16+ and ASR-10. All this information was found by reverse engineering the bank format with the above samplers. The description may be not exact at some points or may even contain errors. If you find any issues, please inform the author thoralt@thoralt.de.

An Ensoniq Bank contains the following information:

- instruments to load
- song to load
- volume table
- panning table
- track output table
- effect control table
- performance presets
- effect data

All this data is stored binary coded inside the bank file.



Bank Layout

The bank consist of a number of consecutive sections, each containing specific data.

Bank Header
9 File Info Blocks
Table: Volume/Track Output info
Table: Panning/Fx Control info
8 Performance Presets
Effect code

Unless otherwise stated, all the following data types are referenced to as **Intel ordering** (lowest byte first), although coming from a Motorola based machine.

The Bank Header

The bank header is located at offset 0x0000 and has a size of 24 bytes.

Offset	Size	Description
0x0000	DWORD	bank size: shift right by 4 to get the actual size in bytes (should be 1536 bytes in all cases)
0x0004	DWORD	machine ID: 0xC0FF4089 EPS 0x000020A8 EPS16+ 0x0000C034 ASR-10
0x0008	12 WORD	bank name: one character in each low byte
0x0020	WORD	track mask: low byte: if a bit (0...7) is set, the corresponding track (1...8) has valid data high byte: currently unknown (0xFF on EPS/EPS16+, 0xFE on ASR-10)

File Info Blocks (FIBs)

The FIBs are located at offset 0x0022. They are numbered from 0..8 containing information about the 8 loaded instrument files (FIB 0..7 for track 1..8) and the loaded song (FIB 8).

There are two types of FIBs: One for the EPS/EPS16+ and one for the ASR-10. The only difference is that the file paths for EPS/EPS16+ may only be 5 levels deep, for ASR-10 the path limit is 11 levels. Each FIB is 16 bytes (EPS/EPS16+) or 28 bytes (ASR-10) long, so the length of all FIBs is 144 bytes (EPS/EPS16+) or 252 bytes (ASR-10).

Additionally, the original EPS doesn't use the high bytes of the file pointers for disk name storage; on EPS all files of a bank *must* be on the same disk, so disk name storage is not necessary.

Offset	Size	Description
0x0000	WORD	instrument copy: low byte: if bit 7 is set, then this is a copy; bits 0..3 contain the copy source high byte: unknown (values 0xFF on EPS/EPS16+ or 0xFE on ASR-10)
0x0002	WORD	1st file pointer: low byte: device (0x00=floppy, 0x01...0x08=SCSI0...SCSI7) high byte: first character of source disk name (unused on original EPS)
0x0004	6 WORDs	2nd – 7th file pointer: low byte: 1 st – 6 th directory index* (see below) high byte: 2 nd – 7 th character of source disk name (unused on original EPS)
<i>ASR-10 only</i>		
0x0010	6 WORDs	8th – 13th file pointer: low byte: 7 st – 12 th directory index* (see below) high byte: unknown (probably unused, but not filled with zeroes)

**Directory index:*

The position of a file is stored as a chain of directory positions. If the first entry for example is 0x05, then the file with number 0x05 in the root directory has to be loaded. If this happens to be a directory itself, this subdirectory will be opened and the directory index of the following file pointer will be evaluated. This continues until either a non-directory file was found or the end of the list (7th pointer on EPS/EPS16+ or 14th pointer on ASR-10) is reached. In this case, the loading of that particular file fails and the sampler continues with the next FIB.

Volume and Track Output Table

The “Volume/Track Output Table” is located at offset 0x00B2 (EPS/EPS16+) or 0x011E (ASR-10) and has a size of 16 bytes (EPS/EPS16+) or 32 bytes (ASR-10).

On the ASR-10, the second half of the table seems to be unused, so only the first half is described here.

Offset	Size	Description
0x0000	8 WORDS	volume and track output information: low byte: volume (0x00=0, 0x7F=99) high byte: track output (0x00=WS, 0x01=BUS1, 0x02=BUS2, 0x03=BUS3, 0x04=AUX1, 0x05=ROTATE)

Panning and Effect Control Table

The “Panning/Fx Control Table” is located at offset 0x00C2 (EPS/EPS16+) or 0x013E (ASR-10) and has a size of 16 bytes (EPS/EPS16+) or 32 byte (ASR-10).

On the ASR-10, the second half of the table seems to be unused, so only the first half is described here.

Offset	Size	Description
0x0000	8 WORDS	panning and fx control information: low byte: panning (0x80=WS, 0x82=-98, 0x7F=+99) high byte: fx control (0x00=fx control off, 0x01=fx control on)

Performance Presets

incomplete

The performance presets are located at offset 0x00D2 (EPS/EPS16+) or 0x015E (ASR-10) and have a size of 8*134=1072 bytes.

Offset	Size	Description
0x0000	WORD	???:
0x0000	WORD	???:
0x0018	WORD	track 1 volume and track output information: low byte: volume (0x00=0, 0x7F=99) high byte: track output (0x00=WS, 0x01=BUS1, 0x02=BUS2, 0x03=BUS3, 0x04=AUX1, 0x05=ROTATE)

Effect Code

incomplete

TODO:

- performance preset description
- some words about the fx section
- source code snippets, C structures

Thoralt Franz, 12/28/2006 12:13 AM