MIDI playing bank for Yamaha OPL2 (YMF262) chip

file format specification (WOPL and OPLI)

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0. Changelog

Version	What's new
1	First version (23rd of July, 2017)
2	Added banks meta-data arrays into bank format (August, 1, 2017)
3	Added two delay coefficients are needed for ADLMIDI's channel busy (19th of November, 2017) Change: Added 'blank instrument' flag into existing variable (26th of March, 2018) Change: Added rhythm-mode drum type three-bit number (29th of May, 2018) Change: Added two new volume scaling models: DMX and Apogee with fixed AM voices (31st of August, 2020) Change: Added three new volume scaling models: Audio Interfaces Library, Win9x Generic FM, and HMI Sound Operating System (6th of September, 2020) Change: Added three new volume scaling models: Old variant of HMI with defected FM voices, MS AdLib driver for Windows 3.x, IMF Creator, and Jammie O'Connel's FM Synth driver for Windowx 3.x (14th of November, 2025) Change: Formerly unused bit at the instrument bitwise flags, now became the "Fixed note" flag. Also clarified other bits. (24th of November, 2025)
3	Documented operators layout as footnote (May, 12, 2019) also corrected bitwise flags layout and other spelling mistakes

1. Single-instrument entry

Each instrument file contains a set of data for single channel of YMF262 chip to setup the timbre. Length of each instrument entry is 62 bytes (up to version 2 and in OPLI files). Any non-ASCII string data must be encoded with UTF-8 and fit to 32 bytes including the NULL terminator. Since version 3, in WOPL banks each instrument has 4 extra bytes for two extra fields.

Bytes-Length	Description
32	Name of instrument null-terminated string
2	Big-Endian 16-bit signed integer, MIDI key offset value (master instrument, or first voice in pseudo 4-operators mode)
2	Big-Endian 16-bit signed integer, MIDI key offset value (second voice in pseudo 4-operators mode)
1	8-bit signed integer, MIDI Velocity offset
1	8-bit signed integer, Second voice detune in pseudo-4-operators mode
1	8-bit unsigned integer, Percussion instrument key number
1	8-bit unsigned integer, Bitwise flags: [0EDDDCBA] A) 0x00 - 2-operator mode 0x01 - 4-operator mode B) 0x02 - pseudo-4-operator (two 2-operator voices) mode C) 0x04 - is 'blank' instrument (instrument which has no sound) D) 0x38 - Reserved for rhythm-mode percussion type number (three bits number) -> 0x08 - is Bass drum -> 0x10 - is Snare -> 0x18 - is Tom-tom -> 0x20 - is Cymbal -> 0x28 - is Hi-hat E) 0x40 - Fixed note 0) Reserved / Unused
1	8-bit unsigned integer, Feedback / Connection for 1'st and 2'nd operators or first voice
1	8-bit unsigned integer, Feedback / Connection for 3'st and 4'nd operators or second voice
--- Operators 1/2/3/4 (repeats 4 times) --- [1]	
1	AM/Vib/Env/Ksr/FMult characteristics
1	Key Scale Level / Total level register data
1	Attack / Decay
1	Sustain and Release register data
1	Wave form
--VERSION >= 3---WOPL-Bank-only, OPLI doesn't have those fields---	
2	Big-Endian 16-bit unsigned integer, Millisecond delay of sound while key is on
2	Big-Endian 16-bit unsigned integer, Millisecond delay of sound after key off

1 /* Operator indices inside of Instrument Entry */
#define WOPL_OP_CARRIER1 0 // Operator 2 for 4-operators mode
#define WOPL_OP_MODULATOR1 1 // Operator 1 for 4-operators mode
#define WOPL_OP_CARRIER2 2 // Operator 4 for 4-operators mode
#define WOPL_OP_MODULATOR2 3 // Operator 3 for 4-operators mode

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2. Instrument file (OPLI)

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Each instrument file contains a set of data for single channel of YMF262 chip to setup the timbre on it.

Total data length: 76 bytes

Bytes-Length	Description
	Header
11	Magic number "WOPL3-INST\0". Where '\0' is a zero byte which terminates the string
2	Version. Little endian Unsigned 16-bit integer. Latest version is 2 (no difference between 2 and 1)
1	Is this instrument a percussion. 0 - melodic, or 1 - percussion
	Data
62	[Single-instrument entry], look at top of this text file

3. MIDI playing bank file (WOPL)

Bank format designed to store instrument bank for playing MIDI in multiple standards like GM, GS and XG. Format allows to save multiple sets with 128-instruments which is needed to store GS and XG instrument sets which have more than standard 128 instruments with a single bank. Any non-ASCII string data must be encoded with UTF-8 and fit to 32 bytes including the NULL terminator.

Total data length is sum of: 19 + (62*128*MBanks) + (62*128*PBanks) bytes

Bytes-Length	Description
--Header--	
11	Magic number "WOPL3-BANK\0". Where '\0' is a zero byte which terminates the string
2	Version. Little endian Unsigned 16-bit integer. Latest version is 2
2	[MBanks] Unsigned 16-bit BE integer, count of melodic MIDI banks (every bank contains 128 instruments)
2	[PBanks] Unsigned 16-bit BE integer, count of percussion MIDI banks (every bank contains 128 instruments)
1	8-bit unsigned integer, Global bank bitwise flags: [000000BA] A) Deep-Tremolo flag B) Deep-Vibrato flag 0) Unused / Reserved
1	8-bit unsigned integer, ADLMIDI's volume scaling model enumeration, default is 0: 0 - Generic, linearized 1 - Native OPL3's logarithmic volume model 2 - DMX volume model 3 - Apogee Sound System's volume model 4 - Windows 9x SB16 driver volume model 5 - DMX volume model with fixed AM voices 6 - Apogee Sound System volume model with fixed AM voc. 7 - Audio Interfaces Library volume model 8 - Windows 9x Generic FM driver volume model 9 - HMI Sound Operating System volume model 10 - HMI Sound Operating System (Ver. 3.0 and below) 11 - MS AdLib Driver for Windows 9x volume model 12 - IMF Creator volume model 13 - Jammie O'Connel's FM Synth volume model
--VERSION >= 2---Melodic bank meta-data-----	
(repeat MBanks times)	
32	Name of melodic bank null-terminated string
1	LSB index of bank (unsigned char)
1	MSB index of bank (unsigned char)
--VERSION >= 2---Percussion bank meta-data--	
(repeat PBanks times)	
32	Name of melodic bank null-terminated string
1	LSB index of bank (unsigned char)
1	MSB index of bank (unsigned char)

InsSize:
- --62 bytes in up to version 2
- --66 bytes since version 3 and later

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-----------Melodic Instruments--------------
    InsSize * 128 * MBanks  | 128 [Single-instrument entries] per each bank,
                            |     look at top of this text file
---------Percussion Instruments-------------
    InsSize * 128 * PBanks  | 128 [Single-instrument entries] per each bank,
                            |     look at top of this text file
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