
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 YM262 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 double-voice mode. It's 1/64 cent of the tone. Formula to compute valid half-tone value as a float: $(\text{float}) (\text{(int)} X + 128) \gg 1 - 64 / 32.0f$ Where X is the detune value from the file.
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

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

```
--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
```

2. Instrument file (OPLI)

Each instrument file contains a set of data for single channel of YM262 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-----	
--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	

-----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
