MIDI playing bank for Yamaha OPL2 (YMF262) chip

file format specification (WOPL and OPLI)

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                        0. Changelog

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Version | What's new
--------------------------------------------------------------------------------
    1    | First version (23rd of July, 2017)
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    2    | Added banks meta-data arrays into bank format (August, 1, 2017)
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    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'Connell'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)
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    3    | Documented operators layout as footnote (May, 12, 2019)
         | also corrected bitwise flags layout and other spelling mistakes
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1. Single-instrument entry

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     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 double-voice mode.
              | It's 1/64 cent of the tone. Formula to compute valid half-tone
              | value as a float:
              |   (float) ( ( (int) X + 128 ) >> 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
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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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--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
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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

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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
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3. MIDI playing bank file (WOPL)

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    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'Connell'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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