

I. Introduction of SID-Wizard and SID

=====

SID-Wizard is a music-tracker application for the Commodore 64 computer's audio-chip called SID. It has many advanced features not found in other trackers, however I took many ideas from the best C64 music editors like Goattracker, SDI, X-SID, SID-Factory, JCH Editor, etc.

Main features of SID-Wizard:

- 46 Instruments (32 in 2SID version)
- 6 subtones (only 2 in 2SID version)
- 100 of 250-byte patterns (105 in 2SID)
- Each instrument has own distinct tables
- Each instrument has own Hard-Restart
- Calculated vibrato (4 types) & slide
- Up to 8x framespeed (400Hz SID-control)
- ChordTable, more chords for 1 instrument
- Keyboard-tracking (note-dependent filt)
- Support for different tempos on tracks
- Up to 3 pattern-effects in a patternrow
- Gate-off entries in instrument-tables
- Scalable player (from 'bare' to extra)
- Export formats like .SID and Executable
- Goattracker-like concept and keys
- Oscilloscope & pulsed./cutoff displays
- Selectable pre-set colour-themes
- Other keyboard-layout(s) are selectable
- NTSC machine-type support (video&audio)
- MIDI/XM file-conversion via SWMconvert
- Goattracker SNG importer 'sng2swm.exe'

New features in SID-Wizard 1.5:

- MIDI-in (poly/mono, velo-sense), devices: HerMIDI, Sequential, Passport/Syntech, JMS Dattel/Siel/CLAB, NameSoft, Maplin, MoogSP.
- 2SID (stereo) version - format is 'sws'
- Introducing smaller "Bare" player-type
- Note-entry mode for chord-table
- Tunings: Verdi-tuning, Just-intonation
- SDI & Janko piano/keyboardlayouts added
- Saving editor-settings to a config-file
- One-step "Undo" for patt./orderl./ins.
- Solo/Unsolo function (with Shift+0)
- Some more key-combinations (e.g. C+=K)
- Sound-FX support (SFX, Check doc's end)
- Title-indentation and 4x fast-forward function in .exe.prg SID-Maker exports
- Less audible player-initialization pop
- Fresh collection of 324 instruments

New features in SID-Wizard 1.6:

- Many improvements/fixes upon SW-1.5
- Better cursor-movement between panels
- New MIDI-messages: Start/Stop/Reset/etc.
- Better MIDI-handling ('running status')
- SWM to SWS conversion in SWMconvert
- Positions not lost after save/load

If you're interested in sound-synthesis and the SID-chip you can read a bit more in SID-Wizard 1.4 User Manual. But let's see the registers of SID in a nutshell:

00-01	07-08	0E-0F	:Pitch low&high bytes (low byte;high byte)
02-03	09-0A	10-11	:Pulsewidth registers (low byte;hi-nybble)
\$04	\$0B	\$12	:Waveform+control reg (test,ring, sync,gate)
05-06	0C-0D	13-14	:ADSR envelope reg. (Att,Decay; Sust,Rel)
\$15-\$16			:Filter cutoff frequency (low 3 bits; high 8 bits)
\$17			:Filter Resonance & Switch (Reso.nybble, Ch3, Ch2, Ch1)
\$18			:Filter Band / Volume reg. (Band nybble, Vol.nybble)

=====

II. Usage of SID-Wizard

=====

1.Startup-menu:

You can select between these player-routine types at startup:

Normal: It probably has everything you will need: Calculated vibratos, Detune, Chord, Transpose, instrument octave, WF-ARP speed, Pulse/Filt.reset OFF, keyboard-track, 11bit filter, tempo-programs, vibrato types, HR-types, frame1 setting, note-off tableindex, subtone-jump, zeropage-restore

Medium: Smaller player-size but lacks: vibrato-type, hard-restart type, frame1 setting, PW keybrd-track, note-off index, subtone-jump FX and zeropage save/restore

Light: Even smaller & consumes less rastertime, but lacks also: Calculated vibrato & slide, Detune, Chord-table, Transpose FX, Instrument-octave, WF-arp.speed, PW/Filt.reset OFF, keyboard-trk, 11bit filter, tempo-programs

Extra: Based on 'Normal', adds extras: (takes more memory & rastertime) program-tables never skipped, FiltSwitch-Reso.FX, Ghost registers, fast tempo (0..2), vibrato is not lost after pitch-slide, note/track Delay pattern-FX

Bare: Very restricted, significantly smaller size, less than "Light".
Lacks: sub-tune-support, multispeed support, external volume-setting, filter-shift FX, orderlist-FX, portamento in note-column, WF-arpeggio NOP \$80, vibrato-rate FX, filter/detune/WF small effects

- *If none of these pre-set values fit your needs you can refine them in file /sources/settings.cfg and recompile SID-Wizard with your own settings.
- *2SID version of SID-Wizard uses ghost-registers in all types of players.

For PAL machines you can select an alternative pitch-tuning system in Start-up menu: Verdi tuning is equal-tempered but uses A4=432Hz as base-note, while Just-intonation even has note-intervals based on integer ratios to produce pure intervals in key of C. (not other keys)

2. User Interface (and navigation keys)

You have to use key-combinations to do tasks in SID-Wizard. Numbers are given in hexadecimal 1..F format everywhere. CRSR-keys can now go through ins.panel. The top-border part displays the logo with SW version-number and player-type, Octave, Playback-time, Rastertime, Auto advance amount, Pulswidth- and Filter-cutoff bars, and finally Channel3 wave.

Pattern-editor (call with F5 key):

The largest part of the screen where you can put notes & effects for the 3 tracks of SID. A patternrow looks like

Column1	Column2	Column3	Column4
Note/Fx	Instrument/Fx	Effect	Fx-Value

The notes can be typed in the selected octave by 2 rows in normal SW-layout:

Upper octave: 2 3 5 6 7 9 0
(SDI's layout) Q W E R T Y U I O P @ *
Lower octave: S D G H J L
Z X C V B N M , .

DMC-layout: W E T Y U O P

A S D F G H J K L :

JANKO-layout: Chromatic/non-diatonic, notes found on F,4,K,8 keys as well.

Orderlist (call with F6 = Shift+F5):

In the bottom-border you can organize the sequence how the patterns are to be played after each other on tracks. Some effects can also be given above \$80, see values later in section III.

Instrument-panel (call with F7 key):

On the right-side of the screen the instruments can be edited. You can select instrument to edit with +/- keys. Each instrument has a number and you can give them a name as well. See the content of the tables in section III.

At the rightmost side of the screen are chord-table (call with C+=F5 or C+=K) and the tempo-program table (C+=F7/F8)

3. Menu: File operations, configuration

Menu and file-operations can be called with F8 key (Shift+F7). Press Esc/STOP to exit the Menu or file-dialog. You can save/load worktunes with SWM extension, while SWI stands for instruments. (You can check the author-information and player-type abbreviation N/M/L/E/B of the loaded tune in orderlist's position-row right after loading or by calling the menu with F8 key.)

Press RETURN on the menupoints to set or adjust parameters. One exception is default pattern-length which can be set with +/- and sets the unused patterns' lengths when you kill/load/save a tune.

To activate a MIDI-device first select its type with RETURN, then select the MIDI-channel you want to receive from. (Press Shift+RETURN to disable MIDI.) If a MIDI-device is set successfully you can see ':' before its name, else a '!' notifies you about the issues.

Attention: Most MIDI-devices which use \$DE00..\$DFFF will cause a crash/freeze if you have a cartridge attached on Expansion port. I don't know a workaround except using HerMIDI which doesn't use the Expansion-port kept for cartridges.

The base-address of the 2nd SID can be set to all possible values with +/- but the most commonly used addresses come first. The setting gets performed when you exit from menu or restart tune. (F1) (Crash with cartridges can also happen if you try to set \$DE00..\$DFE0 here.)

From version 1.5 SID-Wizard no longer saves editor-specific settings into the workfile: you can save your settings with 'SAVE CONFIG' menupoint into a file called '@SWCONFIG.PRGM'. Then it's loaded at next startup automatically, if succeeds it is seen in startup-menu. Otherwise you'll see a '?' next to this menupoint. (If even saving the config was unsuccessful you'll see a '!' here)

4.Keyboard-layout of SID-Wizard

If you use VICE emulator some useful equivalents: CONTROL=Tab, RUNSTOP=Esc, C= (called CBM-key too) is Control-key, Pound=Insert, UpArrow=PageDn (in Linux)

General keys (some were told before):

F1	Play from the beginning
F2 (Shift+F1)	Play from play-mark(s)
F3	Play selected patterns
F4 or RUNSTOP	Stop/Continue (toggle)
C= + F1..F4	Same, but Follow-play
<- (LeftArrow)	FastForward 6x playback
Shift + <-	Toggle follow-playback
C= + <-	Toggle auto-Follow
C= + , / .	Select(inc/dec) Subtune
< > (Sh+ ,/.)	Inc./Dec. subtune-tempo
[] (Sh+ :/;))	Inc./Dec. 2nd funktempo
C= + T	Toggle SubtuneFunkTempo
/ or Up-Arrow	Page Down (4/8 steps)
Sh+/, RESTORE	Page Up (4/8 steps)
Shift + F / G	Inc./Dec. framespeed
Shift + I	Toggle auto-Instrument

Pattern-editor related keys (F5):

CONTROL (Tab)	Step Track (Shift:back)
C= + CONTROL	Fast switch SID1/SID2
Shift + SPACE	Play patt. from cursor
Shift+ 1..6/0	Mute-Unmute/Solo-Unsolo
C=+1..8 C= +/-	Select / inc.dec.Octave
RETURN (+Sh.)	Put Note-ON / Note-OFF
	Go to instr. / chord
C= + RETURN	Select played patterns
A / 1 / C=+DEL	Empty row in column
DEL	Delete / Dec. patt.len.
Sh+DEL / Pound	Insert / Inc. patt.len.
Shift+C= + DEL	Delete whole PatternRow
C= + Z/X/C/V	Undo/CutCopy/Copy/Paste
Shift + C	Set end of Copy-marking
Shift + Q / W	Transpose from cursor
C= + Q / W	Transpose octave up/dn.
Shift + V	Vibrato in Note-column
Shift + P	Portamento in Note-col.
Shift/C= + R	RingMod.ON/OFF in NoteC
Shift/C= + S	Sync.ON/OFF in Note-col
Shift + +/-	Select pattern on track
Sh+D / C= + D	DoveTail/MIDI-Polyphony
Shift + A / Z	Inc./Dec. auto-adv.step
Shift + H / J	Inc./Dec.highlight-step
C= + B	Toggle track-binding

Orderlist-related keys (F6 / F5):

RETURN (+Sh.)	Go to pattern(s) in pos
Shift+SPACE	Set play-mark (F2 key)
C= + SPACE	Set marks to played pos
C= + Z/C/V	Undo/Copy/Paste @cursor
Shift + C	Set end of Copy-marking
C= + E	Find 1st Empty pattern

Instrument-related keys (F7):

+ / - (&Shift)	Select instrument
CONTROL (Tab)	Go Instrument-subtables
Shift + N	Name the instrument
RETURN	Toggle param./ go Chord
Shift+SPACE	Set Note-OFF table-pos.
C= + Z/X/C/V	Undo/Cut/Copy/Paste Ins
C= + P / F	Toggle PW/Filter reset
=	Negate value in table
Shift + S	Go to main Inst.setting
Shift + W	Go to WF-ARP table
Shift + P	Go to PulseWidth table

Chord-table related keys (C=+F5):

Shift + K / L	Select Chord anywhere
+ / -	Sel.Chord in ChordTable
RETURN	Return to patt./instr.
=	Negate value in table
C= + N	Note-mode / Number-mode

Tempo-table related keys (C=+F7):

Shift + T / Y	Select Tempo-program
+ / -	Sel.Tempo in TempoTable

Menu keys (F8):

RETURN (+Sh.)	Adjust/reset settings
+ / -	Set default patt.length or SID2 base-address

File selector keys:

F1	Re-read disk-directory
F3 / Up-arrow	Page-down in directory
CONTROL (Tab)	Filename/info/selector
RETURN	Approve / Perform task
F7/STOP (Esc)	Quit file-dialog

5.SDI key-layout's differences/addons:

SH L	Load music (bring up MENU too)
SH S	Save Music (bring up MENU too)
F1	Play from orderlist mark(s)
F2	Set play-mark in orderlist
F3	Stop/Continue playback
Z	Play pattern from current line
Return	Play pattern from top
F4	Edit/Synth mode (toggle)
F7/F8	Select octave (incr./decr.)
STOP, /	Toggle instrum./pattern-editor
SH F	Filter program table
SH T	Tempo program table
CBM +/-	Next/Previous song (subtune)
CBM 1..3	Track on/off (mute/unmute)
S/K , L	Tab jump left/right (tracks)
, / .	Jump up/down 8/4 lines
Space	Delete down (in pattern)
G, SH G	Gate on/off (---/++ in pattern)
> / <	Transpose in pattern / Chord+
M, CBM M	Copy, Paste (at cursor-posit.)
SH M	Set end of copy-mark/selection
CBM F	Clear pattern (From cursorpos)
SH Home	To start of song (orderlist)
H	Hunt next unused in Orderlist
N	Name sound/instrument
?	Set speed calls (framesp.1..8)

III. Hexadecimal value reference

1. Instrument-parameters

Main instrument-settings:

ADSR - If Sustain=8, MIDI-velocity=ON
 ADHR - ADSR value for hard-restart
 Framel waveform (turn on with RETURN)
 HardRestart timer (0..2 frames before)
 HardRestart-type (normal/staccato)
 Vibrato amplitude, rate, delay/increase
 Vibrato-type (incremental/delayed u/d)
 Waveform-Arp. table execution speed
 (>\$40:PW-multispeed, >\$80:Filter too)
 Default Chord's No. for the instrument
 Octave-shift (set '+/-' with RETURN)
 PW/Filt-reset (inits on ins.selection)

Waveform-Arpeggio-Detune table:

WF-column: \$00..\$0F repeat row 1..16x
 \$10..\$FD set waveform/ctrl.
 \$FE Jump (>\$40:itself)
 Arp-column: \$00 No pitch-shift
 (with Wform) \$01..\$5F Pitch-shift up
 \$7F Jump to chord
 \$80 NOP (prev.val.)
 \$81..\$DF Absolute pitch
 \$FF..\$E0 PitchShift down
 Detune-column: \$00..\$FE Detune upwards
 \$FF NOP (prev.val.)

PulseWidth-table:

\$8x..\$Fx xx Set Pulsewidth xxx
 \$00..\$7F xx Add xx to PW 00..7F times
 \$FE xx Jump to table-position xx
 *3rd column is keyboard-tracking curve
 (\$00:off, \$00->downwards:less, \$01->up-
 wards:more dependence on note-pitch)

Filter-program table:

Filters are switched on automatically
 for channels that use filtered instru-
 ments. The leftmost channel has the
 highest priority for filter-control if
 more tracks try to use filter. Values:
 \$8r..\$Fr xx Set resonance and cutoff
 (9:lowpass,A:band,C:hi)
 \$00..\$7F xx Add xx to Cutoff .. times
 \$FE xx Jump to table-position xx
 *3rd column: \$00..\$7F, \$ff..\$90:kbTrack
 \$8x FilterSwitch-override
 *If you just insert an empty row in
 1st row of the filtertable, instrument
 is filtered but won't control filter.

2. Pattern-Effects

Note-column effects: They appear like
 tiny graph. symbols after being typed
 with key-combinations (Shift+R/S/P/V)
 Vibrato's amplitude can be set to 1..F

Instrument-column effects:

\$01..\$3E Select Instrument for track
 \$3F Legato/tied (set pitch only)
 \$40..\$4F Set Waveform (small Fx)
 \$50..\$5F Set Sustain-level (note-vol)
 \$60..\$6F Set note's Release-time
 \$70..\$7F Set Chord(overrides default)

Effect-column SMALL effects:

\$20..\$2F Set Attack-time of note
 \$30..\$3F Set Decay-time of note
 \$4,5,6,7x The same as above (instr.FX)
 \$80..\$8F Vibrato Amplitude setting
 \$90..\$9F Vibrato Rate setting
 \$A0..\$AF Set Main Volume (\$d418 nybL)
 \$B0..\$BF Filter-band nybble
 \$C0..\$CF Chord-speed setting
 \$D0..\$DF Detune current note
 \$E0..\$EF Control-nyb. (test/ring/sync)
 \$F0..\$FF Filter-resonance setting

Effect-column BIG effects:

\$01 Pitch-slide Up
 \$02 Pitch Slide Down
 \$03 Tone-portamento (auto-portamento)
 \$04 Waveform-Control register setting
 \$05 ATTACK/DECAY register setting
 \$06 SUSTAIN/RELEASE register setting
 \$07 Select Chord (overrides default)
 \$08 Set Vibrato Amplitude & Rate
 \$09 Go to WF-ARP table-position
 \$0A Go to PulseWidth table-position
 \$0B Go to Filter table-position
 \$0C Set Chord-speed (or arp.speed)
 \$0D Detune current note upwards
 \$0E Set PulseWidth
 \$0F Set Filter Cutoff-freq. hi-byte
 \$10 Set Main single tempo
 \$11 Set Main FunkTempo
 \$12 Launch Main Tempo-program
 \$13 Set Track's single tempo
 \$14 Set Track's individual FunkTempo
 \$15 Launch Tempo-program for track
 \$16 Select Vibrato-type (0/10/20/30)
 \$1C Shift Cutoff hi-byte (permanent)
 \$1D Delay track by \$00..\$ff frames
 \$1E Delay note by max=tempo-3 frames
 \$1F Set FiltSw/Reso register (\$d417)

3. Orderlist values

\$01..\$7F Pattern-numbers
 \$8F..\$80 Transpose key down
 \$90..\$9F Transpose key up (\$90:orig.)
 \$A0..\$AF Set Main Volume (\$0..\$F)
 \$B0..\$FD Set single track-tempo
 \$FE End of tune, stop playback
 \$FF Jump to position given by the
 following number, above \$80:Jump subtone
 *Orderlist must not begin with \$FE/\$FF!

4.Chord-table values

```
$00..$7D Rel. pitch up (by halfnotes)
$FF..$80 Rel. pitch-shift downwards
$7E Return from chord to Arp-tbl.
$7F Loop the chord infinitely
```

ChordTable now can be edited in 2 ways: default is the new 'Note-mode': You can set the base/root note of a chord outside of the chord-table, then the notes of the chord IN the chordtable. Editing mode (Space) should be selected to type (More convenient method than the number based.Playback also sets the basenote)

5.Tempo-table values

```
$00..$7F Tempo for one pattern-row
```

IV. SID-Maker and converters

SID-Maker is an important addon for SID-Wizard, it can create various formats from the saved SWM tune: Normal, Raw, Executable and SID. (If you used a ':' in the author-info field it will behave as a separator between author-name and tune-title in the SID export.)

Each format has different settings, you can select a different player-type for all if you want, and relocation-address. SID-export has one more setting, if the SID-type to be set for old/new. (Player-type and SIDtype defaults autodetected.)

There is an additional 'SID2 address' setting in 2SID version, works the same as in the editor: most common addresses come first. All export-formats need it.

SWMconvert.exe is a non-C64 addon, you can convert from/to XM/MID formats with a degree of precision. It's used to convert between .P00/.prg or .S00/.sid format in case you save from VICE-emulator.

sng2swm can convert Goattracker's .sng workfiles to SID-Wizard's .swm format. You can find some examples on the disk.

The exported tune (normal/raw/sid) can be included in your programs in the usual way, LoadAddress of the tune is the initialization subroutine, subtune must be set in accumulator before calling it. LoadAddress+3 is the playback-routine to be called in every frame. LoadAddress+6 is the multispeed-call if you have multispeed tune.

And LoadAddress+9 is the external volume setting. (Put volume into accu before you call this short routine.)

Now SFX (Sound-FX) can be triggered on channel 3 from your program by calling LoadAddress+12, if you exported the tune with the special SID-Maker-SFX. All FXes are essentially instruments, they override channel3 notes during execution. You have to set the CPU-registers first: X=Note, Y=Instrument, A=Length (frames) (Check '/sources/SFX-example' folder.)

You can see the estimated rastertime during composing and the final measure in the executable export. The memory footprints of the different player-types are displayed in the Startup-menu of editor.

Supported MIDI-commands: Stop, Start, Reset SoundOff, ProgramChange, Brightness, Volume Note, PitchWheel, ModWheel, Aftertouch (in monophonic-mode only on cursor channel)

V. Closing Words

Don't be surprised if you see some short screen-flashing in the top & bottom borders when you use MIDI-devices. That's caused by the IRQ that MIDI-cartridges generate in arbitrary times and so they disturb raster-interrupt of SID-Wizard.

In case you'd have an unfortunate crash due to external issues (drive, etc.) you can restart SID-Wizard safely after a warm reset by 'SYS 2061' command.

I hope You'll enjoy using SID-Wizard...

Thanks to people for their contribution:

Witchmaster for the ebook and testing
Akaobi for Japanese Manual and support
Necropolo & Chabee for tests and tunes
Spider, Toggle, Adam, Triton for demotunes
Unreal who decorated the original box
Leon who drew SW-1.2 & 1.4 splash-logos
Soci who brought SW to svn & added stuff
Ant1 for an online tutorial for Newbies
T.L.R for some tests, reports, ideas
Conrad who layed down base of sng2swm
Gartenzwerg for help with Namesoft-MIDI
Ian Coog for timing & SID-format hints

```
*****
*           Mihaly Horvath alias Hermit *
*                               Hungary 2014 AD *
*           hermit@t-email.hu *
*****
```