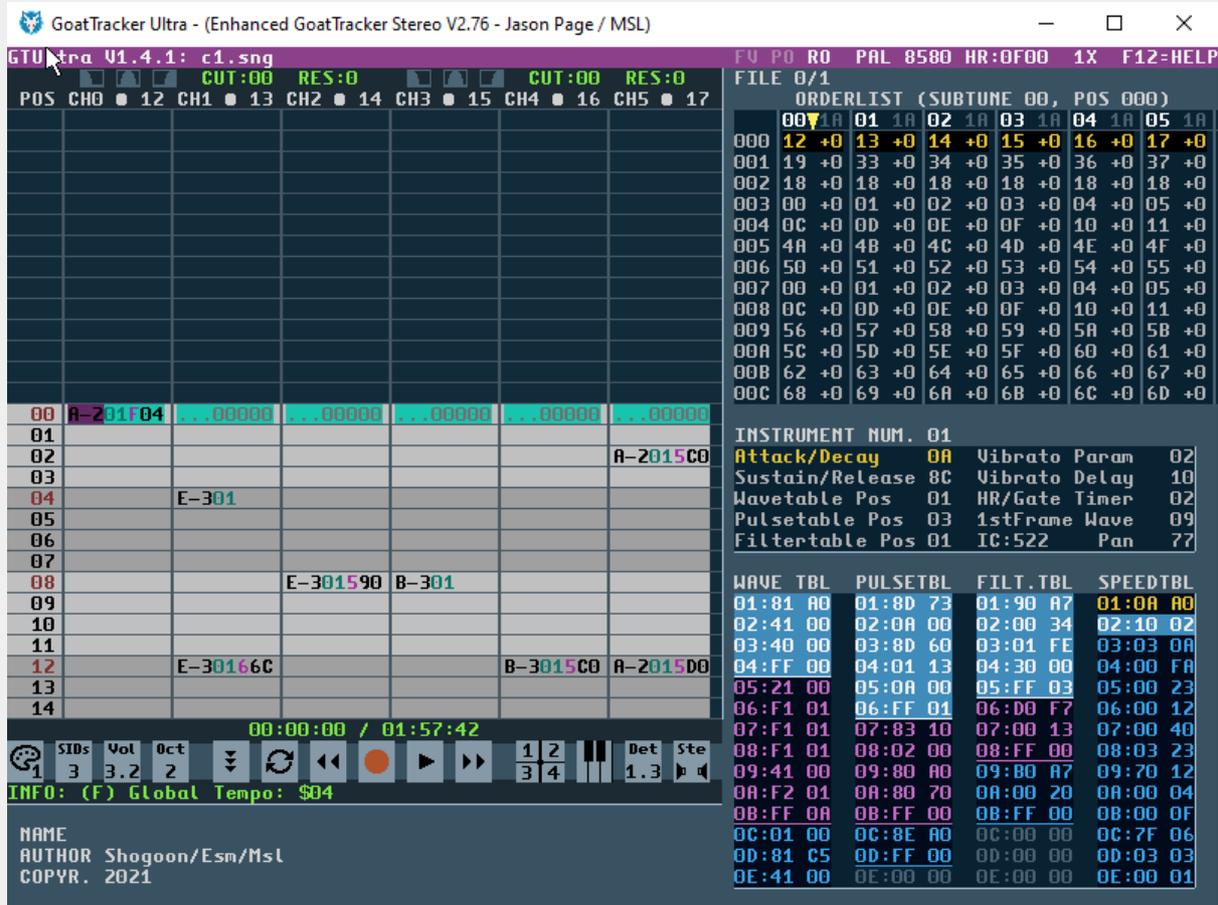


GTUltra - V1.5.3
May 25th 2023 - Jason Page / MultiStyle Labs



What is it?	3
What's new for 1.5.0?	3
Credits:	5
Features compared to GTStereo	5
1. Updated display / skinning	5
2. Undo (ctrl-z)	5
3. Instrument Use count (IC)	5
4. Instrument True Stereo Panning	6
5. Transport bar	6
a. Change Skin (Mouse L/R button) - 16 default presets	6
b. Select SID count (Mouse L/R button - 1-4)	6
c. Select output volume	6
d. Select Octave (Mouse L/R button - 1-6)	6
e. Follow ON / OFF	6
f. Loop pattern ON / OFF	6
g. Selected area looping ON / OFF	6
h. Rewind (similar to a CD player rewind control)	6
i. Record ON / OFF	7

j. Use original GoatTracker F1-F3 keys	7
k. Play / Pause	7
l. Fast Forward	7
m. JAM Mode - SID chip enable	7
n. Display piano keyboard On/Off	7
o. MIDI Port Select	7
p. Detune (-100 cents > 100 cents)	7
6. True Stereo (Editor emulation only)	8
7. Stereo Panning	8
8. 3,6,9 or 12 channel playback (1-4 SID support)	9
9. Song pattern selection	9
10. Song playback from anywhere	9
11. F3 = Shift/Space	10
12. Jam Mode (when not in record mode)- Polyphonic	10
13. Displays note and arp chord offsets in Jam Mode	10
14. MIDI note input	10
15. Load / Save Screen (F10 / F11)	10
16. Move to the previous / next pattern in a song	10
17. Tables separated by colour	11
18. Auto-Portamento key (SHIFT-Y)	11
19. Displays the overall time of the song	11
20. Quick Save	11
21. Info line	11
22. The Master Channel	12
23. F8 = Edit Tables ('cos Jammer said so)	12
24. Filter Information	12
25. Palette Editor	12
26. Char Editor	13
27. F2: Changed function (if classic F1-F3 mode disabled)	14
28. Modify values with mouse	14
29. Looping	14
30. Copy (Ctrl-C) changes	14
31. Inter-pattern looping	14
32. Improved ENTER key functionality (moving to tables..)	14
33. Detailed Table Editing: WaveTable	15
34. Detailed Table Editing: Pulse Table	16
35. Detailed Table Editing: Filter Table	16
36. Waveform editor	17
37. MIDI Port Select	17
38. Ctrl+Left / Ctrl+Right keys to quickly move to previous / next song position	17
39. SID export	18
40. Automatic .sng backup	18
41. Editor information is saved within the .sng file	18
42. Expanded OrderList View	18

43. Expanded OrderList - Copy / Cut / Paste / Insert	19
44. Expanded OrderList - Pasting Transpose Values	20
45. Expanded OrderList - Setting Transpose values	20
46. Expanded OrderList - Compressed Size	20
47. Expanded OrderList - Repeat / End Markers	20
48. Disable all MIDI	21
49. Multiple .SNG support	21
50. Export to .WAV	21
51. GT2Reloc.exe	21
52. Pattern order change when exporting to .SID	22
53. Auto-Advance modes	22
54. Mouse Wheel	22
55. SIDTracker64 Mode	22
56. Drag and Drop to load	23
57. SID Export - Zeropage SID playback option	23

What is it?

GTUltra is an enhanced version of GoatTracker editor.

What's new for 1.5.0?

- Drag / Drop to load files
 - No need to use the F10 menu option
- Bug fixes and stability improvements
- Improved jamming mode
 - KeyOff performed automatically on key release
- SIDTracker64 mode
 - KeyOff automatically applied on an empty pattern row
 - Enter Key - create Key On entries from previous note to cursor position to extend note length prior to Key Off
 - F2-F3 keys act different:
 - F2 = Play current pattern from the cursor position
 - F3 = Play current pattern from the beginning
 - Shift (or CTRL) F12 to toggle this mode on or off
- Export to WAV
 - Shift-F11 to display this panel
 - Normalization on/off option
 - Will export to 16 bit, stereo, 44.1KHz .WAV file
 - Uses current mute settings (allows you to export individual channels)
- Change: CTRL+A to select whole pattern row
 - SHIFT+A to decrease note values (used to also work with CTRL+A)

- Change: 3 different auto-advance modes (SHIFT-Z) when entering data, depending on where cursor is within pattern area
 - Notes only (advance if you enter a note, rest, key on or key off. NOT if you are entering hex data)
 - All (Advance when entering notes or values)
 - OFF (no auto advance)
- Mouse Wheel
 - Use the mouse wheel to scroll through panels, depending on where your flashing editor cursor is currently located
- New: Improved failing merge of 2 .sng files (if running out of instruments or patterns)
 - Original GT gave no warning of a failed merge.
- Optional Debug mode in .cfg file
 - When enabled, memory checks are performed to check for memory leaks
- Optional "Use repeats when compressing from expanded order list view"
 - By default, the expanded orderlist will insert REPEAT commands when converting back to the original orderlist. This keeps the data small, however it makes it difficult to read. Use this option to disable the use of the REPEAT command
- Optional "Automatically move to next or previous pattern in order list when moving cursor"
 - Previously this was always enabled. Now it is possible to disable
 - SHIFT+Click on Follow icon to toggle this mode
- Added new .sng file (JasonPage/RType: Amiga2SID.sng)
 - This uses the SIDTracker64 mode

What's new for 1.4.1?

- Multiple .sng file support (load multiple .sng files and copy/paste between them)
- Mac executable added to the release
- Mac - fixed MIDI support
- Linux executable added to the release
- Linux - fixed automatic backup (crashed GTUltra)
- Various fixes for Expanded Order List
- MIDI (general) fixed (hasn't worked since 1.3.0. Sorry)
- 4SID export fix (GTUltra quits when exporting, due to 6510 BCS being out of range)

What's new for 1.3.0?

- Expanded Order List View
- True Stereo Panning per instrument (emulation only)
- Definable SID Chip Pan positions (eg. place the 3rd SID in the center!)
- Automatic regular .sng backups (user definable duration between saves)
- Inter-pattern looping now optional
- Optional "Classic" F1-F3 key use (shift-click on record button to enable)
- Improved 6502 code for 9 and 12 channel SIDs for simpler playback
- SID emulation now disabled when seeking to start position (the delay was noticeable and annoying)
- Option to fully disable MIDI within now within .cfg file
- Editor settings are now saved in .sng files:
 - FV, PO, RO, NTSC/PAL, SID Type, HR Value, Speed, # SIDs, Stereo mode

Credits:

Original GoatTracker Editor by Lasse Öörni (loorni@gmail.com)

HardSID 4U support by Téli Sándor.

Uses reSID engine by Dag Lem.

Uses reSID distortion / nonlinearity by Antti Lankila.

Uses 6510 crossassembler from Exomizer2 beta by Magnus Lind.

Uses the SDL library.

Uses the RTMIDI library.

GoatTracker icon by Antonio Vera.

Command quick reference by Simon Bennett.

Patches by Stefan A. Haubenthal, Valerio Cannone and Raine M. Ekman.

GTUltra updates, features, bugs(!), bug fixes.. by Jason Page.

GTUltra inspiration - Thank you Daniel Larsson (SIDTracker 64)

GTUltra beta Testing - Thanks to: Russell Hoy, Jani Väisänen, Egon Sandar & Shogoon

GTUltra charset and palettes - Markus 'LMan' Klein

GTUltra Linux support - Special thanks to: tlr & theK

GTUltra Mac support - Special thanks to Muzza / The Codeblasters.

GTUltra Hall Of Fame. Thanks for feedback and bug reports:

acrouzet, JCH, spider-j, TheRyk, DeMOSic, Groepaz, Youth, zzarko, theK

And, of course, thanks to Emma. x

Features compared to GTStereo

1. Updated display / skinning

- a. User definable colour schemes
 - i. Make it easier to visualise what is actually going on!
 - ii. Presets are aimed to make you feel comfortable, with skins based on other trackers. If you don't like them - create your own!

2. Undo (ctrl-z)

- a. Yes. Really.

3. Instrument Use count (IC)

- a. Displays how many times an instrument has been used in all patterns
- b. Allows you to quickly find unused instruments

INSTRUMENT NUM. 01			
Attack/Decay	0A	Vibrato Param	02
Sustain/Release	8C	Vibrato Delay	10
Wavetable Pos	01	HR/Gate Timer	02
Pulsetable Pos	03	1stFrame Wave	09
Filterable Pos	01	IC:522 Pan	77

4. Instrument True Stereo Panning

- a. See *True Stereo* section

5. Transport bar



- a. Change Skin (Mouse L/R button) - 16 default presets
 - i. Ctrl Left-Click = Open Palette editor
 - ii. Ctrl+Shift+Left Click = Open Char editor
- b. Select SID count (Mouse L/R button - 1-4)
 - i. Number of SID chips to be active during song playback
- c. Select output volume
 - i. Left Mouse Button = Increase volume
 - ii. Right Mouse Button = Decrease volume
- d. Select Octave (Mouse L/R button - 1-6)
 - i. Select octave for QWERTY note playback
- e. Follow ON / OFF
 - i. On = view will follow the current playback position
 - ii. This can be enabled / disabled during playback
- f. Loop pattern ON / OFF
 - i. On = playback will loop to start of the selected pattern when end of pattern is reached
 - ii. On also enables inter-pattern looping (if a section of a pattern is marked for copy/cut, this section will loop)
 - iii. See "Master Channel" section
- g. Selected area looping ON / OFF
 - i. Shift or CTRL click on the Loop Pattern button to enable/disable
 - ii. A "P" will be displayed within the loop button when this feature is enabled
 - iii. Note: Selected area looping is only enabled when Loop Pattern is also enabled



h. Rewind (similar to a CD player rewind control)

- i. Single left-click (or CTRL-Left Key)

1. Move to row 0 of the selected pattern
2. If already at row 0, move to the previous song position
- ii. Hold button
 1. Move to the start of the song
- iii. During playback / follow enabled
 1. Double click to move to the previous song position
- i. Record ON / OFF
 - i. On = QWERTY will play monophonic. Notes will be recorded in the currently selected pattern.
 - ii. Off = JAM mode. This allows for up to 12 channels to play played at one time (4 SID chips)
- j. Use original GoatTracker F1-F3 keys
 - i. Press Shift or Ctrl when clicking on the RECORD button to turn this feature on or off.
 - ii. An "F" is displayed within the record button image when this feature is enabled



- k. Play / Pause
 - i. Play = song will play from the current position
 - ii. Pause = song will pause at the current position
- l. Fast Forward
 - i. Move to the next song position (or CTRL-Right key)
- m. JAM Mode - SID chip enable
 - i. Click on 1-4 to enable/disable SID chips for jam mode
 - ii. Example: If a single 3 channel SID song, you could enable SID Chips 2-4 to allow you to jam over the 3 channel SID without interrupting playing notes from the song.
- n. Display piano keyboard On/Off
 - i. Note: Available if MIDI is enabled
 1. Disable MIDI by setting MIDIport to 9999 in .cfg file)
 - ii. Displays piano keyboard, showing playing notes
 - iii. Notes are calculated using the closest SID frequency, so this will take portamento / wild vibrato settings into account too.
- o. MIDI Port Select
 - i. Press SHIFT or CTRL when clicking the piano keyboard on/off icon to open MIDI Port Select panel
- p. Detune (-100 cents > 100 cents)
 - i. 1 = normal pitch (440hz = A)
 - ii. 0 = -100 cents
 - iii. 2 = +100 cents
 - iv. This allows for testbit effects to be tuned to the music



q.

Mono / Stereo / True Stereo

- i. In mono mode (1 SID is selected), this will toggle between mono (Mon) and True Stereo (Pan).
- ii. If more than one SID is selected, this will toggle between mono (Mon), stereo (Ste) and True Stereo (Pan).
- iii. See *Stereo Panning* for more information on stereo panning options
- iv. See *True Stereo Panning* for more information on True Stereo panning options

6. True Stereo (Editor emulation only)

- a. GT Ultra SID emulation has been modified to allow per-channel stereo panning. This can be used to bring new life to SID music, as well as being useful for SID remixes and such like.
- b. As an example of what stereo panning can offer, here's a set of classic Rob Hubbard music, processed in TrueStereo
<https://soundcloud.com/nothermedicine/reconstructed-rob-hubbard-in-truestereo>
- c. To enable TrueStereo, set the panning type to "Pan"



- d. Within each instrument, there is a "Pan" setting, which is comprised of two pan values

 - i. 0-7 = Left > Center
 - ii. 7-E = Center > Right
 - iii. (F does nothing. If 16 (or any even number) of values were available, it would not be possible to have a value that is in the center)
- e. Every time an instrument is played (a key ON is performed), a random pan value is set, somewhere between (and including) the two pan values.
 - i. Example 1: 07 would pan anywhere from hard-left to center
 - ii. Example 2: 0E would pan anywhere from hard-left to hard-right
 - iii. Example 3: E0 does the same as 0E (you can put values in any order)
 - iv. Example 4: 77 would pan to center..
- f. Stereo SID emulation trivia:
 - i. Stereo SID emulation uses the unused 4 bits of the Pulse Width High byte (\$D403, \$D40A, \$D411). Therefore keeping somewhat to the possibility of reality in what a stereo SID could have achieved.
- g. Panning information is ignored if True Stereo is not enabled

7. Stereo Panning

- a. When playing in either mono or stereo mode (not True Stereo) it is possible to set the panning position of each SID chip.

- b. By default, SIDs 1+3 will play from the left speaker, and SIDs 2+4 will play from the right speaker. However, in many cases (for example, when playing 3 SID music), it may be that you want SIDs laid out in as Left, Right, Center.
- c. By Shift or Ctrl clicking on the HR: text at the top of the editor, the view will change to the panning information for the number of SID chips that is currently selected.
- d. For example, if 3 SID chips are selected:

```
PAL 8580 P3:0E7- 1X
```

- i. Here, you can see that P3 (Panning for 3 SID chips) information is showing 3 panning values (hard-left, hard-right and center)
- e. If 4 SID chips are selected for playback, the view shows 4 values:

```
PAL 8580 P4:0E0E 1
```

- i. As you can see, panning is set to Left,Right,Left,Right for each SID chip
- f. This panning information (a set of 4 values for SIDs 1-4) is saved in the GTUltra.cfg file

8. 3,6,9 or 12 channel playback (1-4 SID support)

- a. 7-12 channels require 2 songs (song 0+1, song 2+3, song 4+5...)
 - i. This ensures that the GT Stereo file format does not need to change (yet..)
 - ii. 3,6 or 9 channel .SID files can be exported. .SID file format only handles up to 3 SID chips. Not all SID players handle 3 SID chips.
 - iii. For 12 channel (4 SIDs), these can only be played back where hardware / emulation allows (Mega65 for example). **.SID format does not allow for more than 3 SID files - so SID players will NOT work with 4SIDs**
- b. Example: 9 channel (3 SID) song shows SUBTUNE 01 as only 3 channels

```
CHN ORDERLIST (SUBTUNE 01, POS 00)
6 81 8A 97 97 97 8B 91 97 98 9E
7 81 85 8A 97 97 97 8C 92 97 99 9F
8 83 86 CF CE 97 97 8D 93 97 9A A0
9
10
11
```

9. Song pattern selection

- a. Hold Left button OR shift-left click on a pattern in order list:
 - i. All correct patterns are selected for the song at that position
 - ii. Takes into consideration order lists with patterns that may have repeated n times, or channel-specific tempo changes

10. Song playback from anywhere

- a. Double click on a pattern in order list:

- i. Playback will begin at the selected position
- ii. Any previously keyed on notes will also be heard correctly (as long as they were started within the previous 2 song positions)

11. F3 = Shift/Space

- a. Pressing F3 plays the from the current cursor position. Depending on where you are currently editing:
 - i. From within the pattern, if you're editing the pattern, table or instrument data
 - ii. From the correct position in the song if currently editing the order list
- b. All patterns are synced correctly (taking into consideration channel tempo and pattern lengths, etc.)
- c. Using F3 means that it's possible to play whilst also modifying instrument or table values
- d. Disabling FOLLOW allows for quick playing from a specific pattern position, whilst allowing you to edit instrument or table information.

12. Jam Mode (when not in record mode)- Polyphonic

- a. Up to 3 channels can be played for every enabled SID chip
 - i. Enable SID chips via clicking the transport bar options 1-4



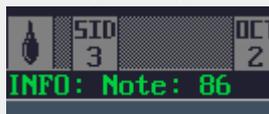
- ii. KeyOff (release) is automatically performed when releasing keys

13. Displays note and arp chord offsets in Jam Mode

- a. Holding multiple notes will display note offsets:



- b. Holding a single note will display the number number



14. MIDI note input

- a. Disable all MIDI processing by setting the MIDI Port number to 9999 within the GTUltra.cfg file or via -m command line option
- b. Connecting a MIDI keyboard *BEFORE STARTING GT-ULTRA* allows for MIDI keyboard input.
 - i. MIDI keyboard input works in jam mode when also editing tables / instruments
- c. Shift-click on the keyboard button in the transport bar to go to Midi Settings panel

15. Load / Save Screen (F10 / F11)

- a. Colour changed to GREEN (load) or RED (save) so that it's easier to realise that you're about to accidentally wipe over your work, rather than load it!

16. Move to the previous / next pattern in a song

- Scrolling to top or bottom of a pattern will automatically move to the previous / next song position, displaying correct patterns. This can be disabled by editing the GTUltra.CFG file

17. Tables separated by colour

- Sections separated with an underline when a END/LOOP (FF) is detected
- The table entry that is used by selected instrument is highlighted
- Unused entries (00 00) are shown as muted (grey, in this screenshot)

FILT. TBL	
01:90	A7
02:00	34
03:01	FE
04:30	00
05:FF	03
06:D0	F1
07:00	13
08:FF	00
09:B0	A7
0A:00	20
0B:FF	00
0C:00	00
0D:00	00
0E:00	00

18. Auto-Portamento key (SHIFT-Y)

- Press SHIFT-Y to automatically calculate portamento value for commands 1 or 2 from the pitch at cursor location to the next note in the pattern.
- Also changes the next note to be a tie
- Correct portamento value is added to the speed table
- Idea taken from the BRILLIANT SIDTracker 64 by Daniel Larsson

E-301590	E-301590
... 00000	... 00117
	117
	117
	117
B-301590	B-301300

>>>

19. Displays the overall time of the song

- Automatically calculated when loading / modifying song
- Time is either the length for the last channel to loop, or the first channel to stop the song.

00 25:28 / 01:57:43

20. Quick Save

- Ctrl-S at any time to save song using current file name

21. Info line

- Displays details based on what the cursor is currently over.
- Example1: Displaying the pattern instruction value (1 = portamento up), as well as the corresponding value from the speed table (\$0040)

INFO: (1) Portamento up. Value: \$0040

- Example2: Displaying the filter table information:

INFO: For \$30 (48) ticks, cutoff + \$0C (12)

22. The Master Channel

- To sync to the correct playing position, a channel needs to be selected as the "Master". Syncing will then take place, based on this channel. The Master channel is defined by the cursor position. Either:
 - The channel number within the pattern editor when editing patterns
 - The channel number within the order list
- The Master channel is always highlighted in the OrderList view as a yellow arrow (in this example, channel 2 is the Master Channel)

CHN	ORDERLIST	CS
0	12 19 18 00	
1	13 33 18 01	
2	14 34 18 02	
3	15 35 18 03	
4	16 36 18 04	
5	17 18 05	

- This then takes into consideration the different pattern lengths, pattern repeat commands, channel-specific tempo settings within the song.
(*If ALL patterns were the same length and there were no repeat commands in the order list or channel-specific tempo changes, life would have been far simpler..!)

23. F8 = Edit Tables ('cos Jammer said so)

- This used to go to the Edit Name / Copyright section.

24. Filter Information

- Displays the current filter type (green = active), cutoff and resonance for each SID channel above the corresponding SID channels

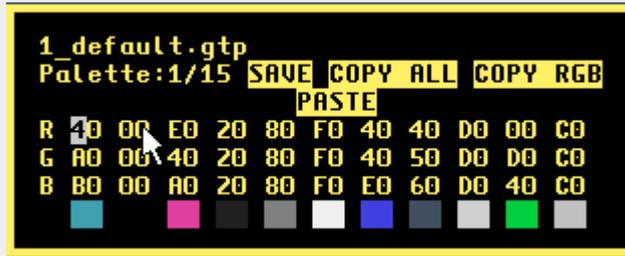
CUT:32 RES:0
CH1 12 CH2 13 CH3 14

- Also highlights when a channel has filter enabled (red dot)

CUT:DA RES:A
CH1 12 CH2 13 CH3 14

25. Palette Editor

- CTRL+Left Click on skin icon in transport bar
- This will display palette information



- c. Each column displays RGB for a specific area (8 bits)
- d. INFO text explains what each RGB is used for



- e. There are 16 palettes to choose from
 - i. File name and palette index is displayed
- f. Press Ctrl-S or left-click on the SAVE text to save a palette file.
 - i. User generated palette files will load automatically when starting GTUltra, if it is found within the gtpalettes folder.
 - ii. Ctrl-S will automatically save over the existing palette file, if one has already been selected.
- g. Press Ctrl-C to top current RGB (or click Copy RGB)
- h. Click on COPY ALL to copy all RGBs for this preset
- i. Press Ctrl-V or click PASTE to paste either current RGB or ALL (overwrites all RGBs for palette), depending on what was last copied.
- j. WARNING: NO UNDO.

26. Char Editor

- a. I needed to add this so that I could display nicer borders / piano keyboard and such like! Please excuse my programmer art.
- b. Thank you to LMan for supplying the far better graphics!



- c. CTRL-S or click on the SAVE text to save charset (charset.bin)
 - i. If this file exists, it will automatically load when starting GTUltra.
 - ii. Delete or rename charset.bin file to restore the default charset
- d. Left panel
 - i. Select char to edit
- e. Middle panel

- i. Char editor
- f. Right panel
 - i. Sketch pad (draw selected char)
- g. Largely untested and not exactly Photoshop - But it did the job.
- h. Charset 1 / 2
 - i. A second charset is used for specific purposes. Charsets can be selected by clicking on the 1 / 2 text next to the char set.

27. F2: Changed function (if classic F1-F3 mode disabled)

- a. F2 used to play the current pattern. F3 now does this.
- b. F2 now enables/disables pattern follow or looping (Shift F2)
- c. See section *Use original GoatTracker F1-F3 keys* for more information on enabling classic GoatTracker F1-F3 keys

28. Modify values with mouse

- a. Hold / Drag Left or Right to modify the currently selected value
- b. Works for both Table and Instrument information only
- c. AD or SR values will only change the nybble selected
 - i. (Eg. Only change Attack OR Decay part of the Attack/Decay byte)

29. Looping

- a. When pattern loop is enabled, playback will sync all channels to the correct song position (based on the Master Channel) within the song, taking into consideration different pattern lengths, channel-specific tempo changes and such like.

30. Copy (Ctrl-C) changes

- a. Ctrl C will now always copy the information under the cursor, so no need to select a single entry via shift-Up/Down or shift-Left/Right
- b. When Ctrl-C is used to copy a single entry within the pattern view, the current instrument will also change to match the copied entry. This allows for very quick selecting of instruments.
- c. The functionality to copy the whole of a pattern row is still available via Shift-C

31. Inter-pattern looping

- a. When pattern looping **AND Selected Area looping is also enabled**, if a highlighted section within the pattern is marked (shift + up / down to select an area), playback will loop within this area. As with pattern looping, all channels will loop correctly, using the highlighted channel as the Master Channel

32. Improved ENTER key functionality (moving to tables..)

- a. Press ENTER to go to the correct table entry from anywhere
- b. Press ENTER again to return to the previous cursor position

33. Detailed Table Editing: WaveTable

WAVE TBL					SPEED TBL	
01:	-WDCJ	RA	WAVE:81	20	G#2	01:0A A0
02:	-WDCJ	RA	WAVE:41	+00		02:10 02
03:	-WDCJ	RA	WAVE:40	+00		03:03 0A
04:	-WDCJ		STOP:00	---		04:00 FA
05:	-WDCJ	RA	WAVE:21	+00		05:00 23
06:	-WDCJ		CMND:01	01		06:00 12
07:	-WDCJ		CMND:01	01		07:00 40
08:	-WDCJ		CMND:01	01		08:03 23
09:	-WDCJ	RA	WAVE:41	+00		09:70 12
0A:	-WDCJ		CMND:02	01		0A:00 04
0B:	-WDCJ		JUMP:0A	---		0B:00 0F
0C:	-WDCJ	RA	DELY:01	+00		0C:7F 06
0D:	-WDCJ	RA	WAVE:81	45	A-5	0D:03 03
0E:	-WDCJ	RA	WAVE:41	+00		0E:00 01

- Clicking on the WAVE TBL title decodes the table data and displays it in a more user-friendly way
 - Click on the title again to show the original table view
- For each row, you can select functionality by clicking either **-WDCJ**
 - : Skip left column - only process note info in right column)
 - W: *WAVE* Set Waveform (0-\$DF)
 - D: *DELY* Set Delay (\$1-\$F)
 - C: *CMND* Set Command (1-\$F)
 - J: *JUMP* Jump (1-\$FF or 0 to Stop)
- If WAVE or DELAY is specified above, you can then also set the note (pitch) information in the right column.
- Note information can be either Relative or Absolute (offset from the note that is initially played.) **RA**
 - Select either R or A for Relative or Absolute note values
 - Disabling both leaves the pitch unmodified
- For Relative notes, you can also click on the + or - to swap between positive or negative offsets **+24**
- Pressing ENTER when the cursor is on a command value will move the cursor to the correct entry within the speed table (if applicable)
- Remember that the combination of CTRL-C / CTRL-V can be used to quickly copy & paste single entries

34. Detailed Table Editing: Pulse Table

PULSE TBL				
01:	SMJ	PLS SET	D73	---
02:	SMJ	PLS MOD	0A	+00
03:	SMJ	PLS SET	D60	---
04:	SMJ	PLS MOD	01	+13
05:	SMJ	PLS MOD	0A	+00
06:	SMJ	JUMP:	01	---
07:	SMJ	PLS SET	310	---
08:	SMJ	PLS MOD	02	+00
09:	SMJ	PLS SET	0A0	---
0A:	SMJ	PLS SET	070	---
0B:	SMJ	STOP:	00	---
0C:	SMJ	PLS SET	EA0	---
0D:	SMJ	STOP:	00	---
0E:	SMJ	??? ???	---	---

- Clicking on the PULSE TBL title decodes the pulse table data and displays it in a more user-friendly way
 - Click on the title again to show the original table view
- For each row, you can select functionality by clicking either **SMJ**
 - S: "PLS SET" Set Pulse Width (0-\$FFF)
 - M: "PLS MOD" Modify Pulse Width (left column = time, right column=speed)
 - J: Jump (1-\$FF or 0 to Stop)
- When modifying pulse width, the right column (speed) can be changed from + to - by clicking on the + or - symbol **+24**
- Remember that the combination of CTRL-C / CTRL-V can be used to quickly copy & paste single entries

35. Detailed Table Editing: Filter Table

FILTER TBL					
01:	CMFJ	FLT SET	0A	●●●	■ ■ ■
02:	CMFJ	CUTOFF	34	---	
03:	CMFJ	FLT MOD	01	-02	
04:	CMFJ	FLT MOD	31	+00	
05:	CMFJ	JUMP:	03	---	
06:	CMFJ	FLT SET	0F	●●●	■ ■ ■
07:	CMFJ	CUTOFF	13	---	
08:	CMFJ	STOP:	00	---	
09:	CMFJ	FLT SET	0A	●●●	■ ■ ■
0A:	CMFJ	CUTOFF	20	---	
0B:	CMFJ	STOP:	00	---	
0C:	CMFJ	CUTOFF	00	---	
0D:	CMFJ	CUTOFF	00	---	
0E:	CMFJ	CUTOFF	00	---	

- Clicking on the FILTER TBL title decodes the filter table data and displays it in a more user-friendly way
 - Click on the title again to show the original table view
- For each row, you can select functionality by clicking either **CMFJ**
 - C: "CUTOFF" Set Filter Cutoff (0-\$FF)
 - M: "FLT MOD" Modify Filter Cutoff (left column = time, right column=speed)
 - F: "FLT SET" Filter Info (Resonance, Channel On/Off, Filter Type)

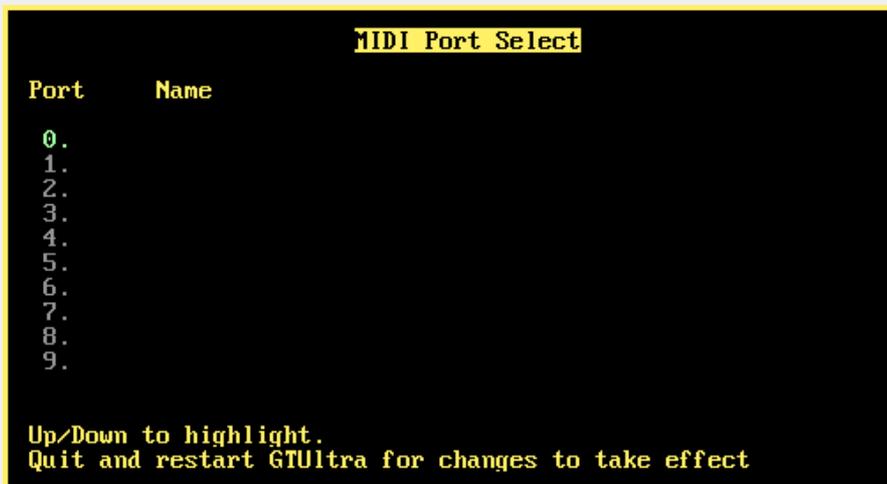
- iv. J: Jump (1-\$FF or 0 to Stop)
- c. Filter Info 
 - i. The 3 circles represent the channels which will be affected by the filter
 - 1. Red = filter is active on the channel
 - 2. Grey = filter is not active on the channel
 - 3. Click on the circles to enable / disable filters
 - ii. The filter type (lowpass, bandpass, high pass) is shown as 3 icons
 - 1. Green = filter type is enabled
 - 2. Grey = filter type is disabled
 - 3. Click on the icons to enable / disable filter types
- d. When modifying filter cutoff, the right column (speed can be change from + to - by clicking on the + or - symbol )
- e. Remember that the combination of CTRL-C / CTRL-V can be used to quickly copy & paste single entries

36. Waveform editor



- a. When editing any waveform parameter, the current waveform settings are displayed (replacing the timer display above the transport bar)
- b. Click on the waveforms / test bit (TEST), ringmod (RING), sync or gate bit (GATE) information to toggle enable / disable

37. MIDI Port Select



- a. Click on the keyboard icon in the transport bar, whilst holding either CTRL or SHIFT
- b. This opens the MIDI Port Select Panel.
- c. Use up/down to select MIDI port
- d. Exit and restart GTUltra for the newly selected MIDI port to take effect.

38. Ctrl+Left / Ctrl+Right keys to quickly move to previous / next song position

- a. These key combinations emulate clicking on the previous / next icons in the transport bar.

39. SID export

- a. Uses original GoatTracker 3 channel assembly code if saving a 3 channel SID
- b. Saves as V3 .SID format if saving 9 channel SID (note: not all sid players can handle this format)
- c. **4 SID will only play on specific emulators / hardware (Mega65 for example)**

40. Automatic .sng backup

- a. There's always a chance that GTUltra may crash (or a power cut, or you accidentally save over your song..etc.). GTUltra automatically saves a copy of the current song at regular intervals in a folder named "gtbackup", which is located within the same folder as the GTUltra.cfg file.
- b. If GTUltra crashes, you can use this .sng file to hopefully recover your work with minimal loss of time and effort.
- c. The gtbackup folder is automatically created when GTUltra is run.
- d. You can specify how often a song is backed up either by changing the value in the GTUltra.cfg file or via the -b command line option
- e. Setting the backup time to 0 will disable auto backups
- f. Default is to save the backup every 30 seconds.
- g. A copy of the sng is automatically saved every n seconds to gtbackup folder.
- h. Saving only happens when a song is not being played to ensure that nothing interrupts playback.
- i. Saving only happens if there has been a change to the song since the last save.
- j. Each backup filename contains the time and date.

41. Editor information is saved within the .sng file

- a. The following information is saved within the GTUltra .sng file
 - i. FV (use fine vibrato)
 - ii. PO (optimize pulse)
 - iii. RO (optimize realtime)
 - iv. NTSC / PAL
 - v. SID Model (8580 or 6581)
 - vi. HR value (eg: HR:0F00)
 - vii. Speed multiplier
 - viii. Number of SID Chips used
 - ix. Stereo mode (mono, stereo or TrueStereo panning)
- b. On loading a .sng, the editor settings will then be set accordingly.

42. Expanded OrderList View



- a. Click on the *ORDERLIST* text to toggle between *Classic* and *Expanded* OrderList view.

b. Expanded orderlist:

ORDERLIST (SUBTUNE 00, POS 019)						
	00 34	01 33	02 38	03 04	04 04	05 04
018	23 +0	2E +0	33 +0			
019	22 +0	2F +0	0C +C			
01A	16 +0	30 +0	0D +C			
01B	1E +0	31 +0	0E +0			
01C	17 +0	3F +0	34 +0			
01D	18 +0	03 +3	01 +3			
01E	19 +0	04 +3	05 +3			
01F	18 +0	02 +0	01 +0			
020	1A +0	07 +0	05 +0			
021	35 +0	36 +0	01 +2			
022	00 +3	37 +2	09 +2			
023	00 +3	38 +2	43 +E			
024	00 +3	39 +2	42 +E			

- Shows each channels order list vertically.
- Each entry has its corresponding transpose value (-F > +E)
- All repeat instructions are unravelled.
 - For example, `+2 R3 00` in Classic view is displayed as the following in Expanded view:

```
00 +2
00 +2
00 +2
```

- When changing back to *Classic* view, the expanded orderlist data is re-compressed - Any repeated patterns will be compressed using repeat counters.
- Compressing using the repeat command can be disabled by editing an entry in the GTUltra.CFG file. This can make it easier to edit if swapping between views. However, it is still recommended to enable this setting when you want to export to .SID, so that the file size is as small as possible.

43. Expanded OrderList - Copy / Cut / Paste / Insert

ORDERLIST (SUBTUNE 00, POS 019)						
	00 34	01 33	02 38	03 04	04 04	05 04
018	23 +0	2E +0	33 +0			
019	22 +0	2F +0	0C +C			
01A	16 +0	30 +0	0D +C			
01B	1E +0	31 +0	0E +0			
01C	17 +0	3F +0	34 +0			
01D	18 +0	03 +3	01 +3			
01E	19 +0	04 +3	05 +3			
01F	18 +0	02 +0	01 +0			
020	1A +0	07 +0	05 +0			
021	35 +0	36 +0	01 +2			
022	00 +3	37 +2	09 +2			
023	00 +3	38 +2	43 +E			
024	00 +3	39 +2	42 +E			

- Right click / drag to select multiple rows and channels
- CTRL_C / CTRL_V / CTRL_X to copy/paste/cut
- Unlike the classic view, CTRL_V (paste) will *not* insert new rows prior to pasting.
- To insert copied data in expanded view, use CTRL_I to insert the clipboard

44. Expanded OrderList - Pasting Transpose Values

- If the cursor position is in the transpose column when pasting, only the transpose values are set

45. Expanded OrderList - Setting Transpose values

- When the cursor is in the + or - column, use keys + or - to set the transpose direction
- When the cursor is in the transpose value column, use keys 0-F (or 0-E for positive transpose) to set the value
- If you change the transpose value of a currently playing pattern within the orderlist, you will hear the difference in pitch instantly (in *Classic* view, the transpose value is only refreshed when playback starts a new pattern)

46. Expanded OrderList - Compressed Size

Order	Channel	Transpose	Channel	Transpose	Channel	Transpose
023	00	+3	38	+2	43	+E
024	00	+3	39	+2	42	+E
025	06	+3	3A	+2	43	+E
026	00	+0	1F	+0	1B	+E
027	00	+0	30	+2	1C	+E

- When a .sng is saved or is exported, it is still done so in classic mode. This ensures that the data size is still as small as possible.
- In Expanded mode, is it possible to create order list data that is too large - the number of entries does not compress to under 256 bytes of data.
- The current compressed data size is shown at the top of the expanded orderlist view. In the case above, you can see:
 - Channel 00: **
 - Channel 01: 33
 - Channel 02: 38
- The ** shows that the size of the channel is invalid (over 256 bytes). As such, **it is not possible to swap back to the classic view - or the .sng to be saved or exported** - until the data in this channel has been reduced to a valid size.

47. Expanded OrderList - Repeat / End Markers

02A	00	+2	3C	+2	3E	+0
02B	06	+2	FF00	3C	+0	
02C	00	+2	00	+0	FF00	

- In *Classic* view, the RPT marker at the end of an order list dictates the position to loop to.
- In *Expanded* view, this is the same. However, the marker is shown as the value FF
- In the Expanded view, it is possible to have up to 2048 (0x800) entries (based on a compressed order list that uses R0 (repeat 16) multiple times). As such, the loop values are converted to this larger range when a song is expanded.
- Other than this, the same rules apply:
 - A value that is lower than the FF position will cause the channel to loop to the position specified

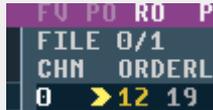
- ii. A value that is higher or equal to the FF position will cause the song to stop.

48. Disable all MIDI

- a. Set the MIDI Port to 9999 within the .cfg file to disable all MIDI processing
 - i. No MIDI calls or initialization will take place when this is enabled

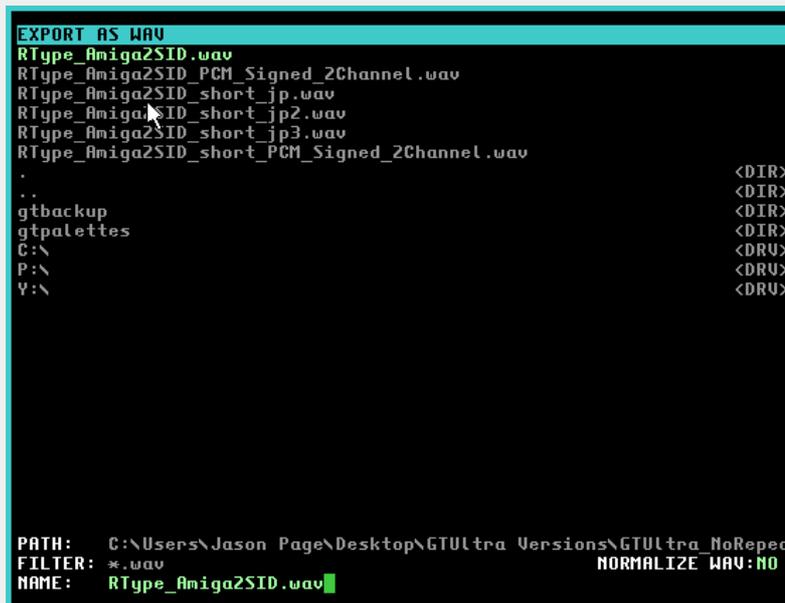
49. Multiple .SNG support

- a. From GTUltra 1.4.1, it is possible to load two .SNG files



- b. Click on the numbers next to FILE (above the order list view) to select a song slot..
 - i. Left click - increase song slot. Right click - decrease song slot.
 - ii. The display will change to display the song
 - iii. Any playing / loading / saving / exporting will only affect this song
 - iv. You can copy from one song and paste into another
 - v. Song playback will stop when changing the FILE value

50. Export to .WAV



- a. Press Shift (or CTRL) F11 to display
- b. Click on the YES or NO to enable or disable normalization
 - i. Normalization on will increase the sample amplitude to the full range (making the .WAV as loud as possible without causing distortion)
 - ii. If exporting individual channels to remake on another DAW, for example, it is recommended not to normalize, as this could result in some channels being noticeably different in volume than in the original .sng file

51. GT2Reloc.exe

- a. Convert .sng to .sid using this stand-alone convertor

- b. This was originally released with the 3 channel GoatTracker. However, it was not included in GTStereo (which GTUltra is based upon).

52. Pattern order change when exporting to .SID

- The original GoatTracker will export patterns in order, based on if they are used within a song.
- For example, if pattern 0 is used, that will be stored in the .SID file first.
- In 1.5.0 update, the order is based on when the pattern is played within the .sng. For example, if pattern 6 is played first in the song, then it will be stored first in the .SID file.
- Why? This makes it easier to track and reuse memory if a pattern is no longer going to play again, if used in a game or demo with tight memory restrictions

53. Auto-Advance modes

- There are now 3 different auto-advance modes (SHIFT-Z) when entering data, depending on where cursor is within pattern area
 - Notes only (advance if you enter a note, rest, key on or key off. NOT if you are entering hex data)
 - All (Advance when entering notes or values)
 - OFF (no auto advance)

54. Mouse Wheel

- Use the mouse wheel to scroll through panels, depending on where your flashing editor cursor is currently located

55. SIDTracker64 Mode

The screenshot shows the GoatTracker Ultra interface. The main window title is "GoatTracker Ultra - (Enhanced GoatTracker Stereo V2.76 - Jason Page / MSL)". The interface is divided into several panels:

- Pattern Editor:** A grid with columns for channels (CH0-CH5) and rows for patterns (00-26). The current pattern is 00, and the cursor is at row 12, column 03. The pattern data includes notes like "A-40D", "D#508", "G#107", "D#50F", "G#409", "B-409", etc.
- Order List:** A table showing the sequence of patterns to be played. The first row is "00 6A 01 63 02 78 03 73 04 76 05 74".
- Instrument Settings:** A panel on the right showing settings for "Attack/Decay", "Sustain/Release", "Wavetable Pos", "Pulsetable Pos", and "Filterable Pos".
- Wave Table:** A table showing wave table settings for various instruments.
- Control Panel:** A bottom panel with buttons for "SIDs", "Vol", "Oct", "Play", "Stop", "Reset", "Det", and "Pan".
- Info Panel:** A bottom-left panel showing "INFO: OrderTable" and metadata like "NAME: RType Amiga-2-SID", "AUTHOR: Jason Page & Chris Huelsbeck", and "COPYR. MultiStyle Labs 2023".

- NOTE: This mode is not compatible with standard GT editor mode. Key OFF does not react in the same way. Songs created in this mode will sound different in standard GT mode**

- b. Enable / Disable using Shift (or CTRL) F12
- c. This makes GT work a little more like SIDTracker64.
 - i. This is the editor I feel most at home with. All changes here are for my own personal benefit!
 - ii. Instruments automatically key OFF when a rest is reached (a blank space)
 - iii. Pressing ENTER to enter a key ON command will fill blank notes from the previous note to the cursor position with keyON
 - iv. Display is changed to show Key ON as vertical lines instead of +++
- d. F2-F3 keys are different:
 - i. F2 = Play current pattern from the cursor position
 - ii. F3 = Play current pattern from the beginning
- e. Multiple KeyOn commands are now also compressed when exporting to .SID file in the same manner as when there is a gap between notes (where the note and note length is stored. Now, the keyon and keyon length is stored if necessary)

56. Drag and Drop to load

- a. Drag .sng files and drop them into the GTUltra editor window to automatically load them
- b. No need to use F10 to find / load a .sng now

57. SID Export - Zeropage SID playback option

- a. Usually, if exporting with Use zeropage ghostregs is enabled, no audio is heard - a programmer has to write code to copy the zero page RAM to the SID registers.
- b. Enabling zeropage SID playback will also write the zeropage RAM to SID registers, whilst still allowing a programmer to access the zeropage values to perform syncing graphics to specific SID waveforms, for example.
- c. 3 channel SID option only.

```

GTUltra V1.5.3 Packer/Relocator
SELECT PLAYROUTINE OPTIONS: (CURSORS=MOVE/CHANGE, ENTER=ACCEPT, ESC=CANCEL)
Buffered SID-writes      Yes
Sound effect support    No
Volume change support   No
Store author-info       No
Use zeropage ghostregs  Yes
Disable optimization    No
zeropage SID playback   Yes
Full SID buffering      No
  
```