

WHERE'S THE PARTY AT?

Operator's Manual Revision B

Hardware Revision 1.01

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TMB

Valid for Firmware Version 0x03! Not the earlier ones.

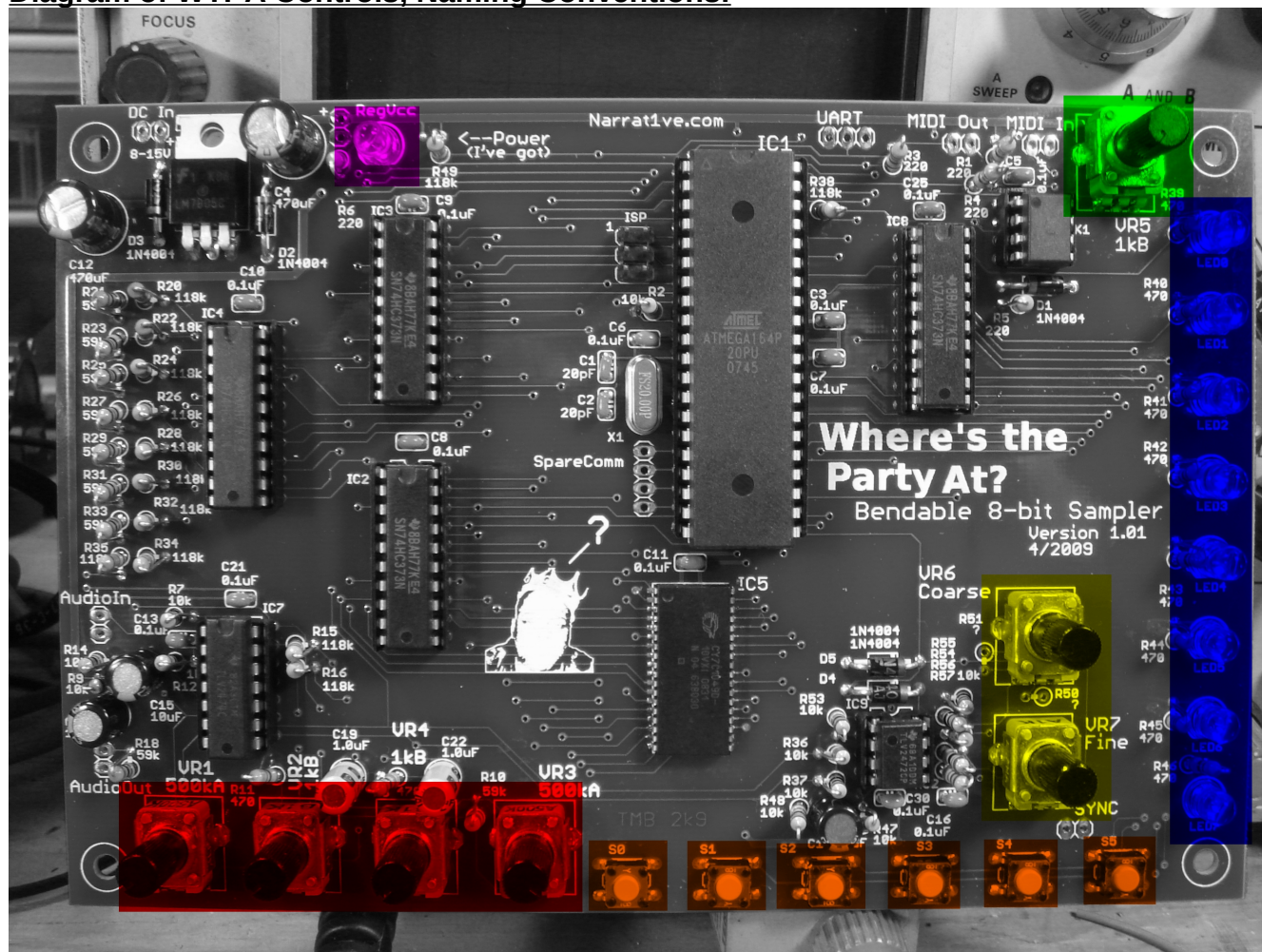
Intrepid Noodler:

Herein lie the secret magic keypresses you need to know to make your WTPA rock out to the best of its ability. This manual assumes you already have a correctly assembled WTPA – there are other manuals that deal with getting that far.

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Diagram of WTPA Controls, Naming Conventions:



Red = Analog Controls Pots (4)

From left to right they ALWAYS are:

- Input signal gain (VR1)
- Throughput Level (VR2)
- DAC Output Level (VR4)
- Master Volume (VR3)

Orange = Switch Inputs (Buttons) (6)

From left to right they are numbered S0-S5, their function may change based on the current operating mode.

Yellow = Coarse and Fine Oscillator Control Pots (2)

These are analog controls which ALWAYS control the external clock based sampling frequency.

Green = Parameter Control Pot (1)

This pot is used to adjust certain control parameters, usually effects.

Blue = Indicator LEDs (8)

From top to bottom these are numbered LED0-LED7, and they are used to convey data about what WTPA is currently doing.

Purple = Power Indicator (1)

Should be shining bright when the power is on.

On Powerup Options:

WTPA with Rev 3 firmware no longer does any cute dancing lights because I had to can them to get back some flash memory. So it just goes right into the main sampler mode unless you tell it to do the following:

Change Default MIDI Channels:

Holding down S5 (the right most button) during boot up will allow you to change the default MIDI channels WTPA responds to. Because WTPA is multi-timbral it uses one MIDI channel for each sample bank. The defaults are the first two MIDI channels (0 and 1 if you count like a programmer, 1 and 2 if you count like a dirty dirty music person – refer to Anderton's "MIDI For Musicians" for a refresher).

Immediately after the pretty lights, the LEDs will come on and display the two MIDI channel numbers. The top nybble (top four lights) correspond to WTPA's first sample bank (they default to channel 0 (or 1 depending on how you count) which is ALL OFF) and the bottom nybble (the bottom four LEDs) correspond to the channel the second sample bank responds to. This defaults to channel 1 (2 for guitar players). The numbers are displayed in binary, with the topmost light being the LSb.

THIS MEANS THAT UNTIL YOU MESS WITH IT, you should see LED4 lit up, and that's it.

To change the MIDI channel for sample bank A, use S0. This will increment through all 16 MIDI channels and loop back to zero at the end. To change the channel for sample bank B, use S1. It works the same way. When you are done setting the midi channels, press S2. This will store the channels to permanent memory and reboot WTPA.

Normal “Caveman Mode” Operation (the buttons and knobs):

WTPA is designed to operate simultaneously listening to the buttons and control knob and also the MIDI channels. Most people will find it useful to rock the buttons at some point. I do it all the time, even though I'm the kind of Mimosa-sipping ponce who generally likes a big midi controller with a lot of buttons.

WTPA's control scheme is fairly straightforward until you start getting into effects. I just didn't have enough buttons to implement effects without using some multi-button commands, so I tried to keep the normal things (like record, overdub, etc) simple at the expense of making the weirdbeard things a little harder to access. This is probably the biggest argument for using MIDI controllers, but I digress. First, here's what the LEDs mean 99% of the time:

LED Legend (top to bottom):

LED0 = Indicates the current bank is RECORDING.

LED1 = Indicates the current bank is OVERDUBBING (rec / playback simultaneously).

LED2 = Indicates the current bank is PLAYING BACK.

LED3 = Indicates the sampler has run OUT OF RAM.

LED4 = Indicates the CURRENT BANK (I call them Bank0 and Bank1 as well as A and B)

LED5-7 = Indicates the value on the control pot – useful for setting effects.

The buttons also do the same things MOST OF THE TIME. Like so:

Control Switch Legend (left to right):

S0 = Pressing this will make WTPA RECORD on the current bank. Pressing it again will stop the recording and begin playing back the current sample. RECORDING is destructive and will overwrite the previous recording on the channel.

S1 = Pressing this will make WTPA OVERDUB on the current bank. You can only overdub if a sample is currently in RAM, and overdubbing will loop continuously though the length of the first recorded sample. OVERDUB is destructive in WTPA (you cannot selectively remove layers of overdubbing). Pressing the button a second time stop the overdub and return to playback.

S2 = Pressing this will RESUME or PAUSE PLAYBACK on the current bank. Again, you can only play/pause if a sample currently exists in the bank.

S3 = Pressing this will “SINGLE SHOT” the playback – playback will begin at the start of the sample and play once through to the end. Useful for the “I Want The Knife” / “Jam It On The One” style moves.

S4 = Pressing this will CHANGE BANKS. WTPA currently has two banks of samples which it can manipulate independently, but it doesn't have enough switches and lights to deal with them both, so this button toggles the controls and UI between the two (you can see the bank you're currently in with LED4).

S5 = The Mystical EFFECTS AND WEIRD STUFF Button.

NOTE: The knobs affect all this stuff. The gain knob in particular will make things crusty or clear depending on where it is, and the pitch of playback and recording is determined by the oscillator controls.

Effects and General Nerdiness:

So WTPA is already pretty cool, but this stuff is what makes her Special. In caveman mode, most of the weird stuff that WTPA can do is accessed by holding down S5 – the weirdbeard button – and pressing something else. You can really mess up what you were doing with this stuff, so read carefully. Also, many effects take a parametric input from the CONTROL POT, whose rough value is displayed in binary on the bottom three LEDs. Most of this stuff is banked (meaning you can do it on the different channels independently) but some of it is combinatorial, meaning it uses what's going on in both banks to generate an effect. Without further adieu here's all the cool stuff and how to do it:

BIT DEPTH REDUCTION = Hold S5 and press S0. The bit depth of the current bank's sample playback will be reduced by the number shown on the bottom three LEDs. It really takes reducing by all seven bits before you get the extra gnarly crust.

GRANULARITY = Hold S5 and press S1. This will divide the current bank's sample into 1-128 sections based on the setting of the control pot, and reshuffle those sections into a random playback order. This either sounds like granular synthesis or IDM based on the length of the sample and the number of sections. This one took a lot of code.

OUTPUT RECOMBINATION = Hold S5 and press S2. This takes an input value from 0-3 (from the pot) and affects the way BOTH banks work. The different values do this:

0 = Sum the banks during output. This makes normal audio.

1 = Multiply the two banks together for output. Modulates and saturates, and requires two samples to be playing back (ie, multiplying by 0 is always silence).

2 = Bitwise AND banks during output. Crusty. Requires valid samples in A&B.

3 = Bitwise XOR the banks. Doesn't sound weird with only one sample.

SKREW AND CHOP = Hold S5 and press S3. Toggles. Some people like to call this "half time" but I think that makes it sound kind of Rage Against the Machine which I prefer to avoid when possible.

PAUL IS DEAD = Hold S5 and press S4. Toggles. Used for determining whether there are any secret messages from the devil hidden in your samples.

JITTER = Only via MIDI. Sorry.

BAIL! = Hold S5, and press S4 and S3 at the same time. This gets you out of whatever godawful audio mess you've made and returns all the effects to default.

DO REALTIME EFFECTS = Hold S5, and press S4 and S2 at the same time. This processes incoming audio in realtime by sampling it, doing whatever math problems you've set up and then spitting the results through the DAC. You can bit reduce music in realtime, for example (but you can't reverse it, obviously). Unfortunately this is very ADC heavy so you can't adjust the control pot while working in realtime (workaround = use MIDI). NOTE: Because REALTIME is its own thing (and doesn't fit into the record / odub / playback schema) all three top LEDs will illuminate when in realtime mode to indicate that something weird is going on.

Edit Mode (only in Rev3 firmware):

The Rev 3 firmware adds realtime editing features to both sample banks! They allow you to adjust the functional start and end point of each sample, and also move that adjusted-size chunk around. The Start adjustment pushes the sample start forward in time, the end adjustment moves the end back in time. The window adjustment keeps the adjusted size constant but moves that chunk around within your larger sample.

For example: you could sample an entire measure of music, then edit it down to a single beat, and then sweep that beat-sized window around throughout the entire original sample! This is undo-able also.

Extra points: When the START is adjusted so it occurs after the END, the sample reverses!

The unadjusted sample is divided into 256 for the purposes of editing. That means if you had a 2.56 second long sample, the edit steps would be 0.01 seconds long.

Edit mode is accessed like so:

When holding S5 and S3, press S0, S1, or S2. This will lock you into edit mode in that bank until you exit edit mode by pressing S3, S4, or S5.

S0 will ADJUST START by the value on the pot.

S1 will ADJUST END by the value on the pot.

S2 will ADJUST WINDOW by the value on the pot.

You can hold down one of these buttons and sweep the pot too. It totally sounds cool. It's also more intuitive than I've made it sound.

NOTE: The MIDI editing functions don't stick you in EDIT mode, they just do the edits. Edit mode is there because testers hated having to hold down three buttons to futz around messing with their samples.

NOTE: Using MIDI editing, you have to select WIDE or RESOLUTE messages. The difference has to do with MIDI only sending values of 0-127. A WIDE edit will change your edit value by $2 \times \text{theValue}$ (for a range of 0-254 in steps of 2). The RESOLUTE edit will use the MIDI CC value directly, 0-127 in steps of 1. The control pot, in contrast, has a range of 0-256 in steps of 1.

WIDE edits sound wilder, RESOLUTE edits are easier to trim. WTPA always sends WIDE edit MIDI messages.

Fancypants MIDI Operations:

MIDI operation of WTPA has one very big fundamental difference from Caveman in that it uses the internal (crystal-derived) clock to do sample timing as opposed to the relaxation oscillator. This means that MIDI works a little bit more like proper MPC-style sampler and less like a loop pedal. Using MIDI, the MCU can handle changing samples by proper pitch relationships, and generally thinks this way. This also means that when using MIDI, WTPA can play the two sample banks at independent pitches from one another (not possible with the single relaxation oscillator). Finally, because it makes the math easier, it's possible to introduce clock jitter as an effect when using the internal clock.

MIDI and Caveman modes are not exclusive. It is entirely possible (and fun) to wank on the knobs and buttons on one channel and sequence the other.

Because WTPA is multi-timbral (it has two independent banks) it responds on two MIDI channels. Setting those channels is detailed in the "On Powerup" section of this manual.

WTPA is fully capable of handling and generating running status messages (and interpreting NOTE ON messages with a velocity of 0 correctly as NOTE OFFs).

WTPA responds to NOTE ON and NOTE OFF messages for a given channel pretty much exactly like you expect it would. Although multi-timbral, WTPA's channels are each monophonic, and a NOTE OFF will only turn off the currently playing note. The PITCH BEND wheel also does pretty much what you expect it should do. The MOD WHEEL doesn't do anything. Yet.

Everything else in WTPA responds to Control Change Messages, and all that magic is laid out in our:

MIDI IMPLEMENTATION CHART

(new numbers in firmware 0x03 for compatibility with Ableton and other stuff)

Command or Effect:	CC Number	Value:
Start/Stop Recording	3	0 = Stop, >0 = Start
Start/Stop Overdub	9	0 = Stop, >0 = Start
Start/Stop Realtime	14	0 = Stop, >0 = Start
Loop Continuously/Once	15	0 = Once, >0 = Cont.
Half Speed Playback	16	0 = Stop, >0 = Start
Backwards Playback	17	0 = Stop, >0 = Start
Cancel All Effects	18	Any
Bit Reduction	19	0-7
Granularize Sample	20	0-127
Introduce Jitter Errors	21	0-127
Change Output Combination Math	22	0-3
Store Default Record Note	23	Any
<u>EDIT commands:</u>		
Adjust Sample Start RESOLUTE	24	0-127
Adjust Sample End RESOLUTE	25	0-127
Adjust Sample Window RESOLUTE	26	0-127
Revert Sample to Unadjusted	27	0-127
Adjust Sample Start WIDE	28	0-127
Adjust Sample End WIDE	29	0-127
Adjust Sample Window WIDE	30	0-127

Most of the above are either self-explanatory or the same as Caveman mode. JITTER is different, and will introduce an increasing amount of random clock jitter into sample playback. STORE DEFAULT RECORD NOTE will command WTPA to record samples at the clock value corresponding to the last NOTE ON message it got, and save this value to permanent memory. A higher pitch note makes for cleaner samples by default, and vice versa.

WTPA sends MIDI as well as receiving it. For instance, if you tell WTPA to BIT REDUCE to 7 bits using the switches, WTPA will send a Control Change 0 on the current channel, with a value of 7. This feature is the least well-tested of any on WTPA and any suggestions are welcome. The idea is that the MIDI out would be useful for setting up programs like Ableton Live to automate WTPA controls – meaning you could just twiddle a knob on WTPA and Ableton would be able to track it. This feature would also be useful for sequencing WTPA in real time. Since I don't use those programs much, this is poorly tested. I know the MIDI output works correctly, but that's about it. "Modern" synthesizers and whatnot do this stuff all the time and I'm not sure how bizarre my implementation is compared to theirs.

NOTE: WTPA always sends WIDE sample editing commands.

Tips For Getting Your Party Started Right:

WTPA can do a lot of stuff. Here are some recommendations for getting cool sounds out of WTPA based on what I've learned from fiddling with it.

Take advantage of the banks! No other "loop" sampler I know, no matter how expensive, can independently fiddle with samples. This is a WTPA exclusive.

Use MIDI if you can. You don't have to make techno, but it immediately allows for more fine-grained control of (and faster access to) all the parameters. It's just a whole other tool set.

Use the weird bitwise effects. You won't see Line 6 incorporating them anytime soon.

Use the Jitter. Normally modern computers kick WTPA's ass in processing power but this is one of the weird niches where the embedded system can still do stuff faster.

Try the realtime. It's fun.

Edit mode is awesome for making cool glitchy sounds. I might argue it's better for that than trimming samples to size. Somebody told me this is like a particular Machinedrum function.

WTPA is not infinitely fast, and I am not an infinitely good programmer. This means that if you really tweak on all the parameters (or some of the processor heavy effects) you'll hear WTPA start to bog down. As I go through firmware revisions, the code will invariably get faster and this will happen less [EDIT: this has been true but at this point it's as good as it's going to get, which is pretty good usually] You can be of two camps: view this as another cool distortion source, or view this as a limitation to be avoided. I'm trying very hard to see the former viewpoint as a Good Thing, but my pride will keep me trying to eradicate it. I'm a programmer first and noise musician second. Sorry(?)

I am not a circuitbender by trade, but I have made the impedance of the DAC and analog sections such that you should be able mess with them with your fingers if you're into that. Generally speaking, avoid the crystal, and avoid the power supply rails, since little good can come of messing with those, and much crashing will happen.

Finally, good luck! Thanks again for caring about the Party and let me know if you have any suggestions, comments, pictures, cool sounds, tracks, bends, whatever. I love to hear about this stuff.

Best, and give 'em Hell,
Todd Michael Bailey
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