

# REAL WORLD INTERFACES

## TR-808 Sound Mods

Robin Whittle 3 March 2019 [www.firstpr.com.au/rwi/tr-808/](http://www.firstpr.com.au/rwi/tr-808/)

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These modifications consist of knobs, switches, a button and 6.5mm input sockets on the left side of the machine. They are described in order of the controls from rear to front, and then the three Alternative Noise Inputs.

This description matches a machine I worked on in 2012, and some more I worked on in 2015 and later years. For documentation of earlier versions of the Sound Mods, from the 1980s to about 2010, please see the website.

Please see a separate manual which covers the three possible battery arrangements for memory backup and the Write Spike mods, which I do to all machines I work on.

### **1 - Bass Drum Extended Decay - to Self-Oscillation**

The Bass Drum decay range is extended to include self-oscillation, so any decay time from the normal minimum to infinity can be achieved with the Decay knob.

### **2 - Bass Drum Tuning (top white knob)**

The Bass Drum Tuning knob enables higher and lower tuning.

### **3 - Snare Mods (blue and yellow knobs)**

The Snare sound is changed in number of respects:

- Sharper attack for the Snappy noise pulse.
- Reduced cutoff frequency in the Snappy noise pulse high pass filter, to make it gutsier in the lower mid-range.
- The two tonal components of the sound are boosted in level.

The Snare sound is composed of the Snappy noise pulse and the ringing of two "Bridged T-Network" (as the Roland service manual describes them) resonators, with the Tone pot controlling the mix of the outputs of the two resonators.

There are two Snare Tuning pots, one for the upper resonator (blue knob) and one for the lower (yellow knob). Tuning is at the normal pitch when these pots are anticlockwise (ACW) and is reduced by around an octave when they are clockwise (CW).

### **4 - Cymbal Soft-Attack Switch**

The Cymbal Soft Attack switch (above the three small pots) gives more of a ride cymbal sound, compared to the normal crash sound. The attack is soft and the decay is somewhat extended.

## **5 - Tom/Conga Mods (three small knobs)**

The Toms have a pulse of filtered noise, which is barely perceptible, but gives them something of a rumbling sound. These pulses are shortened somewhat. (In Conga mode, there is no such pulse.)

The Tom/Conga circuits each have a Decay pot, where ACW is the normal decay time and CW is a much shorter decay time. These are the three small pots with silver indicator lines. The rearmost pot is for the Hi Tom/Conga.

In 2019 I changed the circuitry to use 50k log instead of 10 k log pots. I also changed some other values so the shortest decay time is not quite as short and so that the main range of normal to somewhat shorter decays is spread over a greater range of the pots' positions, starting from ACW.

## **6 - Hand Clap Mods (switch and red knob)**

The Hand Clap sound is composed of a series of close-spaced pulses of filtered and distorted noise plus a softer pseudo-reverb exponential decay pulse of softly filtered noise. The Clap Reverb Disable switch (below the three small Tom/Conga Decay knobs) turns off this pulse, leaving the dry, stark, and potentially extremely loud main pulse-cluster of the Clap circuit.

The Hand Clap Density pot (red knob) controls the density of this cluster of pulses, from being very light (ACW) through normal, to each pulse being bigger, to all pulses being much louder and joined together (CW).

The sound produced by the Hand Clap circuit depends very much on the level of the internal noise source, or, if the Alternative Noise Input for the Hand Clap is used, the nature of the input signal and its level.

## **7 - Noise Level pot (lower white knob)**

The Noise Level pot (white knob) controls the output level of the internal White Noise Generator. ACW creates a somewhat lower than normal level of noise. 12 o'clock creates a somewhat higher level. 3 o'clock creates a much higher level. Fully CW produces an extreme level of noise such that the Tom "rumble" circuits are occasionally overloaded, even when not being triggered, so there will be sporadic crackles through each of whichever of the Tom/Conga channels are in Tom mode.

The internal White Noise Generator runs from a noisy transistor and is genuinely random broadband noise. (This is a welcome contrast to the digital noise generator in the TR-909, which produces the same pattern of noise every second or two.) It is used for:

- The Snappy pulse of the Snare Drum. Increased noise levels make this a very strong pulse indeed.
- The Rumble pulse of the Toms. High noise levels lead to more rumble to the point of completely unphysical rumbles and muffled crackles.
- The Maracas sound is based on this signal, but it affected very little by the noise level.

- The Hand Clap sound, both the pulse-cluster and the pseudo-reverb, is based on this noise source. Higher noise levels lead to gutsier and potentially very loud hand-clap sounds. It is generally best to disable the Hand Clap Reverb when high noise levels are used. The resulting clap sounds, especially with the Density control turned somewhat to the ACW and with the Noise Level pot set to about 2 o'clock, are a unique and gusty discrete sound. Since these are generated from real analogue noise, no two Hand Clap sounds are the same.

## **8 - Accent Button**

The Accent Button forces Accent on even if the internal sequencer's pattern has no Accent on the current beat. This Accent state also drives the 4 Level Accent system, if this modification is installed.

It does not activate the Accent Trigger Out, which is driven by the Internal Sequencer's Accent state.

## **9 - Optional Accent Input Socket**

In mid-2014 I introduced an optional Accent Input socket. This 3.5mm input socket, mounted on the right of the machine, enables external audio or CV input signals to turn on the Accent, if it was not already turned on by the Internal Sequencer or the Accent Button.

The detector circuit uses a +1.15 volt detector circuit which will remain on as long as any part of the input waveform exceeds 1.15 volts in the previous 30 msec. Therefore, sufficiently strong audio signals, down to bass signals, will drive this input on.

Machines modified in 2019 and later have a red LED between the Accent button and the Noise pot, which lights when the detector is activated. Machines modified before 2019 do not have this LED, though it was mentioned in the manual.

Activating this circuit does not cause pulses to be emitted from the Accent Trigger Out socket, which is driven only by the Accent state of the Internal Sequencer.

## **10 - Alternative Noise Inputs**

There are three audio signal inputs. (6.5mm mono sockets on right side.) When an audio signal is plugged into one of these, that signal takes over the role of an internal noise signal. These are not to trigger drum sounds – they are signals from which drum sounds are made.

### ***Cymbal / Hi Hat Alternative Noise Input***

Normally the Cymbal and Hi Hat sounds are created from a mix of 6 square-wave oscillators. This signal is filtered, distorted in a gating circuit (which controls the volume) and filtered again. By plugging an audio signal into this socket, the 6 square-wave oscillators are no longer used and the Cymbal and Hi Hat sounds are made from the input signal instead. Bright, high, chord sounds are an obvious choice of signal – they cause the Cymbal and Hi Hat sounds to be metallic shimmering (low level) or mashed and splattered chord-related sounds. Playing a single pitch into this signal results in single-pitch high-pass filtered square-wave Cymbal and Hi Hat sounds.

Miking up a continual cymbal sound (such as from a large cymbal hammered softly with a mallet) and feeding this signal into this input results in realistic sounding Cymbal and Hi Hat sounds, depending on the level.

The Cymbal and Hi Hat circuitry is beautiful, inspired and unique to the TR-808 and TR-606. (The CR-8000 may have similar circuitry – but it is many years since I have seen one.) This Alternative Input enables the creation of many bright, delicate and potentially wild sounds. It is my favourite part of the TR-808.

Each TR-808 has a unique tonality to its Cymbal and Hi Hat sounds, due to each machine's six square wave oscillators having a unique set of frequencies. It is possible to use this socket as an output for this mix of six square waves – by inserting a plug gently until it touches the tip contact of the switch, but not hard enough to lift the tip contact from the normally closed contact. Then, it is possible to record a few minutes or whatever of this mix of square waves. This can be played back into a second TR-808 via this Input, and the second machine will have the tonality of the first machine, assuming the playback level is adjusted to match the required signal level. Of course, this recorded signal could be subject to manipulation by changing its playback pitch, but distorting it, by adding reverb, random vibrato or whatever via audio editing software, so the original tonality could be used in the same machine, with various modifications.

### ***Hand Clap and Maracas Alternative Noise Input***

Whatever signal is input here replaces the internal white noise generator in the Hand Clap and Maracas circuits. Random mid-range to high frequency noise, chords, distorted and/or reverberated chords or various other signals result in staccato Hand Clap sounds which are unique to the Modified TR-808 and would never result from conventional synthesis techniques.

This socket (and the next) can be used as an output for the internal noise source, with the same technique as described above for the CY/HH Alternative Noise Input. It is (in audio terms) "white" (flat spectrum in energy per Hertz) noise – real noise from a reverse-biased transistor junction going into avalanche breakdown. There are many other sources of noise in the modern world, but this is a source and it might be handy. The volume and to some extent the character of the noise will vary with the setting of the Noise Level pot.

There's no significant difference in the audible quality of the noise between one TR-808 and another, other than the effects of TM4 inside the machine (for a standard TR-808) or the Noise Level pot (on a modified TR-808) which affects the white noise level sent to the Snare, Toms and the Hand Clap / Maracas circuit.

### ***Snare Drum Alternative Noise Input***

This signal replaces the internal white noise generator for the Snare Snappy noise pulse circuit.

### ***Document history***

- 2015-05-25 New document, derived from the text at the website.
- 2019-03-03 Mention change Tom/Conga Decay circuitry. Added note that the LED indicator for the Accent In socket is present in machines modified in 2019 and later, but not machines modified earlier. Added notes about the Accent button and Accent Audio/CV input not activating Accent Trigger Out pulses.