Quilcom Informant User Reference

The Quilcom Informant is a VSTi plugin enabling you to explore formant synthesis, shaping and sequencing. Simple speech can be programmed but it is not intended to be a “singing synthesiser” as there is no text to speech provided. If you want a singing synth I would suggest using a vocoder like the Quilcom Bluesky for example. This can provide immediate and intelligible results for any input speech.

The idea of this instrument is to explore a system that can use the many parameters of speech, resonant sound boxes and tubes to create interesting new sounds, musical and otherwise.

You can watch a demo at <https://youtu.be/LH8aR0NUwr8>.

Design

There are 2 methods provided for the formant generation: Parallel resonant bandpass filters, found on the Synth panel, and an unusual technique patented by Yamaha.

The Yamaha method could be described as granular, since it creates waveform grains which can resemble just the resonant parts of a traditional filter. Since these are sinewave-based grains, and no filters are involved, the grain contours (envelopes) can be shaped over a very wide range. This would be impossible using just filters and can give a very wide range of results. As far as I know this method was only ever included in one product, the FS1R (Formant Shaping 1u Rack) synth module. One powerful feature of the FS1R was the Formant Sequencer which could control the many parameters of the generators and unpitched components like fricatives and explosives (plosives). This synth was the inspiration for the Informant but it’s *not* an emulation, merely the essence of principle. The Yamaha US patent is included in the download so you can see the background in more detail.

There are 3 granular Formants which can be viewed individually. These can be controlled locally, from their own panels, or the most important parameters can be sequenced by the Sequencer, also viewable separately.

The Informant also has 5 “Frix” generators for producing the noise-based components of speech or even basic percussion. These are all on the Frix panel. I coined the term Frix to cover any unpitched sounds you may need or want. The Frix generators can each be triggered by the Frix window on the Sequencer, or completely locally if the Sequencer is turned off.

There is a Synth panel available too. The granular technique provides a thin sound on its own, since there is virtually no fundamental energy. We do hear a pitch due to psychoacoustics, based on the repetition rate of the grains, but it’s normally insufficient for a more useful and convincing result. The Synth provided is actually very flexible in this context and can produce a modelled glottis wave or other waveforms as a base sound. This synth also features optional bandpass formant filters and some of the presets use only this scheme. These filters may also be sequenced with or without the granular formants sounding too. Comparing the 2 methods is quite interesting and the results are different, depending on settings of the granular formants of course.

In use

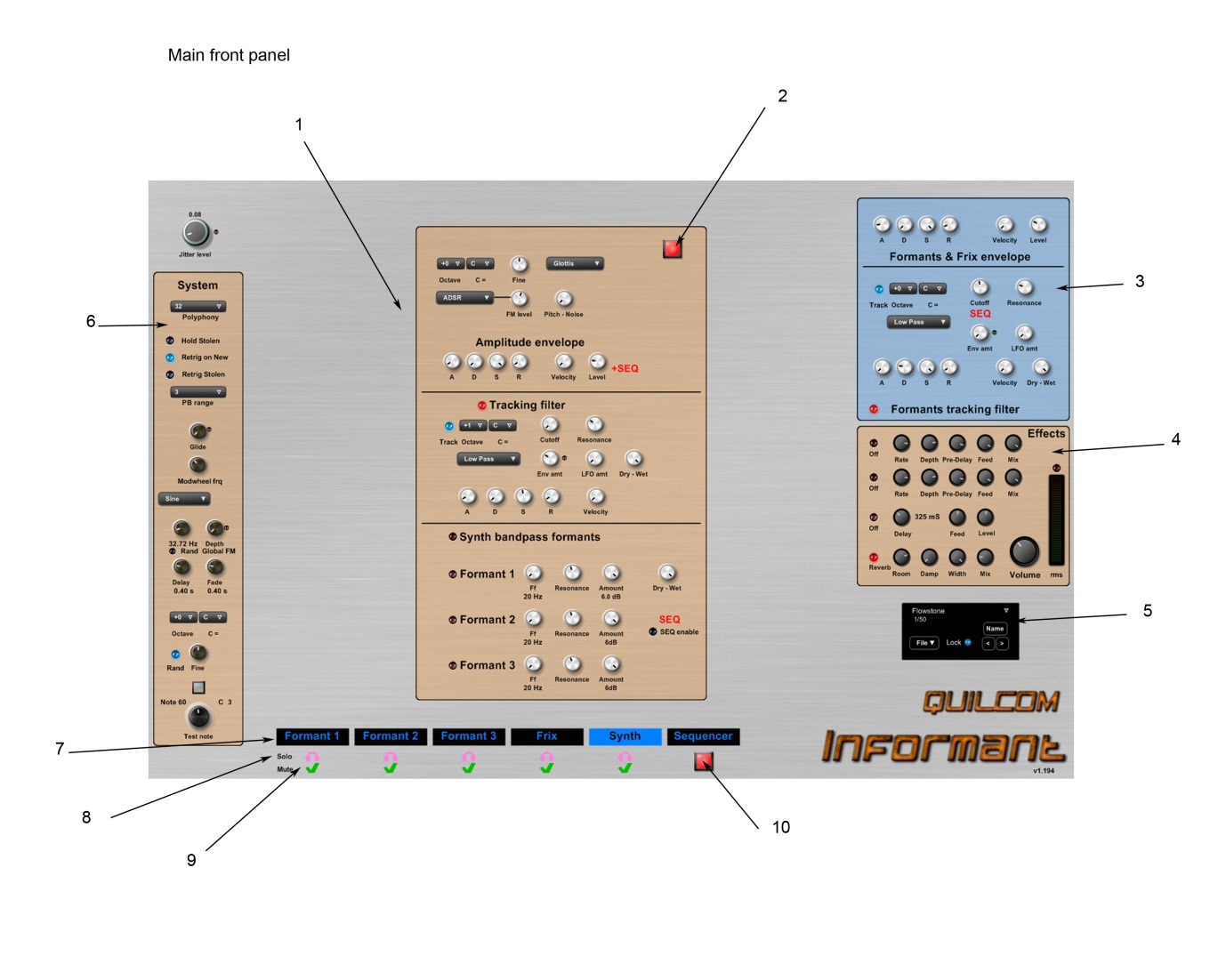
Experimentation is the key to learning the Informant, as with many novel systems. The download includes 2 excellent formant tables, so you can enter vowel parameters you want from these before you start. There are other (old) documents which go into the principles of formants and their synthesis, and there is a wealth of information on the internet. The documents I provided are at least a good starting point.

Keep in mind that in real speech relative timing is very critical for intelligibility, as well as formant pitch and level. One of the trickiest aspects is trying to achieve a specific phoneme which often consists of a very precise transition between 2 sets of parameters. In commercial voice synthesisers these phonemes are either actual voice samples joined in a string (concatenation) or preset control blocks fed to a formant synthesiser in sequence. The Informant allows exploration to a deep level and whilst operation is as easy and convenient as I could make it, programming it is far more demanding.

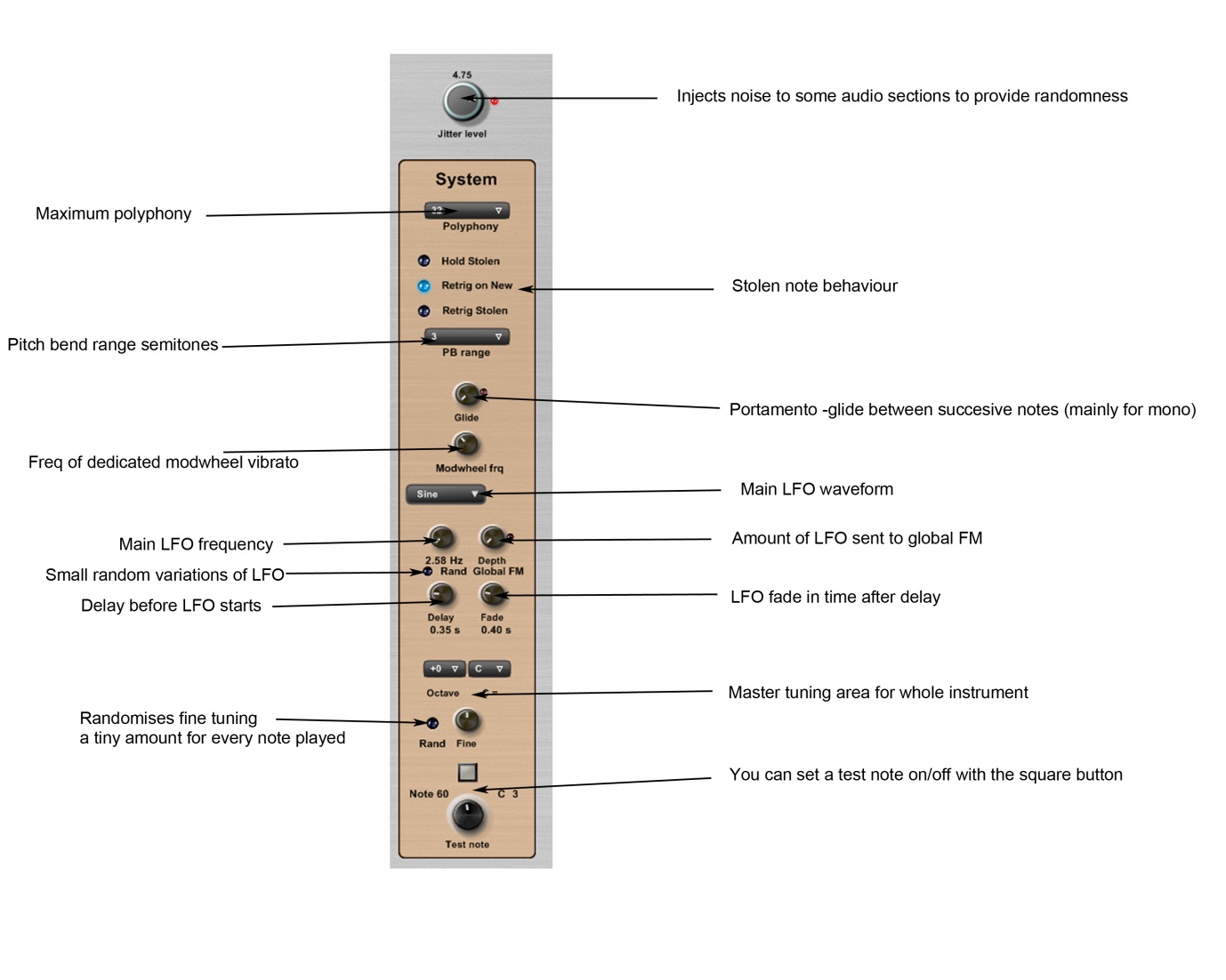
I think the best method of learning is to fool around and try making small changes to my presets to see what happens and to get a feel for the system.

Main thing is to explore and have fun.

Information that follows explains all the operating elements of the instrument.

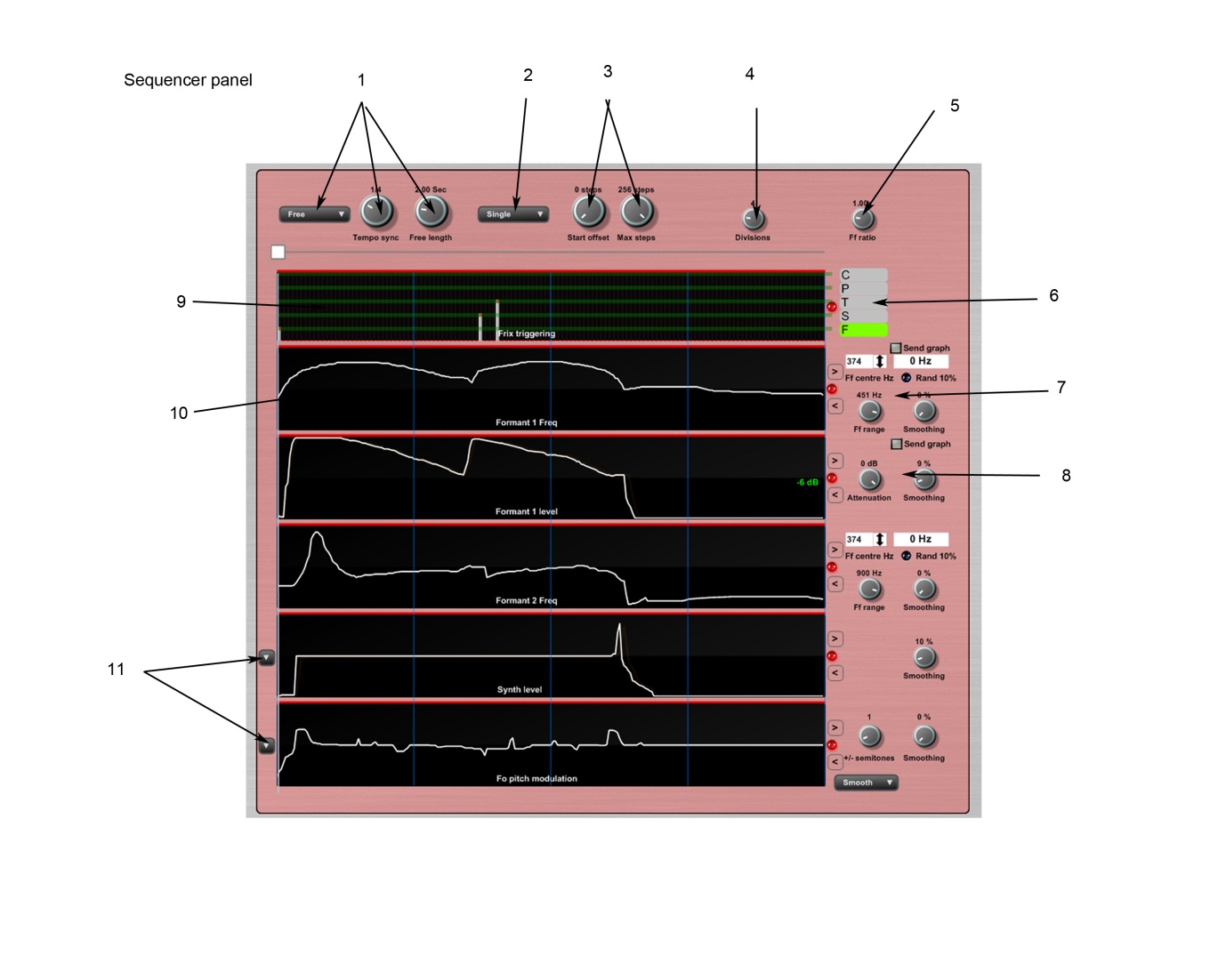


1. Central panel display area.
2. Red switches turn on/off to save CPU if not required.
3. The Formants and Frix envelope controls the combined levels of granular formants and Frix sounds. Mainly used to fade in/out if needed. The tracking filter only processes the granular formants. This can be used to fine adjust the spectrum or provide an additional formant. The tracking filter has its own ADSR. The LFO amt adjusts the influence of the main LFO on the System panel. You can also mix between the filtered sound and the dry sound for further control.
4. The effects panel provides for 2 identical triple chorus effects, wired in parallel, for a thick sound. If using both, adjust different settings for each to give a thicker sound. The output then goes into the simple delay then finally into the reverb at the bottom. The red LED switches will bypass their effect and save CPU if not required. The Vu meter shows rms but the LED at the top responds to excessive peaks to show clipping. Here you’ll find the master volume control too.
5. Preset manager with Lock button. The lock button can preserve the starting sound and any edits will be lost unless Lock is off.
6. System panel for master controls. See later for details.
7. This is the row of view buttons to reveal the selected panel.
8. Solo buttons to hear the contribution of the audio form any panel. You can “solo” more than one panel by using the control key and selecting those you wish to hear together.
9. Mute buttons are also useful for assessing the contribution of a panel or panels from the whole.
10. This turns the Sequencer on and off. When turned on certain parameters are controlled for the sequencer view and each panel will indicate what areas are now under sequencer control.



Shown above is the System panel with labels to indicate function.

The Test note is useful when fine-tweaking the sequencer graphs so you have both hands free to operate the shift or control keys and/or the Scrub slider.

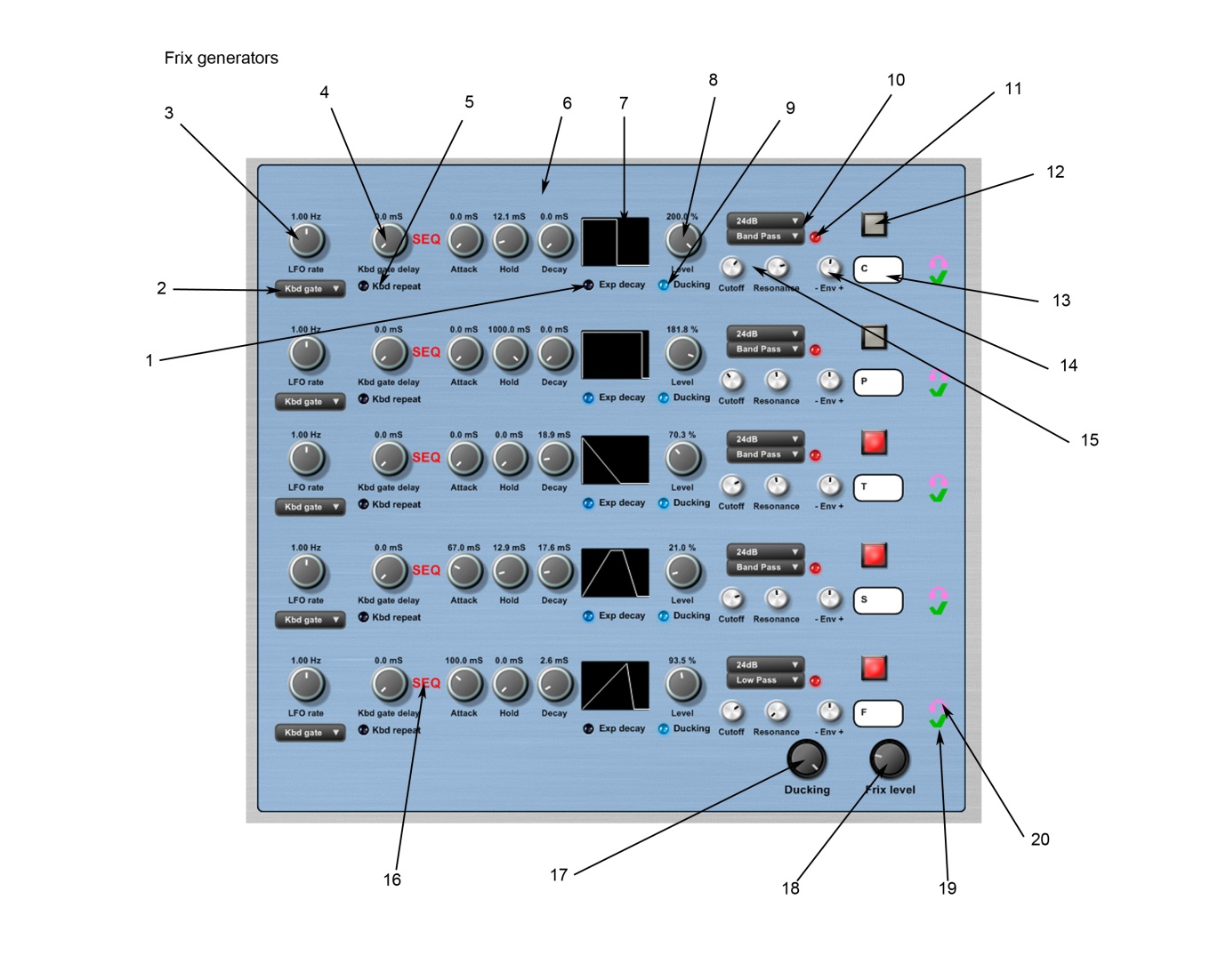


Sequencer panel

1. Here you can set free time in seconds or sync to your DAW’s BPM setting. Note that a Free setting of 2 seconds is identical to a Tempo setting of 1 / 4 at 120 BPM where the window covers 1 whole bar (measure) in 4/4 time signature. The default with no DAW tempo is 120BPM so each quarter of the sequencer’s window will be one quarter note.
2. Choose Single shot, Repeat or Scrub play modes. In Scrub mode you need a note sounding and you can drag the top white-buttoned slider left/right to scrub. You could make use of the Test note feature here.
3. These 2 knobs control the portion of the sequence to listen to. You can set max length and start position to hear any section. The line along the top of every sequencer window will show you where you are. The line can also be useful for land marking a position for accurate alignment.
4. The Divisions knob provides a grid of vertical alignment lines to help get timing spot on. You can choose up to 16 divisions.
5. Ff ratio knob controls the ratio of formants 2 and 3 to formant 1. Normally leave it at 1 but if you get a sound you like you can alter its most effective keyboard range to suit with this knob. Also makes some nice sounds if adjusted during playing.
6. These are the names for the Frix sounds you enter on the Frix panel so you don’t have to keep switching views. Edit them on the Frix panel, not here!
7. This is a Formant frequency (Ff) sequencer. 3 are available, all identical. The white Ff centre Hz box can be adjusted by dragging up/down in the arrow section or just enter the number directly. When you mouse-over the graph, the display will change to a green indicator of the Ff at the mouse cursor. This can be useful to get more precise values drawn in. The Ff range adjusts the range of the graph. To the right of this is a Hz display which is live during playback but is really only useful when scrubbing. You can send the Formant 1 Ff graph to the other 2 Ff graphs for land marking as a starting point. ALL the graphs have a smoothing knob which softens hand-drawn spikes and wobbles to reduce clicks and other unwanted artefacts. A control-click on the Ff controls will set a good start point and allow *all* the values on the supplied formant charts to be entered on the graphs. The same goes for the INIT preset.
8. This is the level or attenuation graph for Formant 1. This graph can be sent to the other 2 formant level graphs for land marking or duplication. The attenuation dB is for the top of the graph so halfway down is at -6dB and there’s a label which changes with the attenuation you set, as a reminder.
9. This is a 128 step Frix triggering sequencer. Drag the point you want up to the band for the Frix you want to trigger. Once you click on a bar the X-mouse position is locked so you can be shaky and still just control the trigger point you want. A double-right-click will clear all the triggers.
10. This applies to *all* the “black” sequencer graph windows:

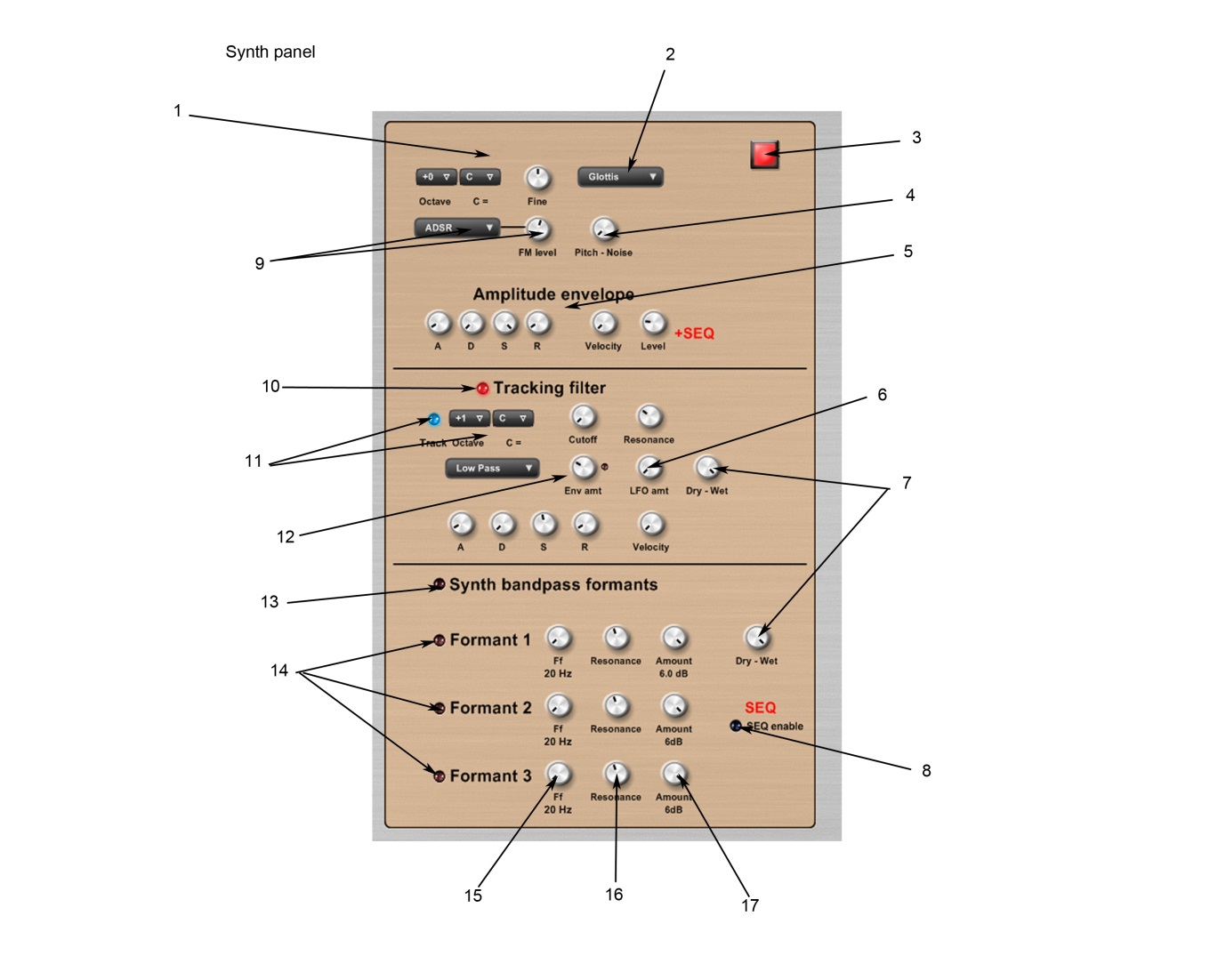
* Double right-click to reset the *whole* graph to default.
* Shift-drag left/right to set the dragged *region* to default.
* Control-click memorises the Y-position as long as you hold control key. If you click *then* drag you’ll get a horizontal line from where you first pressed control. If you release the mouse but keep control pressed you can click elsewhere and draw with the same y-mouse position. This is very useful for setting repeated vowel and pitch sounds, which can be critical, and also allows for a shaky hand.
* To the right of every black graph are nudge left/right buttons to help you align graphs. If you hold these you get a repeat and you can wrap around indefinitely without loss of data. This nudging can be useful when smoothing a graph because smoothing produces some phase shift which can misalign critical changes.
* Every sequencer graph will use some CPU so please turn them off with the red LED switch to the right, if not required. This is also useful for auditioning the contribution or to trace where an errant sound is coming from.

1. These dropdown menu buttons allow you to choose the graphs to display in the bottom 2 slots. The top 4 slots are fixed.



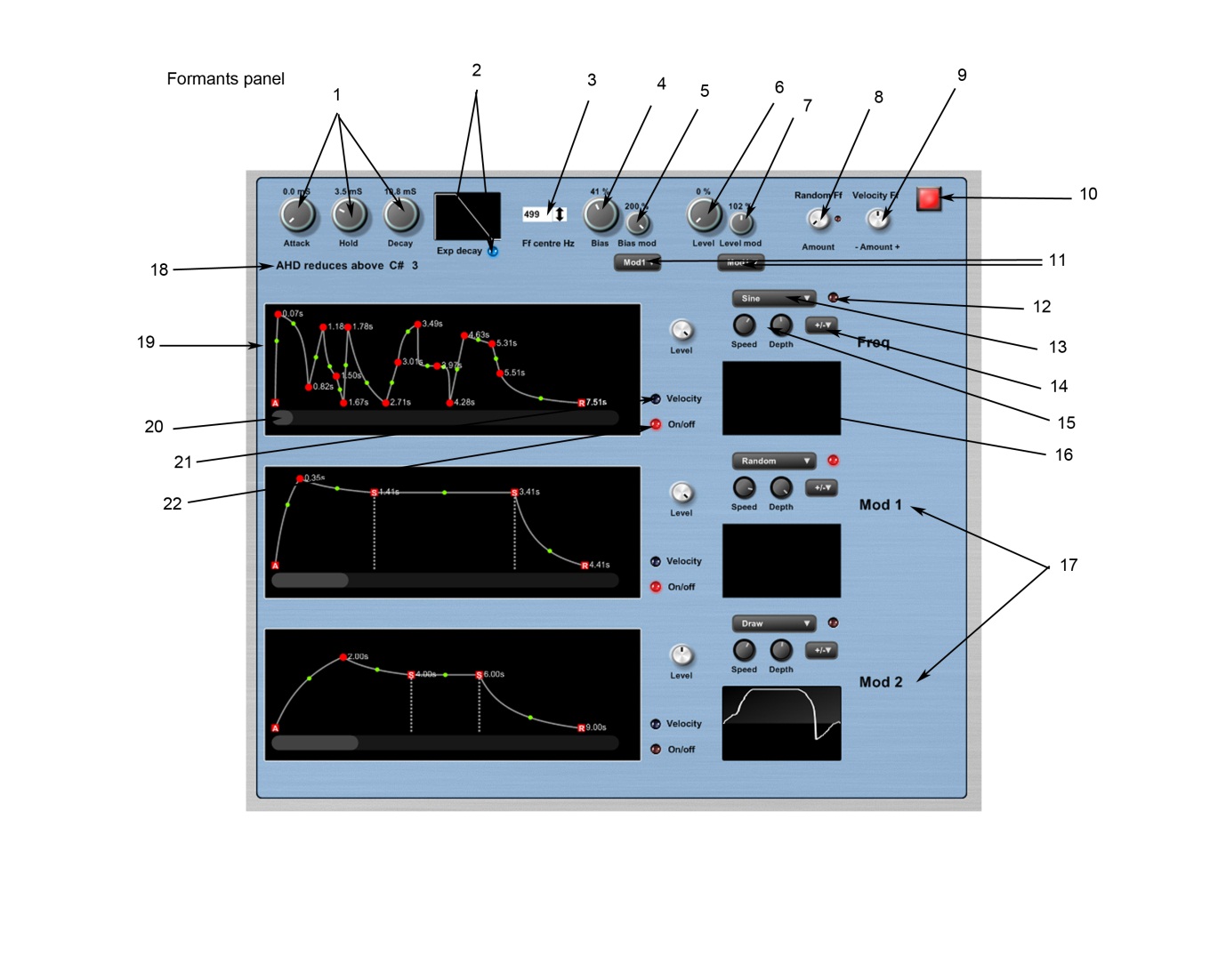
“Frix” stands for Fricatives and Explosives (sometimes called plosives). These are noise-based sounds like “S” and “T” for example. There are 5 identical generators which function like drum/percussion synths in many ways, but with no pitched sound source.

1. The decay stage can be either (pseudo) exponential or linear and both have their uses.
2. If the sequencer isn’t turned ON this sets the trigger source. Note that LFO Rand 1 will give the same random sequence for each note and LFO Rand 2 will give a unique random sequence for each note. So Rand 1 will be more appropriate for playing chords, since the notes will vary in sync.
3. If set to LFO the rate can be set here.
4. This delay is from key-press to trigger. This can allow different trigger delay times for each Frix sound.
5. If this is ON the Kbd gate delay (4) controls the repeat rate, once a key is pressed.
6. The generators make use of Attack/Hold/Decay (AHD) envelope generators for the grains, which do not re-trigger until each grain’s envelope is completed.
7. A graphic to show the *relative* shape of the envelope to provide some indication. Note that the Exp decay option is not reflected in the decay stage of the graphic.
8. This sets the level of the Frix in question. It goes high so you can easily hear it while editing but is normally set to no more than 100% in use.
9. “Ducking” is reducing the sound of the Formants and Synth (the synth is the fundamental or glottal sound normally) while a Frix is sounding. This is like side-chain compression in effect. Ducking is present for the Attack and Hold phases but not decay (allowing blending during decay). There is a ducking buss so each Frix can contribute or not, depending on its usage.
10. Here you can set the type of filter and its slope to give a very wide range of Frix sounds. Be aware the 24dB may sound too “tuned” for some sounds.
11. If you don’t need the filter at all turn it off!
12. These red LED switches disable each Frix generator and can save CPU; even if they are muted, don’t leave more ON than you need.
13. Give a name to your Frix sound here. This then shows up on the sequencer view so you know which Frix to trigger. This is saved in the preset of course.
14. The AHD envelope can be made to modulate the filter’s cutoff frequency up or down. Like all knobs, do control-click to set the default (which is zero on this knob).
15. Manual filter cutoff and resonance (always locally controlled, not from the sequencer).
16. The red SEQ indicates that the sequencer is controlling the adjacent parameters so local control is disabled.
17. Ducking level sets the amount of gain reduction for the Synth and grain Formants. Note that if this is set high but the Frix is muted the formant and synth sound will still dip but you won’t hear the Frix.
18. Once you have a good *balance* between any programmed Frix sounds, you can set the overall level of Frix here. Normally this will be at a quite low and subtle level for more authentic vocal emulations.
19. The green tick is for switching muting on or off.
20. The headphone symbol is for setting solo. You can control-click others to “solo” more than one Frix.



The Synth panel provides a complete simple synth with its own Formant section. It can be used to fill out the granular formants (which contain almost no fundamental or glottal content) or purely on its own, as some presets demonstrate.

1. Tuning for the Synth.
2. Waveform selection for the synth. Glottis is a special waveform, modelling the shape of published work revealing the basic sound produced by the vocal cords, without resonant influence.
3. If you don’t need the Synth turn it off to save CPU!
4. You can blend between the selected waveform and white noise.
5. The selected waveform has its own envelope generator. The velocity knob, if turned clockwise, will reduce the amplitude at lower velocities. Note that when the sequencer is turned ON the red +SEQ label indicates that the sequencer can add or subtract from the basic ADSR envelope settings. This is the only part of the instrument where control is shared between local and sequencer control.
6. The LFO referred to here is the main LFO on the System panel.
7. The Dry – Wet knobs allow blending between filter effect and dry.
8. The Formant section can be controlled by the sequencer if the sequencer is turned ON. But you can decide if you want sequencer control but if the Sequencer is OFF there is no option visible.
9. The sine, triangle and ramp waves can be phase modulated (FM) and this drop-list menu selects the source. The most useful one is Sine since you can make subtle or extreme changes to the harmonic content of the basic sound.
10. If you don’t need the tracking filter turn it off to save CPU!
11. If tracking is selected with the blue LED switch the tuner will set the filter’s cutoff based on the tuning set and the keys pressed, so it will track the notes played. You can use this in conjunction with the manual Cutoff whereby the settings are added. This can be used for part-tracking so the effect is non-chromatic.
12. The Cutoff can be modulated by the ADSR to the degree required.
13. If you don’t need formants added to the base sound turn them all off!
14. If the Synth bandpass formants section is turned on, you need to turn on at least one of the formants to hear anything. Usually all 3 will be used and the red LED switches can be used to audition their contribution. The filters are connected in parallel. This signal topology is the easiest to work with due to much reduced interaction.
15. This sets the Formant frequency (Ff). Each Ff can be controlled *individually* by the sequencer’s Ff graphs.
16. This is the resonance or bandwidth of the formant. It’s level-compensated so you can adjust the bandwidth with much reduced effect on the gain. Note that if the Sequencer control is enabled all 3 resonance values are the same and supplied by the Bias/Resonance sequencer graph.
17. This controls the attenuation (level) of the formant. Each format level can be controlled *individually* by the sequencer’s Level graphs.



There are 3 identical formant generators using what could be described as a granular technique patented by Yamaha. This method allows for “Formant Shaping” and is used only in their FS1R synth module. The “formants” created consist of shaped wave packages of sine waves. The sound produced is like a resonant filter but with virtually no fundamental energy.

Since this is a granular technique we can shape the packages freely to provide sounds that could not be produced by the more common filter approach (as found on the Synth panel). So that we can frequently trigger the grains, they are created sequentially to avoid harsh premature termination due to retriggering. In the Quilcom Informant there is a 4-phase trigger system running at one quarter fundamental frequency and this gives a good range before total overlap. This accurately duplicates the published waveforms from the Yamaha FS1R.

In this way we can create formant-like sounds that no filter technique can achieve.

1. The Attack-Hold-Decay (AHD) envelope defines the shape of the formant grain packages. The AHDs never retrigger so there is no harsh addition to the spectrum produced.
2. The graphic shows the *relative* shape of each grain’s envelope. The Decay phase can be (pseudo) exponential or linear. The exponential decay isn’t shown in the graphic.
3. This is where you set the Formant frequency (Ff). The control has the arrow area where you can drag up/down with the mouse or just enter the required value into the box. If you control-click in the arrow area you’ll get a default value which differs in each Formant panel to give a good start point (same as with the INIT preset).
4. “Bias” is something else we can’t do with a filter. At higher settings it chops off the lower part of the grain envelope and is level-compensated. This has an overall effect like varying the bandwidth, and can be controlled by the Sequencer. Of course the AHD settings themselves have a large effect on the sound too but these are static.
5. The bias modulation level can be modulated locally (no Sequencer) and this knob determines the range.
6. This knob controls the level of the Formant when the Sequencer is OFF.
7. The level can be modulated locally and this knob sets the range.
8. Random Ff allows each note pressed to have a random value added to the Ff. This can be set from a subtle to a wild variation.
9. This knob allows for the Ff to be modified based on velocity of the key pressed in a plus/minus direction. Control-click sets it to zero influence.
10. If you don’t use or need a Formant generator turn it off to save CPU! For some vowel sounds Formant 3 contributes so little it can be disregarded and not used.
11. Both Bias and Level can each be modulated by Mod 1 or Mod 2 so you can select which to use. Sometimes Mod 1 for example can be used to modulate both Bias and Level in sync.
12. Each of the 3 LFOs available can be turned ON or OFF to save CPU.
13. Select each LFO’s waveform.
14. Sets the polarity of each LFO.
15. LFO speed and depth knobs.
16. Each LFO provides for a wave drawing option so you can sketch your wild and wacky shapes when you choose the draw option. Keep in mind the LFOs are polyphonic so each key press will start its own note’s LFO wave from the beginning.
17. The upper modulation strip is dedicated to the Ff. Below this are 2 identical strips Mod 1 and Mod 2 which can be routed to Level and/or Bias (see 11 above).
18. As mentioned above, the AHDs can never retrigger prematurely since this would cause a harsh sound. So in order to extend the usable pitch range it’s necessary to reduce the total AHD time at higher pitches. If you set longer AHD times this text will indicate where on the keyboard the AHDs will start to reduce. Note that the *shape* of each grain envelope will not be altered so there’s actually little impact on the sound itself. If you are working only in the lower keyboard ranges you can experiment with longer grain times. If you want a wider range of the keyboard to sound more similar, I would recommend setting the AHDs so the reduction starts above about C4. Keep in mind it’s the *shape* of the grains that has easily the most influence on the sound, compared to the length which has a much smaller effect.
19. The 3 graphic envelope generators are identical in operation:

* Right-click for a range of options.
* Drag the red nodes to set the time and amplitude.
* Drag the green nodes to set the curve shape between transitions.

1. Drag the scroll bar left-right to pan the graph left-right. Drag up/down on the scroll bar to zoom in or out of the graph.
2. This button links key-press velocity to amplitude such that softer key presses will produce a lower level.
3. If you’re not in need of a graphic envelope turn it off to save CPU!