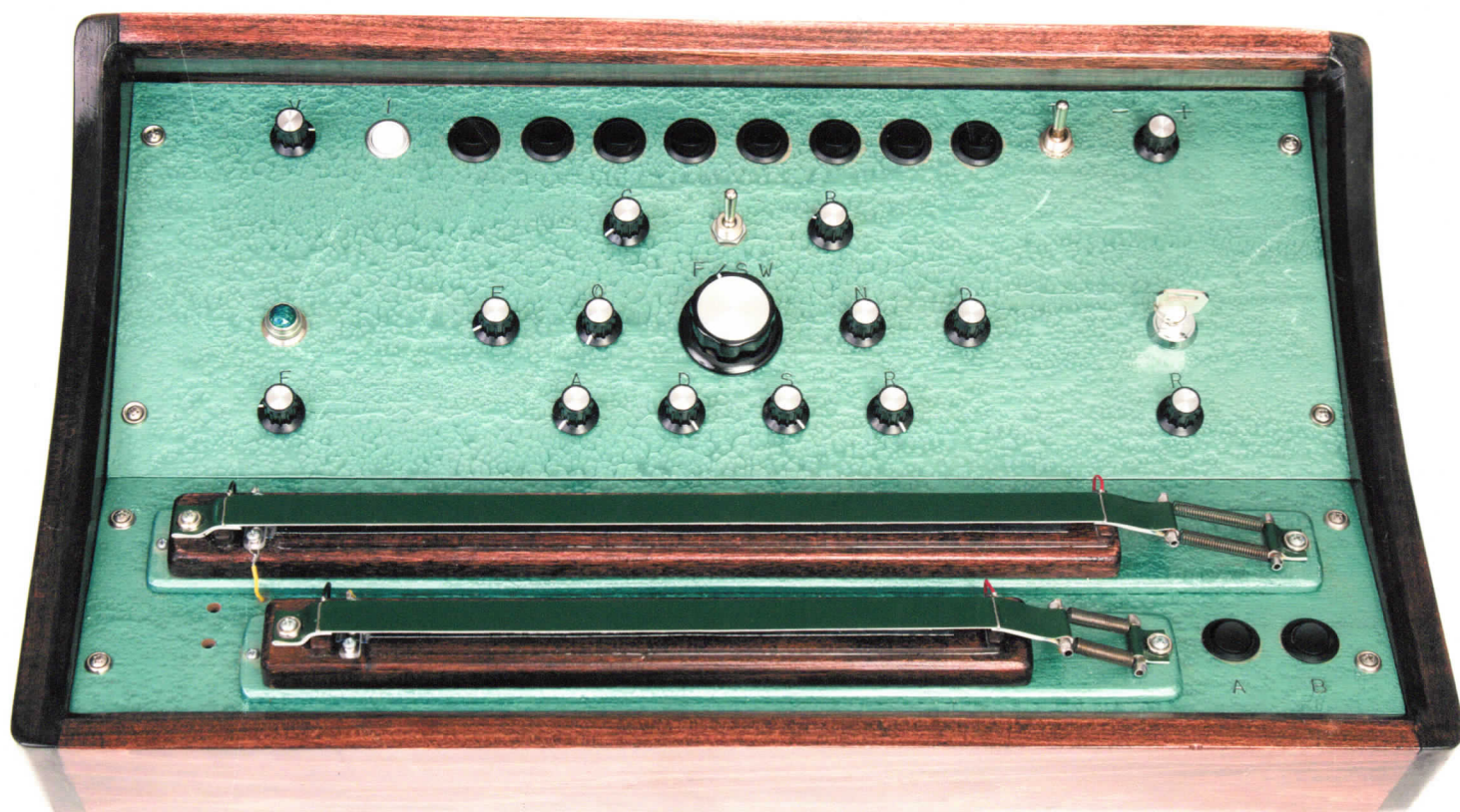


The Dewanatron

# SWARMATRON



Operator's Guide

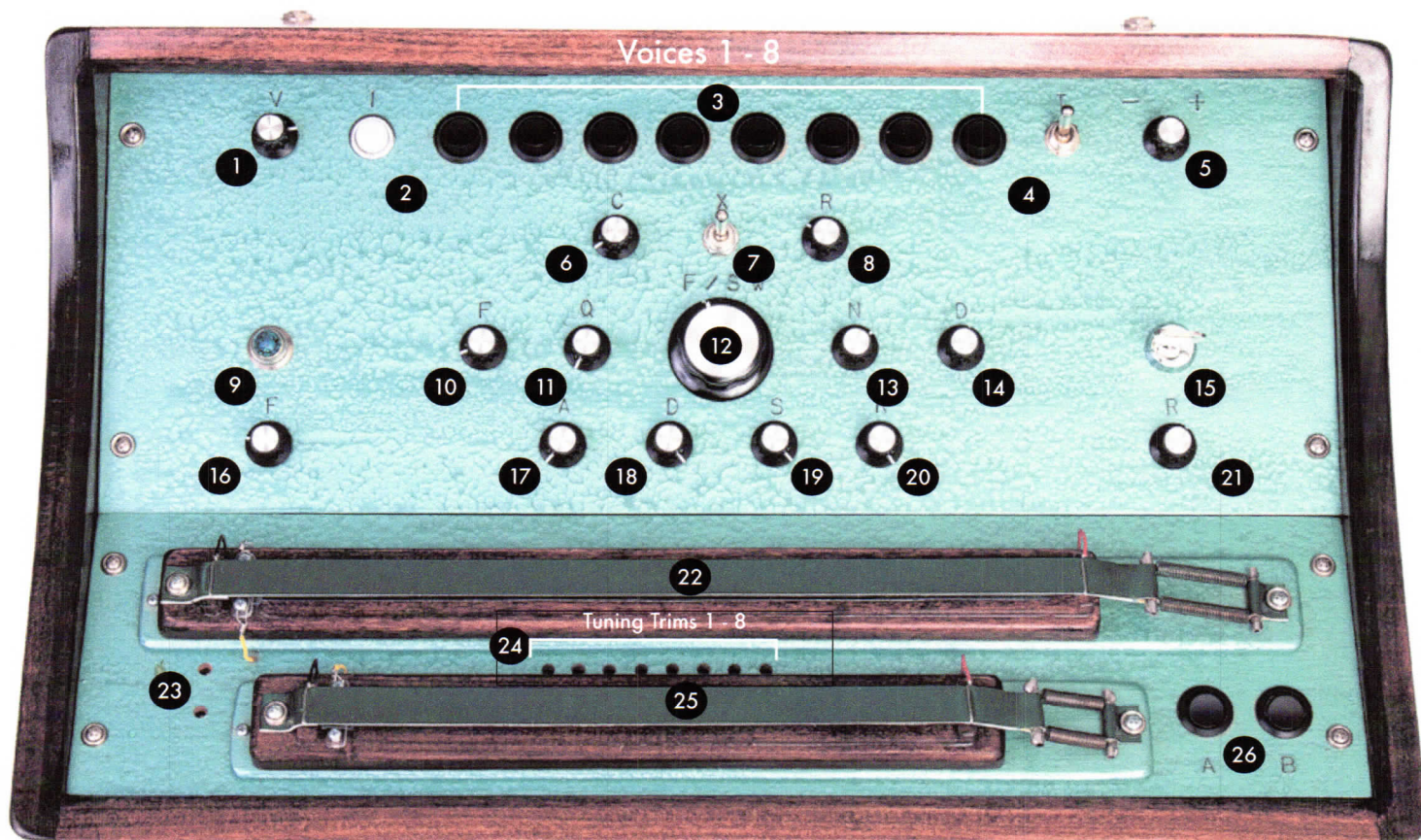
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The Swarmatron produces eight tones tuned approximately to one note, each tone slightly different in pitch to produce a complex and natural choral effect.

These eight oscillators can be played with a ribbon controller (the "pitch ribbon") to move the pitch center up or down.

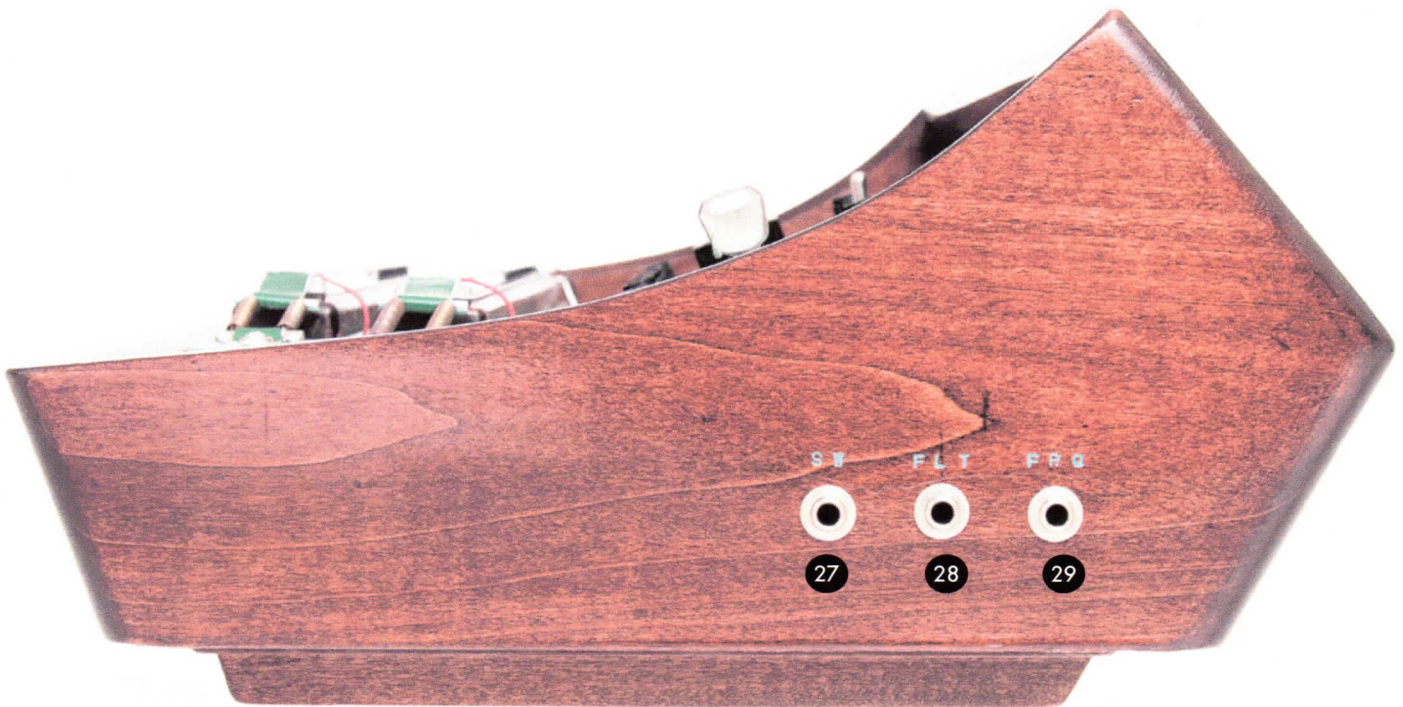
A second ribbon controller (the "swarm ribbon") expands the sound of a swarm of eight notes spread just a few cents apart into a wide chord of equidistant pitches spread over the entire spectrum. The player can "taffy pull" the resulting chord by using the swarm ribbon and pitch ribbon in tandem.

## Front Panel Controls



- |                                      |                                    |
|--------------------------------------|------------------------------------|
| 1. V – Audio volume                  | 14. D – Filter drive               |
| 2. I – Audio signal interrupt        | 15. Power key                      |
| 3. Voices 1-8 – on/off for each note | 16. F – Pitch floor                |
| 4. T – Filter tracking on/off        | 17. A – Envelope attack            |
| 5. +/- – Filter tracking +/-         | 18. D – Envelope decay             |
| 6. C – Cluster preset                | 19. S – Envelope sustain           |
| 7. X – Swarm/filter control reverse  | 20. R – Envelope release           |
| 8. R – Swarm control range           | 21. R – Pitch range                |
| 9. Pilot light                       | 22. Pitch ribbon                   |
| 10. F – Filter frequency floor       | 23. Ribbon trims                   |
| 11. Q – Filter resonance             | 24. Tuning Trims                   |
| 12. F/SW – Filter/swarm frequency    | 25. Swarm ribbon                   |
| 13. N – Filter envelope (+/-)        | 26. A, B – Trigger select switches |

## Side Panel Jacks and Trims

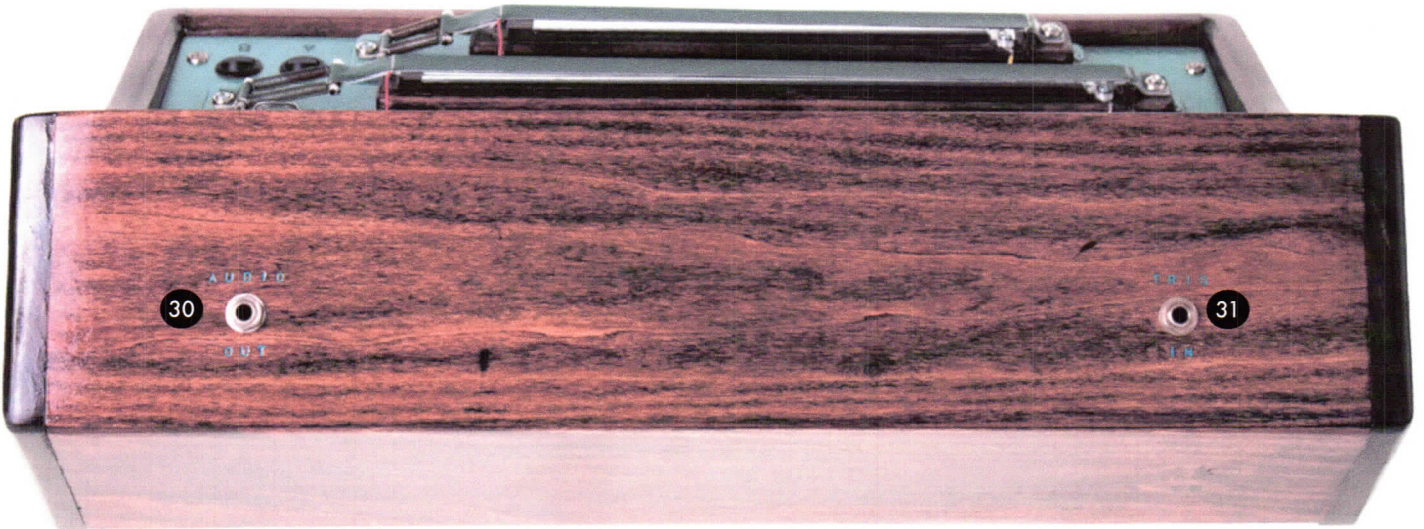


27. SW – Swarm cv in

28. FLT – Filter cutoff cv

29. FRQ – Pitch cv in

## Back Panel Jacks



30. Audio signal out

31. Envelope trigger in

# Operation

The Swarmatron operates on 80-240 v household current and does not need a voltage adaptor for use in different countries.

Turn the Swarmatron on by rotating power key (15) clockwise. The pilot light (9) will light up. Run the audio signal output (30) into a line-level amplifier with a 1/4" cable. You are now ready to play the Swarmatron.

## Pitches and Clusters

Pressing down on the pitch ribbon (22) at any point triggers a volume envelope causing a note or note cluster to sound. The pitch of the note (or tonal center of note cluster) depends on where the ribbon is pressed. Pressing down on the leftmost end of the ribbon yields the lowest note, sliding rightwards raises the pitch. Sweeping along the pitch ribbon while maintaining downward pressure yields continuously varying pitches, small back and forth motions and "rocking" of fingertip add vibrato.

The frequency range of the ribbon is controlled by the pitch range control R (21). The lowest note is set with the pitch floor control F (16). The pitch floor is capable of bringing the pitch down to sub-audio frequencies (~1hz). Full pitch range extends pitch frequency to the upper limits of the audio spectrum (~15-20k).

The swarm ribbon (25) controls the separation of the notes. Pressing down on the leftmost end of the ribbon aligns the 8 voices in approximate unison. Sliding rightwards separates the notes. The range of influence of the swarm ribbon can be adjusted with the swarm range control R (8). Maximum swarm range covers most of the audio spectrum.

The cluster preset control (6) replaces swarm ribbon controlled note separation with 4 presets as it is turned clockwise. These presets represent approximate note separations of major thirds, fifths, major sixths and octaves. When it is in its most counterclockwise position, the note separation is controlled by the swarm ribbon.

Individual voices can be turned on and off with the Voices 1-8 switches (3).

## Envelope Generator

The Swarmatron's ADSR (Attack Decay Sustain Release) envelope is triggered by pressing down on the pitch ribbon. This envelope controls the volume as well as the filter cutoff frequency. Controls 17-20 adjust the attack time, decay time, sustain level, and release time of the envelope.

## Filter Controls

Filter frequency floor F (10) controls the filter's lowest cutoff frequency.

Filter resonance Q (11) controls the filter's "sharpness" or resonance.

Filter/swarm frequency F/SW (12) - with the "X" switch (7) in the upper position, this controls the filter's cutoff frequency.

Filter envelope N (13) controls the degree to which the envelope influences the filter cutoff; this is a +/- control - counterclockwise-most position yields maximum negative influence, clockwise-most results in maximum positive influence, and in the exact middle (straight up) the envelope has no effect on filter cutoff.

Filter drive D (14) adjusts degree of filter "overdrive", yielding complex and chaotic waveforms, especially with higher Q settings.

Filter tracking on/off (4) allows the filter cutoff frequency to be influenced by the pitch when in the 'up' position).

Filter tracking +/- (5) controls the extent to which the filter cutoff frequency is influenced by the pitch. All the way counterclockwise yields maximum negative correlation (as pitch rises cutoff frequency falls), all the way clockwise results in maximum positive correlation (filter cutoff rises along with pitch).

## Crossing Filter and Swarm Control

The swarm/filter control cross switch X (7) is used to cross the functionality of the swarm ribbon and the filter/swarm frequency knob – when it is in the down position, the swarm ribbon controls the filter cutoff and the filter/swarm frequency knob F/SW (12) controls the degree of note separation. In addition, the filter envelope and tracking also influence the swarm instead of the filter cutoff. The filter frequency floor still applies to the filter, regardless of the position of switch.

## External Control Voltage Inputs

The Swarmatron has 3 control voltage (cv) inputs – the swarm cv input jack SW (27), the filter cutoff cv input FLT (28), and the pitch cv input FRQ (29). The degree to which the pitch cv input influences the pitch is determined by the pitch range control R (21). Similarly, the influence of the swarm cv input is determined by the swarm range control R (8). The filter cutoff cv input's influence is determined by the filter frequency floor control F (10). These control voltages should be in the 0 - +10v range.

## External Envelope Generator Trigger Input

The envelope generator, in addition to being triggered by pressing down on the pitch ribbon, can also be triggered by an external trigger signal (+5v) running into the envelope trigger input jack TRIG IN (31). The way in which this trigger signal interacts with the pitch ribbon triggering is determined by the four on/off combinations of the trigger select switches A and B (26):

A and B off – only the pitch ribbon can trigger the envelope generator; the external trigger input is ignored.

A on, B off – either the pitch ribbon or the external trigger input can trigger the envelope generator.

A off, B on – both the pitch ribbon and the external trigger input must be on in order to trigger the envelope generator.

A and B on – only the external trigger input can trigger the envelope generator; the pitch ribbon is ignored.

For example, suppose a rhythmic signal is plugged into the external trigger input. With A on and B off, the rhythm would be interrupted by pressing on the pitch ribbon. With A off and B on, the rhythm would only be heard when the pitch ribbon is pressed down.

# Trimming and Tuning

## Ribbon Trims

The ribbon trims (23) are used for adjusting the zero-voltage point of each ribbon – the upper trim screw corresponds to the pitch ribbon, the lower trim screw adjusts the swarm ribbon. While these have been preset accurately, these trims are provided for future adjustment in the event that component values change slightly over time.

In order to adjust the zero point for the pitch ribbon turn the swarm range R (8) all the way down. Press down on the lowest playable point of the pitch ribbon and sweep the pitch range control R (16) from its lowest to highest value. If the pitch rises, the point you are pressing is to the right of the zero point, which can be moved to the right by turning the pitch trim screw clockwise. If it falls, the reverse is true, and the zero point should be moved to the left by turning the pitch trim screw counterclockwise until sweeping the range does not change the pitch.

To adjust the zero point for the swarm ribbon, turn the swarm range control R all the way up, play a note with the pitch ribbon (turn the envelope decay, sustain and release controls all the way up so that you don't have to keep holding the pitch ribbon down), and move your finger leftwards along the swarm ribbon until the notes play in unison. If this zero point is not all the way at the leftmost playable end of the swarm ribbon, it can be moved to the left by turning the swarm trim screw counterclockwise. If the notes never converge, the zero point is probably off the left end of the ribbon, and the swarm trim screw should be turned clockwise until the zero point reaches the leftmost playable end of the ribbon.

## Tuning Trims

The ability of the swarmatron to play eight separate notes that are capable of coinciding over most of the musical frequency spectrum has been made possible by careful internal adjustment of each voice's voltage/frequency response. Although these have been preset to be accurately coincident, tuning trims have been provided for future adjustment. A row of tuning trim screws (24) is located on the front panel, corresponding to voices 1-8 in ascending order from left to right. This row sets the baseline (zero-voltage) frequencies. If the unison sound with the swarm range turned all the way down sounds like it's starting to spread, follow these steps to re-tune:

1. Turn the swarm range control R (8) all the way down. Turn the decay, sustain and release all the way up so that it is not necessary to keep holding the pitch ribbon down while tuning.
2. Turn off all voices except for 1 and 2.
3. Adjust the trim screw for voice 2 until the two notes are the same pitch. By doing this you are lining up the baseline frequencies of these two notes.
4. Turn voice 2 off, turn voice 3 on, and repeat this process. Repeat until the baseline frequencies of voices 2-8 all match voice 1.

# Advice

## Unexpected Silence

Because the Swarmatron was designed for a wide range of tones and timbres, there are a number of combinations of settings that can result in unexpected silence. Here are the main ones to check for.

1. Tones out of audio range: check the pitch floor control F (16). The combination of it being past 1 o'clock and minimal swarm spread could result in all notes being above audio range. Similarly, if it is all the way down, minimal swarm spread will yield intermittent clicking sounds – all notes in this case are well below the audio zone.
2. Filter cutoff below audio range: check the filter frequency floor control F (10) – if this is all the way down, a flat envelope control will result in the filter cutting out the entire audio spectrum.
3. Filter overdrive and Q too high: the combination of a near-maximum Q setting and drive setting can sometimes temporarily silence the filter until it resets – this can take as long as several seconds.
4. Filter cutoff and Q too high: an extremely high filter cutoff frequency and extremely high Q may also yield unexpected silence.
5. X switch – Playing the Swarmatron with the swarm/filter control reverse switch X (7) in the down position can often result in a filter cutoff below audio range, especially if the swarm control range R is all the way down.
6. Attack, Decay, Sustain, and Release all the way down – If the A D S R controls are each turned all the way down, the resulting blip of an envelope will yield nothing more than a click.
7. Trigger select switches settings - if the trigger select switches A and B are both in the 'on' position, the volume envelope can be triggered only by an external trigger signal – if none is present, pressing down on the pitch ribbon will not trigger the volume envelope and no sound will be heard. Similarly, in the A-off B-on position, the lack of an external trigger signal will prevent triggering of the volume envelope by the pitch ribbon.

## Ribbon Friction

Playing the Swarmatron is much easier with a frictionless ribbon. A guitar string lubricant (such as Finger-ease) is recommended.

## Output Levels

The combination of high Q, drive, and output volume can result in very high momentary output signal levels. Explore such combinations with care, especially when amplifying the Swarmatron with an instrument amp.

## Safety Precautions

All standard common-sense safety precautions for domestic household current devices apply to the Swarmatron (i.e. do not operate outdoors in the rain, underwater, or in outer space).