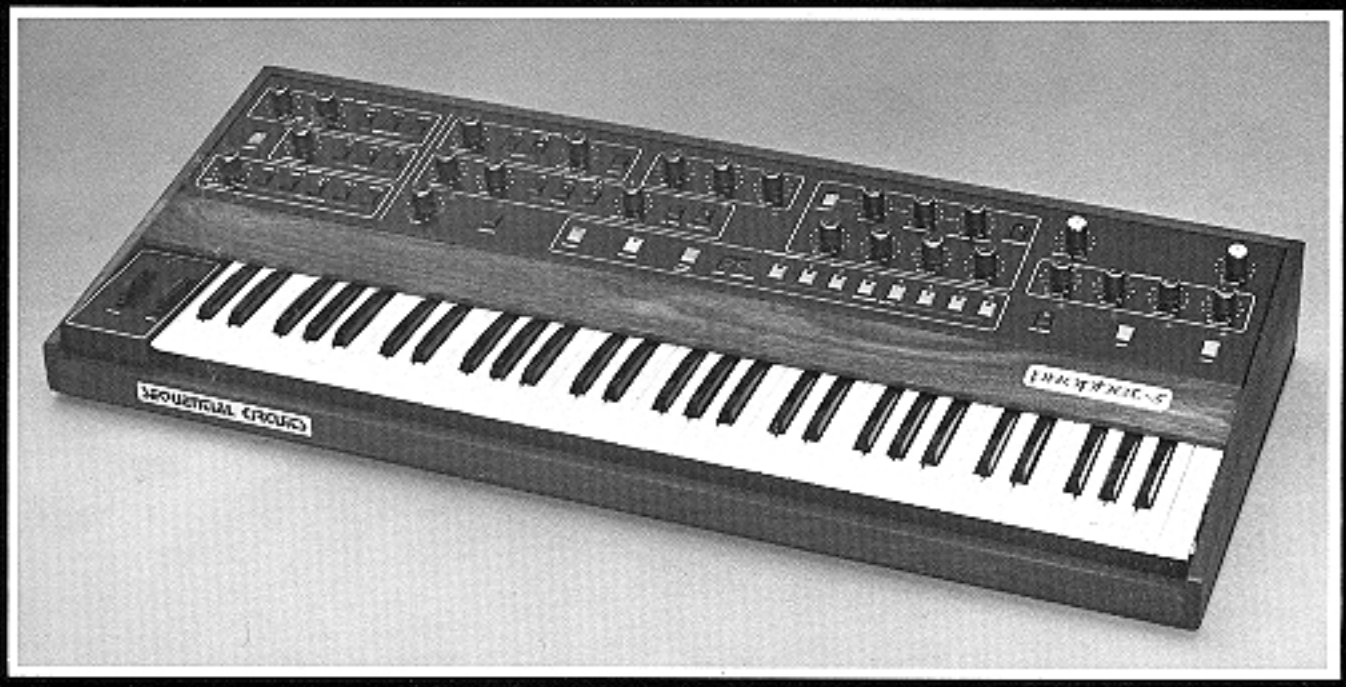
prophet-5



OPERATION MANUAL

SEQUENTIAL CIRCUITS INC

MODEL 1000

Prophet-5 Synthesizer Operation Manual

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About The Author

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THE PROPHET

QUICK SET UP GUIDE

The PROPHET is shipped from the factory in "ready-to-play" condition with 40 factory preset programs. These programs are arranged in 5 banks containing 8 programs each, and are selected by means of buttons in the PROGRAMMER section (front panel, lower center). The selected bank and program numbers are indicated by the digital display in the PROGRAMMER section.

The PROPHET should be plugged into 110V A.C. and connected to your sound system via the standard ¼" mono "audio output" jack on the rear panel. After turning power on, the front panel will go blank for 5 to 10 seconds while the oscillators are being tuned. The panel will then light up, with BANK 1 PROGRAM 1 ready to play. The only knob that will have to be adjusted is the VOLUME. At this point you can simply step through the banks and/or programs to select the programs as shown on the reverse side of this card. To work off the front panel, simply hit the PRESET switch in the PROGRAMMER section; the entire front panel is now active.

NOTE: The PROPHET should be re-tuned soon after turning power on, since the oscillators need a few minutes to stabilize. To tune, simply hit the TUNE button. The panel will go blank for 5-10 seconds, and come back in BANK 1, PROGRAM 1.

PROGRAMS

BANK	1	2	3	4	5	6	7	8
1	BRASS	LOW STRINGS *	MUTED CLAV.	PERCUSSIVE ELECTRIC PIANO	FLUTES	HARPSI-CHORD	SYNC. I	PERCUSSIVE ORGAN
2	UNISON GLIDE w/RESONANCE	HARMONIUM	ORGAN w/RESONANCE	TOY PIANO	TRUMPET/ FLUTE	FILTER MOD	REED ORGAN	BRASS IN FIFTH
3	PIPE ORGAN FLUTES	SYNC. II	ELECTRIC PIANO	HIGH STRINGS *	OCTAVE SAWTEETH	RELEASE REPEAT	DELAYED HARMONIC	ECHO - REPEAT
4	PULSE WIDTH MOD	SLOW SYNC SWEEP * *	FOURTHS w/ RESONANCE * *	SWEEPING HARMONICS *	SLOW SYNC	RANDOM ARPEGGIATOR	SAWTOOTH ARPEGGIATOR	CLANGOROUS BELLS
5	ALIEN * *	NOISE SWEEP	DESCENDING BELLS	DESCENDING PULSE WIDTH MOD	HELICOPTER *	RESONANCE BELLS	DUPE 1-1	DUPE 1-6

*MOVE MOD. WHEEL FORWARD *AT LEAST* ONE-THIRD.
**MOVE MOD. WHEEL FORWARD *ONE-HALF* TO *FULL*.

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Section I

Getting Started

1-0 INTRODUCTION

The Prophet-5 is a polyphonic synthesizer having 5 complete and distinct synthesizer "voices." Although each voice operates independently, all 5 will always function from the same patch settings at any given time; in other words, the texture of the Prophet is homogeneous.

Each synthesizer voice consists of 2 voltage-controlled oscillators (VCOs), a white noise source, a resonant low-pass voltage-controlled filter (VCF), a voltage-controlled amplifier (VCA), and two envelope generators (one wired to the VCF and one wired to the VCA). In addition, there are routings (via the POLY-MOD section) that allow for oscillator 2 and the filter envelope generator to function as modulation sources (which can be applied to the frequency of oscillator 1, the pulse-width of oscillator 1, or the filter). Finally, there is a single LFO (and a pink noise source) for modulation, which can be applied to each of the five voices for various modulation effects.

The Prophet also contains a microcomputer, which serves several purposes: it determines which voice is assigned to which key, it keeps the five voices in tune relative to each other, and (most importantly) it remembers preset voice patches which may be instantly recalled and applied to the five synthesizer voices. The memory bank in which these preset programs are stored functions constantly, thanks to a small battery (with a 10-year life) installed in the Prophet; in other words, programs are retained by the microcomputer's memory even when the Prophet is turned off.

1-1 SET-UP

To set up the Prophet-5, simply plug the power cord into 115V or 230V AC and connect the instrument to an amplifier via the ¼" monophonic AUDIO OUT jack on the rear panel.

The Prophet has a voltage selector switch on the rear panel for selecting between 115 or 230 volts AC. This switch should be checked and set to match your line voltage before you plug the instrument in. (European Prophets are usually shipped in the 230 position.) CAUTION: *Never change the setting with the power cord connected.* The fuse should also match the setting of the switch (and the AC voltage being used). A ¾-amp slo-blo fuse should be used for 115 volt operation, and a ½-amp slo-blo fuse should be used for 230 volt operation.

As with most electronic equipment, the Prophet comes with a three-prong power plug to insure safe grounding with other pieces of equipment in use. The ground prong is connected to the chassis

of the instrument. It is up to you to check the ground connections of the Prophet and all other instruments and pieces of equipment used to keep shocks (even lethal shocks) from happening. As you probably know, many older buildings and clubs are not known for their quality AC wiring, so we urge you to use one of the several "ground-checking" devices available on the market to verify AC connections.

Because of the AC ground, a "ground loop" will often exist when a cable is plugged between the Prophet and an amplifier; as a result, low-level hum will often occur. Bypassing the AC ground with a two-prong adapter will usually eliminate the noise, but it can also set up a shock hazard between the pieces of equipment. The amount of hum is dependent on where the two units are connected to AC. For minimal hum, use the same outlet for both the Prophet and its amplifier; with this set-up, the hum will be low enough below the signal level to be acceptable. The further away from each other the plugs are connected to AC, the more hum will occur. The quality of wiring in the wall and wall socket will also affect the amount of hum.

Here is a summary set of recommended procedures to follow when setting up the Prophet-5:

1) Plug the Prophet into a three-prong outlet.
2) Plug all other connected equipment (amplifiers, volume pedals, effects devices, and other accessories) into the same outlet. (Warning: do not overload. When in doubt, consult an electrician.)
3) Verify all equipment grounding with a ground tester.

Sequential Circuits is not responsible for any equipment failure due to incorrect AC connections, and is not liable for any personal injury due to electrical shocks as a result of poor grounding.

1-2 TURN-ON AND INITIAL TUNING

The Prophet is turned on via the POWER switch on the rear panel. After the instrument is turned on, the front panel will be completely dark for approximately 5 to 7 seconds while the internal computer tunes the oscillators. When the tuning process is complete the front panel will light up and the BANK PROGRAM indicator (the digital display) in the PROGRAMMER section of the front panel will display "1 1". This indicates that the Prophet is ready to play and that its voices are programmed according to the settings stored in BANK 1 PROGRAM 1 of the computer's memory.

To adjust the overall volume and tuning, hold down a single tone on the keyboard (e.g. middle *A*) and adjust the VOLUME and MASTER TUNE controls in the upper right corner of the front panel.

The Prophet has a built-in, crystal-referenced *A*-440 Hz oscillator which is accurate to .1 Hz in any environment. This reference oscillator is turned on by holding down PROGRAM SELECT 1 in the PROGRAMMER section and hitting PROGRAM SELECT 2. You will hear the tone when you push down any key. Since this tone is mixed in with the Prophet's oscillators, the FILTER and AMPLIFIER sections must be set up properly for the reference tone to be audible (i.e., the filter CUTOFF and the amplifier SUSTAIN must be up). To turn the *A*-440 tone off, simply repeat the procedure for turning it on: hold down the PROGRAM SELECT 1 button and hit the PROGRAM SELECT 2 button.

1-3 PRESET SELECTION

When turned on, the Prophet automatically enters a PRESET mode, meaning that it is ready to set up the synthesizer's voices according to preset patches stored in the memory of the Prophet's computer. These preset programs are arranged in 5 banks of 8 programs each, and may be selected by means of the pushbuttons in the PROGRAMMER section of the front panel. The switch marked BANK SELECT steps through the banks in order, and the 8 switches marked PROGRAM SELECT (numbered 1 through 8) allow immediate selection of a particular program within a bank. To choose a program, step through the banks until you reach the one you want and then hit the PROGRAM

SELECT switch to call up the exact program you wish. The selected bank will be indicated by the digital display in the PROGRAMMER section, and the selected program will be indicated both by the digital display and by the lights (LEDs) embedded in the PROGRAM SELECT switches.

Since the Prophet is shipped with a full complement of 40 factory presets, it will be ready to play as soon as it has been turned on and the initial tuning procedure has ended. For information on these factory-loaded patches, see the section entitled "THE FACTORY PRESETS."

1-4 PITCH AND MOD WHEELS

The pitch wheel (PITCH) and modulation wheel (MOD) are located to the left of the keyboard. Both wheels affect all voices simultaneously. The PITCH wheel has a center detent position, from which the pitch may be varied up or down a 5th.

The MOD wheel determines the amount of modulation to be routed via the WHEEL-MOD settings of a particular program — when the wheel is fully down no modulation will occur, and when the wheel is fully up a maximum of modulation will occur. For information on the effects that may be engaged relative to the various factory-programmed patches, see the notes accompanying each patch diagram in the "FACTORY PRESET" section of this manual.

1-5 RETUNING

Although the computer tunes the oscillators relative to each other when the Prophet is turned on, it may become necessary to retune, particularly during the first 15-20 minutes of operation since the oscillators need time to stabilize. (After 20 minutes or so the instrument should not have to be retuned very often, unless there is a radical temperature change in the room.)

Hitting the TUNE switch will tell the computer to retune the oscillators. When this is done the front panel will go dark for approximately 5 to 7 seconds, and then will relight (in PRESET mode) with BANK 1 PROGRAM 1 selected.

Before hitting the TUNE switch, be sure that the PITCH is centered in its detent position. During tuning (while the front panel lights are off) do not touch either the PITCH or the MASTER TUNE knob; erroneous tuning will result. Also, the MASTER TUNE may have to be re-adjusted slightly after the retuning procedure has ended.

1-6 KEYBOARD ASSIGNMENT OF VOICES

The assignment of voices to keys played on the keyboard is done by the Prophet's computer. If the same key is struck repeatedly, the computer will continue to assign the same voice. If more than 5 keys are held down at the same time, the computer will reassign the earliest used voices first; for example, playing *C, D, E, F, G,* and *A* in succession and holding all six keys down will cause *D, E, F, G,* and *A* to be sustained — the *C* will disappear when the *A* is played. In other words, the Prophet operates on a "last-note priority" system, and each new note played will always be perceived and assigned to one of the synthesizer voices by the Prophet's internal computer.

Section 2

Modes of Operation

The synthesizer voices in the Prophet may be programmed in two ways: 1) using the front panel controls in MANUAL mode; and 2) by the computer via the PRESET mode. If the light (LED) embedded in the PRESET switch is on, the synthesizer is in PRESET mode; if the light is off, the synthesizer is in MANUAL mode. (Since the PRESET switch is an "alternate action" switch, successive pressings of the PRESET switch will move the Prophet back and forth from PRESET to MANUAL mode.)

The Prophet's front panel controls are color-coded to help clarify the function of the computer's memory. All black knobs and switches are programmable; that is, their settings can be entered into the memory and recalled through the PROGRAMMER section (via PRESET mode). The silver knobs and gray switches on the front panel (the MASTER TUNE knob, the VOLUME knob, the filter PRESET switch, the mod PRESET switch, the EDIT switch, the TUNE switch, and the switches in the PROGRAMMER section) are not programmable (i.e. they are always active). The PITCH and MOD wheels are always active also. The RECORD switch is orange, to set it apart from the other front panel controls.

In MANUAL mode all of the front panel controls are active. For more information on this aspect of the Prophet's function, see the next section: "THE FRONT PANEL CONTROLS."

In PRESET mode only the switches on the front panel are active; the top row of knobs in the FILTER section and the entire MODULATION section may also be made active by pressing the gray PRESET switches in those sections. For more information on PRESET mode operation, see the paragraphs on "PRESET SELECTION" in the "GETTING STARTED" section, and the text and notes in the "FACTORY PRESETS" section.

EDIT mode may be entered by pressing the EDIT button; when in EDIT mode, the light (LED) embedded in the PRESET switch will blink on and off. In EDIT mode all of the front panel controls are potentially active. For more information on EDIT mode, see the section called "RECORDING, MODIFYING, AND EDITING PROGRAMS."

RECORD mode is a momentary situation that allows for the storing and rearranging of programs in the computer's memory. To enter RECORD mode, press the RECORD switch. The RECORD switch will only engage if the RECORD ENABLE/DISABLE switch on the back panel is in the up (ENABLE) position. *(It is suggested that the RECORD ENABLE/DISABLE switch be left in the down (DISABLE) position until manual operation, edit mode, and other functions are mastered. This will*

ensure against the accidental erasure of factory preset programs.) In addition, the RECORD mode cannot be entered directly from PRESET mode; it can only be entered from MANUAL or EDIT mode. For information on the operation of RECORD mode, see the section called "RECORDING, MODIFYING, AND EDITING PROGRAMS."

Section 3

The Front Panel Controls

3-0 INTRODUCTION

It is true that the Prophet can be used exclusively in PRESET mode, in which case the front panel controls need not be used very often. However, it is also true that using the instrument in this way would defeat a large part of its overall purpose, which is to allow the user to create and store patches of his or her own that may be called up immediately for use.

Therefore, it goes without saying that it is important to understand how the front panel controls work to set up patches (when the Prophet is functioning in MANUAL mode). In this section we will look at the functions of the controls, and see how they relate to the overall signal flow of the Prophet's synthesizer voices. Since all of the Prophet's voices are programmed alike, the front panel controls reflect the settings for a single voice only; these settings are duplicated in all 5 of the Prophet's voices.

By the way, this section will not attempt to be a manual of basic synthesis techniques — it will be merely descriptive. (For more complete basic information on synthesis, refer to the books and magazines listed in the APPENDIX.) In going through this section, it will be helpful to refer to the "FACTORY PRESETS" diagrams — seeing how a particular front panel setting affects the sound of a patch that you can call up and listen to will help you get a quick grasp of some of the possibilities of MANUAL mode operation.

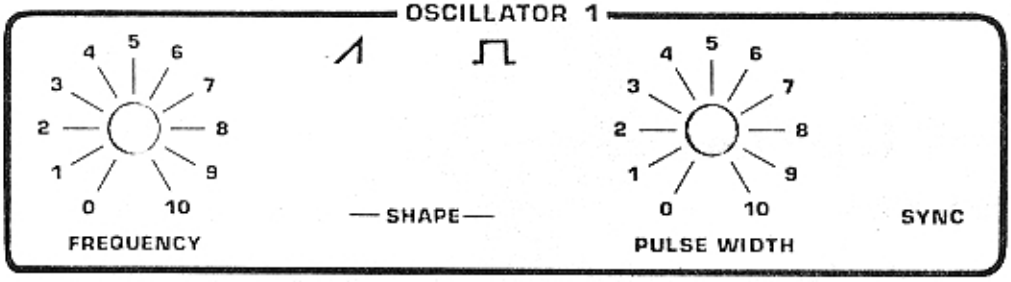
The Prophet's front panel contains two kinds of controls: rotary controls (knobs) and switches. All of the switches except the BANK SELECT switch have red lights (LEDs) embedded in them. All of these lighted switches, except for the 8 PROGRAM SELECT switches, are "alternate action" switches (i.e., one push turns them on and a second push turns them off).

The Prophet is operating in preset mode when the PRESET switch in the PROGRAMMER section is on. It is in MANUAL mode when the PRESET switch is off. All of the PROPHET's front panel switches are active in both preset and manual mode. The knobs are active in manual mode only, with the exception of the knobs in the modulation section and the top row of knobs in the FILTER section; these may be activated while the Prophet is in PRESET mode by pressing the PRESET switches in the respective sections. Another exception is EDIT mode, which will be discussed later. Finally, the MASTER TUNE knob, the VOLUME knob, the PITCH wheel, and the MOD wheel are always active.

3-1 SIGNAL FLOW

The "signal" which appears at the Prophet's AUDIO OUT jack is the result of several stages of signal generating, modifying, and mixing; the last stage being the mixing of all Prophet voices into a single, monophonic output signal. The output signal from a single voice begins with selection and mixing of 3 available sources: Oscillator 1, Oscillator 2, and noise. The programming of the oscillators is done in the OSCILLATOR sections and the mixing of the three sources is done in the MIXER section. The signal output from the mixer is then sent through the FILTER and AMPLIFIER sections where, roughly speaking, its timbre and loudness are shaped. Finally it is mixed with the other Prophet "voices", sent through a final amplifier whose level is controlled by the VOLUME control, and routed to the AUDIO OUT jack on the rear panel. The block diagram on the following page shows the signal flow for a single synthesizer voice in the Prophet.

3-2 OSCILLATOR 1



FREQUENCY knob: Controls pitch setting (oscillator tuning), stepped in semitones (quantized) over a 5 octave range. (Exact pitch of the overall output is set with the MASTER TUNE knob.)

SAWTOOTH WAVESHAPE switch: When on, a sawtooth wave (containing all harmonics) is supplied as OSC 1's output.

PULSE WAVESHAPE switch: When on, a pulse wave is supplied as OSC 1's output (harmonic content is dependent on the setting of the pulse width knob).

NOTES:

— When both the sawtooth and pulse switches are on, sawtooth and pulse waves are mixed at full level and supplied as OSC 1's output.

— When neither waveshape switch is on, no signal is supplied as OSC 1's output.

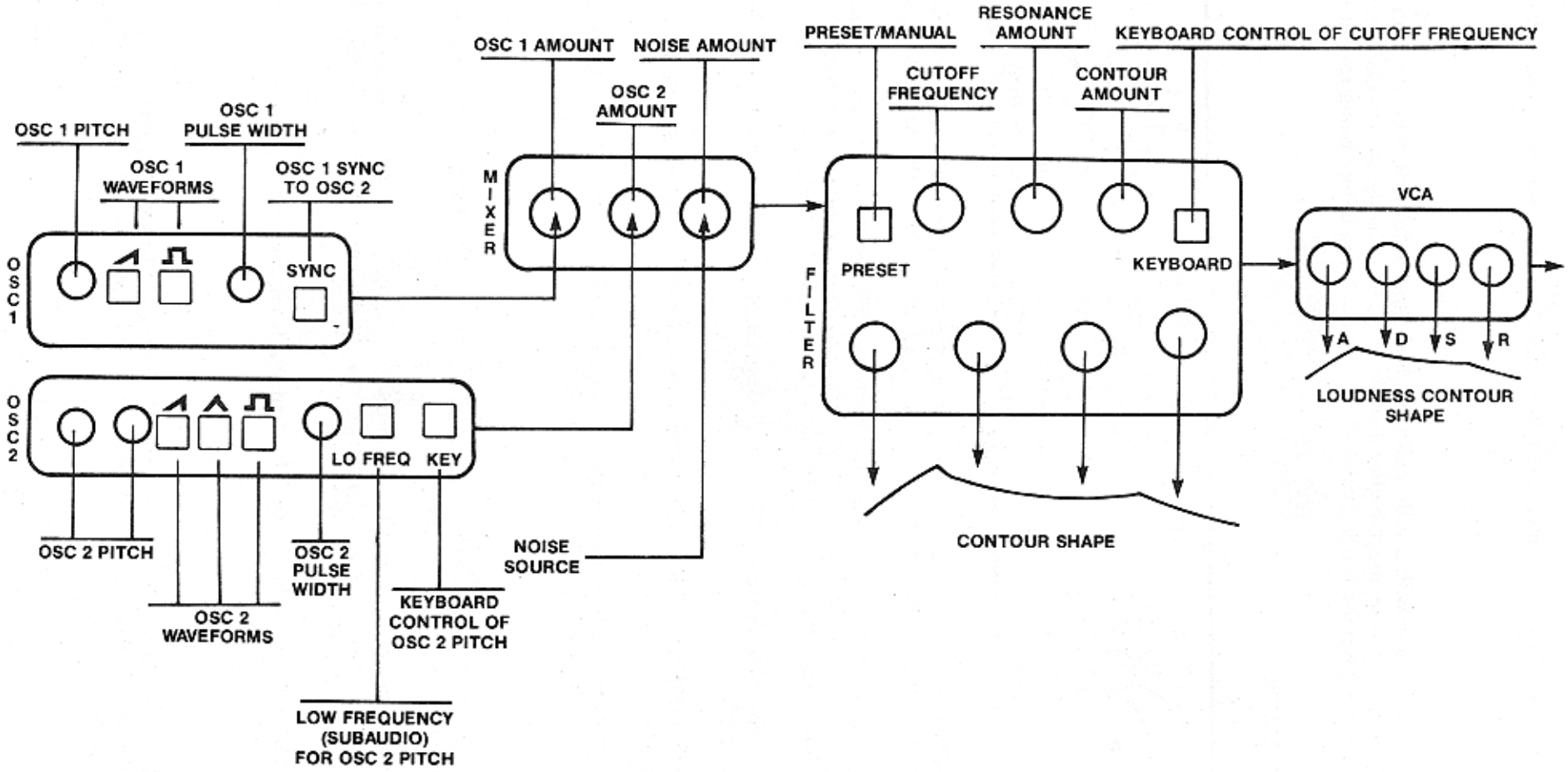
PULSE WIDTH knob: Sets the pulse width (ranging from aproximately 5% to 95%) for the pulse wave output of OSC 1.

NOTES:

— The extreme settings of this knob (0 to 10) may cause the OSC 1 signal to degenerate to DC, and there will be no output signal (of course, this knob will only have this effect if the pulse waveshape is selected).

— An exact square wave (having only odd harmonics) may be obtained by setting this knob to approximately 5 and adjusting by ear for the drop out of the 2nd harmonic (the octave).

SYNC switch: When on, OSC 1 becomes "hard" synchronized to OSC 2, and will therefore tune only to harmonic frequencies of OSC 2. Intermediate frequency settings will produce unusual waveforms (and therefore unusual timbres) at the next lower harmonic of OSC 2. To gain an under-

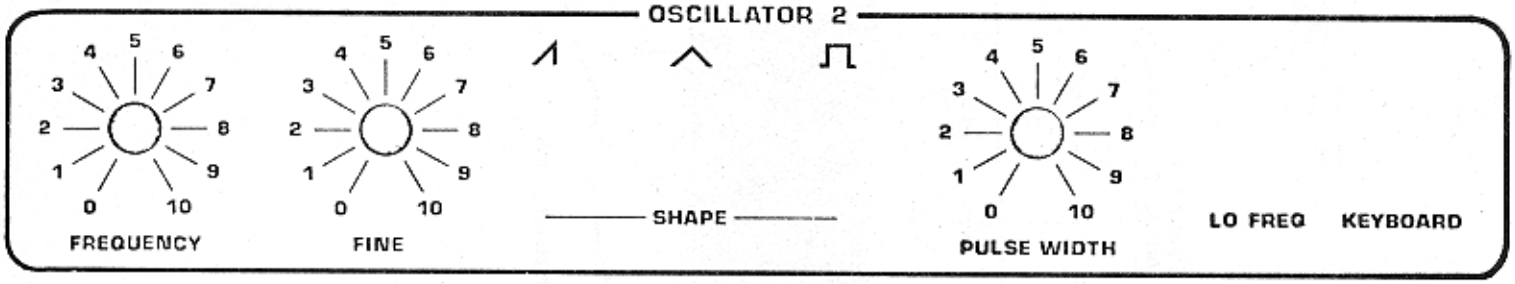

OSC 1 AMOUNT
NOISE AMOUNT
OSC 2 AMOUNT
PRESET/MANUAL
RESONANCE AMOUNT
KEYBOARD CONTROL OF CUTOFF FREQUENCY
CUTOFF FREQUENCY
CONTOUR AMOUNT
OSC 1 PITCH
OSC 1 PULSE WIDTH
OSC 1 WAVEFORMS
OSC 1 SYNC TO OSC 2
MIXER
VCA
OSC 1
SYNC
PRESET
KEYBOARD
FILTER
A
D
S
R
LOUDNESS CONTOUR SHAPE
OSC 2
LO FREQ
KEY
CONTOUR SHAPE
OSC 2 PITCH
OSC 2 PULSE WIDTH
NOISE SOURCE
OSC 2 WAVEFORMS
KEYBOARD CONTROL OF OSC 2 PITCH
LOW FREQUENCY (SUBAUDIO) FOR OSC 2 PITCH

standing of the effect of SYNCing, check the following factory preset programs: 1-4, 1-7, 2-7, 3-2, 4-2, and 4-5.

NOTES:

— When a pulse shape with a wide pulse width is selected for OSC 1 in sync with OSC 2, and if OSC 2's frequency is set much higher than that of OSC 1, the signal from OSC 1 may degenerate into DC since the pulse is not given a chance to discharge before being re-synced.

3-3 OSCILLATOR 2



FREQUENCY knob: Controls pitch setting (oscillator tuning), stepped in semitones (quantized) over a 5 octave range. (Exact pitch of the overall output is set with the MASTER TUNE knob.)

FINE TUNE knob: Controls a continuously variable pitch setting over a semitone range (up from the basic pitch setting of the FREQUENCY knob). This knob is useful for detuning of OSC 2 relative to OSC 1. When no detuning is desired, the FINE TUNE knob should be set at 0.

SAWTOOTH WAVESHAPE switch: When on, a sawtooth wave (containing all harmonics) is supplied as OSC 2's output.

TRIANGLE WAVESHAPE switch: When on, a triangle wave (containing only odd harmonics) is supplied as OSC 2's output.

PULSE WAVESHAPE switch: When on, a pulse wave is supplied as OSC 2's output (harmonic content is dependent on the setting of the PULSE WIDTH knob).

NOTES:

— When 2 or 3 of the waveshape switches are on, the selected waveshapes are mixed at full level and supplied as OSC 2's output.

— When neither waveshape switch is on, no signal is supplied as OSC 2's output. However, the overall pitch range of a particular patch may still be determined by the FREQUENCY knob setting of OSC 2, if OSC 1 is in SYNC with it.

PULSE WIDTH knob: Sets the pulse width (ranging from approximately 5% to 95%) for the pulse wave output of OSC 2.

NOTES:

— The extreme settings of this knob (0 and 10) may cause the OSC 2 signal to degenerate to DC, and there will be no output signal (of course, this knob will only have this effect if the pulse waveshape is selected).

— An exact square wave (having only odd harmonics) may be obtained by setting this knob to approximately 5 and adjusting by ear for the drop out of the 2nd harmonic (the octave).

LO FREQUENCY switch: When on, OSC 2 will function as a low frequency oscillator, with a range of approximately .4 Hz (or 2.5 seconds-per-cycle) to 12 Hz (when the KEYBOARD switch is off). This function is usually used in conjunction with the POLY-MOD section.

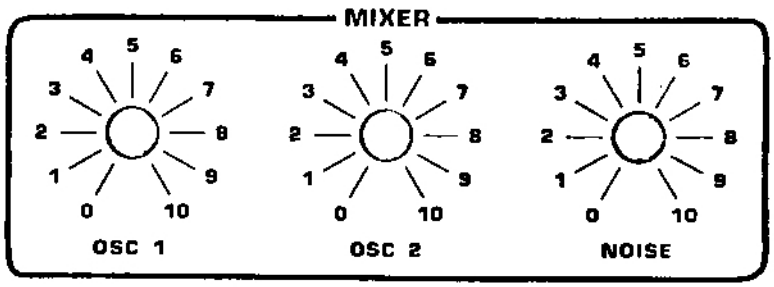
KEYBOARD switch: When on, the frequency of OSC 2 is affected by the keyboard, as is that of OSC 1. When off, the frequency of OSC 2 will not be affected by the keyboard.

NOTES:

— If the KEYBOARD switch is off and the LO FREQ switch is off, OSC 2 will act as a drone in the audio range. Set the pitch of this drone with the FREQUENCY knob *after* the KEYBOARD switch is turned off (otherwise you may have to retune).

— The use of OSC 2 as a modulation source for the POLY-MOD will be discussed in the paragraphs on "MODULATION." Normally, when OSC 2 is being used as a signal source, the LO FREQ switch will be off and the KEYBOARD switch will be on. (For exceptions to this general rule, check some of the patch diagrams for the factory presets loaded in bank 5.)

3-4 MIXER



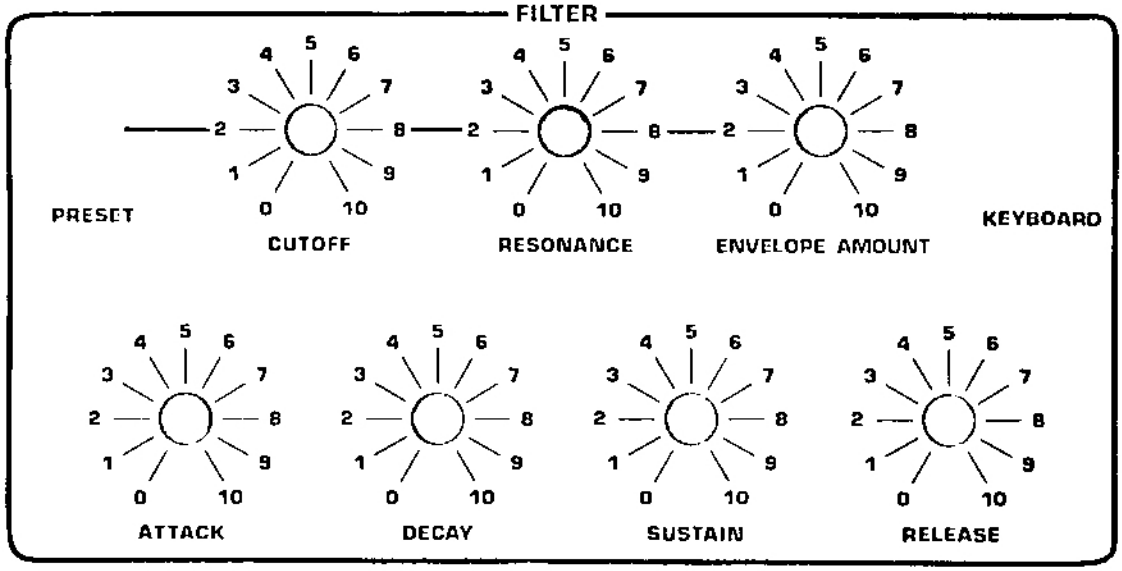
OSC 1 knob: Determines the amount of OSC 1's output to be mixed into the signal sent to the filter.

OSC 2 knob: Determines the amount of OSC 2's output to be mixed into the signal sent to the filter.

NOISE knob: Determines the amount of white noise (combination of all frequencies) to be mixed into the signal sent to the filter.

NOTES:

— These mixer amount knobs could also be used to program the overall volume of the synthesizer voice, so that when switching from one program to another in PRESET mode one program won't be wildly different in volume than the others.



CUTOFF knob: The Prophet's filter is a 4-pole, 24 dB-per-octave low-pass filter, and therefore the cutoff knob sets the frequency below which all elements of the signal are let through. The higher frequency components of the signal (i.e. the frequencies above the cutoff frequency) are suppressed. The higher the knob is set, the more frequencies are allowed through the filter. In general terms, the CUTOFF knob may be thought of as a tone control.

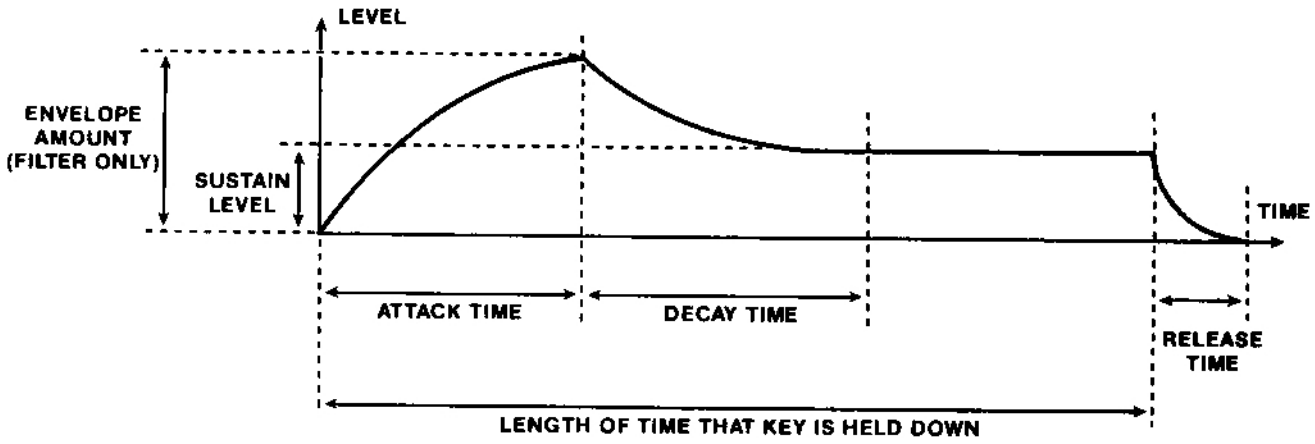
RESONANCE knob: As the setting on this knob is increased from 0 to approximately 7, the amount of resonance ("emphasis" or "Q") applied to those signal frequencies at the cutoff frequency will increase (as the resonance increases, the frequencies far below the cutoff frequency will be less audible relative to the frequencies being resonated). If the setting is increased beyond 7, the filter will break into oscillation and will act as a sine wave sound source whose pitch is determined by the cutoff frequency.

ENVELOPE AMOUNT knob: The filter cutoff frequency may be contoured (shaped) electronically in a pattern determined by the settings of the ATTACK, DECAY, SUSTAIN, and RELEASE knobs (these are the controls for the ADSR envelope generator that is connected to the filter). The envelope amount knob determines the amount (but not the shape) of this contouring that is applied to the filter's cutoff frequency.

NOTES on the ENVELOPE GENERATORS:

— The ADSR envelope generators whose controls appear as the ATTACK, DECAY, SUSTAIN, and RELEASE knobs in the filter and amplifier sections generate voltage patterns that can be used to contour timbre (via the filter's cutoff frequency) and loudness (via the VCA) respectively. The voltage patterns generated have four stages (one for each knob) as pictured in the diagram below. The entire contour pattern is initiated when a key is depressed and proceeds through the attack and decay stages at rates determined by the settings of those knobs. The sustain level is determined by the setting of the sustain knob, and is maintained as long as the key is held down. When the key is released the release stage is activated and proceeds at a rate determined by that knob.

— In the FILTER section, the envelope amount knob functions as an attenuator on the voltage patterns from the filter's envelope generator (see diagram below). There is no comparable attenuator connected to the VCA's envelope generator.



ATTACK knob: Determines the length of time it takes the envelope generator's contour to go from 0 level (at initial key depression) to maximum level.

DECAY knob: Determines the length of time it takes the envelope generator's contour to go from maximum level to sustain level. If SUSTAIN is set at maximum then the DECAY knob setting is irrelevant.

SUSTAIN knob: Determines the sustain level of the envelope generator's contour. Remember, this is a level setting, not a time setting; the sustain time is determined by the key being held down.

RELEASE knob: Determines the length of time it takes the envelope generator's contour to drop from the sustain level to 0 level after the key is released. If the key is released before the attack and decay stages of the envelope are complete, the RELEASE knob setting will determine the length of time for the contour to drop from its level at the time of key release to 0 level. If the sustain is set at 0 and the attack and decay stages are complete (while the key is still depressed) then the release setting is irrelevant.

NOTES:

— The time range on the ATTACK, DECAY, and RELEASE knobs is approximately 1 millisecond to 30 seconds. Since the response to the knob is exponential, the durations as set on these knobs will not be linear; for example, the setting 5 on these knobs will result in a time duration of approximately ½ second.

— Remember that, for the FILTER only (not the VCA), the overall maximum level of the envelope generator's contour is determined by the ENVELOPE AMOUNT knob. If the envelope amount is set at 0 then the envelope will have no direct effect on the filter's cutoff frequency.

KEYBOARD switch: When on, the control voltage from the keyboard will be applied to the filter's cutoff frequency (just as it is normally applied to the frequency of the oscillators). This connection maintains the cutoff frequency at a constant level relative to the notes played on the keyboard, and therefore creates a consistency of tone color over the entire range of the keyboard. When this switch is off, notes played higher on the keyboard will have more of their overtones suppressed than notes played lower on the keyboard; as a result, notes played in the higher register of the keyboard will be less bright in tone color than those notes played in the lower register of the keyboard.

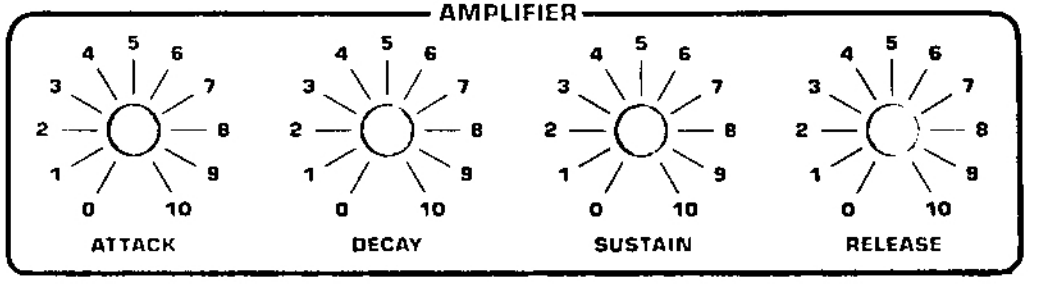
NOTES:

— If the filter RESONANCE is set so that the filter is in oscillation (i.e. functioning as a sine wave), then switching the KEYBOARD switch on will allow for this filter sine wave to be played from the keyboard. Unless a complex effect is desired when playing the filter's "sine wave" in this

way, the envelope generator settings will normally be set at 0; the ENVELOPE AMOUNT knob should also be set at zero in this case (in order to maintain a steady response from voice to voice).

PRESET switch: With the Prophet in preset mode and the PRESET switch in the FILTER section off, the CUTOFF, RESONANCE, and ENVELOPE AMOUNT are manual rather than preset.

3-6 AMPLIFIER



The **ATTACK**, **DECAY**, **SUSTAIN**, and **RELEASE** controls in the amplifier section determine the settings for the amplifier's ADSR envelope generator. For details on the function of these knobs, see the "NOTES on the ENVELOPE GENERATOR" and the notes on the ATTACK, DECAY, SUSTAIN, and RELEASE knobs in the "FILTER" portion of this section.

3-7 MISCELLANEOUS

RELEASE switch: When off, the amplifier and filter release times are approximately 0 (instant release) regardless of PRESET or MANUAL control settings (actually, the release time is set at about 2 when the RELEASE switch is off, so there won't be an audible "whack" when the key is released — which would be caused by the instantaneous closing down of the VCA). This switch is programmable; that is, it can be stored in the computer's memory in either the on or the off position.

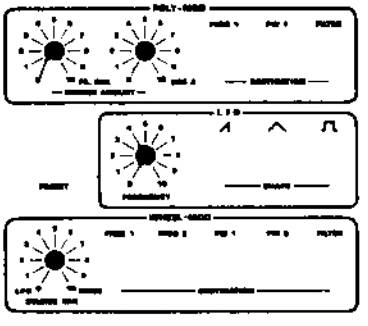
NOTES:

— This switch must be off to allow for the operation of the release footswitch (see the section entitled "ACCESSORIES").

UNISON switch: When on, the Prophet will assign all 5 voices to the most recently played note. In other words, the Prophet will become a very fat monophonic synthesizer in UNISON mode.

GLIDE knob: Effective only in UNISON mode, this knob determines the rate of glide (portamento) between notes played on the keyboard.

3-8 MODULATION



The Prophet provides two distinct systems for producing unique modulation effects. These systems may be under either MANUAL or PRESET control. Modulation involves a source and a destination; the destination is modulated (changed) in a pattern determined by the source.

The Prophet's WHEEL-MOD section uses a low-frequency oscillator (LFO) with sawtooth, triangle, and square waveforms, and a pink noise generator as sources. Possible destinations are frequency and pulse-width for OSC 1 (FREQ 1, PW 1), frequency and pulse-width for OSC 2 (FREQ 2, PW 2), the filter's cutoff frequency (FILTER), or any combination thereof.

The SOURCE MIX knob in the WHEEL-MOD section determines the relative amounts of LFO and pink NOISE used as the modulation source (0 for all LFO as source and 10 for all noise as source). The FREQUENCY knob in the LFO section determines the LFO frequency (or rate), the overall range being approximately .04 Hz (or 25 seconds-per-cycle) to 20 Hz. The SHAPE switches determine the waveforms used as the LFO portion of the modulation source. (When more than one waveshape switch is on, the selected waveshapes are mixed at full level.) The MOD wheel to the left of the keyboard determines the amount of modulation source that is sent to the destination (as set by the destination switches in the WHEEL-MOD section). In order to get an idea of some of the modulation possibilities offered by the WHEEL-MOD section of the Prophet, see the notes accompanying each patch diagram in the "FACTORY PRESET" section of this manual.

In the Prophet's unique POLY-MOD section, 5 LFOs (OSC 2 in LO FREQ mode) or 5 filter envelope generators — one from each of the synthesizer's five voices — can be used as modulation sources. Although the modulation routing will be the same for each voice, the minute differences between the voices (the phase relationships of the oscillators, for instance) will create modulation effects that will be slightly different from voice to voice and from note to note. This is in direct contrast to the WHEEL-MOD section where, since a single modulation source is applied equally to all 5 voices, the modulation effect will be exactly the same from note to note.

As said above, OSC 2 and filter's envelope generator are the possible sources for modulation in the POLY-MOD section. The amounts of each source are determined by the SOURCE AMOUNT knobs. The possible destinations are frequency of OSC 1 (FREQ 1), pulse-width of OSC 1 (PW 1), and the filter's cutoff frequency (FILTER). The amount of modulation is determined by the SOURCE AMOUNT knobs. There will be no modulation via the POLY-MOD section if the SOURCE AMOUNT knobs are set at 0 or if all destination switches are off.

POLY-MOD with OSC 2 as source is useful for creating clangorous sounds such as bells, chimes, percussive sounds, and "ring modulation" type sounds. Various patterns of pitch and timbre sweeps may be obtained using the filter's envelope generator as source. The LO FREQ switch *on* and/or KEYBOARD switch *off* settings in the OSC 2 section are primarily for use when OSC 2 is used as a POLY-MOD source rather than a signal source. In order to get an idea of some of the modulation possibilities offered by the POLY-MOD section of the Prophet, study its use in some of the factory preset programs.

The PRESET switch in the modulation section, when *off*, makes all knobs in the POLY-MOD, LFO and WHEEL-MOD sections active when the Prophet is in PRESET mode.

Section 4

Recording, Modifying, and Editing Programs

A manually set program may be stored as a preset program as follows:

1) Set the RECORD ENABLE/DISABLE switch on the rear panel in the ENABLE (up) position.
2) Switch the RECORD switch in the PROGRAMMER section on (this can only be done when the Prophet is in MANUAL or EDIT mode; the RECORD switch will not go on when the Prophet is in PRESET mode).
3) Select the desired bank using the BANK SELECT switch.
4) At this point pressing any PROGRAM SELECT switch will cause the front panel program to be recorded at the corresponding number in the selected bank. Make sure to hit the correct PROGRAM SELECT switch or you may erase a program you wanted to keep. When a PROGRAM SELECT switch has been hit, the RECORD switch will go off.
5) After recording a program it is always a good idea to return to PRESET mode and check to make sure that the program is safely recorded in the desired location.

By the way, the RECORD switch may be switched off (when on) without a program being recorded.

Preset programs may be modified in several ways (by "modified" we mean that they may be altered in non-permanent ways during performance, recording, or whatever):

1) The state of any switch can be changed by simply pressing that switch (remember, all switches remain active in PRESET mode).
2) The CUTOFF, RESONANCE, and ENVELOPE AMOUNT knobs in the FILTER section may be made active by switching the gray PRESET switch in the FILTER section off.
3) The SOURCE AMOUNT, FREQUENCY, and SOURCE MIX knobs in the MODULATION sections may be made active by switching the gray PRESET switch in the MODULATION section off.
4) The amplifier envelope generator RELEASE may be cancelled (i.e. set to quasi-instant release) by switching the RELEASE switch off.

NOTES:

— Switching the gray PRESET switches in the FILTER and MODULATION sections back on after they have been off will cause the corresponding section to return to PRESET mode (with knobs inactive and all switches as originally preset).

— If a particular patch is programmed with the RELEASE switch off but with a programmed amplifier envelope RELEASE setting that will have an audible effect, this release can be engaged (while in PRESET mode) by switching the RELEASE switch on.

— Further modifications to the preset programs (non-permanent changes) can be brought about through the use of various accessories (which connect to the Prophet via jacks in the back panel). For information on these possibilities, see the section entitled "ACCESSORIES."

One of the most powerful features of the Prophet is that it allows you to EDIT preset programs. In the Prophet's EDIT mode it is possible to modify any element of a preset program using the front panel controls; the edited program may then be stored as a preset in the same location (or in a new location). EDIT mode may also be used to relocate programs within the Prophet's memory bank (so that you can set up your programs for convenience relative to your particular needs). For details on this relocation procedure, see the notes accompanying the DUPLICATE presets (5-7 and 5-8) in the "FACTORY PRESETS" section of this manual.

Since it is also possible to return from EDIT mode to the original preset program, EDIT mode is also a powerful tool to help you learn how each element of a program affects the overall sound. Use EDIT mode in conjunction with the various factory presets (and the accompanying notes in the "FACTORY PRESETS" section) to gain familiarity with the functions of the various front panel controls, and their operation in the creation of a synthesizer patch.

EDIT mode may only be entered from PRESET mode. Once you are in PRESET mode, select the BANK and PROGRAM numbers for the program you wish to edit, and enter EDIT mode by hitting the EDIT switch. EDIT mode is indicated by the blinking of the PRESET switch LED. To return from EDIT mode to PRESET mode (with the original program restored) simply press the PRESET switch in the PROGRAMMER section. To record an edited program simply press the RECORD switch on, then select the bank and finally the program number where the edited program is to be stored. (As in recording a new program the RECORD switch may be pressed off without recording the program.)

In EDIT mode all front panel controls are potentially active; however, no knobs are active until they are slightly turned. Once the computer has determined that a knob has moved, it will activate that knob. All unmoved knobs will not be affected. In this way, any knob or combinations of knobs can be controlled in a stored program without affecting the others. For example, suppose you like a stored program, but you want to change OSC 1's frequency by an octave, and you want to make the program brighter in tone. Simply hit the EDIT switch, adjust OSC 1's FREQUENCY to the desired pitch, and adjust the filter CUTOFF to the desired brightness. All other parameters (mixer volumes, modulation settings, envelopes, etc.) have not changed from the stored program. If a permanent change is desired, this edited program can be stored in the same memory location. Or, if both the old program and the new program are wanted, store the edited program in a new location.

Section 5

The Factory Preset Programs

The Prophet is shipped from the factory in "ready-to-play" condition with 40 factory preset programs. These programs are arranged in 5 banks containing 8 programs each, and are selected by means of buttons in the PROGRAMMER section. The selected bank and program numbers are indicated by the digital display in the PROGRAMMER section.

In this section of the manual you will find front-panel patch diagrams for all of the factory presets as programmed into the Prophet's memory bank. This will of course allow you to recreate a program in the event that you accidentally erase a particular patch from the memory. However, the main purpose for the inclusion of these diagrams is to provide you with a frame of reference as you familiarize yourself with the Prophet's capabilities. Knowing how each patch is set up may help you to understand the process of programming in general, and it will definitely make it easier for you to begin adjusting, fine tuning, and altering the various preset programs to suit your particular musical needs and tastes.

Along with each patch diagram you will find a set of comments and notes concerning various aspects of each patch. These notes will contain the following information:

1) The use of the MOD WHEEL section with each patch, including the optimum settings for the mod wheel to create the effects that are programmed in.
2) Special considerations concerning performance on the keyboard (what range to use, whether to use a sustained, chordal approach or a staccato, detached approach, etc.) to obtain the maximum effect from the preset.
3) An explanation of potentially-active settings, such as the octave doubling in the BRASS patch (1-1), which can be engaged by switching on a waveform in OSC 2.
4) An indication of certain settings that can be adjusted to alter some aspect of the patch. This information is provided to help you fine tune the patch to suit your tastes.

Occasionally there is also some explanation of how some aspect of the patch works (representative examples: the discussions included with the 1-2, 1-4, and 1-6 patch diagrams). These short discussions should help you understand why a particular patch is configured the way it is, and should also help you develop an approach to the creation of your own sounds.

In general, the comments and notes are more extensive for the patches in banks 1 and 2, since they are (for the most part) representative instrumental timbres, and are therefore subject to adjustments and fine tuning to taste. The notes are much more sketchy for the later banks in general (particularly

for the sound-effects patches in banks 4 and 5) since many of those patches are dedicated to a specific effect that is either not subject to alteration (without changing the basic character of the sound) or is easy to assimilate from a study of the front-panel settings themselves.

As you play through the programmed presets, study the patch diagram and read the accompanying notes. They will help you to get a quick grasp of some of the Prophet's capabilities.

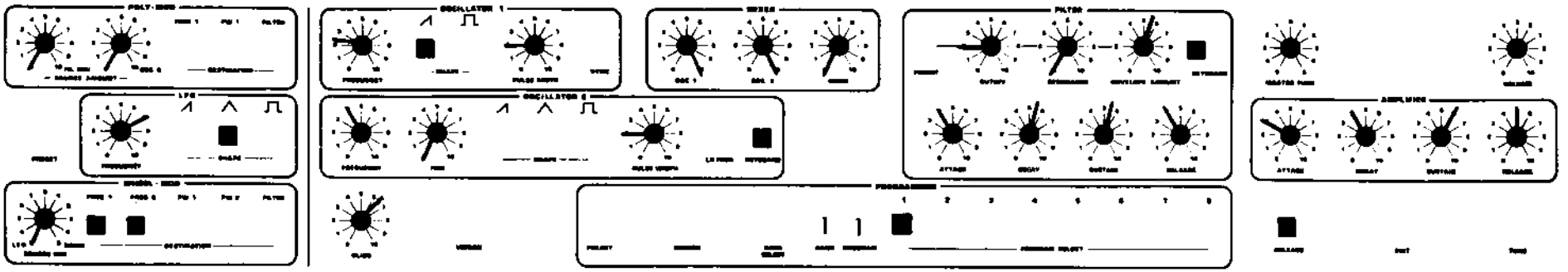
* * * * *

At this point, we should offer a special word of acknowledgement (and thanks) to John Bowen, who created most of the factory preset programs for the Prophet-5.

PROGRAMS

BANK	1	2	3	4	5	6	7	8
1	BRASS	LOW STRINGS *	MUTED CLAV.	PERCUSSIVE ELECTRIC PIANO	FLUTES	HARPSI-CHORD	SYNC. I	PERCUSSIVE ORGAN
2	UNISON GLIDE w/RESONANCE	HARMONIUM	ORGAN w/RESONANCE	TOY PIANO	TRUMPET/ FLUTE	FILTER MOD	REED ORGAN	BRASS IN FIFTH
3	PIPE ORGAN FLUTES	SYNC. II	ELECTRIC PIANO	HIGH STRINGS *	OCTAVE SAWTEETH	RELEASE REPEAT	DELAYED HARMONIC	ECHO - REPEAT
4	PULSE WIDTH MOD	SLOW SYNC SWEEP * *	FOURTHS w/ RESONANCE * *	SWEEPING HARMONICS *	SLOW SYNC	RANDOM ARPEGGIATOR	SAWTOOTH ARPEGGIATOR	CLANGOROUS BELLS
5	ALIEN * *	NOISE SWEEP	DESCENDING BELLS	DESCENDING PULSE WAVE MOD	HELICOPTER *	RESONANCE BELLS	DUPE 1-1	DUPE 1-6

*MOVE MOD. WHEEL FORWARD *AT LEAST* ONE-THIRD.
**MOVE MOD. WHEEL FORWARD *ONE-HALF* TO *FULL*.



1-1: Brass

OSC 1: up 1 octave (basic pitch)
OSC 2: up 2 octaves

MOD WHEEL section is set for a vibrato effect (approximately 5 cycles per second). Move wheel up slightly (1/8 to 1/4) to engage vibrato.

OSC 2 is programmed off (no waveform selected); however, the mixer section is set to allow for its addition to the sound. If added, OSC 2 will provide an octave doubling, for a full ensemble effect. Use sawtooth wave to match tone color with OSC 1; the triangle wave will give a softer doubling effect.

GLIDE is programmed in for use with UNISON mode — when the patch is used as a lead line. Glide will engage if UNISON is switched on.

PULSE-WIDTH on both oscillators is set at 2; this allows switching of waveforms (if pulse-width were programmed at 0, there would be no sound when OSC 1 or 2 were switched to pulse wave).

NOTES:

— Try routing mod to the FILTER instead of the oscillators; it gives a quasi-tremolo effect rather than a straight vibrato. Once again, the wheel should be moved up only slightly. Adjust vibrato or tremolo rate to suit your preference by adjusting the LFO FREQUENCY.

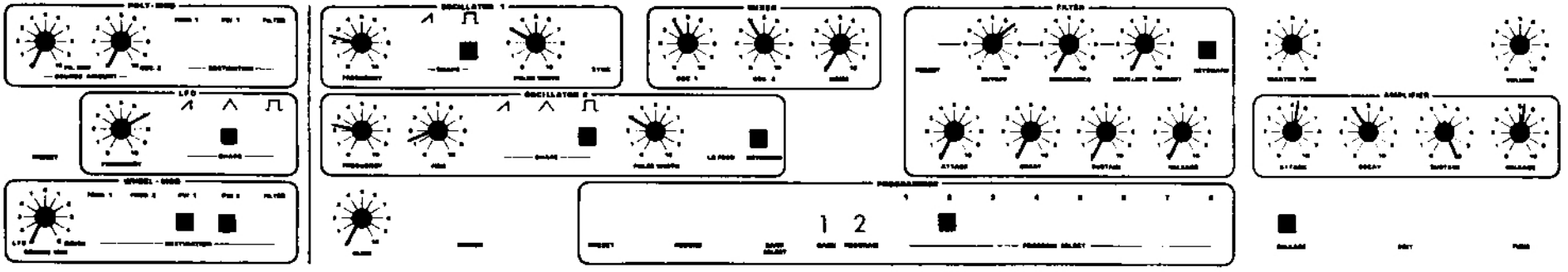
— Adjust filter settings (CUTOFF and ENVELOPE AMOUNT) to alter brightness of tone. Adjust settings on both envelope generators (particularly the ATTACK and DECAY settings) to change the characteristic shape of the sound (in order to simulate different brass instruments).

— For different ensemble balance (if both oscillators are used), change MIXER settings for OSC 1 and 2.

— Select different waveforms on OSC 1 and OSC 2 to experiment with different tone colors — sounds that are less "brass"-like.

— OSC 2 can be used in LO FREQ mode with the POLY-MOD section

for either vibrato (route to OSC 1) or tremolo (route to FILTER). Set the OSC 2 SOURCE AMOUNT at approximately 1½. There will be a bit more animation with the POLY-MOD, since 5 LFOs are involved (one for each voice).



1-2: Low Strings

OSC 1: up 1 octave
OSC 2: up 1 octave

MOD WHEEL must be moved up 1/4 to 1/3 for proper effect. Pulse-width modulation is used on both oscillators to create the animation of the sound; in combination with the detuning of OSC 2, the pulse-width mod helps create the effect of a string section. The MOD WHEEL should be adjusted for different registers on the keyboard; more for playing in the higher register, less for the lower register.

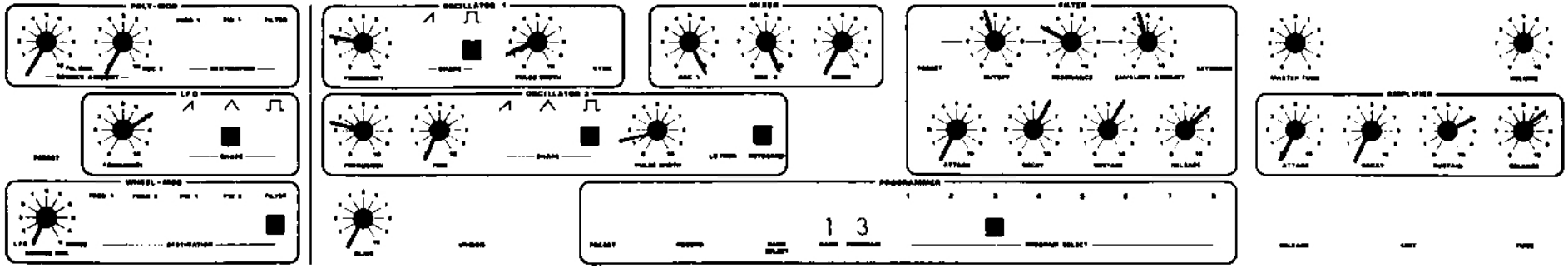
In general, the best string sound results when the keyboard is played in the bottom 3 octaves; adjust the filter CUTOFF to play consistently in the top 2 octaves.

NOTES:

— Adjust filter CUTOFF to change brightness of tone.

— Try adding an envelope shape to the FILTER. Envelope generator settings should be similar to those on the amplifier section; adjust filter CUTOFF and ENVELOPE AMOUNT to engage the envelope generator at the proper level.

— Remember that in order to create the effect of a low string section you must do your part: you must play notes that are idiomatic for strings. If you play this patch with piano phrasing, it will not sound like a string section.



1-3: Muted Clav.

OSC 1: up 1 octave
OSC 2: up 1 octave

RELEASE is programmed off; switch on to engage the programmed release times — sound will fade slowly after keys are released.

UNISON can be switched on to get a thick bass patch.

MOD WHEEL section can be engaged (if desired) to add a tremolo effect to the sound. Move wheel up slightly (1/8 to 1/4) to engage tremolo.

NOTES:

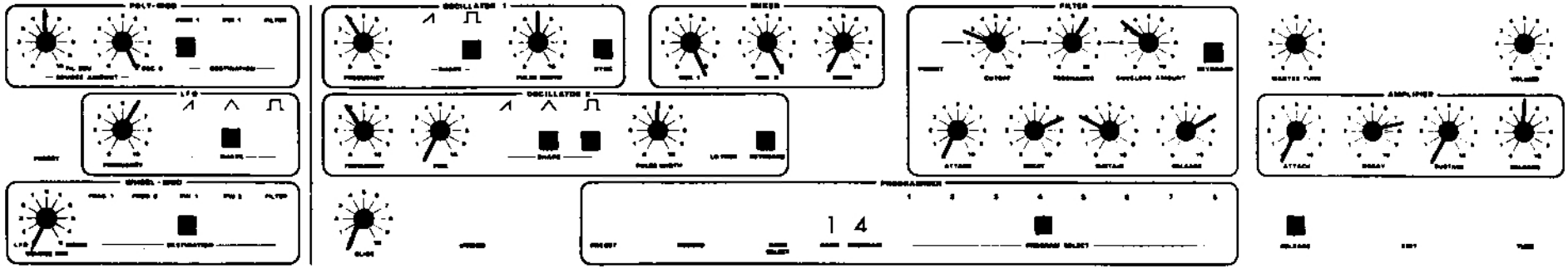
— Pulse-width on both oscillators is programmed at 1½. Adjust to a narrower pulse-width for a more nasal sound, or to a wider pulse-width for a thicker sound.

— Add filter KEYBOARD switch for increased brightness (particularly in the higher register of the keyboard).

— Try increasing the filter ENVELOPE AMOUNT to brighten the sound.

— For increased thickness in the sound, try detuning OSC 2 by setting the FINE TUNE knob to 1 or 1½.

— In conjunction with these various changes (as suggested above), adjust the filter CUTOFF setting to alter the overall brightness of the sound.



1-4: Percussive Electric Piano

OSC 1: up 1 octave + a perfect 5th
OSC 2: up 2 octaves (basic pitch)

One important aspect of the sound of this patch is the appearance of an octave overtone at the beginning of each note, which fades as the note decays (this is a characteristic sound of reed or tine electric pianos, when the keys are struck forcefully). This effect is created by the POLY-MOD section in conjunction with the SYNC on OSC 1: the FILTER ENVELOPE is used as the modulation source (as the voltage lowers during the DECAY portion, the octave overtone disappears). To study this effect directly, switch off the OSC 2 waveshapes and listen to OSC 1 by itself. Since the two oscillators are in SYNC, the effect of OSC 2 as a modulation source in the POLY-MOD section is minimal; if SYNC is switched off, OSC 2 will have a strong effect via the POLY-MOD section: you will hear a clangorous tone that descends at the rate of the filter envelope decay.

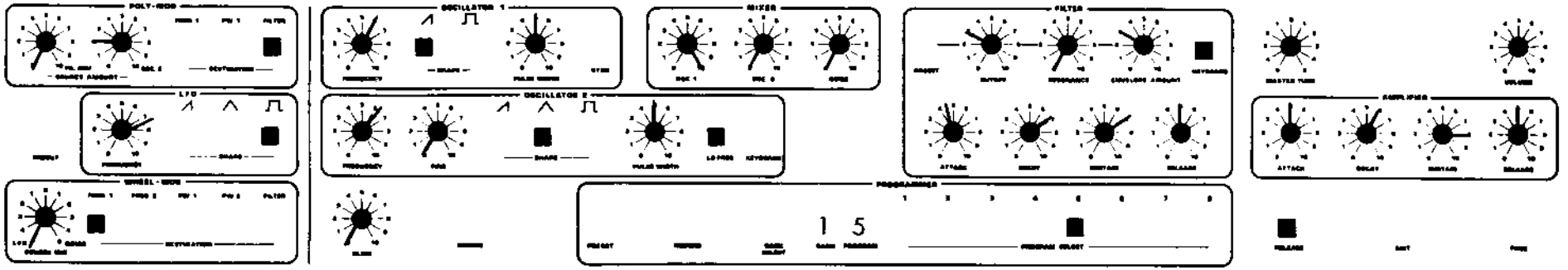
To simulate a piano sustain pedal, switch RELEASE off and use the footswitch to engage and disengage the release settings.

MOD WHEEL section can be engaged (if desired) to create a quasi-rotating-speaker animation of sound. Move wheel up approximately ½ (or more) to engage the effect. Also, try routing the modulation to FREQ 1 or PW 2 (or in various combinations with PW 1 to get different animation effects.

NOTES:

— Select different waveforms on OSC 1 and OSC 2 to experiment with different tone colors.

— If the MOD WHEEL section is engaged, try adding to the RELEASE time on the two envelope generators; the animation effect will seem to increase somewhat (since it will have more time to establish itself in the sound).



1-5: Flutes

OSC 1: up 3 octaves
OSC 2: LF mode

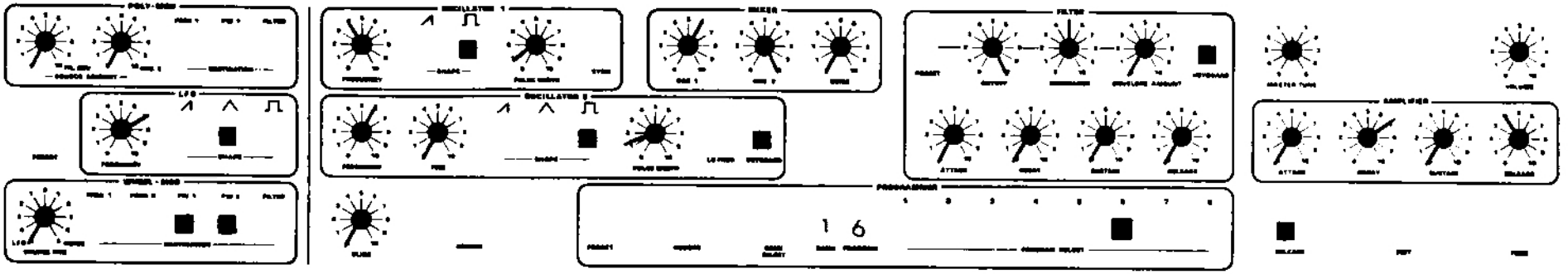
MOD WHEEL section can be engaged (if desired) to create a trill effect. The range of the trill is determined by the position of the wheel: the more the wheel is moved up, the greater the range of the trill.

POLY-MOD is being used to create a quasi-tremolo effect (similar to the breath-controlled vibrato/tremolo used by flute players).

PULSE-WIDTH on both oscillators is set at 5; this allows switching of waveforms on OSC 1, and on OSC 2 it leaves open the option to use the pulse wave as a modulation source. The use of the pulse wave on OSC 1 will create a hollower sound (more like a wooden flute).

NOTES:

— Adjust filter settings (CUTOFF and ENVELOPE AMOUNT) to alter brightness of tone.



1-6: Harpsichord

OSC 1: up 2 octaves
OSC 2: up 3 octaves

GENESIS OF THE PATCH: To create the bright, nasal sound of the thin strings of a harpsichord, narrow pulse waves were selected. The FILTER settings are also important: brightness is insured by setting the filter CUTOFF fully open, and the nasal sound is intensified by setting the filter RESONANCE at 5. The amplifier envelope generator is set to simulate a plucked string (since, in a harpsichord, the strings are plucked rather than struck). Even though there is no audible release time on a harpsichord, the RELEASE is set at 4 on the VCA envelope generator so there won't be an audible "whack" when the key is released (caused by the instantaneous closing down of the VCA). The oscillators are set at two different octaves to emphasize the brightness of the harpsichord (and to simulate the sound of the harpsichord with more than one of its stops selected).

MOD WHEEL section can be engaged (if desired) to create a repeating effect. Move wheel up approximately ½ (or more) to engage the effect.

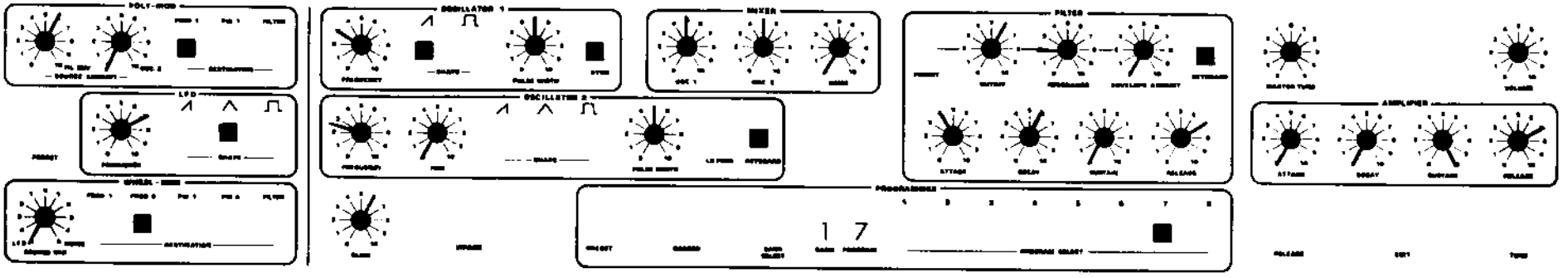
NOTES:

— Adjust oscillators to a wider pulse-width for a fuller sound.

— For a less nasal sound, reduce the amount of filter RESONANCE.

— To change overall tone color mix, change MIXER settings for OSC 1 and 2.

— Try adding an envelope shape to the FILTER. Envelope generator settings should be similar to those on the amplifier section; adjust filter CUTOFF and ENVELOPE AMOUNT to engage the envelope generator at the proper level.



1-7: Sync I

OSC 1: up 1 octave + a minor 3rd
OSC 2: up 1 octave (basic pitch)

MOD WHEEL is set for a vibrato effect. Move wheel up slightly (⅛ to ¼) to engage vibrato.

GLIDE is programmed in for use with UNISON mode — when the patch is used as a lead line. Glide will engage if UNISON is switched on.

RELEASE is programmed off; switch on to engage the programmed release times — sound will fade slowly after keys are released.

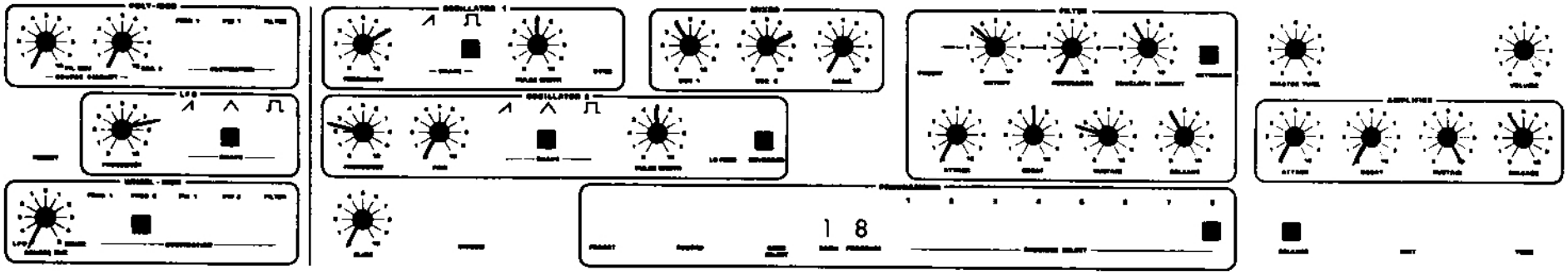
PULSE-WIDTH on both oscillators is set at 5; this allows switching of waveforms on OSC 1, and leaves open the possibility of adding OSC 2 pulse wave to the sound.

In the MIXER section, OSC 2 is programmed at 5 to allow for setting the pitch of the oscillator, and also to allow for its addition to the sound (for a fuller effect).

Although the filter ENVELOPE AMOUNT is set at 0, the filter envelope generator settings are programmed for use as a modulation source for the POLY-MOD section.

NOTES:

— Adjust OSC 1 pitch to alter the amount of animation at the beginning of the sound.



1-8: Percussive Organ

OSC 1: up 3 octaves + a perfect 5th
OSC 2: up 1 octave (basic pitch)

MOD WHEEL section is set for a vibrato effect. Move wheel up slightly (⅛ to ¼) to engage vibrato.

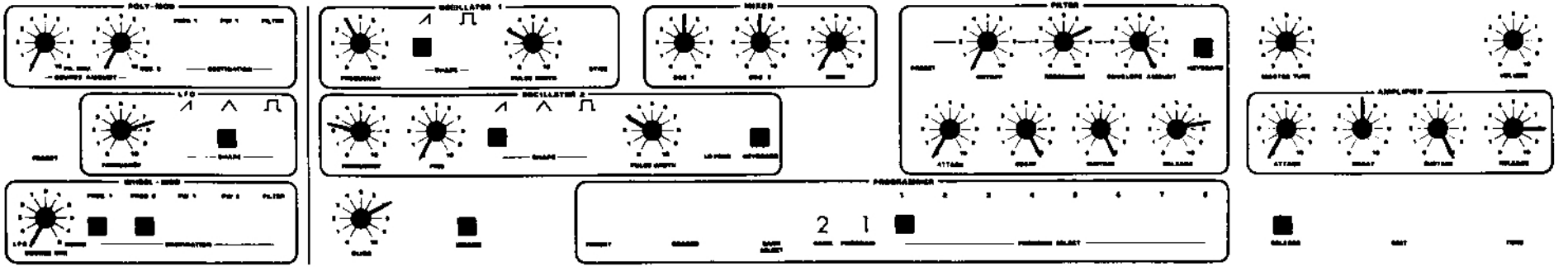
PULSE-WIDTH on OSC 2 is set at 5; this allows for switching of waveforms.

For proper effect, OSC 1 must be a square wave (set at approximately 5 and listen for the dropout of the octave — the 2nd harmonic).

NOTES:

— Adjust the filter ENVELOPE AMOUNT to change amount of percussion effect and brightness of tone color.

— Adjust filter CUTOFF to change overall brightness of tone.

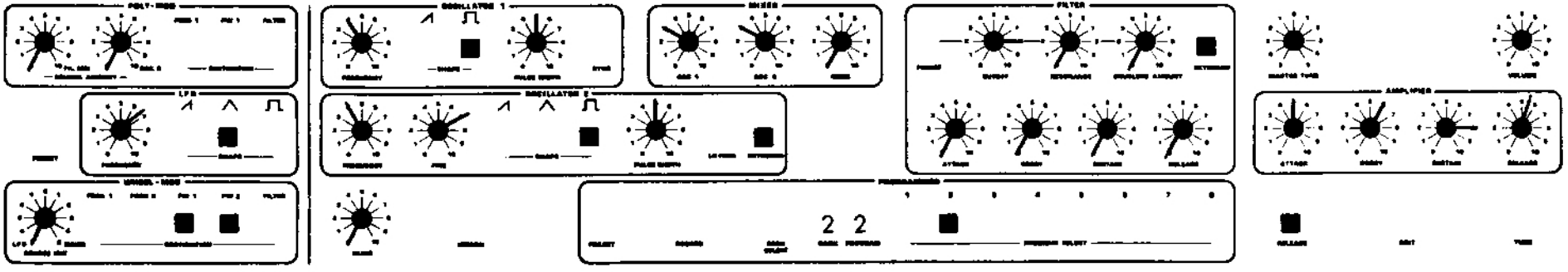


2-1: Unison Glide With Resonance

OSC 1: up 2 octaves
OSC 2: up 1 octave

MOD WHEEL section is set for a vibrato effect. Move wheel up slightly (⅛ to ¼) to engage vibrato.

PULSE-WIDTH on both oscillators is set at 3; this allows switching of waveforms.

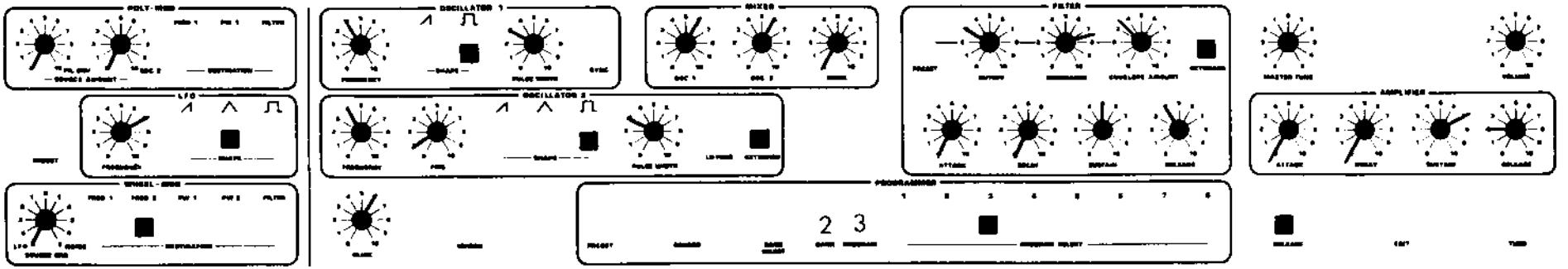


2-2: Harmonium

OSC 1: up 2 octaves (basic pitch)
OSC 2: ½-step below OSC 1; FINE tune up (to 7) for detuning

MOD WHEEL section can be engaged (if desired) to create a chorusing animation-of-sound effect. Move wheel up approximately 1/3 to engage effect.

The pitch setting on OSC 2 shows one method to set up a detuning effect; using this system, the pitch of OSC 2 will be slightly below that of OSC 1. The other method — setting both oscillators to the same pitch and then setting the FINE TUNE up slightly — will set the pitch of OSC 2 slightly above that of OSC 1.



2-3: Organ With Resonance

OSC 1: up 2 octaves
OSC 2: up 2 octaves

MOD WHEEL section is set for a rotating-speaker effect. Move wheel up slightly (⅛ to ¼) to engage effect.

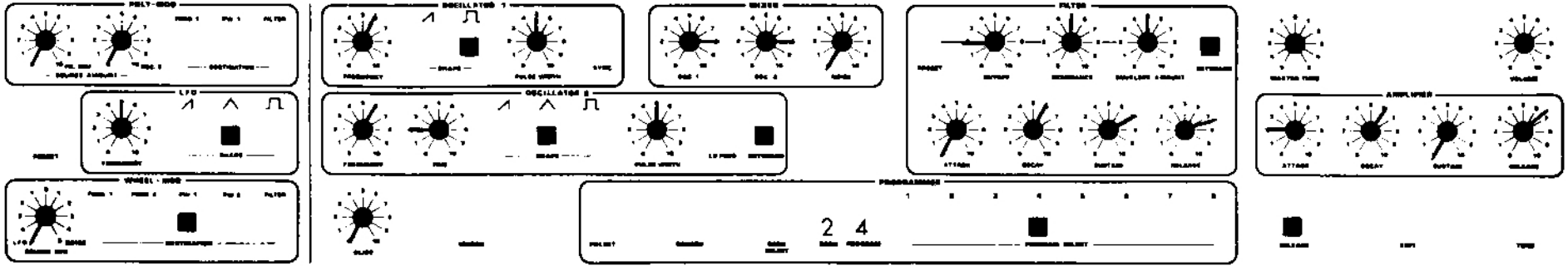
GLIDE is programmed in for use with UNISON mode — when the patch is used as a lead line. Glide will engage if UNISON is switched on.

NOTES:

— For a thicker sound, detune OSC 2 by setting FINE tune to approximately 1½.

— For a different animation-of-sound effect, try routing mod to PW 1 (or PW 1 and PW 2) instead of FREQ 2.

— Adjust DECAY and SUSTAIN settings on filter envelope generator to alter the organ percussion effect.



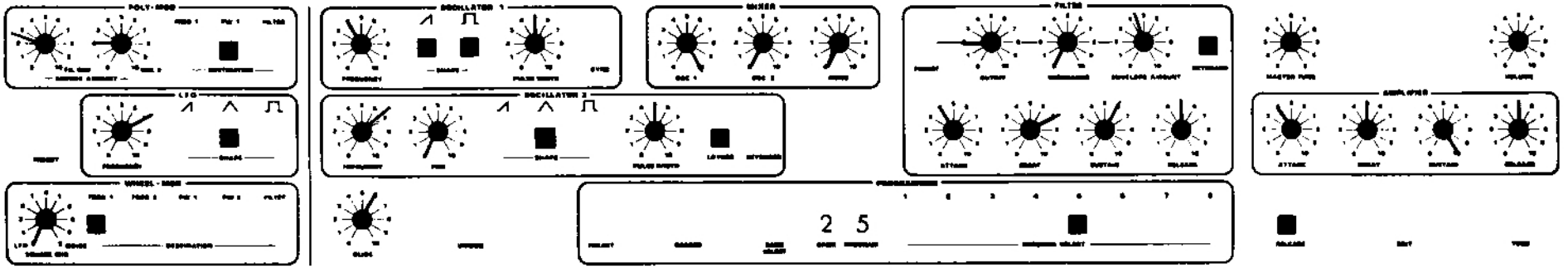
2-4: Toy Piano

OSC 1: up 3 octaves
OSC 2: up 3 octaves

MOD WHEEL section is set for an animation effect. Move wheel up 1/4 to 1/3 to engage effect.

PULSE-WIDTH on OSC 2 is set at 5; this allows switching of waveforms.

OSC 2 is detuned slightly to create the out-of-tune effect that is characteristic of toy pianos. For the best effect, play the keyboard in a detached manner (i.e. don't hold the keys down for very long).



2-5: Trumpet/Flute

OSC 1: up 2 octaves
OSC 2: LF mode

MOD WHEEL section is set for a vibrato effect. Move wheel up slightly (⅛ to ¼) to engage effect.

GLIDE is programmed in for use with UNISON mode — when the patch is used as a lead line. Glide will engage if UNISON is switched on.

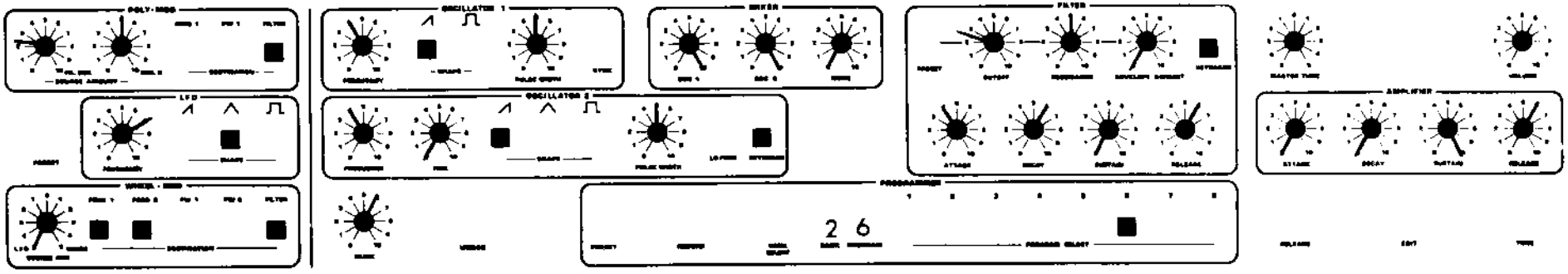
PULSE-WIDTH on OSC 2 is set at 5; this allows switching of waveforms.

OSC 1 is set as a square wave (set at approximately 5 and listen for the dropout of the octave — the 2nd harmonic).

NOTES:

— Select different waveforms on OSC 1 and OSC 2 to experiment with different tone colors.

— Adjust filter settings (CUTOFF and ENVELOPE AMOUNT) to alter brightness of tone.



2-6: Filter Mod

OSC 1: up 2 octaves
OSC 2: up 2 octaves

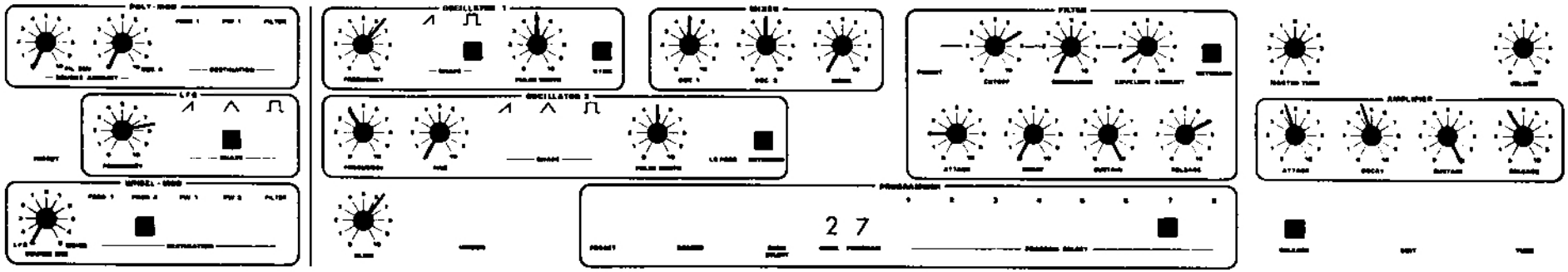
MOD WHEEL section is set for a vibrato/tremolo effect. Move wheel up slightly (⅛ to ¼) to engage effect.

GLIDE is programmed in for use with UNISON mode — when the patch is used as a lead line. Glide will engage if UNISON is switched on.

RELEASE is programmed off; switch on to engage the programmed release times.

PULSE-WIDTH on both oscillators is set at 5; this allows switching of waveforms.

Although the filter ENVELOPE AMOUNT is set at 0, the filter envelope generator settings are programmed for use as a modulation source for the POLY-MOD section.



2-7: Reed Organ

OSC 1: up 3 octaves + a major 3rd
OSC 2: up 2 octaves (basic pitch)

MOD WHEEL section is set for a vibrato effect. Move wheel up slightly (⅛ to ¼) to engage effect.

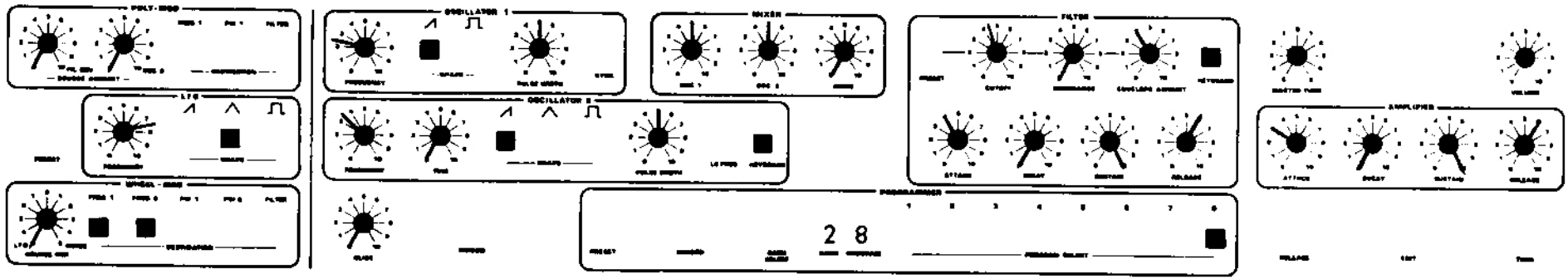
In the MIXER section, OSC 2 is programmed at 5 to allow for setting the pitch of the oscillator, and also to allow for its addition to the sound (for a fuller effect).

PULSE-WIDTH on OSC 2 is set at 5; this leaves open the possibility of adding OSC 2 pulse wave to the sound.

NOTES:

— Select different waveforms on OSC 1 (and OSC 2) to experiment with different tone colors.

— Adjust filter CUTOFF setting to alter brightness of tone.



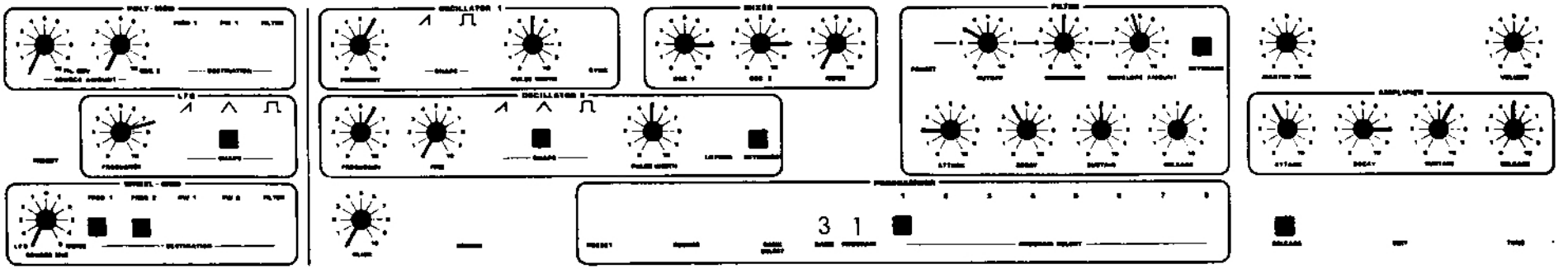
2-8: Brass In Fifths

OSC 1: up 1 octave
OSC 2: up 1 octave + a perfect 5th

MOD WHEEL section is set for a vibrato effect. Move wheel up slightly (⅛ to ¼) to engage vibrato.

RELEASE is programmed off; switch on to engage the programmed release time.

PULSE-WIDTH on both oscillators is set at 5; this allows switching of waveforms.



3-1: Pipe Organ Flutes

OSC 1: up 3 octaves
OSC 2: up 3 octaves

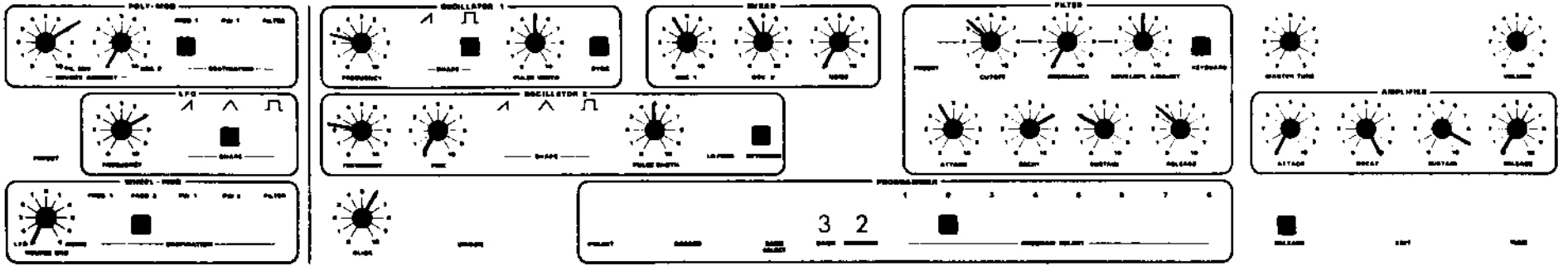
MOD WHEEL is set for a vibrato effect. Move wheel up slightly (⅛ to ¼) to engage effect.

OSC 1 is programmed off (no waveform selected); however, the MIXER section is set to allow for its addition to the sound.

PULSE-WIDTH on both oscillators is set at 5; this allows switching of waveforms on OSC 2, and leaves open the possibility of adding OSC 1 pulse wave to the sound.

NOTES:

— The wooden "chiff" effect in the initial portion of the tone (a characteristic of pipe organ attack transients) is created mainly by the settings in the FILTER section. The filter envelope generator settings (particularly the ATTACK, DECAY, and SUSTAIN), working in conjunction with the filter CUTOFF, ENVELOPE AMOUNT, and RESONANCE settings, are critical. (The use of the mellow triangle waveshape in OSC 2 is also important to the overall tone color.) To understand how these settings work together to create the effect, try altering them all slightly, one at a time and in combination.



3-2: Sync II

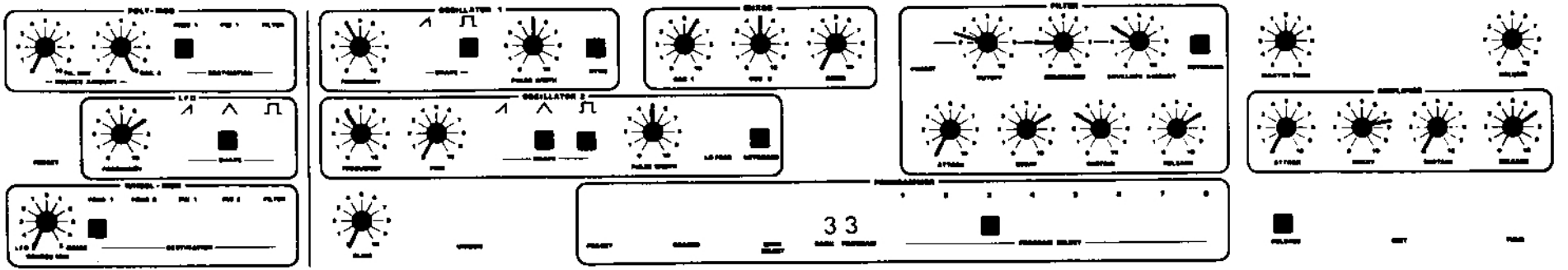
OSC 1: up 1 octave
OSC 2: up 1 octave

MOD WHEEL section is set for a vibrato effect. Move wheel up slightly (⅛ to ¼) to engage effect.

OSC 2 is programmed off (no waveform selected); however, the MIXER section is set to allow for its addition to the sound.

PULSE-WIDTH on both oscillators is set at 5; this allows switching of waveforms on OSC 1, and leaves open the possibility of adding OSC 2 pulse wave to the sound.

GLIDE is programmed in for use with UNISON mode — when the patch is used as a lead line. Glide will engage if UNISON is switched on.



3-3: Electric Piano

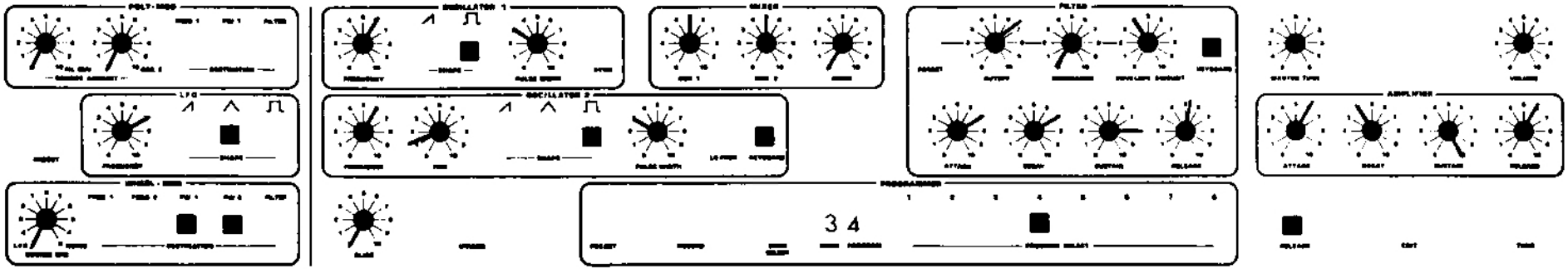
OSC 1: up 2 octaves
OSC 2: up 2 octaves

MOD WHEEL section can be engaged (if desired) to create a vibraphone-like vibrato/tremolo effect. Move wheel on full to engage effect.

To simulate a piano sustain pedal, switch RELEASE off and use the footswitch to engage and disengage the release settings.

NOTES:

— Since the two oscillators are in SYNC, the effect of OSC 2 as a modulation source in the POLY-MOD section is minimal; if SYNC is switched off, OSC 2 will have a strong clangorous effect via the POLY-MOD section.



3-4: High Strings

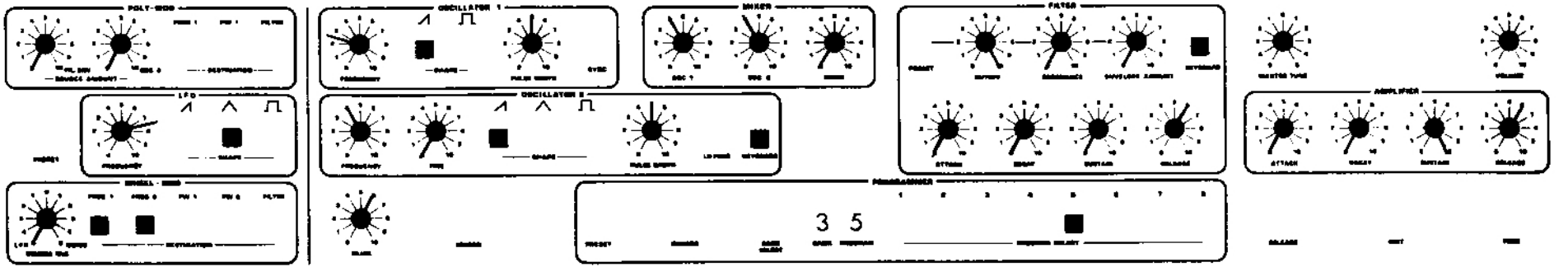
OSC 1: up 3 octaves
OSC 2: up 3 octaves

MOD WHEEL must be moved up 1/3 to 1/2 for proper effect. Consider adjusting the MOD WHEEL for different registers on the keyboard; more for playing in the higher register, less for the lower register.

NOTES:

— Adjust filter CUTOFF and ENVELOPE AMOUNT to change brightness of tone.

— Remember that in order to create the effect of a high string section you must do your part: you must play notes that are idiomatic for strings. If you play this patch with piano phrasing, it will not sound like a string section.



3-5: Octave Sawteeth

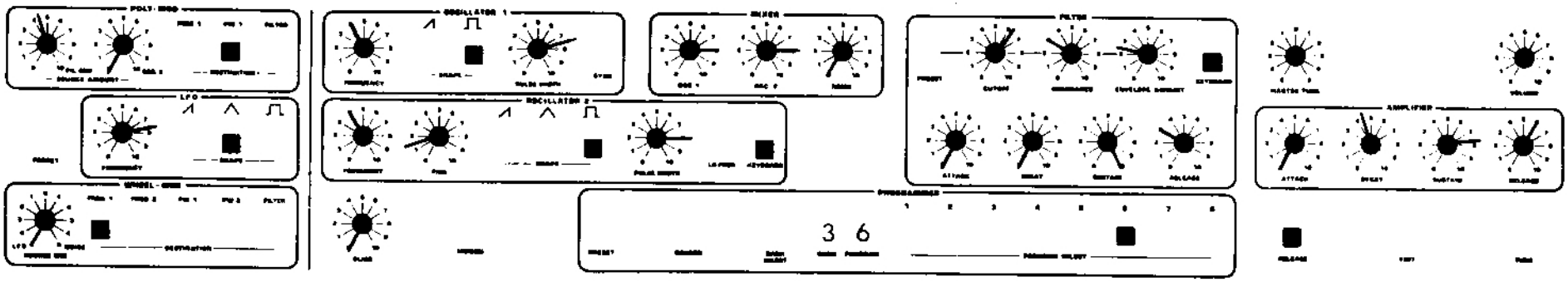
OSC 1: up 1 octave
OSC 2: up 2 octaves

MOD WHEEL section is set for a vibrato effect. Move wheel up slightly (⅛ to ¼) to engage vibrato.

GLIDE is programmed in for use with UNISON mode — when the patch is used as a lead line. Glide will engage if UNISON is switched on.

RELEASE is programmed off; switch on to engage the programmed release times.

PULSE-WIDTH on both oscillators is set at 5; this allows switching of waveforms.



3-6: Release-Repeat

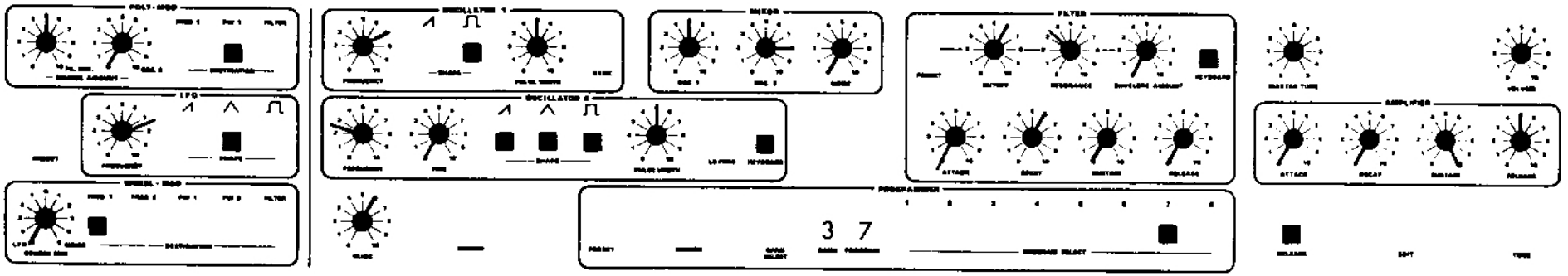
OSC 1: up 2 octaves
OSC 2: up 2 octaves

The release effect in this patch is created by the POLY-MOD section. The filter envelope generator is being used as the modulation source, routed to PW 1; since the SUSTAIN is set at 10, the PULSE-WIDTH of OSC 1 is driven to 10 and degenerates to DC — in other words, no sound is generated. When the key is released, the filter RELEASE is faster than the amplifier RELEASE, so that OSC 1 is allowed to sound. In other words, OSC 2 provides the sound while a key is depressed, and OSC 1 provides the repeat effect.

MOD WHEEL section can be engaged (if desired) to create a chorusing effect on the release portion of the sound. Move wheel up to engage effect (from ⅛ to ½, depending on effect desired).

NOTES:

— Detuning of OSC 2 separates the basic sound from the "release-repeat" sound by making the basic sound (OSC 2) slightly higher in pitch than the repeat sound (OSC 1).



3-7: Delayed Harmonic

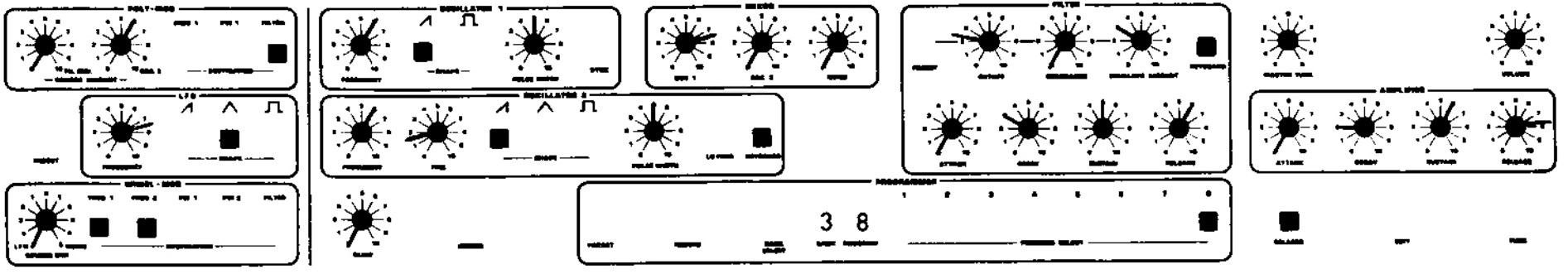
OSC 1: up 4 octaves
OSC 2: up 1 octave (basic pitch)

The delayed harmonic effect in this patch is created by the POLY-MOD section. The filter envelope generator is being used as the modulation source, routed to PW 1; at first, the voltage from the envelope generator is so high that the PULSE-WIDTH is driven to 10 and generates to DC — in other words, no sound is generated. As the DECAY of the envelope generator continues, the voltage lowers, and OSC 1 is allowed to sound. Since it is pitched 3 octaves above OSC 2 (the primary sound source), it gives the effect of an overtone.

The type of effect generated by this patch depends on the technique used on the keyboard: if the keys are held down, you will get the basic "delayed harmonic" effect; if you play with a staccato touch, the harmonic note (OSC 1) will come in as a plucked timbre at the release of each key.

MOD WHEEL section is set for a vibrato effect on the harmonic note only (OSC 1). Move wheel up slightly (⅛ to ¼) to engage vibrato.

GLIDE is programmed in for use with UNISON mode — when the patch is used as a lead line. Glide will engage if UNISON is switched on.



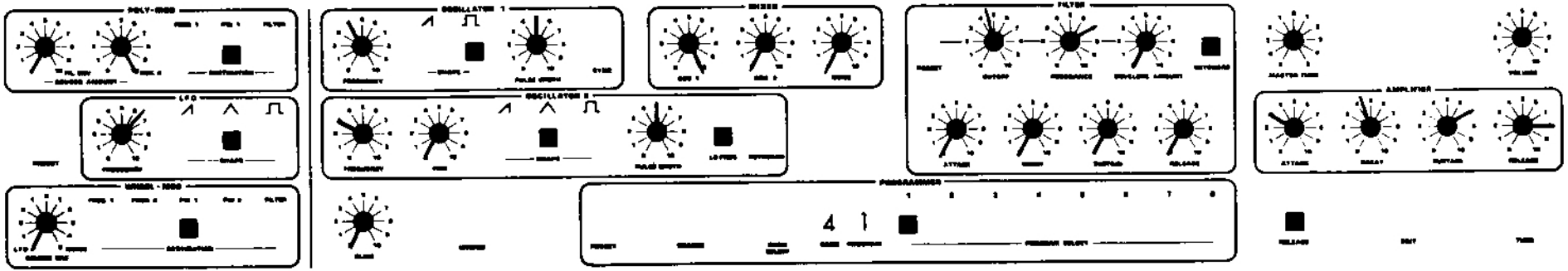
3-8: Echo-Repeat

OSC 1: up 3 octaves
OSC 2: up 3 octaves

PULSE-WIDTH on both oscillators is set at 5; this allows switching of waveforms.

MOD WHEEL section can be engaged (if desired) to add a swirling effect to the sound. Move wheel up ¼ to ½ to engage effect. For a more bizarre effect, move wheel past the ½ position.

The detuning of OSC 2 controls the speed of the repeat effect: the more detuning (i.e. the higher the FINE TUNE is set), the faster the repeat effect. Also, the repeat effect will (in general) be faster in the higher register of the keyboard.

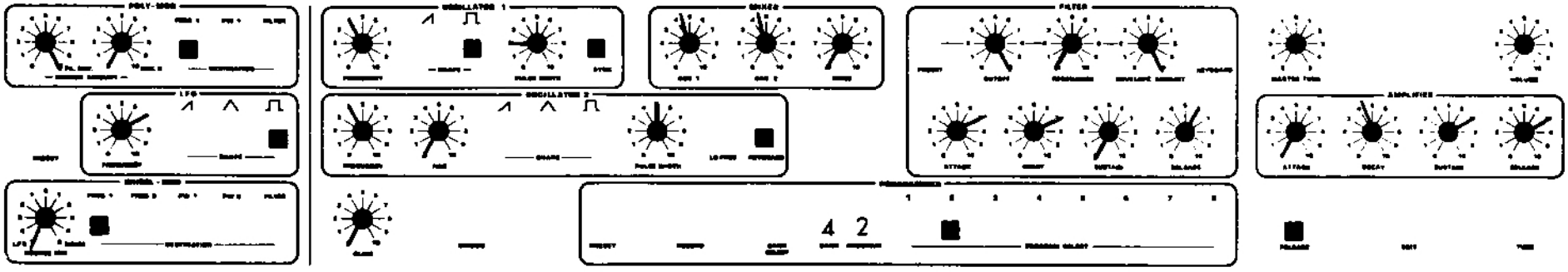


4-1: Pulse-Width Mod

OSC 1: up 2 octaves
OSC 2: LF mode

Move MOD WHEEL up (approximately 1/3 to 1/2) for added pulse-width modulation effect.

PULSE-WIDTH on OSC 2 is set at 5; this leaves open the option of using the pulse wave as a modulation source.



4-2: Slow Sync Sweep

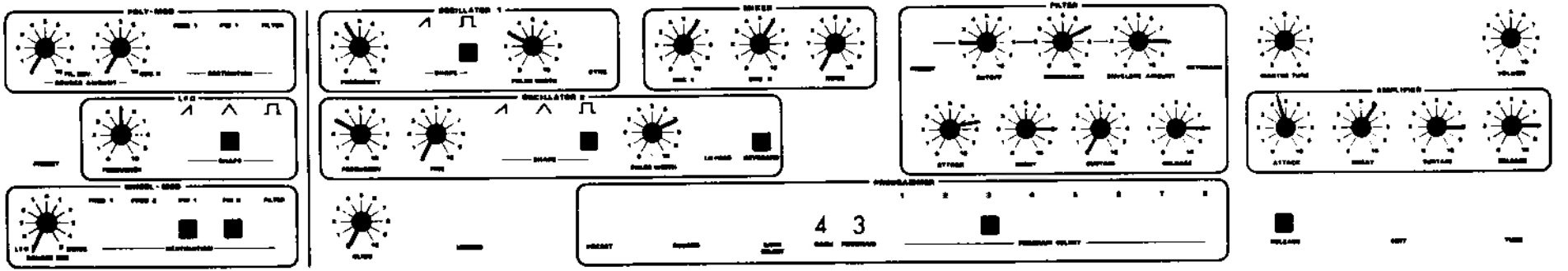
OSC 1: up 2 octaves
OSC 2: up 2 octaves

For the full sweeping effect, hold keys down (i.e. play long, sustained tones).

MOD WHEEL section is set for a vibrato effect. Move wheel up slightly (⅛ to ¼) to engage effect.

OSC 2 is programmed off (no waveform selected); however, the MIXER section is set to allow for its addition to the sound.

PULSE-WIDTH on OSC 2 is set at 5; this leaves open the possibility of adding OSC 2 pulse wave to the sound.

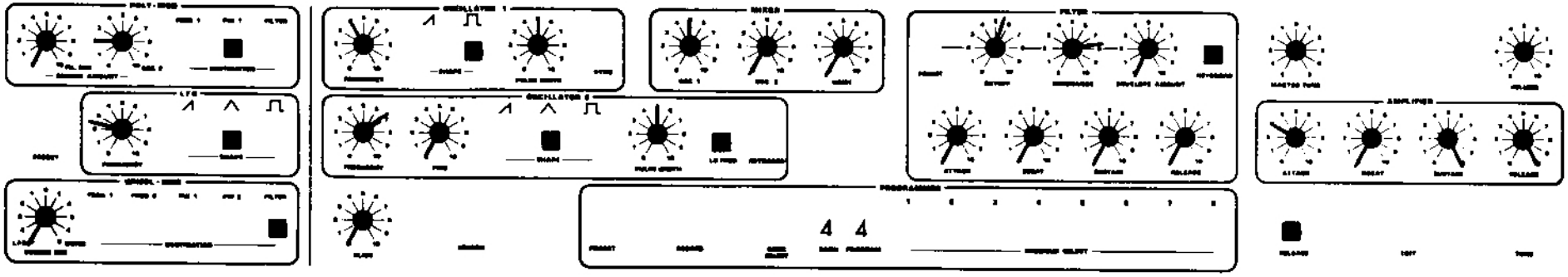


4-3: Fourths With Resonance

OSC 1: up 2 octaves
OSC 2: up 1 octave + a perfect 5th

To allow time for the full effect to develop, hold keys down.

MOD WHEEL section can be engaged (if desired) to create an alternating-fourth effect (OSC 1 and OSC 2 alternate as the sound source). Move MOD wheel full up to engage this effect.

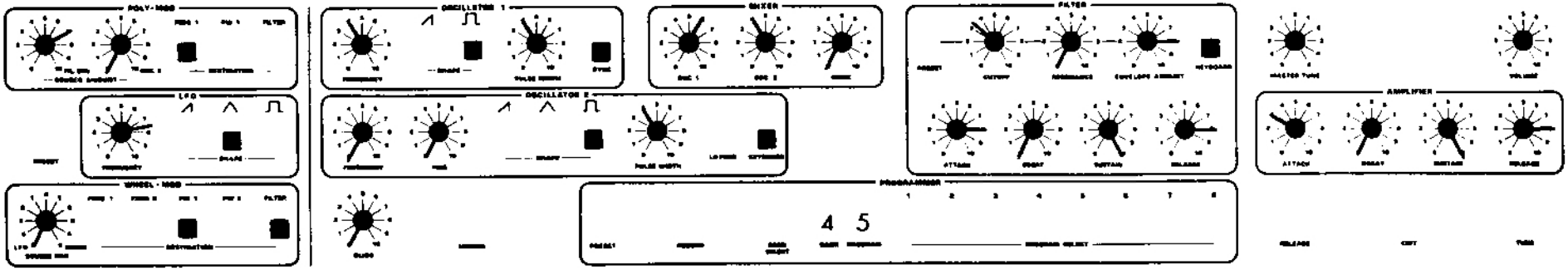


4-4: Sweeping Harmonics

OSC 1: up 2 octaves
OSC 2: LF mode

MOD WHEEL should be moved up 1/3 to 2/3 for best effect. The slow LFO triangle wave causes the filter to sweep slowly through the more rapidly changing (via the POLY-MOD routing of OSC 2) harmonics of OSC 1's pulse waves.

Filter RESONANCE is set on the edge of oscillation.



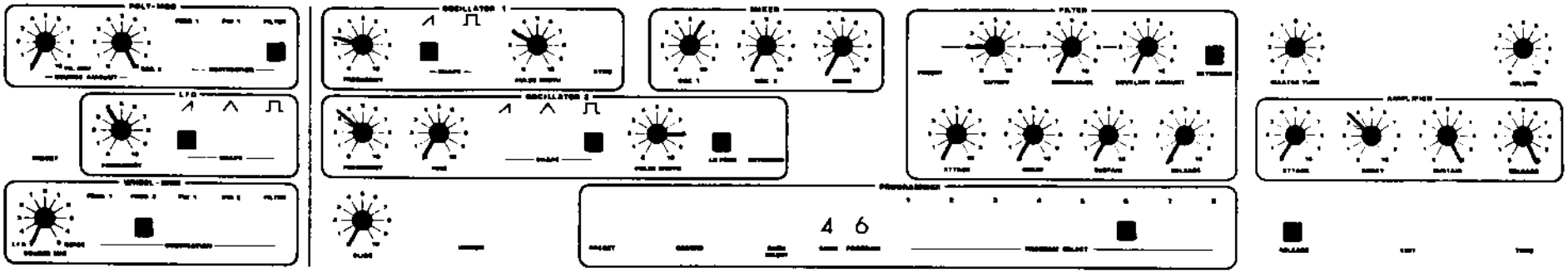
4-5: Slow Sync

OSC 1: up 2 octaves
OSC 2: up 0

The length of time that the keys are held down makes a strong difference in the overall sweep effect.

RELEASE is programmed off; switch on to engage the programmed release time.

MOD WHEEL section can be engaged (if desired) to add a strong tremolo/repeat effect to the sound. Move wheel up approximately 2/3 to engage effect.



4-6: Random Arpeggiator

OSC 1: up 1 octave
OSC 2: LF mode

In order to create a complete "arpeggiation" effect, more than one note must be struck on the keyboard. The notes need not be held down, since the amplifier RELEASE is set at 10.

MOD WHEEL section can be engaged (if desired) to set up changes in the speed of repetition of each "arpeggiated" note. Move wheel full up to engage effect.

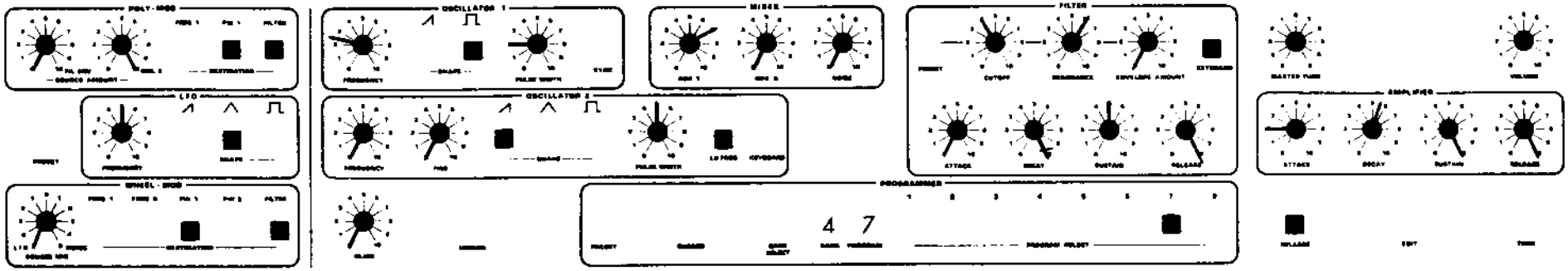
PULSE-WIDTH on OSC 1 is set at 3; this allows switching of waveforms.

NOTES:

— Adjust FREQUENCY of OSC 1 to change speed of arpeggiation.

— Adjust PULSE-WIDTH of OSC 1 to change duration of arpeggiated notes: the greater the pulse-width setting, the shorter the duration.

— Try routing mod to FREQ 1 instead of FREQ 2; this will create a sliding pitch effect on each note.



4-7: Sawtooth Arpeggiator

OSC 1: up 1 octave
OSC 2: LF mode

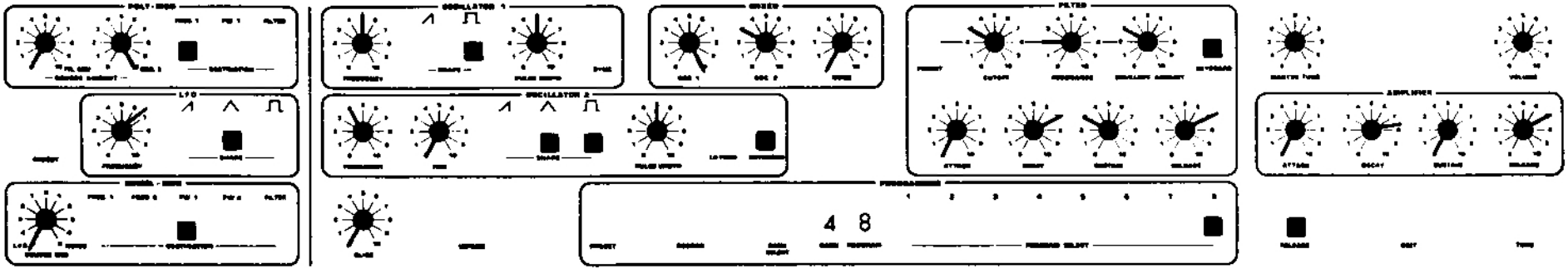
MOD WHEEL can be engaged (if desired) to increase the overall effect. Move wheel full up to engage effect.

NOTES:

— For a completely different effect, switch OSC 2 LO FREQ off and switch OSC 2 KEYBOARD on.

— PULSE-WIDTH on OSC 2 is set at 5, to leave open the possibility of using the pulse wave as a modulation source. Try using both the pulse wave and the triangle wave for different effects.

— The filter envelope generator settings are programmed to allow enveloping on the filter. Try adding the programmed envelope by setting the filter ENVELOPE AMOUNT above 0 (adjust the filter CUTOFF accordingly). This aspect of the patch can also be engaged in performance by switching the filter section out of PRESET mode.



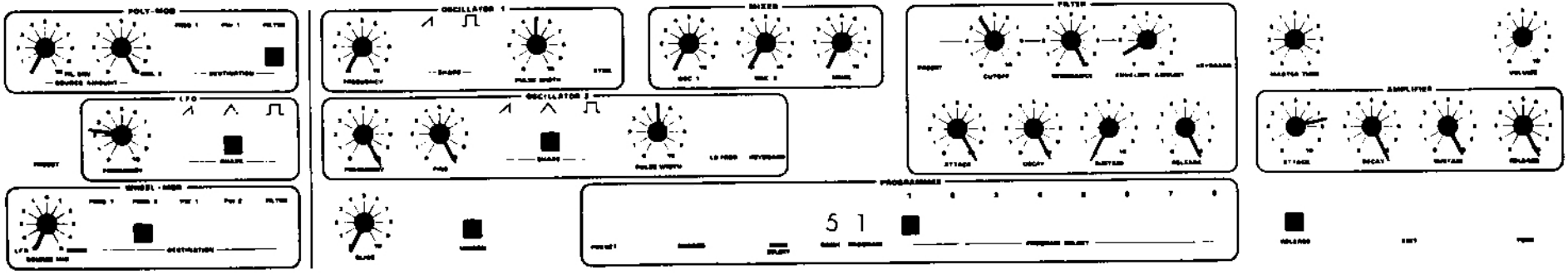
4-8: Clangorous Bells

OSC 1: up 2 octaves + a tritone
OSC 2: up 2 octaves

MOD WHEEL section can be engaged (if desired) to create a repeat/ echo effect. Move wheel ½ to full to engage effect.

NOTES:

— For added effect, increase filter RESONANCE setting.



5-1: Alien

OSC 1: up 0
OSC 2: up 5 octaves (plus FINE tune on 10)

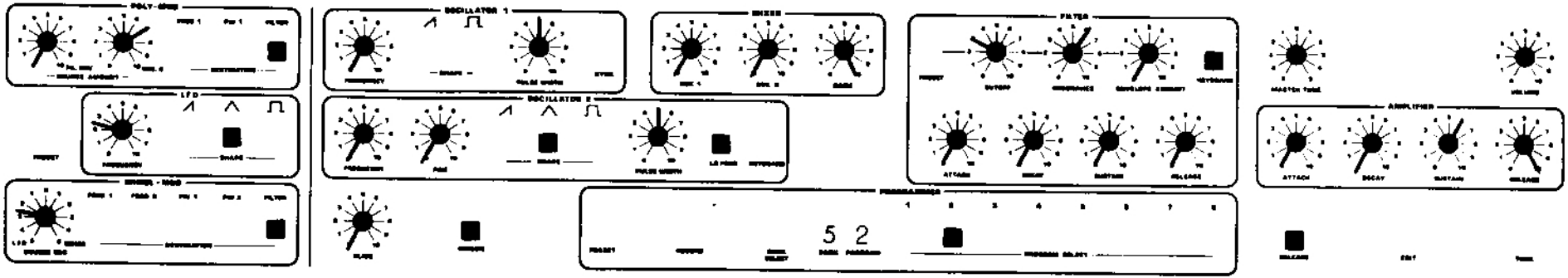
MOD WHEEL must be moved full up for proper effect.

To allow time for full effect to develop, hold key down for a long time (approximately 30 seconds).

NOTES:

— For extra effect, route WHEEL-MOD to FILTER in addition to FREQ 2.

— Increase filter ENVELOPE AMOUNT to exaggerate effect.



5-2: Noise Sweep

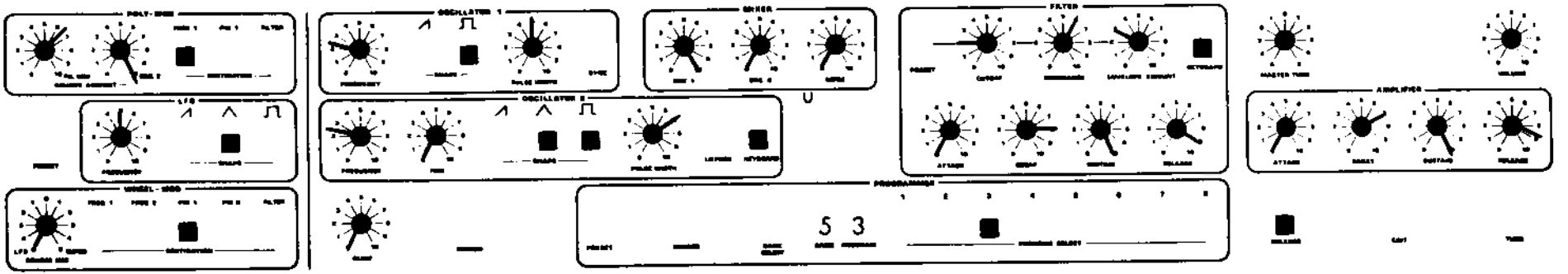
OSC 1: up 0
OSC 2: LF mode

Oscillators are not part of the sound source of this patch.

Play different registers on the keyboard to adjust the overall brightness of the effect.

PULSE-WIDTH on both oscillators is set at 5; this leaves open the possibility of adding OSC 1 pulse wave to the sound, and also allows for the use of OSC 2 pulse wave as a modulation source.

MOD WHEEL can be engaged (if desired) to add to overall effect. Move wheel up approximately 1/3 to engage effect. Also, try moving the wheel up more to get a different effect.



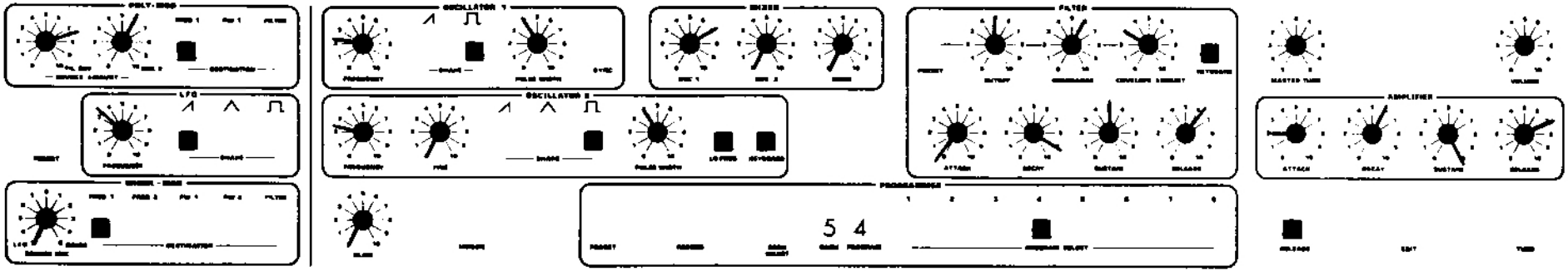
5-3: Descending Bells

OSC 1: up 1 octave
OSC 2: up 1 octave

MOD WHEEL section can be engaged (if desired) to create a phase-shift effect. Move wheel up ½ to ¾ to engage effect.

NOTES:

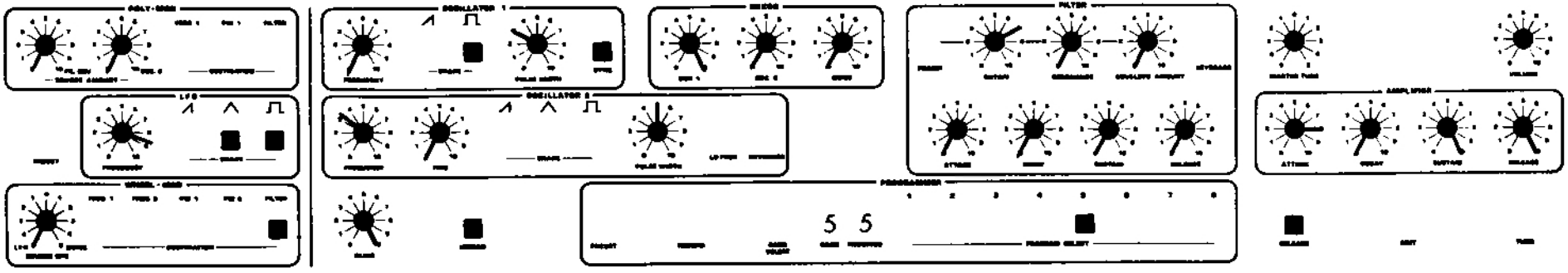
— Adjust filter CUTOFF setting to alter brightness of tone.



5-4: Descending Pulse Wave Mod

OSC 1: up 1 octave
OSC 2: LF mode

MOD WHEEL section can be engaged (if desired) to add an extra effect to the overall sound. Move wheel up approximately ½ to engage effect.



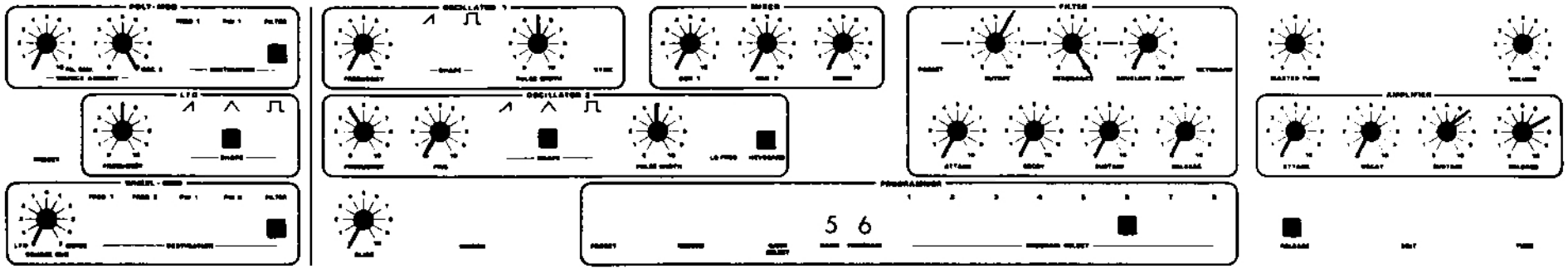
5-5: Helicopter

OSC 1: up 0
OSC 2: tuned to low E (1 octave + major 3rd above lowest note).

MOD WHEEL section is set to create "chopper" effect. Move wheel up at least 1/3 to engage effect. For increased effect, move wheel up 1/2 to full. If MOD wheel is turned off, sound will resemble a distant airplane squadron rather than a helicopter.

For best helicopter effect, play keyboard in the bottom 3 octaves. Try "flying" the sound by playing low C and middle C alternately on the keyboard while moving the PITCH and MOD wheels slightly to simulate approach and departure of aircraft.

Tune OSC 2 after turning KEYBOARD switch off; pitch may change when KEYBOARD switch is disengaged.



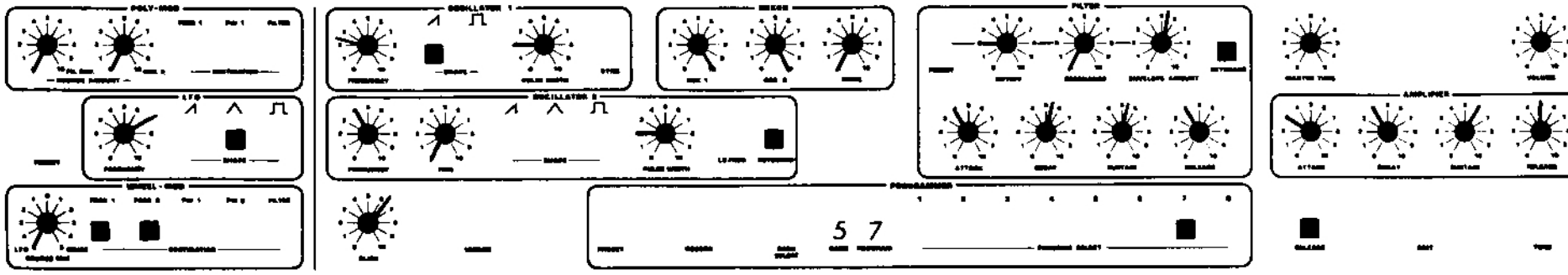
5-6: Resonance Bells

OSC 1: up 0
OSC 2: up 2 octaves

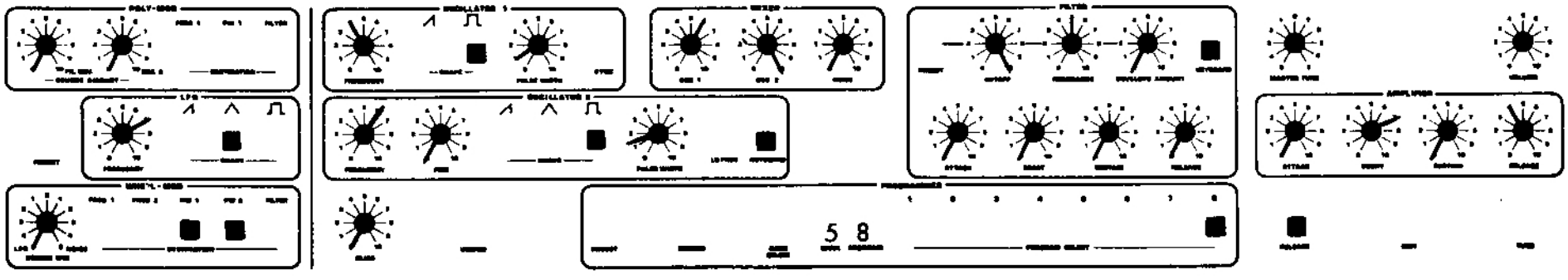
MOD WHEEL section can be engaged (if desired) to create a sweeping pitch effect. Move wheel up approximately 1/3 to engage effect.

NOTES:

— Adjust filter CUTOFF to alter range of bells and overall tone color.



5-7: Dupe of 1-1



5-8: Dupe of 1-6

5-7: Dupe of 1-1
5-8: Dupe of 1-6

These duplicate presets have been included for several reasons: 1) to leave open pivot points to allow you to move the factory presets to different locations for your particular needs; 2) to give you space to store your first programs and live with them for a while before storing them in another location (in place of one of the factory presets); 3) to allow you to practice working with the factory presets in order to fine tune them to suit your tastes; and 4) to let you trace the development of certain of the factory preset sounds (BRASS and HARPSICHORD) so that you can begin to work out your own methods for creating programmed sounds. Let us look at these various things one at a time.

It is easy to change the positions of the factory presets using either 5-7 or 5-8 as a pivot point. For instance, let us say that we want to move SYNC I from 1-7 to 3-1 (so it will be next to SYNC II), PIPE ORGAN FLUTES from 3-1 to 2-8 (so it will be next to REED ORGAN), and BRASS IN FIFTHS from 2-8 to 1-7 (so it will be in the same bank as BRASS). Use the following procedure:

1) Put the RECORD ENABLE/DISABLE switch in the ENABLE position.
2) Select 3-1 and switch EDIT mode on (remember, the RECORD switch will not work if the Prophet is in PRESET mode).
3) Press the RECORD button; then select BANK 5 and hit PROGRAM button 7. You have now recorded PIPE ORGAN FLUTES in location 5-7.
4) After checking to make sure that PIPE ORGAN FLUTES is indeed recorded in 5-7 (by returning to PRESET mode), select 1-7. Switch EDIT on, press the RECORD button, and select BANK 3 PROGRAM 1. You have now recorded SYNC I in location 3-1.
5) After checking to make sure that SYNC I is indeed recorded in 3-1 (by returning to PRESET mode), select 2-8. Switch EDIT on, press the RECORD button, and select bank BANK 1 PROGRAM 7. You have now recorded BRASS IN FIFTHS in location 1-7.
6) After checking to make sure that BRASS IN FIFTHS is indeed recorded in 1-7 (by returning to PRESET mode), select 5-7 (currently holding PIPE ORGAN FLUTES). Switch EDIT on, press the RECORD button, and select BANK 2 PROGRAM 8. You have now recorded PIPE ORGAN FLUTES in location 2-8, and have completed this round of location juggling. After checking to make sure that PIPE ORGAN FLUTES is indeed recorded in 2-8 (by returning to PRESET mode), location 5-7 will again be ready for use as a pivot point.

If the above procedure is followed carefully, you will never erase a program accidentally, because each program that is about to be erased from one location also exists in another location. Of course, you should be careful to hit the correct BANK and PROGRAM buttons when you are in RECORD mode — if you hit the wrong button you may erase a program that is not duplicated.

It is true that if you erase a factory preset you can duplicate it using the patch diagrams provided in this manual; however, if you erase one of your own programs, you will have to start again from scratch unless you have kept a record of your front panel settings for that program. For this reason, we have provided you with a number of blank front panel diagrams at the end of this manual, and we recommend that you keep a record of your favorite programs.

After you have worked up a patch you like, store it (at first) in 5-7 or 5-8 and experiment with it for a while. After you are satisfied that it is what you want, copy the panel settings into a patch diagram, and then locate your program in place of one of the factory presets that doesn't suit your needs. After your patch has been programmed in its final location, 5-7 or 5-8 will again be open for further experimentation.

Before you use 5-7 or 5-8 for these purposes, however, it might be good to use the duplicated presets located there to familiarize yourself with the techniques of programming and fine tuning a patch. Look at the notes accompanying the BRASS patch diagram (1-1); then select 5-7, switch to EDIT

mode, and make some adjustments. RECORD those adjustments, then switch back and forth between 1-1 (the original patch) and 5-7 (the patch as you have adjusted it). This will allow you to make some very direct comparisons between various settings, and will help you to understand how to go about adjusting various aspects of a patch in order to get the sound you want.

Use a similar approach in working with the 5-8 dupe of the factory preset HARPSICHORD patch. Read the notes accompanying the HARPSICHORD patch diagram (1-6), particularly those under the heading "GENESIS OF THIS PATCH." Experiment with some of the critical adjustments on the FILTER; change the PULSE-WIDTH settings of the two oscillators. RECORD some of your alterations on the patch in location 5-8 and compare them with the original patch at location 1-6. After you have come up with settings that please you, RECORD the result in location 1-6 and use 5-8 for a new purpose.

By the way, you need not limit yourself to BRASS and HARPSICHORD sounds when experimenting in this way: any of the factory presets can be duplicated in location 5-7 or 5-8 to allow for this kind of experimental comparison testing.

You are encouraged to adjust all of the factory presets to suit your taste (or at least those that you want to keep). You are also encouraged to dump the factory presets that you don't find useful and replace them with patches of your own design (remember, you can always recreate any of the factory patches using the diagrams in this manual). If you never use the EDIT mode, or if you never record any of your own programs, much of the circuitry of the Prophet will be standing idle. The full scope of the instrument can only be realized if you use the technology it contains as an extension of your own musical personality.

Section 6

Accessories

Various devices may be connected to the Prophet-5 via jacks on the rear panel to increase its versatility in live performance.

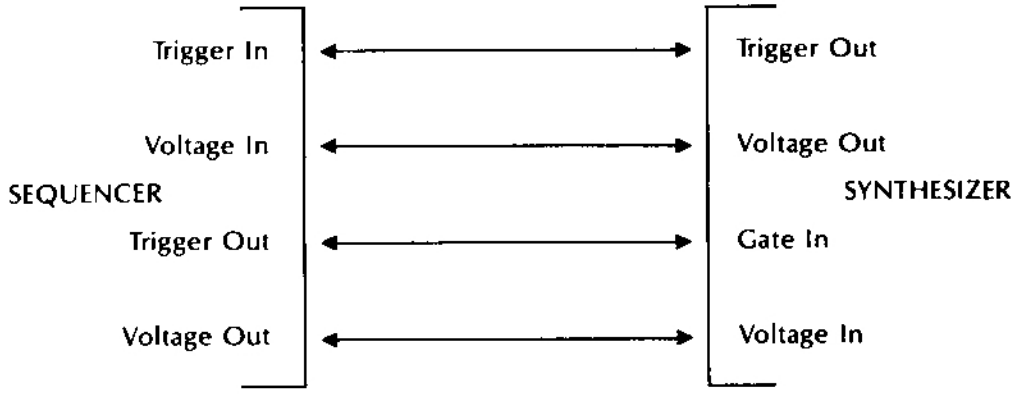
The ¼" jack labeled FILTER will allow an input voltage (with a range of 0 to 10 volts) to be added to the filter CUTOFF setting, thereby allowing external control of an important factor in the overall brightness of most tone colors. A voltage pedal (such as the Model 840 from Sequential Circuits) is the most common device for use in this context, but various other devices (such as a ribbon controller, an x/y joystick controller, or a sample-and-hold module) will provide for control of various interesting effects. An external controller connected to the FILTER jack will effect changes even when the filter CUTOFF knob on the front panel is inactive (i.e. when the Prophet is in PRESET mode). All voices will be affected equally by the input voltages.

The ¼" jack labeled AMPLIFIER will allow an input voltage (with a range of 0 to 10 volts) to be applied to the overall gain of the VCA. A voltage footpedal (such as the Model 840 from Sequential Circuits) is the most common (and most convenient) device for use in this context. The overall range of the pedal will be determined by the setting of the master VOLUME knob: if the VOLUME knob is set at 10, the pedal will function within the entire 0 to 10 range of the VOLUME knob; if the VOLUME knob is set at 5, the pedal will function within the 0 to 5 portion of the VOLUME knob's range. In other words, unlike the FILTER jack, the voltage input to the AMPLIFIER jack is not additive: if a voltage pedal (or other device) connected to the AMPLIFIER jack is turned all the way off, it will have the same effect as turning the master VOLUME knob to 0. An external control device connected to the AMPLIFIER jack will always be active, and all voices will be affected equally by the input voltages.

The ¼" jack labeled FOOTSWITCH allows for footswitch control of the release portion of the amplifier's envelope generator. It functions in much the same manner as the RELEASE switch on the front panel, and is only operative when the RELEASE switch is off. It then takes the place of the RELEASE switch: when pushed, the programmed amplifier release time is engaged; when not pushed, the programmed amplifier release time is disengaged. In that respect, it is similar to a piano sustain pedal. The footswitch for use in this context comes standard with every Prophet-5.

The four ¼" jacks labeled VOLTAGE IN, VOLTAGE OUT, GATE IN, and GATE OUT are provided to allow for the interfacing of a Sequential Circuits Model 800 digital sequencer to the Prophet-5. The Prophet, when connected to a Model 800, devotes one of its voices to the sequencer; the

remaining four voices may be played "live" while the sequencer is controlling the other voice. The diagram below shows how the Model 800 should be connected to the Prophet-5. The Model 800 TRIGGER IN and VOLTAGE IN switches should be in the up (1) position; the TRIGGER OUT switch should be in the center (2) position. When recording a sequence, the Prophet will send *each note played* to the sequencer, together with a trigger; when playing back a sequence, the Prophet will send all notes and gates to the same voice.



These four jacks can also be used for other functions: the OUT jacks can be used to control other synthesizers (most common 1-volt-per-octave synthesizers), while the IN jacks can be used to apply other controllers (such as analog sequencers, sample-and-hold units, guitar synthesizer pitch followers, etc.) to one of the Prophet's voices. Both VOLTAGE jacks are exactly 1-volt-per-octave. The GATE OUT is a +15 volt gate, and GATE IN can be any signal which switches through at least 7 volts.

NOTE: Any time a plug is inserted into the GATE IN jack on the Prophet-5, the computer disconnects voice 5 from the Prophet's keyboard; the instrument becomes essentially a 4-voice synthesizer, with voice 5 reserved for the external input (if any).

Section 7

Appendix — Books and Magazines on Synthesis

This abbreviated list is not (in any way) intended to be complete; it is merely a short compilation of (currently available) materials that may prove useful to you in your exploration of synthesis through the Prophet-5. Should you wish to explore further, many of the books listed here have extensive bibliographies.

BOOKS

Appleton, John; and **Perera, Ronald**. *The Development and Practice of Electronic Music*; Prentice-Hall, Englewood Cliffs, NJ.

The ARP 2600 Owner's Manual; ARP Instruments, Lexington, MA.

Backus, John. *The Acoustic Foundations of Music*; W. W. Norton and Company, New York, NY.

Deutsch, Herbert. *Synthesis*; Alfred Publishing, Sherman Oaks, CA.

Ernst, David. *The Evolution of Electronic Music*; Schirmer, New York, NY.

Friend, David; **Pearlman, Alan**; and **Piggott, Thomas**. *Learning Music With Synthesizers*; Hal Leonard Publishing, Milwaukee, WI.

Rhea, Tom. *The Minimoog Owner's Manual*; Moog Music, Buffalo, NY.

Strange, Allen. *Electronic Music*; William C. Brown Company, Dubuque, IO.

Wells, Thomas, and **Vogel, Eric**. *The Technique of Electronic Music*; Sterling Swift Publishing, Manchaca, TX.

MAGAZINES

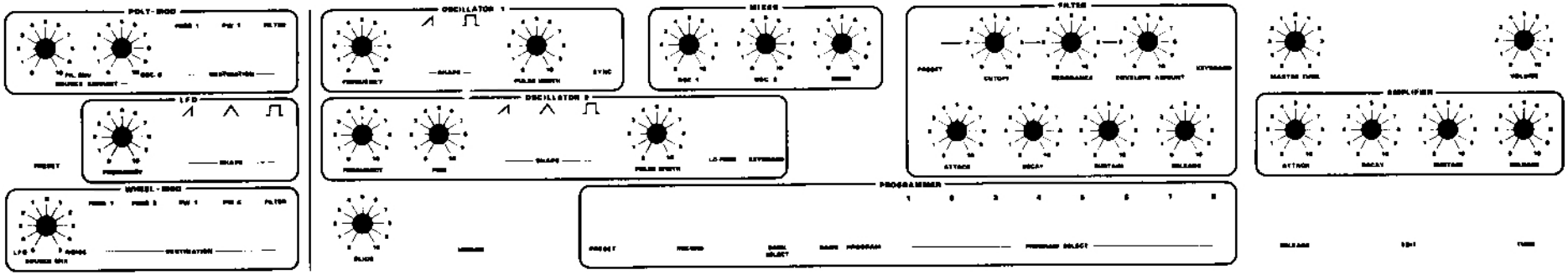
Contemporary Keyboard, 20605 Lazaneo, Cupertino, CA 95014.

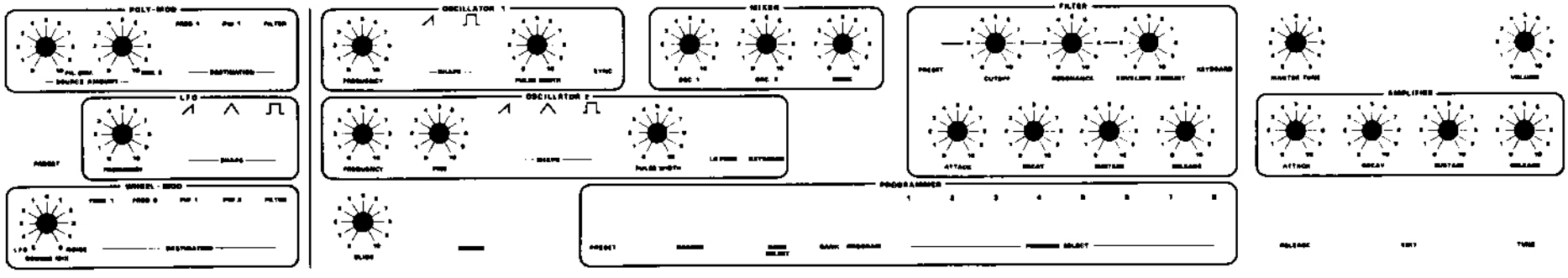
Polyphony, Box 20305, Oklahoma City, OK 73156.

Synapse, 1052 W. Sixth St., Suite 424, Los Angeles, CA 90017.

Section 8

Blank Patch Diagrams


POLY-MOD
LFO
WHEEL-MOD
OSCILLATOR 1
OSCILLATOR 2
MIXER
FILTER
PROGRAMMER
AMPLIFIER


POLY-MOD
LFO
WHEEL-MOD
OSCILLATOR 1
OSCILLATOR 2
MIXER
FILTER
PROGRAMMER
AMPLIFIER