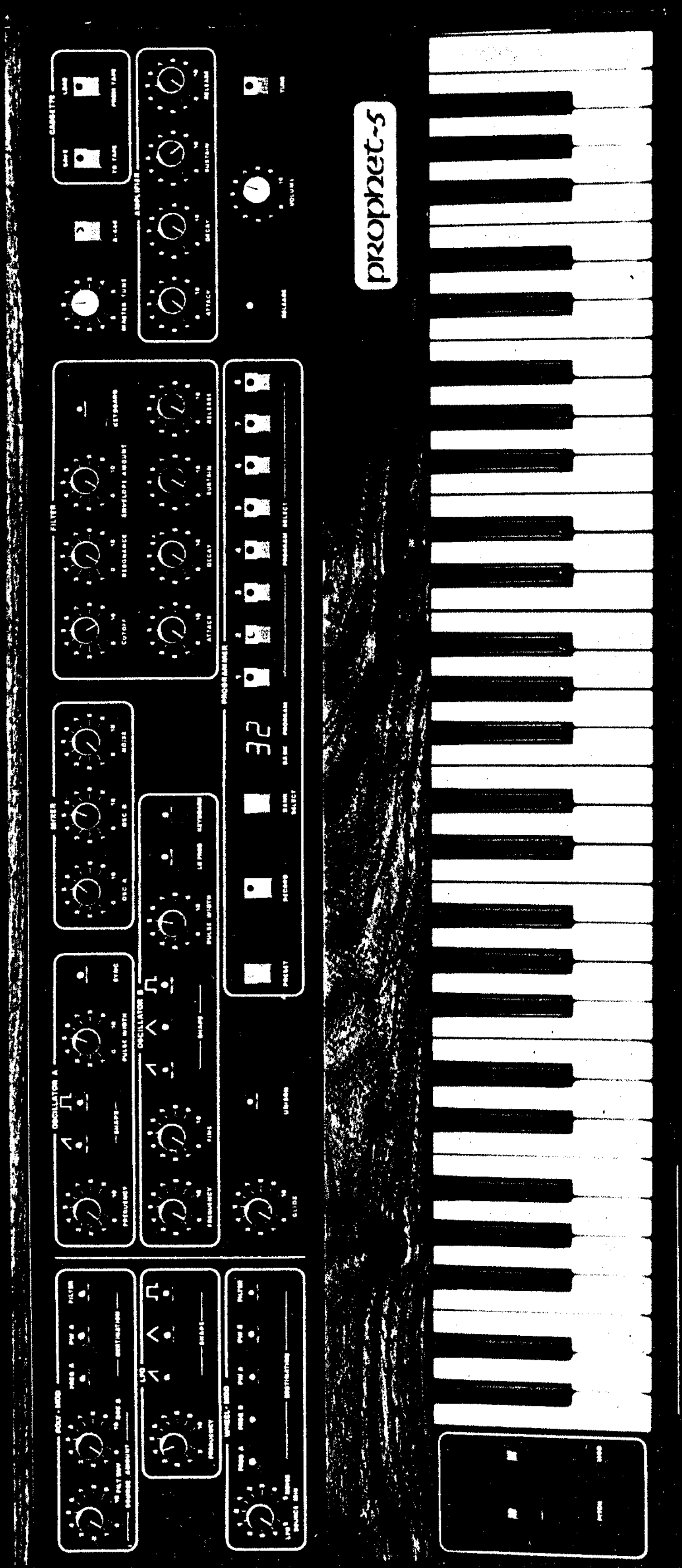
OPERATION MANUAL



SEQUENTIAL CIRCUITS INC

MODEL 1000
Revision 3.3
S/N 4064 up
Manual No. CM1000D

PROPHET-5 SYNTHESIZER OPERATION MANUAL

By

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About the Prophet-5

The Prophet-5 has been the world's leading polyphonic keyboard synthesizer since its appearance in January, 1978. Renowned among professionals for the range and quality of its sound, it provides five-voice capability and now allows the keyboardist to instantly select from 120 sounds (programs). All programs can be fully customized (edited) and stored internally, or on audio tape via the built-in cassette interface.

The Prophet-5 actually contains five individual synthesizers, termed "voices." For its principle sound sources, each voice contains two voltage-controlled oscillators (VCOs), referred to as OSC A and OSC B. OSC A, OSC B, and a white noise source can be mixed into a resonant low-pass voltage-controlled filter (VCF). The filter modifies the voice timbre under control of its four-stage envelope generator. The filter may also serve as a sound source. Following each filter, a voltage-controlled amplifier (VCA) also controlled by a four-stage envelope generator shapes the voice amplitude. Only one voice is depicted on the control panel, because the voice controls "patch" the five voices identically. This makes the voices homophonous--they sound alike--with pitch differences corresponding to (at most) five simultaneously-held keys.

Supplementing the basic voice are polyphonic modulation (POLY-MOD) signal routings within each voice that allow OSC B and the filter envelope generator to function as modulation sources applied to OSC A frequency or pulse-width, or to the filter frequency. Finally, there is a single low-frequency oscillator (LFO) and a pink noise source which can be mixed to modulate all five voices, as adjusted by the modulation (MOD) wheel. The PITCH wheel raises or lowers the pitch of all voices by the same interval.

The term "digital-analog hybrid" is often used to describe the Prophet. This means that instead of directly controlling the analog synthesizer voices, the keyboard and most controls are actually devices which input "data" to a microcomputer system which in turn "programs" the voices. The microcomputer system has three main functions. First, it solves the problem of generating five independent sets of voice control voltages and gate signals (which operate the envelope generators) from a single keyboard. Second, its digital memory provides a way to store all of the switch and knob settings which form a program. These programs are retained by the microcomputer's memory even when the Prophet is turned off, thanks to a small battery with a 10-year life. Third, the microcomputer system keeps the ten voice oscillators in tune.

Accessories specifically designed for the Prophet-5 include the Model 1005 Polyphonic Sequencer which allows direct storage of lengthy keyboard sequences, and the Model 1001 Remote Keyboard. For increased performance flexibility, the Model 842 Analog Interface Adapter enables remote control of the PITCH and MOD wheels by two Model 840 Voltage Pedals.

Congratulations on choosing the Prophet-5. It has already become a classic.

Table of Contents

SECTION 1

BASIC OPERATION

1-0 INTRODUCTION

This section contains instructions for set-up and basic operation. After unpacking, read paragraph 1-1 and connect the Prophet-5 as described. The remaining paragraphs in this section cover tuning, program selection, and other essential information.

The Prophet-5 offers astounding sonic flexibility and performance. To exploit these capabilities fully, learn as much as you can about it with this manual and the books listed in the bibliography (Section 7). Additional references can be obtained from the more extensive bibliographies contained in the sources listed. Thus prepared, you will no doubt create many interesting sounds. Be advised that in the excitement of creation patches tend to escape if not documented. Panel blanks for this purpose are provided at the back of the manual.

Remember the Prophet-5 is a sophisticated device. It should be handled with as much care as you would afford an acoustic instrument. Shock or vibration can damage the keyboard or controls, and can loosen socketed integrated circuits (ICs). Avoid temperature extremes. If you expect to transport the Prophet-5 regularly, we urge you to invest in a professional "road" case for it. These are made by several manufacturers and should be carried by your music dealer. If you can't find a case, please contact the SCI Sales Department.

1-1 SET-UP

The Prophet has a switch on its back panel for selecting between a 115- or 230-Vac power source. Prophets shipped in the U.S. and to Japan are usually switched to 115V, and those destined for Europe are usually switched to 230V. **CAUTION:** Check this switch and set to match your line voltage before plugging in the instrument. Don't change this switch when the line cord is connected. If you do switch the line voltage selector, you will have to change the fuse also. Use 3/4A SLO-BLO for 115V and 1/2A SLO-BLO for 230V.

As does most electronic equipment, the Prophet comes with a three-prong power plug to insure safe grounding with other equipment. The ground prong is connected to the metal chassis of the instrument. It is up to you to check the ground connections of the Prophet and all other instruments and equipment you use to prevent potentially lethal shocks. As you probably know, many older buildings and clubs are notorious for their poor quality AC wiring. We therefore 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 be created when the audio cable is connected between the Prophet and its amplifier. As a result, low-level hum may occur. Defeating the AC ground with a two-prong adapter will usually defeat the hum, but this practice can also set up a shock hazard between the units. The hum level will depend on exactly how the two units are connected to the AC. For minimal hum, use the same outlet for both the Prophet and its amplifier. This should reduce the hum to an acceptable level.

In short, we recommend the following steps when connecting the Prophet-5:

1. Plug the Prophet into a three-prong outlet. Don't defeat the AC-ground.

2. Plug all other equipment such as amplifiers, volume pedals, and effects devices into the same outlet. **WARNING:** Do not overload. When in doubt, consult an electrician.

3. Verify all equipment grounding with a ground tester.

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

This is an excellent time to think about your amplifier and speaker system. By converting the synthesizer's electrical output into the potent vibrations you hear, your sound system becomes part of the instrument. Of course you can use anything you like. But if your speakers are muddy and weak, so will be your sound. Using your home stereo will generally give good high-frequency range, but if you go this route be careful. The Prophet has much more dynamic range than the typical stereo source. It can generate powerful transients which can damage component speakers if the volume is set too high. Therefore, you might consider using amplifiers and speakers specifically designed for electronic instruments.

To protect speakers, it is customary to switch off amplifier power when connecting cable from the Prophet's AUDIO OUT jack.

Connection and use of the enclosed footswitch is explained in paragraph 1-5. For other back-panel connections, see Section 3.

1-2 POWER-ON AND INITIAL TUNING

The Prophet is turned on with the POWER switch on the back panel. After the instrument is switched on, the front panel will be dark--except for the TUNE switch--for approximately eight seconds while the computer tunes the oscillators. When tuning is completed the front panel will light up and the BANK-PROGRAM numeric 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 key on the keyboard (e.g. middle A) and adjust the VOLUME and MASTER TUNE controls on the right side 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 enabled by hitting the A-440 switch. The LED indicator in the switch will light. To turn the A-440 tone off, hit the switch again.

1-3 PRESET SELECTION

Since the Prophet is shipped with a full complement of 120 factory programs it will be ready to play as soon as initial tuning is completed. At this point the Prophet automatically enters PRESET Mode, meaning that it is ready to patch the synthesizer voices according to a program stored in the Prophet's microcomputer memory.

The 120 programs are organized as three 40-program files. Only one file can be active in the PROGRAMMER at a time. Each 40-program file is in turn arranged as five banks of eight programs each. The BANK SELECT switch steps through the file's five banks in order, and the eight PROGRAM SELECT switches (numbered 1 through 8) allow immediate selection of a particular program within a bank.

When the Prophet first "comes-up," Program File 1 is active. To choose one of these 40 programs, step through the banks until you reach the desired BANK then press the PROGRAM SELECT switch for the program you wish. The selected bank will be indicated by the numeric display, and the selected program will be indicated both by the numeric display and by an LED embedded in the PROGRAM SELECT switches.

To select Program Files 2 or 3, hold the BANK switch and press PROGRAM SELECT 2 or 3. This will bring a fresh set of 40 programs to the PROGRAMMER. The file number is indicated on the numeric display with decimal points: no decimal point indicates File 1; a decimal point after the BANK digit indicates File 2; a decimal point after the PROGRAM digit indicates File 3. (To return to File 1, hold BANK and press PROGRAM SELECT 1.)

All factory programs in the three files are charted in Section 8. Also included are specific patch diagrams and comments for Program File 1. The three program files are also recorded on the included cassette. Use of the cassette interface for program storage is discussed in Section 4.

The Prophet can also be operated in MANUAL Mode (PRESET off), with the knobs and switches functioning as described in Section 2.

1-4 PITCH AND MOD WHEELS

The PITCH and modulation (MOD) wheels 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 of all voices may be varied up or down by about a 5th.

The MOD wheel determines the amount of modulation 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 within Program File 1, see the notes accompanying each patch diagram in Section 8.

1-5 RELEASE FOOTSWITCH

In PRESET Mode, if the RELEASE switch is programmed to be off, but the program also contains an amplifier envelope release setting which can have an audible effect, this release can be engaged either by switching RELEASE on, or by using the included footswitch (which connects to the RELEASE FOOTSWITCH jack on the back panel).

The footswitch will function like the RELEASE switch on the front panel, except it only operates when the RELEASE switch is (programmed) off. The footswitch then takes the place of the RELEASE switch. When pushed, the programmed amplifier release cycle is enabled. When not pushed, the amplifier release cycle is set to minimum. In this respect, the footswitch functions similarly to a piano's sustain pedal.

Further expressive influences on the Prophet's programs can be brought about through the use of other accessories which connect to the Prophet's back panel. For information on these possibilities, see Section 3.

1-6 RETUNING

Although the microcomputer tunes the oscillators when the Prophet is first turned on, it will occasionally be necessary to retune, particularly during the first few 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. During this process the control panel goes dark--except for the TUNE switch--for two to eight seconds (depending on how far out of tune the oscillators were), then will return to the previous front panel status.

1-7 VOICE ASSIGNMENT

The microcomputer assigns the five synthesizer voices to keys played on the keyboard. If the same key is struck repeatedly, the microcomputer assigns the same voice. If more than five 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 normally operates on a "last-note priority" system: each new note played is assigned to the earliest-used voice.

There is an exception to this system. If the UNISON switch is on, all five voices are assigned to a single key. In keeping with conventions established by monophonic synthesizers, UNISON assigns priority to the lowest key held.

1-8 VOICE DEFEAT

For the occasion when a voice may become unplayable due to component failure, a Voice Defeat allows you to delete the failed voice from the assignment system. The Prophet can then be played normally, with the remaining voices.

To defeat a voice, hold the key it is currently assigned to with one hand while holding PROGRAM SELECT 1 and pressing PROGRAM SELECT 8. The voice will be defeated and will remain defeated until the Prophet's power is switched off. (When power is switched back on, the voice will not be defeated.)

1-9 EDITING AND RECORDING PROGRAMS

NOTE: The following directions are to simply get you started. More information on editing and recording programs is in paragraph 2-1.

While any program is selected, you can experiment with changes to it by toggling the switches and adjusting the knobs. This is "editing." Once you move a knob, it becomes "active," showing its actual setting on the panel. (Unmoved knobs do not necessarily show their actual setting in the current program.) The original program remains unchanged, and can always be recalled by just hitting its PROGRAM SELECT switch.

In general, to record an edited program, the RECORD switch is pressed on, then the desired destination BANK and PROGRAM location are selected.

NOTE: To protect the program memory from accidental erasure, RECORD Mode can only be entered if the back panel RECORD ENABLE/DISABLE switch is up (ENABLE). The switch should probably be left in the DISABLE position until the modes of operation and control functions are well understood. This will ensure against accidental erasure of the original factory programs. However, remember that accidental erasure is not a disaster, since the factory programs can be re-programmed into the Prophet at any time through the cassette interface, as explained in Section 4.

The exact program-RECORD procedure is as follows:

1. Check that the back panel RECORD ENABLE/DISABLE switch is set to the ENABLE (up) position.

2. Switch on the orange RECORD switch in the PROGRAMMER section. It will light.

3. Select the desired destination program file (1, 2, or 3), using the BANK and PROGRAM SELECT switches. (Ignore this step if the current file is desired.)

4. Select the desired bank using the BANK SELECT. (Ignore this step if current BANK is desired.)

5. At this point you can exit RECORD Mode by switching the RECORD switch off. The memory will not be affected.

6. Otherwise, press any PROGRAM SELECT and the program will be recorded at the corresponding number in the selected bank. NOTE: Be sure to hit the correct PROGRAM SELECT switch or you may erase a program you wanted to keep.

7. When a PROGRAM SELECT switch has been hit, the RECORD LED will go off and the Prophet will return to the mode it was in before recording.

8. After recording a program, it is always a good idea to check that the program is correctly recorded in the desired location by pressing the PROGRAM SELECT again.

SECTION 2

FRONT PANEL

2-0 INTRODUCTION

This section explains the modes of operation and functions of the controls comprising the "modules" (for example, OSCILLATOR, FILTER, AMPLIFIER, and LFO) outlined on the front panel. The alternatives of each switch and ranges of each knob are described relative to the overall signal flow of the voices and to the modulation circuitry.

Section 1 introduced basic PRESET operation with the factory programs accessible through the PROGRAMMER. It is true that the Prophet can be used exclusively in PRESET Mode, in which case the voice and modulation controls would not be used very often. However, using the instrument solely in this way defeats a large part of its overall purpose, which is to allow keyboard synthesists to create and record sounds appropriate to their own music. The creation of satisfying custom programs depends entirely on familiarity with the controls described below.

By the way, in describing the front panel, this section will not attempt to comprehensively explain synthesis technique. However, by referring to the patch diagrams in Section 8 while playing through the factory programs, you will soon grasp some of the sonic possibilities the Prophet makes available. To gain familiarity with the voice and modulation controls, we encourage you to edit the factory programs. Programs 5-7 and 5-8 (in File 1) are specifically included for editing practice--please see the notes accompanying these programs in Section 8.

For more information on synthesis technique, refer to the books and magazines listed in Section 7.

2-1 MODES OF OPERATION

The Edit feature of PRESET Mode is a powerful tool that allows you to experiment with program changes by selectively adjusting the front panel controls. The original program remains unchanged and can be restored at any time by simply hitting its PROGRAM SELECT again.

In addition to PRESET, the Prophet has MANUAL and RECORD Modes of operation. In MANUAL Mode a patch can be formed entirely "from scratch." RECORD is a momentary mode for storing or relocating programs. A "patch" becomes a "program" when recorded. Custom programs can therefore be created in two ways: 1) by recording manually-formed patches or 2) recording edited programs. Edited programs can be recorded into the original location if the original program is not desired, or in a new location.

The front panel controls are color-coded to clarify the modes of operation and the function of the computer's memory. All black knobs and switches are programmable: that is, their settings can be recorded into memory and recalled in PRESET Mode.

The silver knobs (MASTER TUNE and VOLUME) and grey switches (PROGRAMMER, TUNE, A-440, SAVE TO TAPE and LOAD FROM TAPE) are not programmable. The PITCH and MOD wheels are also not programmable. (The RECORD switch is orange so it can easily be distinguished.)

All of the switches except BANK SELECT have LED indicators embedded in them. And, except for the eight PROGRAM SELECTs, SAVE TO TAPE, LOAD FROM TAPE and TUNE, all LED switches are alternate action: one push turns them on, the next push turns them off. For example, the PRESET switch LED when lit indicates PRESET Mode. When the Prophet is switched to MANUAL Mode by pushing the (lit) PRESET switch, the LED goes off.

In MANUAL Mode the control panel always indicates the status of the patch under construction. You can see exactly what signal paths are closed by (lit) switches. The knob settings reflect their actual values. Note that in PRESET Mode as you select different programs, the switch LEDs indicate how the switches are programmed. But there is no way for the knobs to move themselves--they just stay where they were last set. So, in PRESET Mode the knobs do not normally indicate their "current" setting. However as soon as you move a knob to EDIT a program, that knob converts to MANUAL operation. So only the knobs you move will actually indicate their current setting: the parameters controlled by unmoved knobs do not change.

For example, suppose you like program 3-3 but want to change OSC A pitch and prefer a brighter tone. In PRESET Mode, select BANK 3-PROGRAM 3, adjust OSC A FREQUENCY to the desired pitch and increase the FILTER CUTOFF to the desired brightness. You can cancel any changes and return to the original program by hitting PROGRAM SELECT 3. If you want to permanently program location 3-3 to your edited version, record it in 3-3. Or, if both the original and the edited version are wanted, record the edited program in a new location (that is, a location with an undesired program).

For a further discussion of recording and relocating programs, see the notes following programs 5-7 and 5-8, in Section 8.

2-2 VOICE SIGNAL FLOW

The Prophet's audio output results from several stages of signal generation, combination, and modification. The front panel is divided into VOICE and MODULATION sections. MODULATION controls are covered in paragraph 2-9. It should be kept in mind that while only one voice is depicted on the panel, the voice controls patch five voices in parallel. Figure 2-0 diagrams signal flow in a single voice. Basically, the MIXER sets OSCILLATOR (VCO) A, B, and NOISE levels sent to the FILTER (VCF) and AMPLIFIER (VCA) where, roughly speaking, the timbre and dynamics are shaped. Finally the voices are combined and the overall level set by the VOLUME control.

Each voice module is detailed in paragraphs 2-3 through 2-7.

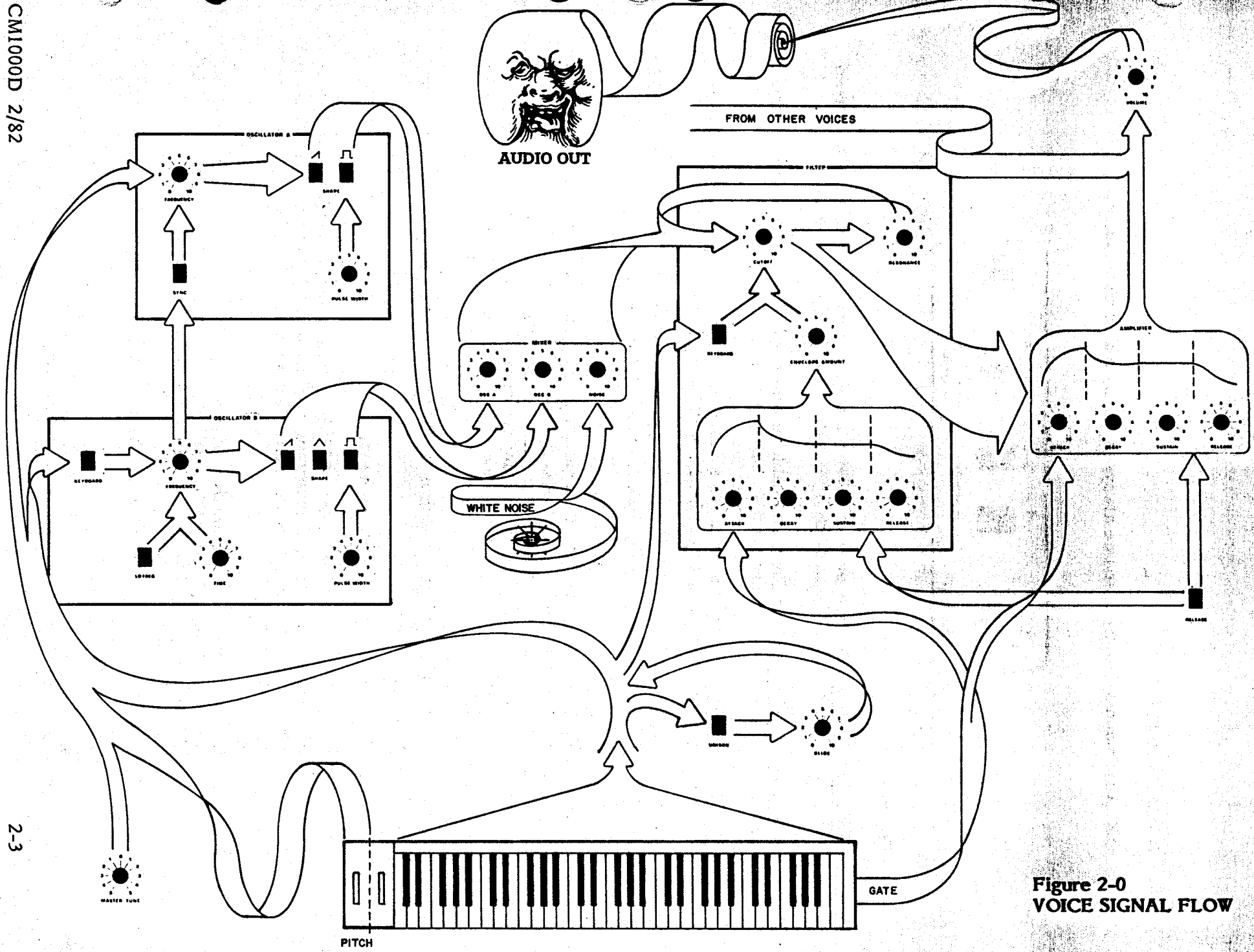

Figure 2-0
VOICE SIGNAL FLOW

2-3 OSCILLATOR A

OSC A is an audio-frequency source always under control of the keyboard.

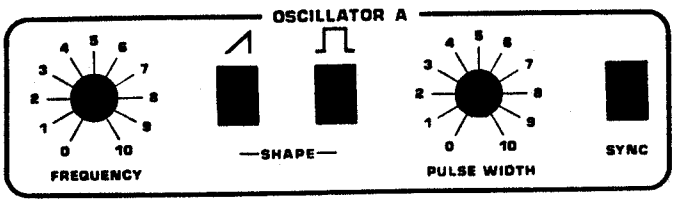

Figure 2-1

FREQUENCY knob: Controls pitch (oscillator tuning). Stepped (quantized) in semitones over a four-octave range. Exact pitch is set with the MASTER TUNE knob.

SAWTOOTH SHAPE switch: When on, enables a full-level sawtooth wave containing all harmonics. This unmodified shape is often described as "brassy."

PULSE SHAPE switch: When on, enables a full-level rectangular wave whose harmonic content depends on the setting of the PULSE WIDTH knob.

If neither SHAPE switch is on, OSC A will have no output to the mixer. If both SHAPE switches are on, the sawtooth and pulse are mixed at full level and supplied as OSC A's output to the mixer.

PULSE WIDTH knob: Adjusts the harmonic content of the pulse wave by setting its duty cycle from approximately 1 to 99%. A 50% duty-cycle pulse (having only odd harmonics), also called a square wave, can be obtained by setting the knob to approximately 5, then carefully adjusting for the dropout of the second harmonic (the first octave overtone). Of course this knob is only effective if the PULSE SHAPE switch is on.

At the extreme knob settings the pulses may "thin out" until they degenerate to dc, resulting in no output signal.

This knob has no effect on the sawtooth wave.

SYNC switch: Forces OSC A to follow OSC B in "hard" synchronization, so it will therefore tune only to harmonic frequencies of OSC B. Intermediate FREQUENCY knob settings will produce unusual wave shapes (and therefore unusual timbres) at the next lower harmonic of OSC B.

When a wide-width pulse is selected for OSC A in sync with OSC B, and OSC B's frequency is set much higher than OSC A, the signal from OSC A may degenerate to dc since the pulse is not given a chance to discharge before being resynced.

To gain an understanding of SYNC effects, check programs 1-4, 1-7, 2-7, 3-2, 4-2, and 4-5 in Program File 1.

2-4 OSCILLATOR B

OSC B is similar to OSC A, except that in addition to being a keyboard-controlled audio-frequency source it can also be a low-frequency modulation source with or without keyboard control. The identically-named controls function as described under OSC A. In addition:

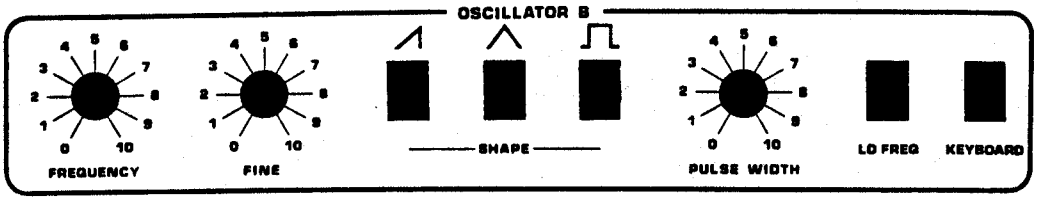

Figure 2-2

FINE knob: Continuously varies pitch over a semitone range, up from the basic pitch setting of the FREQUENCY knob. This is useful for detuning OSC B relative to OSC A. When no detuning is desired, the FINE knob should be set to 0.

TRIANGLE switch: Enables full-level triangle wave, containing little harmonic energy.

So as to not offset modulation destinations, this output is centered about ground.

NOTE: When no waveshapes are switched on, OSC B provides no output. However, if OSC A SYNC is on, the overall pitch range of the program may still be determined by the OSC B FREQUENCY knob setting.

LO FREQ switch: Converts OSC B's function to a low-frequency oscillator (LFO), with a range of approximately 0.4 Hz (or, 1 cycle every 2.5 seconds) to 30 Hz. This function is usually used in conjuntion with the POLY-MOD section (see paragraph 2-9).

KEYBOARD switch: When on, OSC B frequency is controlled by the keyboard. When off, OSC B frequency will be independent of the keyboard.

When OSC B is used as an audio source, usually LO FREQ is switched off and KEYBOARD is switched on. (For some exceptions to this rule, check some of the programs in bank 5 of Program File 1.)

If the LO FREQ and KEYBOARD switches are off, OSC B will act as a drone in the audio range. Set the pitch of this drone with the OSC B FREQUENCY knob after the KEYBOARD switch is switched off. Otherwise you may have to retune.

2-5 MIXER

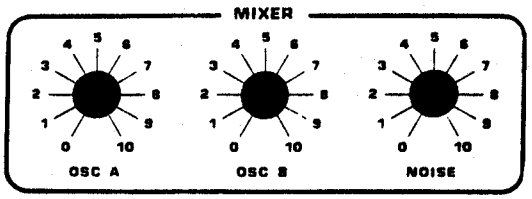

Figure 2-3

OSC A and OSC B knobs: Adjust the level of oscillator input to the filter.

NOISE knob: Adjusts the white noise level input to the filter. Noise is an unpitched combination of all frequencies useful for such sounds as drums, cymbals, surf, or rain.

These MIXER knobs are also used to set overall volume of the patch so when switching between PRESET programs, one program won't be wildly different in volume from another.

2-6 FILTER

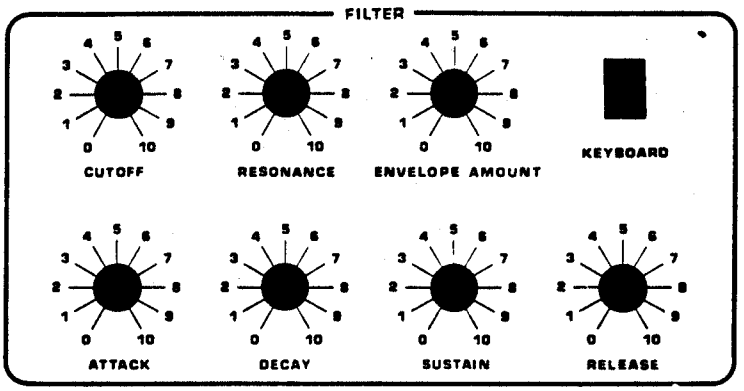

Figure 2-4

The FILTER module contains controls for the filter itself and for its envelope generator.

CUTOFF knob: This adjusts cutoff frequency of the 24 dB/octave (4-pole) low-pass filter. It is rather like a tone control. "Cutoff" is the frequency below which all elements of the mixer's output signal are let through. The higher-frequency components of the input signal (i.e. all those above the cutoff frequency) are suppressed. The higher the knob setting, the higher the frequencies are which pass through the filter. Thus, the "brighter" the sound.

RESONANCE knob: Adjusts the amount of filter resonance. As the setting is increased from 0 to approximately 7 the amount of resonance ("emphasis," "regeneration," or "Q") applied to those signal components at the cutoff frequency will increase. As resonance increases, frequencies lower than the cutoff will become decreasingly audible in comparison with those nearer the cutoff. As the knob setting is increased beyond 7, the filter breaks into oscillation, acting like a sine-wave audio source whose pitch is determined by the cutoff frequency.

ENVELOPE AMOUNT knob: The filter cutoff may be contoured (shaped) electronically according to a voltage pattern provided by the envelope generator. The specific envelope is shaped by the ATTACK, DECAY, SUSTAIN, and RELEASE (ADSR) knobs. The ENVELOPE AMOUNT knob is an attenuator which sets the depth of the applied envelope. Creating the envelope itself with the ADSR knobs is discussed below.

KEYBOARD switch: When on, the KEYBOARD control voltage (CV) is applied to the filter's cutoff frequency just as it is normally applied to OSC A and optionally applied to OSC B. With the filter thus "tracking" the keyboard, its cuttoff frequency is maintained at a constant point relative to the notes being played. This results in a consistency of timbre over the whole keyboard range. When FILTER KEYBOARD is switched off, notes played higher on the keyboard will have more of their overtones suppressed than notes played lower. As a result, the higher notes will have a duller timbre.

If FILTER RESONANCE is set for self-oscillation (e. g. above 7), then switching FILTER KEYBOARD on will allow the filter to be played from the keyboard. Unless a complex effect is desired, the FILTER ENVELOPE AMOUNT knob will in this case normally be set to 0 (to maintain a steady response from voice to voice).

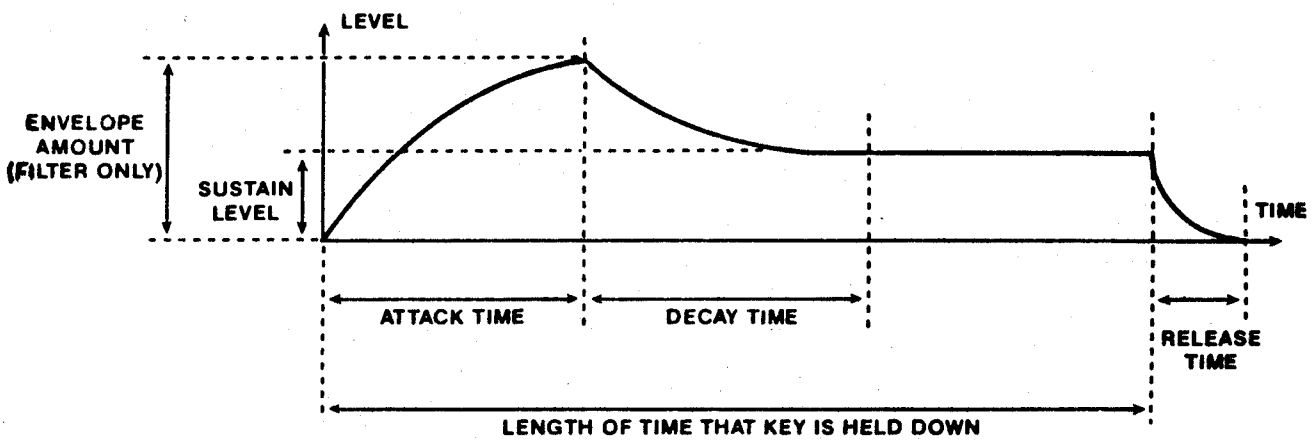

Figure 2-5
ENVELOPE

The filter envelope generator contours timbre by controlling the filter cutoff frequency. The contour pattern is initiated when a key is struck, producing a gate. The initial appearance of the gate "triggers" the envelope generator(s) to proceed through their attack and decay periods. After the attack and decay periods set for each envelope generator have elapsed, the generator will produce a steady control voltage (CV) at the level set by the SUSTAIN knob for as long as the GATE is present (indicating the key is held). When the key is released, the GATE goes off and the envelope generator output voltage drops to zero at a rate set by the RELEASE knob.

ATTACK knob: Adjusts the length of time for the envelope generator's output to go from zero level (when key is initially depressed) to maximum level.

DECAY knob: Adjusts the length of time for the envelope generator's output to go from maximum level to sustain level.

SUSTAIN knob: Adjusts the sustain level from zero to maximum. Remember, this is a level control, not a time control. (Sustain time is the period between the end of the DECAY period and the beginning of the RELEASE period. This is determined by touch.)

If SUSTAIN is set at maximum then the DECAY knob setting is irrelevant, because there is no level below maximum for the envelope to decay to.

RELEASE knob: Adjusts the length of time for the envelope generator's output to go from sustain level to zero.

If the key is released before the attack or decay periods have elapsed, the RELEASE knob controls the time taken for the output to drop to zero from whatever its level when the key was released.

If the attack and decay periods have elapsed and SUSTAIN is set to 0, then the RELEASE setting is irrelevant, because there is no level for the envelope to release from.

NOTE: The time range on the ATTACK, DECAY, and RELEASE knobs is approximately 1 millisecond (1/1000 second) to 30 seconds. Since the generators respond exponentially to their timing CV inputs, setting 5, for example, gives a period of approximately 1/2 second (rather than 15 seconds).

Remember that the FILTER ENVELOPE AMOUNT knob governs the depth of filter contour. So if ENVELOPE AMOUNT is set to 0, the envelope generator will have no effect on the filter.

2-7 AMPLIFIER

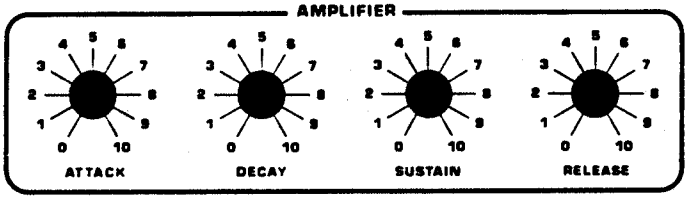

Figure 2-6

The ATTACK, DECAY, SUSTAIN, and RELEASE knobs in this module shape the envelope applied to the VCA in the same manner as the corresponding controls in the FILTER module.

Unless the SUSTAIN knob is somewhat advanced, nothing will be heard after the ATTACK and DECAY periods have elapsed.

2-8 MISCELLANEOUS

RELEASE switch: This was discussed in paragraph 1-5. When switched off, the filter and amplifier release times are programmed to a minimal setting so there will be no release but also no audible "whack" which would be caused by the instantaneous closing of the VCA. To allow operation of the release footswitch, the RELEASE switch must be off.

UNISON switch: When this switch is on, the Prophet-5 will assign all five voices to the lowest note played. The Prophet thus becomes a very "fat" monophonic synth. When the monophonic sequencer interface (see paragraph 3-3) is being used, four voices will be available for UNISON assignment.

GLIDE knob: Effective only when UNISON is on, the GLIDE module is a "lag processor" which can delay the rate at which the KEYBOARD CV (which controls the oscillators and filter) can change. When set to 0 the KEYBOARD CV instantly steps between notes. As the GLIDE knob is advanced, the CV does not step between the notes, but begins to "slew." This introduces "portamento" between notes.

2-9 MODULATION

A synthesizer's expressiveness stands on its modulation facilities. The term "modulation" refers to a periodic or consistent (as opposed to random) aural change which is interesting or musically useful. Modulation is created by electronic controllers when it is not possible to adjust a mechanical controller with the required speed or precision. Modulating devices therefore free the hands for playing the keyboard.

Modulation involves the signal-generating source and the modulated destination. The Prophet contains two distinct modulation systems: WHEEL-MOD and POLYphonic-MOD. The WHEEL-MOD system (see Figure 2-7) has two sources, LFO and pink noise, and five destinations: OSC A frequency and pulse-width, OSC B frequency and pulse-width, and filter frequency.

In the LFO module, the FREQUENCY knob adjusts LFO frequency from approximatley 0.04 Hz (or, 1 cycle every 25 seconds) to 20 Hz. The SHAPE switches select the full-level modulating waveforms. In the WHEEL-MOD module, the SOURCE MIX knob determines the relative amount of LFO or noise sent to the destination: 0 for all LFO as source and 10 for all noise as source. To the left of the keyboard, the MOD wheel itself determines the actual modulation level.

In addition to the WHEEL-MOD system, the Prophet's unique POLY-MOD system (see Figure 2-8) provides routings within each voice for two sources, the filter envelope generator or OSC B, to modulate three destinations: OSC A frequency, pulse width, or filter frequency. Although the routings are exactly the same for each voice, the minute but omnipresent differences between the voices (e. g. phase relationship of the oscillators) will create modulation effects that will be unique from voice to voice or note to note. This is in direct contrast to the effect of WHEEL-MOD, where one signal is applied equally to the voices, yielding the same effect from note to note. (There will be no POLY-MOD if the two SOURCE AMOUNT knobs are set to 0 or if the three destination switches are off.)

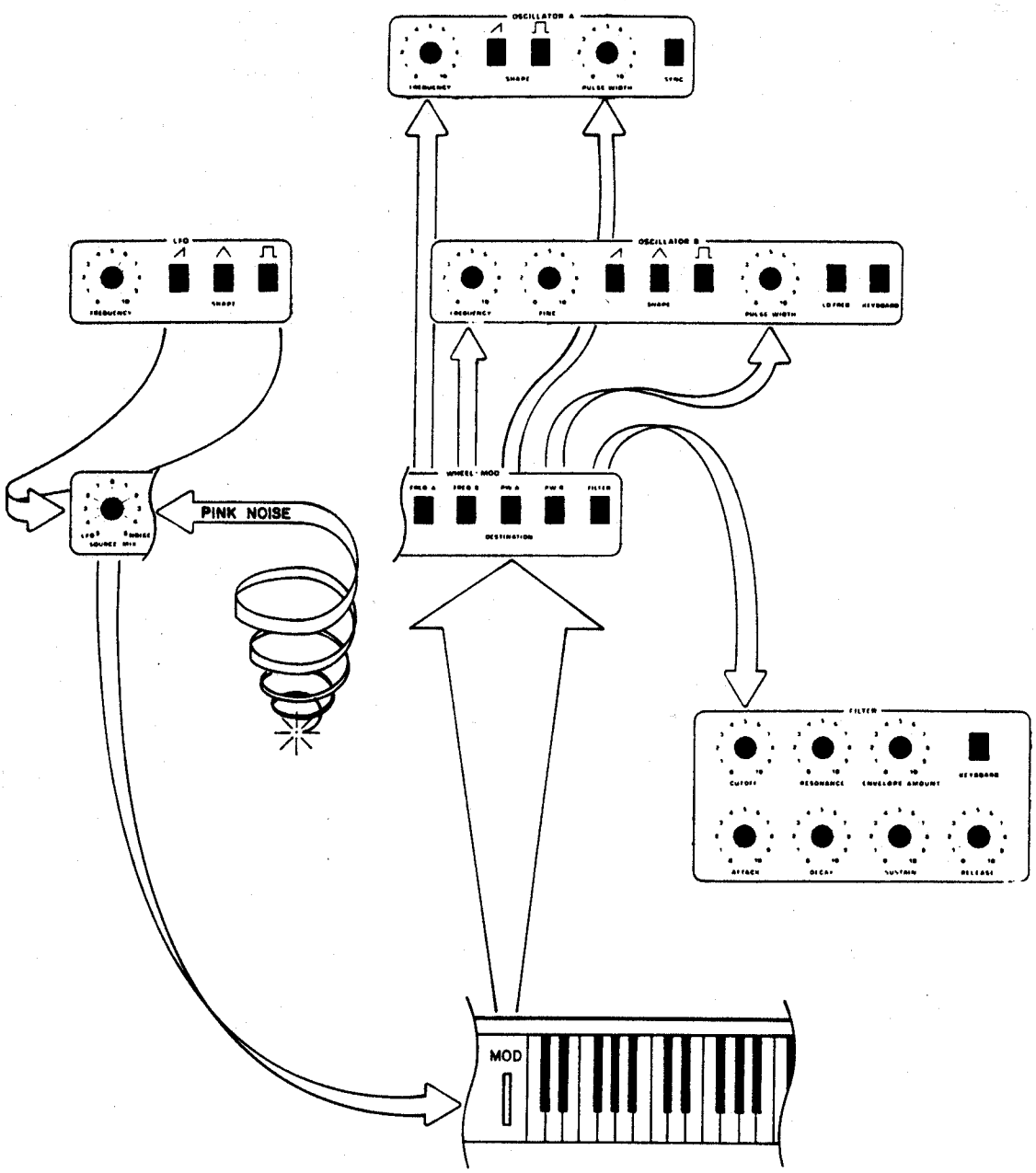

Figure 2-7
WHEEL-MOD

The OSC B LO FREQ and KEYBOARD switches are primarily for use when OSC B is operated as a POLY-MOD source. For independent LFO-type operation, LO FREQ will be on and KEYBOARD off. But consider also using OSC B with LO FREQ and KEYBOARD switches on. The rate of modulation within each voice will then increase as you play up from the keyboard. With LO FREQ off, OSC B (through POLY-MOD) will be useful for creating clangorous sounds such as bells, chimes, percussion, and "ring modulation" effects.

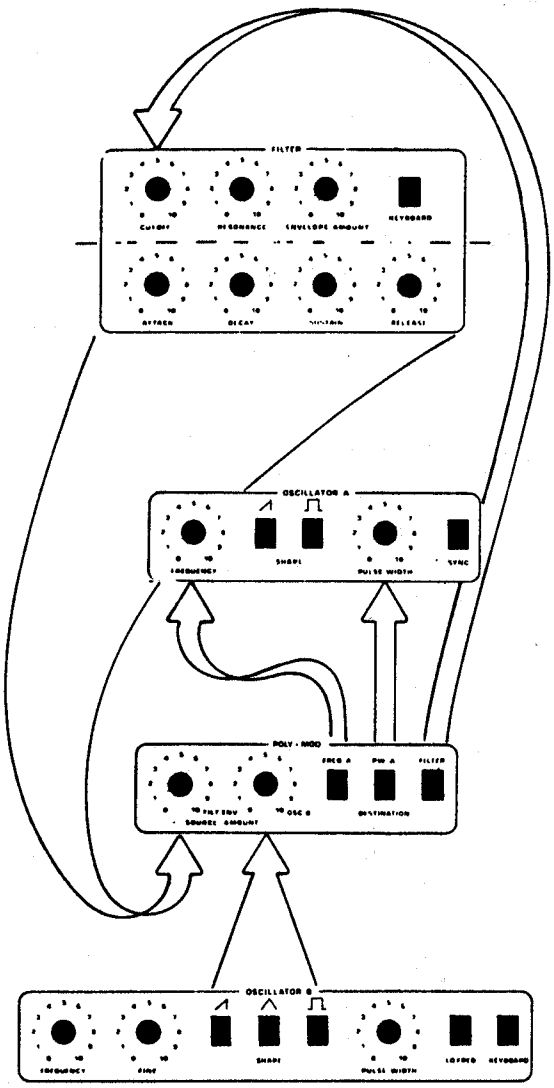

Figure 2-8
POLY-MOD

Using the filter envelope generator as a POLY-MOD source, various pitch and timbre sweeps can be obtained.

To familiarize yourself with the possibilities available through the WHEEL-MOD and POLY-MOD systems, study its use in the factory programs documented in Section 8.

SECTION 3

BACK PANEL

3-0 INTRODUCTION

To increase its performance versatility, various devices may be connected to the Prophet-5 through jacks on the back panel. The release footswitch was described in paragraph 1-5. The ANALOG and DIGITAL system interface connectors are specified below, but actual programming of the system interface is described in Section 6. Use of the CASSETTE jacks is discussed in Section 4.

3-1 AMPLIFIER CONTROL VOLTAGE IN

The AMPLIFIER input allows remote voltage control of overall volume. The voltage input can range to +10V, and the VOLUME control on the front panel is still effective. A voltage pedal (such as SCI Model 840) is the most common remote controller, but various other devices (such as a ribbon controller, an x/y joystick controller, or a sample-and-hold module) can be useful.

3-2 FILTER CONTROL VOLTAGE IN

The FILTER jack adds an input voltage (again, ranging to +10V) to the filter CUTOFF setting, thereby allowing external control of timbre, or "brightness". As above, a variety of controllers are suitable.

3-3 MONOPHONIC SEQUENCER INTERFACE

The four jacks labeled VOLTAGE IN, VOLTAGE OUT, GATE IN, and TRIGGER OUT allow the interfacing of a SCI Model 800 monophonic digital sequencer to the Prophet-5. When connected to a Model 800, the Prophet devotes its fifth voice to the sequencer: Voices 1, 2, 3, and 4 may be played "live" while the sequencer is controlling Voice 5. Figure 3-0 shows how the Model 800 should be connected to the Prophet-5.

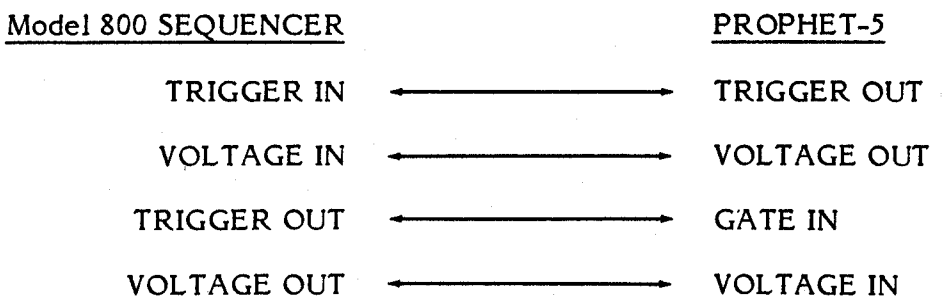

Figure 3-0
MONOPHONIC SEQUENCER INTERFACE

The Model 800 TRIGGER IN and VOLTAGE IN switches should be in the up (1) position. Its TRIGGER OUT switch should be in the center (2) position. When recording a sequence, the Prophet will send each note played (regardless of voice assignment), to the sequencer together with a gate. When playing back a sequence, the sequencer control voltage (CV) and trigger outputs control Voice 5.

The SEQUENCER INTERFACE jacks can also be used for other functions: the OUT jacks can be used to control 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 Voice 5. However, since VOLTAGE IN is "digitized" by the microcomputer to maintain tuning with the other four voices, the external controller will not be able to "glide." Also, the voltage will only be converted on a new gate edge. Both VOLTAGE jacks are exactly 1-volt-per-octave. The TRIGGER OUT is actually a +15V gate, and GATE IN can be any signal which switches through at least +3.5V.

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). The sequencer interface cannot operate if Voice 5 has been defeated (see paragraph 1-8).

3-4 ANALOG

The ANALOG jack, in effect, allows remote control of the PITCH and MOD wheels. It is specifically designed for use with the Model 1001 Remote Keyboard. If you are technically competent, you can make an appropriate analog controller from the following specifications. Otherwise, you can order the Analog Interface Adapter, SCI Model 842. This adapts the special ANALOG connector to two standard phone jacks for PITCH and MOD wheel control voltage (CV) inputs, usually provided by voltage pedals.

CAUTION: Since we have no idea what you will be connecting to the ANALOG and DIGITAL inputs, we cannot guarantee this interface will work with any custom device. You are completely responsible for any damage to the Prophet which may result from use with non-SCI products.

The connector is a 5-pin Switchcraft SL-17-5F, SCI #J-054. To mate, use SL-40-5M, SCI #P-054.

Pin 1, GROUND

Pin 3, +22V, unregulated, 50 mA
Pin 5, -22V, unregulated, 50 mA
These two supplies have current-limiting resistors, but are not protected against short circuits. Accessories should be fully tested with another power source before connecting to these supplies. **CAUTION:** The Prophet can be damaged if these supplies are tampered with. For best protection of the Prophet, it is best to avoid using these supplies.

Pin 4, PITCH WHEEL CONTROL VOLTAGE INPUT (P-WH CV IN)
This input raises or lowers the pitch of all five voices. The voltage applied should be nominally zero for the instrument to be tuned to A-440. Both positive and negative voltages can be applied. To prevent accidental detuning, the Prophet disables this input during its TUNE routine.

Pin 2, MODULATION WHEEL CONTROL VOLTAGE INPUT (M-WH CV IN)
This input ranges 0 - +10V, with maximum modulation being applied at +10V. Do not apply a negative voltage to this input.

3-5 DIGITAL

NOTE: For information on programming this interface, see Section 6.

The DIGITAL jack on the back panel allows bidirectional data communication at up to 625 kilobaud. The connector is a 4-pin Switchcraft SL-17-4F, SCI #J-053. To mate, use SL-40-4M, SCI #P-053. The interface uses 5-V TTL levels.

CAUTION: This is not an RS-232 interface. RS-232 voltage levels (+/- 12 or +/-15V) will most likely blow the two input gates. Furthermore, most RS-232 interfaces lack the speed required for transparent sequencer-Prophet communications.

Pin 1, GROUND

Pin 2, CLOCK TO SYNTH
This input sees pin 2 of a 74LS08, with a 10K pull-up to +5V. Maximum frequency: 625 kHz. Minimum clock frequency for "transparent" real-time sequencer operation depends on exact operations involved. Slower speeds will generally degrade performance by causing the Prophet to wait too long for the sequencer to complete multi-byte data transfers. 50 kHz is probably as slow as anyone is likely to find useful.

Pin 3, DATA TO SYNTH
This input sees pin 4 of a 74LS08, with a 10K pull-up to +5V. Data format is discussed below.

Pin 4, DATA FROM SYNTH
This is a MOS output direct from pin 19 of a Signetics 2661 USART. The driver Low output voltage (V_{OL}) is specified at 0.4V max. with a 2.2 mA output current (I_{OL}). The driver High output voltage (V_{OH}) is 2.4V min., specified at -400 uA (I_{OH}).

Digital Cable Specifications
The cabling used depends on the distance desired between units, and upon the noise present in the system environment. Using individual coaxial cables for the two data and clock lines will work best. It is likely you could have trouble-free operation at 20-ft or longer. Three-conductor coax will probably work up to 10 ft. At the opposite extreme, individual wires can be used for the two to five-foot range. The clock speed influences cable performance, since data transferred at higher speeds encounters more reactance (hence, degradation) in the cable.

SECTION 4

CASSETTE INTERFACE

4-0 INTRODUCTION

The Prophet-5 cassette interface enables the permanent storage of any 40-program file, or any eight-program bank, on common audio tape. This allows you to retain an unlimited number of Prophet programs, and provides program protection (backup) from component failure or damage. Also, you can immediately personalize another Prophet for your own use, since reprogramming takes less than a minute. The three 40-program files which constitute the factory programs are included on cassette with each Prophet-5.

Naturally, the Program File which is saved to or loaded from tape will be the current Program File as indicated by the decimals in the numeric display. That is, if you are in Program File 2 when doing the SAVE, file 2 will be saved. By the same token, loaded programs will occupy the Program File selected as the LOAD is executed.

Since individual banks can be saved and loaded into any bank location, it is simple, for example, to create a new 40-program file from as many as five separate bank files. This would be done by first loading each complete file into the Prophet and separately saving the desired banks. Then the five individual bank files would be loaded into the Prophet. Finally, this group would be stored as a complete 40-program file.

4-1 FUNCTION

The general function of the interface is as follows. First, the Prophet's back panel RECORD switch is set to DISABLE, to protect the program memory contents. After a few switch operations (actual operation instructions are below) a series of "sync" pulses appears at the CASSETTE OUT jack on the Prophet back panel. The recorder is placed in record mode. After 20 seconds--allowing the tape leader time to pass and the tape speed to stabilize--programs are sent (written) to the recorder. This takes about 30 seconds. When done, an LED indicator blinks.

To insure that the data has been correctly recorded, the procedure includes a verification test. The recording is played back into the Prophet, where the computer checks for a byte-by-byte match with the contents of the program memory.

To reprogram the Prophet by loading a file or bank from tape, first the back panel record switch is set to ENABLE. The recorder plays back the data, which replaces the existing contents of the program memory. (If you were to monitor this tape, you would first hear a steady tone, which are the sync pulses, followed by erratic "bleeps"--the data itself). Loading concludes with a comparison of the new contents of the program memory with the recorded data.

4-2 RECORDER AND TAPE SELECTION

Virtually any portable cassette recorder will work satisfactorily with this interface. High-fidelity cassette decks will work, too. But since high-fidelity contributes little to the recording of digital data, an expensive component deck is not at all necessary.

In other words, you can try any recorder you may already own (including reel-to-reel) with the interface. But if you intend to acquire one for specific use with the Prophet, here are some features to look for in a monophonic, portable cassette recorder:

*AC-supply, included or available--to help regulate tape speed.

*MIC or LINE IN jack.

*EAR or MONITOR jack.

*adjustable output level in play.

*built-in speaker--for monitoring voice announcements and locating files.

*built-in microphone--handy for voice-announcing files.

*tape counter--for indexing multiple files on the same cassette.

The cassette interface verification system prevents accidental recording over a "dropout"--or any problem area--on the cassette tape. So, dropout-tested tape is not necessary. High-fidelity is also a secondary consideration with regard to tape selection. But once recorded, the data's permanence will depend on the durability of the tape emulsion and the reliability of the cassette mechanism. So while it is true that even the most exotic tape formulations may not be 100% dropout tested, we recommend the use of high-fidelity cassettes because they generally have better emulsions and mechanics. Besides being less likely to jam, "name" cassettes assembled with machine screws are preferred because they can be opened and repaired without destroying the cassette itself.

4-3 CONNECTIONS

1. Cable from CASSETTE OUT jack on Prophet back panel to recorder input, typically MIC or LINE IN.

2. Cable from recorder output, typically EARPHONE or MONITOR, to CASSETTE IN jack on Prophet back panel.

4-4 RECORD AND PLAYBACK LEVELS

Cassette interface data recording is quite different from typical audio practice, where the tape is rarely allowed to saturate. For recorders with VU meters, level should be at 0 dB or above. Recorders with single-LED peak detectors should be set so the LED stays lit. Record level is automatically adjusted in recorders with ALC. The reference for these adjustments is the 20-second sync signal preceding the data transfer.

The rule-of-thumb for playback level on portable recorders is about 75% of full volume. The interface is difficult to overdrive (but it can happen).

4-5 PRECAUTIONS

*Use an AC-supply with portable recorders. Use of (weak) batteries may cause tape speed variations outside of the interface's range.

*Don't copy tapes between recorders. Instead load the master into the Prophet and record the copy from the Prophet.

*If using a stereo deck, record on both channels simultaneously to preserve monophonic compatibility. (Otherwise, playback noise from an unrecorded channel could interfere with data loading).

*For protection from loss or damage, maintain a duplicate set of cassettes in a safe place.

4-6 SAVING TO TAPE

1. Check that the Prophet's back panel RECORD switch is is set to DISABLE.

2. Insert cassette into recorder and rewind to start of tape.

3. Check record and playback levels as discussed above.

4. Check also cable from CASSETTE OUT to recorder input.

5. If saving a bank only, select the bank before the one you want to record. For example, to record BANK 3, select BANK 2. To record BANK 1, select BANK 5.

6. Place recorder into record mode and wait 5 seconds for the tape leader to pass.

7. Hold the RECORD switch, and, if saving a bank only, press and hold also the BANK SELECT switch as well. The BANK display will now show the bank being saved. Then press the SAVE TO TAPE switch. The front panel will go dark, except the SAVE TO TAPE LED will remain lit.

8. When, after about 40 seconds, the grey LOAD FROM TAPE LED blinks, STOP the recorder.

Tape Verification

9. Rewind to start of tape.

10. Check cable from recorder output to CASSETTE IN jack. (If necessary, check playback level.)

11. Place recorder into play mode and wait 10 seconds for the tape leader to pass.

12. Press the (blinking) LOAD FROM TAPE switch.

13. The LOAD FROM TAPE LED will remain lit. When it goes out, stop the recorder. With tape verification completed, the Prophet enters its TUNE routine and will "come-up" with program 1-1 after a few seconds.

Error Detection

14. If the LOAD FROM TAPE LED instead blinks, an error has occurred. Try steps 9 through 13 again.

15. If step 14 fails, try from step 2 again. If there are repeated failures, try different record and playback levels or try a new cassette.

16. It is possible to store more than one file or bank on a cassette. Just be careful to leave plenty of time (1-2 minutes) between data recordings on the tape. You may wish to voice-announce each file, for example, "Prophet file number 4, containing...follows in ten seconds."

4-7 LOADING FROM TAPE

1. Check that the Prophet's back panel RECORD switch is ENABLED.

2. Insert cassette into recorder and rewind to start of tape.

3. Check playback level.

4. Check cable from recorder output to CASSETTE IN jack.

5. If loading a bank only, select the bank before the one you want to load.

6. Place recorder into play mode and wait 10 seconds for the tape leader to pass.

7. Hold the RECORD switch, and, if saving a bank only, press and hold also the BANK SELECT switch as well. Then press the LOAD FROM TAPE switch. The front panel will go dark, except the LOAD FROM TAPE LED will remain lit.

8. The Prophet front panel will go dark, except the LOAD FROM TAPE LED will be lit.

9. When, after about 40 seconds, the LED goes out, STOP the recorder.

Error Detection

10. If the LOAD FROM TAPE LED instead blinks, an error has occured. Try from step 2 again.

4-8 PROBLEMS

If recorders A and B have each been used satisfactorily by themselves, and tapes exchanged between them produce errors, the two recorders probably have quite different tape speeds. The same error could occur on one recorder operated at one time from batteries and another time from an AC-supply.

To isolate the problem, try cross-verification, as follows.

1. SAVE and verify a file to recorder A as in paragraph 4-6, steps 1-13.

2. Disconnect TO TAPE cable from recorder A's input.

3. Transfer FROM TAPE cable from recorder A to recorder B's output.

4. Transfer the cassette from recorder A to recorder B.

5. Perform paragraph 4-6 steps 2 through 7 again.

NOTE: Nothing is recorded with the TO TAPE cable disconnected. This step simply brings up the verification test again.

6. After 50 seconds, perform paragraph 4-6 steps 9-13 with recorder B.

7. If verification is successful, the cassette will be able to be used on both recorders.

8. If verification is not successful, the speed difference between the recorders probably exceeds the range of the interface.

5-0 INTRODUCTION

The predominance of equal temperament in keyboards is largely due to the impracticality of retuning the organ, harpsichord, or piano to accommodate changing key signatures. But the Prophet's unique variable Scale Mode allows programming alternatives to equal-tempered tuning. Scale Mode converts the twelve knobs in the middle row of the control panel (LFO FREQ, OSC B FREQ, OSC B FINE...AMP RELEASE) to pitch adjusters for the twelve chromatic notes (C, C#, D...B) so each note can be individually raised or lowered up to one-half semitone from its normal, equal-tempered pitch. The resulting intonation can be recorded as a Scale program. When playing, Scale programs can then be selected to maintain a high number of pure intervals (or impure intervals, if you prefer) in the music. Also, with the Model 1005 Polyphonic Sequencer, you can sequence temperament changes to accomodate harmonic key changes (or simply to create new sounds).

Scale programs are selected, recorded, and edited very much like normal Patch programs, either in Manual or Preset modes. Scale programs occupy memory locations --which therefore cannot be used for Patch programs--and are SAVED or LOADED with the Patch programs through the cassette interface. Scale Mode isn't hard to use: just keep in mind that you can only change Patch programs in Patch Mode, and you can only change Scale programs in Scale Mode. Therefore if you have entered Scale Mode and altered any intervals, then wish to return to Patch Mode with equal-temperament, you must first select an E-T Scale program while in Scale Mode before you return to Patch Mode.

A brief discussion of the subject of keyboard intonation precedes actual use instructions. The interested reader should consult the Books on Tuning listed in the bibliography (Section 7) for details concerning just intonation, mean-tone, Pythagorean and other scales.

5-1 KEYBOARD INTONATION

The problem of keyboard intonation results from the incompatibility of the original Pythagorean principle of pure pentatonic (five-tone) harmony with the later extension of the western scale to seven, then twelve tones.

For illustration, suppose A=220 and 440 Hz and it is desired to find the perfect ratio of higher to lower pitch in any whole-tone interval, based on larger, pure intervals such as the fifth. The fifth has a ratio of 3/2, so the fifth of A, E, will be 220 x 3/2 = 330 Hz. The fifth of E, B, will be 330 x 3/2 = 495 Hz. This establishes a whole-tone interval for B and A of the ratio 495/440 = 9/8. According to the twelve-note keyboard there are exactly six whole tones to the octave which, of course, has the ratio 2/1. But $(9/8)^6$=2.027/1: a ratio that would put the octave itself out of tune. This means that if there are to remain exactly six whole tones to the octave, at least one of them must have a smaller ratio than the "pure" ratio 9/8. This adjustment introduces unavoidable mistuning of all intervals (e.g., 3rds, 5ths, 7ths) which use the adjusted notes.

There are numerous ways to demonstrate this problem, but the essential result is that many more than twelve pitches are required in an octave for there to be pure or "just" intonation of all notes in all key signatures. So a keyboard with only twelve fixed pitches per octave must somehow always be out of tune.

Responses to this problem fall into two classes. First, one can tune the most important intervals in a key signature pure, relegating the inevitable mistunings to lesser-used tones. These "just intonations" allow the keyboard to be in good tune for one or two key signatures but in bad tune for the rest. This tends to confine the instrument to music of simple, predictable harmony.

The second response, equal temperament, equalizes the mistuning between all twelve notes so all key signatures are equally usable. This method allows unlimited modulation and transposition between the keys, as Bach celebrated in The Well-Tempered Clavier.

Although twelve-tone equal temperament has standardized keyboard tuning, it has enough disadvantages for interest in alternative schemes to have persisted. Equal temperament requires there exist no pure intervals (except octaves) anywhere on the keyboard. Besides being more or less always out of tune with itself, the keyboard creates problems in ensembles where vocalists, string-and wind-instrumentalists have finer control of their intonation. Equal-tempered thirds and sevenths have stimulated the greatest number of complaints among sensitive ears.

It cannot be denied there are musical advantages to just intonation, nor that equal temperament will remain the standard for keyboards. Programmable intonation allows the keyboardist to choose. Some will never use the feature. Others will find it a revelation.

The following instructions describe how to first create an equal-tempered Scale program, then how to edit it into other tunings, and how to quickly move between Patch and Scale Modes.

5-2 USE

To distinguish it from Scale Mode, the normal state of the Prophet--which you are already familiar with--is referred to here as Patch Mode. Each of the 40 memory locations in a file can hold either a Patch program or a Scale program: but not both. In Scale Mode the twelve knobs which control the LFO, OSC B and the two envelope generators are used as chromatic pitch adjusters. (Labels are included for more easily identifying the knob functions, as shown in Figure 5-0.) The programmed knob settings which produce specific sounds in Patch Mode will produce only arbitrary tunings in Scale Mode. Conversely, knob settings which establish precise intonation in Scale Mode will produce only "garbage" sounds in Patch Mode. For this reason, programs created in each mode must not be confused.

For switching between Scale and Patch Modes, the Prophet uses a switch combination: hold <u>any</u> PROGRAM SELECT, then press TUNE. Normally, one selects the currently-active program. Note that this action cancels any editing which may have been done. Therefore you must use a recorded (unedited) program, or be in MANUAL mode (in which case pressing <u>any</u> PROGRAM SELECT will switch the Prophet to Scale Mode). This switch-combination is used to switch in either direction between Patch and Scale Modes.

AFFIXING M-173 TUNING LABELS TO PROPHET-5:

NOTE: POSITION LABEL WITH KNOB SET AT "5"

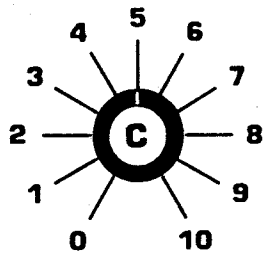

Figure 5-0
SCALE MODE KNOBS

Pressed by itself, the TUNE switch works identically in Scale Mode as it does in Patch mode. In fact, frequent tuning is recommended when developing Scale Mode programs.

The Prophet is always equal-tempered when power is first turned on. In general, one selects a program in Patch Mode then selects Scale Mode and adjusts the intonation. The resulting intonation(s) can be recorded and edited or not. Switching between Scale programs allows the Patch Mode program to be played in various intonations. Whatever intonation is in effect when Scale Mode is exited determines the intonation of all Patch Mode programs.

You can enter Scale Mode while any of the three 40-program files are selected. However, due to Scale Mode software idiosyncracies, the numeric display does not indicate the selection of Program Files 2 and 3 with decimal points. Program files can only be selected in Patch Mode: you can't switch files in Scale Mode.

NOTE: The back panel RECORD ENABLE/DISABLE switch must be up (ENABLE) to record Scale programs. Also, since each Scale program you record will erase the Patch program previously in that location, you may want to first SAVE existing programs through the cassette interface.

Preparation

1. Switch power on (this is always a good start).

2. Allow a thorough warm-up, possibly several hours, depending on environment and the precision you desire.

3. Select a Patch Mode program to work with in tuning. The sound should be free of frequency modulation and have enough harmonics to allow easy pitch discrimination.

4. Check the PITCH wheel and set MOD to minimum.

5. With one hand, hold the PROGRAM SELECT of the selected Patch program and (with other hand) hit TUNE. Notice that the PROGRAM SELECT display inverts--the selected program is unlit (while all others are lit). This indicates Scale Mode. (If a Manual patch were to be used, PRESET would be OFF and any PROGRAM SELECT could be held while pressing the TUNE switch). When Scale Mode is entered PRESET will be off, location 1-1 will be displayed, and the instrument will be in equal temperament.

Recording Equal-Tempered Scale Program

Use of Scale Mode best begins by recording an equal-tempered (E-T) Scale program. This establishes a convenient basis from which to create other tunings or to quickly return the Prophet to standard tuning, before returning to Patch Mode.

6. Switch RECORD on (it lights).

7. Select the BANK in which the E-T Scale program is to be stored.

8. Press the PROGRAM SELECT for the E-T Scale program destination. The E-T Scale program is now recorded. (If you were to return to Patch Mode at this point and select this program, you would hear a useless program.)

Creating Alternative Temperments

In Scale Mode, alternative tunings are created by editing the E-T program similarly to the way that in Patch Mode, you can take one basic sound and edit it into a number of variations.

NOTE: Unlike Patch Mode, Scale Mode PRESET does not automatically come on when power is first switched on. Switch on PRESET the first time Scale Mode is entered after power-up (unless recording the E-T program, as in steps 6-8).

9. For best accuracy, press TUNE. (The TUNE routine works normally in Scale Mode, just as in Patch Mode.)

10. While playing on the keyboard, tune the intervals by adjusting the knobs shown on Figure 5-0. The center setting, 5, corresponds to the equal-tempered pitch. 0 and 10 correspond to approximately one-half semitone below and above it. This also works like Edit in Patch mode--the knobs don't show their "real" positions until you move them. If you prefer, intonation can be adjusted manually if you switch PRESET off. The tuning will then initially correspond to wherever the twelve knobs happen to be set. When tuning is concluded, the knob settings will represent the deviations from equal-tempered pitch by their difference from center "5".

11. We must leave the actual method of tuning to you. For example, a Pythagorean scale in the key of C could be established by leaving C at its equal-tempered pitch, then zero-beating G to C, D to G, A to D and so on.

Recording the Alternative Temperment Program

12. When you have set the desired tuning, switch RECORD on.

13. Select the BANK in which the alternative Scale program is to be stored.

14. Press the PROGRAM SELECT for the alternative Scale program destination. This Scale program is now recorded. (So this program location cannot be used in Patch Mode.)

15. Additional tunings can be created by selection and editing in the same manner. Of course, you can start by editing any Scale program, not just the E-T program.

Returning from Scale Mode to Patch Mode

16. With one hand hold the PROGRAM SELECT of the Scale Program which you want to maintain (which may be the E-T Scale program) and hit TUNE. The PROGRAM SELECTs return to normal indications, and all Patch Mode programs will have the new intonation.

If you somehow can't find your E-T program and want to get the Prophet back to normal quickly, just reset (switch power off then back on).

Normal Use

Once you have created a few Scale programs (and PRESET has been switched on in Scale Mode at least once), you can easily manipulate Patch and Scale programs as follows:

17. In Patch Mode, select the "sound" program. Without lifting your finger from its PROGRAM SELECT, hit TUNE to switch to Scale Mode.

18. In Scale Mode, select Scale program. Without lifting finger from its PROGRAM SELECT, hit TUNE to return to Patch Mode.

Moving Scale Programs Between Program Files

Since it is not possible to change Program Files in Scale Mode, the procedure for transferring Scale Programs between files is somewhat involved, but nevertheless can be useful:

19. In Patch Mode, select the Program File containg the Scale program to be moved.

20. Switch to Scale Mode, and select the Scale program (with PRESET on).

21. Switch back to Patch Mode.

22. Select the destination Program File.

23. Switch back to Scale Mode.

24. Switch RECORD on.

25. Select desired BANK and PROGRAM destination for the Scale program.

26. Verify that the Scale program is recorded as you intended.

5-3 REVISED SCALE MODE OPERATION

This version of the Prophet-5 has three enhanced Scale Mode operations.

The tuning range in the Scale Mode for each note has been increased to +1, -½ semitone (approximately +94 to -50 cents) from nominal equal-tempered center. Existing Scale Mode programs will still work with no modification. Each note now has two ranges: Range 1 is -50 to about +44 cents. Range 2 is 0 to about +94 cents. At power up, all notes are in Range 1. After going into Scale Mode, turning a pot all the way clockwise will cause it to automatically switch to Range 2. You will hear the jump in pitch. Turning the knob counter-clockwise again, you can dial the exact pitch you want, and turning it completely counter-clockwise will cause a switch back to Range 1. (You will notice a random LED will light on the front panel when a pot is in Range 1. This LED has no useful meaning and can be ignored.) Scale Mode programs can still be recorded as usual.

For those with Rev 3.3 machines (120 programs), a new feature has been added to allow more flexible operation in Scale Mode with the three files. A file can be independently selected in Scale Mode, so it is possible to have one file just for Scale Mode programs, and one for Patch programs. Additionally, moving Scale Mode programs between files is now much easier--it's the same as in Patch Mode. Just switch to Scale Mode and follow the same instructions as given for regular Patch Mode File operations. Saving or loading programs to tape (either sequencer or regular cassette) always references the file selected in Patch Mode.

It is now possible to switch both Patch and Scale Mode programs in a sequence. The sequencer now remembers whether you were in Patch or Scale Mode when a program change was recorded, and when playing back, the changes will be loaded accordingly, although the actual front panel mode does not change. For example, say you are in Patch Mode when playing back a sequence. Patch Mode changes will be displayed in the front panel, but Scale program changes will not--even though you can hear the tunings change. To produce such a sequence, you would probably want to edit Patch Mode programs in on a second pass after recording the notes, then go out of Edit, switch to Scale Mode and enter another Edit cycle to add the Scale Mode changes. (Note: After power on, remember to enter Scale Mode and switch PRESET on before running sequences with Scale Mode changes.)

SYSTEM INTERFACE PROGRAMMING

6-0 INTRODUCTION

The Prophet-5 system interface is specifically designed for the Model 1005 Polyphonic Sequencer, Model 1001 Remote Keyboard and other forthcoming accesories. The programming specifications below will enable experienced technicians and programmers to design their own sequencers and accessories. Many of the popular microcomputers can now be interfaced to the Prophet-5.

CAUTION: Since we have no idea what you will be connecting to the DIGITAL or ANALOG inputs, we cannot guarantee this interface will work with any custom device. You are completely responsible for any damage to the Prophet which may result from use with non-SCI products.

You should be most concerned with hardware connections. Interface hardware and signal specifications are given in paragraphs 3-4 and 3-5. Actually, you can't "hurt" the Prophet by faulty programming. The Prophet's operating system is in ROM and remains unaltered, no matter what codes are sent to the Prophet. At worst you will jumble or erase the Non Volatile (NV) Program RAM area which stores the current 40-program file. But the file is easily reloaded through the cassette interface.

All the information required to program the interface is below. But some will no doubt also wish to purchase the Prophet-5 Technical Manual (TM1000D.3), which may be ordered through the Customer Service Department.

This is a high-speed serial interface. The Prophet uses a SIGNETICS 2651 or 2661 Programmable Communications Interface, which is essentially a microcomputer-oriented USART (Universal Synchronous/Asynchronous Receiver-Transmitter). It can be clocked to 1 MHz. Not all USARTs will operate at the speeds required, so choose carefully. USARTs are probably the easiest to use, but other techniques are possible. A cleverly-programmed microprocessor could drive the interface directly, as could discrete logic.

6-1 DATA FORMAT

Both the DATA TO and DATA FROM SYNTH signals use the standard asynchronous serial format: start bit; eight data bits; parity (odd); stop bit. Start bit is low, data is positive, stop is high.

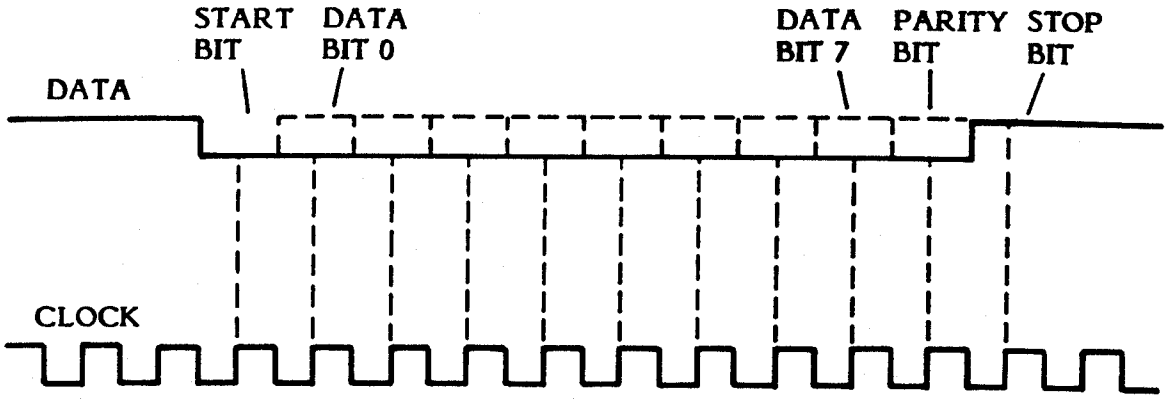

Figure 6-0
DATA FORMAT

At the speed this system normally operates, completely asynchronous operation is not possible. Therefore the external circuitry provides its own normally-high clock. Clock division is not used, so during data transmission a clock pulse must accompany each data bit. As shown, the Prophet receiver samples DATA TO on the rising edge of the clock. The clock should be free running, but the system will work if the clock toggles only during data transmission.

6-2 ERROR CHECKING

When it receives data, the Prophet receiver interrupts the CPU which examines a status register in the receiver. The status register indicates whether there are any errors. There are three possible types of errors: parity, framing, and overrun.

Odd parity works by counting the total number of the data bits and the parity bit (9 total) which are set. If one, three, five, or seven data bits are set (1), parity is already odd, therefore the parity bit is left reset (0). If zero, two, four, six, or eight data bits are set, the parity bit is set to make the set-bit total odd. The Prophet checks DATA TO for parity, and ignores any byte with a parity error. The Prophet sends the parity bit with DATA FROM. However, you may choose to ignore parity at your sequencer receiver.

A framing error results when the receiver doesn't find a stop bit at the end of the byte. In a standard asynchronous system this could be caused by a gross difference in transmit and receive clock frequencies. On this system the clocks are synchronous, so a framing error may only result from actual data loss or noise.

An overrun error results when data is being sent too fast for the Prophet receiver to process it, or, by not allowing enough time between bytes. So, this error results from transmitter timing problems with your interface.

6-3 STATUS BYTES

The Prophet-5 never volunteers DATA FROM, it only transmits when prompted by the sequencer. Communication is initiated by the sequencer transmitting "status" bytes which may or may not signify that data follows. For example, to change programs the sequencer first sends a byte to the Prophet saying that the next byte is the new program number. The Prophet will then wait for the new program byte, and change its program when the second byte is received.

There are 13 unique status bytes. A status byte is simply a unique hexadecimal (H) number. It is distinguished from other bytes merely by being the first which the sequencer transmits to the Prophet as part of any data transfer. The Prophet requires 0 - 1-1/2 milliseconds (worst case) to respond to the status byte interrupt. It will then be ready to receive or transmit data which is formatted and timed as specified below. Generally, while data can be transmitted with spaces of between 1 to 4 ms between bytes without causing errors, you will probably want to operate faster for the most transparent operation. Most of the Prophet's receiving operations are accompanied by a "time-out" which declares an error if data is not received within 4 ms. When any error is detected, the Prophet simply ignores the received data and resets to wait for another status byte. So if data arrives too late, or you accidentally send more data than needed, the Prophet may interpret the data as a status byte.

The Prophet will not accept status bytes during its TUNE routine. During TUNE, DATA FROM transmits a BREAK signal to tell the sequencer the Prophet isn't listening. The BREAK is simply a continuous low on DATA FROM. In other words, your receiver will see a start bit followed by no stop bit. The break can therefore be detected by counting at least two framing errors with zero as data received. (Provided that the receiver is being constantly clocked.) The BREAK can therefore be used to inhibit the sequencer.

6-4 STATUS 0: SEND KEYBOARD and BANK/PROGRAM BYTES

This status byte is used for the sequencer to record the Prophet's keyboard and "sound" program status. Code 01(H) on DATA TO interrupts the Prophet to read its keyboard. After a 0 - 2-ms (worst-case) delay to respond to the interrupt, the Prophet transmits eight bytes of keyboard information over DATA FROM. As mapped below, 61 of the 64 bits represent key status (three aren't used). 0 means the key is off ("up"), 1 means the key is on ("down"). As shown, the least-significant bit (LSB) of the first byte is the lowest C (CO).

	LSB							MSB
Byte 0	C0	C#0	D0	D#0	E0	F0	F#0	G0
Byte 1	G#0	A0	A#0	B0	C1	C#1	D1	D#1
Byte 2	E1	F1	F#1	G1	G#1	A1	A#1	B1
Byte 3	C2	C#2	D2	D#2	E2	F2	F#2	G2
Byte 4	G#2	A2	A#2	B2	C3	C#3	D3	D#3
Byte 5	E3	F3	F#3	G3	G#3	A3	A#3	B3
Byte 6	C4	C#4	D4	D#4	E4	F4	F#4	G4
Byte 7	G#4	A4	A#4	B4	C5	X	X	X

After sending the eight keyboard bytes, the Prophet sends a byte which contains the bank and program number. This byte's format is that the least significant three bits are the PROGRAM number; 0 corresponds to program number 1, 7 corresponds to program number 8. The next three bits are the BANK number; 0 is bank 1, 4 is bank 5. (The two most significant bits aren't used.)

These nine bytes follow close on one another. The delay between keyboard bytes 0 and 1 is 150 us. The time between the remaining eight bytes is a uniform 36.4 us. The sequencer receiver must be ready to receive this data with the required speed, or an overrun error will occur in the sequencer. Note that it is also a good idea to insert "time-outs" in your receiver software so your system is not hung-up waiting for bytes which it somehow may have missed.

You will have to format this data in RAM for your particular requirements. For example, since these bytes only tell the sequencer what keys are being held when it asks, in order to create timing information the sequencer will have to continually sample the Prophet's keyboard and compare to find out when keys go on or off.

6-5 STATUS 1: SEND ACK and RECEIVE KEYBOARD and BANK/PROGRAM BYTES

This status is used for the sequencer to play the Prophet's keyboard and select programs. When code 02(H) is received, the Prophet processes the interrupt (again, for up to 2-ms, worst-case). When it is ready to receive eight keyboard bytes and a program byte, it acknowledges the sequencer's request by sending the "ACK" code 36(H). The sequencer then transmits the keyboard and program bytes in the format discussed under STATUS 0.

For the most transparent operation, you will want a minimum of time between bytes transmitted to the Prophet. The faster the transfer, the truer the timing will be. Some specific timing figures may be of use. For example, the Prophet's scan time (for each program loop) is 6 ms, or 11 ms if controls are being used. This means there is a worst-case delay of 11 ms between a key being pressed and its being heard or recorded. This is not normally detectable in the Prophet. However, sequencing adds new timing concerns, since the Prophet waits for the transfer to be completed before continuing its loop. With a 625 kHz clock, 9 serially-formatted bytes will take only 158.4 us (1.6 us X 99 bits). But if they are spaced 1 ms apart, the whole transfer will about double the worst-case loop time. It is more reasonable to use the fastest clock possible, and allow up to 100 us between bytes. This will have a negligible effect on the Prophet's loop.

The Prophet is protected from being "hung-up" by extremely slow or missing data. Its time-out software declares an error and ignores the whole message if more than about 4 milliseconds elapses between bytes.

When the message is complete, the Prophet places this data into its "Scratchpad" RAM table, playing the notes as if they came from its own keyboard. Even while receiving from the external sequencer the Prophet's keyboard remains active and can be used normally (unless the sequencer TRANSPOSE function is enabled, see STATUS 2). Of course you still have a five-voice maximum. So if you, for example, play on the keyboard while the sequencer is playing, you may "steal" voices from the sequence.

If no program change is desired, you can either transmit the last program number, or the code FF(H) which the Prophet simply ignores. Except for the FF code, the Prophet will sense an error if either of the two MSBs of the program byte are set.

NOTE: Be sure the Prophet is switched to PRESET mode when you want to change programs. Also, when switching Scale programs, the Prophet must first be manually placed into Scale mode.

(Status B can be used for changing the program only. Status E can be used for receiving "short" keyboard data. See below.)

6-6 STATUS 2: TRANSPOSE ON

This status byte is used to enable the sequencer transpose function. Once the Prophet receives code 04(H), you can transpose the entire playback sequence over a four-octave range by just hitting a key between C0 and C4 on the Prophet. The transposition is equal to the interval between C2 and the key played. For example, to transpose down a fifth, hit F1. To transpose up a major seventh from the original key, hit B2. To transpose back to the original key, hit C2.

The Prophet keyboard will not function normally until it receives a STATUS 5, CLEAR TRANSPOSE.

6-7 STATUS 3: SAVE TO TAPE

This status byte is used to extract the contents of the current Non-Volatile Program RAM file from the Prophet, without using the independent CASSETTE interface. Since a file is organized as 40 24-byte programs, the file uses 960 of its 1024 (1K) assigned bytes. The least-significant seven bits of each byte represent a programmable potentiometer setting of 0-127 steps, while the MSB represents a switch setting (1=on, 0=off). The Prophet has another area of RAM called "Scratchpad" in which the current status of the machine is registered. When selecting a program in PRESET mode, a set of 24 bytes is transferred from NV RAM to the Scratchpad, with the "pot" bits filling the pot table and the switch bits being regrouped into the switch status table. Here is how the pot and switch bits are grouped in each NV program:

	Switch Bit (7)	Pot Bits (0-6)
Byte 0	OSC A PULSE	FILT ATK
Byte 1	OSC A SAW	FILT DEC
Byte 2	OSC A SYNC	FILT SUS
Byte 3	OSC B SAW	FILT REL
Byte 4	OSC B TRI	AMP ATK
Byte 5	OSC B PULSE	AMP DEC
Byte 6	OSC B KBD	AMP SUS
Byte 7	UNISON	AMP REL
Byte 8	POLY-MOD FREQ A	FILTER CUTOFF
Byte 9	POLY-MOD PW A	FILT ENV AMT
Byte 10	POLY-MOD FILT	MIX OSC B
Byte 11	LFO SAW	OSC B PW
Byte 12	LFO TRI	MIX OSC A
Byte 13	LFO SQUARE	OSC A PW

Byte 14	FILT KBD	MIX NOISE
Byte 15	RELEASE	FILT RESONANCE
Byte 16	W-MOD FREQ A	GLIDE
Byte 17	W-MOD FREQ B	LFO FREQ
Byte 18	W-MOD PW A	W-MOD SOURCE MIX
Byte 19	W-MOD PW B	P-MOD OSC B
Byte 20	W-MOD FILT	P-MOD FILT ENV
Byte 21	OSC B LO FREQ	OSC A FREQ
Byte 22	X	OSC B FREQ
Byte 23	X	OSC B FINE

For use with this interface, the Prophet maintains a pointer to NV RAM addresses which allows implied addressing of the file. The pointer initially indicates the first NV RAM address (0). Whenever the Prophet receives a code 08(H), it outputs the NV RAM byte currently being pointed to, then increments the pointer. Therefore to read all of the NV RAM file, the sequencer will have to supply exactly 1024 (960 program bytes + 64 unused bytes) STATUS 3 requests. This will leave the pointer reset at address 0. To access specific programs, send the number of STATUS 3's required to increment the pointer to the desired starting address, and simply ignore the intermediate data which the Prophet returns.

Any error detected by the Prophet's receiver resets the NV RAM pointer to address 0.

6-8 STATUS 4: LOAD FROM TAPE

This status byte is used to initiate a file loading of NV RAM. When the Prophet receives code 10(H), it sets itself to TAPE READ mode, in which it expects to receive exactly 2048 bytes. This will be the entire 40-program data block (+64 unused bytes) sent twice, without interruption. The first byte received will be placed in the NV location indicated by the pointer. The Prophet will not recognize status bytes again until all 2048 bytes have been received, or an error occurs. The error clears TAPE READ mode and resets the NV pointer address 0.

To load NV RAM, the Prophet's back panel RECORD switch must be ENABLED.

6-9 STATUS 5: CLEAR TRANSPOSE

Code 20(H) turns off the TRANSPOSE function enabled by Status 2. It also returns the sequence to its original key.

6-10 STATUS 6: INITIALIZE SEQ LOWER PROGRAM

This status byte 40(H) was inherited from the Prophet-10 but should not be sent to the Prophet-5.

6-11 STATUS 9: DISABLE TUNE

Code 09(H) is used to disable the Prophet's TUNE switch. An ideal application would be for the sequencer to disable TUNE before executing a LOAD FROM TAPE operation (STATUS 4). During TUNE, the Prophet disables its interrupts. Therefore if TUNE were to be activated while loading from tape, an overrun error would occur in the receiver.

6-12 STATUS A: ENABLE TUNE

Code 0A(H) reverses STATUS 9, to allow the Prophet to be tuned. This code doesn't start the TUNE routine (see 6-16, STATUS 80), it just enables you to hit the switch.

6-13 STATUS B: RECEIVE PROGRAM CHANGE

Code 0B(H) prepares the Prophet to change programs, without the Prophet sending an ACK as with STATUS 1. The program byte has the format described under STATUS 0, and should follow STATUS B after 2 milliseconds. If it arrives before 2 ms, an overrun error may occur. If it doesn't arrive within 4 ms, the Prophet will then expect to be receiving status bytes again.

6-14 STATUS C: SYSTEM CONNECT

This status byte is best used for initial testing of your system hardware. The Prophet responds to code 0C(H) by sending an AA(H). The sequencer thus learns that the Prophet is connected and listening.

6-15 STATUS E: RECEIVE SHORT KEYBOARD DATA

This status byte is similar to STATUS 1, except that the keyboard data is limited to seven bytes (56 notes), and there is no program byte. There is also no ACK. In short, the sequencer ideally sends code 0E(H), waits 2 ms, then sends seven bytes at 100-us intervals. There is a 4-ms timeout.

6-16 STATUS 80: START TUNE

Code 80(H) starts the Prophet's TUNE routine.

SECTION 7

SELECTED BIBLIOGRAPHY

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

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SECTION 8

FACTORY PROGRAMS

8-0 INTRODUCTION

The Prophet is shipped "ready-to-play," with 120 factory programs. As explained in paragraph 1-3, the programs are organized as three 40-program files, each file in turn consisting of five banks of eight programs each. Use of the PROGRAMMER switches to select programs was also discussed in paragraph 1-3. This section contains maps of the three Program Files, and front-panel patch diagrams for only the programs in File 1.

Go ahead and experiment with editing and recording programs. You can always restore the Prophet-5 to its original condition by loading the factory Program Files through the cassette interface (as explained in Section 4).

8-1 PROGRAM FILE 1

File 1 consists of the Prophet-5's original 40 sounds. While many of these sounds have become "classics," they are still only the beginning of what can be done with the instrument. We have included the front-panel diagrams for these programs to encourage you to familiarize yourself with the Prophet's capabilities. Knowing how these programs are set up will help you understand the process of programming in general, and it will definitely make it easier for you to begin adjusting, fine tuning, and altering (in other words, editing) the various preset programs to suit your particular musical needs and tastes.

Along with each diagram for this file you will find comments and notes by Tom Darter concerning various aspects of each program. These notes contain the following information: the use of the WHEEL-MOD section with each patch, including the optimum settings for the MOD wheel to create the effects that are programmed-in; 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 program; an explanation of potentially-active settings, such as the octave doubling in the Brass program 1-1, which can be engaged by adding a waveform from OSC B; an indication of control positions that can be adjusted to alter some aspect of the patch. This information is provided to help you edit the patch to suit your tastes.

Occasionally there is also some explanation of how some aspect of the patch works, such as the discussions included with programs 1-2, 1-4, and 1-6. These short discussions should help you understand why a particular patch is configured the way it is, and should also help you create your own sounds.

In general, the comments are more extensive for the patches in banks 1 and 2, since they are (for the most part) representative instrumental sounds, and are therefore more suitable for a discussion of editing, than are the sound-effect programs in banks 4 and 5. The comments are much more sketchy for these later banks since many of those programs 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 understand from a study of the front-panel settings themselves.

Programs 5-7 and 5-8 are duplicates of programs 1-1 and 1-6. As explained in the notes accompanying these programs, the "dupes" are specifically provided for experimentation with editing, and for practice shuttling programs between memory locations.

At this point we offer a special word of acknowledgement and thanks to John Bowen, who created most of the factory preset programs for the Prophet-5 in File 1.

8-2 PROGRAM FILES 2 AND 3

The 80 additional programs comprising Files 2 and 3 are mapped on sheets following the map for File 1. These programs provide more instrumental sounds, effects, and some imitation animals. There are no accompanying panel diagrams or comments for the programs, which were provided by Bob Styles, Kevin Kent, and Rick Davies.

FILE 1 PROGRAMS

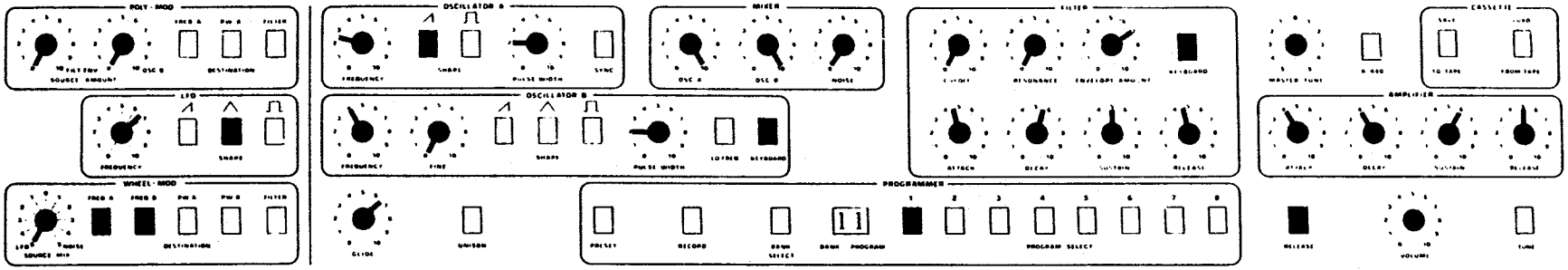
BANK	1	2	3	4	5	6	7	8
1	BRASS	LOW STRINGS (MOD:1/3)	MUTED CLAVINET	PERCUSSIVE ELECTRIC PIANO	FLUTES	HARPSI-CHORD	SYNC I	PERCUSSIVE ORGAN
2	UNISON GLIDE w/ RESONANCE	HARMO-NIUM	ORGAN w/ RES-ONANCE	TOY PIANO	TRUMPET/ FLUTE	FILTER MOD	REED ORGAN	BASS IN FIFTHS
3	PIPE ORGAN FLUTES	SYNC II	ELECTRIC PIANO I	HIGH STRINGS (MOD:1/3)	OCTAVE SAWTEETH	RELEASE REPEAT	DELAYED HARMONIC	ECHO-REPEAT
4	PULSE WIDTH MOD	SLOW SYNC SWEEP (MOD:½-full)	FOURTHS w/ RESONANCE (MOD ½-full)	SWEEPING HARMONICS (MOD:1/3)	SLOW SYNC	RANDOM ARPEG-GIATOR	SAWTOOTH ARPEG-GIATOR	CLANG-OROUS BELLS
5	ALIEN (MOD:½-full)	NOISE SWEEP	DECENDING BELLS	DESCENDING PULSE-WIDTH MOD	HELI-COPTER (MOD:1/3)	RESONANCE BELLS	DUPE 1-1	DUPE 1-6

FILE 2 PROGRAMS

BANK	1	2	3	4	5	6	7	8
1	PERCUSSIVE FLUTE w/ " DELAY	COMPING #42 (MOD:¼)	ENSEMBLE w/ RELEASE	CUTTING THROUGH	QUACK #9	CAMP ARGON	REEDY SOLO	SOLO SYNC #73
2	BASS GUITAR UNISON	SPITTING ORGAN	SLOW ORCHES-TRAL BRASS (MOD:1/3)	PULSE WIDTH ECHO	DEPT. STORE CLARINET	SLOW STRINGS	SOLO VIOLIN	HIGH VIOLINS
3	CLAV SLIGHTLY M''TED	ELECTRIC PIANO II	BARKING ORGAN	1960's ORGAN	JAZZ ORGAN	ROCK ORGAN	ANGELIC	FAT SOLO IN SYNC
4	PAINFUL SOLO	ELECTRO-CUTION	LAUNCHING SPACE-CRAFTS	DIGITAL INDIGES-TION	WHISTLE w/ GLISSANDO	RUBBER KNIFE	DIGITAL SOLO	BANSHEE JETS (MOD:full)
5	DESCEND-ING RESO-NANCES	CATS MEOW	BIRDS	DOG	WHISTLE (use wheels extensively)	ASCENDING BLEEPS	MORNING AFTER (MOD:full)	N.Y.C. (MOD:full)

FILE 3 PROGRAMS

BANK	1	2	3	4	5	6	7	8
1	MALLETED MARIMBA	TRUMPET w/SPIT	OBOE (MOD:1/8)	TROMBONES	PERCO-LATING GRUNGE (try MOD)	WURLIE ELECTRIC PIANO (MOD:1/8)	CHURCH ORGAN	SLOW BRASS (w/growl on MOD wheel)
2	TRIFFID ORGAN	PLUCKED HARP	ARCO VIOLIN	ARCO ENSEMBLE	HARPSI-CHORD	SLOW STRINGS	PLUCKING w/ BRASS ON VCF PEDAL	WATER ORGAN
3	PULSE WIDTH DELAY	DULCIMER ORGAN	BANJO	DU. KEG SOLO	SYNC COMP	FLUTES IN FIFTHS	SLIDE GUITAR (use PITCH wheel)	STEEL DRUMS
4	THE NUGE R&R GUITAR (MOD:1/8)	VIDEO GAMES	FINAL FRONTIER	THE LANDING	DEAD DROIDS	STEAM ENGINE	DETROIT SOLO (use wheels)	FORMULA II RACE CARS PASSING GRAND STANDS
5	SNARE	TOM-TOMS	TYMPANI	ELECTRIC DRUMS	BOMBS DROPPING (MOD:full)	GUNSHOTS	WIND	THUNDER (MOD:½ up)



1-1: Brass

OSC A: up 1 octave (basic pitch)
OSC B: 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 B is programmed off (no waveform selected); however, the mixer section is set to allow for its addition to the sound. If added, OSC B will provide an octave doubling, for a full ensemble effect. Use sawtooth wave to match tone color with OSC A; 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 A or B were switched to pulse wave).

NOTES:

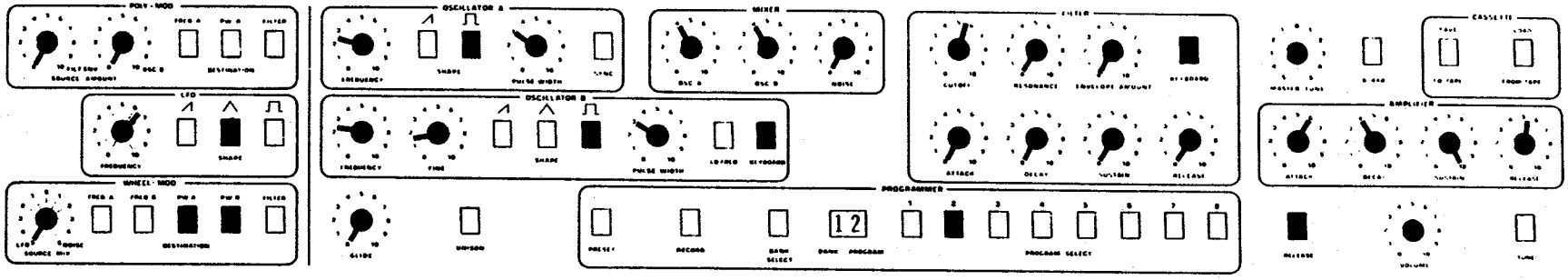
— Try routing mod to the FILTER instead of the oscillators; it gives a quasi-tremolo effect rather than a straight vibrato. Once again, the wheel should be moved up only slightly. Adjust vibrato or tremolo rate to suit your preference by adjusting the LFO FREQUENCY.

— 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 A and B.

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

— OSC B can be used in LO FREQ mode with the POLY-MOD section for either vibrato (route to OSC A) or tremolo (route to FILTER). Set the OSC B 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 A: up 1 octave
OSC B: 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 B, 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.

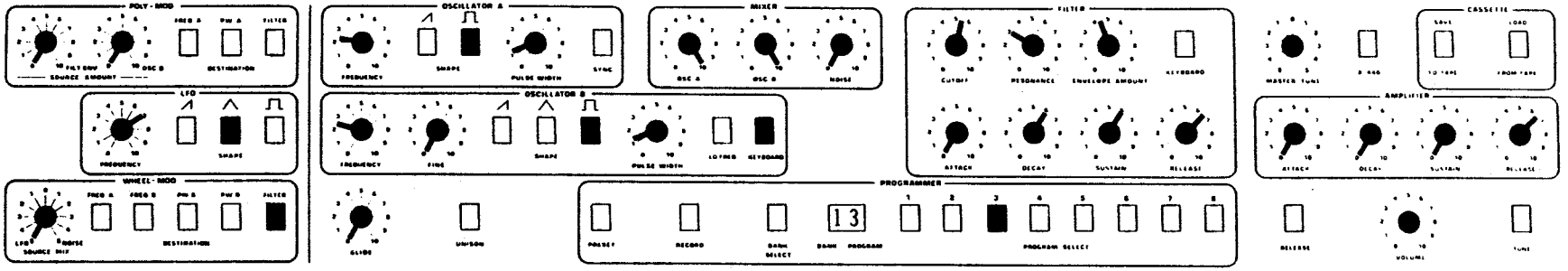
In general, the best string sound results when the keyboard is played in the bottom 3 octaves; adjust the filter CUTOFF to play consistently in the top 2 octaves.

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 A: up 1 octave
OSC B: 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:

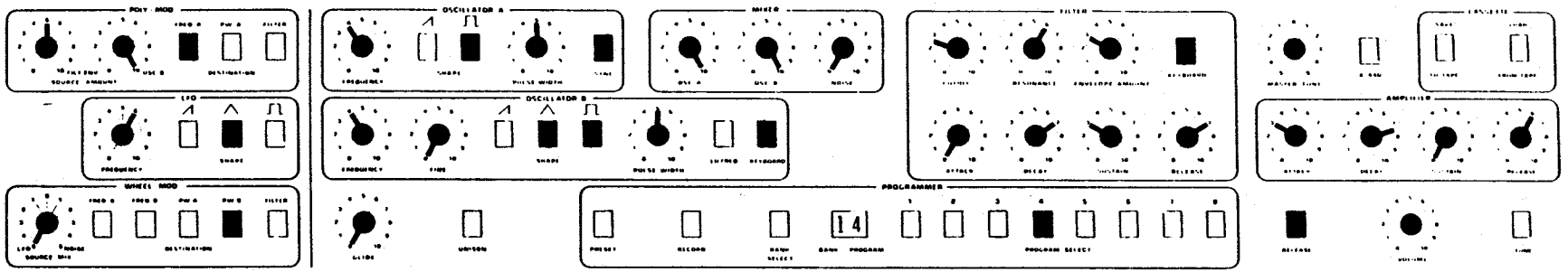
— Pulse-width on both oscillators is programmed at 1½. Adjust to a narrower pulse-width for a more nasal sound, or to a wider pulse-width for a thicker sound.

— 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 B 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 A: up 1 octave + a perfect 5th
OSC B: 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 A 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 B waveshapes and listen to OSC A by itself. Since the two oscillators are in SYNC, the effect of OSC B as a modulation source in the POLY-MOD section is minimal; if SYNC is switched off, OSC B 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.

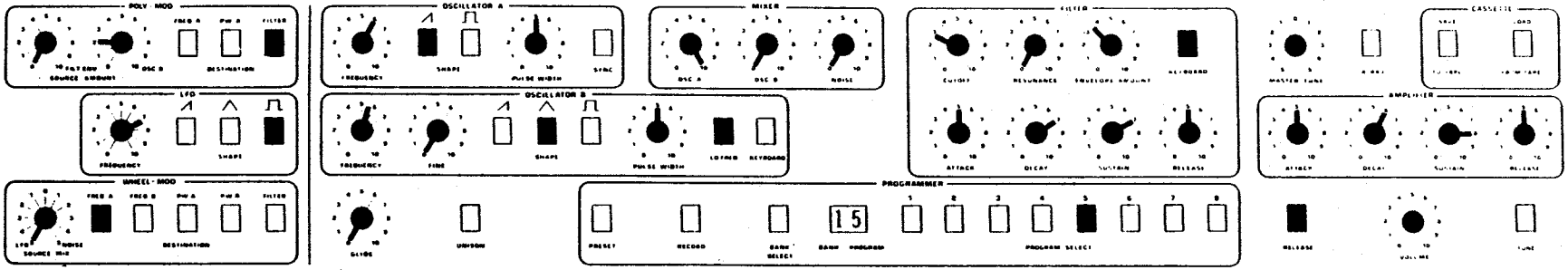
To simulate a piano sustain pedal, switch RELEASE off and use the footswitch to engage and disengage the release settings.

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 A or PW A (or in various combinations with PW B to get different animation effects).

NOTES:

— Select different waveforms on OSC A and OSC B 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 A: up 3 octaves
OSC B: LF mode

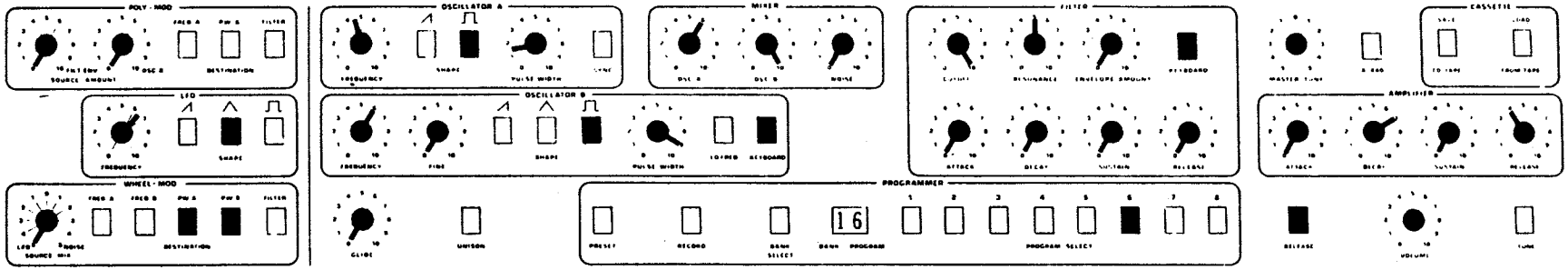
MOD WHEEL section can be engaged (if desired) to create a trill effect. The range of the trill is determined by the position of the wheel: the more the wheel is moved up, the greater the range of the trill.

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 A, and on OSC B it leaves open the option to use the pulse wave as a modulation source. The use of the pulse wave on OSC A 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 A: up 2 octaves
OSC B: 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.

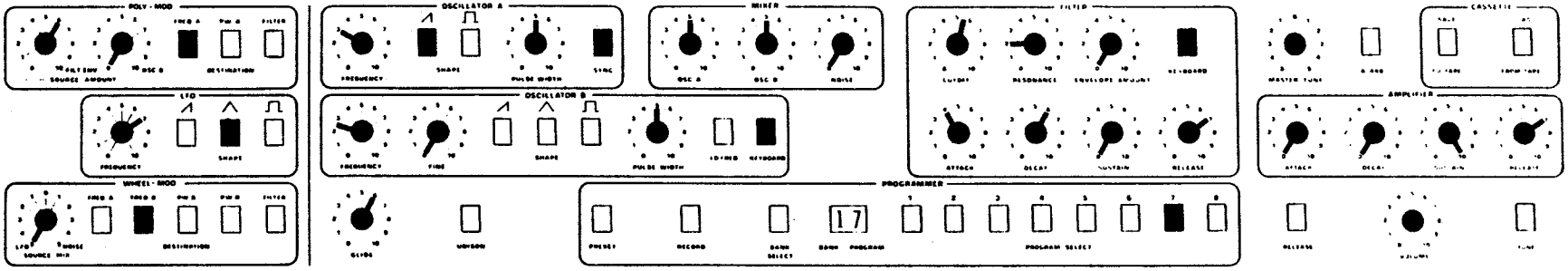
NOTES:

— 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 A and B.

— Try adding an envelope shapeto 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 A: up 1 octave + a minor 3rd
OSB B: 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.

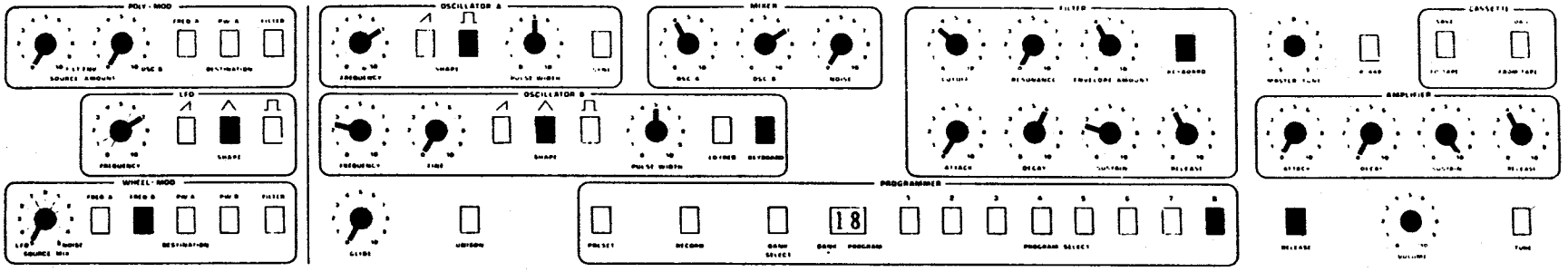
PULSE-WIDTH on both oscillators is set at 5; this allows switching of waveforms on OSC A, and leaves open the possibility of adding OSC B pulse wave to the sound.

In the MIXER section, OSC B 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 A pitch to alter the amount of animation at the beginning of the sound.



1-8: Percussive Organ

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

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

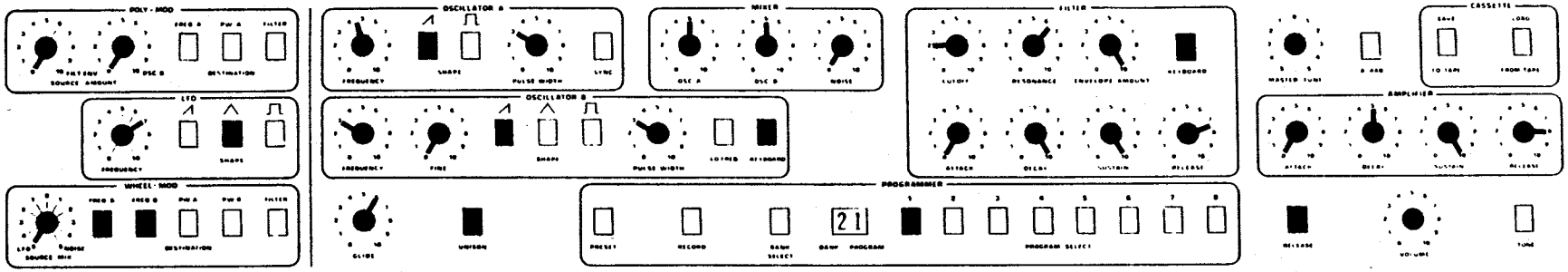
PULSE-WIDTH on OSC B is set at 5, this allows for switching of waveforms.

For proper effect, OSC A 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.

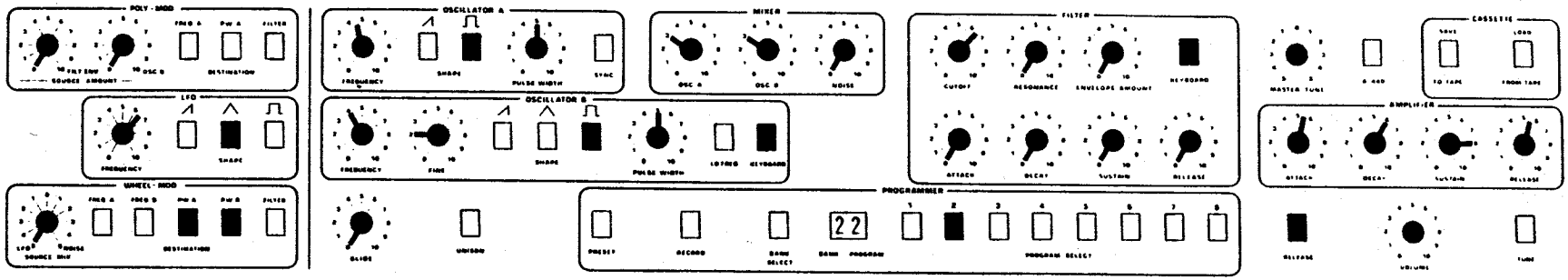


2-1: Unison Glide With Resonance

OSC A: up 2 octaves
OSC B: 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.

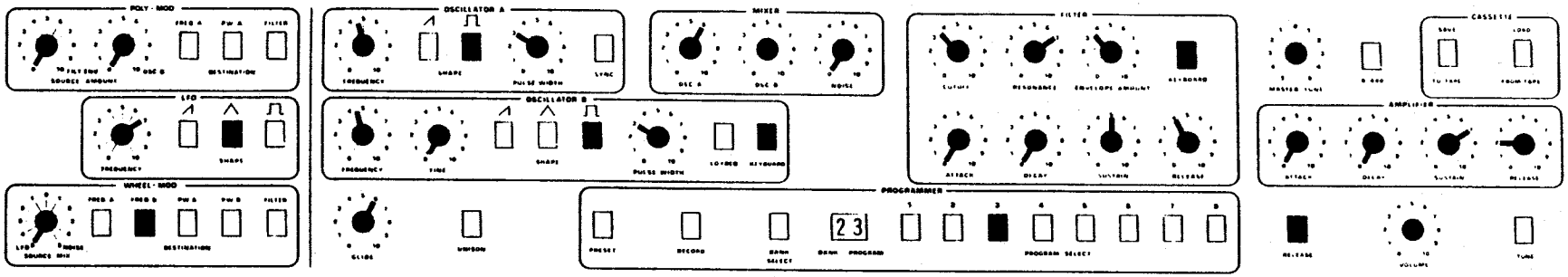


2-2: Harmonium

OSC A: up 2 octaves (basic pitch)
OSC B: up 2 octaves

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.

For French Accordion effect, turn off release.



2-3: Organ With Resonance

OSC A: up 2 octaves
OSC B: up 2 octaves

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

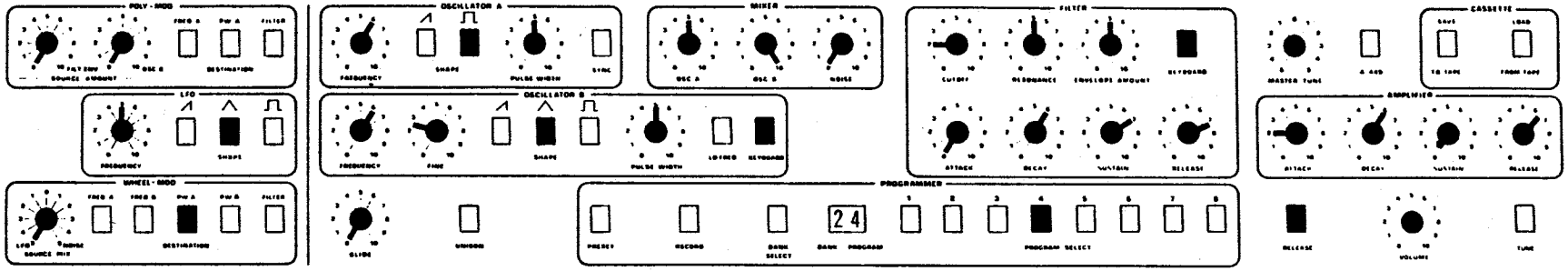
GLIDE is programmed in for use with UNISON mode — when the patch is used as a lead line. Glide will engage if UNISON is switched on.

NOTES:

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

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

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



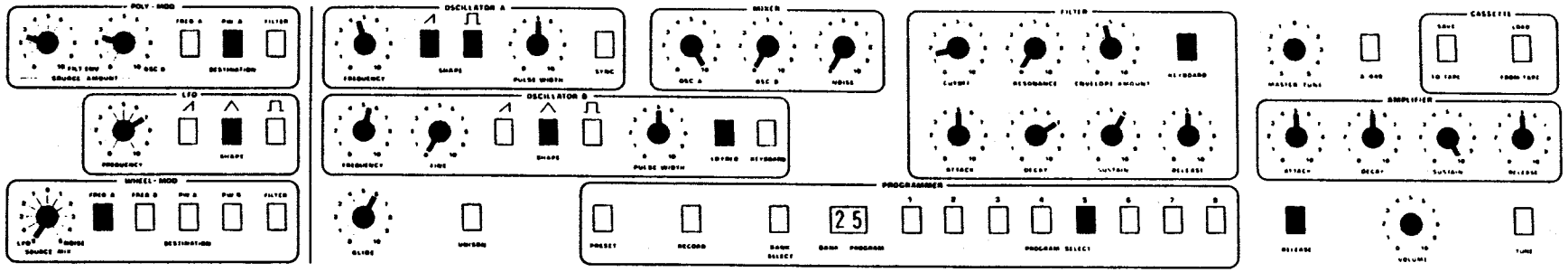
2-4: Toy Piano

OSC A: up 3 octaves
OSC B: 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 B is set at 5; this allows switching of waveforms.

OSC B 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 A: up 2 octaves
OSC B: 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.

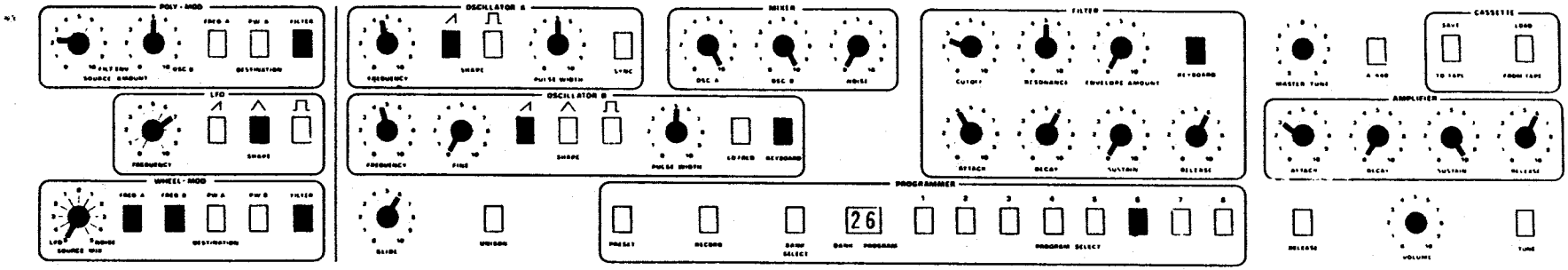
PULSE-WIDTH on OSC B is set at 5; this allows switching of waveforms.

•OSC A 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 A and OSC B to experiment with different tone colors.

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



2-6: Filter Mod

OSC A: up 2 octaves
OSC B: up 2 octaves

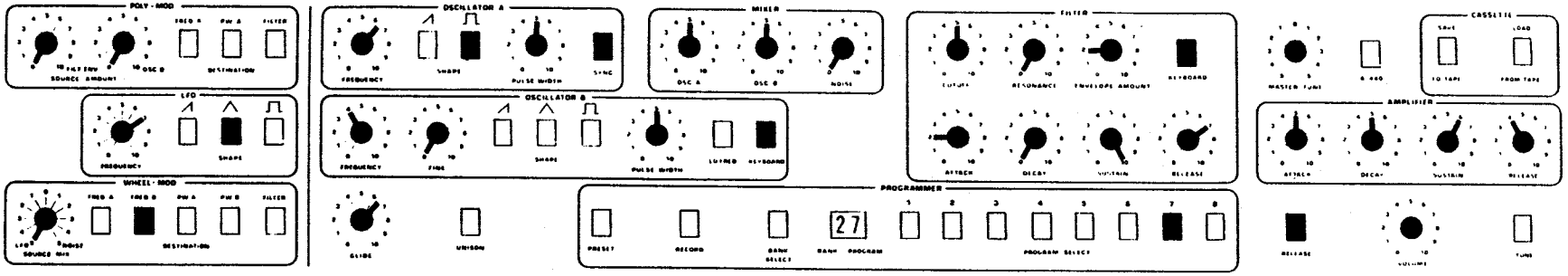
MOD WHEEL section is set for a vibrato/tremolo effect. Move wheel up slightly (⅛ to ¼) to engage effect.

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

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

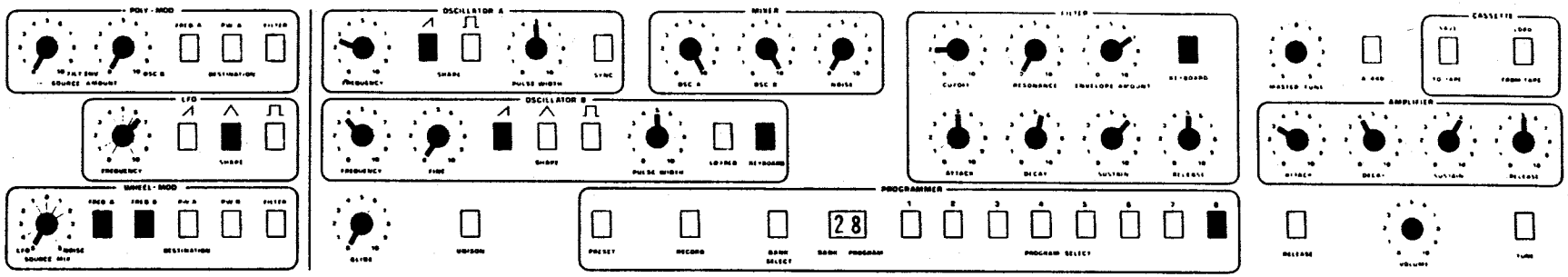
In the MIXER section, OSC B is programmed at 5 to allow for setting the pitch of the oscillator, and also to allow for its addition to the sound (for a fuller effect).

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

NOTES:

— Select different waveforms on OSC A (and OSC B) to experiment with different tone colros.

— Adjust filter CUTOFF setting to alter brightness of tone.



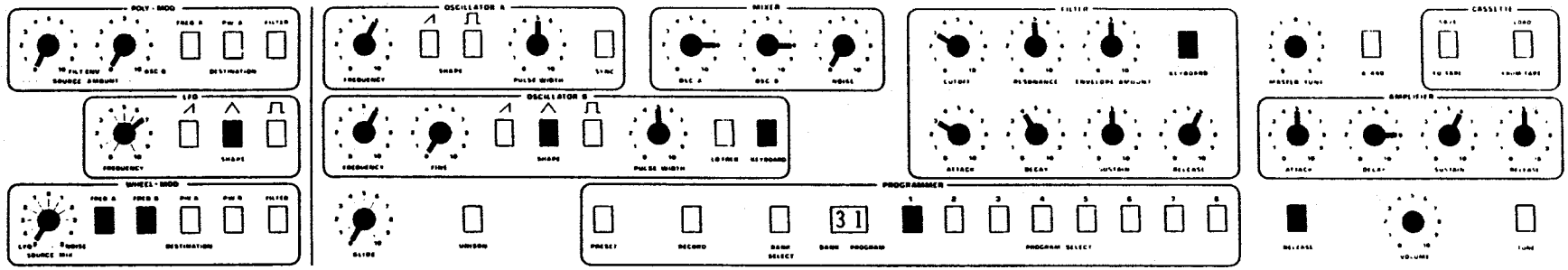
2-8: Brass In Fifths

OSC A: up 1 octave
OSC B: 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 A: up 3 octaves
OSC B: up 3 octaves

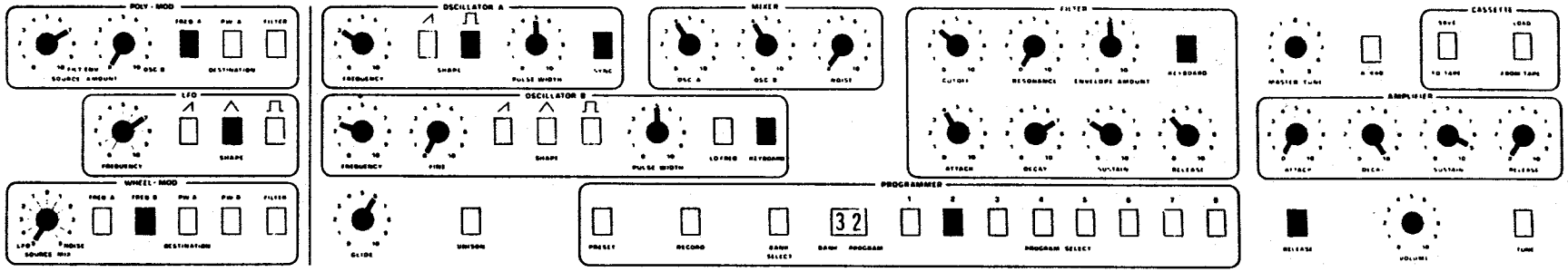
MOD WHEEL is set for a vibrato effect. Move wheel up slightly (⅛ to ¼) to engage effect.

OSC A 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 B, and leaves open the possibility of adding OSC A 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 B 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

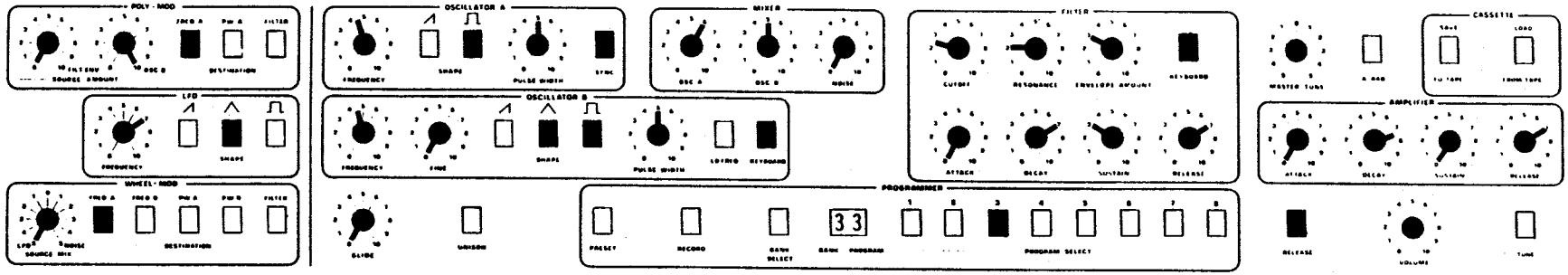
OSC A: up 1 octave
OSC B: up 1 octave

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

OSC B 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 A, and leaves open the possibility of adding OSC B 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

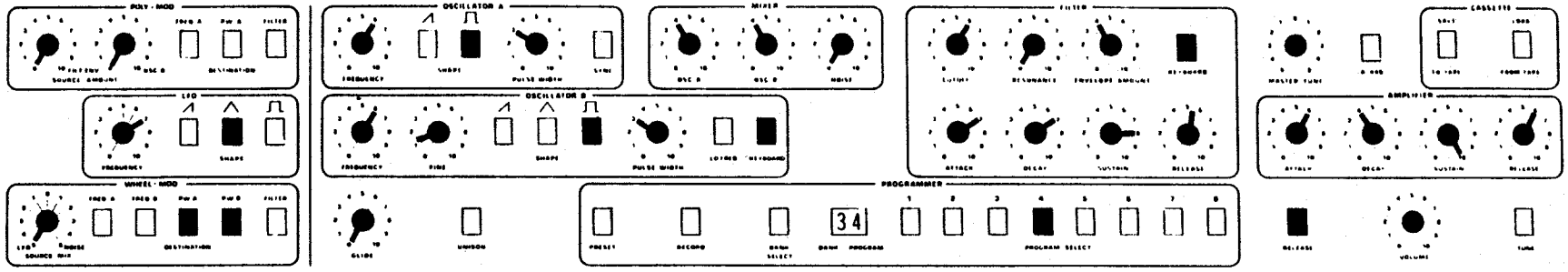
OSC A: up 2 octaves
OSC B: up 2 octaves

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 B as a modulation source in the POLY-MOD section is minimal; if SYNC is switched off, OSC B will have a strong clangorous effect via the POLY-MOD section.



3-4: High Strings

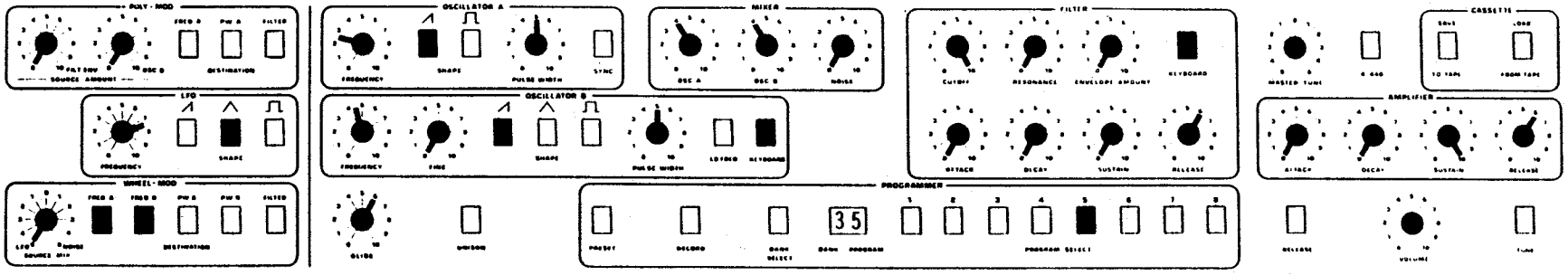
OSC A: up 3 octaves
OSC B: up 3 octaves

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

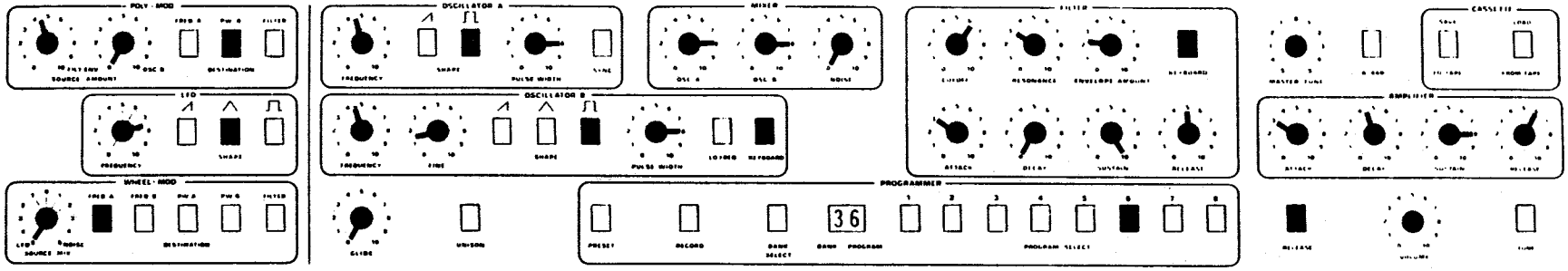
OSC A: up 1 octave
OSC B: up 2 octaves

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

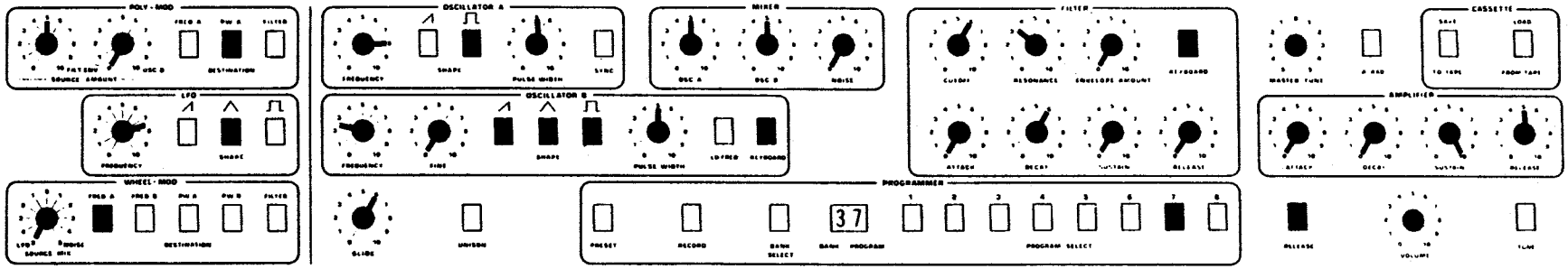
OSC A: up 2 octaves
OSC B: up 2 octaves

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 A; since the SUSTAIN is set at 10, the PULSE-WIDTH of OSC A 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 A is allowed to sound. In other words, OSC B provides the sound while a key is depressed, and OSC A 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 B separates the basic sound from the "release-repeat" sound by making the basic sound (OSC B) slightly higher in pitch than the repeat sound (OSC A).



3-7: Delayed Harmonic

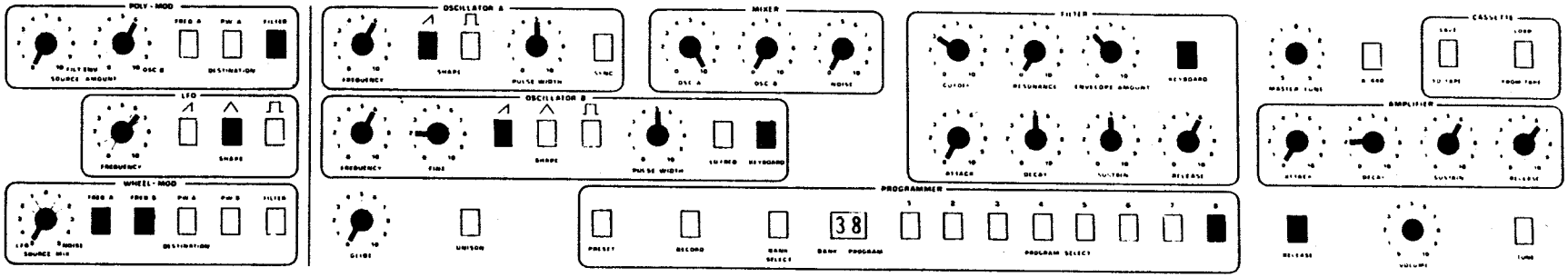
OSC A: up 4 octaves
OSC B: up 1 octave (basic pitch)

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 A; 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 A is allowed to sound. Since it is pitched 3 octaves above OSC B (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 A) 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 A). 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.



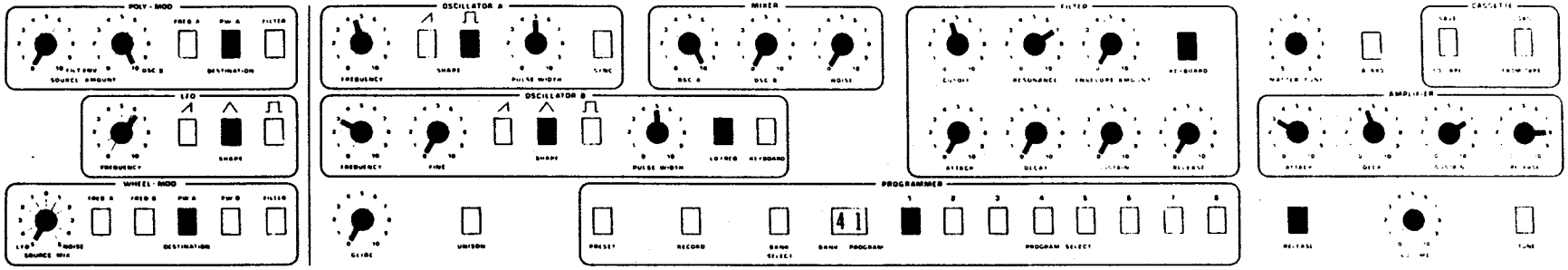
3-8: Echo-Repeat

OSC A: up 3 octaves
OSC B: 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 B 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.

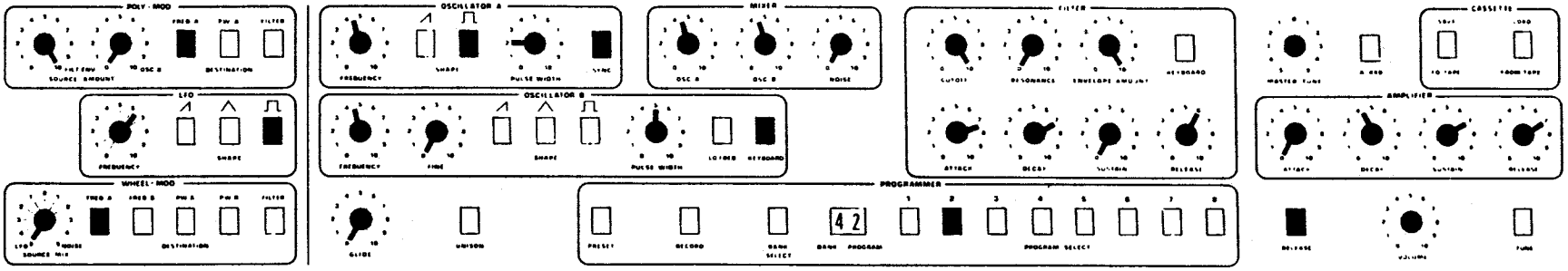


4-1: Pulse-Width Mod

OSC A: up 2 octaves
OSC B: LF mode

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

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



4-2: Slow Sync Sweep

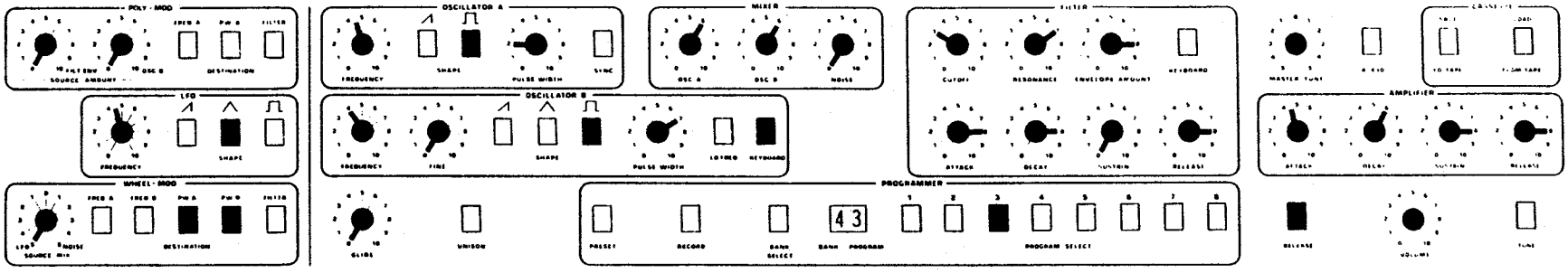
OSC A: up 2 octaves
OSC B: up 2 octaves

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

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

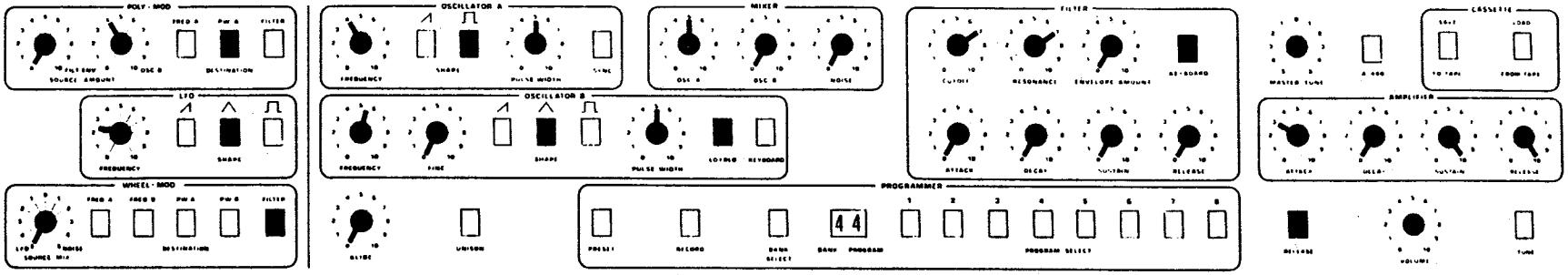


4-3: Fourths With Resonance

OSC A: up 2 octaves
OSC B: 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 A and OSC B alternate as the sound source). Move MOD wheel full up to engage this effect.

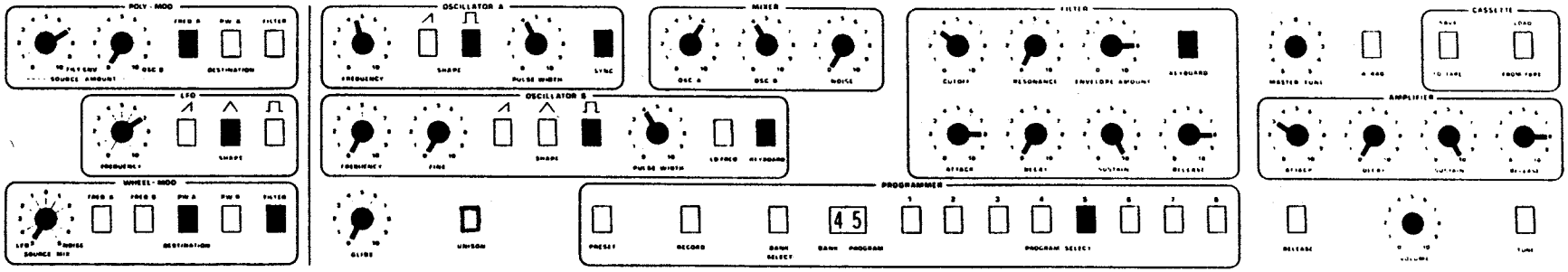


4-4: Sweeping Harmonics

OSC A: up 2 octaves
OSC B: 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 B) harmonics of OSC A's pulse waves.

Filter RESONANCE is set on the edge of oscillation.



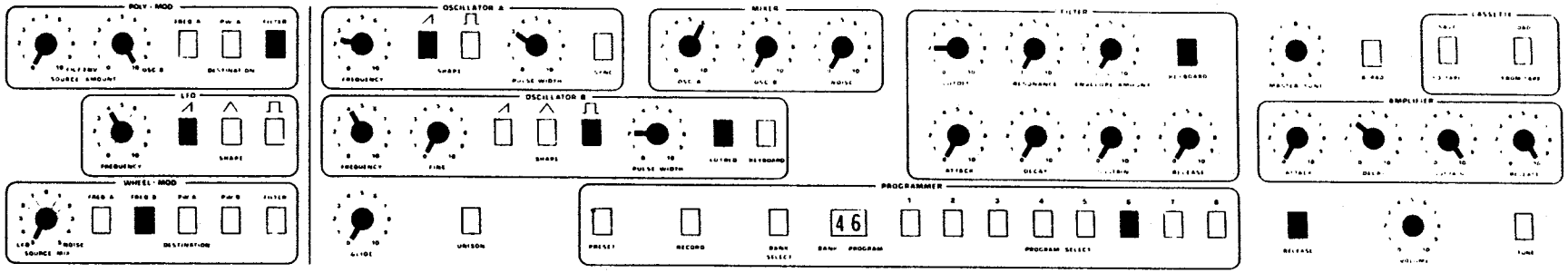
4-5: Slow Sync

OSC A: up 2 octaves
OSC B: 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 A: up 1 octave
OSC B: 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.

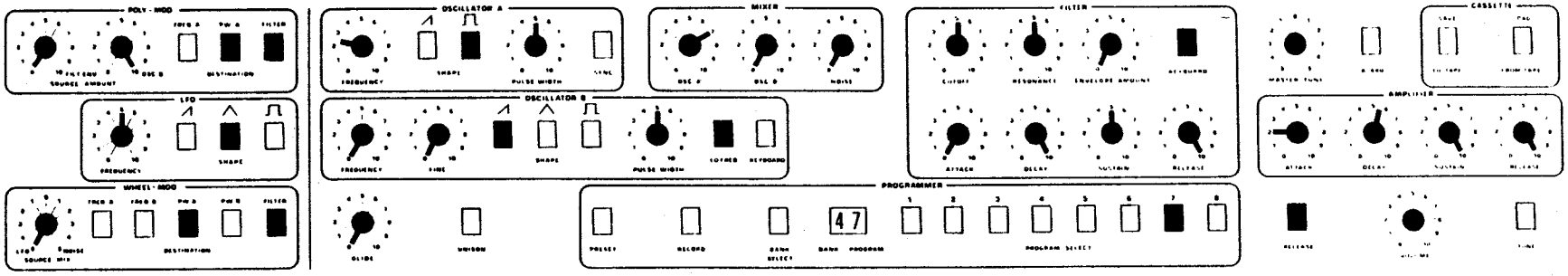
PULSE-WIDTH on OSC A is set at 3; this allows switching of waveforms.

NOTES:

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

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

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



4-7: Sawtooth Arpeggiator

OSC A: up 1 octave
OSC B: LF mode

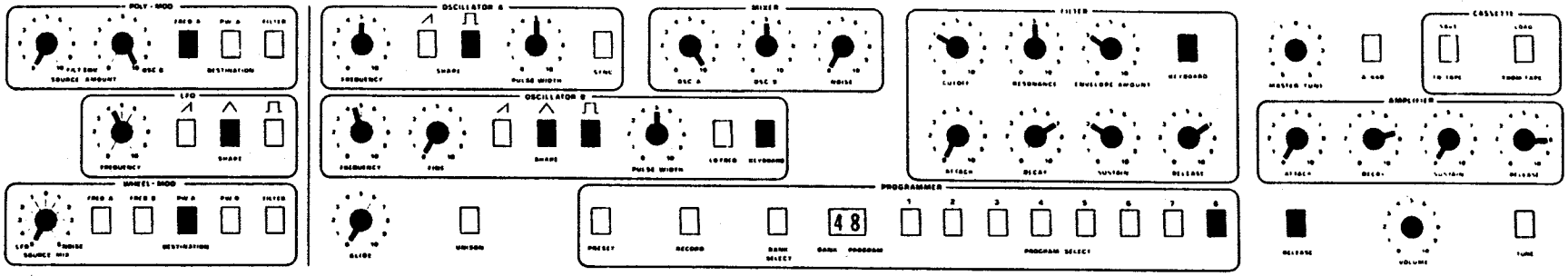
MOD WHEEL can be engaged (if desired) to increase the overall effect. Move wheel full up to engage effect.

NOTES:

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

— PULSE-WIDTH on OSC B 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).



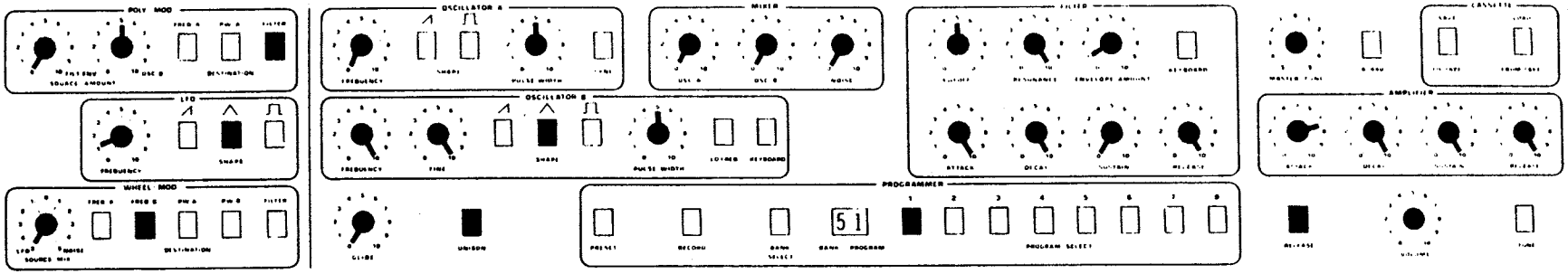
4-8: Clangorous Bells

OSC A: up 2 octaves + a tritone
OSC B: up 2 octaves - less ½ step

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 A: up 0
OSC B: up 5 octaves (plus FINE tune on 10)

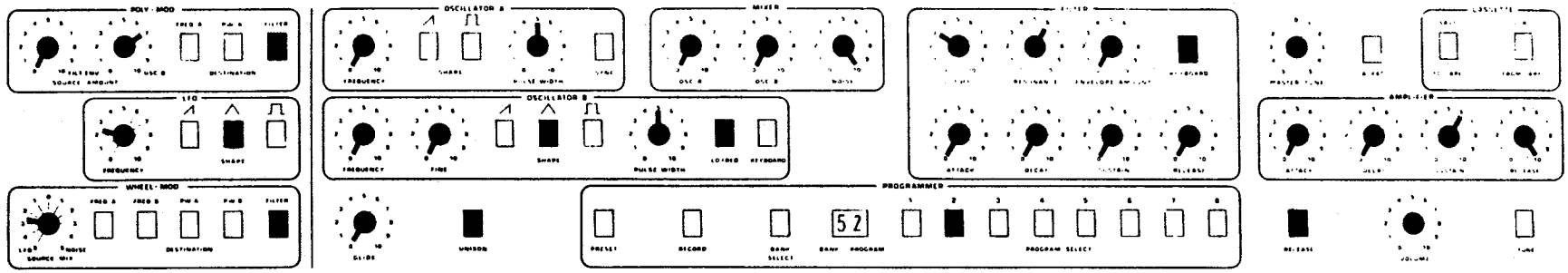
MOD WHEEL must be moved full up for proper effect.

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 B.

— Increase filter ENVELOPE AMOUNT to exaggerate effect.



5-2: Noise Sweep

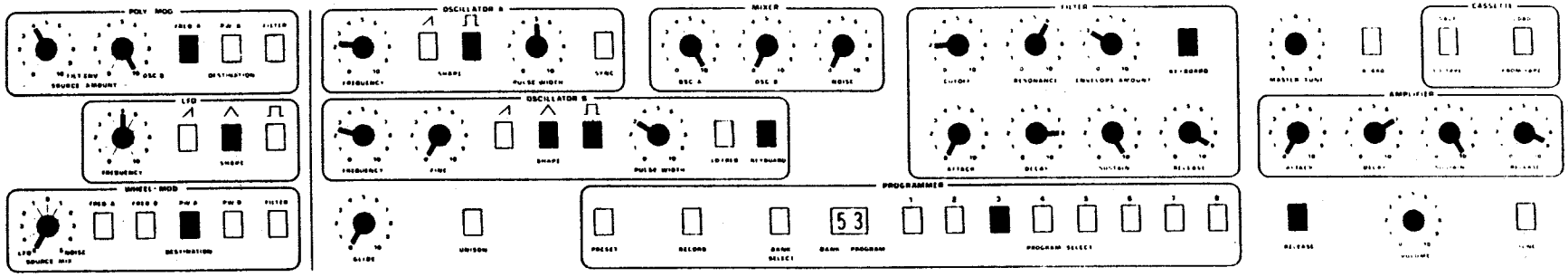
OSC A: up 0
OSC B: LF mode

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 A pulse wave to the sound, and also allows for the use of OSC B 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.



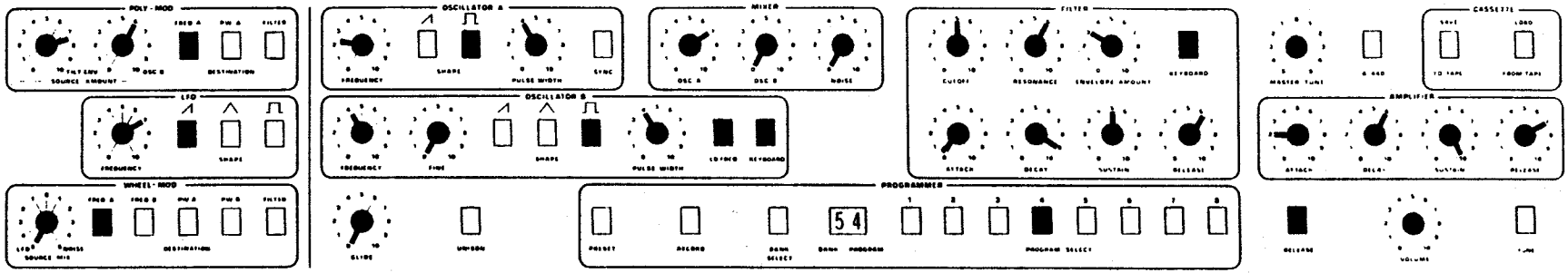
5-3: Descending Bells

OSC A: up 1 octave
OSC B: up 1 octave

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

NOTES:

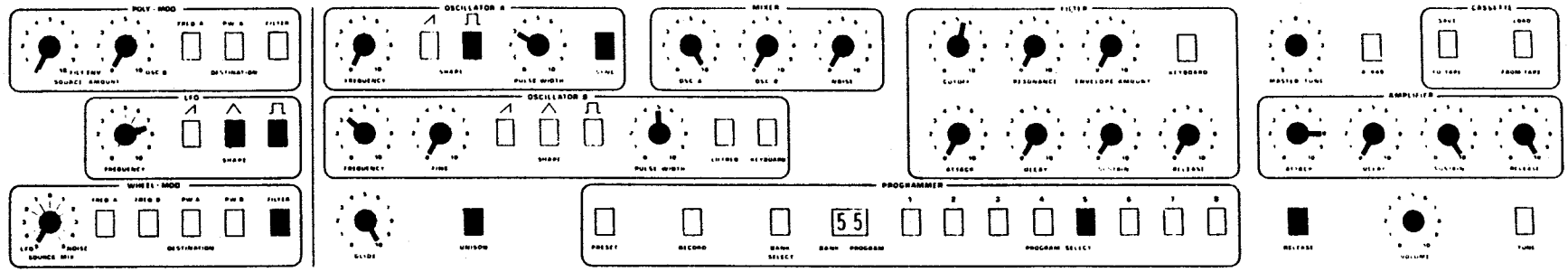
— Adjust filter CUTOFF setting to alter brightness of tone.



5-4: Descending Pulse Wave Mod

OSC A: up 1 octave
OSC B: 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.



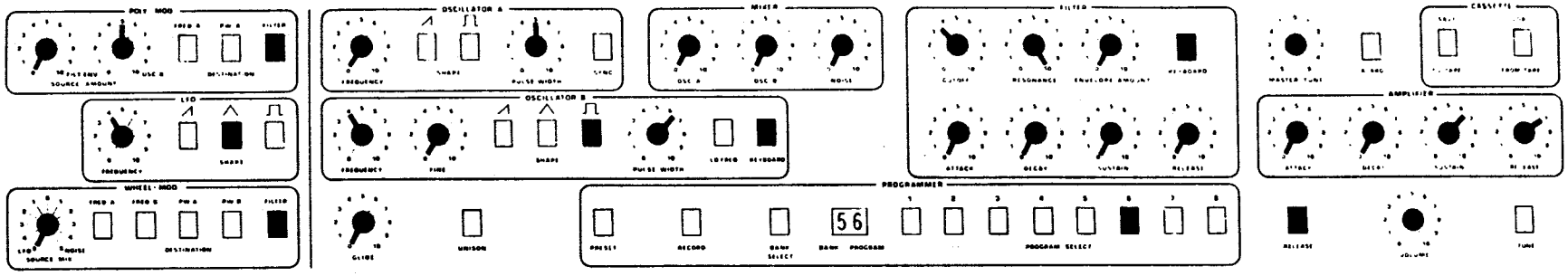
5-5: Helicopter

OSC A: up 0
OSC B: 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 B after turning KEYBOARD switch off; pitch may change when KEYBOARD switch is disengaged.



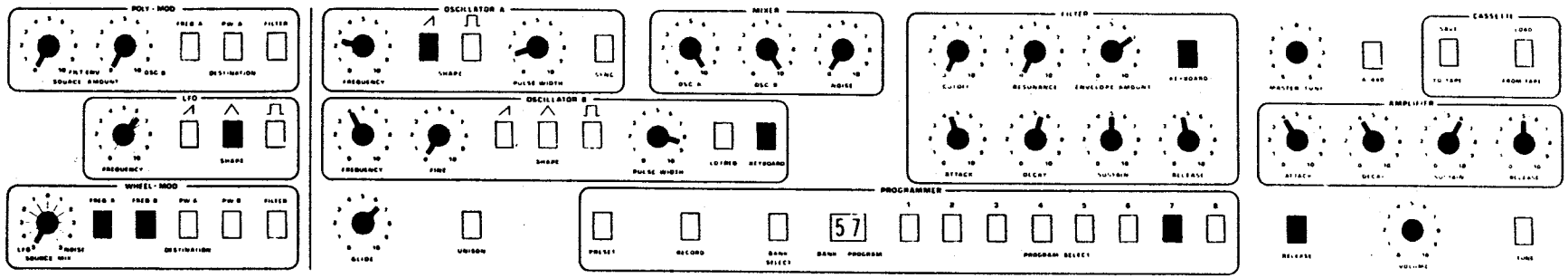
5-6: Resonance Bells

OSC A: up 0
OSC B: up 2 octaves

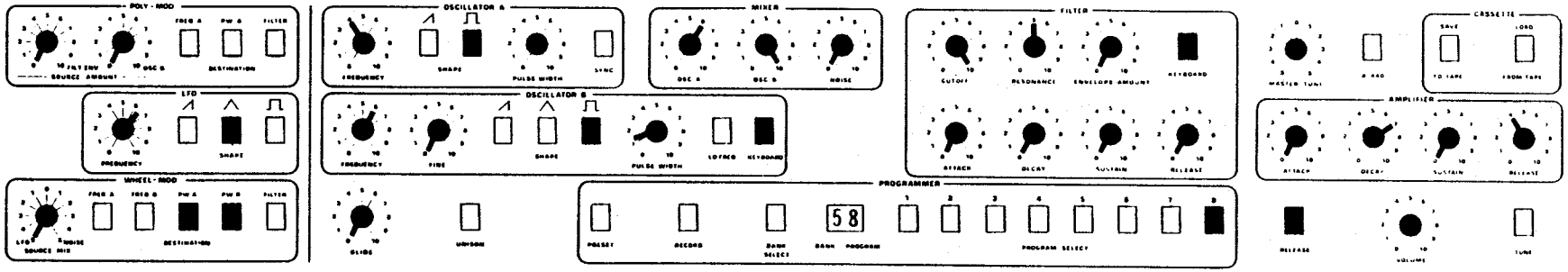
MOD WHEEL section can be engaged (if desired) to create a sweeping pitch effect. Move wheel up approximately 1/3 to engage effect.

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 programs have been included for several reasons: 1) to leave open pivot points to allow you to move the factory programs 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 programs; 3) to allow you to practice working with the factory programs in order to fine tune them to suit your tastes; and 4) to let you trace the development of certain of the factory programs (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 programs 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 back panel RECORD ENABLE/DISABLE switch in the ENABLE position.
2) Switch PRESET mode on.
3) Select 3-1 and press the RECORD switch.
4) Select 5-7. You have now recorded PIPE ORGAN FLUTES in location 5-7.
5) Select 1-7 and press the RECORD switch.
6) Select 3-1. You have now recorded SYNC I in location 3-1.
7) Select 2-8 and press the RECORD swtich.
8) Select 1-7. You have now recorded BRASS IN FIFTHS in location 1-7.
9) Select 5-7 and press the RECORD switch.
10) Select 2-8. You have now recorded PIPE ORGAN FLUTES in location 2-8, and have completed this round of location juggling.

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 program 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.

Before replacing 5-7 or 5-8, it might be good to use the duplicate programs to familiarize yourself with techniques of fine-tuning a program. Edit 5-7 and RECORD those adjustments, then switch back and forth between 1-1 (the original patch) and 5-7 (the patch as you have edited 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 HARPSICHORD program. 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 and use 5-8 for a new purpose.

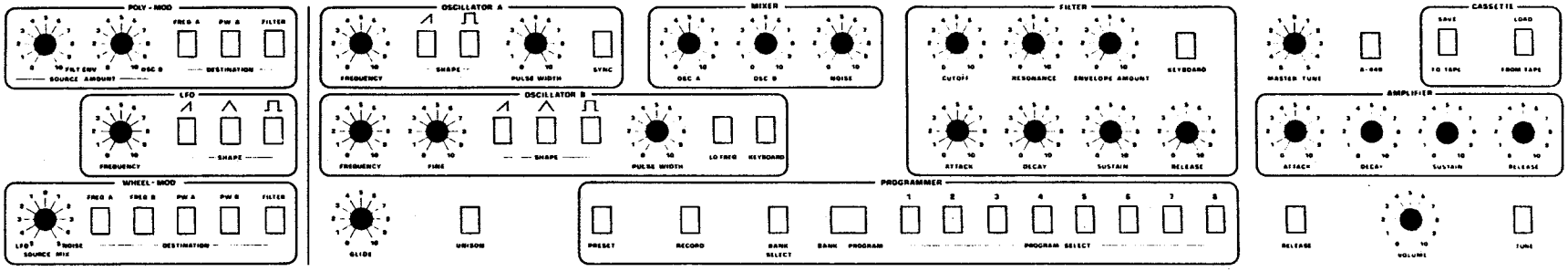
By the way, you need not limit yourself to BRASS and HARPSICHORD sounds when experimenting in this way: any of the factory presets can be duplicated in location 5-7 or 5-8 to allow for this kind of experimental comparison.

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 programs 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.

You are encouraged to adjust all of the factory programs to suit your taste (or at least those that you want to keep). You are also encouraged to erase the factory programs 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 9

PANEL BLANKS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OSC B
FREQ A
PW A
FILTER
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LFO
FREQUENCY
SHAPE
WHEEL - MOD
LFO
NOISE
SOURCE MIX
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FREQ B
PW A
PW B
FILTER
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OSCILLATOR A
FREQUENCY
SHAPE
PULSE WIDTH
SYNC
OSCILLATOR B
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FINE
SHAPE
PULSE WIDTH
LO FREQ
KEYBOARD
GLIDE
UNISON
MIXER
OSC A
OSC B
NOISE
FILTER
CUTOFF
RESONANCE
ENVELOPE AMOUNT
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ATTACK
DECAY
SUSTAIN
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PROGRAM SELECT
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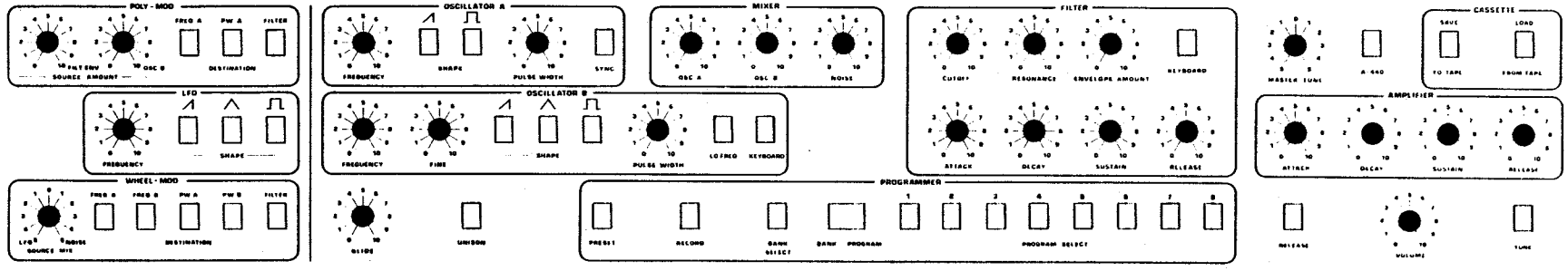
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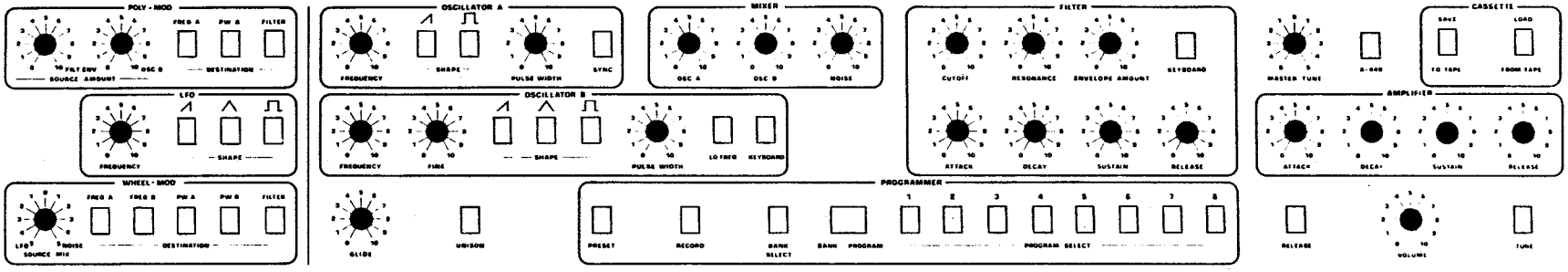
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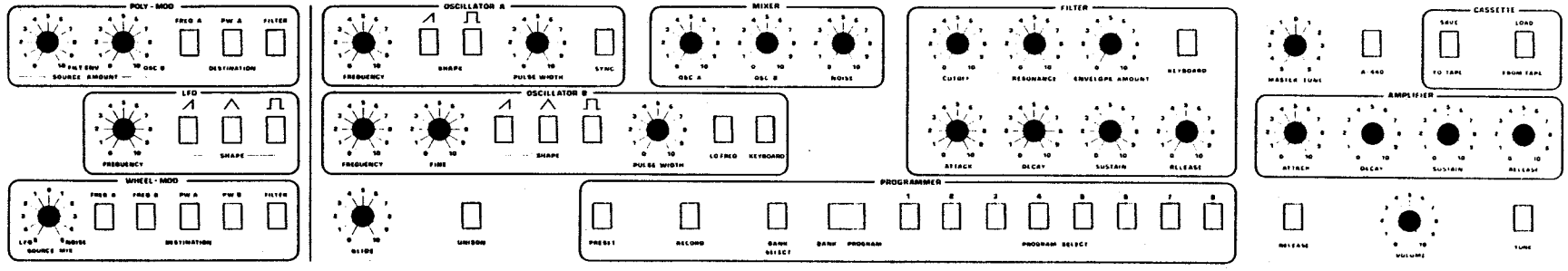
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