OPERATION MANUAL

SEQUENTIAL CIRCUITS INC

MODEL 600
Manual No. CM600A

PROPHET-600 SYNTHESIZER

OPERATION MANUAL

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Manual No. CM600A
Issued: December, 1982

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About the Prophet-600

Early in 1978 Sequential Circuits revolutionized the art of keyboard synthesis by introducing the Prophet-5, a compact instrument intended for the performer. Before the Prophet appeared it was not possible for a keyboardist to instantly select custom synthesized sounds and play them polyphonically. Its featured programmability used emerging microcomputer technology to allow complete and instantaneous control over, essentially, five complete synthesizers (voices). The Prophet-5 became the leading instrument of its kind.

Now technology has developed to the point where SCI can offer the six-voice Prophet-600, which sounds basically like a Prophet-5, at less than half its price. It has the capacity for 100 sound programs. All programs can be fully customized (edited) and stored internally, or on audio tape via the built-in cassette interface. The Prophet-600 adds a flexible arpeggiator and a 400-note, real-time polyphonic sequencer, which remembers whatever you play.

The Prophet-600 actually contains six 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 and OSC B 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 six voices identically. This makes the voices homophonous--they sound alike--with pitch differences corresponding to (at most) six 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 or the filter cutoff frequency. There is a single low-frequency oscillator (LFO) which can modulate all six voices to a depth adjusted by the modulation (MOD) wheel. The PITCH wheel can be used to raise or lower the pitch of all voices by the same interval.

The term "digital-analog hybrid" is often used to describe the Prophet synthesizers. This means that rather than 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. This microcomputer system has several important functions. It solves the problem of generating six independent sets of voice control voltages and gate signals (which operate the envelope generators) from a single keyboard. In fact, in the Prophet-600 the (formerly) analog envelope generators and LFO have been entirely replaced by computer system functions. The digital memory provides a way to store all of the switch and knob settings which form a program, and the keystrokes which form sequences. The programs and sequences are retained even when the Prophet is turned off, thanks to a small battery with a 10-year life. Finally, the microcomputer system keeps the twelve voice oscillators in tune.

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1-0 GENERAL

This section describes installation procedures and connections which can be made to the back panel of the Prophet-600. See Figure 1-0. All connectors are standard 1/4-inch phone jacks, except for the MIDI, which uses 5-pin DIN connectors.

> **CAUTION!** Do not connect the Prophet-600 to power or switch power on before following the instructions below.

1-1 HANDLING

The Prophet-600 is a sophisticated device containing state-of-the-art microcomputer and analog circuitry. It should be treated with as much care as you would provide an acoustic instrument. Avoid temperature and humidity extremes. Shock or constant vibration can damage the keyboard or controls, and can loosen connectors or socketed integrated circuits. If you expect to transport the Prophet-600 regularly, it is imperative to invest in a professional "road" or "flight" 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 Customer Service Department.

1-2 LINE VOLTAGE SELECTION AND FUSING

> **CAUTION!** Check line voltage selector before switching power on. Disconnect power before switching line voltage.

The Prophet-600 has a power fixture on its back panel to which its three-wire power cable attaches. There is also a line voltage selector switch and fuse holder. Prophet-600s shipped in the U.S. and to Japan are usually set at the factory for 110V; to Europe, 220V.

If the selected voltage does not match the line voltage, disconnect the power cord and switch the voltage selector. Replace the fuse according to the selected line voltage:

110V	1/2A, slo-blo
220V	1/4A, slo-blo

1-3 POWER CONNECTION

> **WARNING!** It is up to you to check the power and ground interconnections of the Prophet-600 and all other instruments and equipment you use to prevent potentially lethal shocks. 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 unsafe grounding practices.

The Prophet-600 comes with a three-prong power plug to insure safe grounding with other equipment. The ground prong is connected directly to the metal chassis. Because of this AC ground, a "ground loop" will often be created when an audio cable is connected between the Prophet-600 and standard amplifiers. 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 set up a shock hazard between the units. The hum level will depend on exactly how the synthesizer and amplifier are connected to the AC. For minimal hum, use the same AC outlet for the Prophet-600 and its amplifier. This should reduce the hum to an acceptable level.

1. Connect the power cable to the power fixture on the Prophet-600.

2. Check that the Prophet-600 power switch is in off position.

3. Connect the other end of the power cable to a properly grounded three-prong outlet. Don't defeat the AC-ground.

4. Plug all other equipment such as effects devices, mixers, amplifiers and recorders into the same outlet.

> **WARNING!** Do not overload. When in doubt, consult an electrician.

5. 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 available "ground-checking" devices to verify AC connections.

1-4 AMPLIFIER AND SPEAKER CONSIDERATIONS

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, the sound system becomes part of the instrument. Of course you can use anything you like and can afford. But obviously a synthesizer of this caliber should not be constrained by a weak amplifier and muddy speakers.

Particularly because the synthesizer develops a much greater dynamic range than the typical audio source, a greater margin of amplifier headroom is needed to prevent clipping, thus ensure the cleanest possible sound (and possibly preventing tweeter or horn damage). In consideration of this it is not difficult to justify committing a stereo amp of 200W/channel for performance. While a mono amp will suffice, a stereo

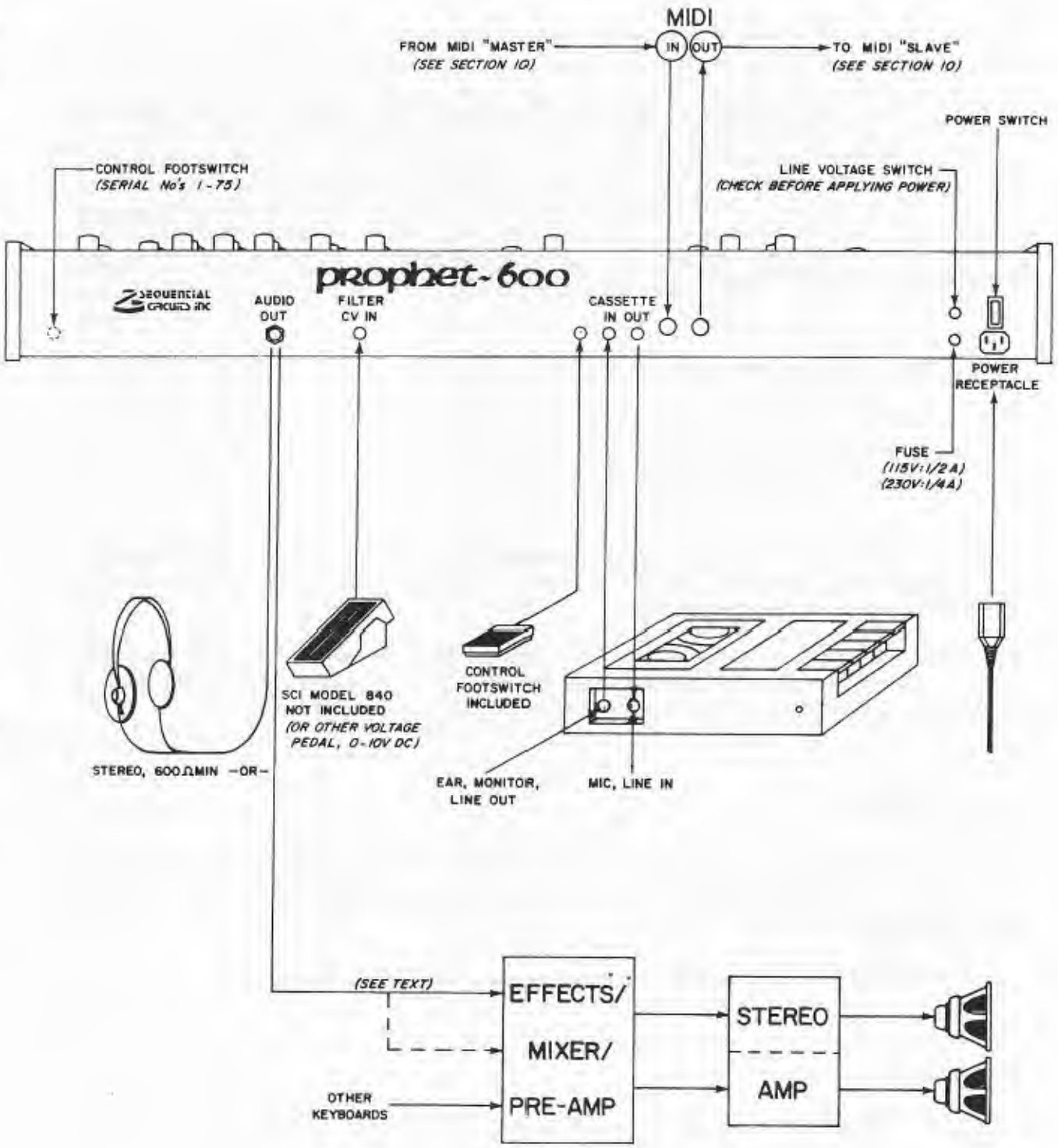


Figure 1-0
BACK PANEL CONNECTIONS

configuration will be able to take advantage of the numerous flanger/chorus and delay units on the market. A little reverb does a lot to enliven a synthesizer.

Speakers ought to be capable of handling the full amplifier power over the full audio range (20 Hz to 20 kHz) without breaking up. If it is not practical to use amplifiers and speakers specifically designed for electronic instruments or if volume must be kept low, using your stereo system will generally give good high-frequency response. But if you do this, be careful. Continuous playing of sustained synthesizer notes can cause component amplifiers to overheat. Furthermore, the dynamic range of the Prophet-600 places stereo component speakers at some risk, because of powerful bass notes and transients which will damage them if the volume is set too high.

1-5 AUDIO OUTPUT

> **CAUTION!** To protect speakers, switch amplifier power off when connecting the Prophet-600's audio output.

To drive a preamp or amp, a standard monophonic cable can be used. Or if there are two audio destinations (perhaps one to remain "dry" while the other is processed), a stereo cable may be more convenient.

The Prophet-600 has a monophonic output signal, but the jack is wired so that both sides of standard stereo headphones can be driven. The headphones should have a minimum impedance of 1200 Ohms per element (600 Ohms, in parallel).

1-6 FOOTSWITCH

A footswitch is included which frees your hands from various control functions which are explained elsewhere. On units with serial numbers 1 through 75 the footswitch jack is located to the far left (see Figure 1-0). The jack is placed near the CASSETTE jacks on subsequent units.

Electrically, the footswitch is normally open; and closes when pressed.

1-7 CASSETTE

1. Connect CASSETTE IN to recorder output (EAR, MONITOR, LINE OUT).

2. Connect TO TAPE to recorder input (MIC, LINE IN).

Cassette interface operations are explained in Section 8.

1-8 FILTER CV IN

This jack accepts a 0-10 Vdc control voltage (CV) which raises programmed filter frequency settings. This enables remote and spontaneous increase (but not decrease) of brightness. This CV is usually provided by an accessory voltage pedal.

1-9 MIDI

MIDI stands for Musical Instrument Digital Interface, which is a means for interconnecting equipment from various manufacturers. For more information, see Section 10.

1. Connect the IN jack to the MIDI OUT of the master sequencer or synthesizer.

2. Connect the OUT jack to the MIDI IN of the sequencer or slave synthesizer.

WARNING! Before using this instrument, read instructions in Section 1 concerning proper power connections and grounding.

2-0 PRESET MODE

1. Check that PITCH wheel is centered.

2. Check that MOD wheel is set to minimum (finger-slot towards you).

3. Play. Adjust VOLUME.

4. Check that MASTER TUNE knob is centered, or tune against another instrument for A-440.

5. To switch programs (up to 99), press any two PROGRAM SELECT switches.

6. Use the PITCH and MOD wheels.

7. After a few minutes, press TUNE. Retune as needed.

For more information, see Section 3.

2-1 PROGRAM EDIT AND RECORD

1. Adjust knobs and switches to modify current program. Decimal point between program digits lights, indicating Edit Mode.

2. To cancel changes, re-select program or press PRESET twice.

3. To record edited program, press RECORD then select desired program destination.

For more information, see Section 6.

2-2 UNISON

NORMAL: Switch UNISON TRACK up. Play.

CHORD TRACK: Hold chord. Switch UNISON TRACK up, or press footswitch (if already in Normal Unison). To track a different chord, switch UNISON TRACK off, then hold new notes, then switch UNISON TRACK on, or press footswitch.

For more information, see pages 3-4 and 3-5.

2-3 ARPEGGIATE

UP/DOWN: Switch ARPEG UP-DN on. Hold keys. Adjust SPEED.

ASSIGN: Switch ARPEG ASSIGN on. Hold keys in the order to be arpeggiated.

LATCH: Press RECORD or hit footswitch.

STEP: Turn SPEED to -5 (fully counter-clockwise). Hit footswitch quickly, since the arpeggiator will advance when the footswitch is released.

EXTERNAL CLOCK: Turn SPEED to -5. Connect clock to footswitch jack.
For more information, see Section 4.

2-4 SEQUENCER

RECORD: Switch RECORD on. Select SEQ 1 or SEQ 2. Play. To stop recording, press footswitch or RECORD. Sequence will playback. To stop, press SEQ 1 or 2 again, or press footswitch.

PLAY: Press SEQ 1 or SEQ 2. To stop, press again, or press footswitch.

PROGRAM SPEED: During playback, adjust SPEED knob as desired. To program speed, press RECORD.

For more information, see Section 5.

2-5 SAVE TO TAPE

1. Insert tape and rewind to start.

2. Press RECORD.

3. If storing only ten programs, press appropriate PROGRAM SELECT once, so the second display digit is blank.

4. Start recorder in record mode, with level at "0," or slightly into the red.

5. Press TO TAPE.

6. If storing sequences, press either SEQ 1 or 2 (within 3 seconds of TO TAPE).

7. When FROM TAPE blinks, stop recorder and rewind.

8. To verify, start playback.

9. Press the FROM TAPE switch.

10. When the FROM TAPE LED goes out, stop the recorder. The file has been recorded and verified.

For more information, see Section 8.

2-6 LOAD FROM TAPE

1. Insert tape and rewind to start.

2. Press RECORD

3. If loading only ten programs, press appropriate PROGRAM SELECT once.

4. Start recorder in play mode.

5. Press FROM TAPE.

6. If loading sequences, press either SEQ 1 or SEQ 2 (within three seconds of FROM TAPE).

7. When the FROM TAPE LED goes out, stop the recorder. The Prophet-600 is reprogrammed.

> NOTE: A cassette is included which contains the Factory Programs, followed by two demonstration sequences.

For more information, see Section 8.

3-0 GENERAL

This section contains information essential for basic operation. The Arpeggiator, Sequencer, Programming, the Synthesizer Controls, Factory Programs, and Cassette Interface are each detailed in separate sections.

> NOTE: If you have trouble with any of the following basic operations, please see page 3-5, In Case of Difficulty.

3-1 POWER ON

1. Install the Prophet-600 according to Section 1, Installation.

2. Switch Prophet-600 power on with its back-panel switch, which is at the left as you face the keyboard.

3. Switch power on to your preamp or mixer, if used, then switch amplifier power on.

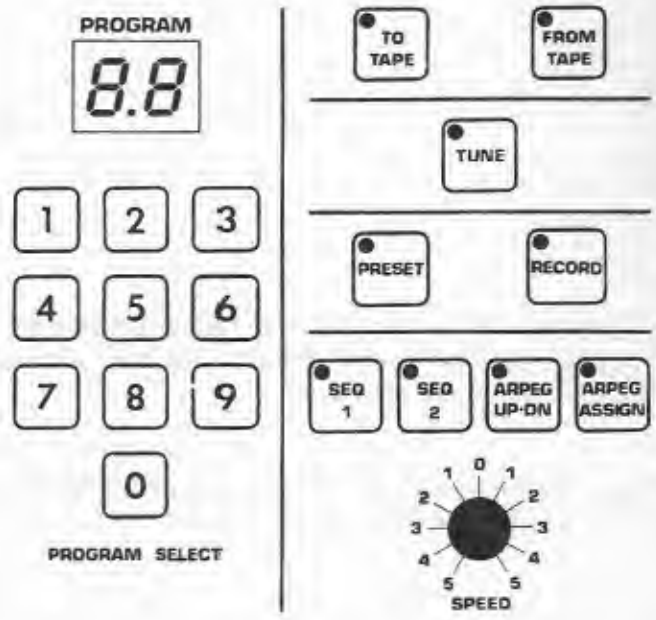
3-2 PREPARATION

Please see Figure 3-0, next page. When power is first switched on, the TUNE switch light-emitting-diode (LED) lights to indicate that the microcomputer is tuning the oscillators. The rest of the control panel will remain unlit for these few seconds. The Prophet-600 cannot be played while the computer tuning routine is in progress.

After a few seconds, when tuning is complete, the TUNE LED will go out and the control panel will come to life. The PRESET LED will be on, indicating Preset Mode. This means the computer is ready to "patch" the synthesizer voices according to any of the 100 programs stored in the Prophet's microcomputer memory. Program 00 is automatically selected at first. All of the "Factory Programs" shipped with the Prophet-600 are listed in Section 11. You are encouraged to modify (edit) all programs to suit your own purposes. To learn how, see Sections 6 and 7.

But if you are like most people, you'll want to play the Prophet-600 before studying it. To do this, simply press two PROGRAM SELECT switches to enable a different program. The new program will activate when you enter the second digit.

> **CAUTION!** Before playing any key, first check that the MASTER VOLUME knob is reduced to 0. This may keep you from accidentally blowing-out speakers or ears.



PROGRAM display: Indicates current program in Preset or Manual Modes. Indicates Edit Mode by lighting decimal point between the digits.

PROGRAM SELECT 0-9 switches: Used to select program numbers 00-99.

TO TAPE switch: Used for initiating program and sequence storage through cassette interface.

FROM TAPE switch: Used for verifying and loading programs and sequences through cassette interface.

TUNE switch: Activates and indicates computer tuning of oscillators and filters.

PRESET switch: When on, indicates the Prophet-600 is programmed according to memory. When unlit, indicates Manual Mode.

RECORD switch: Used for storing programs or sequences, or initiating tape interface operations. Also used to latch arpeggiator.

SEQ 1 and SEQ 2 switches: Selects sequence banks for recording or playback.

ARPEG UP-DN switch: Controls arpeggiator by key position.

ARPEG ASSIGN switch: Controls arpeggiator by key order.

SPEED knob: Adjusts arpeggiator and sequence playback rate.

Figure 3-0
BASIC OPERATION CONTROLS

While playing, gradually raise VOLUME until the synth can be heard. For optimum signal-to-noise ratio, the Prophet-600's VOLUME knob should be set as high as possible, while overall audio system gain is reduced with the power amplifier control.

The MASTER TUNE knob simultaneously adjusts OSC A and OSC B pitch on all voices over about a one-semitone range. It is used to easily tune the Prophet-600 to another instrument, such as a piano. If no other instrument is in use, the MASTER TUNE knob should be centered.

3-3 PITCH AND MOD WHEELS

The PITCH and MOD wheels to the left of the keyboard are performance tools which may take some practice to master. The wheels are monophonic. That is, both wheels affect all voices uniformly: all voices are pitch-bent by the same interval and modulated to the same depth. An integral part of playing is using the wheels and the synthesizer controls (for example, FILTER CUTOFF and ENVELOPE AMOUNT) for expression through dynamic and timbral variations.

The PITCH wheel is normally left in its center-detent position, from which it is possible to "bend" oscillator pitch up or down by about a 3rd.

Check that the MOD wheel is down (minimum modulation). The MOD wheel sets the modulation level. When not in use the wheel is left "down" and no modulation will occur. When the wheel is advanced fully "up," modulation is maximum.

3-4 RETUNING

The microcomputer tunes the oscillators when the Prophet-600 is first switched on. But as the instrument warms up, the temperature change causes the oscillators to drift. So it will ocassionally be necessary to retune, particularly during the first few minutes of operation. After 30 minutes or so the instrument should not have to be retuned very often. On the other hand, the more often you activate TUNE, the more accurate the tuning will be. You will soon learn to hear when the Prophet-600 needs to be tuned.

To retune, simply press the TUNE switch. Except for this switch, the control panel will go dark while tuning is in process. Retuning takes up to four seconds, depending on how far out of tune the oscillators drifted since the last tuning. The more often you tune, the less time each tuning takes.

When tuning is concluded, the Prophet-600 returns to exactly its state before the tuning. (Even unrecorded Edit Mode changes are restored.) It may be necessary to slightly readjust MASTER TUNE.

3-5 VOICE ASSIGNMENT

The microcomputer continuously assigns the six synthesizer voices to the most recently-played keys on the keyboard. You can play a maximum of six keys at once. If

more than six keys are held down at the same time, the computer will reassign the earliest used voices first. For example: playing and holding C, D, E, F, G, A, and B in succession will result in D, E, F, G, A, and B being sustained, while the C will disappear when the B 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. (If the same key is struck repeatedly, the microcomputer assigns the same voice.)

3-6 UNISON AND GLIDE

While switching through the Factory Programs, you may have noticed the Prophet-600 switching in and out of UNISON mode. There are actually three Unison modes.

Normal Unison: To enable, simply switch UNISON TRACK on, while no keys are held. (RECORD must be off.) The current program will be switched to UNISON operation: all six voices will be assigned to the lowest key played.

In Normal Unison, if more than one key is played at once, the lower will be sounded. The keyboard will also change from multiple- to single-triggering. This keyboard mode was conventionalized by the Mini-Moog monophonic synthesizer and requires--but also allows--a somewhat different keyboard technique. Instead of retriggering with each keystroke, the envelopes will only retrigger if the previous key is completely released before the new key is pressed. This requires a stacatto touch. By the same token, if you play legato, the envelopes will only trigger on the first note, while the rest of the phrase will be sounded by the sustain settings of the envelopes. (Unless the Arpeggiator is in use.) With practice, this system allows you to selectively accent notes by touch.

> NOTE: Normal Unison can only be switched off with the UNISON/TRACK switch (not with the footswitch).

Tracking Unison: Play and hold any chord, then switch UNISON TRACK on or, if UNISON TRACK is already on, hit the footswitch once. This "latches" the chord, so that any key you play becomes the root, while the upper intervals follow along (track). A new chord can be latched by simply playing it, then either switching UNSION track off and on, or hitting the footswitch.

> NOTE: Tracking Unison can only be switched off with the UNISON TRACK switch (not with the footswitch). If the footswitch is pressed, this switches back to Normal Unison.

Normally you'll release all keys when switching programs. However, if keys are held while switching from a polyphonic to Unison program, these keys will form a tracked chord. (Because keys are being held when the UNISON/TRACK switch goes on.) This trick can be used to advantage as a combined program select/chord track action.

Single Voice Unison: Play and hold any one note, then switch UNISON TRACK on. In effect, this assigns one voice for tracking. This will yield a thinner sound than Normal Unison, where six voices sound simultaneously.

Glide: Lastly there is the GLIDE knob, which operates identically whether the keyboard is polyphonic or in unison. When set to 0, there is no effect, because the oscillator control voltages are allowed to step instantly between the discrete voltages required to sound specific pitches. As GLIDE is advanced, the rate at which the oscillator control voltages change is decreased. This introduces "portamento" between the notes, which can be subtle or quite extreme.

Because the six voices are assigned to each new note in rotation, the polyphonic glide function is not easy to predict. The amount of voice glide is the difference between the last and next note to which it is assigned. For example, if GLIDE is turned up and all voices have been assigned to the bottom of the keyboard (by virtue of six different low notes having been played there), and you then play notes each in the middle and high ranges, the middle notes will "arrive" before the higher notes.

In any Unison mode, the voices glide at the same rate.

3-7 IN CASE OF DIFFICULTY

Power

If the Prophet-600 is receiving power, it will display program numbers, or the TUNE or one of the TAPE switch LEDs will be lit.

If no LEDs are lit, either power is not reaching the unit or the fuse has blown.

Disconnect power cable and check fuse by opening fuseholder.

Check the power source by plugging in other equipment.

Examine the power cable for damage.

Audio

If the PROGRAM display lights but no sound can be obtained, check that PRESET is on and that the VOLUME control is turned up.

Test the synth by simply connecting stereo headphones directly to the output.

If still no sound can be heard, try substituting the audio output cable with one known to be good.

Check your amplifier by trying a high-level audio input such as another synthesizer or tape deck.

4-0 INTRODUCTION

The arpeggiator and sequencer (see next section) are keyboard memory features of great usefulness in performance. Through them you can create automatic accompaniments which free the hands for other uses. The keyboard can be played normally while either the arpeggiator or sequencer are on. (They do not operate simultaneously.) The footswitch assumes different functions according to the mode of operation.

4-1 MODES

The Prophet-600 offers two arpeggiate modes: Up/Down and Assign. Up/Down Mode sequences between any held keys according to their position, from low to high and back down. For example, C E G B G E C E G...

Assign Mode sequences between keys according to the order that they are played. For example, C G E B C G E B. This allows the creation of intense riffs, without you having to actually play them.

The arpeggiate (and sequence) rate is controlled by the SPEED knob.

The arpeggiator can be "latched," which means it continues to play keys even when you remove your hand(s) from the keyboard.

4-2 ARPEGGIATE UP/DOWN

1. Press the ARPEG UP-DN switch. Its LED will light.

2. If only one key is held, there will be no arpeggiating. This allows monophonic lines to be played normally, with the arpeggiator brought in only when more than one key is held down simultaneously.

3. Adjust the SPEED knob.

4. If desired, press either the footswitch or RECORD switch (which will not light) to latch the keys. You can then remove your hand(s) and the keys will continue to arpeggiate.

5. While the arpeggiator is latched, you can play along with up to five more keys, which will not be arpeggiated or latched..

6. To stop, switch ARPEG UP-DN off.

7. To relatch a new set of keys, simply hold them down and hit the RECORD switch or footswitch again.

4-3 ARPEGGIATE ASSIGN

1. Press the ARPEG ASSIGN switch. Its LED will light.

2. Depress any number of keys in the order they are to be sounded. They will be arpeggiated.

3. Adjust the SPEED knob.

4. If desired, latch as for ARP UP-DN.

5. To unlatch or stop, switch ARPEG ASSIGN off.

4-4 NOTES ON USAGE

Once an arpeggiate sequence has been entered, it is possible to set-up the arpeggiator to advance either by single presses of the footswitch, or in response to an external clock connected to the FOOTSWITCH jack:

a. Turn the SPEED knob fully counterclockwise. The arpeggiator will stop.

b. Hit the footswitch quickly. The advance takes place not when the switch is pressed, but when released.

c. If desired, connect a 5-15V clock source, preferably a square wave. The maximum useful frequency will be 10 - 15 Hz. (Note that for the Prophet-600 computer to recognize the clock pulse, the pulse must be at least 10 msec long--both high and low.)

By using a combination of UNISON TRACK and ARPEGGIATE, it is possible to advance between chords with the footswitch:

a. Hold a chord to be tracked.

b. Switch UNISON TRACK on. Or if UNISON TRACK is already on, hit the footswitch. This latches the chord.

c. Switch ARPEG UP-DN or ASSIGN on. This arpeggiates the chord.

d. Hit the footswitch. This latches the arpeggiator.

e. Reduce SPEED to 0.

f. To advance the chord, hit the footswitch quickly (or use external clock).

Note that the arpeggiator alters some Unison modes. Low-note priority is always maintained, but to insure that each new note or chord is heard the notes will retrigger (whereas Unison normally allows only single-triggering.) Additionally, if using the arpeggiator in Unison, you can't play along at the same time. Notes played above the arpeggiated keys are ignored, while those played below will essentially "disable" the arpeggiator. Notes played between arpeggiated keys will produce interesting variations.

5-0 INTRODUCTION

The real-time Polyphonic Sequencer within the Prophet-600 allows you to directly record your own instrumentals: bass lines, comping patterns, riffs, or melodies. It records with exact timing whatever you play. It can be operated by a footswitch, keeping the hands free to play. It features six-voice polyphony, storage even while power is off, and wide range of playback speed. The almost 400-note capacity is divisible in any proportion between two "banks," termed SEQ 1 and SEQ 2. The sequences can be permanently stored through the cassette interface.

As it is pre-programmed with sound programs, the Prophet-600 also comes pre-programmed with some demonstration sequences. To play the demonstration sequences, simply press either SEQ 1 or SEQ 2. Adjust speed and select programs as desired.

5-1 RECORDING

1. Switch RECORD on. The LED will light.

2. Press either SEQ 1 or SEQ 2. (Ignore the SPEED knob.)

3. Start playing. (Actual recording does not begin until the first key is pressed.)

4. When finished, press the footswitch or RECORD synchronously with the desired ending.

5. The sequence will play continuously ("loop") until the appropriate SEQ switch is switched off. Adjust the SPEED knob.

6. Care must be taken to not exceed the note limit, which is approximately 400, but may be less if the specific sequence contains long rests. If the note limit is exceeded, the sequence will only contain the last 400 notes--the earliest notes will be lost.

7. When both banks are being used, care must also be taken to not exceed the 400-note limit. The sequencer assigns memory priority to the bank which is currently being recorded, and will "steal" notes from the other bank once the 400 total note limit is reached. For example, if SEQ 1 already has a 250-note sequence recorded in it, you will erase SEQ 1 if you attempt to record more than about 150 notes in SEQ 2.

5-2 PLAYBACK

1. To playback a sequence, press SEQ 1 or SEQ 2.

2. The playback speed can be varied from 1/4 to 4X real-time. The SPEED knob position for 1:1 playback speed is actually to the left of center. This provides more control range of higher speeds.

3. The playback speed can also be programmed. As the sequencer is playing back, set SPEED as desired, then press the RECORD switch (which will not light). Now whenever the sequence is selected it will play at this speed. The progammed speed can be edited and re-recorded (just like the synthesizer controls).

4. To stop, press the appropriate SEQ switch or the footswitch.

6-0 INTRODUCTION

Section 3 covered basic Preset Mode operation with the Factory Programs. You can use the Prophet-600 solely with the Factory Programs. However, using the instrument in this way defeats a large part of its purpose, which is to allow keyboard players to create and program sounds appropriate to their own music and tastes. This section discusses the creation of such custom programs.

Although the Factory Programs were of course chosen to display the range and depth of the 600's sounds, they are still only the beginning of what can be done with the instrument. As good as the Factory Programs are, the musician is bound to feel that some are more useful than others in certain contexts. It is not simply a question of whether to use a "brass" or "string" sound, or something unheard of. It is rather the question of what specific string sound of the myriad available will best convey the musical idea. There is no single, ideal program which is the violin or trumpet, because the synthesized sound is usually heard in a musical context of rhythm, harmony, and melody. The exact timing of the notes played, the speed, the voicings of other ensemble instruments, even the acoustic characteristics of the room all influence the perception of many of the synthesizer parameters which are finely-adjusted with knobs.

So a few Factory Programs will seem perfect. A few will seem useless. Most of them will be perceived as useful in a general sense, but perhaps not quite right for the immediate work at hand. The sound needs to be simpler, raunchier, more acoustic-like, more percussive, funkier, purer. (Or all at once, for all the good words do at describing music.) This is why you want to be able to create custom programs.

Perhaps you are ready to see what else the Prophet-600 can do. We hope this is the case. There are several aspects to programming custom sounds: knowing the Prophet-600's modes of operation and accompanying switch functions; knowing what the synthesizer controls do in a functional sense; and knowing how to use these controls for musical purposes.

The modes and switch functions are explained in this section. The synthesizer controls are explained in Section 7. The use, the art, is your part. To exploit the Prophet-600's sonic possibilities fully, learn as much about it as you can by studying Section 7 and the Factory Programs in Section 11. Seeing exactly how these programs are constructed will make it easier for you to begin to create your own programs. At first, practice synthesizing by editing the Factory Programs. For many, this will be the best way to learn exactly how the synth controls on the Prophet-600 operate. Then switch to Manual Mode and try creating programs "from scratch."

You may want to consult The Complete Guide to Synthesizers, by Devahari, (1982: Prentice-Hall, Englewood Cliffs, NJ, ISBN 0-13-160630-1), or Allen Strange's Electronic Music, (1972: William C. Brown Co., Dubuque, Iowa). Additional references can be obtained from the more extensive bibliographies contained in these books.

Keyboard magazine (20605 Lazaneo, Cupertino, CA 95014) carries many articles on popular synthesis. And there is Polyphony magazine (Box 20305, Oklahoma City, OK 73156) which concentrates on more technical aspects. Also, check into synthesis lessons, seminars, or courses which are increasingly being offered by colleges and individuals.

Be advised that in the excitement of creation, new, interesting patches tend to escape if not documented. Panel blanks are provided for this purpose in Section 12. If a program is not documented when created, the programmed control settings may only be discoverable by rotating all knobs, in Edit Mode, as explained below.)

6-1 EDIT MODE

Programmable controls (such as GLIDE and OSC A FREQUENCY) are subject to setting by the computer, while non-programmable controls (such as the two wheels) are not controlled by the computer. Generally, the programmable controls are crucial to establishing the characteristic sound of a program, while the non-programmable controls are for performance and mode control. However, this does not mean that the programmable controls are unalterable. To the contrary, the programmable controls can be altered at any time and each alteration will influence the sound. Adjusting the programmable controls is called editing.

Edit Mode is a powerful tool that allows you to experiment with program changes by selectively adjusting each front panel control. The original program remains unchanged and can be restored at any time. Edited programs can be recorded into the original location if the original program is not desired, or into a program location which contains an undesired program.

In Preset Mode as you select different programs there is no way for the knobs and switches to move themselves (as they would have to) to indicate their programmed settings. The controls just stay where they happen to have last been set. Edit Mode is entered when the Prophet-600 is in Preset Mode and a programmable switch is toggled, or a programmable knob is rotated. When this occurs the decimal point between the PROGRAM digits lights to indicate Edit Mode. The switch or knob then becomes active, physically indicating its current setting. The programmable parameters of inactive, unmoved switches or knobs do not change. So, unmoved switches and knobs do not necessarily show their currently-programmed settings. Therefore, to discover the programmed setting of a knob or switch, you have to rotate or toggle it, while repeatedly checking the edition against the original program.

As an example of editing, suppose you like program 15 but want to change OSC A waveforms and prefer a brighter tone:

1. Check that PRESET is on.

2. Select program 15.

3. Switch waveforms as desired.

4. Raise FILTER CUTOFF for desired brightness.

5. You can cancel any changes and return to the original program by again pressing PROGAM SELECTs 1 and 5.

6-2 MANUAL MODE

1. To put the Prophet-600 in Manual Mode, switch PRESET off. This removes computer control from the programmable knobs and switches, so they always indicate the exact status of the patch under construction. You can see what signal paths are closed by the switches which are up. The knob positions reflect their actual settings. "What you see is what you get."

2. As you begin to construct the patch, remember that the sound which is produced will at first be the result of wherever the controls happen to be set. For anything to be heard, certain minimum conditions need to be established which may become clearer after Section 7 is reviewed. But here it can be said:

a. At least one oscillator waveform switch must be on.

b. If only a pulse wave is on, the PULSE WIDTH knob must not be set too close either to 0 or 10.

c. A solitary pulse wave should not be over-modulated, or it may "cut out." To quickly isolate the source of over-modulation, simply switch off the PW switch in the LFO-MOD module.

d. Begin with the MIXER knob approximately centered.

e. The filter cutoff frequency must not be set too low. To check this, set the FILTER CUTOFF knob to 10.

f. The AMPLIFIER and FILTER ATTACK time should not be set too slow. If necessary, dial them to 0.

g. The AMPLIFIER SUSTAIN level must not be too low. If necessary, raise it to 10.

6-3 RECORD MODE

Custom programs can be created in two ways: by recording edited programs, or by recording manually-formed patches. (A "patch" becomes a "program" when recorded.)

1. Select a program to be edited or moved. Edit it as desired.

2. Switch RECORD on.

3. Select the first digit of the program number being recorded.

4. If you somehow made a mistake, you can exit Record Mode at this point by merely switching RECORD off. The program memory will not be affected.

5. Press the second digit, and the program will be recorded or copied to that location.

NOTE: When recording, be sure to hit the correct PROGRAM SELECT switch or you may erase a program you wanted to keep.

6. When a PROGRAM SELECT switch has been hit, the RECORD LED will go off and the Prophet will return to either Preset or Manual Mode (whichever preceeded Record Mode).

7. After recording a program, it is always a good idea to check that the program is correctly recorded in the desired location by switching PRESET on.

7-0 INTRODUCTION

As explained in the Preface, the Prophet-600 actually contains six synthesizers, termed "voices." Only one voice is depicted on the front panel because, except for the LFO, the controls "patch" all six voices identically--which makes them sound alike.

The Prophet-600 fits into the tradition of voltage-controlled analog synthesizers. To understand these instruments it has proven useful to identify three basic functions: audio sources, modifiers, and controllers. Briefly, controllers create the control voltages (CVs) which determine the pitch of the audio sources, or the filtering or attenuation effect of the modifiers. Each voice contains several of each type of function, which are represented on the block diagram, Figure 7-0.

On each voice, there are three audio sources: OSC A, OSC B, and the filter, if it is adjusted for self-resonance. The audio level and timbre can be modified by the mixer, filter (when not in self-resonance), and amplifier. The keyboard is the most conspicuous controller, since it issues the six separate KYBD CVs which determine the oscillator pitch on each voice. The MASTER TUNE knob and PITCH wheel provide two separate CVs which control all of the oscillators. And the two envelope generators must each be regarded as a controller of its respective filter or amplifier. Considering the modulation systems, the LFO is a controller, as is OSC B when it is used with POLY-MOD.

Figure 7-0
VOICE BLOCK DIAGRAM

7-1 OSCILLATOR A

OSC A is an audio-frequency source always under control of its FREQUENCY knob, the keyboard, PITCH wheel, and MASTER TUNE knob. Its frequency (FREQ) can be modulated by the LFO-MOD and POLY-MOD systems. PULSE-WIDTH (PW) can also be modulated by the LFO-MOD system.

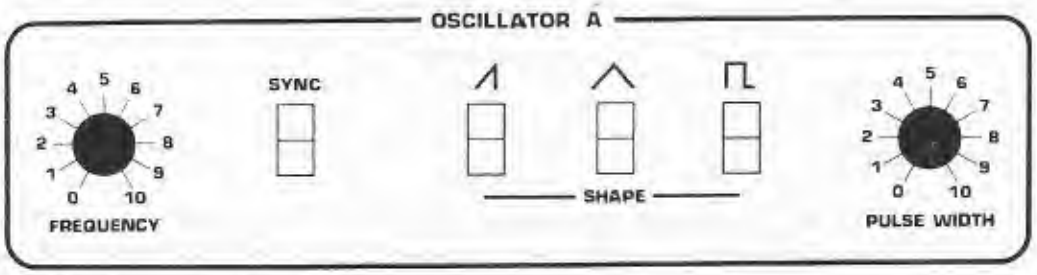


Figure 7-1

FREQUENCY knob: Adjusts oscillator pitch in semitones, over a four-octave range. For basic "concert" tuning, where the middle A on the keyboard equals 440 Hz, set the FREQUENCY knob two octaves above "0" on the dial. Exact oscillator pitch is fine-tuned with the MASTER TUNE knob.

SYNC switch: Forces OSC A to follow OSC B in "hard" synchronization. Depending on the setting of the OSC A FREQUENCY knob, OSC A will either lock to harmonic frequencies of OSC B, or produce unusual timbres at the next lower harmonic of OSC B.

If SYNC is on, and a very narrow or wide pulse is selected for OSC A, and OSC B's frequency is set much higher than OSC A, the output from OSC A may disappear. (Because the pulse is not given a chance to discharge before being re-synced, it degenerates from audio to dc.)

Even if no OSC B waveshapes are switched on, SYNC still operates, so the overall pitch range of the program will be determined by the OSC B FREQUENCY knob setting.

SYNC is used in Factory Programs 17, 26, 76, and others.

SAWTOOTH SHAPE switch: Enables full-level waveshape containing all harmonics. This basic shape is often described as "brassy."

TRIANGLE SHAPE switch: Enables full-level triangle wave, containing little harmonic energy, thus having a dull tone.

PULSE SHAPE switch: Enables full-level waveshape whose harmonic content, thus timbre, depends on the setting of the PULSE WIDTH knob.

If no waveshape switch is on, OSC A will have no audio output. If two or three waveshape switches are on, all waves 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).This knob is only effective if the PULSE SHAPE switch is on. At the extreme knob settings the pulses will "thin out" until they degenerate to dc, resulting in no audio output.

This knob has no effect on the sawtooth or triangle waves.

7-2 OSCILLATOR B

OSC B is identical to OSC A, except instead of the SYNC switch there is a FINE knob. OSC B can also be a POLY-MOD modulation source. It can't be modulated by POLY-MOD.

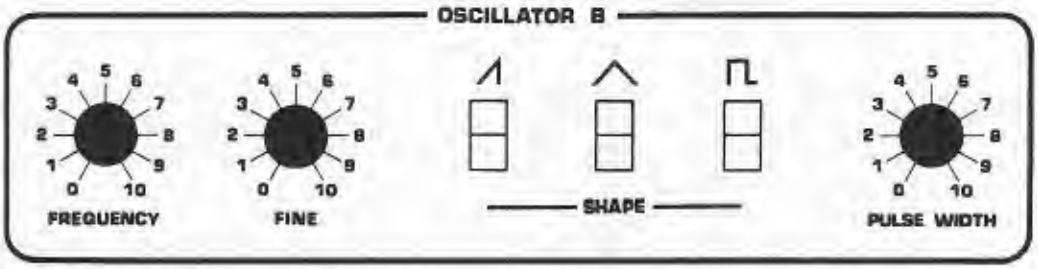


Figure 7-2

FINE knob: Raises OSC B frequency up to one semitone. This allows detuning the oscillators, typically, for a warmer, more natural sound.

7-3 GLIDE

Figure 7-3

GLIDE knob: When set to 0 the KEYBOARD CV, which controls oscillator pitch, 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.

See also pages 3-4 and 3-5.

7-4 MIXER

Figure 7-4

MIXER knob: Adjusts the ratio of OSC A and OSC B output to the FILTER.

7-5 FILTER

The FILTER module contains controls for the filter itself and for its ADSR envelope generator. The envelope generator is discussed separately, below.

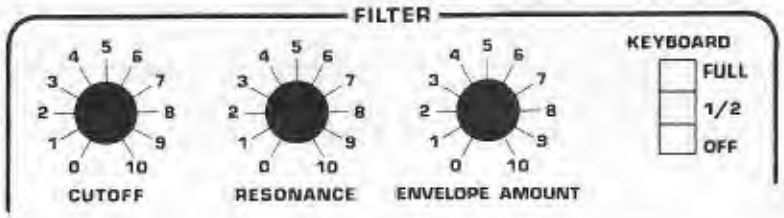


Figure 7-5

CUTOFF knob: 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, 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 formed by the ATTACK, DECAY, SUSTAIN, and RELEASE (ADSR) knobs. The ENVELOPE AMOUNT knob is an attenuator which sets the depth of the applied envelope. If set to 0, the Filter Envelope Generator will have no effect.

KEYBOARD switch: When FULL, the KEYBOARD control voltage (CV) is applied to the filter's cutoff frequency just as it is normally applied to OSC A and OSC B. With the filter thus "tracking" the keyboard, cutoff 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. Obviously, the 1/2 setting selects the midrange between these two effects.

If FILTER RESONANCE is set for self-oscillation (that is, above 7), then switching FILTER KEYBOARD on FULL 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).

If the KEYBOARD switch is toggled while holding keys down, the effect will not be heard until the key is restruck.

7-6 ENVELOPE GENERATORS

Each voice contains two independent ADSR envelope generators: one controls filter cutoff frequency (through the ENVELOPE AMOUNT knob), the other controls the amplifier gain. An "envelope" is a specific dc voltage which changes value over time at a rate adjusted by the ATTACK, DECAY, and RELEASE knobs. As the envelopes are generated with each keystroke, they "contour" the voice timbre and dynamics, animating the otherwise raw waveshapes which come from the mixer.

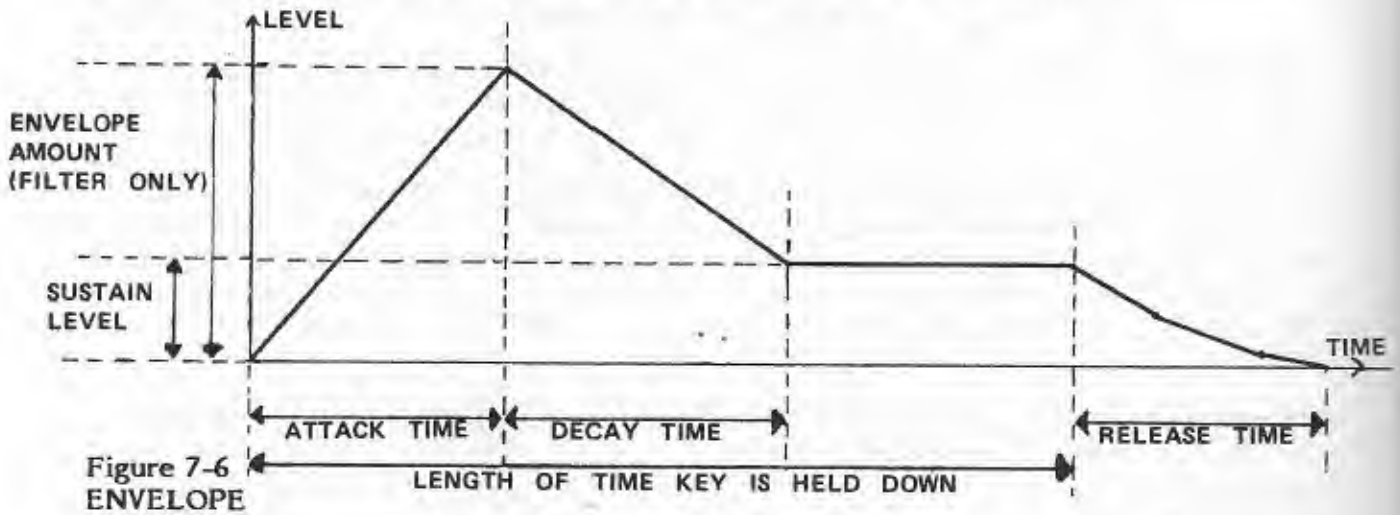


Figure 7-6 ENVELOPE

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. These periods can each range from zero to about 9 seconds, during which time the envelope voltage rises to its full value, then falls (decays) to the level set by the SUSTAIN knob, where it remains until the key is released. When the key is released, the gate goes off and the envelope voltage drops to zero at a rate set by the RELEASE knob.

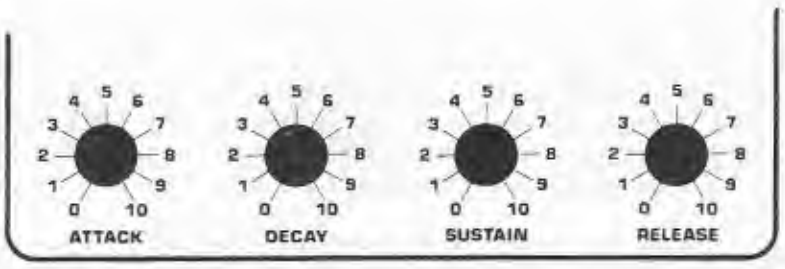


Figure 7-7

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

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

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.

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.)

RELEASE knob: Adjusts the length of time for the envelope 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 envelope to drop to zero from 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.

7-7 AMPLIFIER

The sole amplifier controls are the envelope generator ATTACK, DECAY, SUSTAIN, and RELEASE knobs, which shape the envelope applied to the VCA as described above. These knobs control the note dynamics.

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

To prevent an audible click caused by the instantaneous closing of the amplifier, the RELEASE knob should normally be set slightly above 0.

7-8 LFO-MOD

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. Modulation systems thus free the hands for playing the keyboard.

The Prophet-600 contains two distinct modulation systems: LFO-MOD and POLY-MOD. Modulation involves the signal-generating source and the modulated destination. The difference between these two systems is that LFO-MOD uses a single low-frequency oscillator (LFO) as source, while POLY-MOD is called polyphonic because it uses six (or twelve) sources within each voice itself.

The LFO-MOD depth is set by a combination of the programmed INITAL AMOUNT setting, and the MOD wheel, during performance.

Figure 7-8

FREQUENCY knob: Adjusts LFO frequency from about ¼ to 20 Hz.

SHAPE switch: Selects a triangle wave, for vibrato, or a square wave, for trills.

INITIAL AMOUNT knob: Programs modulation depth independently of the MOD wheel.

FREQ A-B switch: Applies modulation to both oscillator frequencies.

PW A-B switch: Applies modulation to pulse width of both oscillators.

FILTER switch: Applies modulation to filter cutoff frequency.

MOD wheel: A non-programmable performance control which, in conjunction with the INITIAL AMOUNT knob, determines the modulation depth.

7-9 POLY-MOD

The POLY-MOD system provides routings within each voice for two sources, the filter envelope generator or OSC B, to modulate two destinations: OSC A or filter cutoff frequency. Although the routings are exactly the same for each voice, the modulated result will be different, for example, because each OSC B source will be at a different frequency. This is in direct contrast to the effect of LFO-MOD, where one signal is applied equally to all voices, yielding the same effect from note to note.

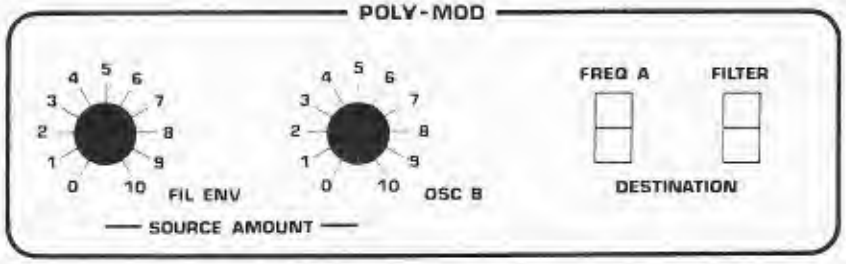


Figure 7-9

FIL ENV knob: Adjusts level of filter envelope generator source.

OSC B knob: Adjusts level of OSC B source.

FREQ A switch: Selects OSC A frequency destination.

FILTER switch: Selects filter cutoff frequency destination.

OSC B (through POLY-MOD) will be useful for creating clangorous sounds such as bells, chimes, percussion, and "ring modulation" effects.

Various pitch and timbre sweeps can be obtained, using the filter envelope generator to modulate FREQ A.

Note that the FILTER switch is a redundant path for the the filter envelope--which is already controlled by the ENVELOPE AMOUNT knob. This path is provided so that OSC B can modulate the filter. Therefore the POLY-MOD FIL ENV knob does not operate through the POLY-MOD FILT switch.

8-0 INTRODUCTION

The Prophet-600 microcomputer transforms the instrument's sonic identity into digital data stored in semiconductor memory (RAM). The cassette interface enables this sonic data to be transfered to and from common audio cassettes, enabling you to build up an unlimited stock of programs and sequences. It then becomes easy to change the 600's vocabulary at any time, since reprogramming by tape takes less than 2 minutes (for all programs or sequences). This means if a Prophet-600 is going to be at your destination, you can leave your 600 home and bring only the cassettes you need to personalize the instrument. However, the most important benefit of tape storage is program protection from accidental erasure, component failure, or instrument damage.

The 100 Factory Programs and two demonstration sequences are included on a cassette with each Prophet-600. Inasmuch as the Factory Programs provide many points of departure for editing into custom sounds, we suggest making a backup copy of this cassette as soon as you learn how to use the interface.

The cassette interface has three modes of operation. It is possible to separately store a) all 100 programs, b) groups of ten programs, and c) both sequences. The procedure for saving and loading is basically the same for all modes.

8-1 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 a portable for specific use with the Prophet-600, here are some features to look for:

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 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 not a 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 audio tape formulations may not be 100% dropout tested, we recommend the use of

high-fidelity cassettes because they generally have tough emulsions and solid 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.

8-2 PRECAUTIONS

Assume that it is always possible for a computer error to occur. You don't have to always have 100 perfect programs and two sequences before storing them. Backup any program or sequence into which you've invested time which you don't want to spend in rework.

It is best to use two different backup cassettes, alternately saving to one, then the other. This protects you from mechanical failures of a cassette.

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

Protect "permanent" programs and sequences from accidental erasure by removing the "write protect" tab on the back of the cassette.

Be careful with cassettes. Do not touch the tape itself (with your oily fingers). Don't leave them in direct sunlight or freeze them overnight in a car.

Make sure there is no tape sticking out of the cassette when inserting into recorder.

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

Don't copy tapes between recorders. Instead load the master into and record the copy from the Prophet-600.

Clean and demagnetize your recorder every 10 - 20 hours.

Protect cassettes from the (slight) possibility of magnetic transients by removing them from the recorder when switching its power on or off.

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).

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 a single recorder operated at one time from batteries and another time from an AC-supply.

18. If verification fails a second time try re-recording a file, by repeating from step 2.

19. If the tape will still not verify, try different record and playback levels or try a new cassette.

20. It is possible to store several program or sequence files 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, "600 file number 4, containing 100 string programs, follows in ten seconds."

8-4 LOADING PROGRAMS OR SEQUENCES FROM TAPE

1. Connect recorder to Prophet-600 as diagrammed on page 1-3.

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

3. Check playback level. For portable recorders, the rule-of-thumb for playback level into the FROM TAPE jack is about 75% of full volume. The interface is difficult to overdrive (but it can happen).

4. Switch the Prophet-600 RECORD switch on.

5. Place recorder into play mode and wait 2 seconds for the sync tone.

6. If loading all 100 programs, proceed to step 9.

7. If loading a group of ten programs, press one just one PROGRAM SELECT, which signifies the destination of the ten programs. For example, if you select "8," the stored programs will be loaded into location 80 - 89. Proceed to step 9.

8. Press the FROM TAPE switch. The control panel will go dark, except the FROM TAPE LED will be lit.

9. To load both sequences, press either SEQ 1 or 2 within three seconds of having switched FROM TAPE on.

10. When the FROM TAPE LED goes out, stop the recorder. With tape loading completed, the Prophet enters its TUNE routine and will "come-up" with program 00 after a few seconds.

11. If the FROM TAPE LED instead blinks, a tape error has occurred. Try loading again, by repeating from step 2.

The Prophet-600's TUNE system has a wide enough range to correct all but the most grossly out-of-tune oscillators and filters. Periodic adjustment may nevertheless be required.

> **CAUTION!** We have provided this scaling procedure information because it may be needed in an emergency. This does not change the fact that you void your warranty when you open the case. If you doubt your ability to perform this procedure, please refer your instrument to a qualified service center, or contact the SCI Service Department.

A poorly-tuned machine exhibits greater "beating" between voices, particularly as the PITCH wheel is rotated to its extremes. Oscillator and filter scaling is simplified through the use of a special routine which can be activated only after the instrument is opened up. To scale the oscillators and filters:

1. Warm-up the instrument thoroughly. Switch power off.

2. Remove the 2 upper screws from both wooden side panels.

3. Lift up the front panel.

4. See Figure 9-0. Locate TP301 SCALE, and jumper it to adjacent +5V TP.

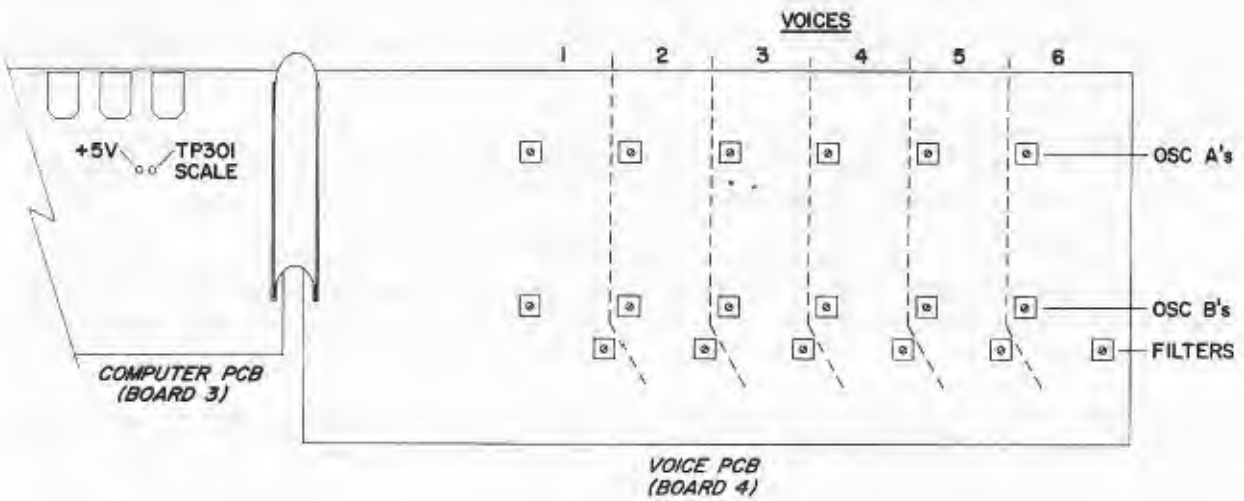


Figure 9-0
SCALING ADJUSTMENTS

5. Switch power on.

6. For the remainder of the procedure hold the front panel or arrange it so the TO and FROM TAPE LEDs can be viewed, yet there remains enough access to adjust the eighteen voice trimmers.

7. Either the TO TAPE or FROM TAPE LED will be lit, and the SEQ 1 LED is lit. The system is now waiting for you to trim OSC 1A. As shown in Figure 9-1, six control switches now serve to indicate which voice is being scaled. SEQ 1 being lit means that Voice 1 should now be trimmed.

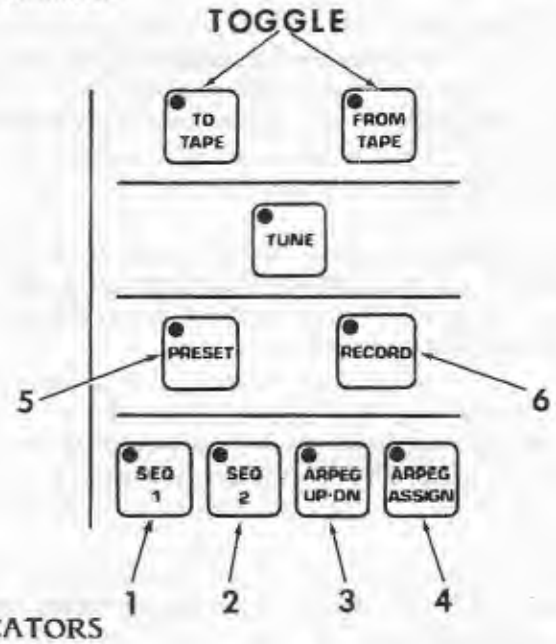


Figure 9-1
VOICE SCALING INDICATORS

8. As you turn OSC 1As scaling trimmer, the TO and FROM TAPE LEDs will toggle. Set the trimmer near the toggle point. You may be able to discern two toggle points, as the trim is attempted clockwise, then counterclockwise. Either point will do, with the midpoint between them slightly preferred. Basically, you want to "encourage" the lights to toggle.

9. When OSC 1A is scaled, press any PROGRAM SELECT 1-6, to move on to OSC 2A. The SEQ 2 LED will light, to indicate that Voice 2 should be trimmed.

10. Scale OSC 2A, then press any PROGRAM SELECT 1-6 to move on to 3A through 6A. After OSC 6A, trim OSC 1B-6B (the second row of trimmers), then Filters 1-6 (the third row). Note that when tuning filters, there is a slight delay before each voice trimmer will respond.

11. After Filter 6 is scaled, pressing any switch 1-6 exits the scaling routine, activates TUNE, then enters Preset Mode.

12. Remove jumper, press TUNE, then verify tuning by playing a few programs.

13. If tuning is acceptable, secure the front panel.

14. If it is desired to immediately exit the scaling routine without advancing through any remaining adjustments, simply remove the TP301 jumper.

10-0 INTRODUCTION

The Prophet-600 is the first commercial synthesizer available with the Musical Instrument Digital Interface (MIDI). This section explains first briefly, then in more detail how to use MIDI and how it is implemented on the Prophet-600. Programmers should also consult the MIDI specification itself and "MIDI Fundamentals" available c/o Sequential Circuits, Inc.

10-1 BASIC OPERATION

1. Switch power off on all equipment to be interconnected.

2. Connect Synth A MIDI OUT to Synth B MIDI IN jack.

3. Switch power on. After TUNE, notes played on Synth A will be played simultaneously on Synth B.

4. To enable Synth A program selections to simultaneously select Synth B programs, hold RECORD and press PROGRAM SELECT 1, on both units.

5. To enable the Synth A MOD and PITCH wheels to control Synth B modulation and pitch, hold RECORD and press PROGRAM SELECT 4, on both units.

6. To reprogram Synth B with a specific sound from Synth A, select the Synth A program, then (on Synth A) hold RECORD and press PROGRAM SELECT 2.

7. Steps 4 and 5 must be performed (if desired) each time power is switched on.

10-2 CONNECTION/INITIALIZATION

The simplest application is to tie two Prophet-600s together, gaining the sonic power of simultaneous programs (Double Mode). MIDI OUT on the "master" is connected to MIDI IN on the "slave" (Figure 10-0). If it is desired to use either keyboard to control the other, a second cable can be added (Figure 10-1). The -600s are smart enough to distinguish information which arises from their keyboard from that which comes in through the MIDI. Each will send what is played on its keyboard or by its sequencer, but they do not "echo" the MIDI IN info over MIDI OUT. This prevents an infinite loop from forming from the slight delays this all takes.

Figure 10-0
SIMPLE CONTROL

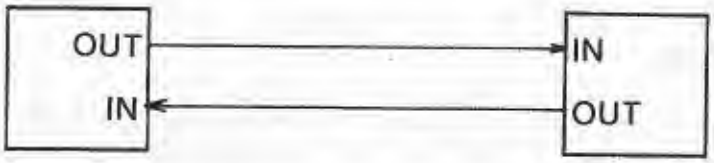


Figure 10-1
DUAL CONTROL

Returning to the simple installation for explanatory purposes, when power is first turned on, both instruments TUNE, then initialize to Omni mode. This means that the master will always be transmitting keyboard and control information on Channel 1, while the slave will be receiving on all channels (even though in this installation Channels 2 - 16 aren't being used).

Both -600s remain in Omni mode, since they are not equipped with Poly or Mono modes.

10-3 KEYBOARD INFORMATION

At this point, any key played on the master will be played simultaneously on the slave. Specifically, suppose middle C on the master is struck. This is a Note On event, transmitted to the slave as a three-byte package where the first byte codes the command and channel numbers, the second byte is the key number, and the third byte is the key velocity. For example: 90H-3CH-40H.

90H 9H= Note On status
0H= Channel 1. Range: 0-FH (Channels 1-16)

3CH = key number 60, middle C. Range: 24-5FH (keys 36/C0 - 96/C5)

40H = velocity 64, the default value since velocity is not implemented.

Because the MSB is set (1), the slave sees the first byte as a status byte. This flag tells the receiver to decode this byte as a command, and prepare for the key number and velocity data bytes which follow.

When the instruction has been completely received, the slave plays middle C and will hold it until one of two kinds of commands are received which turn that specific note off (release).

One way to turn the note off is with a Note On command with velocity set to 0, e.g., 90H-3CH-00H. Actually, the slave receiver has a convenient feature which allows a transmitter to delete unnecessary status bytes. The transmitter can leave out the status byte whenever the status doesn't change. So turning this note off in this way really requires only two bytes: 3CH-00H.

The second way to turn the note off is with the Note Off command, which has a different status, and therefore takes three bytes, whenever it follows a Note On status, e.g, 80H-3CH-40H. The Prophet-600 transmitters always send Note Off commands (rather than Note On/Velocity 0 commands). (Note Off is not redundant. It is needed to define the release velocities of, for example, the Prophet-T8.)

As multiple notes are turned on, the slave will assign its voices just as if the notes were coming from its keyboard. In fact its keyboard can be played normally. It will simply play along with the MIDI input, and "steal" voices if a total of more than six are played.

10-4 PROGRAM SELECT

On power-up, the Prophet-600s select program 00 for themselves. For simplicity, when they are simply interconnected, master and slave program selections are not linked. Instead, one independently selects programs on both the master and slave.

However a coded control function is provided to enable the slave to follow master program changes. To enable MIDI program changes, while holding down the RECORD then press PROGRAM SELECT 1. This must be done on both units (after power-up).

Now whenever the master program is changed, it will transmit the new program number to the slave in two bytes. The status byte again defines the command and channel numbers, while the second byte contains the program number. For example, C0H-62H.

C0H CH= Program Change status
0H= Channel 1

62H = program number 98. Range: 00-63H (programs 00-99)

When the slave receives this code, it switches to its program 98 and plays in whatever sound is stored there.

To disable MIDI program changes, again hold RECORD and press 1.

10-5 MOD WHEEL

Likewise, PITCH and MOD wheel information is also not linked by default, but can be enabled and disabled with a coded function performed on both units (and which links the PITCH wheel as well, see below). Hold RECORD and press 4, on both units. Now whenever a change of master MOD wheel position is detected, a three-byte code will be sent which codes the command, the control number, and the control value. For

example, when the wheel is raised from its off (down) position, the first code sent will be B0H-01H-01H:

B0H BH= Control Change status
0H= Channel 1

01H MOD wheel control address. Range: 00-01H (selects PITCH or MOD)

01H Control value. Range: 00-20H (0-31)

The control value 01H, of course, is the first increment of MOD wheel increase above 00. In the slave, this amount is added to the current values of the slave's MOD wheel and INITIAL MOD AMOUNT pots to establish the total depth of modulation.

10-6 PITCH WHEEL

Like the MOD wheel, master PITCH wheel control over the slave is also disabled on power up, but controlled by the RECORD/PROGRAM SELECT 4 operation. Because it affects pitch, this control needs 8-bits of resolution, therefore two data bytes following the status byte. The pitch wheel value is formatted as a 14-bit signed two's-complement number. For example, when the master PITCH wheel is moved up one increment from center, the code will be E0H-02H-00H:

E0H EH=Pitch Change status
0H=Channel 1

02H Increment of LS byte: 0 p6 p5 p4 p3 p2 p1 p0 (LS 7 bits)

00H No change in MS byte: 0 p13 p12 p11 p10 p9 p8 p7 (MS 7 bits)

Bit p0=0 and bits p9-p13 are sign bits when transmitted by a -600. In the receiver, the 14 bits are shifted as follows:

p13 p13 p12 p11 p10 p9 p8 p7 p6 p5 p4 p3 p2 p1 p0 0

That is, p13 is assumed to be the sign bit and hence is moved into the MS bit. The LS byte is shifted to put the bits in the correct order. For reference, bit p6 equals 1 semitone in the -600. Also note that this pitch value does not go through the auto-tune and as such should not range beyond +/- a 5th, for optimum tuning.

10-7 PROGRAM DUMP

The master -600 can dump programs to the slave, reprogramming the same location by another coded switch function. For example, if program 33 is selected on the master, hold RECORD and hit PROGRAM SELECT 2. The slave's program 33 will be replaced with the master's program. This will happen regardless of the state of either instrument (Preset, Manual, Edit, etc.). Also note that the actual stored program value is sent, even if it has been edited. This means that edited programs must be recorded before they can be sent.

The program dump occurs within the System Exclusive data format. In this example, the code would be F0H-01H-02H-21H-data-F7H:

F0H System Exclusive status

01H SCI's Manufacturer's ID number

02H Defines program dump (Prophet-600).

21H Program number 33. Range 00-63H (programs 00-99).

data 16 bytes of program data, formatted according to Table I.
Sent as 32 4-bit nibbles, right justified, LS nibble sent first.

F7H End-of-Block code terminates System Exclusive status.

Although there is no way to transmit this code from the -600, it will also respond to requests for specific program data. The program dump request takes the form:

F0H System Exclusive status

01H SCI's Manufacturer's ID number

00H Defines program dump request

21H Program number 33. Range 00-63 (programs 00-99).

F7H End-of-Block code terminates System Exclusive status.

When this is received, the -600 will transmit the requested program in the format of Table 1, again regardless of the state of the instrument.

If the receiver sees an incorrect ID number, it will ignore the dump request.

Table 1
PROGRAM BIT MAP

16 bytes of program data

BYTE	MS BIT						LS BIT	
0	B0	A6	A5	A4	A3	A2	A1	A0
1	D0	C3	C2	C1	C0	B3	B2	B1
2	E1	E0	D6	D5	D4	D3	D2	D1
3	F4	F3	F2	F1	F0	E4	E3	E2
4	H0	G5	G4	G3	G2	G1	G0	F5
5	I1	I0	H6	H5	H4	H3	H2	H1
6	J3	J2	J1	J0	I5	I4	I3	I2
7	K4	K3	K2	K1	K0	J6	J5	J4
8	M2	M1	M0	L3	L2	L1	L0	K5
9	O2	O1	O0	N3	N2	N1	N0	M3
A	Q2	Q1	Q0	P3	P2	P1	P0	O3
B	S2	S1	S0	R3	R2	R1	R0	Q3
C	U2	U1	U0	T3	T2	T1	T0	S3
D	V6	V5	V4	V3	V2	V1	V0	U3
E	Z7	Z6	Z5	Z4	Z3	Z2	Z1	Z0
F	ZF	ZE	ZD	ZC	ZB	ZA	Z9	Z8

POT BITS
A=OSC A PULSE WIDTH (7)
B=PMOD FIL ENV AMT (4)
C LFO FREQ (4)
D=PMOD OSC B AMT (7)
E=LFO AMT (5)
F=OSC B FREQ (6)
G=OSC A FREQ (6)
H=OSC B FINE (7)
I=MIXER (6)
J=FILTER CUTOFF (7)
K=RESONANCE (6)
L=FIL ENV AMT (4)
M=FIL REL (4)
N=FIL SUS (4)
O=FIL DEC (4)
P=FIL ATK (4)
Q=AMP REL (4)
R=AMP SUS (4)
S=AMP DEC (4)
T=AMP ATK (4)
U=GLIDE (4)
V=OSC B PULSE WIDTH (7)

SWITCH BITS
Z0=OSC A PULSE
Z1=OSC B PULSE
Z2=FIL KBD FULL (only
Z3=FIL KBD ½ 1 on)
Z4=LFO SHAPE (1=TRI)
Z5=LFO FREQ AB
Z6=LFO PW AB
Z7=LFO FIL
Z8=OSC A SAW
Z9=OSC A TRI
ZA=OSC A SYNC
ZB=OSC B SAW
ZC=OSC B TRI
ZD=PMOD FREQ A
ZE=PMOD FIL
ZF=UNISON

FACTORY PROGRAMS

The Prophet-600 is shipped "ready-to-play," with 100 factory programs. The programs are numbered from 00 through 99. You'll find an extraordinary range of instrumental sounds represented, including some "classics" from the Prophet-5. Most of these sounds were programmed by John Bowen, SCI's Product Specialist, with some help from the SCI staff.

Figure 11-0 maps the locations of the programs in memory, while the remaining diagrams document specific programs. These control diagrams are included to encourage you to familiarize yourself with the Prophet's capabilities.

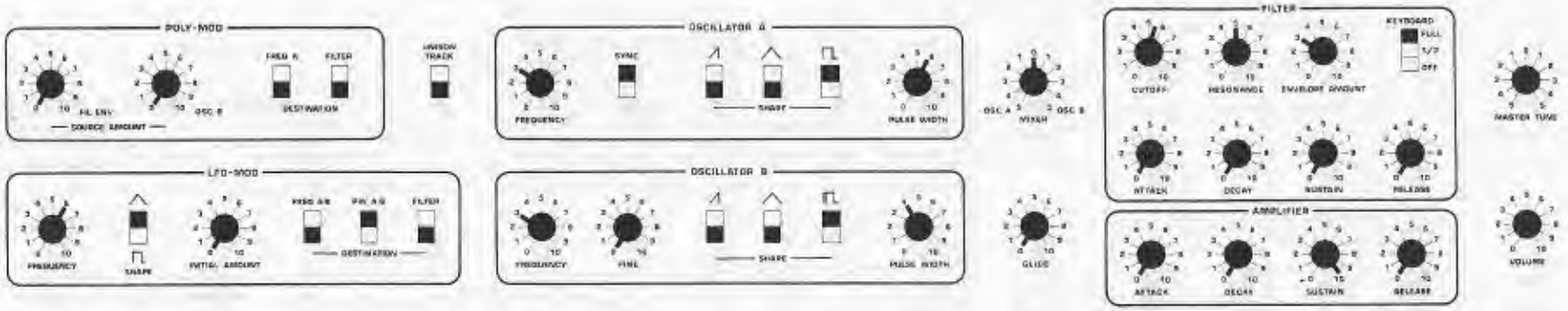
The factory programs are not meant as absolutes but as examples. The programs should serve as starting points for you to create your own sounds. Program editing is often necessary to "fit" the synthesizer into the specific musical context. Seeing how the factory programs are created makes it easier for you to begin editing the various programs to suit your particular needs and tastes. You can always restore the Prophet-600 to its original condition by loading the Factory Programs through the cassette interface. And as you invest time in custom programs, be sure to protect them through cassette storage.

Notes under each program diagram explain the oscillator FREQUENCY knob settings (above 0), effects available when the MOD wheel is advanced, and any other information necessary to create the program.

	0	1	2	3	4
0	ORGAN I	CLASSICAL BRASS	STRINGS	POLY GLIDE I	METALLIC I *
1	ORGAN II	BRASS I	MUTED STRINGS	CLAV I *	PERCUSSIVE ELECTRIC PIANO
2	ORGAN FLUTE STOP	BRASS II	LIGHT STRINGS	CLAV II *	ICE CREAM *
3	ORGAN W/CHORUS	BACH TRUMPET	LOW STRINGS	HARMONICA	WURLIE PIANO
4	CHIFFY ORGAN	BRASS III	ARCO STRINGS	RUNAWAY	HONKY TONK SYNTH *
5	DISTORTED ORGAN	DIGITAL BRASS	HIGH STRINGS	PULSE MOD I	HIGH PLUCKY *
6	CATHEDRAL ORGAN	SLOW BRASS	ARCO BASS VIOL -UNISON-	FROG CITY	DOG'S BARK
7	ORGAN PERCUSSIVE I	B.D.I.'S	R.F.M.	HARMONIUM	METALLIC II *
8	ORGAN PERCUSSIVE II	DETUNED	VOCAL HARMONICA	SQUARE WAVE BUBBLES	METALLIC III
9	FULL ORGAN	FILTER FUNK	BANJO *	CLAV III	PULSE WIDTH MOD III
	0	1	2	3	4

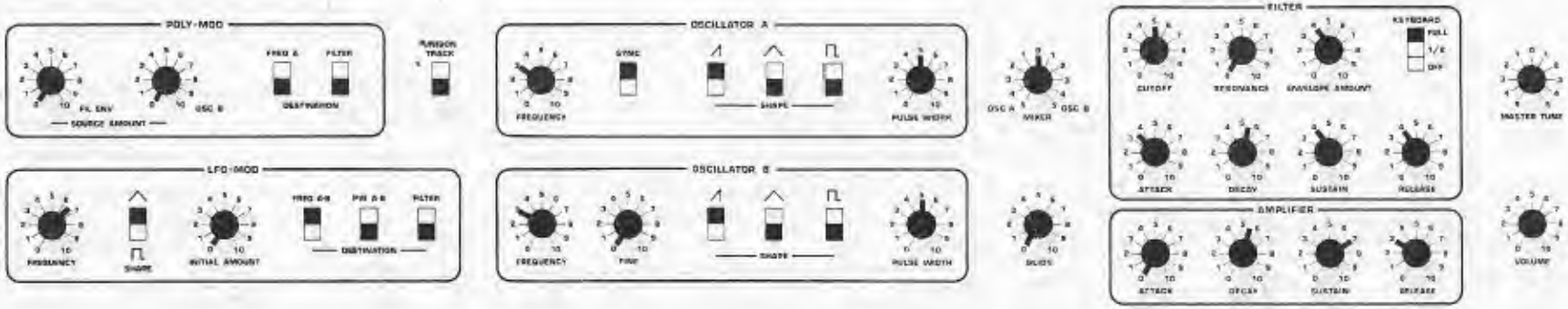
5	6	7	8	9	
TRIANGLE WAVES W/OCTAVE RELEASE	POWER SYNTH	MINI-LEAD -UNISON-	POLY-GLIDE II	VIDEO GAMES	0
FLUTE	HARPSI-CHORD I	SYNC I	CLUB ORGAN	SLEEPING ORGS	1
MUTED *	SYNC II *	FULL BASS -UNISON-	MOVIES	LEECHES FROM SPACE	2
DINKITY -DINK *	BUDDY	CUTTING BASS -UNISON-	ECHO-REPEAT	SCREAMIN' MEMES	3
WHISTLE	ANGELIC SYNTH	HARD LEAD BASS -UNISON-	HARP *	INDIGESTION	4
DESCENDING BELLS	HARPSI-SYNTH	NASAL BASS	XYLO-PHONE *	OBNOXIOUS MOD	5
CAT'S MEOW	SUSTAINED SYNC W/GLIDE	MODOR -UNISON-	TACK SYNTH	GONZOID STEEL DRUMS	6
POLY-MOD PITCH GLIDE	SYNC III *	FAT OCTAVES -UNISON-	LOW PLUCKY *	SPACE RACE -UNISON-	7
JOSEF	PULSE WIDTH MOD II	LUCKY MAN -UNISON-	SUPER PERCUSSION	NOISE SCREAM -UNISON-	8
DRUNKEN SYNTH	TEARS	FIFTHS LEAD -UNISON-	OOPS!	ALIEN -UNISON-	9
5	6	7	8	9	

*=Well-suited for Arpeggiator



00 ORGAN I

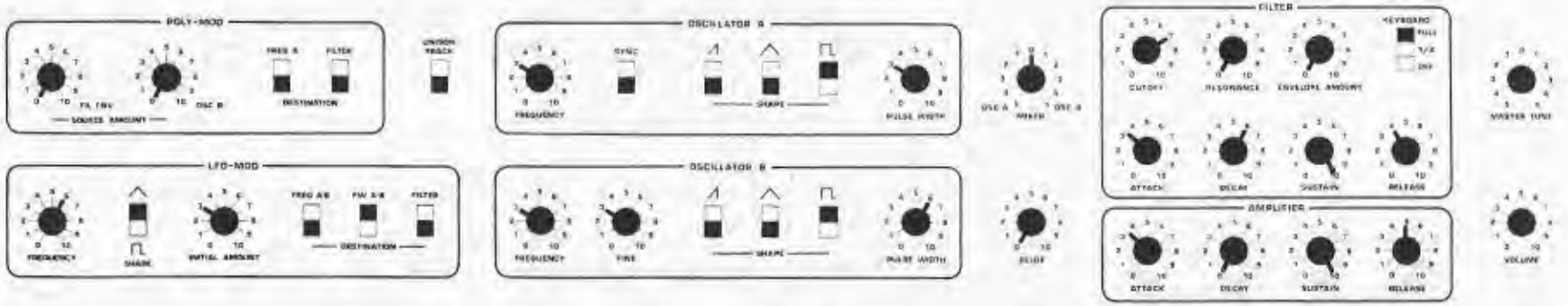
OSC A: 1 octave, square wave
OSC B: 1 octave, 40% pulse
MOD WHEEL: Hammond chorus effect



01 CLASSICAL BRASS

OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: vibrato

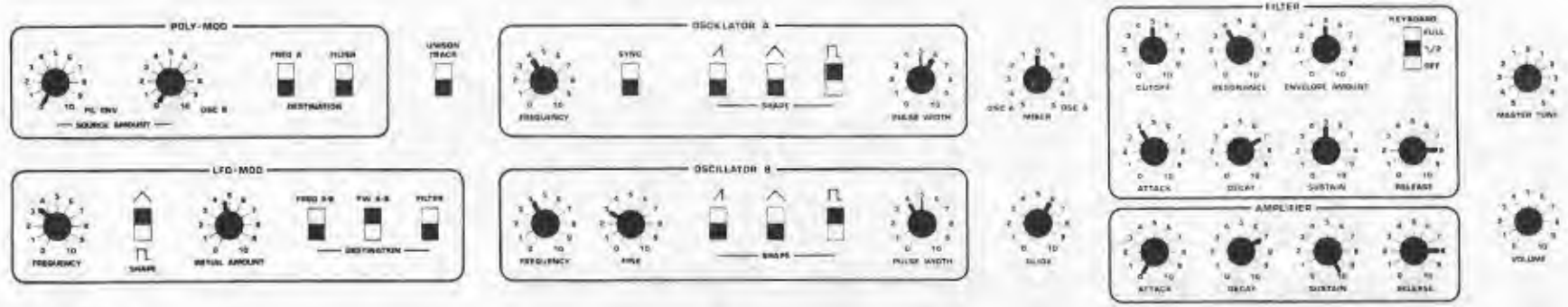
For "brass chorale," switch OSC A SYNC off and detune with OSC B FINE.



02 STRINGS I

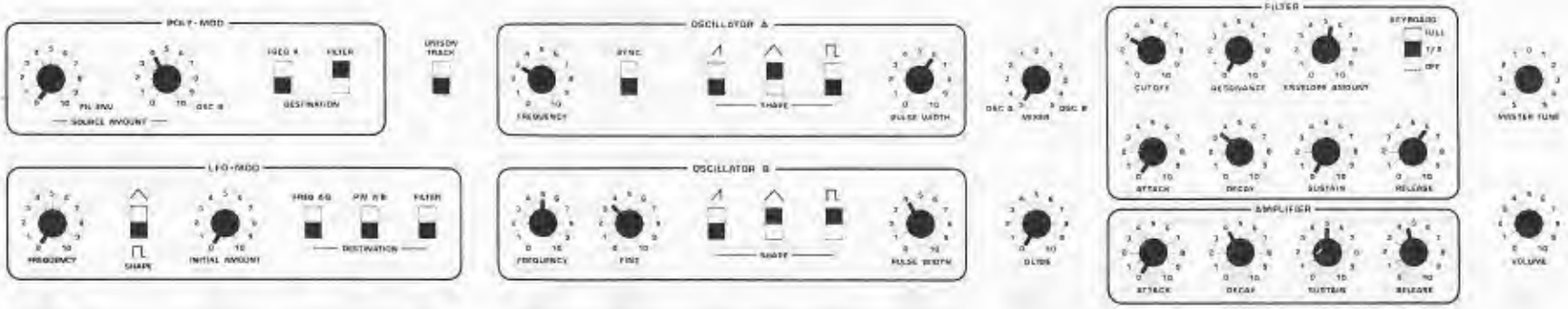
OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: pulse-width (PW) modulation for animation

All of the Prophet-600 string programs use PW modulation to synthesize the varying harmonics created by string sections.



03 POLY GLIDE I

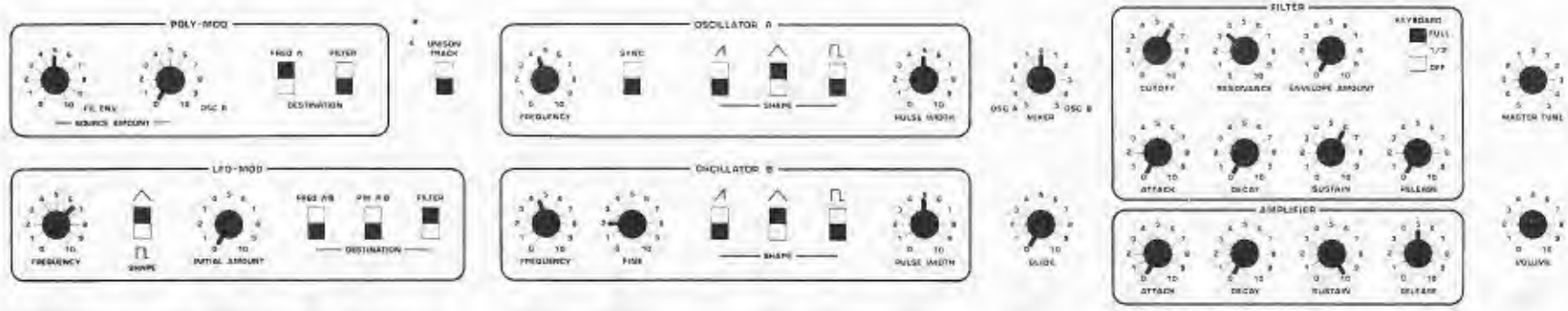
OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL: PW for animation



04 METALLIC I

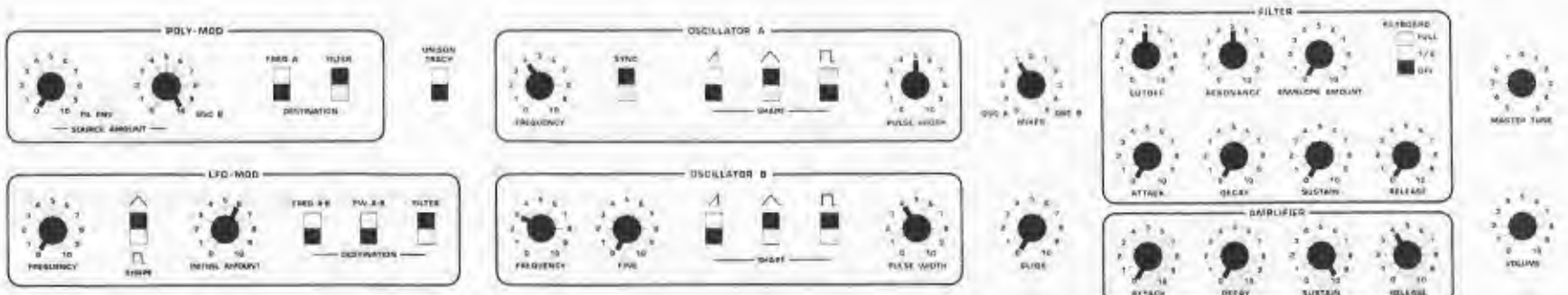
OSC A: 1 octave
OSC B: 2 octaves + major 6th
MOD WHEEL: not used

Well-suited for Arpeggiator



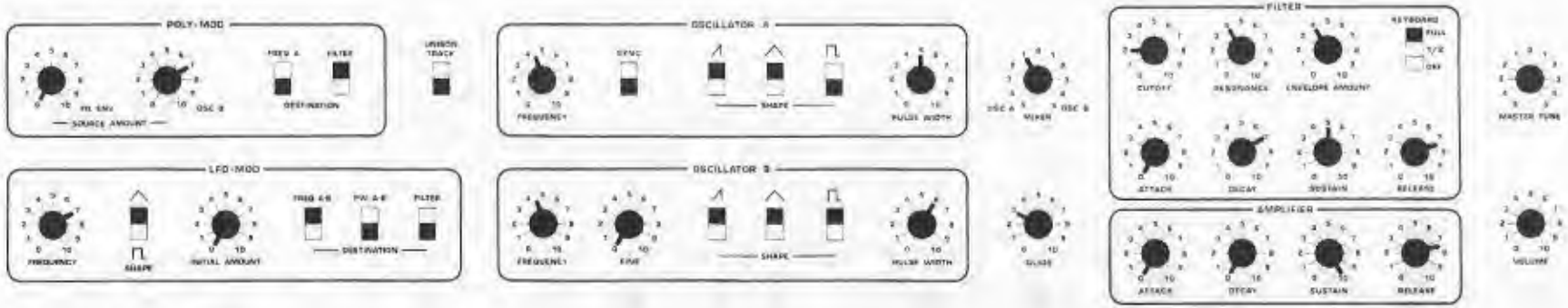
05 TRIANGLE WAVES w/OCTAVE RELEASE

OSC A: tuned at 2 octaves--affected by FILTER SUSTAIN and POLY-MOD FIL ENV.
OSC B: 2 octaves
MOD WHEEL: filter mod



06 POWER SYNTH

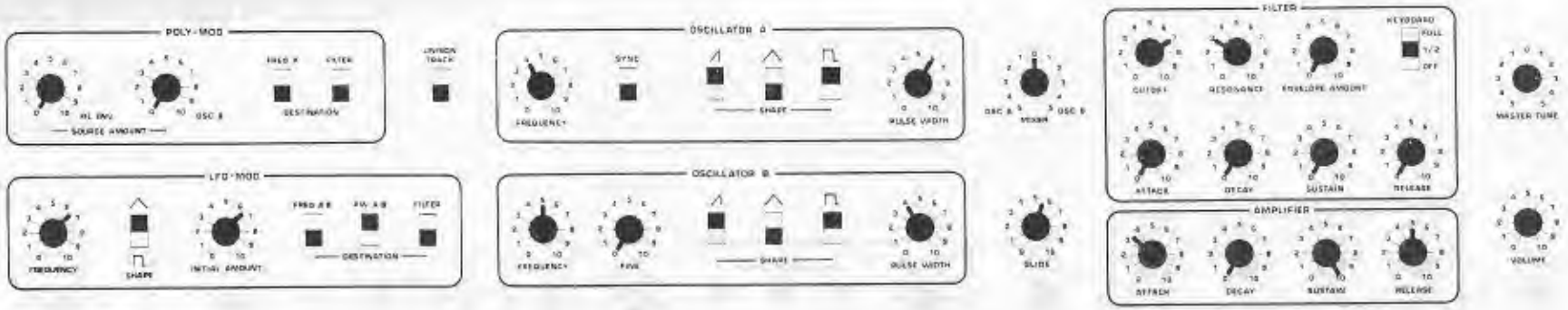
OSC A: 2 octaves
OSC B: 1 octave
MOD WHEEL: filter mod programmed on



07 MINI-LEAD -UNISON-

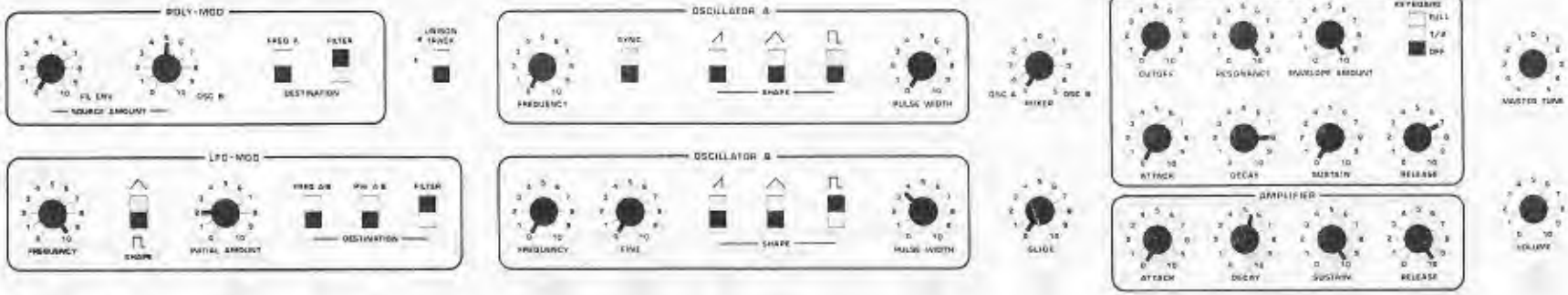
OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL: vibrato

A UNISON lead program.



08 POLY-GLIDE II

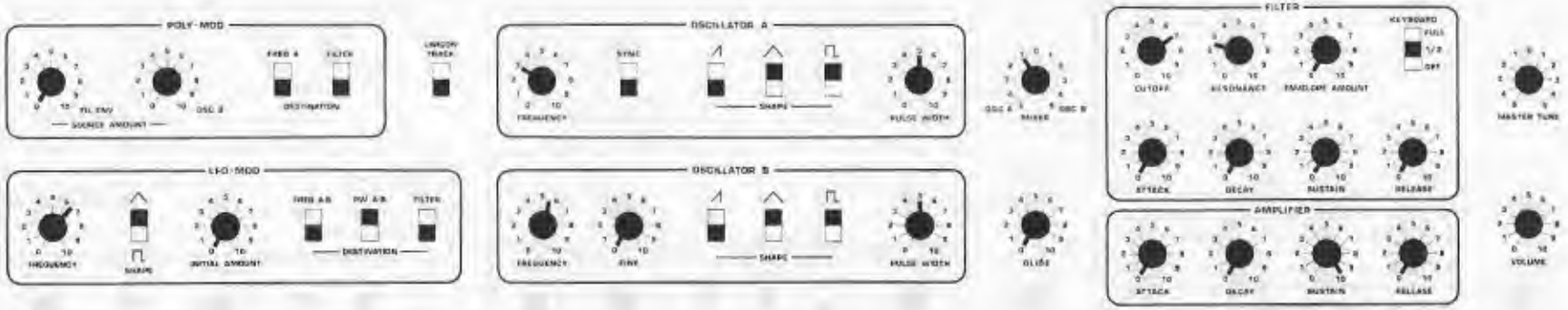
OSC A: 2 octaves
OSC B: 3 octaves
MOD WHEEL: PW mod



09 VIDEO GAMES

OSC A: 0
OSC B: 0
MOD WHEEL:

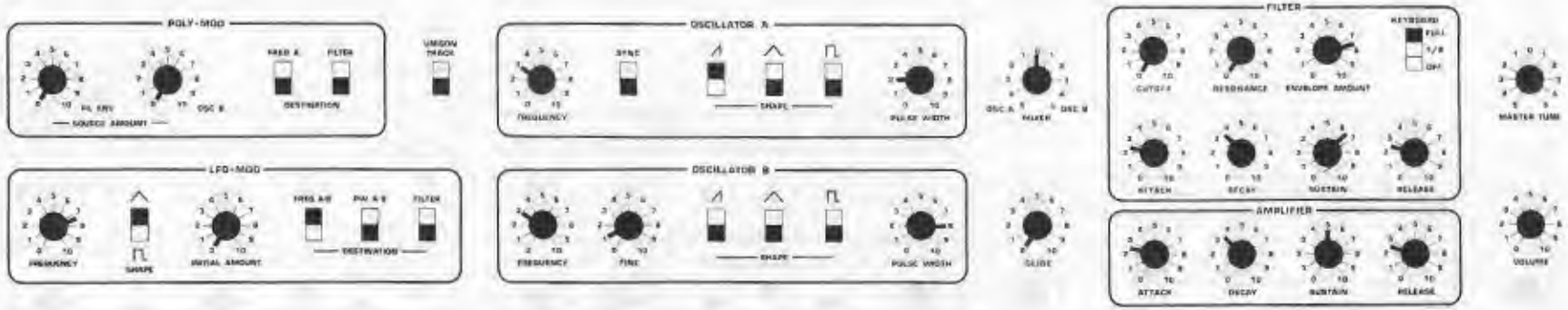
Play low keys.



10 ORGAN II

OSC A: 1 octave
OSC B: 3 octaves
MOD WHEEL: PW mod

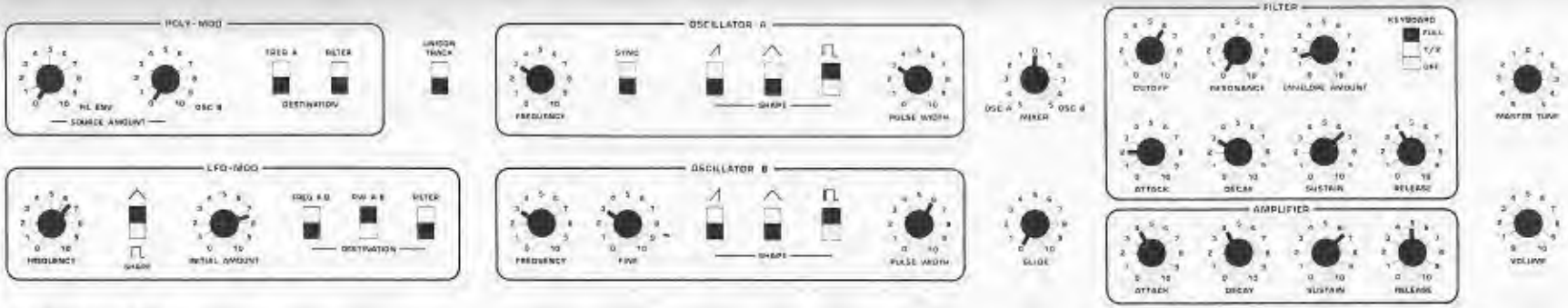
Both oscillator PULSE WIDTHs are adjusted for square waves.



11 BRASS I

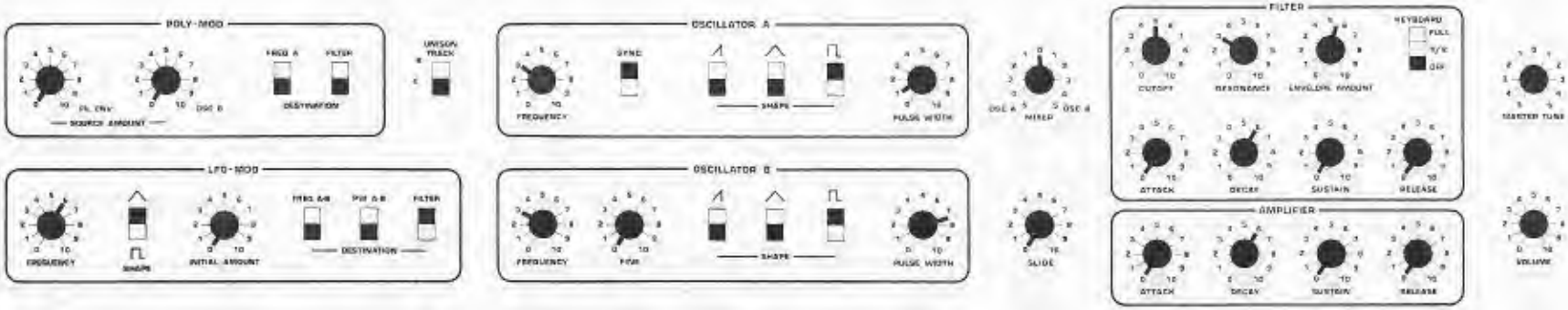
OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: vibrato

For "fatter" sound, switch on OSC B Sawtooth.



12 MUTED STRINGS

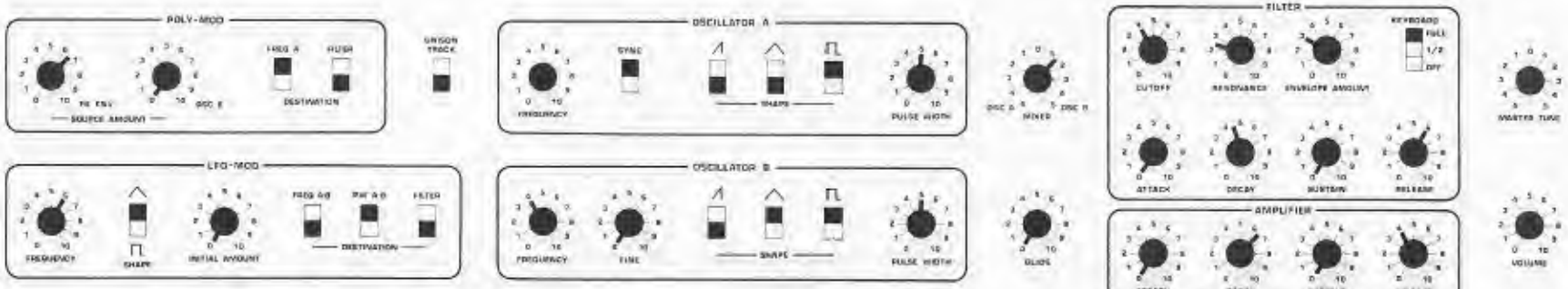
OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: PW mod



13 CLAV I

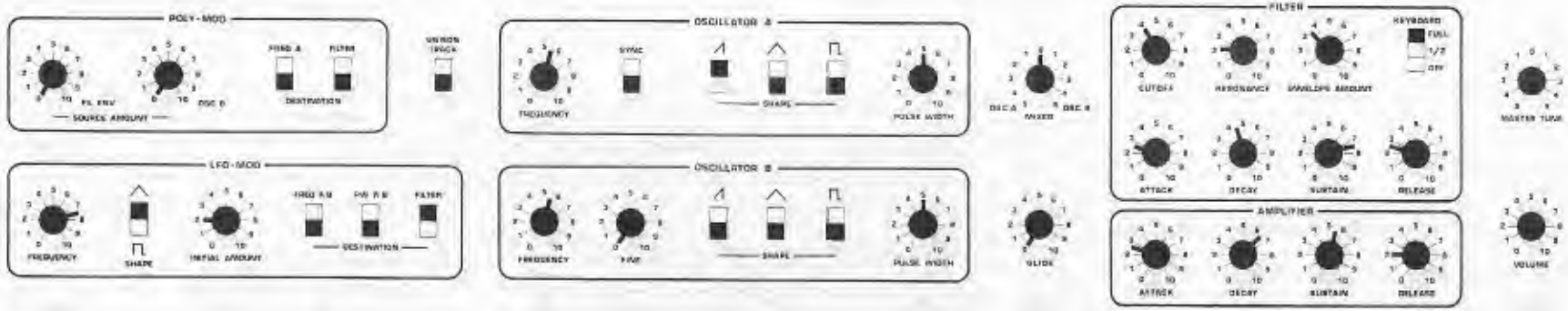
OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL:

For fuller tone, adjust PULSE WIDTHs.
Well-suited for Arpeggiator



14 PERCUSSIVE ELECTRIC PIANO

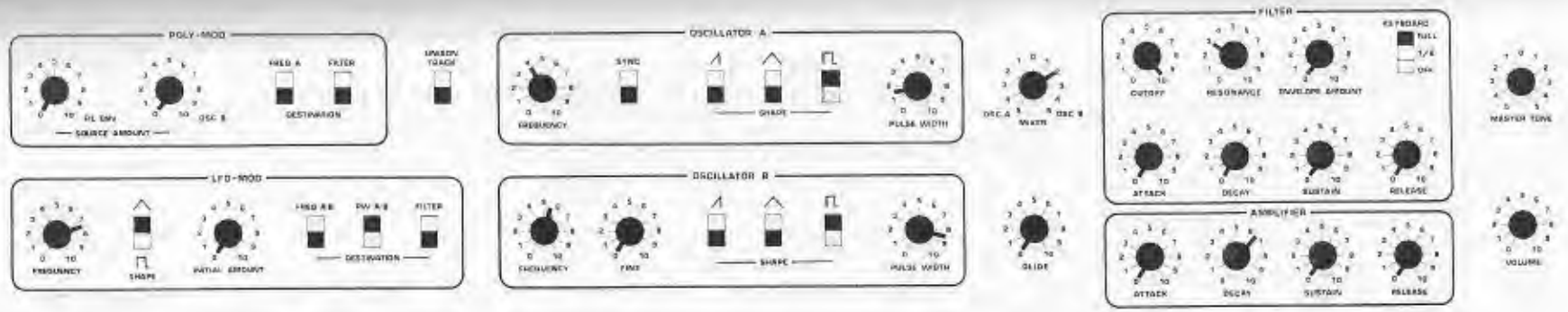
OSC A: 1 octave + 5th (12th)
OSC B: 2 octaves
MOD WHEEL:



15 FLUTE

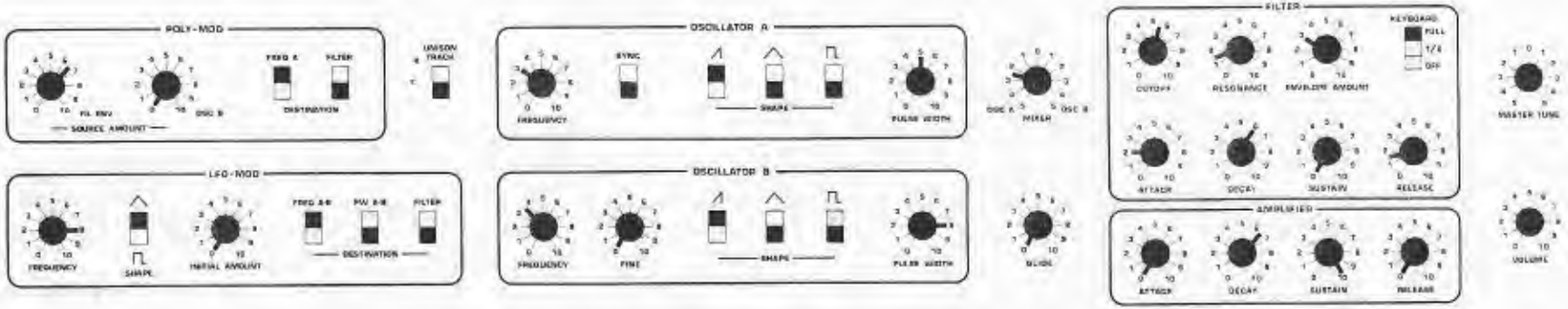
OSC A: 3 octaves
OSC B: 3 octaves
MOD WHEEL:

For fuller sound, switch OSC B Sawtooth on.



16 HARPSICHORD I

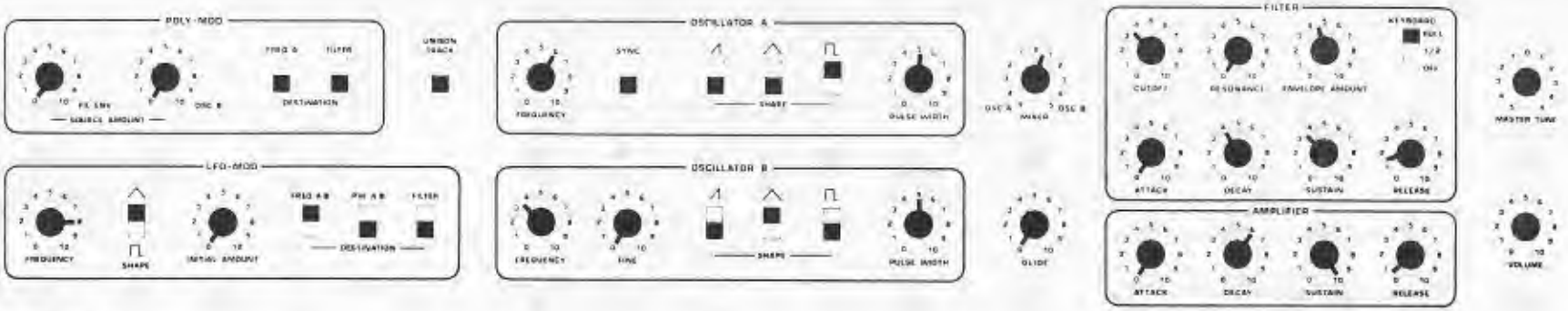
OSC A: 2 octaves
OSC B: 3 octaves
MOD WHEEL: radical pulse-width movement



17 SYNC I

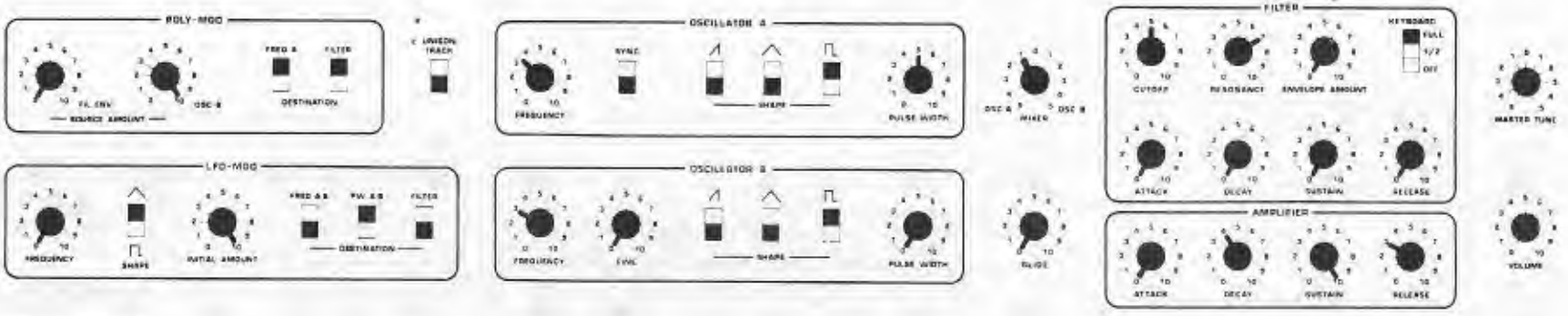
OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL: vibrato

Try UNISON.



18 CLUB ORGAN

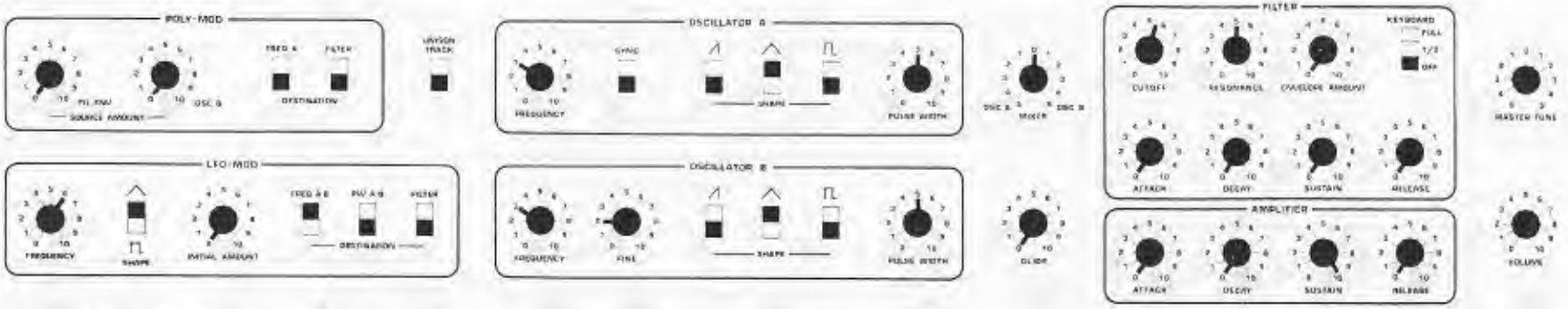
OSC A: 1 octave + 5th (12th)
OSC B: i octave
MOD WHEEL: vibrato



19 SLEEPING ORGS

OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL:

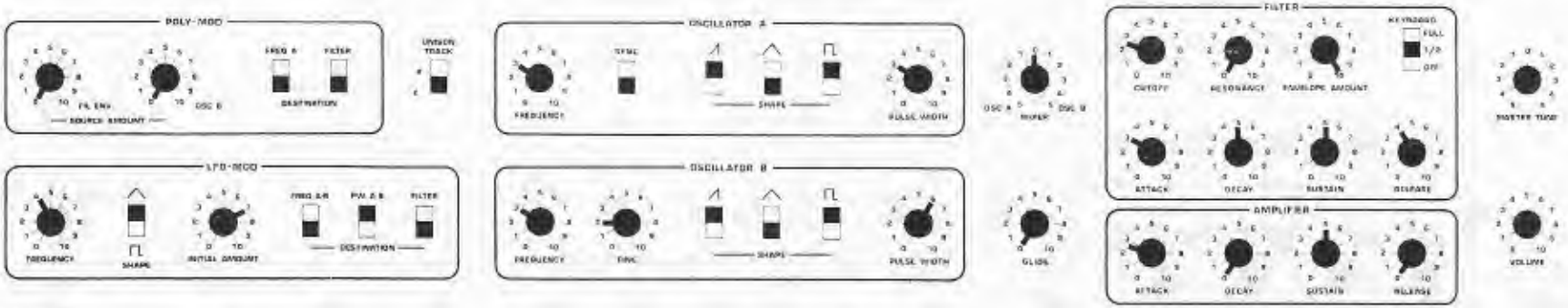
Play in lower register.
Filter is tuned (with CUTOFF knob) 1 octave above OSC A.
As in #67 MODOR, the OSC B pulse wave modulates both OSC A and FILTER FREQ through POLY-MOD. When OSC B PW is set at 0, there is no poly-modulation. The LFO moves OSC B's pulse into action, creating and decreasing the polyphonic



20 ORGAN FLUTE STOP

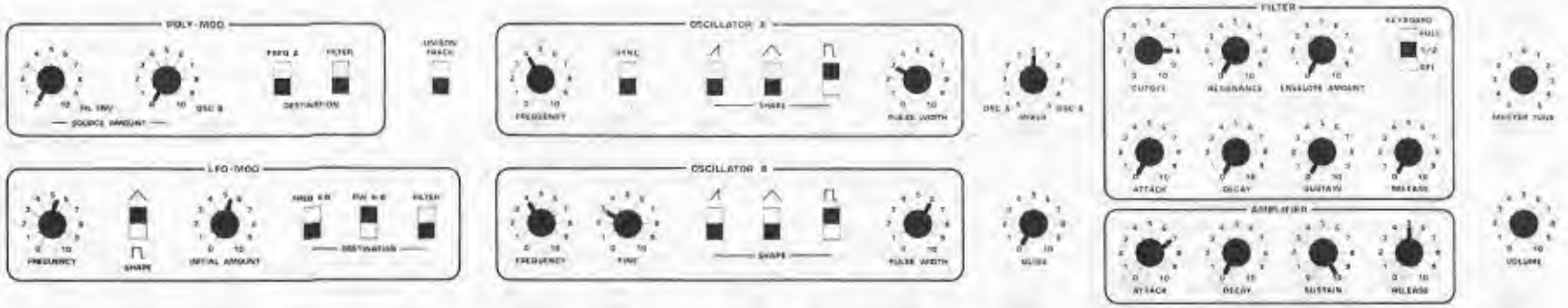
OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: vibrato

The filter is tuned 1 octave + a 5th (12th).



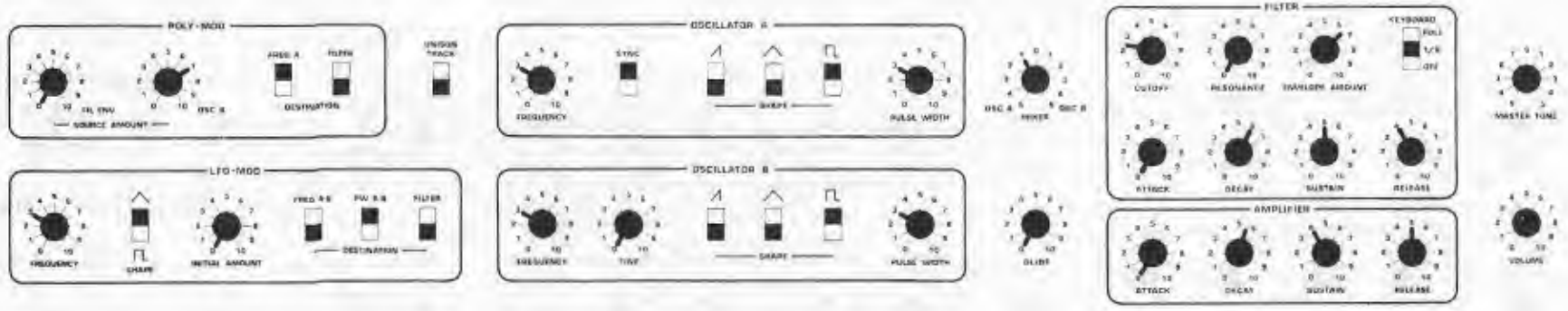
21 BRASS II

OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL:



22 LIGHT STRINGS

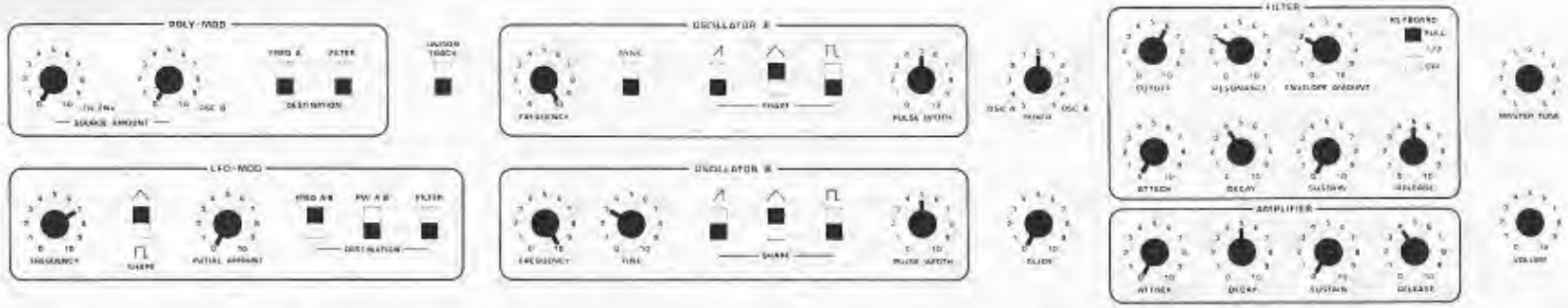
OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL: PW mod



23 CLAV II

OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL:

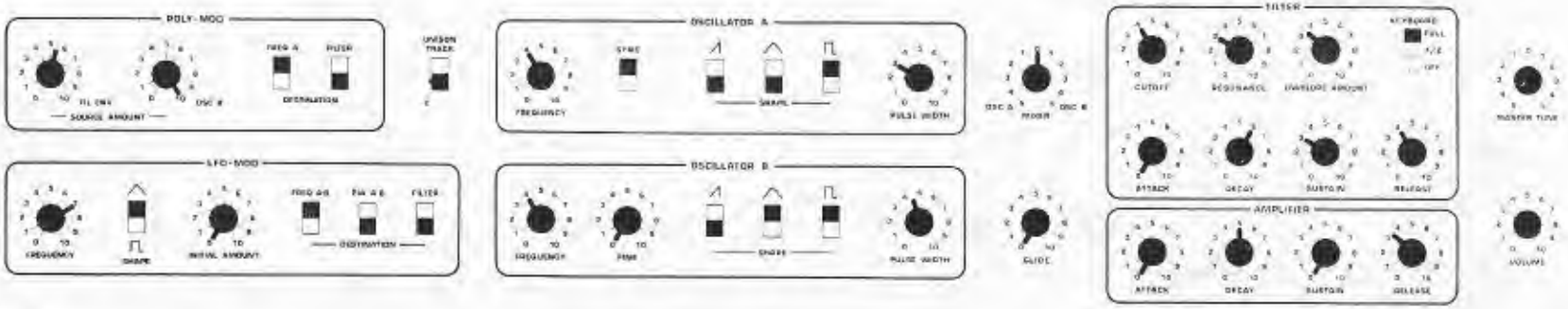
For different timbres, switch sawteeth on.
Well-suited for Arpeggiator.



24 ICE CREAM

OSC A: 4 octaves
OSC B: 4 octaves
MOD WHEEL: vibrato

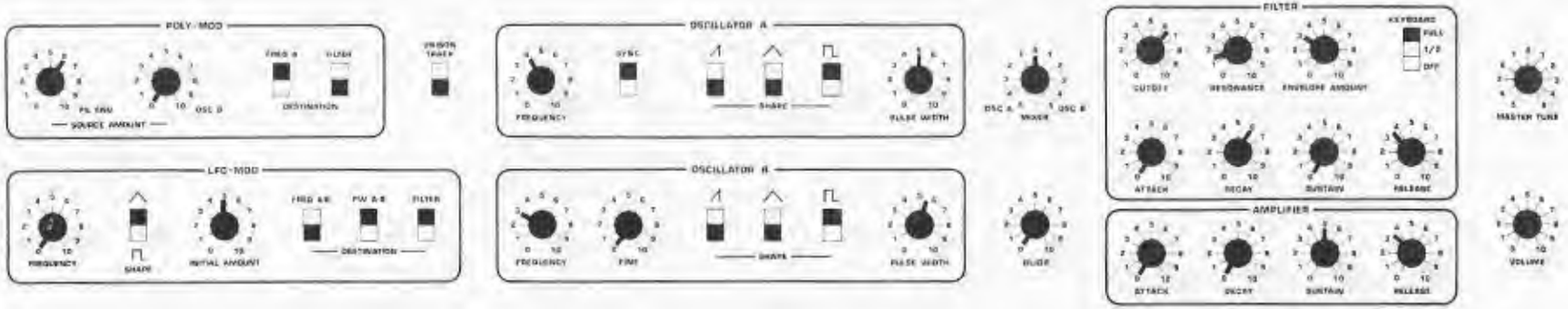
Well-suited for Arpeggiator.



25 MUTED

OSC A: 1 octave + 5th
OSC B: 2 octaves
MOD WHEEL: vibrato

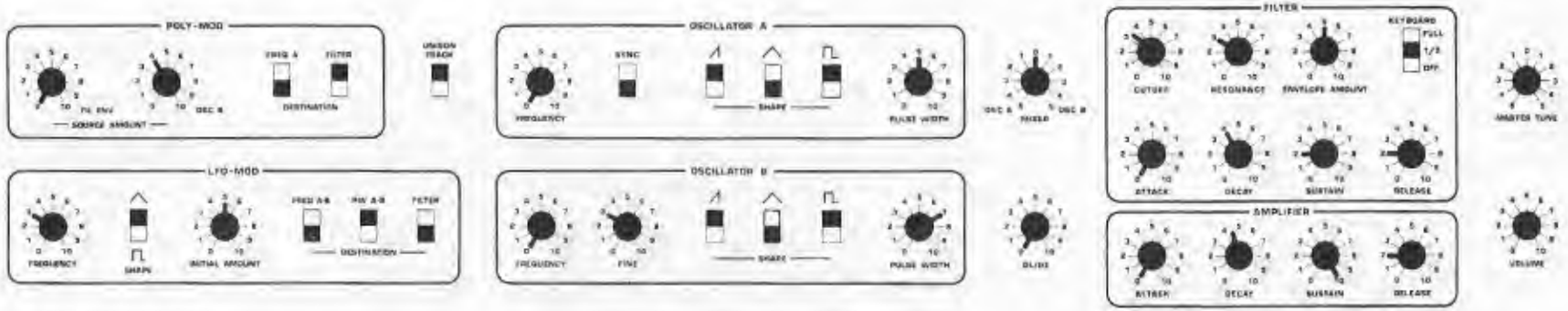
Well-suited for Arpeggiator.



26 SYNC II

OSC A: 1 octave + minor 6th (50% pulse)
OSC B: 1 octave
MOD WHEEL:

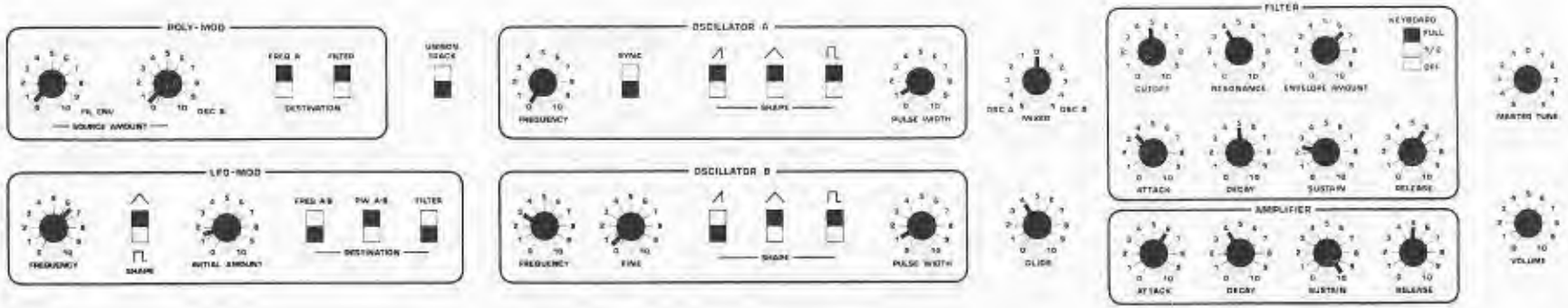
Well-suited for Arpeggiator.



27 FULL BASS-UNISON

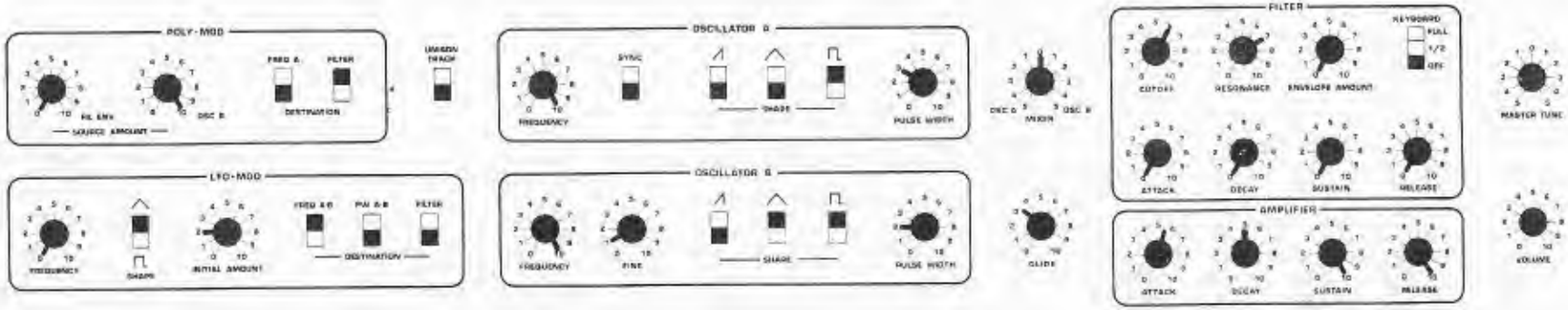
OSC A: 0
OSC B: 0
MOD WHEEL:

A UNISON program.



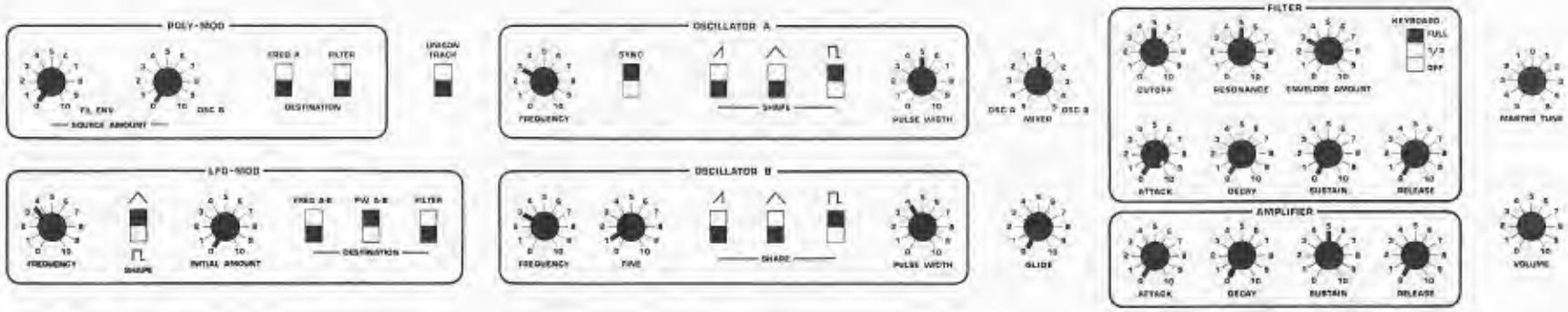
28 MOVIES

OSC A: 0
OSC B: 1 octave
MOD WHEEL: slight PW



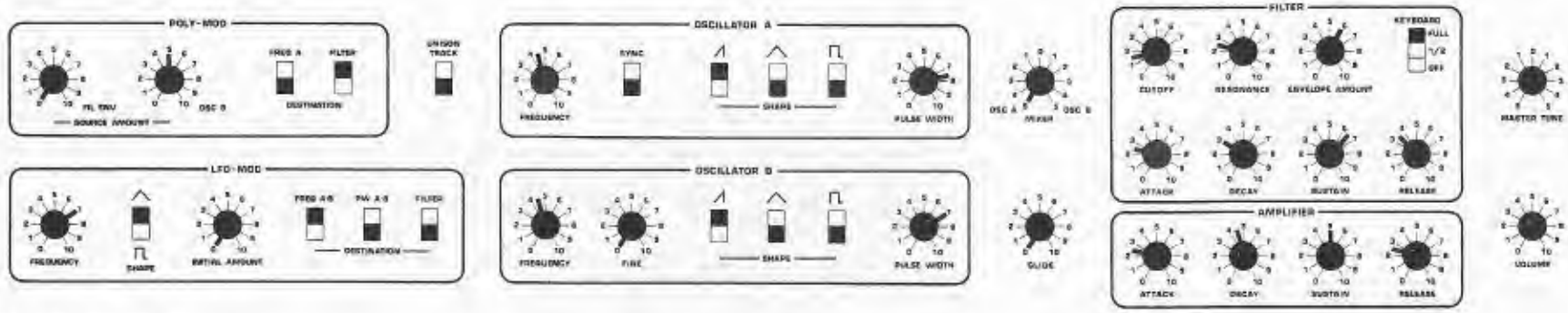
29 LEECHES FROM SPACE

OSC A: 4 octaves
OSC B: 4 octaves
MOD WHEEL: slight slow frequency sweep



30 ORGAN w/CHORUS

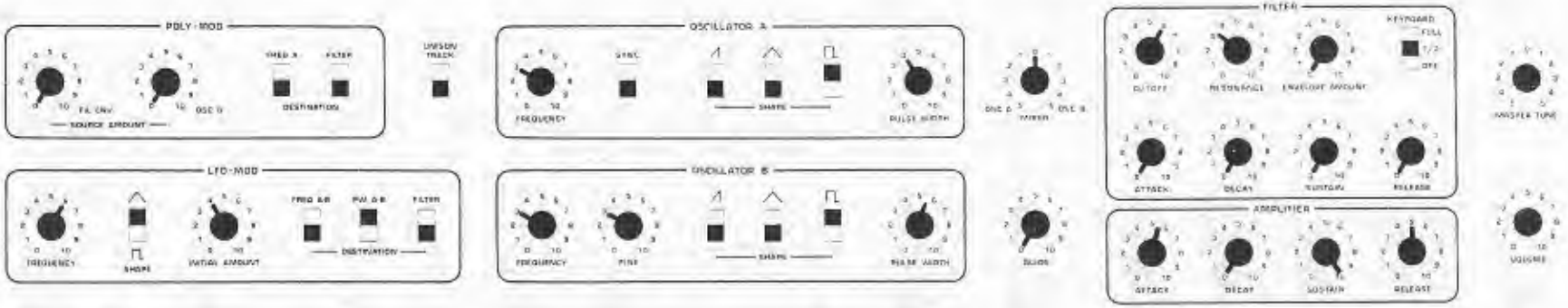
OSC A: 1 octave, (50% pulse)
OSC B: 1 octave (40% pulse)
MOD WHEEL: chorus effect



31 BACH TRUMPET

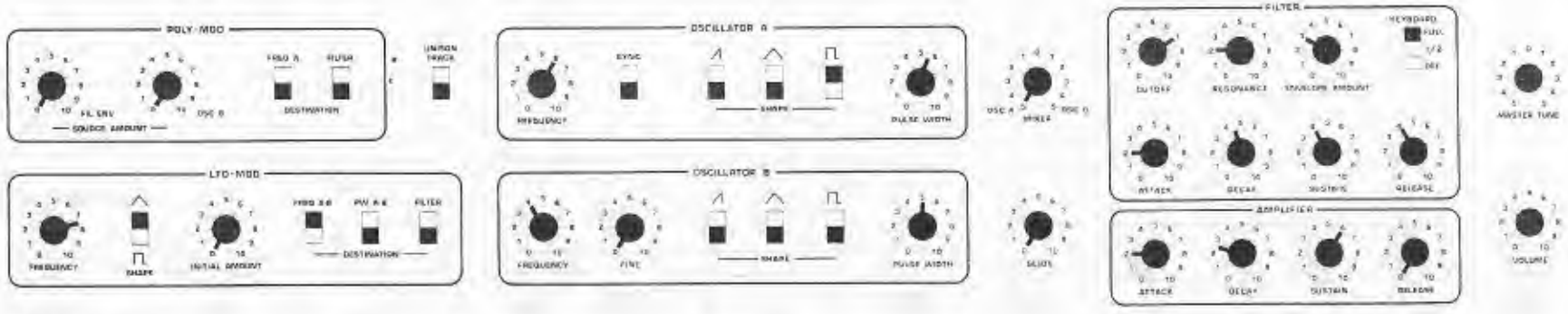
OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL: vibrato

For thinner horn sound, try OSC A pulse (instead of sawtooth).
Well-suited for Arpeggiator.



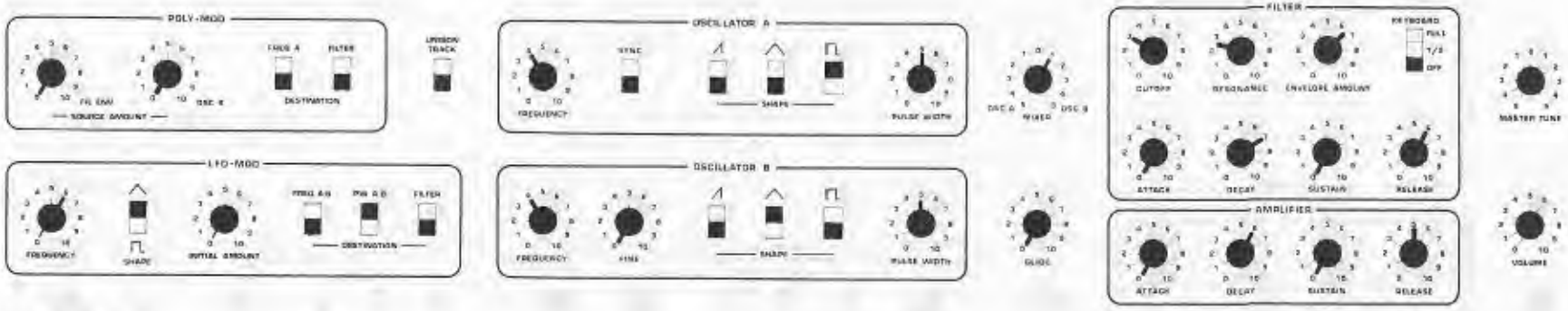
32 LOW STRINGS

OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: PW mod



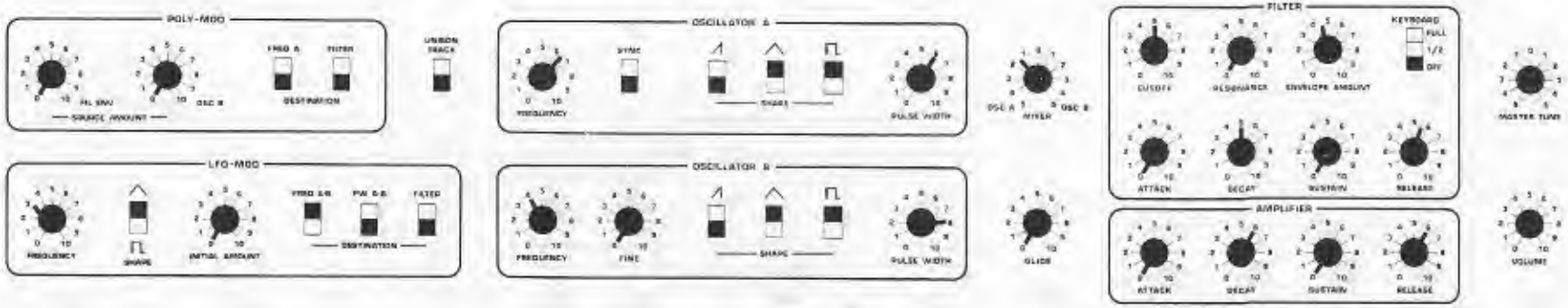
33 HARMONICA

OSC A: 3 octaves + major 3rd
OSC B: 2 octave
MOD WHEEL: vibrato



34 WURLIE PIANO

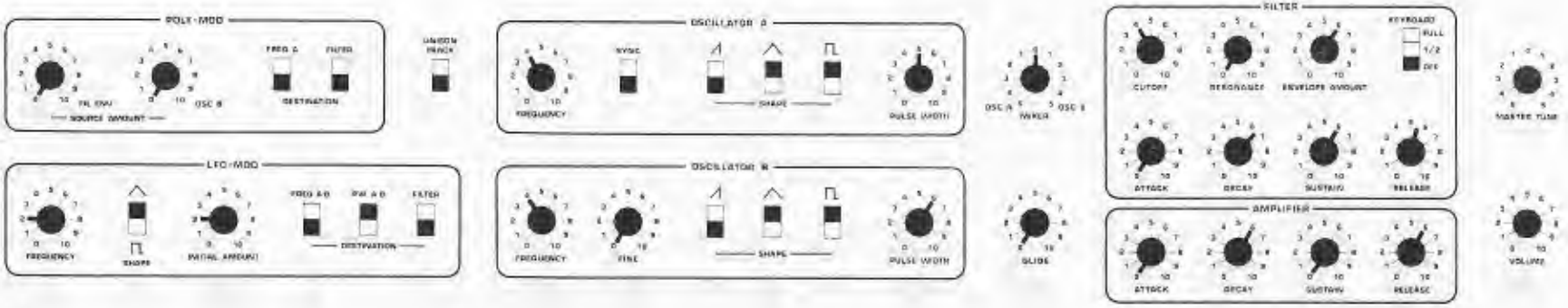
OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL: PW mod



35 DINKITY-DINK

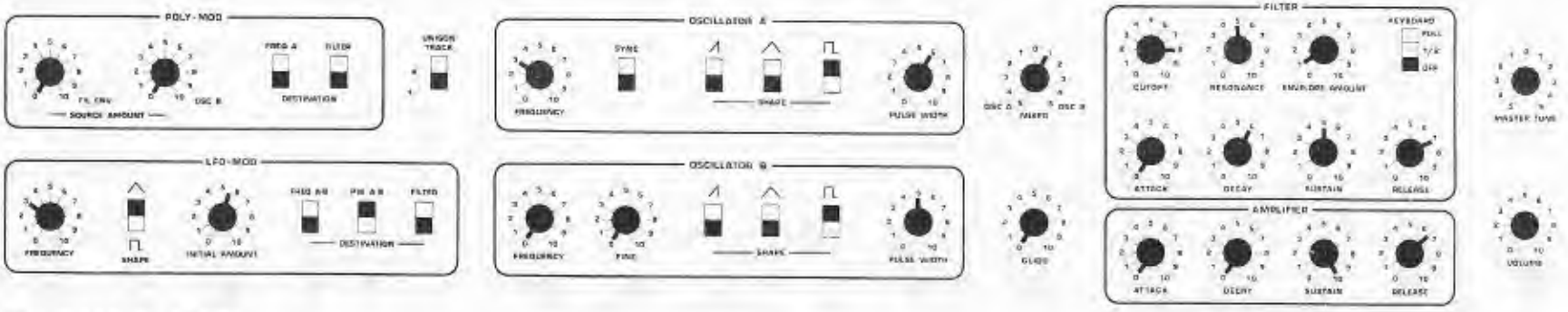
OSC A: 4 octaves
OSC B: 2 octaves
MOD WHEEL: slow vibrato

Well-suited for Arpeggiator.



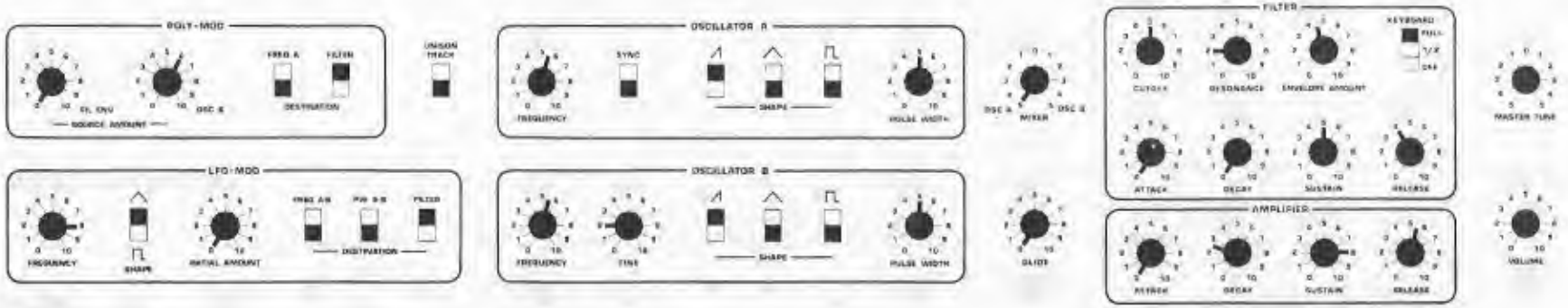
36 BUDDY

OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL:



37 CUTTING BASS-UNISON

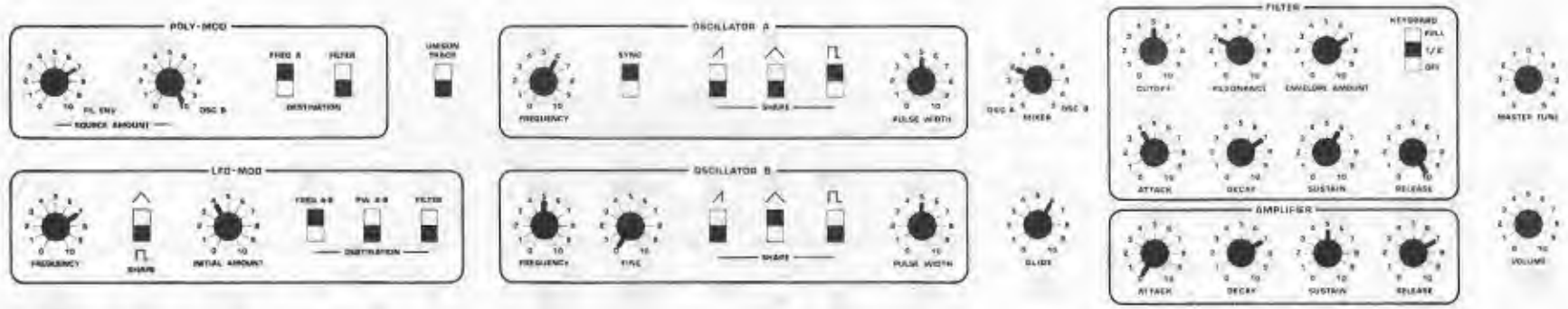
OSC A: 1 octave
OSC B: 0
MOD WHEEL: PW mod



38 ECHO REPEAT

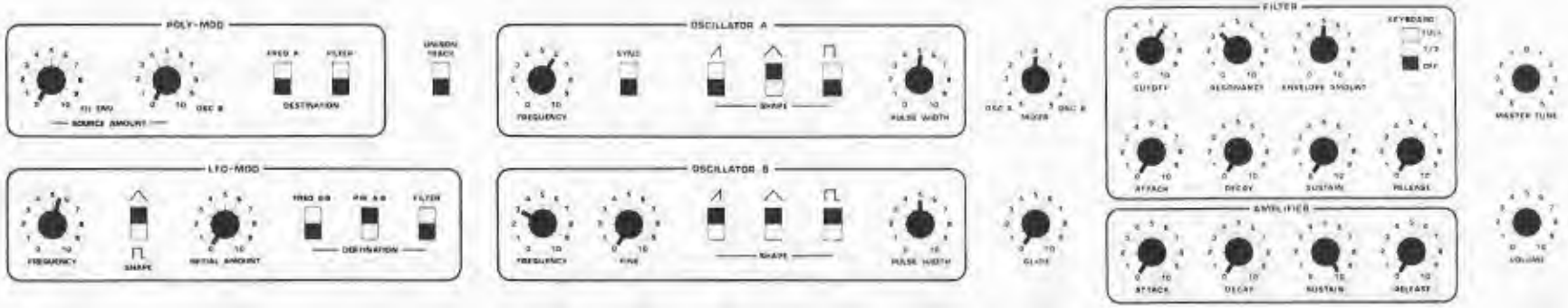
OSC A: 3 octaves
OSC B: 3 octaves
MOD WHEEL: filter modulation

Repeating note is affected by detuning OSC B (with OSC B FINE knob).



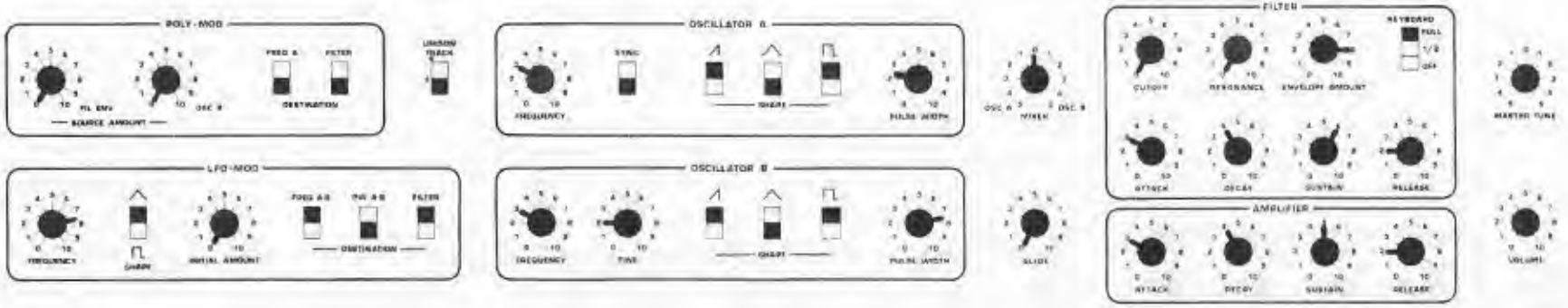
39 SCREAMIN' MEMES

OSC A: 4 octaves
OSC B: 3 octaves
MOD WHEEL: square-wave frequency mod (effect)



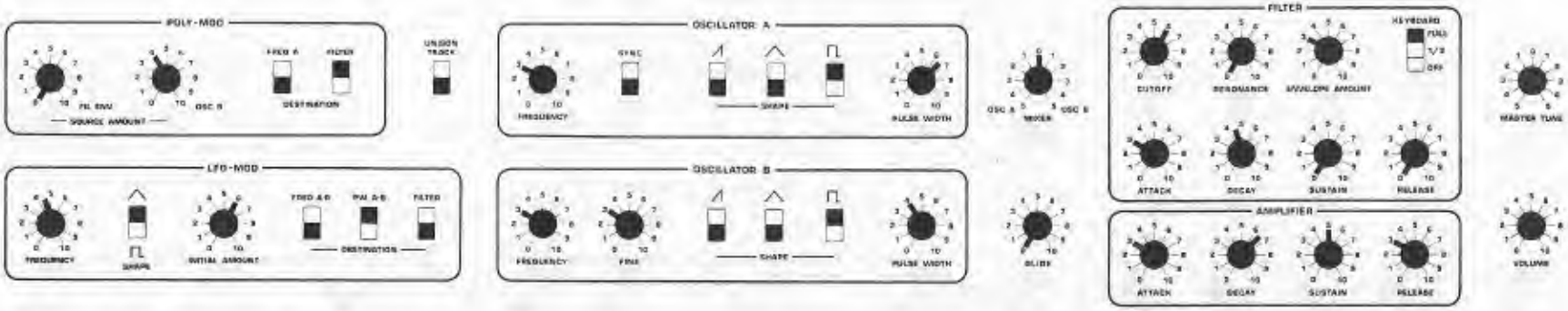
40 CHIFFY ORGAN

OSC A: 3 octaves + 5th
OSC B: 1 octave
MOD WHEEL:



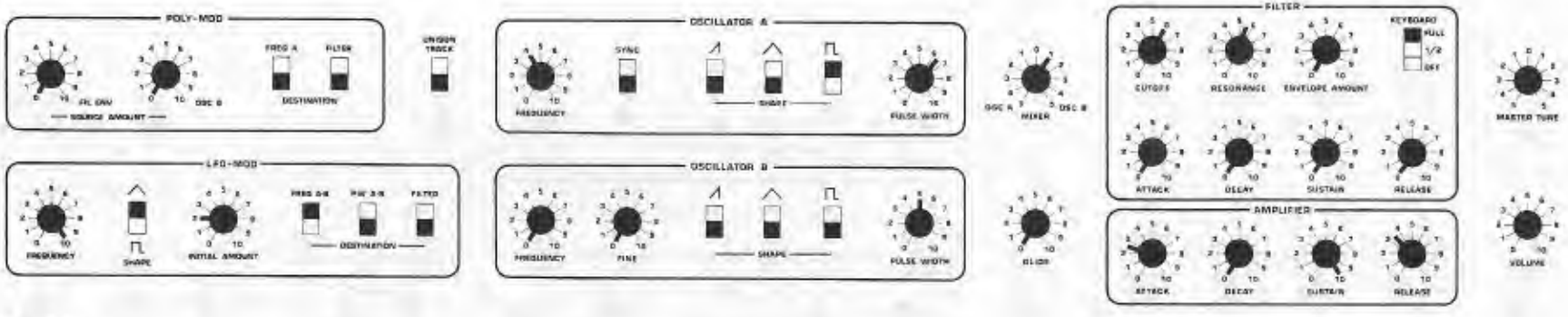
41 BRASS III

OSC A: 1 octave
OSC B: 1octave
MOD WHEEL: vibrato



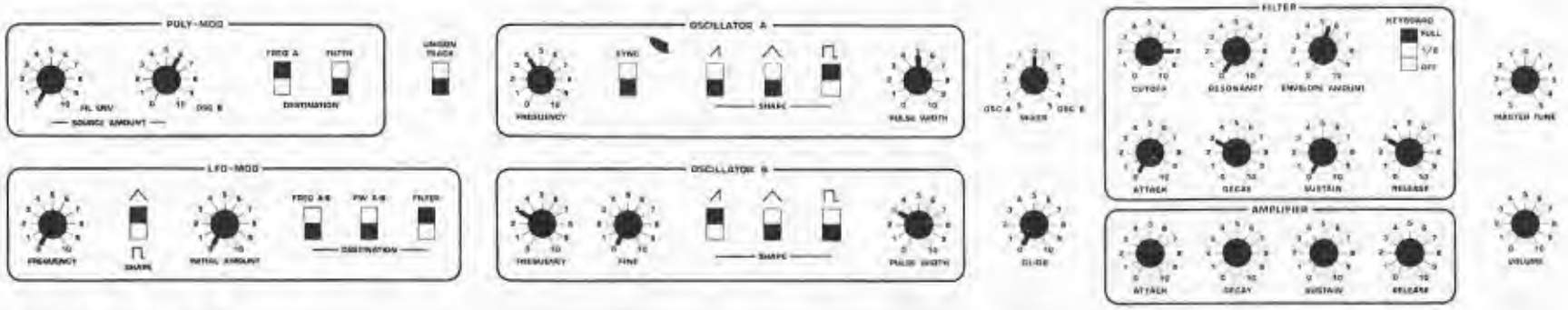
42 ARCO STRINGS

OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: PW mod



43 RUNAWAY

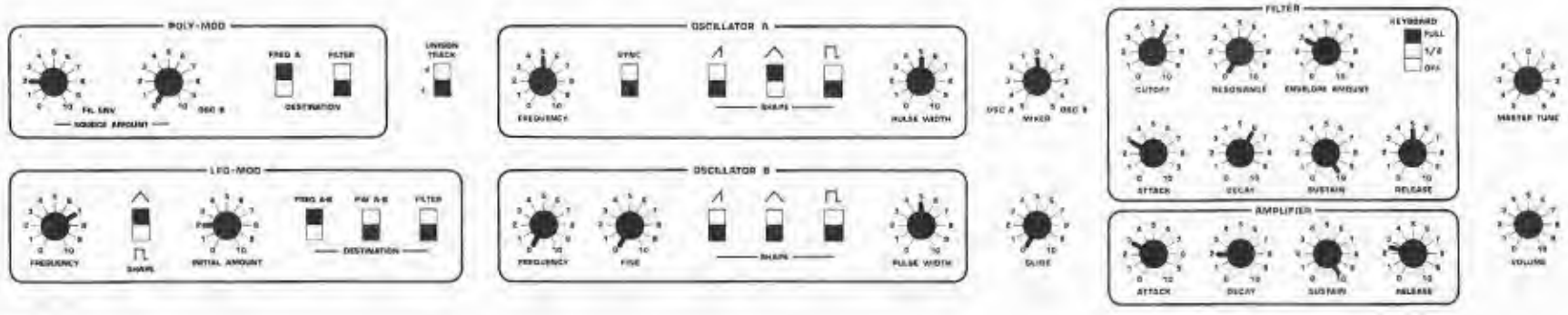
OSC A: 2 octaves
OSC B: 0
MOD WHEEL: slight vibrato



44 HONKY TONK SYNTH

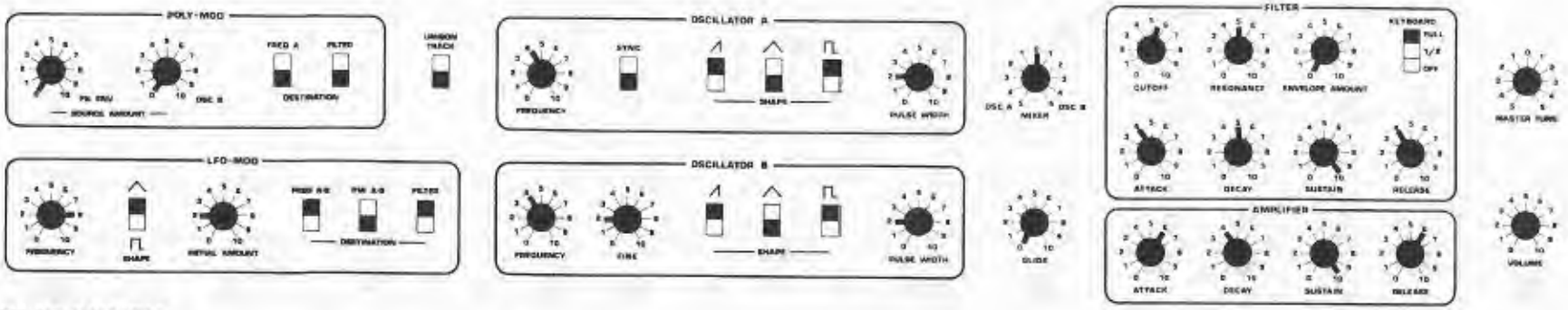
OSC A: 1 octave + major 6th
OSC B: 1 octave
MOD WHEEL:

Well-suited for Arpeggiator.



45 WHISTLE

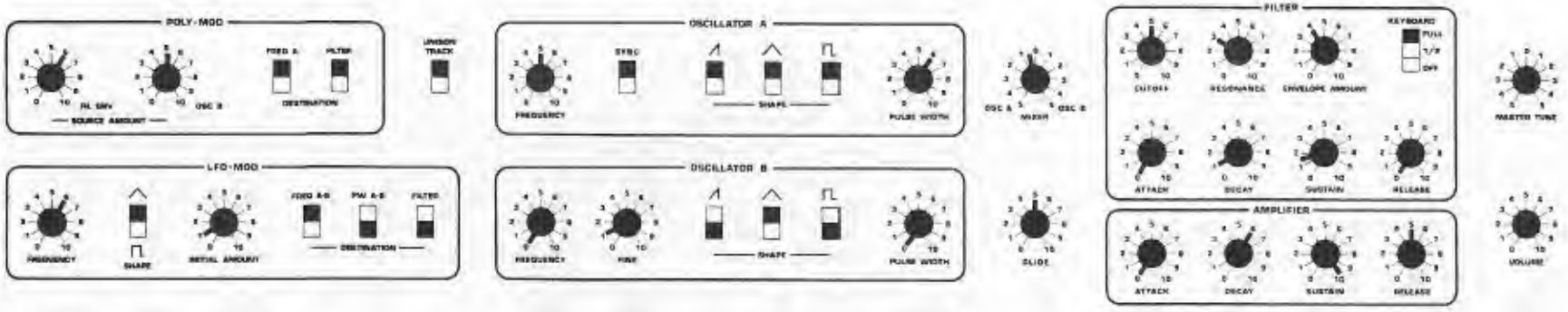
OSC A: 3 octaves
OSC B: not used
MOD WHEEL: vibrato



46 ANGELIC SYNTH

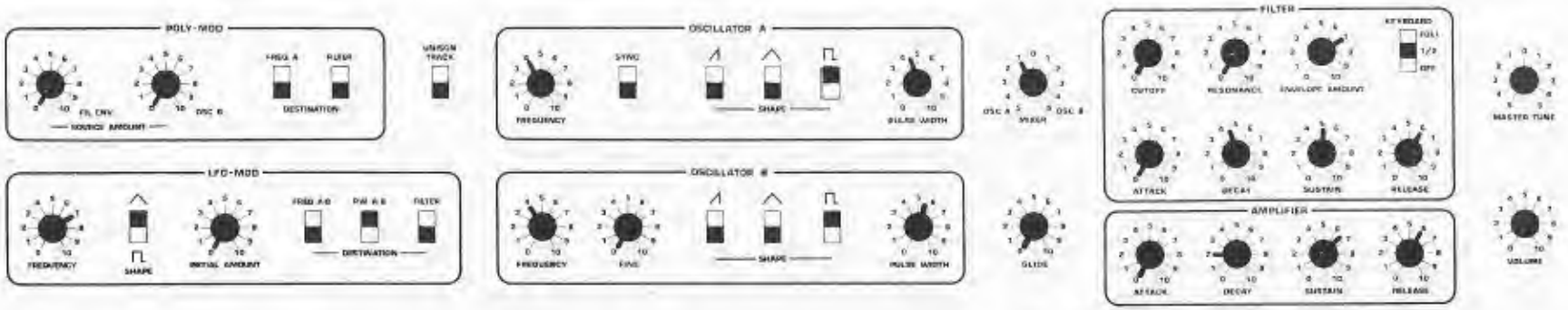
OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL: slight PW mod

Filter is tuned one octave above OSC A.



47 HARD LEAD/BASS-UNISON

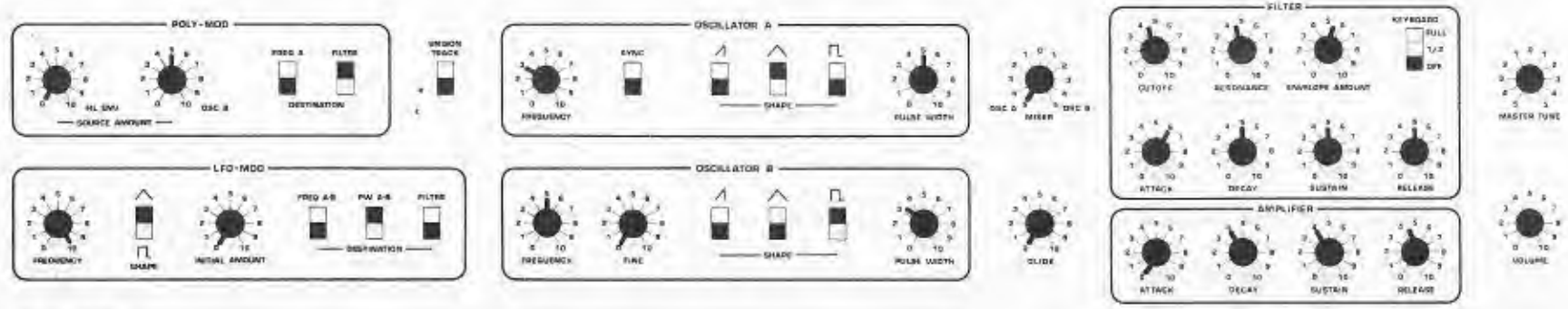
OSC A: 3 octaves
OSC B: 0
MOD WHEEL: vibrato



48 HARP

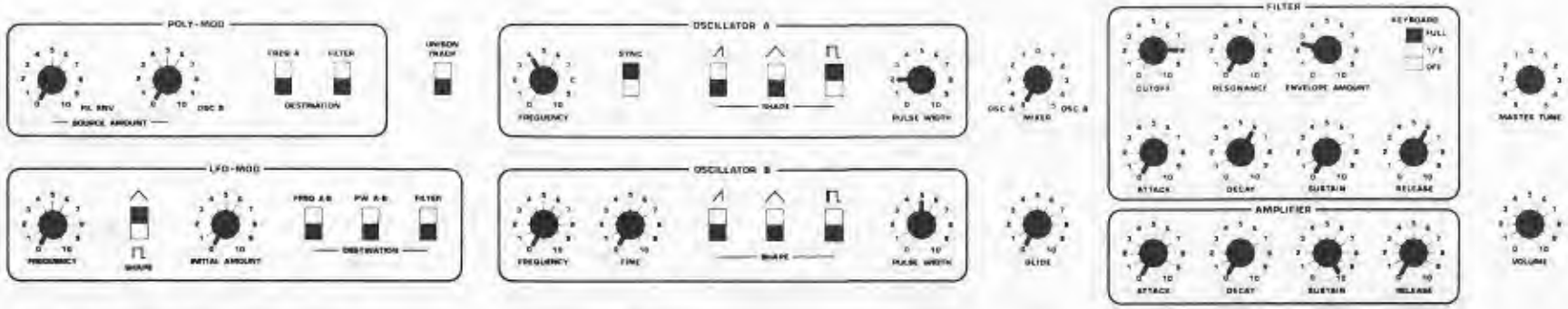
OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL: PW mod

Well-suited for Arpeggiator.



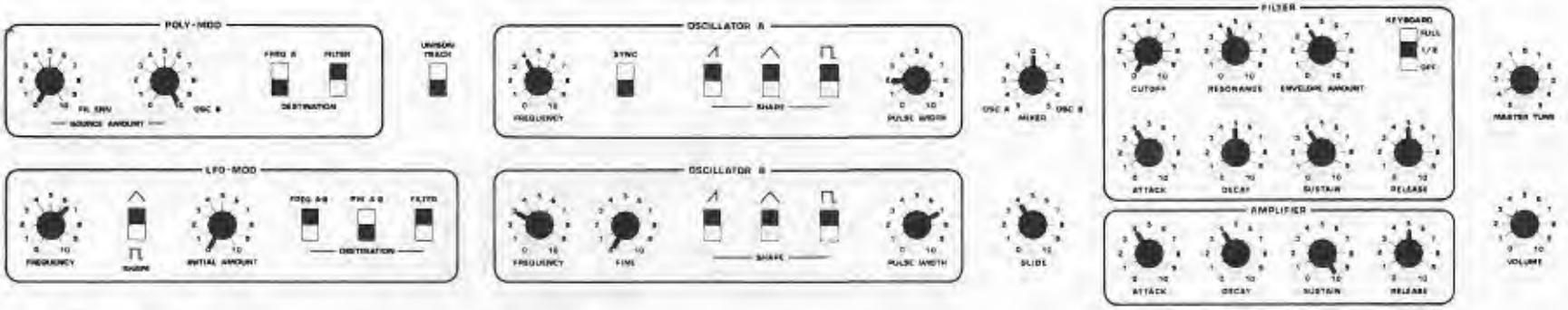
49 INDIGESTION

OSC A: 1 octave
OSC B: 2 octaves + major 6th
MOD WHEEL: PW mod



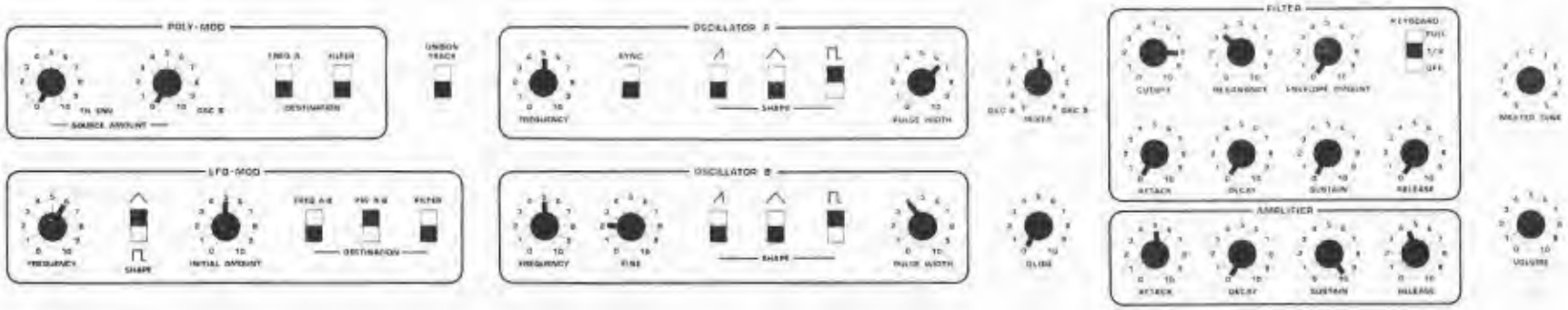
50 DISTORTED ORGAN

OSC A: 2 octaves
OSC B: 0
MOD WHEEL: not used



51 DIGITAL BRASS

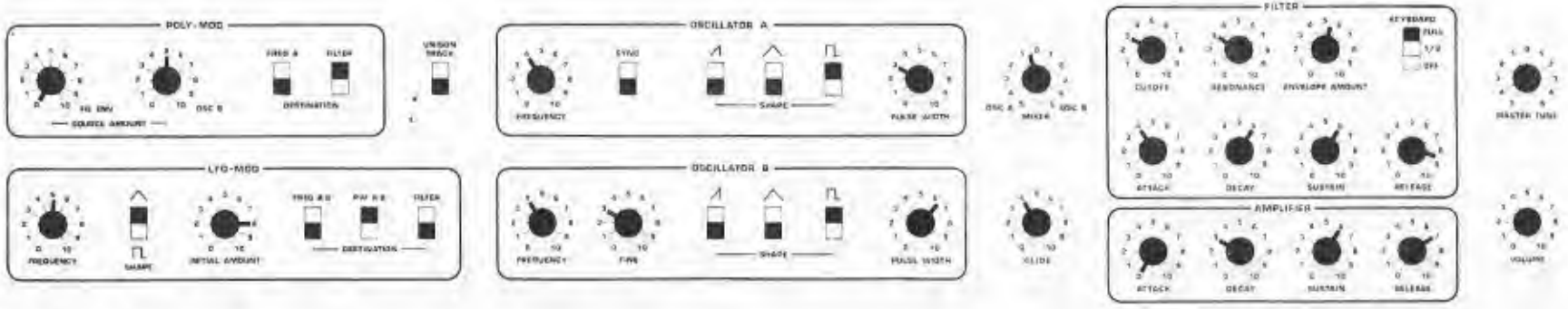
OSC A: 2 octaves
OSC B: 1 octave
MOD WHEEL: vibrato



52 HIGH STRINGS

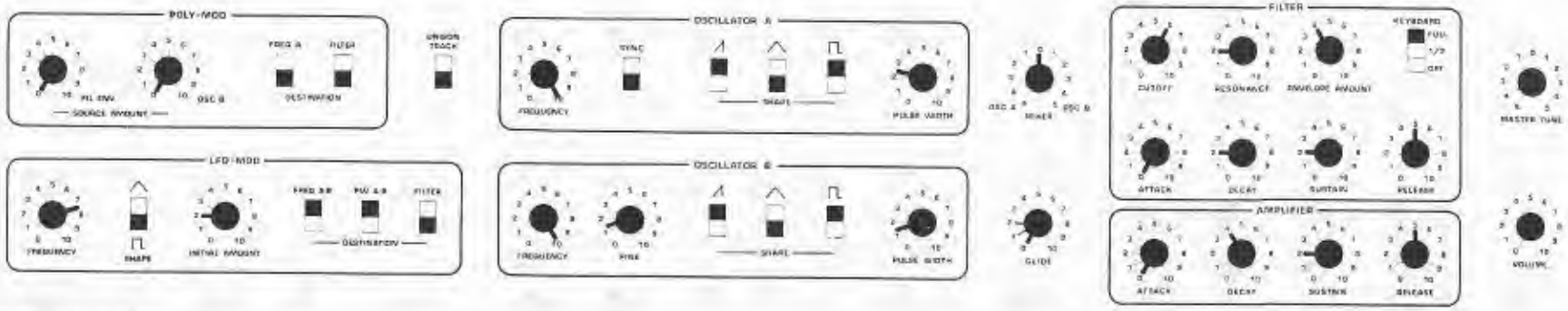
OSC A: 3 octaves
OSC B: 3 octaves
MOD WHEEL: PW mod

The sound has a slow attack.



53 PULSE MOD I

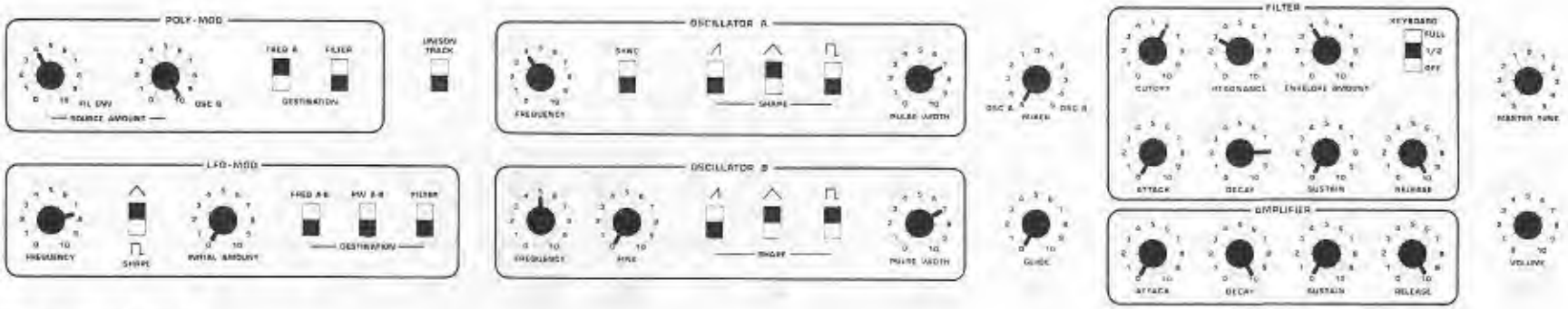
OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL: PW mod



54 HIGH PLUCKY

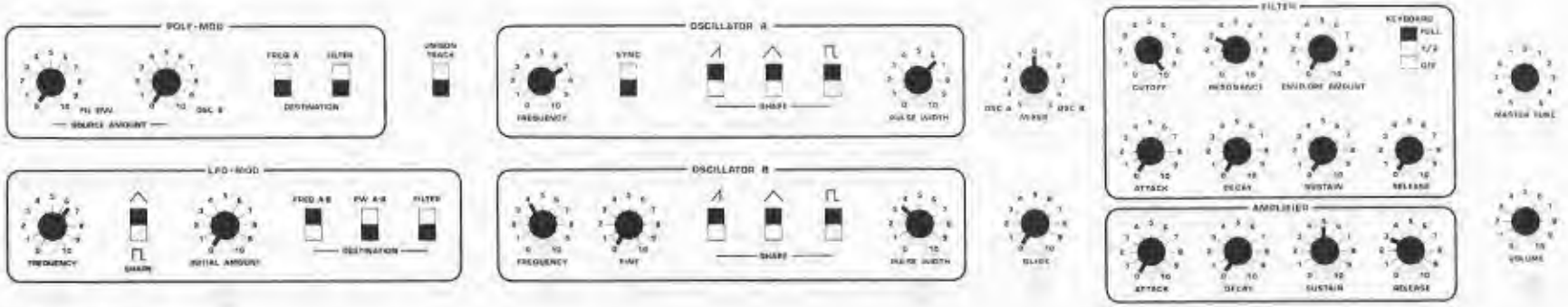
OSC A: 4 octaves (max)
OSC B: 4 octaves
MOD WHEEL: slight square wave effect

Well-suited for Arpeggiator.



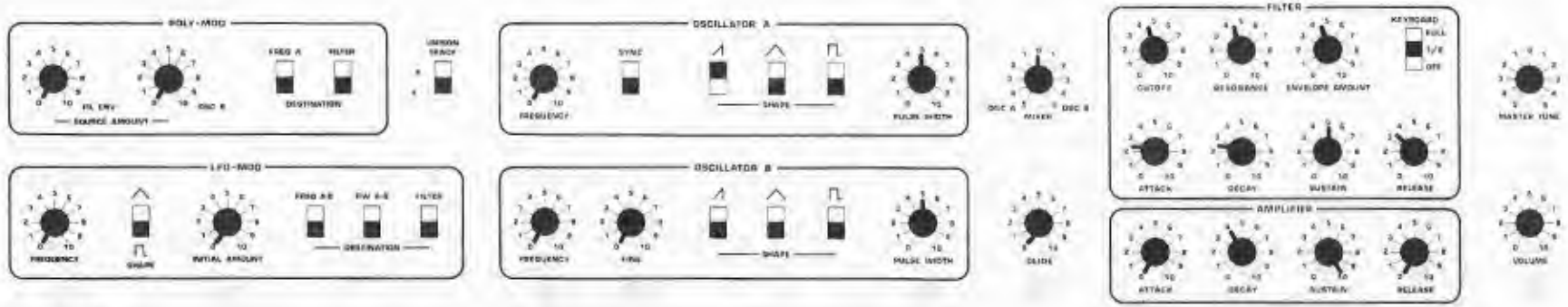
55 DESCENDING BELLS

OSC A: 2 octaves
OSC B: 2 octaves + major 7th
MOD WHEEL: not used



56 HARPSISYNTH

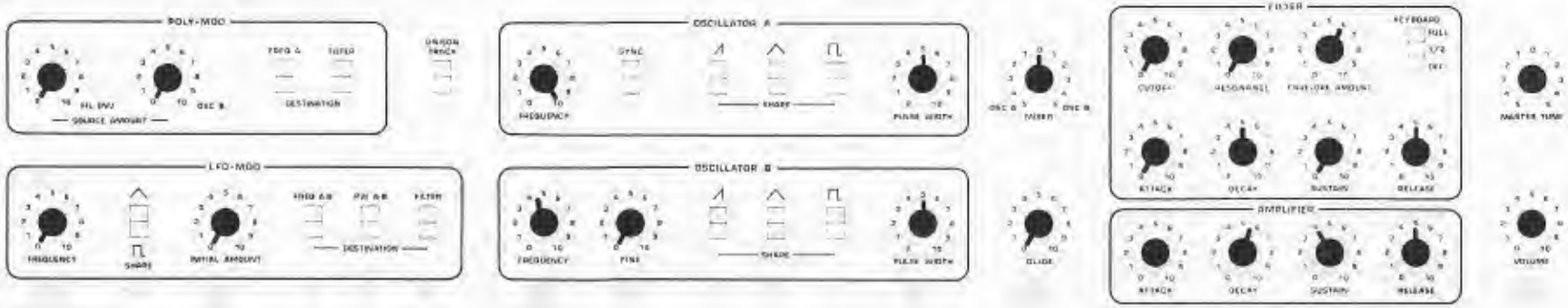
OSC A: 4 octaves
OSC B: 2 octaves
MOD WHEEL: vibrato



57 NASAL BASS

OSC A: 0
OSC B: 0
MOD WHEEL: slow filter sweep

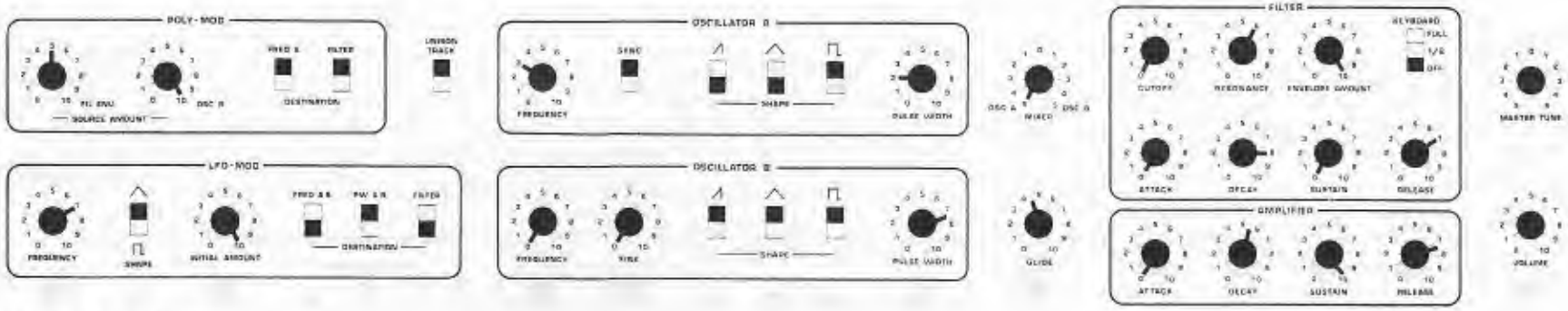
For fuller sound, switch on any OSC B waveshape.



58 XYLOPHONE

OSC A: 4 octaves
OSC B: 2 octaves
MOD WHEEL: not used

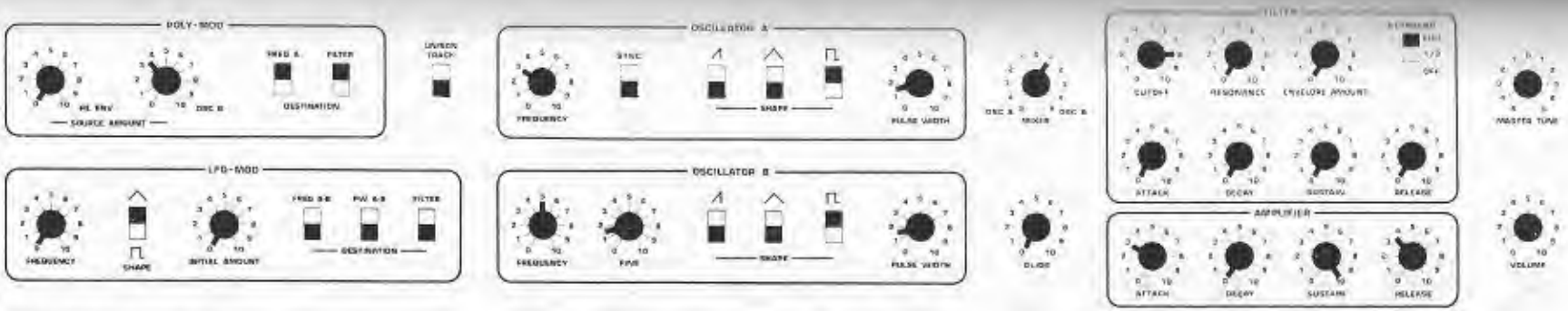
Well-suited for Arpeggiator.



59 OBNOXIOUS MOD

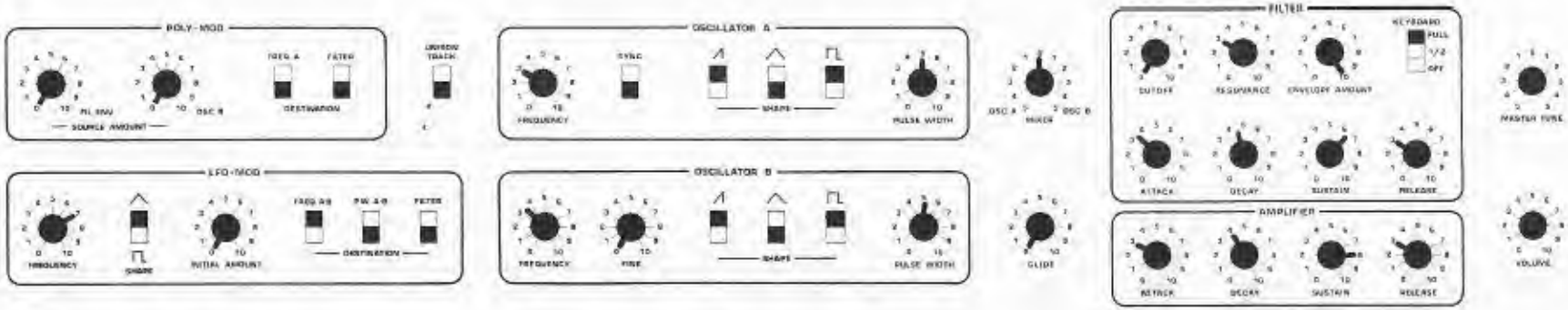
OSC A: 1 octave
OSC B: 0
MOD WHEEL: programmed maximum

Hold key down for several seconds.



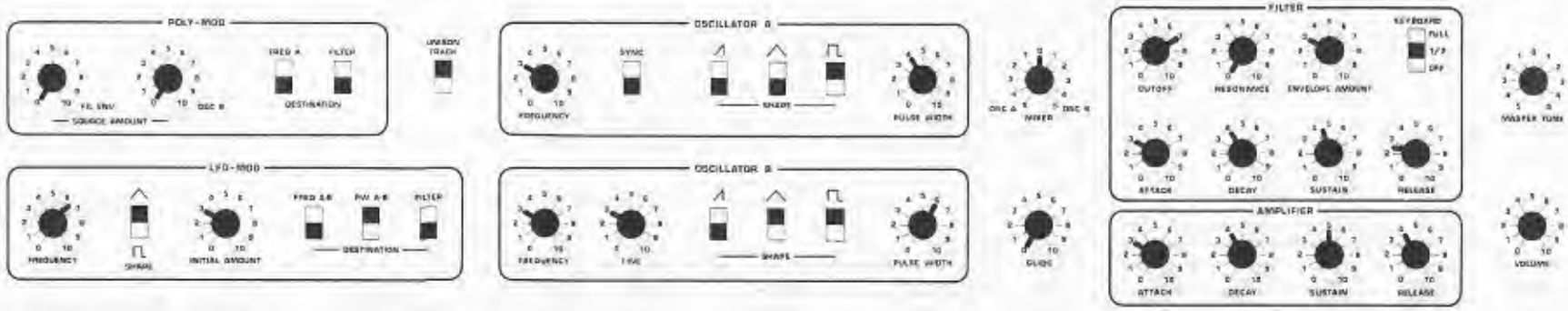
60 CATHEDRAL ORGAN

OSC A: 1 octave
OSC B: 2 octave
MOD WHEEL: not used



61 SLOW BRASS

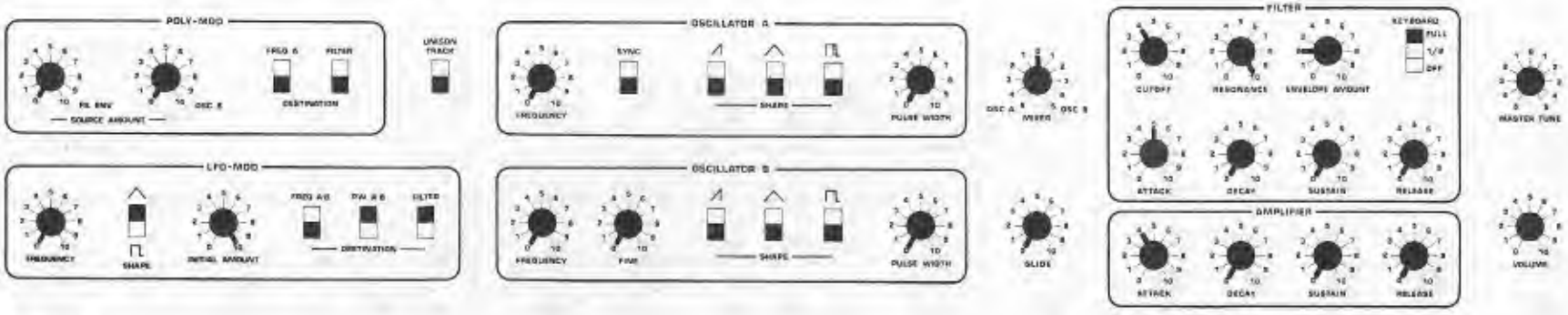
OSC A: 1 octave
OSC B: 1 octave + 5th
MOD WHEEL:



62 ARCO BASS VIOL-UNISON-

OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: PW mod

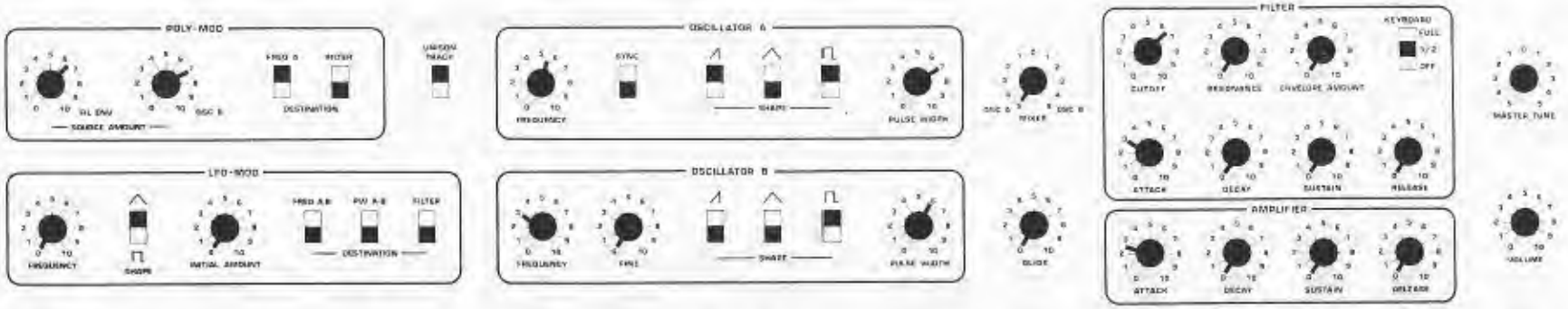
Play at low end of keyboard.



63 FROG CITY

OSC A: 0
OSC B: 0
MOD WHEEL: programmed max for effect

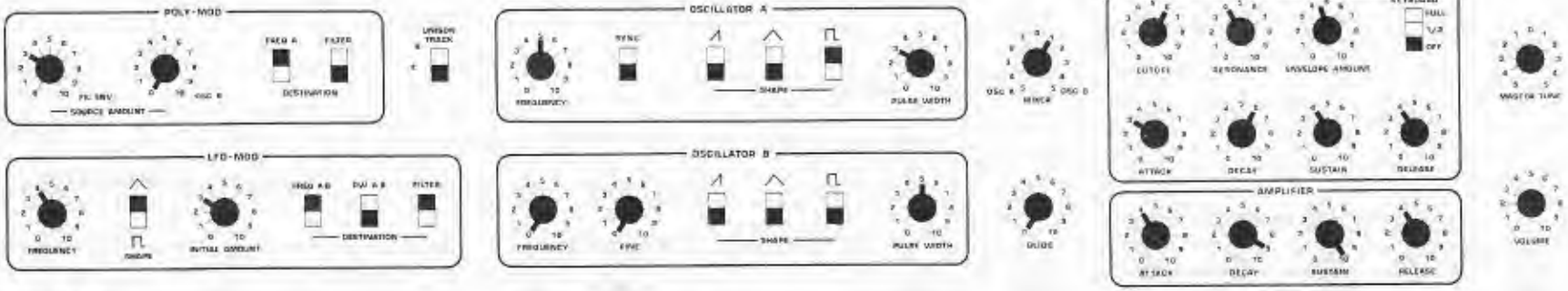
The oscillators aren't used. Instead the filter is set for self-resonance. For a large frog, switch UNISON on.



64 DOG'S BARK

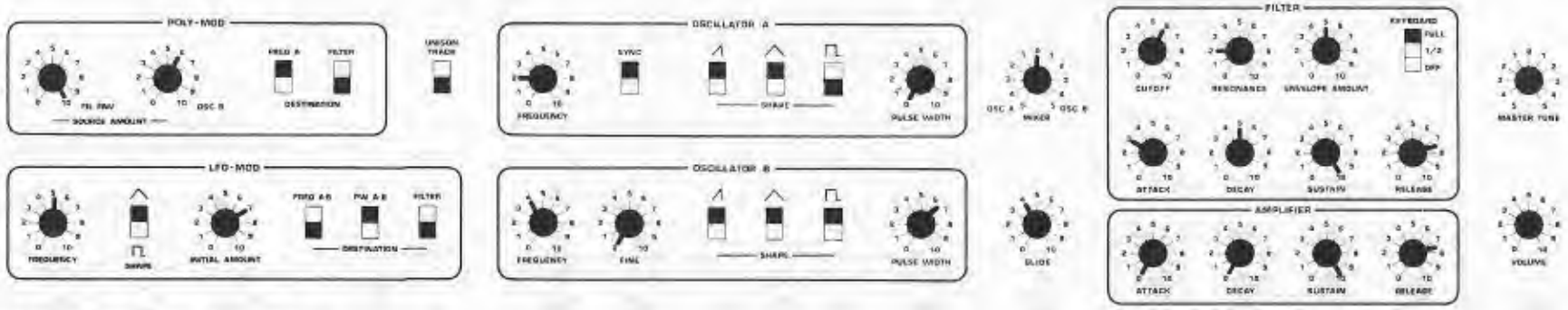
OSC A: 3 octaves
OSC B: 1 octave + minor 3rd
MOD WHEEL: not used

Best effect is obtained near the 2nd C# or E from bottom of keyboard.



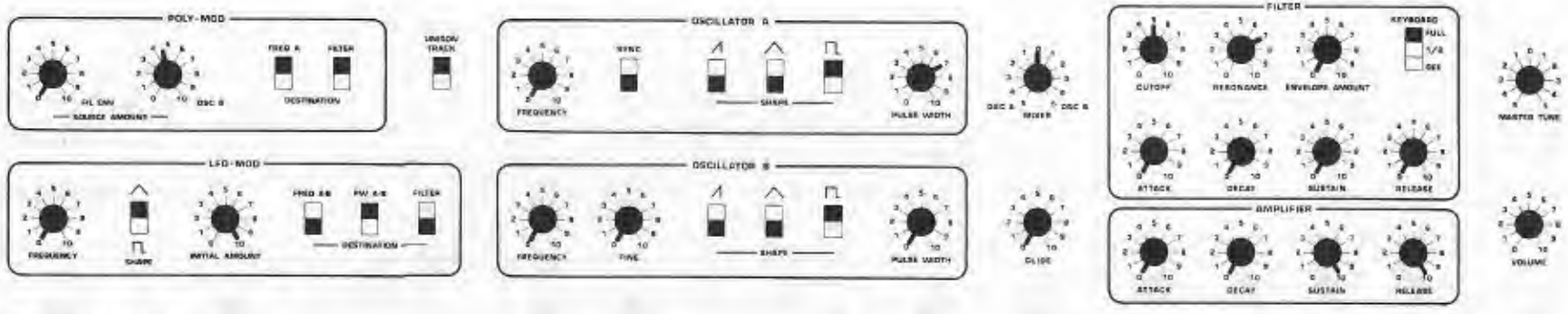
65 CAT'S MEOW

OSC A: tuned 3 octaves up
OSC B: 0
MOD WHEEL:



66 SUSTAINED SYNC w/GLIDE

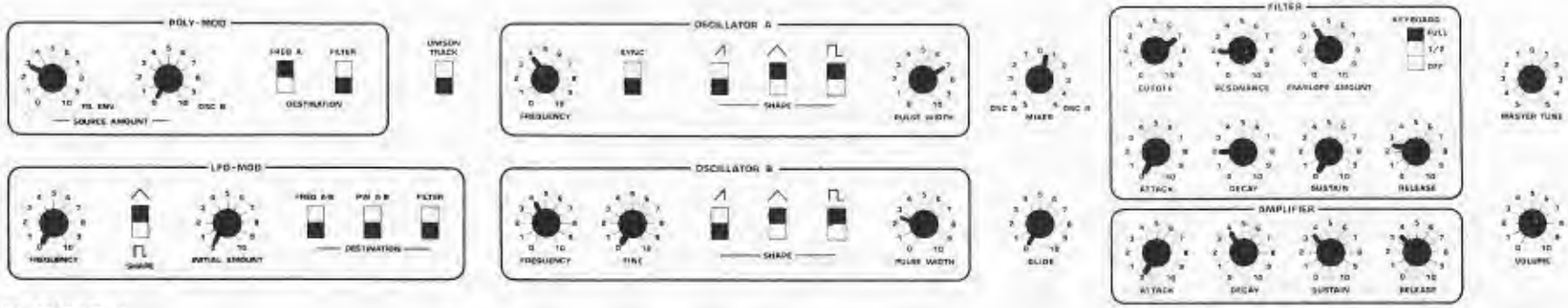
OSC A: 1 octave + 3rd
OSC B: 2 octaves
MOD WHEEL:



67 MODOR-UNISON

OSC A: 0
OSC B: 0
MOD WHEEL:

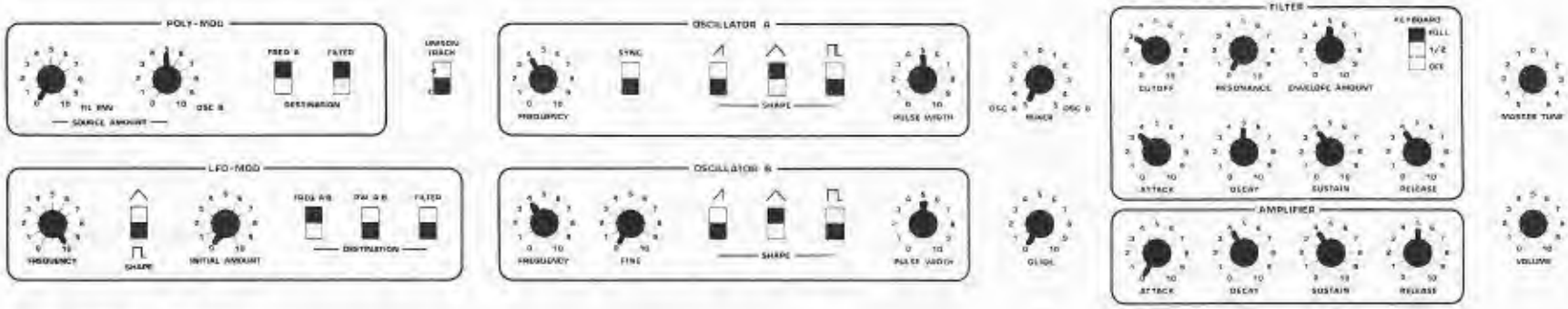
Play at low register. See also note for #19 Sleeping Orgs.



68 TACK SYNTH

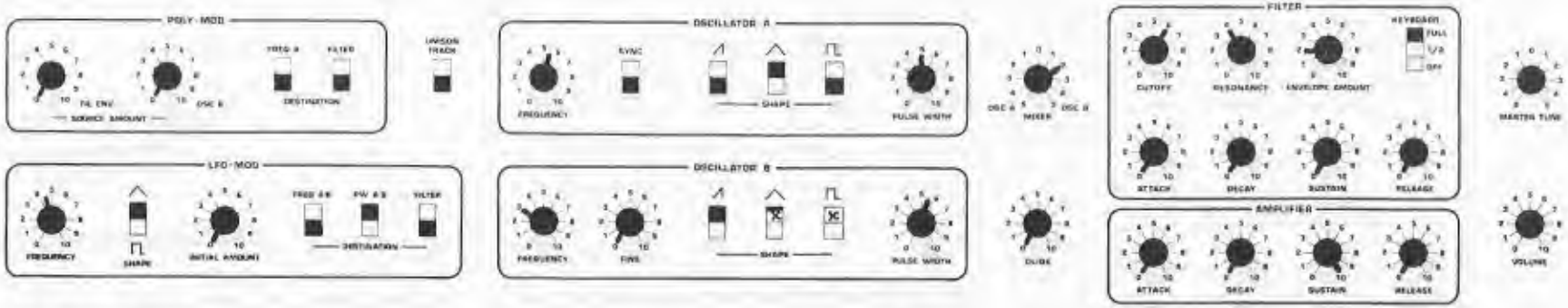
OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL: not used

Experiment with various waveshape combinations, also detuning with OSC B FINE--for a "chorus" sound.
Well-suited for Arpeggiator.



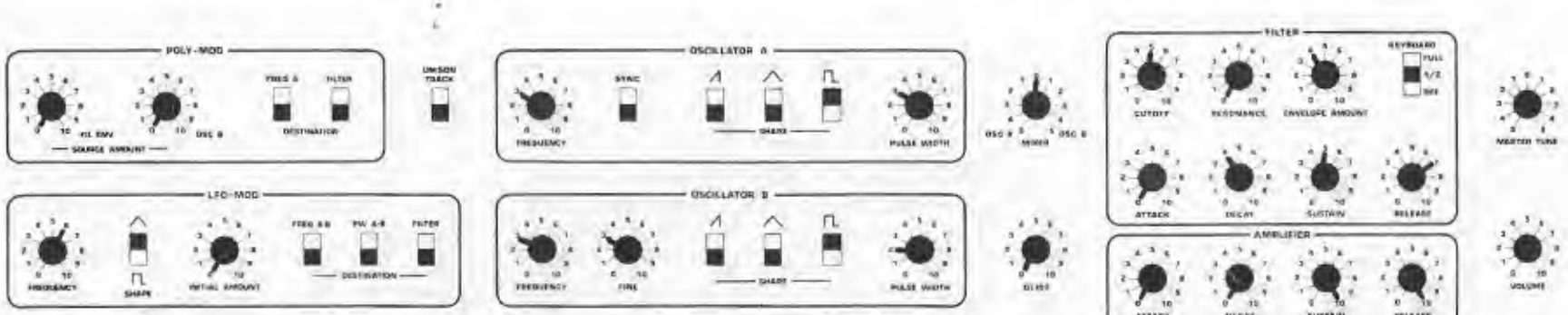
69 GONZOID STEEL DRUMS

OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL: engages trill



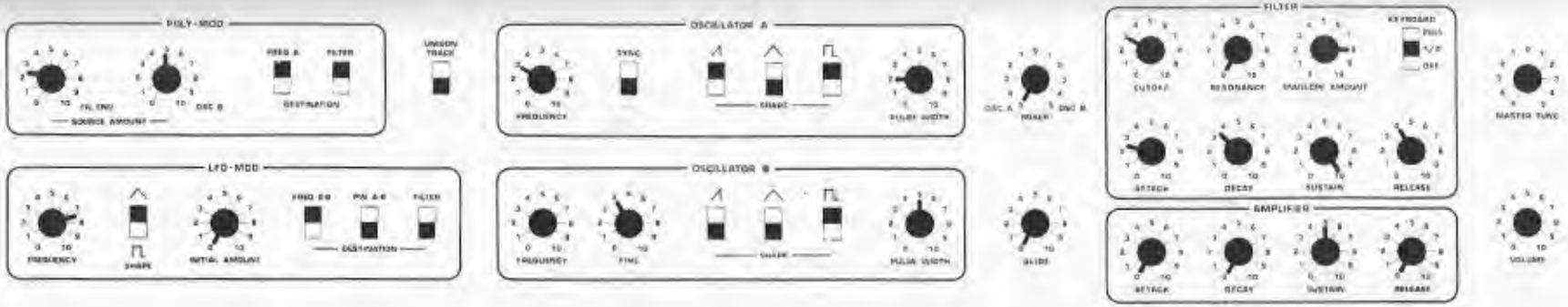
70 ORGAN PERCUSSIVE 1

OSC A: 3 octaves + 5th
OSC B: 1 octave
MOD WHEEL: PW mod



71 B.D.I.'S

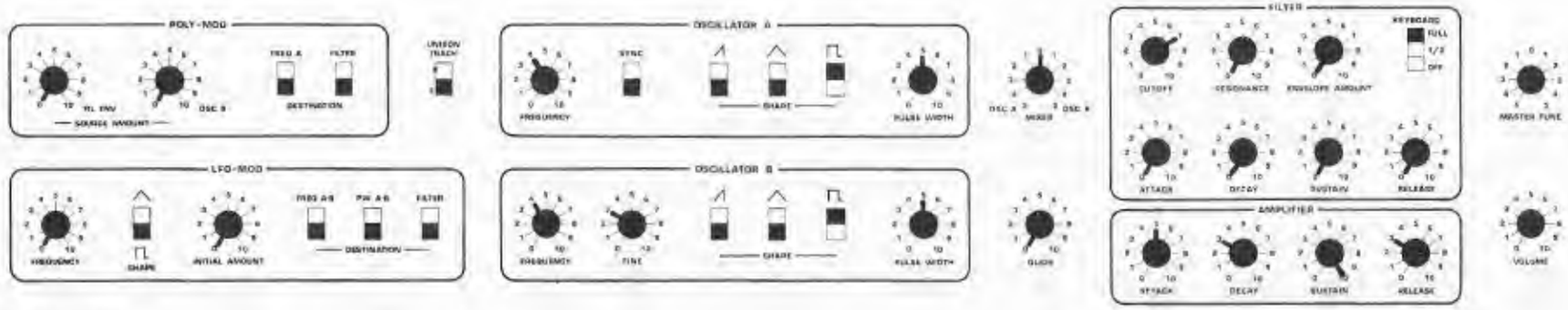
OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: not used



72 R.F.M.

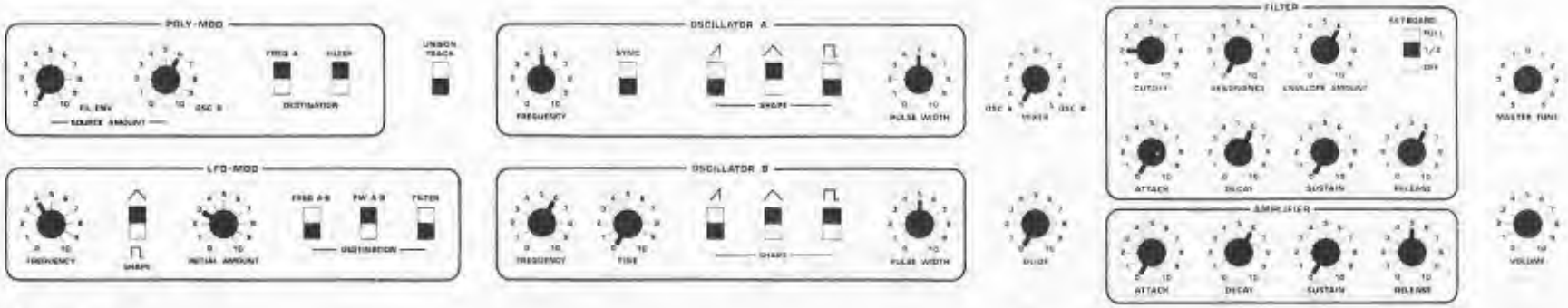
OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: vibrato

To fine-tune, use POLY-MOD OSC B.



73 HARMONIUM

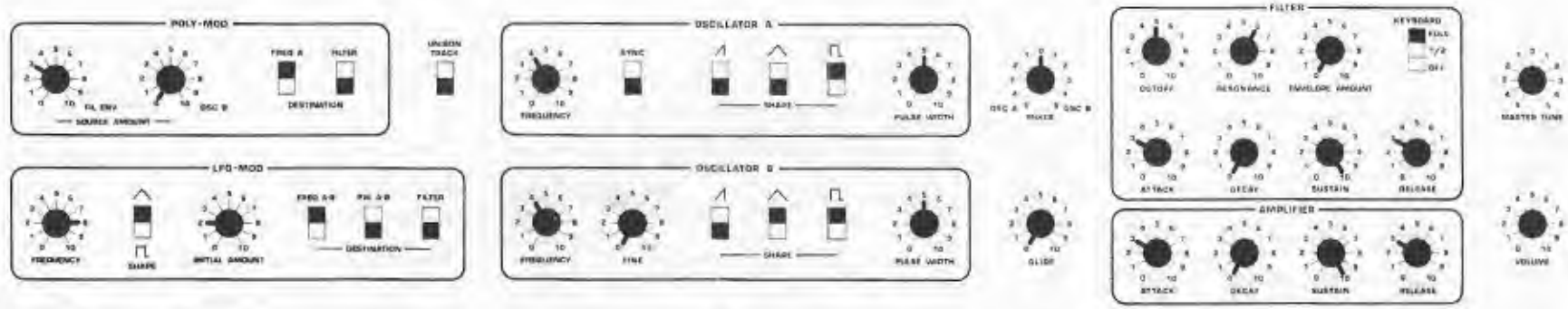
OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL: not used



74 METALLIC II

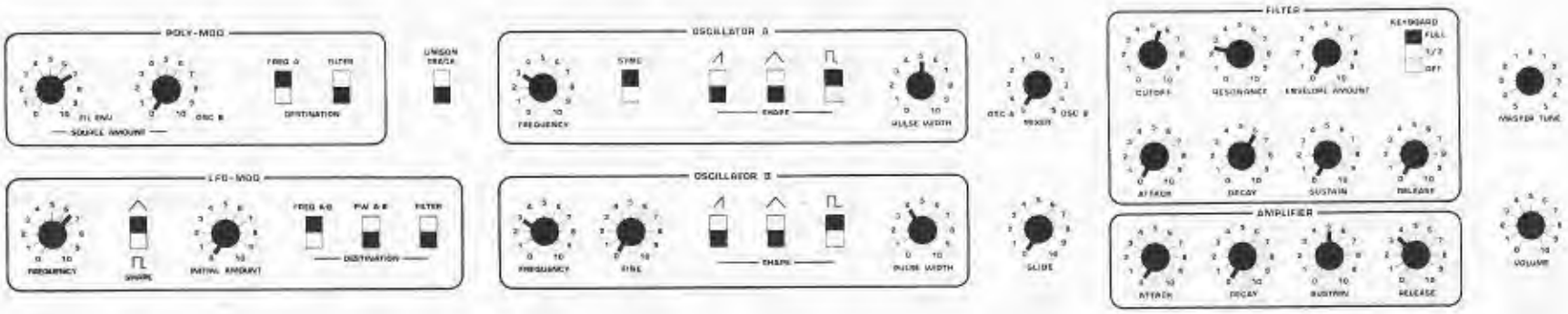
OSC A: 3 octaves
OSC B: 3 octaves + minor 6th
MOD WHEEL: PW mod creates a slight "rolling"

Well-suited for Arpeggiator.



75 POLY-MOD PITCH GLIDE

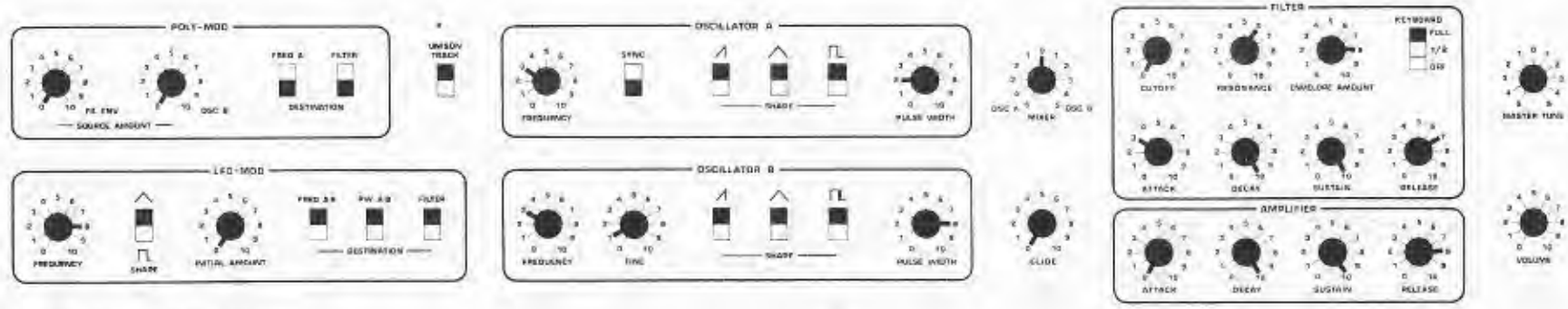
OSC A: 2 octaves (fine-tune using POLY-MOD FIL ENV)
OSC B: 2 octaves
MOD WHEEL: vibrato



76 SYNC III

OSC A: minor 7th
OSC B: 1 octave
MOD WHEEL: vibrato

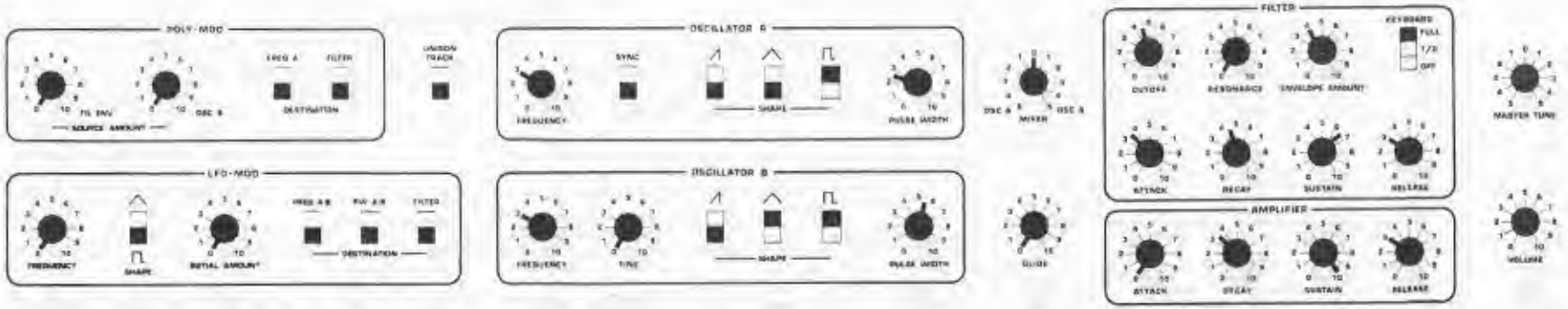
For harsher sound, adjust OSC A FREQ or PULSE WIDTH.
Well-suited for Arpeggiator.



77 FAT OCTAVES-UNISON

OSC A: 1 octave
OSC B: 0 octave (0)
MOD WHEEL: all destinations are on

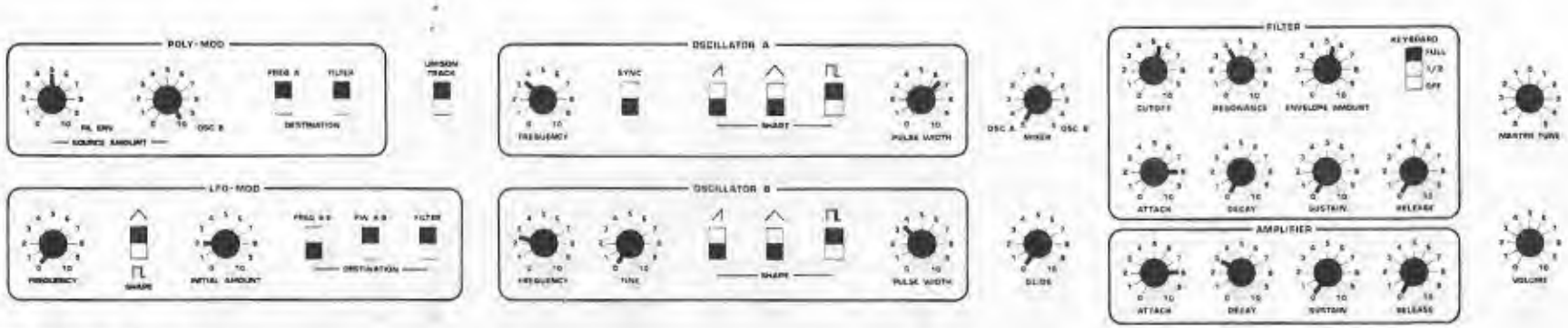
This is a UNISON program meant for 6 voices in unison.



78 LOW PLUCKY

OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: not used

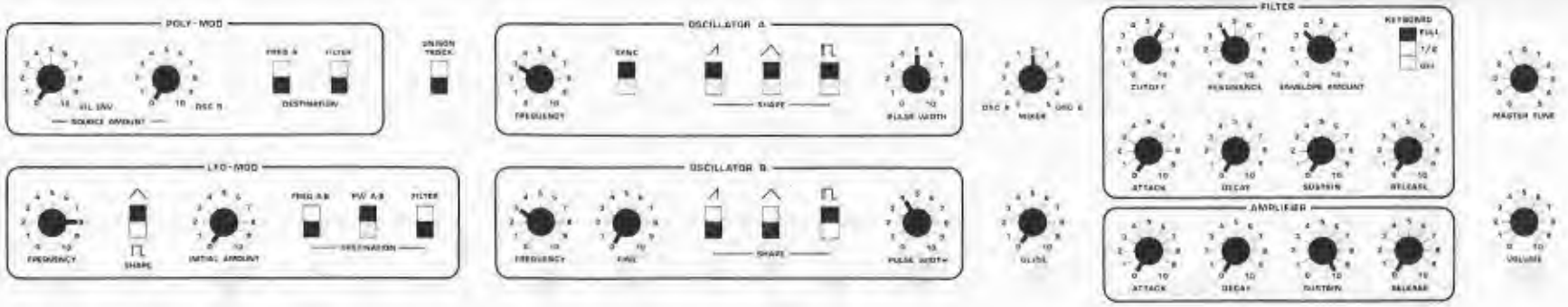
Well-suited for Arpeggiator.



79 SPACE RACE-UNISON

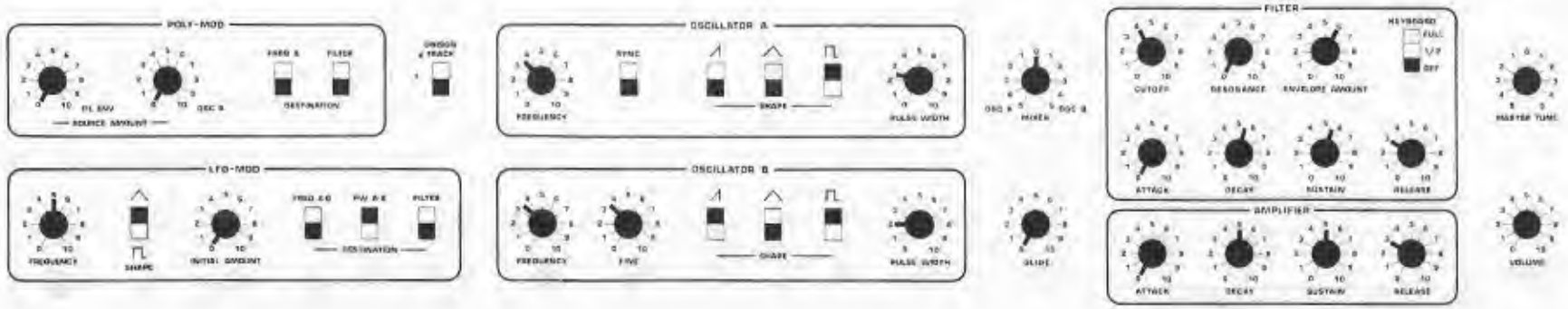
OSC A: 1 octave + major 2nd
OSC B: major 6th
MOD WHEEL: adds more "spaciness"

Play middle C#, then for "down-shifting," play a 4th below (G#), then down another 3rd (to E).



80 ORGAN PERCUSSIVE II

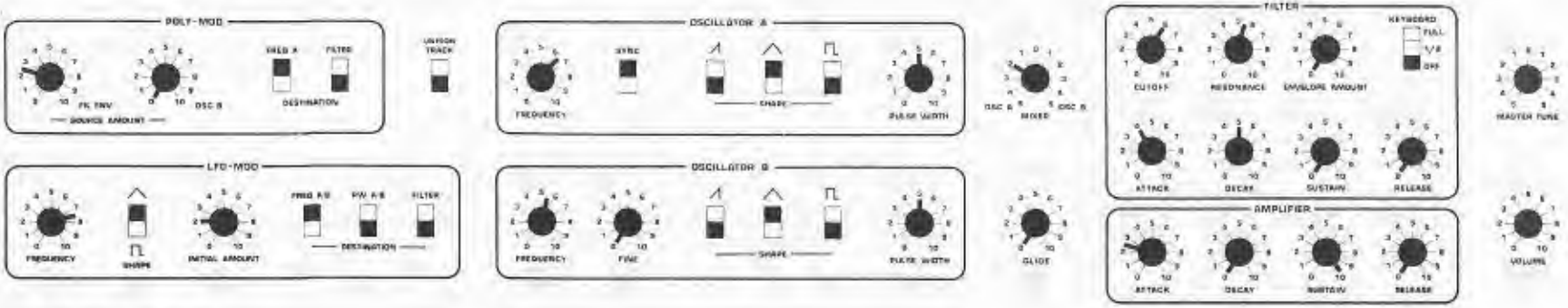
OSC A: a minor 6th
OSC B: 1 octave
MOD WHEEL: chorus effect



81 DETUNED

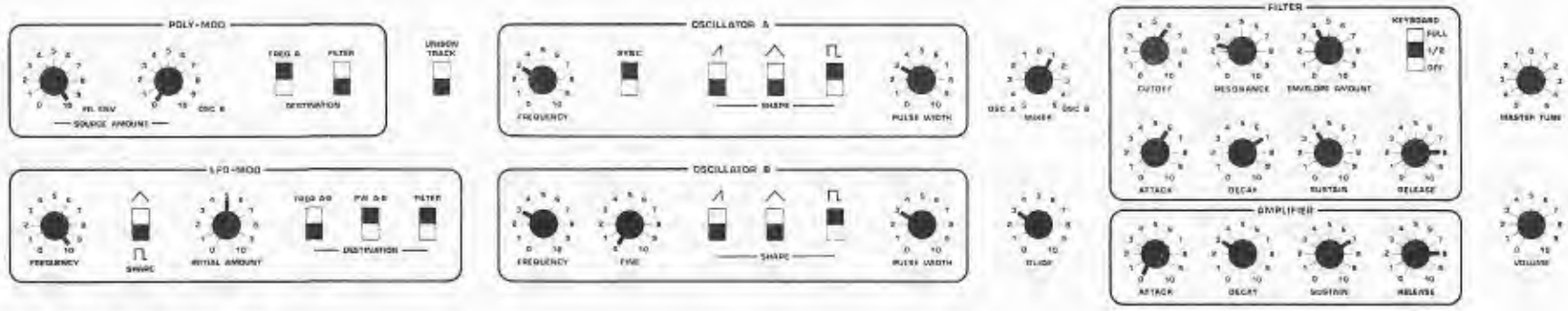
OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: PW mod

Try switching FILTER KEYBOARD to ½.



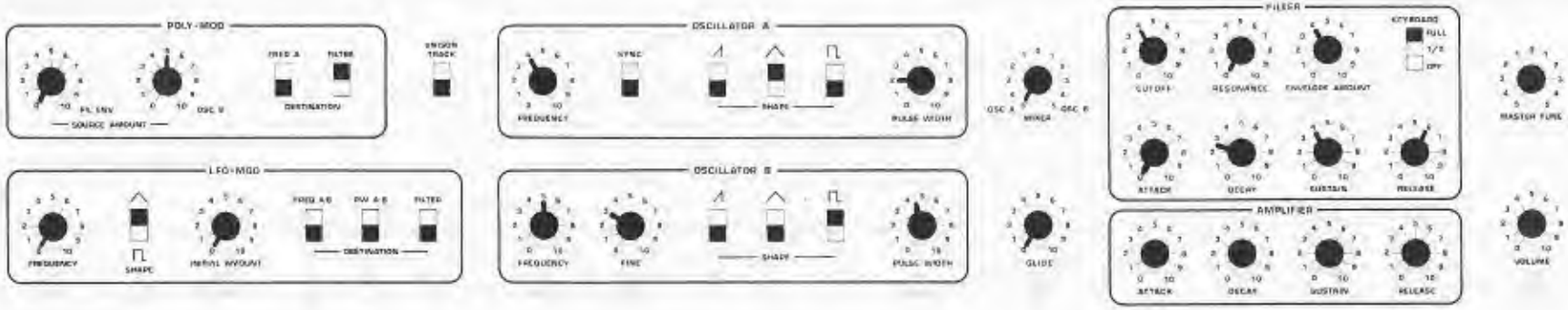
82 VOCAL HARMONICA

OSC A: 3 octaves + a minor 7th
OSC B: 3 octaves
MOD WHEEL: vibrato



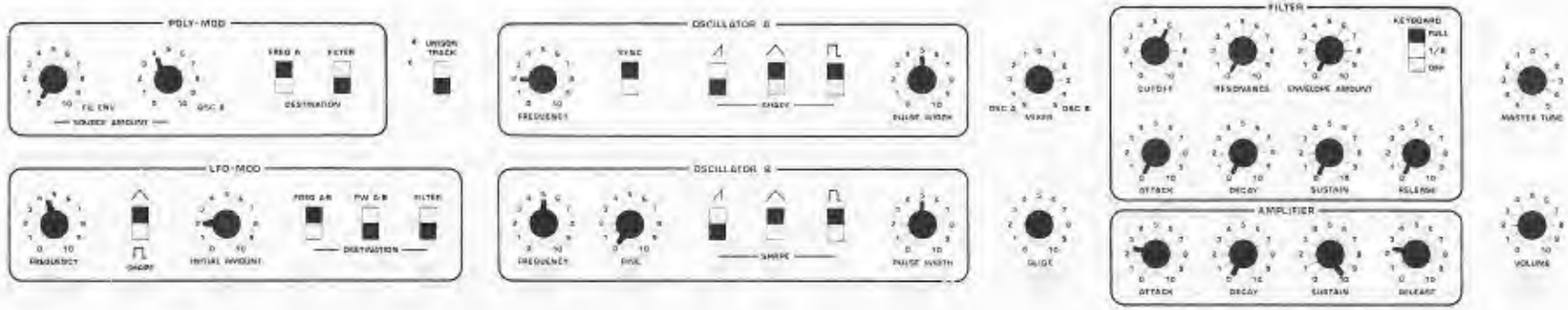
83 SQUARE WAVE BUBBLES

OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: is on for full effect



84 METALLIC III

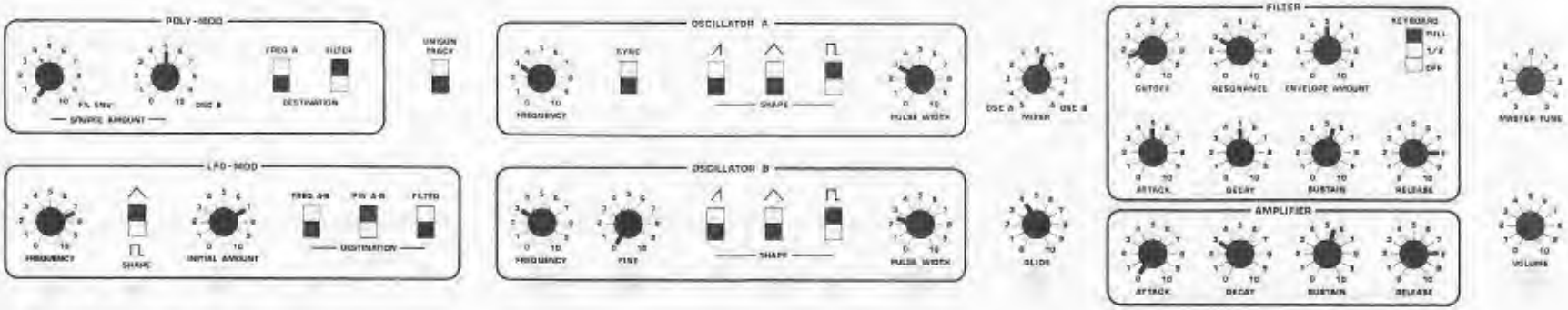
OSC A: 2 octaves
OSC B: 2 octaves + major 6th
MOD WHEEL: not used



85 JOSEF

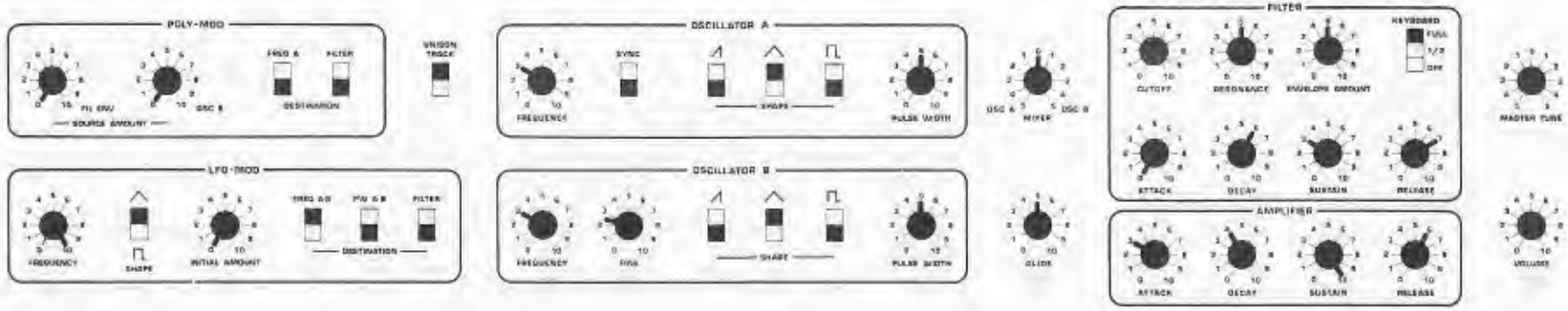
OSC A: up a 4th
OSC B: 3 octaves
MOD WHEEL: slow vibrato

The pulse wdiths are set for square waves (50%).



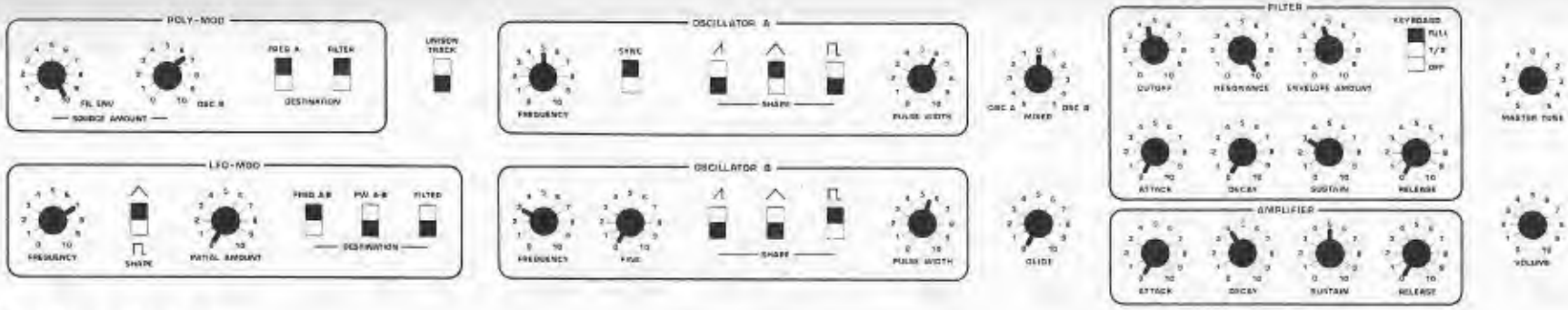
86 PULSE WIDTH MOD II

OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL:



87 LUCKY MAN-UNISON

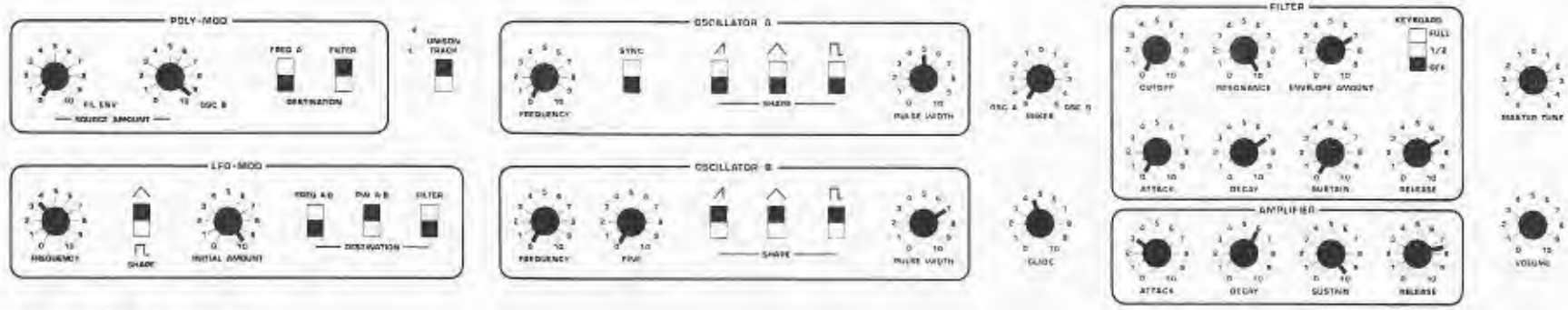
OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: vibrato



88 SUPER PERCUSSION

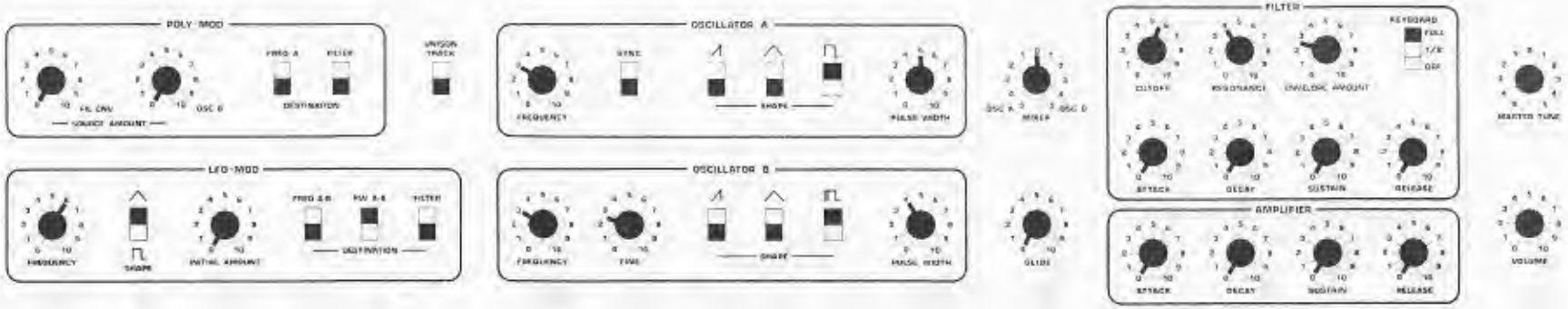
OSC A: 2 octaves + major 6th
OSC B: 1 octave
MOD WHEEL: vibrato

For variations, try changing OSC B PULSE WIDTH, POLY-MOD OSC B, or FILTER CUTOFF.



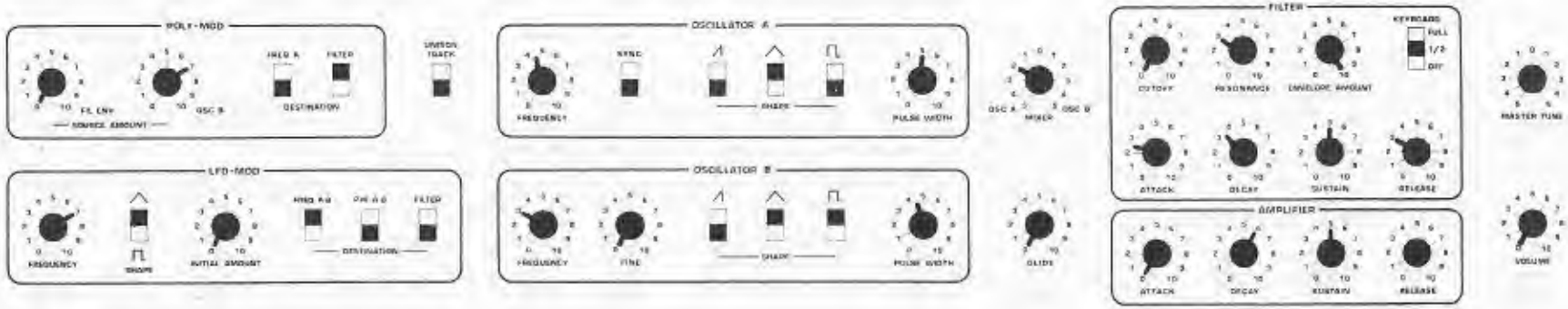
89 NOISE SCREAM-UNISON

OSC A: not used
OSC B: not used
MOD WHEEL:



90 FULL ORGAN

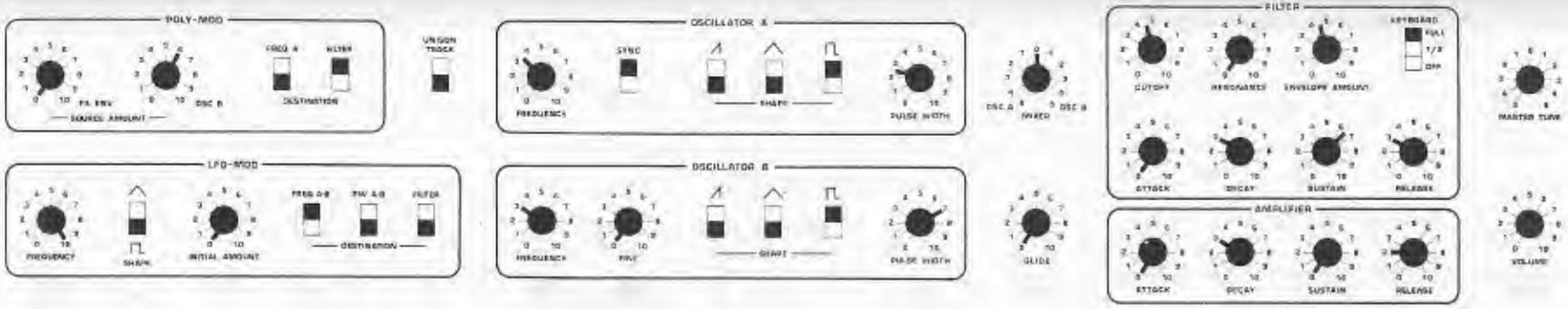
OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: rotating speaker



91 FILTER FUNK

OSC A: 2 octaves
OSC B: 1 octave
MOD WHEEL: vibrato

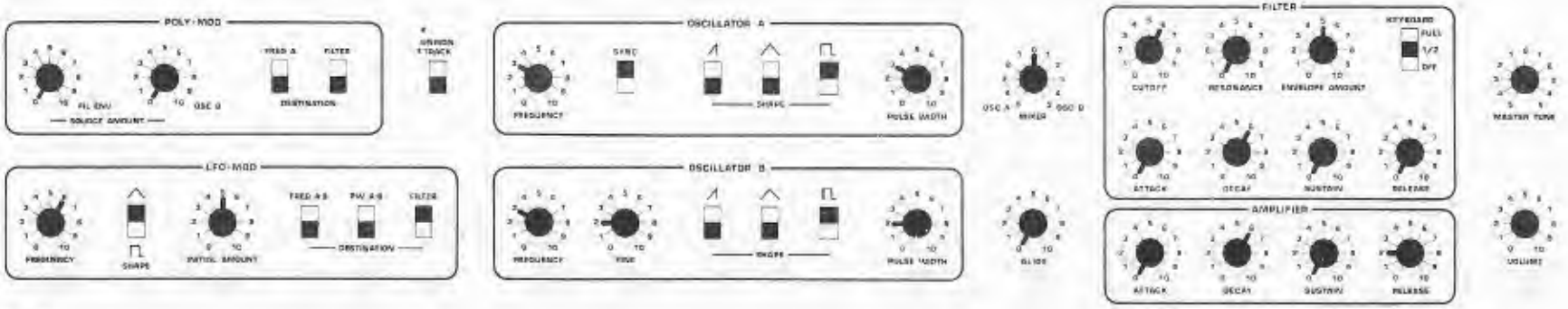
For tone variations, adjust POLY-MOD OSC B.



92 BANJO

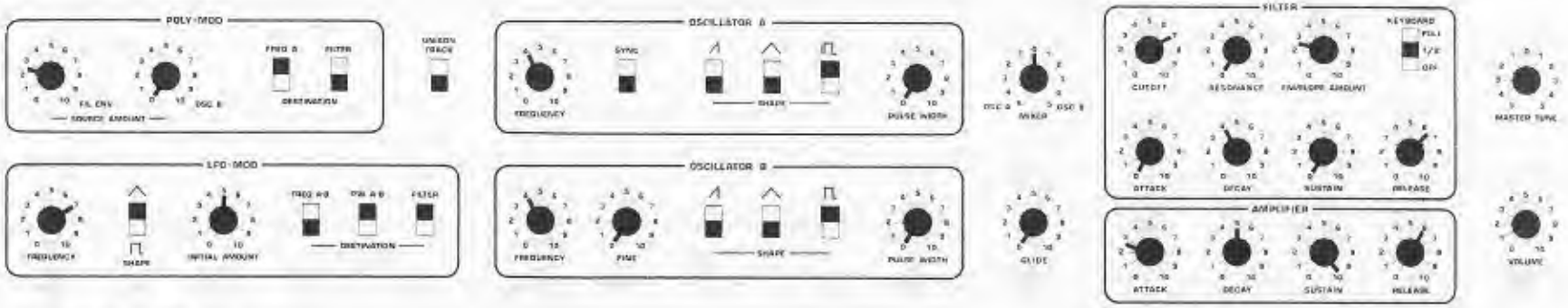
OSC A: 1 octave + 4th
OSC B: 1 octave
MOD WHEEL: trill

Try varying AMPLIFIER DECAY.
Well-suited for Arpeggiator.



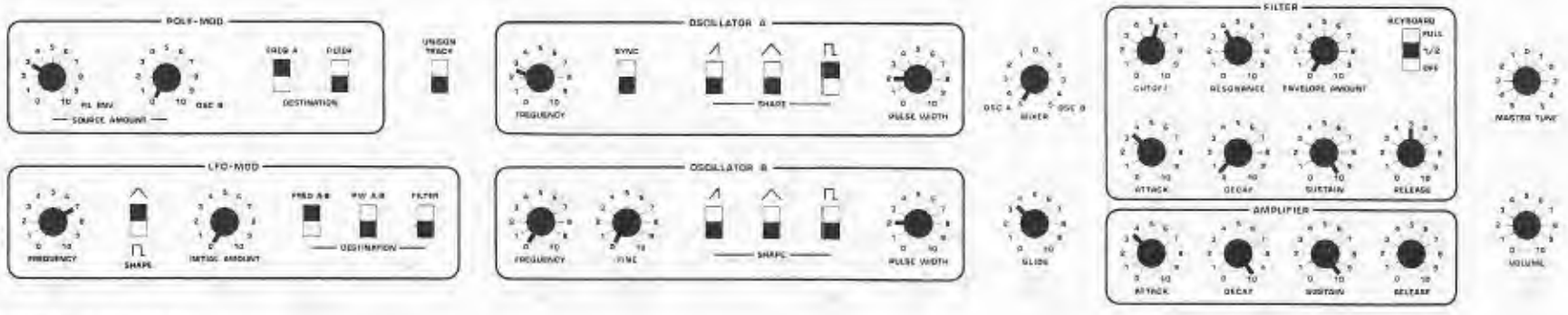
93 CLAV III

OSC A: 1 octave
OSC B: 1 octave
MOD WHEEL: filter mod



94 PULSE WIDTH MOD III

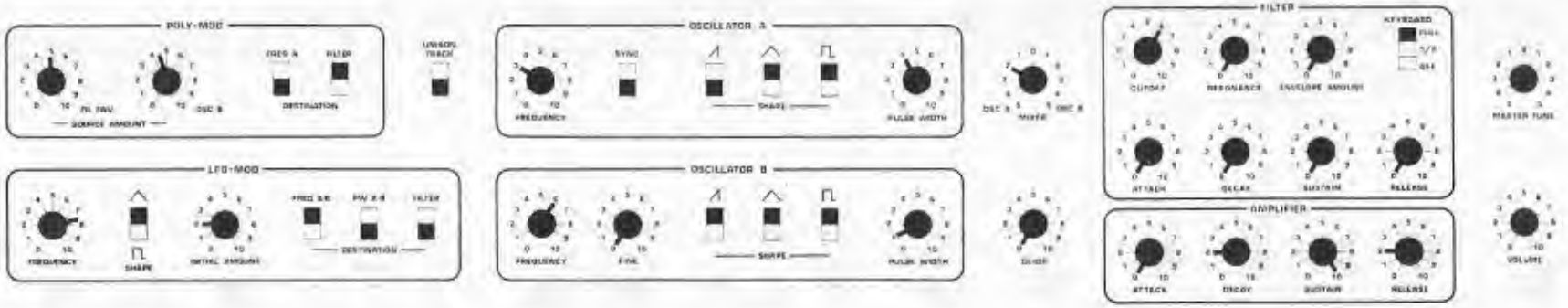
OSC A: 2 octaves
OSC B: 2 octaves
MOD WHEEL:



95 DRUNKEN SYNTH

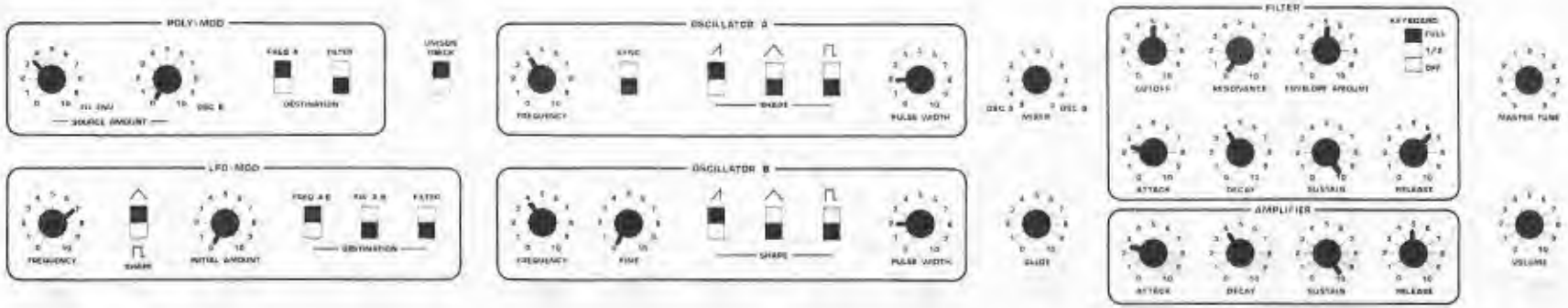
OSC A: minor 6th
OSC B: 0
MOD WHEEL: vibrato

OSC A is tuned dissonant, but POLY-MOD brings it into tune, 1 octave higher.



96 TEARS

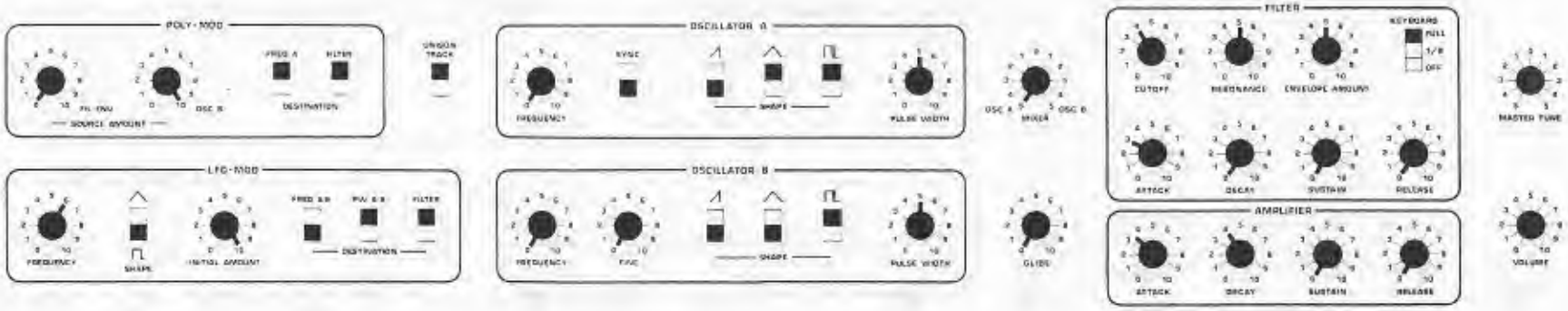
OSC A: 1 octave
OSC B: 4 octave
MOD WHEEL: adds vibrato



97 FIFTHS LEAD-UNISON

OSC A: 2 octaves + 5th
OSC B: 2 octaves
MOD WHEEL: vibrato

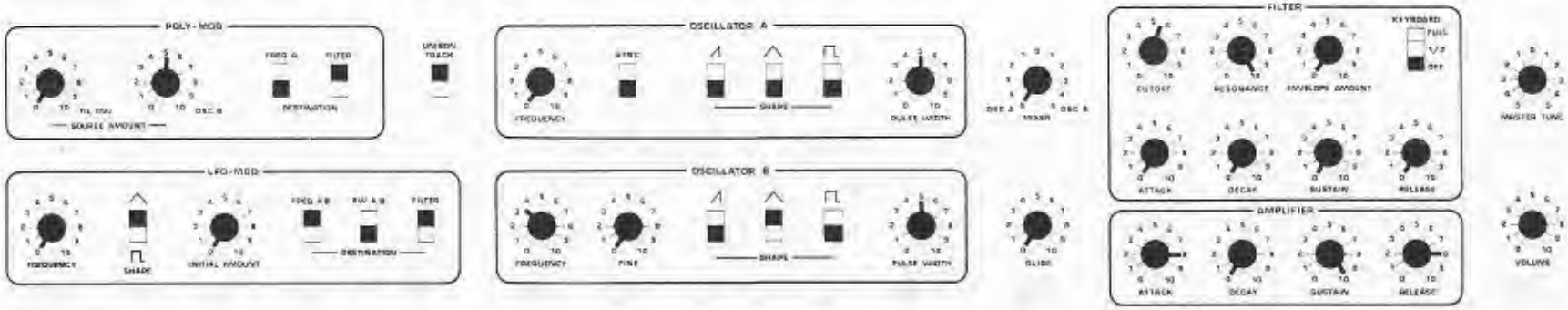
When the key is released, the pitch drops--because of the POLY-MOD FIL ENV setting. To change the rate of this sweep, adjust FILTER RELEASE (and AMPLIFIER RELEASE accordingly).



98 OOPS!

OSC A: 0
OSC B: 0
MOD WHEEL:

Adjust AMPLIFIER ATTACK and DECAY settings.

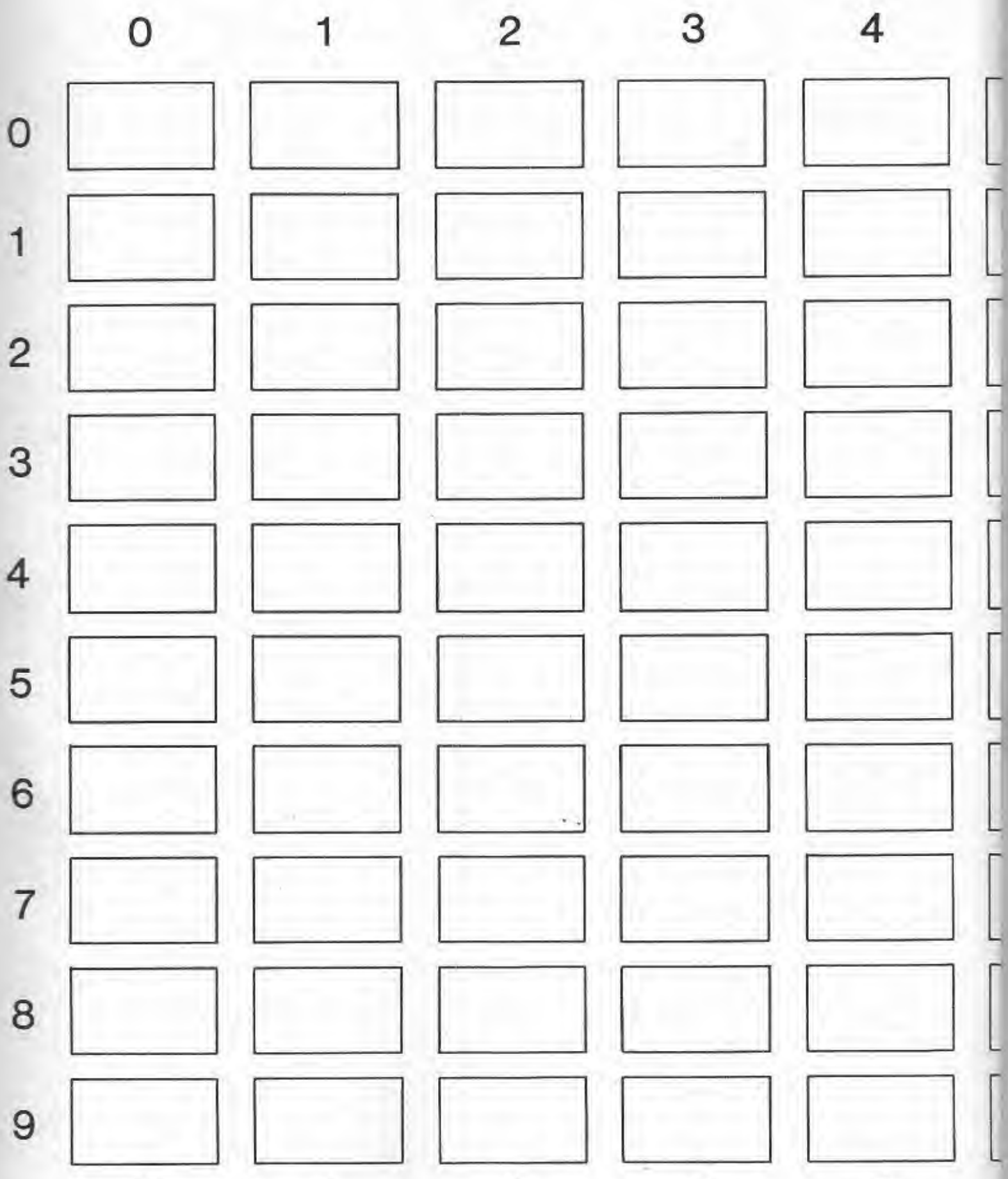


99 ALIEN-UNISON

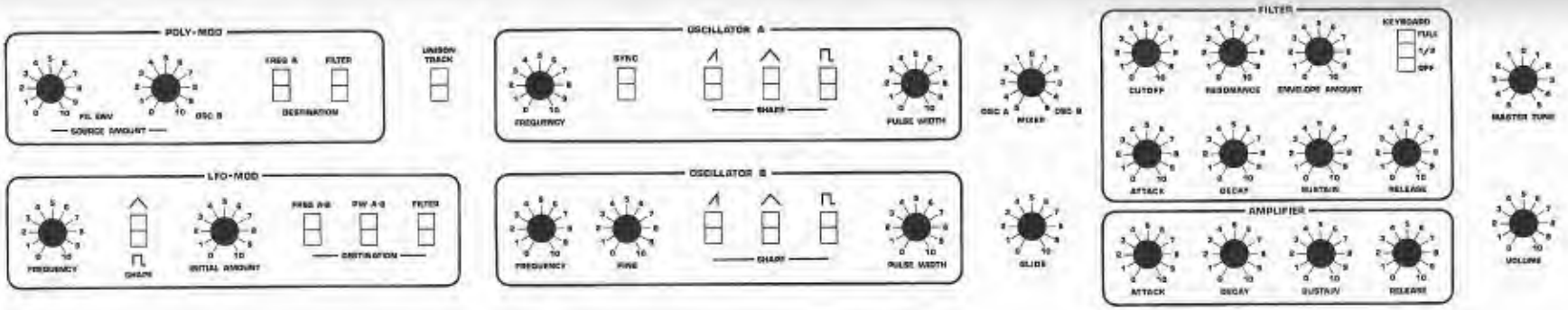
OSC A: 0
OSC B: 1 octave + major 6th
MOD WHEEL: slow frequency sweep

MAP/PANEL BLANKS

These blanks are provided for you to record your own programs and map their locations in memory. Feel free to reproduce them for your own use. (For quantities, printing at a "quick print" shop will often be more economical than xerography.)


0
1
2
3
4
0
1
2
3
4
5
6
7
8
9
0
1
2
3
4

	5	6	7	8	9	
						0
						1
						2
						3
						4
						5
						6
						7
						8
						9
	5	6	7	8	9	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FREQ A+B
PW A-B
FILTER
DESTINATION
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SYNC
SHAPE
FREQUENCY
PULSE WIDTH
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FREQUENCY
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SHAPE
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MIXER
OSC B
GLIDE
FILTER
CUTOFF
RESONANCE
ENVELOPE AMOUNT
KEYBOARD
FULL
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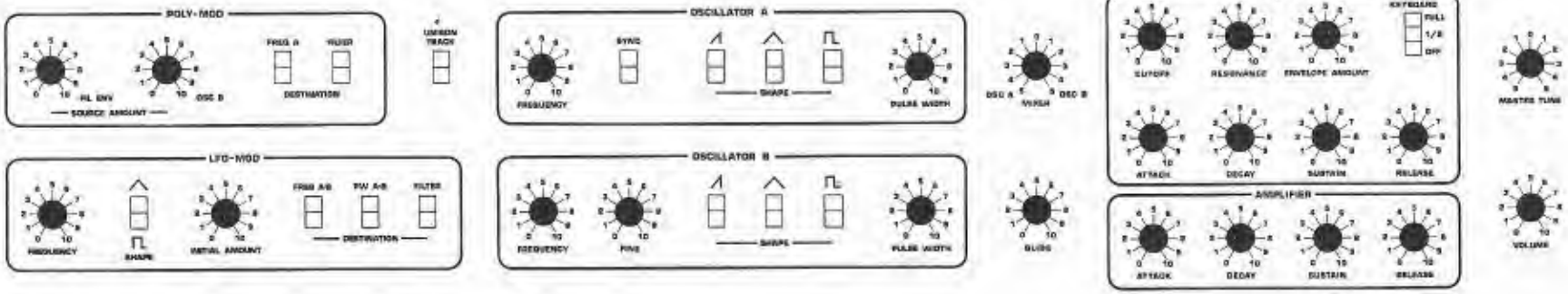
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