



OPERATION MANUAL

 **SEQUENTIAL
CIRCUITS INC**

MODEL 1008
Manual No. CM1008B

**PROPHET-T8 SYNTHESIZER
OPERATION MANUAL**

By Stanley Jungleib

Sequential Circuits, Inc.
Nijverheidsweg 11c
3641 RP Mijdrecht, Netherlands
02979-6211
TELEX: 12721 SQNTL NL

Sequential Circuits, Inc.
3051 North First Street
San Jose, California 95134-2093
408/946-5240
TELEX: 364412 INTR 706

PROPHET-T8 SYNTHESIZER OPERATION MANUAL

By Stanley Jungleib

Manual No. CM1008B
Issued: July, 1983

Copyright© 1983 by
SEQUENTIAL CIRCUITS, INC.
All rights reserved. Printed in USA.

The contents of this manual are the property of
Sequential Circuits, Inc., and are not to be copied
or reproduced without its prior written permission.

Exception is made for reproduction of blank panel
diagrams and memory map (in Section 9) for personal use.

About the Prophet-T8

Early in 1978 Sequential Circuits revolutionized the art of keyboard synthesis with the Prophet-5, a compact but powerful instrument 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 control five complete synthesizers (termed voices) fashioned from analog integrated circuits. The Prophet-5 allowed instantaneous program recall of 120 different "programs" (sounds). It thus captured the attention of most of the world's professional synthesists, becoming "the" programmable polyphonic synthesizer comparable to "the" electric organ (Hammond) and "the" electric piano (Rhodes).

A second rendering of the Prophet concept was the dual-keyboard Prophet-10. This highly versatile instrument provided a ten-voice "Single" mode by simultaneously programming two five-voice synthesizers from one keyboard, or "Split" control from separate keyboards, or "Double" operation which assigned two different programs to one keyboard. The -10 included an elaborate polyphonic sequencer which remembered whatever you played.

The Prophet-T8 integrates the most proven features of its two progenitors with a wooden, piano-like keyboard which is touch-sensitive (hence, the "T") in three ways. First, like a piano, the speed at which a key is pressed can control both loudness and timbre. Unlike a piano, the speed at which a key is released can also control loudness and timbre: this is velocity sensitivity. Beyond this, pressure sensitivity (sometimes called "after-touch") is engaged after a key is depressed and can be used to individually "bend" each key's pitch up or down, modify its loudness, timbre, modulation depth or rate. This new keyboard radically enhances for synthesists the crucial physical basis upon which expression and musicality depend, exponentially multiplying the available aural resources.

The Prophet-T8 actually contains eight individual synthesizers, grouped as four voices on the Left and four voices on the Right. In Single mode all eight voices are programmed to sound alike (homophony)--with pitch differences corresponding to (at most) eight simultaneously-held keys. In Split and Double modes, the four homophonous Left and Right voices are programmed for different sounds which are played either on separate sides or simultaneously over the whole of the keyboard.

For its principle sound sources, each voice contains two voltage-controlled oscillators (VCOs), referred to as OSC A and OSC B. OSC A, OSC B, and a white noise source can be mixed into a resonant low-pass voltage-controlled filter (VCF) which is followed by a voltage-controlled amplifier (VCA). The voice timbre and dynamics are shaped by the filter frequency and amplifier gain parameters which are varied by independent ADSR envelope generators and the various modulation sources (which include velocity and pressure). Furthermore, the envelope RELEASE knobs actually control two alternate programmed release times which are selected with the SECOND RELEASE switch or footswitch. This allows the footswitch to assume the function of the piano's sustain pedal, by switching in a longer release time.

Supplementing the basic voice are polyphonic modulation (POLY-MOD) signal routings within each voice that allow each OSC B and filter envelope generator to function as modulation sources applied to each OSC A or filter. The pressure modulation routings are also fully polyphonic, that is, individual to each note. And for each set of four voices, there is a low-frequency oscillator (LFO) whose modulation depth is adjusted by the MOD wheel (or key pressure). Finally, the PITCH wheel can raise or lower the pitch of all voices, or just the Left or Right, by the same interval.

The term "digital-analog hybrid" is often used to describe the Prophet synthesizers. It means that instead of directly controlling the analog synthesizer voices, the keyboard and most controls actually input "data" to a microcomputer system which in turn "programs" the voices. The Prophet-T8 actually has two microcomputers. One microcomputer is committed to processing the optical (velocity) and pressure sensors in the keyboard. The second microcomputer generates the sixteen independent oscillator control voltages (CVs) and the sixteen complex (velocity plus ADSR) envelopes. The computer memory provides a way to store all of the switch and knob settings which form a program. The memory retains 128 programs (64 each, Left and Right) even when the Prophet is turned off, thanks to a small battery with a 10-year life. Unlimited program storage on common audio cassettes is also available through the built-in interface. The computer system also keeps the voice oscillators in tune. Finally, memory also makes possible the 670-note polyphonic real-time sequencer.

The Prophet-T8 includes the MIDI keyboard-computer interface. This system is being adopted by increasing numbers of manufacturers as a standard means of interconnecting equipment. For example, connecting one cable between any two MIDI synthesizers or between a MIDI sequencer and synthesizer will allow one to play the other and switch programs.

With the range and quality of its sound, multi-responsive keyboard, wealth of performance features, and ergonomic control panel encouraging instant editing of all programmable parameters, this latest Prophet promises to be as significant a development as the first.

Table of Contents

<u>para.</u>	<u>title</u>	<u>page</u>
SECTION 1	INSTALLATION	
1-0	GENERAL	1-1
1-1	HANDLING	1-1
1-2	LINE VOLTAGE SELECTION AND FUSING	1-1
1-3	POWER CONNECTIONS	1-2
1-4	AMPLIFIER AND SPEAKER CONSIDERATIONS	1-3
1-5	AUDIO OUTPUTS	1-3
1-6	FOOTSWITCHES	1-3
1-7	CASSETTE	1-5
1-8	RECORD ENABLE/PROTECT	1-5
1-9	MIDI	1-5
SECTION 2	BRIEF INSTRUCTIONS	
2-0	PRESET MODE	2-1
2-1	PROGRAM EDIT AND RECORD	2-1
2-2	SEQUENCER	2-2
2-3	KEYBOARD	2-2
2-4	CASSETTE	2-3
SECTION 3	BASIC OPERATION	
3-0	GENERAL	3-1
3-1	POWER ON	3-1
3-2	PREPARATION	3-1
3-3	PLAYING	3-2
3-4	PITCH AND MOD WHEELS	3-4
3-5	TUNING	3-4
3-6	KEYBOARD MODES	3-5
3-7	UNISON/TRACK AND GLIDE	3-5
3-8	SEQUENCER	3-7
3-9	IN CASE OF DIFFICULTY	3-8
SECTION 4	PROGRAMMING	
4-0	GENERAL	4-1
4-1	EDIT MODE	4-2
4-2	MANUAL MODE	4-3
4-3	RECORD MODE	4-4
4-4	LINK	4-5

SECTION 5	SYNTHESIZER CONTROLS	
5-0	GENERAL	5-1
5-1	VOICE DESCRIPTION	5-1
5-2	OSCILLATOR A	5-3
5-3	OSCILLATOR B	5-4
5-4	OSCILLATOR NOTES	5-5
5-5	MIXER	5-9
5-6	FILTER	5-9
5-7	FILTER NOTES	5-10
5-8	AMPLIFIER	5-12
5-9	ENVELOPE GENERATORS	5-12
5-10	ENVELOPE GENERATOR NOTES	5-14
5-11	VELOCITY SENSITIVITY	5-16
5-12	VELOCITY NOTES	5-16
5-13	LFO-MOD	5-18
5-14	POLY-MOD	5-19
5-15	PRESSURE-MOD	5-20
SECTION 6	CASSETTE INTERFACE	
6-0	GENERAL	6-1
6-1	RECORDER AND TAPE SELECTION	6-2
6-2	PRECAUTIONS	6-2
6-3	SAVE PROGRAMS OR SEQUENCES TO TAPE	6-3
6-4	LOAD PROGRAMS OR SEQUENCES FROM TAPE	6-4
6-5	RECORDER COMPATIBILITY TESTING	6-5
SECTION 7	MIDI	
7-0	INTRODUCTION	7-1
7-1	BASIC OPERATION	7-1
7-2	INITIALIZATION AND MODES	7-2
7-3	KEYBOARD INFORMATION	7-3
7-4	TUNE	7-4
7-5	PROGRAM SELECT	7-4
7-6	PROGRAM DUMP	7-4
7-7	TEMPERMENT	7-5
SECTION 8	FACTORY PROGRAMS	8-1
SECTION 9	MAP AND PANEL BLANKS	9-1

INSTALLATION

1-0 GENERAL

This section describes installation procedures and connections which can be made to the back panel of the Prophet-T8. See Figure 1-0. All connectors are standard 1/4-inch phone jacks (except for the MIDI jacks, which are 5-pin DIN).

CAUTION! Do not connect the Prophet-T8 to power or switch power on before following the instructions below.

1-1 HANDLING

The Prophet-T8 is a sophisticated device containing a state-of-the-art microcomputer, sensitive analog circuitry, and a wooden keyboard action surrounded by optical and mechanical sensors. The instrument 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 loosen connectors or socketed integrated circuits. If you expect to transport the Prophet-T8 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 setting before switching power on. Disconnect power before switching line voltage.

The Prophet-T8 has a receptacle on its back panel to which its three-wire power cable attaches. Adjacent to this are line voltage selector switch and the main fuse. Prophet-T8s shipped in the U.S. and to Japan are usually set at the factory for 110V; to Europe, 220V.

CAUTION! Never switch the line voltage with power switched on.

Check the voltage selector switch on the back panel. 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: 1A
220V: 1/2A

1-3 POWER CONNECTION

WARNING! It is up to you to check the power and ground interconnections of the Prophet-T8 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-T8 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-T8 and its amplifier. As a result, low-level hum may occur. Defeating the AC ground with a two-prong adapter will usually defeat the hum but this practice can 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-T8 and its amplifier. This should reduce the hum to an acceptable level.

1. Connect the power cable to the Prophet-T8.
2. Check that the Prophet-T8 power switch is in off position.
3. Connect 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 "ground-checking" devices available on the market to verify AC connections.

1-7 CASSETTE

1. Connect TO TAPE to recorder input (MIC, LINE IN).
2. Connect FROM TAPE to recorder output (EAR, MONITOR, LINE OUT).

Cassette interface operations are explained in Section 6.

1-8 RECORD ENABLE/PROTECT

The PROTECT setting prevents accidental program changes. Unless this switch is set to ENABLE, the RECORD switch on the control panel will not operate. For more information, see Section 4, Programming.

1-9 MIDI

1. Connect the OUT jack to the MIDI IN of the sequencer, slave synthesizer, or other MIDI device.
2. Connect the IN jack to the MIDI OUT of the other MIDI device.

For more information on MIDI, see Section 7.

BRIEF INSTRUCTIONS

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

2-0 PRESET MODE

1. Check that the PITCH wheel is centered.
2. Check that the MOD wheel is set to minimum (notch towards you).
3. Play, and adjust MASTER VOLUME.
4. Check that the MASTER TUNE knob is centered, or tune to a piano, or use A-440 reference (switch on/off).
5. To switch programs, select LEFT or RIGHT then press any two PROGRAM/SEQUENCE switches.
6. Use the PITCH and MOD wheels.
7. To experiment with different Left/Right program combinations, switch LINK MODE off. Left and Right program selections will then be independent.
8. After a few minutes, press TUNE. Retune as needed.

For more information, see Section 3.

2-1 PROGRAM EDIT AND RECORD

1. To edit current program, adjust knobs and switches.
2. To cancel changes, press PRESET or re-select program.
3. To record edited program, press RECORD then select desired program destination.
4. To change a program link:
Switch LINK off.
Select program on "other" side.
Re-record desired program (in same location) on "current" side.

For more information, see Section 4.

2-2 SEQUENCER

Record

1. Press RECORD.

2. Press SEQUENCER SELECT/STOP.

3. Select sequence number with a PROGRAM/SEQUENCE switch. It lights.

4. Play. Make desired program changes.

5. To stop recording:

To make a looping sequence press RECORD or hit the SEQUENCER footswitch in time with the desired ending.

or

To make a single-play sequence, press SELECT/STOP.

Playback

1. To start manually:

Press SELECT/STOP.

Then press the desired PROGRAM/SEQUENCE switch.

or

To start by footswitch:

Select desired PROGRAM/SEQUENCE (if not already cued).

Press footswitch.

(To cue footswitch, hold SELECT/STOP then press desired number.)

2. Adjust playback RATE.

3. To save the RATE value, press RECORD (which will not light). Whenever the sequence is selected it will play at this rate.

4. To stop playback:

A sequence recorded as single-play will stop itself.

or

A looping sequence can be stopped with the SELECT/STOP switch or footswitch.

For more information, see Section 3.

2-3 KEYBOARD

SPLIT: To reprogram the split point if the current program is in SPLIT mode, hold the key which is to be lowest key on the Right side, then press SPLIT.

NORMAL UNISON: Switch UNISON/TRACK on. Play.

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

For more information, see Section 3.

2-4 CASSETTE

Connect recorder to Prophet-T8 as diagrammed in Figure 1-0.

For complete instructions, please see Section 6.

SAVE

1. Switch the back-panel RECORD switch to ENABLE.
2. Insert cassette into recorder and rewind (if necessary).
3. Choose storage mode.
 - 128 programs: Check that SEQUENCER SELECT/STOP is off and two program digits are displayed. Or,
 - 8 sequences: Press SEQUENCER SELECT/STOP. Or,
 - 8 programs: Select LEFT or RIGHT, then enter one program digit for the desired "bank." (E.g. Select RIGHT and 6 to store R61 through R68.)
4. Switch RECORD MODE on.
5. Place recorder into record and wait 5 seconds.
6. Press the SAVE TO TAPE switch. SAVE TO TAPE LED will remain lit.
7. Check the record level (0 dB).
8. When the LOAD FROM TAPE LED blinks, stop the recorder.

VERIFY

9. Now the recording must be verified. Rewind.
10. Check playback level.
11. Place recorder into play and wait until the pilot tone appears.
12. Press the (blinking) LOAD FROM TAPE switch. The LED will stay lit.
13. When LOAD FROM TAPE goes out, stop the recorder. With tape verification completed, the Prophet returns itself to the current program.
14. If the LOAD FROM TAPE LED instead blinks, a tape error has occurred. Try verification again, by repeating from step 9.

(over)

LOAD

1. Switch the back-panel RECORD switch to ENABLE.
2. Insert cassette into recorder and rewind (if necessary).
3. Choose mode: 128 programs, or eight sequences or programs, as in step 3, above.
4. Switch RECORD MODE on.
5. Check playback level.
6. Place recorder into play and wait until the pilot tone appears.
7. Press LOAD FROM TAPE. LOAD FROM TAPE LED will remain lit.
8. When LOAD FROM TAPE goes out, stop the recorder. With tape loading completed, the Prophet returns itself to the current program.
9. If LOAD FROM TAPE instead blinks, a tape error has occurred. Try loading again.

BASIC OPERATION

3-0 GENERAL

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

NOTE: If you have trouble with any of these basic operations, please see page 3-9, In Case of Difficulty.

3-1 POWER ON

1. Install the Prophet-T8 according to Section 1, Installation.
2. Switch Prophet-T8 power on with its back-panel switch, which is on the left as you face the keyboard. The switch will light.
3. Switch power on to your preamp or mixer, if used, then switch amplifier power on.

3-2 PREPARATION

When power is first switched on, the TUNE switch light-emitting diode (LED) will light to indicate that the microcomputer is tuning the oscillators. The rest of the control panel will remain unlit for these few seconds. The Prophet-T8 cannot be played while TUNE is lit.

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).

1. Check that the PITCH wheel is centered.
2. Check that the MOD wheel is fully down (minimum).
3. Check that the BALANCE knob is centered.

4. While playing, gradually raise MASTER VOLUME until the synth can be heard.
5. For optimum signal-to-noise ratio, set the Prophet-T8's MASTER VOLUME knob as high as possible. Then overall audio system gain (and noise) will be reduced by the system mixer or the power amplifier level control.
6. If necessary, readjust the BALANCE and MASTER VOLUME knobs while playing both halves of the keyboard.

NOTE: Do not adjust the PROG VOLUME knob. This is a programmed control for balancing Left and Right program loudness. It should not be used to correct amplifier or speaker imbalance.

3-3 PLAYING

After its initial tuning, the Prophet-T8 awakens in Preset mode. This is indicated by the lit PRESET MODE switch. In Preset mode, the Left and Right synthesizer voices are "patched" by programs which reside in memory and are selected with the PROGRAMMER switches.

There is only one "current" program which can be accessed and displayed on the control panel (even though in Split and Double modes the Left and Right programs are simultaneously in effect). The current program side is selected with the LEFT and RIGHT PROGRAMMER switches. The lit switch indicates the side of the current program, while the numerical PROGRAM/SEQUENCE switches select the specific program in that side. The Left and Right sides each have 64 programs designated 11 through 88, (without 0s or 9s). In other words, there are two programs with the same number; one Left and one Right. So specific programs are designated as L11, or R82, for example. R11 is automatically selected at first.

The Prophet-T8 is shipped ready-to-play with 128 "Factory" Programs already in its memory. All of these are mapped and diagrammed in Section 8. To select a program, first select the side (if it is not already indicated), then enter two program digits with the PROGRAM/SEQUENCE switches. These will appear on the LEFT or RIGHT PROGRAM numeric display. The new program will activate when you enter the second digit.

As you find your way around the Factory Programs, you may notice that changing the Right program, for example, usually changes the Left program as well. This is a function of the Link feature, which is also enabled on power-up. To separately control the Right and Left, switch LINK off. Link is explained more fully on page 4-5.

Also as you select programs note that the keyboard is programmed for SINGLE, SPLIT, or DOUBLE operation as indicated by these KEYBOARD switches. Single mode gives eight voices of the current program over the whole keyboard. Split mode gives one four-voice program on the Left, and another four-voice program on the Right. Double mode gives two simultaneous four-voice programs over the whole keyboard. The keyboard modes are more fully explained in page 3-5.

Be sure to investigate the effects available by using velocity on both attack and release, and by engaging pressure modulation after the key is initially pressed. The velocity and pressure effects differ widely between programs.

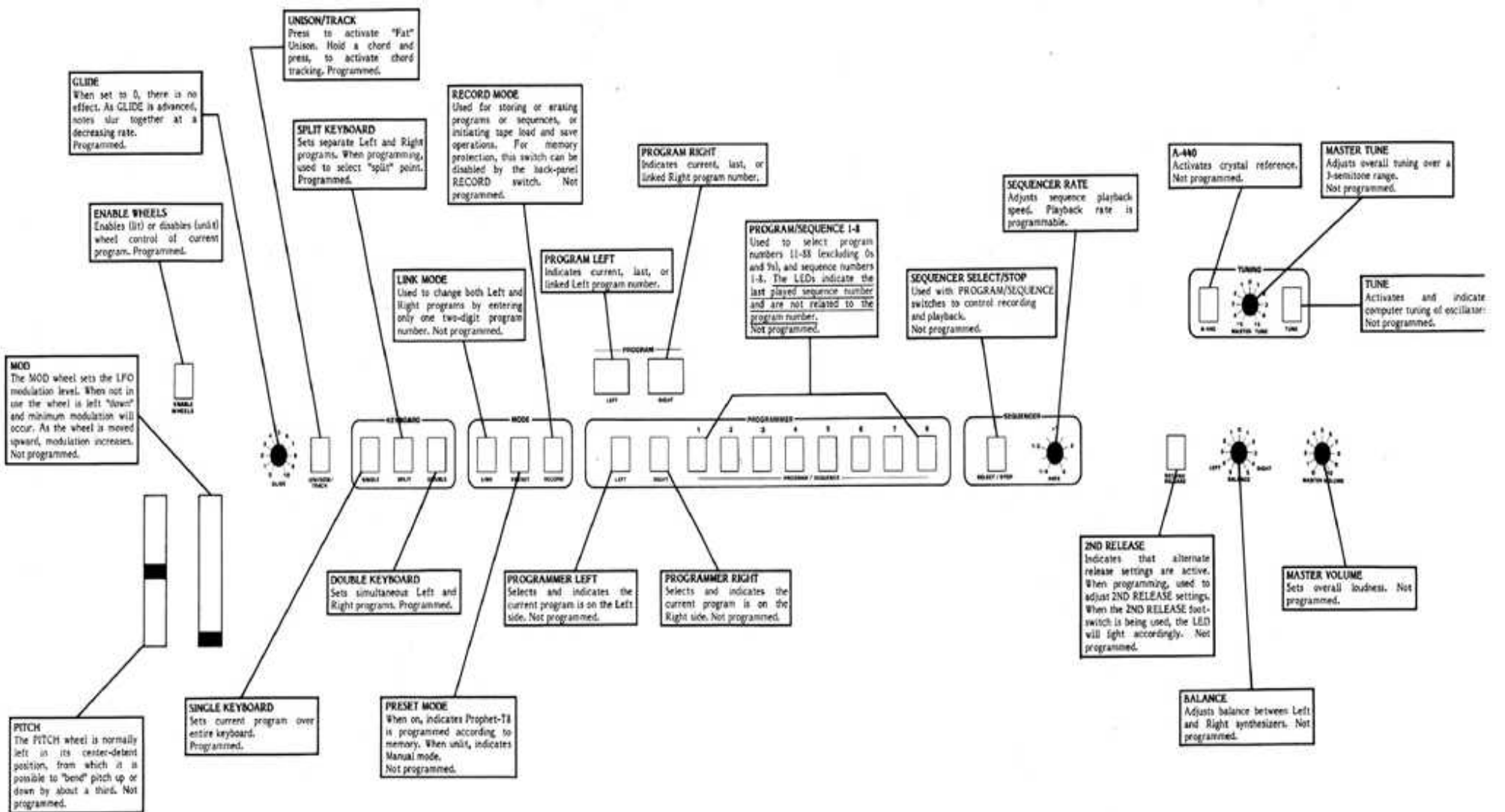


Figure 3-0
BASIC OPERATION CONTROLS

3-4 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, when enabled, both wheels affect all Left or Right voices uniformly: all voices are pitch-bent by the same interval and modulated to the same depth.

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 third.

The MOD wheel sets the modulation level. When the wheel is left down, it is not in use and minimum modulation will occur. (Minimum modulation is determined by the programmed LFO-MOD INITIAL AMT knob.) When the wheel is advanced fully up, modulation will be maximum.

The ENABLE WHEELS switch (located above the LFO-MOD module) is programmed independently by the current Left and Right programs, allowing selective use of the wheels. For example, if soloing on the Right over a "comping" sequence played on the Left, the Right program would have ENABLE WHEELS on, while the Left program would program the wheels off so that bending or modulating the solo line wouldn't also bend and modulate the comping as well.

3-5 TUNING

The MASTER TUNE knob is used to tune the whole synthesizer to another instrument, such as a piano. Or the built-in A-440 reference can be used as a reference. (Note that for accurate tuning, the PITCH wheel must be centered.)

As mentioned above, the microcomputer automatically tunes the oscillators when the Prophet-T8 is first switched on. But as the instrument warms-up, the temperature change causes the oscillators to drift. So it will occasionally 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-T8 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 progress. Retuning takes 5 to 25 seconds, depending on how far out of tune the oscillators have drifted since their last tuning. The more often you tune, the less time each tuning takes.

When tuning is concluded, the Prophet-T8 returns to exactly its state before the tuning. (Even unrecorded Edit mode changes are retained.) It may be necessary to slightly readjust MASTER TUNE.

The TUNE switch will not operate while the -T8 is loading to or saving from tape.

3-6 KEYBOARD MODES

In playing through the Factory Programs you must have noticed the keyboard mode switching between unified, separate or simultaneous sounds over the Left and Right, and between monophonic (unison) lines and polyphonic capacity. The synthesizer voices are assigned to particular keys according to the settings of the KEYBOARD and adjacent UNISON/TRACK switches in the current program. These features are explained in this and the following paragraph.

Single Mode: When the SINGLE KEYBOARD switch is on, the current program controls all eight voices, providing eight homophonous (same-sounding) voices over the whole keyboard. If more than eight keys are held down at the same time, the earliest-used voices are reassigned first. For example: playing and holding C, D, E, F, G, A, B, and C assigns all the available voices. Adding another key, such as D#, to this cluster results in D, E, F, G, A, B, C and D# being sustained. The first C disappears when the D# is played. Each new key played is assigned to the earliest-used voice, which must give up the key it was sounding. (If a key is repeated, the voice assignment doesn't change.)

Split Mode: If SPLIT KEYBOARD is on, the Left and Right voices will have different programs. The active program numbers are indicated in the PROGRAM DISPLAY. The side, Left or Right, which is not current will be programmed by whatever program was last selected there, unless LINK is on. If LINK is on, the program on the non-current side will be the program which has been linked to the current program. The position on the keyboard at which the Left/Right split occurs can be moved at will when the program is recorded or edited. (For further information, see page 4-4.)

Double Mode: If DOUBLE KEYBOARD is on, the Left and Right synthesizers will also have different programs, but they will be played simultaneously to create very complex sounds. This results in a four-voice capacity over the whole keyboard. The non-current side will be programmed by whatever program was last selected there, unless LINK is on. If LINK is on, the non-current program will be the program which has been linked to the current program.

3-7 UNISON/TRACK AND GLIDE

In Single mode the keyboard continuously reassigns each new note to one of eight voices in rotation. In Split and Double modes the assignment occurs within the four Left and four Right synthesizers. In all modes, whenever a key is struck or restruck, the envelope generators (explained in Section 5) are triggered to proceed through their attack and decay periods. These repeated attacks and decays are required to articulate polyphony. Therefore we say the Prophet-T8 keyboard normally operates in last-note priority, with multiple-triggering.

But there are several options to this voice assignment and triggering scheme available, which can be selected with the UNISON/TRACK switch or footswitch: Normal Unison, Tracking Unison, and Simple Unison.

Normal Unison: To enable, simply switch UNISON/TRACK on, or press the footswitch once. If the current program is in Single mode, all eight voices will be assigned to the last (i.e., most recent) key played anywhere. If the current program is in Split mode, four voices will be assigned to the last key on the current side. (The Unison mode of the other side is programmed independently.)

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

In Normal Unison, if several keys are played at once, the last key will sound. Releasing the last key that was pressed causes the lowest pressed key to sound. 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. 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. With practice, the system allows you to selectively trigger notes by touch.

In any Unison mode with single-triggering (and without velocity), the sustain level does not change as two notes are played legato. But velocity sensitivity complicates matters by allowing great differences in sustain levels between legato notes. The problem is how to move between the two sustain levels without retriggering attack and decay. The solution, which you should be able to demonstrate to yourself, is that if the next note is faster (louder) the envelope level will increase to the new sustain level at the attack rate. If the new note is slower (softer) the envelope level will decrease to the new sustain level at the decay rate. By not retriggering both the attack and decay periods, the legato quality is preserved.

Tracking Unison: Play and hold any chord, then press UNISON/TRACK or hit the footswitch once. This "latches" the chord, so that any key you play becomes the root, while the upper intervals follow along (track). In Single mode the chord can have eight voices. Split and Double modes limit tracking to four voices. The chord that is latched into UNISON/TRACK is not retained by the current program.

NOTE: Tracking Unison can only be switched off with the UNISON/TRACK switch (not with the footswitch). If Tracking Unison is on, pressing the footswitch will either latch a new chord or switch the keyboard to Normal Unison, depending on whether keys are held or not.

Simple Unison: Play and hold any one key, then press UNISON/TRACK. In effect, this assigns one voice for tracking. Simple Unison will yield a thinner sound than Normal Unison, where four or eight voices sound simultaneously.

Glide: Lastly there is the GLIDE knob, which operates identically in all modes. When set (or programmed) 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.

3-8 SEQUENCER

The real-time Polyphonic Sequencer within the Prophet-T8 allows you to directly record your own accompaniment; bass lines, comping patterns, riffs, melodies, or whatever. It records with exact timing whatever you play, including velocity dynamics (but not pressure-modulation). It can be operated by a footswitch, keeping the hands free to play. The playback speed can be from four times slower to four times faster than the recorded tempo. The sequencer's 670-note capacity can be shared by eight different sequences. Sequences can be stored through the cassette interface (see Section 6).

As it is pre-programmed with sound programs, the Prophet-T8 also comes pre-programmed with some demonstration sequences. To play the demonstration sequences, follow the Playback instructions below.

Recording

1. As the recording rate is fixed, the position of the SEQUENCER RATE knob doesn't matter.
2. Press the RECORD MODE switch. It lights.
3. Press the SEQUENCER SELECT/STOP switch. It lights.
4. Select the desired sequence number with one of the PROGRAM/SEQUENCE switches. It lights to indicate sequence number.
5. Recording will not start until you begin to play.
6. While playing, select program changes if desired. These changes will be recorded.
7. It is possible to record the sequence ending so that either the sequence immediately plays-back and loops repeatedly, or so that it neither plays-back immediately nor loops at all when played. To create a "looping" sequence, when done playing press the RECORD switch or press the SEQUENCER footswitch. When creating looping sequences, you will find it especially important to synchronize this switching with the desired ending of the sequence.
8. To create a "single-play" sequence, when done playing press the SELECT/STOP switch. It will go off.
9. To record a sequence with a rest at the beginning, hold down any key before switching on RECORD. Recording will then start when that key is released.

NOTE: If the sequencer's note capacity is exceeded, the program displays will indicate "FULL". If this occurs, stop recording according to either of the above two steps. (A droning note can be cleared by playing up to eight notes on the keyboard.) To create more sequence space, erase an undesired sequence by:

Press RECORD on.

Press SELECT/STOP.

Select PROGRAM/SEQUENCE number of undesired sequence.

Press SELECT/STOP.

Playback

1. Press the SEQUENCER SELECT/STOP switch.
2. Press the desired PROGRAM/SEQUENCE switch.
3. Whether the sequence loops or plays once depends on how it was recorded.
4. Adjust the RATE knob as desired.
5. To save the RATE value, press RECORD (which will not light). Whenever the sequence is selected it will play at this rate. This programmed rate can be edited and re-recorded. Each sequence can have its own rate.
6. To stop the sequence at any time, press SELECT/STOP.

Footswitch Playback

1. If no other sequence has been played, pressing the sequencer footswitch starts sequence 1.
2. Otherwise, pressing the sequence footswitch starts whatever sequence was most recently selected or played. (As indicated by the lit LED on one of the PROGRAM/SEQUENCE switches.)
3. When the current sequence is no longer desired, the footswitch can be "cued-up" with another sequence. To do this, hold SELECT/STOP and press the desired new sequence number. The next time the footswitch is hit, the cued sequence will start.
4. Either a looping or single-play sequence can be stopped at any time by pressing the footswitch.

3-9 IN CASE OF DIFFICULTY

Power

If the Prophet-T8 is receiving power, it will either display program numbers, or the TUNE or CASSETTE 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 MASTER VOLUME control is turned up.

If still no sound can be heard, try switching on the A-440 or 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.

Controls

If you are having trouble recording programs, recording or playing sequences, it may help to reset the microcomputers by switching power off then back on after a moment.

Voice Defeat

For the occasion when a voice may become unplayable due to component failure, a Voice Defeat allows you to delete the failed voice from the assignment system. The Prophet-T8 can then be played normally, with the remaining voices.

To defeat a voice:

1. Switch off UNISON/TRACK, if on.
2. Hold the key of the "bad" note.
3. Hold RECORD.
4. Press PROGRAM/SEQUENCE switch #7. The voice will be defeated and will remain defeated until the power is switched off. (When power is switched back on, the voice will not be defeated.)

PROGRAMMING

4-0 GENERAL

Section 3 covered basic Preset Mode operation with the Factory Programs. You can use the Prophet-T8 solely with the Factory Programs. However, using the instrument solely in this way defeats most of its purpose, which is to allow keyboard synthesists to create and program sounds appropriate to their own music.

Although the Factory Programs were of course chosen to display the range and depth of the -T8's sounds, they are still only the beginning of what can be done with the instrument. As good as these programs are, the musician will find that some are more useful than others in certain contexts. It is not simply a question of whether to use a "string" or "brass" sound, or something unheard-of. It is rather the question of what specific string or brass 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, every velocity and pressure nuance, 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. The sound needs to be simpler, raunchier, more acoustic-like, more percussive, weirder, or purer (Or all at once, for all the good words do.) This is why you want to be able to create custom programs.

Perhaps you are ready to see what else the Prophet-T8 can do sonically. There are three levels to programming custom sounds. The first is knowing the -T8's various modes of operation and accompanying control functions. These modes and switch functions are explained in this (and the previous) section.

The second level is knowing what the synthesizer controls do, in a functional and theoretical sense. The controls are explained in Section 5. You may want to consult The Complete Guide to Synthesizers, by Devarahi, (1982: Prentice-Hall, Englewood Cliffs, New Jersey, ISBN 0-14-160630-1), or Allen Strange's Electronic Music, (William C. Brown Co., Dubuque, Iowa). Additional references can be obtained from the more extensive bibliographies contained in these books. "Keyboard" magazine (20605 Laza-neo, Cupertino, CA 95014) carries many articles on synthesis. (For example, see the July, 1983 issue which has Bob Moog writing about MIDI.) And there is "Polyphony" magazine (1020 W. Wilshire Blvd., Oklahoma City, OK 20305) which concentrates on technical aspects. Also, check into synthesis lessons, seminars, or courses which are increasingly being offered by individuals and colleges.

The third level of programming is using all the controls for musical purposes, for art. This is left to you. To exploit the Prophet-T8's sonic possibilities fully, learn as much about it as you can by studying the Factory Programs. The program diagrams are included (Section 8) to encourage you to experiment with the Prophet's capabilities. Knowing exactly how some programs are achieved will make it easier for you to begin to create your own programs. At first, practice synthesizing by editing the Factory Programs, as explained below. For many, this will be the best way to learn exactly how to construct specific sounds. Then switch to Manual mode and try creating programs "from scratch."

Go ahead and experiment with editing and recording programs. You can always restore the instrument to its original condition by reloading the Factory Program file through the cassette interface (see Section 6).

Be advised that in the excitement of creation, new and interesting patches tend to escape if not documented. Panel blanks are provided for this purpose in Section 9. If a program is not documented when it is first created, it will be tedious to do so later. This is because the programmed control settings may only be determined in Edit mode by repositioning all the knobs, as explained below.

4-1 EDIT MODE

Edit mode is a powerful tool that allows you to experiment with program changes by selectively adjusting the front panel controls. The original program remains unchanged and can be restored at any time by simply pressing PRESET again. 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.

Edit mode is entered when the Prophet-T8 is in Preset mode and a programmable control is adjusted.

1. To edit the current program, adjust any black-colored knob, or toggle any black-colored switch. Upon moving any programmed knob the parameter will jump instantly to the new setting indicated on the dial. Edit mode will be indicated by a decimal point between the two displayed program digits.
2. To cancel the edits of a program and restore the original program, press PRESET (or re-select program).
3. It is possible to edit both program sides simultaneously. For example, suppose a Right program is current, and you edit it. Then you switch to a Left program and edit it. When you switch back to the Right program, the edited changes will still be there.
4. Edited programs can be permanently stored in memory, either replacing or supplementing the original program. See Record Mode, page 4-4.

The Basic Operation section classified certain controls as "programmable" and "not programmable." The difference is that programmable controls are subject to setting by the computer (and color-coded black), while non-programmable controls are only set by the player (and color-coded grey or silver, except for the wheels). All of the controls crucial to establishing the characteristic sound of a program are programmable, while the performance and mode controls are non-programmable. (The grey RATE knob is not part of the programs, but is remembered as part of the sequences.)

In Preset mode as you select different programs, the switches always show their state by lighting or not. But there is no way for the knobs to move themselves, as they would have to, to indicate their programmed settings. The knobs just stay where they happen to have last been set. But once a knob is moved, it alone becomes active, accurately indicating its current setting on the dial. The programmable parameters of inactive, unmoved knobs do not change. (So, unmoved knobs do not necessarily show their actual currently-programmable setting.)

For example, suppose you like program R15 but want to change OSC A waveforms and prefer a brighter tone:

1. Check that PRESET is on.
2. Check that the RIGHT side is current.
3. Select program 15.
4. Switch waveforms as desired.
5. Raise FILTER CUTOFF for desired brightness.
6. You can cancel any changes and return to the original program by hitting PRESET.
7. If you want to permanently change program 15 to this sound, press RECORD, then select 15.
8. Or, if both the original and the edited version are wanted, record the edited program in a new location (that is, a location with an undesired program).

To edit SECOND RELEASE values the program must first be recorded:

1. In Preset mode, select the desired program.
2. Switch on SECOND RELEASE either with the front panel switch or footswitch (pedal).
3. Adjust the filter and amplifier RELEASE knobs as desired (for the second release).
4. Re-record the program.

4-2 MANUAL MODE

1. To enter Manual mode, switch PRESET off. This removes computer control from the programmable knobs and switches. All controls will then indicate the exact status of the patch under construction. You can see what signal paths are closed by the switches. The knob positions reflect their actual settings..
2. For convenience, the switches are initially turned off, so nothing will be heard. As you begin to construct the patch by activating switches, remember that the sound which is produced will be the result of however all the synthesizer controls happen to be set. For anything to be heard, certain minimum conditions need to be established, which may be better understood after you have become familiar with the

synthesizer controls (see Section 5). 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 to either 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, first check that the MOD wheel is down, then alternately switch off the PW switches in the POLY-MOD or LFO-MOD modules.
- d. The MIXER knob for the desired oscillator(s) must be turned up.
- e. The filter cutoff frequency must not be set too low. To check this, raise the FILTER CUTOFF knob.
- f. The AMPLIFIER ATTACK time must not be set too slow. If necessary, dial it to 5.
- g. The AMPLIFIER SUSTAIN level must not be too low. If necessary, raise it.
- h. The PROG VOLUME knob must also be somewhat advanced. (This knob should normally be kept as high as possible for best signal-to-noise ratio.)

3. Both sides can be operated manually. Or one side can be operated in Manual mode while the other is operated in Preset or Edit mode.

4-3 RECORD MODE

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

1. Check that the back panel RECORD switch is set to ENABLE.
2. Select a program to be edited or moved. Edit it as desired.
3. If the program is in Split mode, to program the split point:
 - a. Hold the key which is to be the lowest note of the Right section.
 - b. Press the SPLIT KEYBOARD switch.
4. If LINK will be used, check that the LINK switch is off, momentarily switch to the other side and select the program to be linked to the program being recorded.
5. Switch on RECORD. It will light.

6. If the program is to be recorded on the other side, switch the control panel to that side, using the LEFT or RIGHT switch. (Ignore this step if the current side is desired.)
7. Press a PROGRAM/SEQUENCE switch for the first digit of the program number being recorded.

8. 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.

9. Otherwise press the second digit, and the program will be recorded or moved to that location.

NOTE: Be sure to hit the correct PROGRAM/SEQUENCE switch or you may erase a program you had wanted to keep.

10. When the second digit has been entered, the RECORD LED will go off and the Prophet will return to either Preset or Manual mode (whichever was previous to Record Mode).

11. If in Manual mode, it is always a good idea to check that the program is correctly recorded in the desired location by switching PRESET back on.

4-4 LINK

Whenever a program is recorded, the program number which happens to be displayed on the other side is recorded with it. Thereafter if LINK is on when the program is selected, the program on the other side is automatically changed to the linked program number. In addition, the keyboard is switched to the same mode as originally recorded.

The LINK function is a very useful feature for live performance, as it allows a double program change and a keyboard mode change by simply entering a two-digit program number.

A LINK can be changed at any time by simply switching the program on the side to be linked, then re-recording the current program. LINK references the program number, rather than the program itself. So a linked program can be fully edited or even replaced.

SYNTHESIZER CONTROLS

5-0 GENERAL

This section describes the Prophet-T8's programmable synthesizer controls which were not covered in Section 3.

5-1 VOICE DESCRIPTION

Figure 5-0 diagrams one of the Prophet-T8's eight voices and the modulation system at a very general level. Audio from OSC A, OSC B, or the noise source is mixed into the filter, then amplified. Generally, the oscillator frequencies are determined by the keyboard, while the filter cutoff frequency and amplifier gain depend on the envelope generators, although these are all subject to adjustment by the modulation sources. Velocity sensitivity is implemented through the envelope generators.

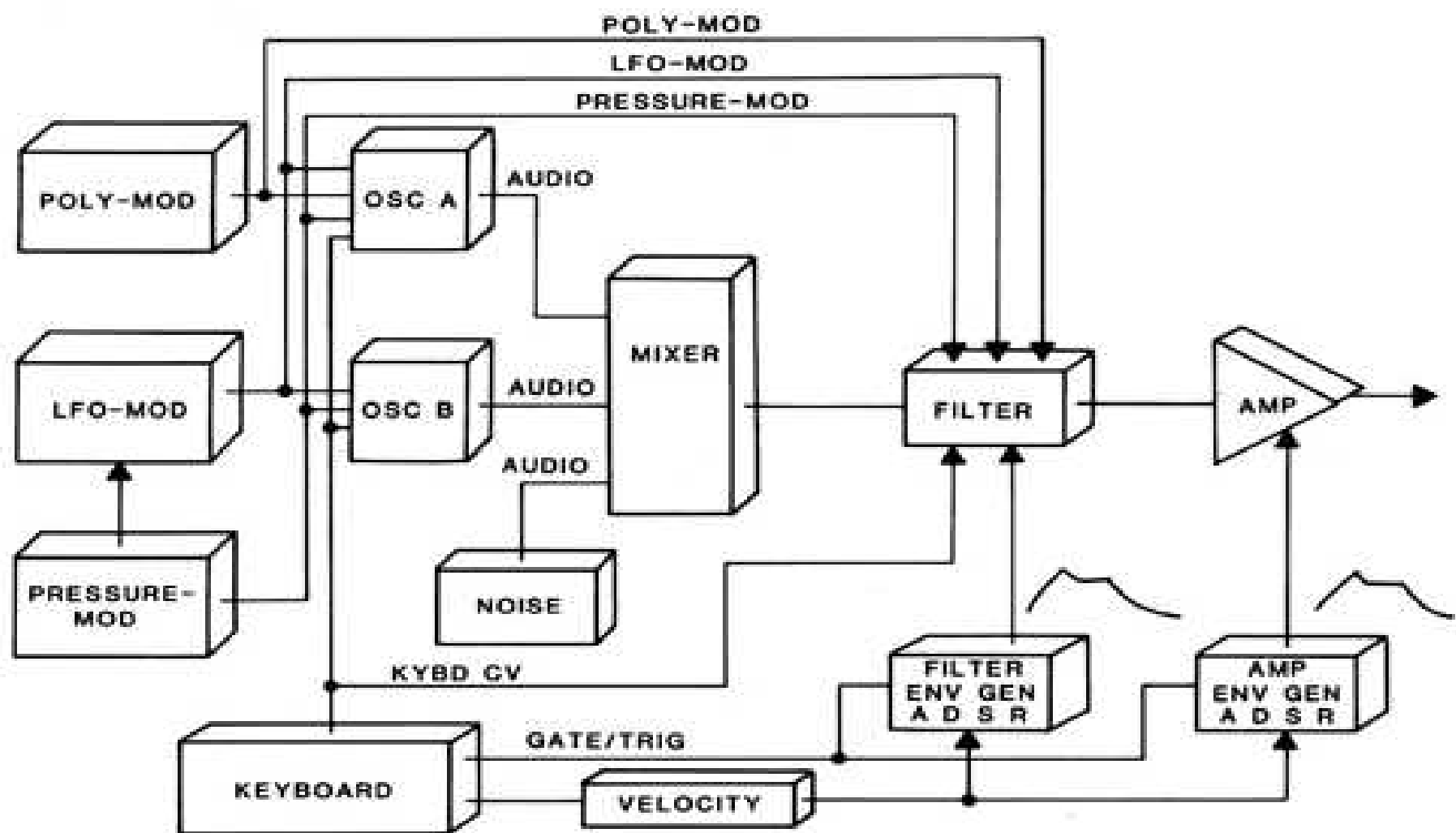


Figure 5-0
BASIC VOICE FUNCTION

The Prophet-T8 belongs to the tradition of voltage-controlled analog synthesizers. To begin understanding these instruments at a functional level, it has proven useful to first identify the functions of the three main synthesizer elements: controllers, audio sources, and modifiers (filters and amplifiers). Basically, controllers provide the control voltages (CVs) which determine the operating parameters of the the audio sources and modifiers. Controllers can be mechanical devices such as keyboards, wheels, and knobs. For example, as the control voltage from the keyboard to an oscillator (audio source) is increased, the oscillator frequency increases. Or controllers

can be electronic, such as an LFO or envelope generator. For example, as a rapidly-decreasing control voltage from an envelope generator sweeps down the filter cutoff frequency, it imparts a "pluck" to the voice. All this is done with voltage control, the essence of analog synthesis.

It follows that understanding analog synthesis requires understanding exactly how the various CVs can be created, routed and adjusted. Figure 5-2 provides a more detailed view of the significant control and audio paths in a typical voice and in the modulation systems. Please refer to it often as you study each synthesizer module.

5-2 OSCILLATOR A

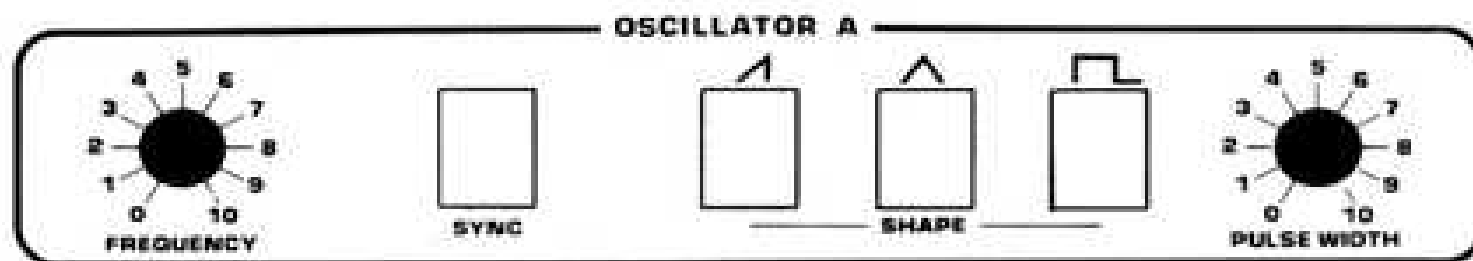


Figure 5-1

FREQUENCY knob: Adjusts oscillator pitch in 1-semitone steps, over a 4-octave range. For basic "concert" tuning, first set the FREQUENCY knob to 0. The T8's keyboard range is then equivalent to a piano minus the top octave. A-440 will be the fifth A from the bottom of the keyboard. 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 with a period equal to that 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.

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 basically pure tone.

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

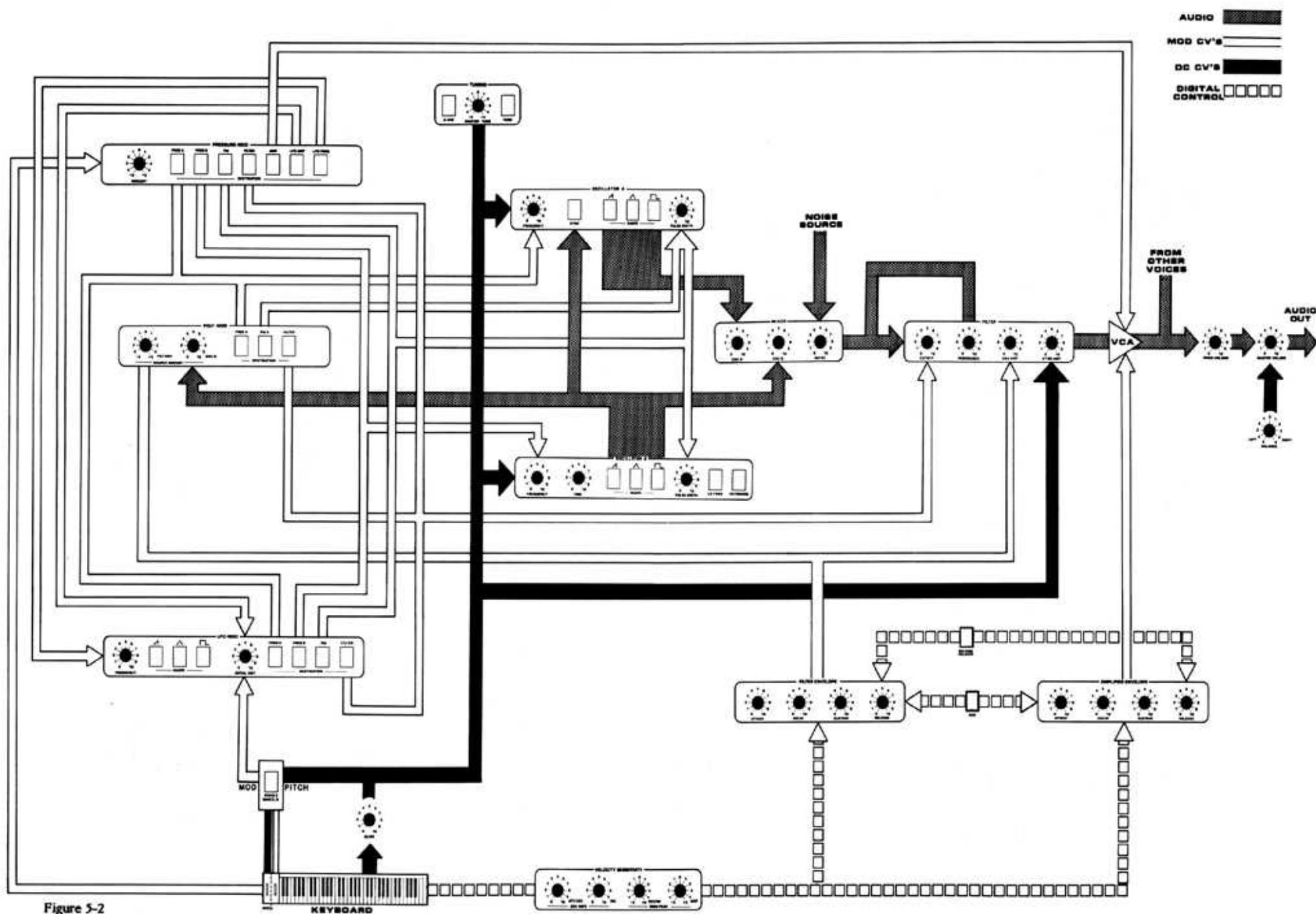


Figure 5-2
 SYNTHESIZER BLOCK DIAGRAM
 CM1008A 3/83

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 0 to 100%. 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. The PULSE WIDTH knob basically has no effect on the sawtooth or triangle waves. (However, extreme pulse-width modulation can affect the oscillator frequency.)

OSC A is an audio-frequency source whose frequency has many controllers. The keyboard is the most conspicuous controller, but the FREQUENCY knob, PITCH wheel, and MASTER TUNE knob all have an influence. Frequency can also be modulated by Pressure, Poly-Mod, and LFO-Mod, for a total of seven overall determinants of OSC A pitch. OSC A pulse width is controlled by the PULSE WIDTH knob, but also by CVs which can be switched in from the LFO-Mod or Pressure-Mod systems.

5-3 OSCILLATOR B

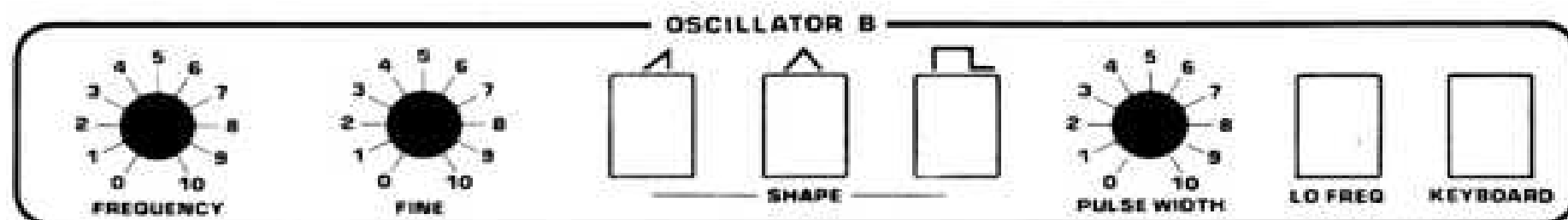


Figure 5-3

FREQUENCY knob: Adjusts oscillator pitch in 1-semitone steps, over a 4-octave range. Exact oscillator pitch is fine-tuned with the MASTER TUNE knob.

FINE knob: Adjusts oscillator pitch over a range of about two semitones. When it is not desired to detune OSC B relative to OSC A, FINE should be set to 0.

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 basically pure tone. This wave is centered around ground so that when using OSC B as a Poly-Mod source, the modulation destinations will not be offset.

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 0 to 100%. 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. The PULSE WIDTH knob has no effect on the sawtooth or triangle waves.

LO FREQ switch: Switches-down OSC B to function as a low-frequency oscillator (LFO). Used when OSC B POLY-MOD is active.

KEYBOARD switch: When OSC B is used as an audio source, this switch is usually on. Switching off removes keyboard control from OSC B, so its frequency doesn't "track" with OSC A.

OSC B is essentially similar to OSC A, except that in addition to being an audio source, it can be a Poly-Mod modulation source. OSC B has eight possible frequency controls: the keyboard, FREQUENCY and FINE knobs, LO FREQ switch, MASTER TUNE, PITCH wheel, Pressure-Mod, and LFO-Mod. Like OSC A, OSC B pulse width is controlled by the PULSE WIDTH knob, but also by CVs which can be switched in from the LFO-Mod or Pressure-Mod systems.

5-4 OSCILLATOR NOTES

The function of the VCO is to convert the direct current (dc) frequency control voltage input into the raw waveshapes which will become musical after processing by the filter and amplifier.

The basic waveshape which describes any single frequency is the sine wave. The sine is characterized not only by the fact that it changes polarity periodically, but also that the polarity change occurs in a smooth, continuous fashion. The sound of a sine wave is innocuous, rather like that of a tuning fork or flute. In the Prophet-T8, this sound can be "patched" by placing the filter in self-resonance (see below, Filter).

As the sine wave has limited usefulness for music, the Prophet-T8 oscillators offer more complex waveshapes consisting of many frequencies at once. Raw synthesizer waveshapes consist of a fundamental frequency plus a variety of "harmonic" frequencies which are multiples of the fundamental. Considered by themselves, the fundamental and each harmonic are sine waves. But their conglomeration actually creates a complex chord. The periodic polarity changes in such waves do not occur smoothly, but rather are characterized by angles and flat segments (as opposed to the continuous sine curve) which form the shape of a triangle, sawtooth, or pulse wave. Each waveshape reveals a specific harmonic structure which results in the specific timbres associated with it. The principles defining the harmonic content for each wave type are as follows:

Triangle

The triangle wave is composed only of the fundamental plus odd-multiple frequencies which are 3, 5, 7 and so on times the fundamental. Although they are present, their strength is very weak, diminishing as the inverse-square of the harmonic number. Because of the weak harmonics the triangle wave is almost as pure as a sine wave.

Figure 5-4 lists some of the harmonic components and graphs how a triangle wave would appear on a spectrum analyzer.

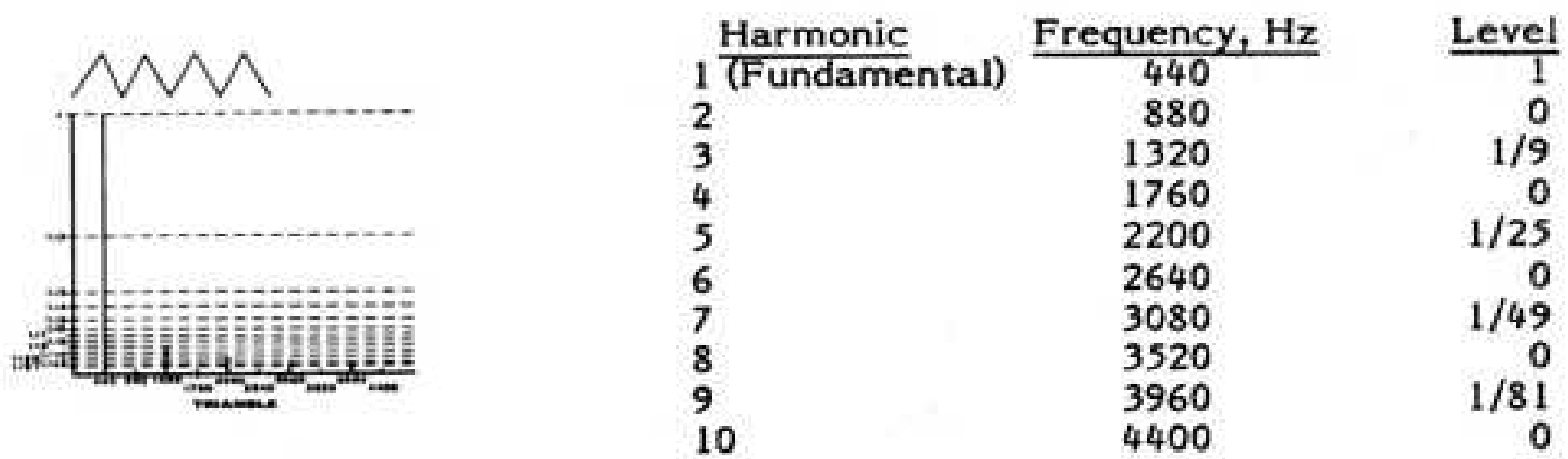


Figure 5-4
TRIANGLE WAVESHAVE

Sawtooth

Opposite to the triangle, the sawtooth waveshape has a bright and brassy sound. Accordingly, its harmonic series contains both even and odd harmonics, and they are present at much higher levels, as shown in Figure 5-5.

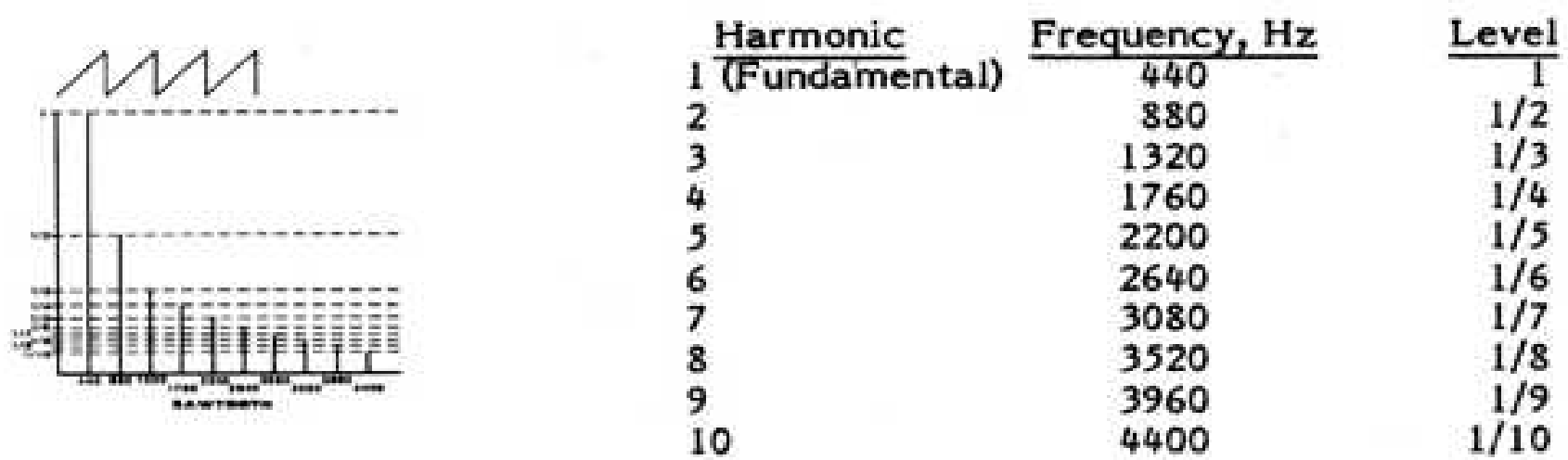
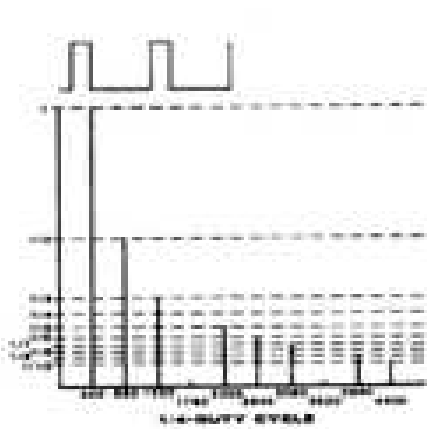


Figure 5-5
SAWTOOTH WAVESHAVE

Pulse and Square

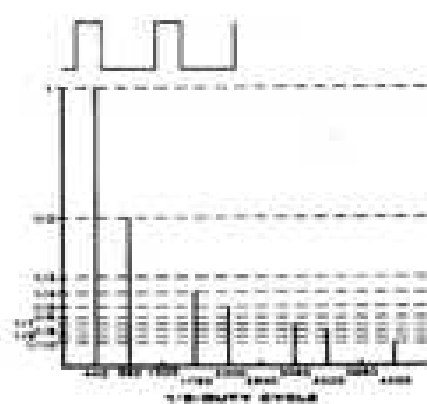
Pulse wave timbres can be rich, hollow, reedy, or nasal, depending upon the PULSE WIDTH, which adjusts the duty cycle of the pulse. Duty cycle is the ratio of time which the pulse wave spends in the positive state, as compared to the total period of the wave. Taking a very slow pulse for example, if the pulse goes positive for one second, negative for three seconds, then repeats, the duty cycle is 25%, or 1/4, because the pulse is positive for 1/4 of the entire wave period. Similarly, a 33% duty cycle pulse would be positive for 1/3 of the wave period.

The specific harmonic structure depends on the duty cycle according to the formula that if the duty cycle is 1/N, every Nth harmonic will disappear. That is, if the duty cycle is 1/4, every fourth harmonic will be missing. If 1/3, every third harmonic will be missing. See Figures 5-6 and 5-7.



Harmonic	Frequency, Hz	Level
1 (Fundamental)	440	1
2	880	1/2
3	1320	1/3
4	1760	0
5	2200	1/5
6	2640	1/6
7	3080	1/7
8	3520	0
9	3960	1/9
10	4400	1/10

Figure 5-6
1/4-DUTY CYCLE PULSE



Harmonic	Frequency, Hz	Level
1 (Fundamental)	440	1
2	880	1/2
3	1320	0
4	1760	1/4
5	2200	1/5
6	2640	0
7	3080	1/7
8	3520	1/8
9	3960	0
10	4400	1/10

Figure 5-7
1/3-DUTY CYCLE PULSE

The square wave is just a pulse wave with a duty cycle of 1/2, therefore each even harmonic is cancelled, leaving only the odd series. See Figure 5-8.

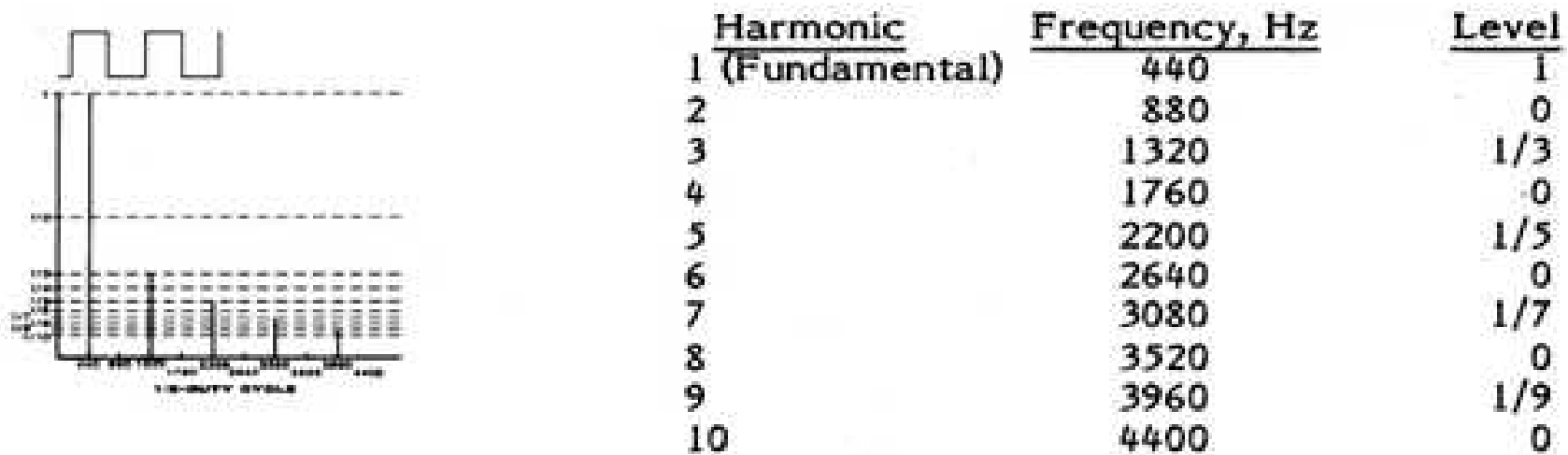


Figure 5-8
1/2-DUTY CYCLE PULSE (SQUARE WAVE)

These three examples show clearly that the harmonic content of the pulse wave depends on the pulse duty cycle, which makes it easier to see how pulse-width modulation achieves its affect. As the controlling voltage fluctuates, the pulse width is shifted, which shifts the harmonic pattern. This dynamic filtering is very useful for enlivening sounds.

The synthesizer begins with its oscillators. Knowing the basic characteristics of the the waveshapes is obviously crucial to using the oscillators efficiently. The oscillators can contribute different timbres, as discussed, but they can also be adjusted--with their FREQUENCY knobs--to track the keyboard at any interval up to four octaves. The Mixer knobs (see below) are used to balance the contributions of each oscillator.

For example, suppose you are synthetically seeking an acoustical instrument which acousticians say has a healthy complement of inharmonic overtones. Inharmonic overtones are those which are not exact multiples of fundamental frequencies. These occur in many natural instruments. A single oscillator cannot generate both harmonic and inharmonic overtones. So one might set up OSC A to provide the fundamental pitch and one harmonic series, while OSC B FREQUENCY is set an octave, twelfth, fifteenth, seventeenth, nineteenth, (or any other interval) higher. To make OSC B's overtones inharmonic, raise its FINE knob. As the harmonics are subtly, then extremely detuned, the sound may move from a piano timbre, for example, to that of a bass celeste, then steel drums, perhaps becoming a xylophone. Under these conditions the MIXER knobs will have a strong influence on the timbre.

5-5 MIXER

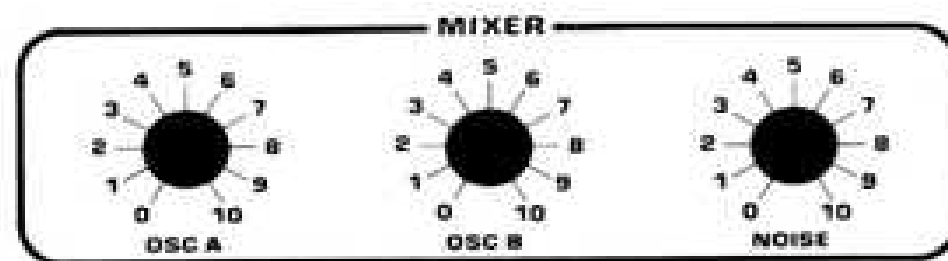


Figure 5-9

OSC A knob: Adjusts the level of oscillator A input to the filter.

OSC B knob: Adjusts the level of oscillator B input to the filter.

NOISE knob: Adjusts the white noise level input to the filter.

The Mixer knobs are used to balance the waveform contributions of OSC A and OSC B. When both OSC A and B are being used as audio sources, they will often be offset in frequency so that one oscillator provides a base pitch and one series of harmonics while the other, tuned higher, fills-in the harmonic structure with its own series of overtones. By setting the relative levels of each harmonic series, the Mixer knobs exert a radical effect on the resulting timbre.

For optimum signal-to-noise ratio, set both Mixer OSC knobs as high as possible. The higher knob should be set to "10," and the lower balanced to that.

When OSC B is being operated in low-frequency mode as a Poly-Mod source, the Mixer OSC B knob should be set to "0" to prevent the modulation signal from entering the filter.

Noise is an unpitched audio source, which can provide the basic material for such sounds as drums, cymbals, surf, or rain. It can be added in small quantities to pitched audio, to put a gritty edge on the tone.

5-6 FILTER

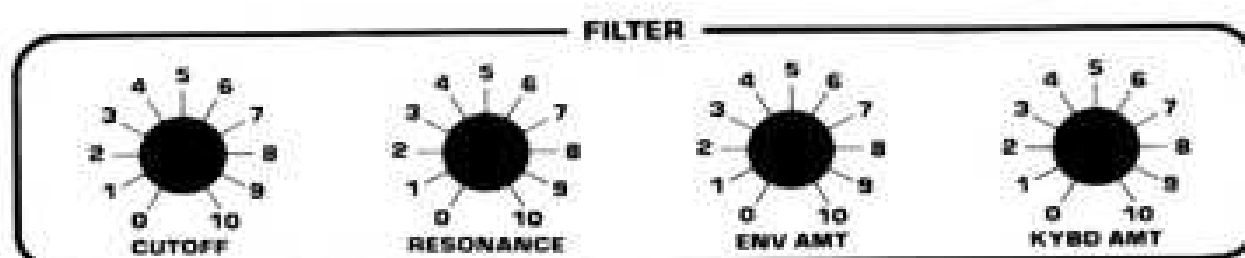


Figure 5-10

CUTOFF knob: This is like a tone control. It adjusts the initial cutoff frequency of the low-pass filter. "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. The CUTOFF knob is only one source of filter frequency control. Other sources are the filter envelope generator, keyboard, LFO-Mod, Poly-Mod, and Pressure-Mod.

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 input signals at the cutoff frequency will increase, due to the increased feedback. As resonance increases, frequencies lower than cutoff will become decreasingly audible in comparison with those nearer cutoff. If there is no signal being input to the filter, oscillation will occur for resonance settings near 10. The pitch of this oscillation is determined by the filter cutoff frequency.

ENV AMT knob: This attenuator sets the depth of the electrical "contour" from the filter envelope generator applied to the filter cutoff frequency. The shape or "envelope" depends on keyboard touch, the settings of the filter envelope ATTACK, DECAY, SUSTAIN, and RELEASE (ADSR) knobs, and upon the VELOCITY RATE and PEAK knobs. The envelope will generate the broadest frequency sweeps if ENV AMT is set towards 10, (in such cases, the CUTOFF knob is usually lowered). If ENV AMT is set to 0, the envelope (including velocity) will have no effect.

KYBD AMT knob: An attenuator which controls the keyboard's effect on the filter cutoff frequency. When set toward maximum, the KEYBOARD control voltage (CV) controls the filter's cutoff frequency just as it normally controls OSC A frequency and OSC B frequency (if the OSC B KEYBOARD switch is on). 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. As KYBD AMT is reduced, 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. Adjust for desired sound while playing over the range of the keyboard.

If RESONANCE is set for self-oscillation (that is, near 10), then the filter can be "played" from the keyboard by carefully tuning the KYBD AMT knob for an octave interval. (Unless a complex effect is desired, the ENV AMT knob will in this case normally be set to 0).

5-7 FILTER NOTES

The filter acts on the raw oscillator waveshapes from the mixer. All timbres are created merely by adjustment of two filter parameters: cutoff frequency and resonance.

Audio filters block some frequencies and pass others. There are four basic types of audio filters: band pass; band reject; high pass; and low pass. These are illustrated in Figure 5-11 with typical charts of their frequency responses. The band pass filter blocks frequencies above and below a certain range. The band reject filter does the opposite. The high pass filter blocks all frequencies below a certain point; the low-pass filter blocks all frequencies above a certain point.

The Prophet-T8 uses voltage-controlled low-pass filters. Basically, these set an upper limit to the harmonics which can pass to the amplifier. This limit, cutoff frequency, is subject to voltage control by the CUTOFF knob and keyboard, by the modulation sources, and filter envelope generator. The first group of controllers set the basic timbre. The modulators provide spontaneous and subtle variation. By rapidly sweeping

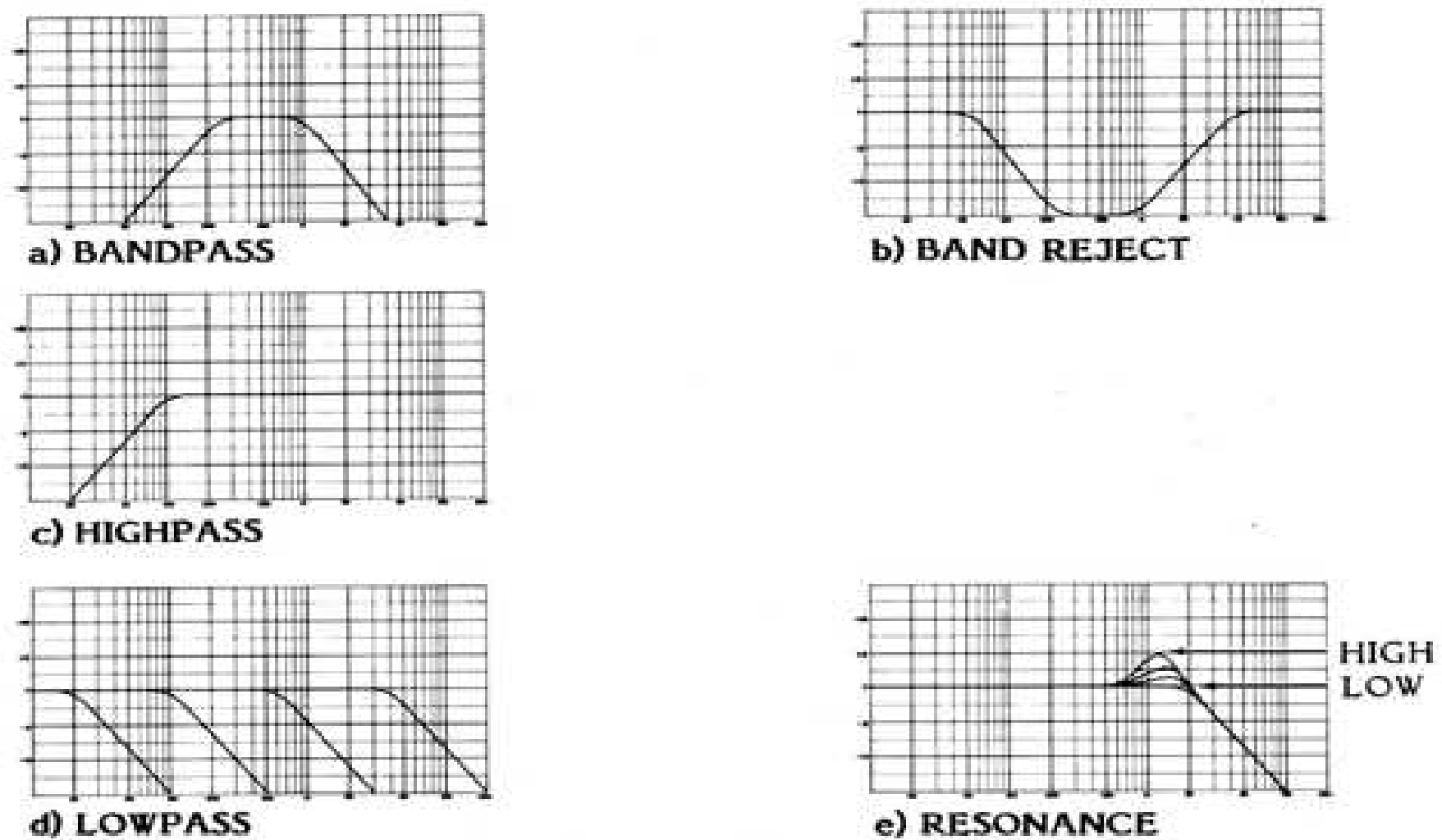


Figure 5-11
FILTER TYPES

the cutoff frequency up and down, the envelope generator creates the important attack "transient," which characterizes the onset of each note. Understanding the filter therefore means knowing the influence of all cutoff controls.

Note that since there are so many sources of filter cutoff control, it is possible to inadvertently disable the filter by applying so much control voltage (CV) that the cutoff frequency is pushed beyond the normal audio range. Referring to Figure 5-11d, in this case the cutoff point is so far to the right that all of the audio frequencies are still passed.

The other filter adjustment which is critical to timbre is resonance, illustrated in Figure 5-11e. The RESONANCE knob is the only resonance control. When resonance is low, higher frequencies are attenuated by 24 dB/octave. In other words, the signal one octave above the cutoff frequency will be attenuated 24 dB with respect to the signal at cutoff. (This is a sharper filter response than, say, 12 dB/octave.) If the cutoff frequency is modulated, this resonant filter will sweep across the harmonically-rich input. This is a practical way to replicate certain resonances of acoustic instruments.

Generally, all filter effects are heightened as resonance is increased. As resonance increases, signals near cutoff frequency are actually amplified. Technically, as the input frequency approaches cutoff frequency, phase shift of the filter output signal approaches 180 degrees. The resonance feed-back amplifier is an inverter. Therefore the second inversion performed by the resonance inverter results in a net phase match at the cutoff frequency (which becomes the resonant frequency), due to the positive feedback. These frequencies are boosted, while frequencies farther below cutoff are attenuated due to the net negative feedback which they receive.

There are two basic techniques for applying filter phase properties. The first is to modulate the filter cutoff frequency itself. To the extent that the resonance control is raised, an actual vibrato (frequency shift) will be imparted to the audio by the resulting phase shift.

The other technique is more appropriate for complex sounds. When filter resonance is high, the input signal will tend to synchronize the filter frequency to itself or to a harmonic. If the input signal to the resonating filter is then shifted through modulation, the resonant filter will not change frequency, but will shift phase. (If under these conditions the difference between input and filter frequency becomes very large, low-frequency beating may occur.)

5-8 AMPLIFIER

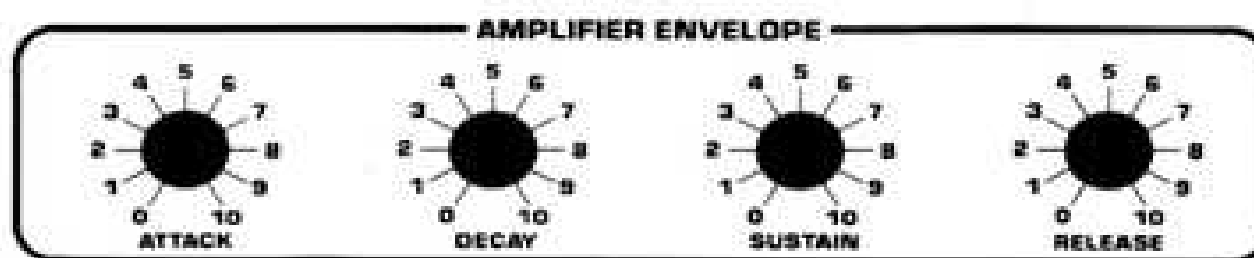


Figure 5-12

The voltage-controlled amplifier determines the loudness of the voice. It is controlled by its own envelope generator (see below), which articulates the necessary transients, and by the Pressure-Mod circuitry, which increases or decreases volume in response to the touch.

The combined envelope and pressure CV is adjusted by the PROGRAMMED VOLUME knob, which is handy for balancing Split and Double mode patches, without having to constantly fiddle with the (non-programmable) BALANCE knob. For optimum signal-to-noise ratio, programmed volume should be set as high as possible.

5-9 ENVELOPE GENERATORS

The filter and amplifier each have their own ADSR envelope generators (EGs). The Filter EG and Amplifier EG controls function identically.

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

DECAY knob: Adjusts the length of time for the CV envelope to fall from peak level to sustain level.

SUSTAIN knob: Adjusts the CV sustain level from zero to maximum.

RELEASE knob: Adjusts the length of time for the CV envelope to go from sustain level to zero.

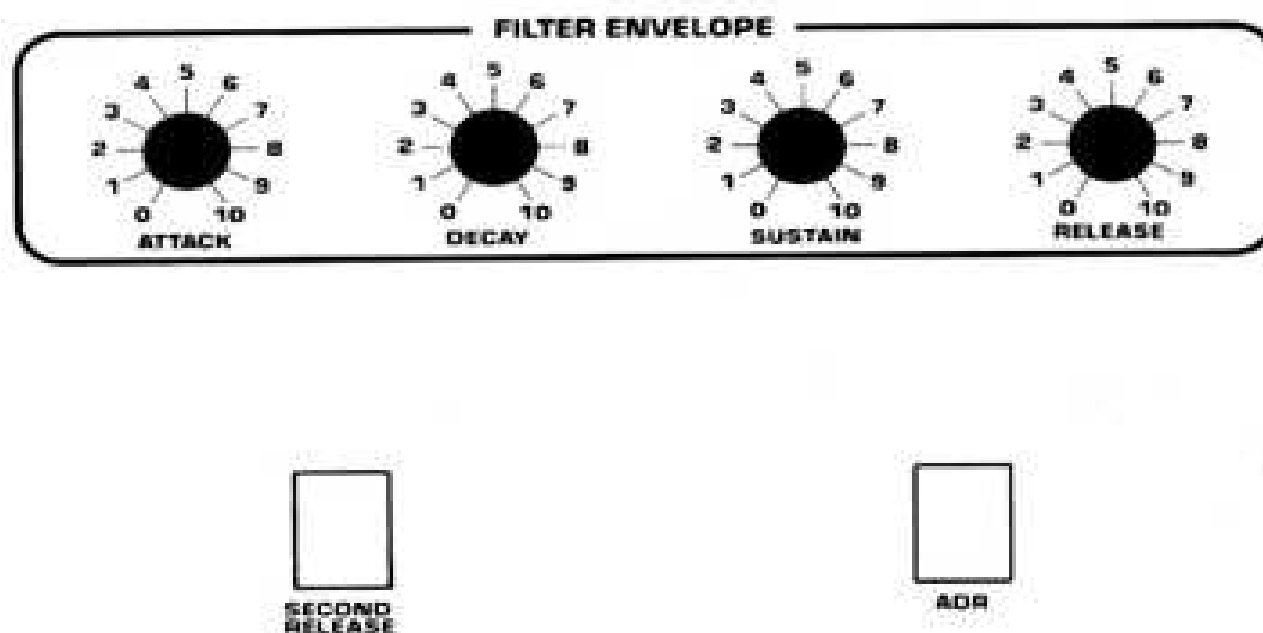


Figure 5-13
ENVELOPE CONTROLS

To prevent an audible click caused by the instantaneous closing of the Amplifier EG, the **AMPLIFIER RELEASE** knob should be set slightly above 0.

The time range on the **ATTACK**, **DECAY**, and **RELEASE** knobs is approximately 3 milliseconds (3/1000 second) to 10 seconds. Since the generators respond exponentially to their timing controls, setting 5, for example, gives a period of approximately 1/2 second (rather than 5 seconds).

The Prophet-T8 allows programming of two separate release times for each envelope generator which can be selected by footpedal while playing. Both release times are controlled by the Filter and Amplifier Envelope **RELEASE** knobs. The **SECOND RELEASE** switch or footswitch determines whether the first or second release setting is selected and accessible with the **RELEASE** knobs.

Footswitch selection of alternate release times (in conjunction with **ADR** mode) is especially useful for creating realistic pedal control of piano sounds. Typically the first release would be programmed for a short release time (less than 1/2 sec.), while the second release actuated by pedal would hold the sound for a much longer period.

SECOND RELEASE switch: When off, the "first" release times are active and editable with the **FILTER** and **AMPLIFIER RELEASE** knobs. When on, indicates that the "second" release times are active and editable.

ADR switch: When on, forces the envelope to have no sustain duration. After completing the decay period, instead of settling at the sustain level, the filter and amplifier envelopes immediately go to the release stage, whether the key is released or not.

SECOND RELEASE footswitch; Allows remote control of alternate release times. When pressed, control panel switch lights.

5-10 ENVELOPE GENERATOR NOTES

Each voice contains two independent ADSR envelope generators. A synthesizer "envelope" is a dc voltage which increases from 0 to some maximum value, then decreases again to 0, according to a specific pattern. Normally the patterns are repeated with each keystroke. (The exception is single-triggering. See below.) As the envelopes rapidly sweep filter cutoff frequency (through the ENVELOPE AMOUNT knob) and amplifier gain they "contour" the voice timbre and dynamics, turning the raw waveshapes from the mixer into musical sounds.

If the keyboard is polyphonic (UNISON off), it operates in multiple-trigger mode. Every new keystroke "triggers" the envelope generator to begin its attack period. If UNISON is on, the keyboard operates in single-trigger mode. The first note played will trigger the envelope. But unless this key is released, a new attack will not be triggered with each note. Instead, these notes will be voiced at the sustain level. As mentioned in paragraph 3-7, selective triggering is an expressive tool. For example, the first note of a phrase played by a reed instrument often receives greater emphasis than following notes. This effect can be synthesized in Unison, with careful attention to envelope settings.

See Figure 5-14. Once triggered, the envelope generator output voltage rises from zero to its peak value. This rise can be instantaneous or can take up to 10 seconds, as adjusted by the ATTACK knob.

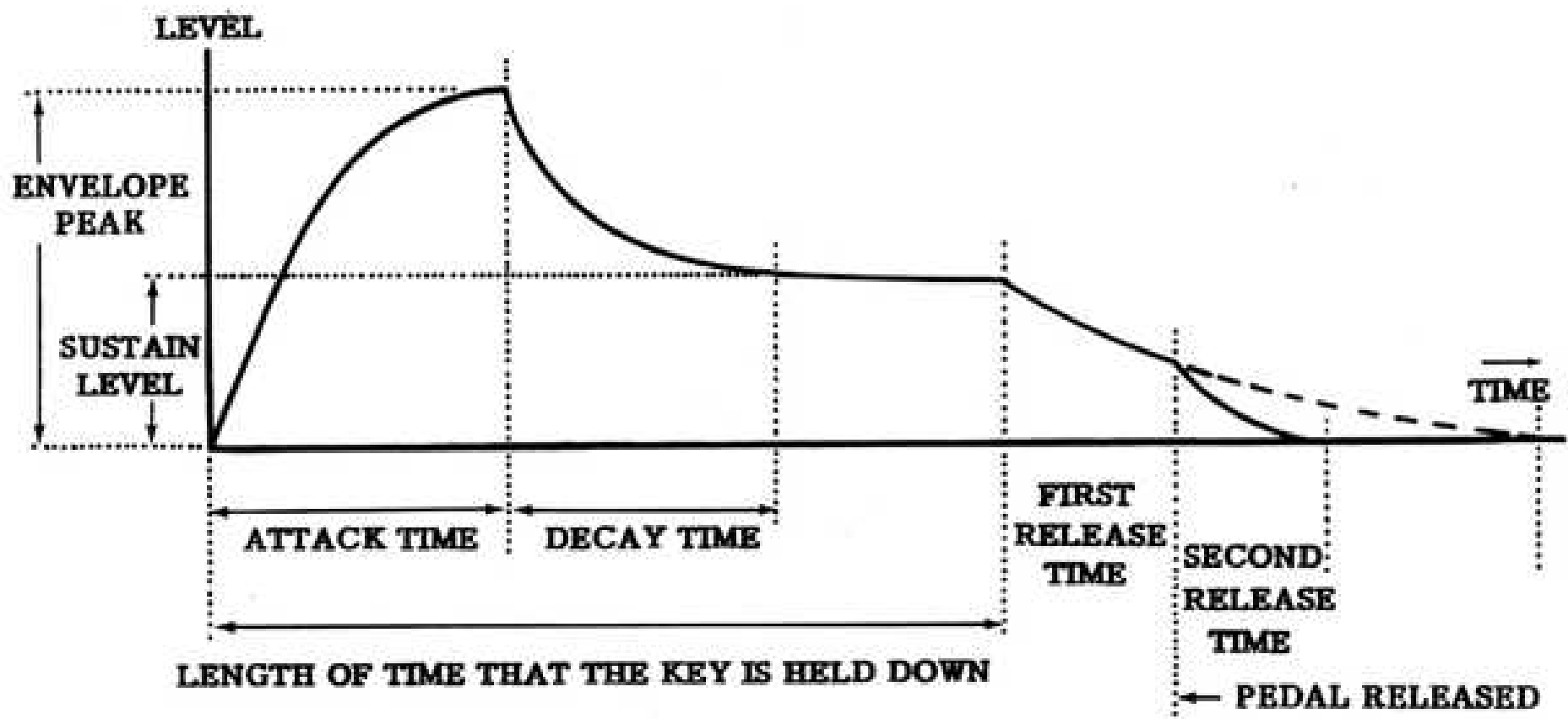


Figure 5-14
ADSR ENVELOPE

When the envelope has reached its peak, the attack period is over and the decay period starts. During this stage the envelope voltage falls from maximum to the sustain level. This can also be virtually instantaneous or take up to 10 seconds, as adjusted by the DECAY knob.

After the attack and decay periods, and if the key is still held, the envelope voltage remains at the level adjusted by the SUSTAIN knob, until the key is released. ATTACK and DECAY (and RELEASE) are time controls. But SUSTAIN is a level control which is effective only while a key is held. Thus sustain duration, that is, the time between the end of the decay period and the beginning of the release period, is determined by touch.

The release period begins whenever the key is released. The envelope then drops from sustain level to zero. This can be instantaneous or take up to 10 seconds, as adjusted by the RELEASE knob. The envelope voltage remains at zero until the envelope generator is triggered with another keystroke.

There are a few more features of these EGs which need to be mentioned. First, note that if SUSTAIN is set to maximum, this level will already have been reached at the end of the attack period, therefore there is no decay period. Similarly, if SUSTAIN is set to minimum, there is no release period, since the envelope is already at zero voltage.

If ADR is switched on, there is no sustain duration. See Figure 5-15. The envelope instead moves from the decay period directly to the release period. This is desirable when synthesizing percussive sounds, which have no sustain period (as opposed to an organ, for example, which does). Eliminating sustain duration allows a complex decay envelope using both the DECAY and RELEASE knobs. Notice that both programmed release settings can be used; if either the key is held or the release pedal is pressed, the second release settings are in effect.

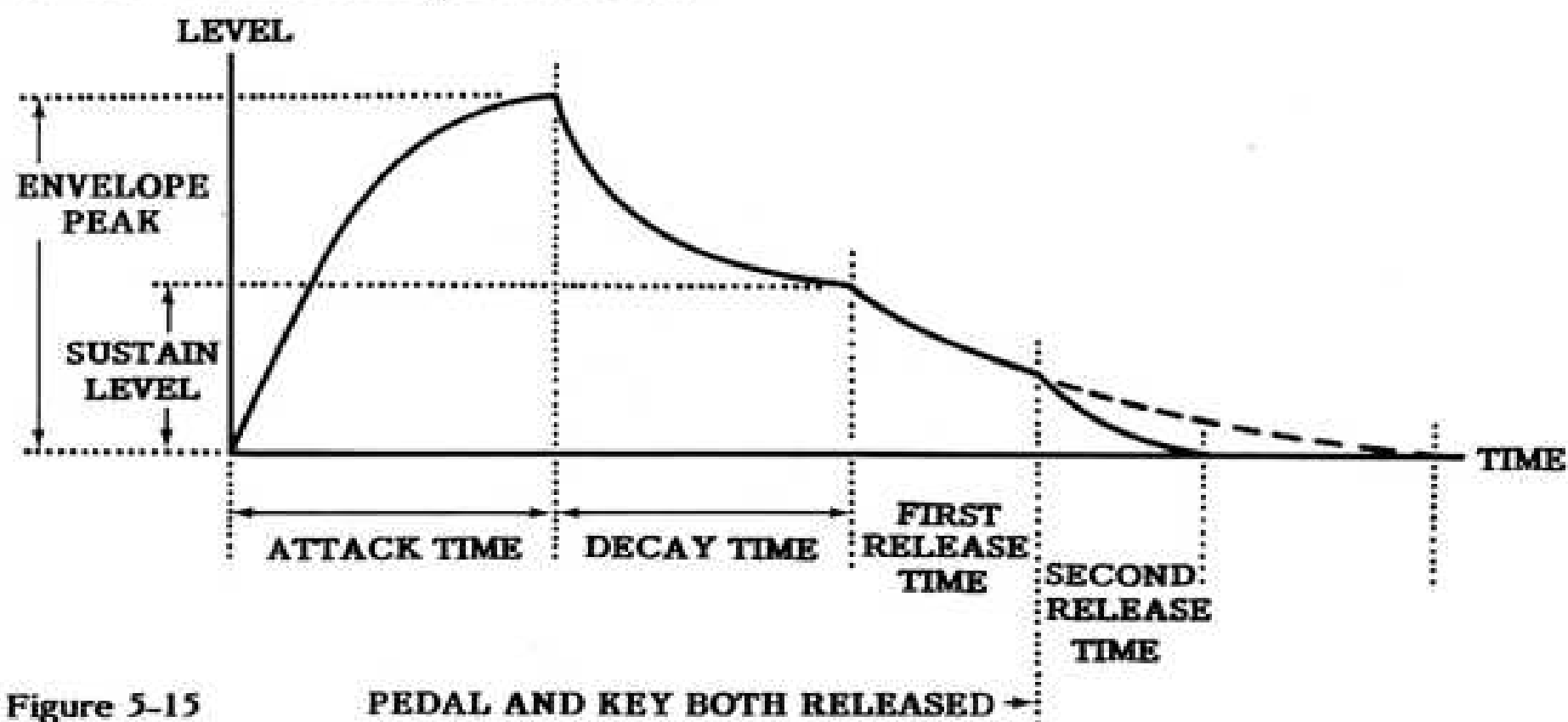


Figure 5-15
ADR ENVELOPE

Concerning questions of specific envelope settings for typical sounds, please see the Factory Program diagrams in Section 8.

Finally, a technical note which may be of interest. Rather than using multiple voltage-controlled ICs (as in the Prophet-5), the envelopes in the Prophet-T8 are actually generated by the microcomputer system. This allows the efficient integration of velocity and envelope signals.

5-11 VELOCITY SENSITIVITY

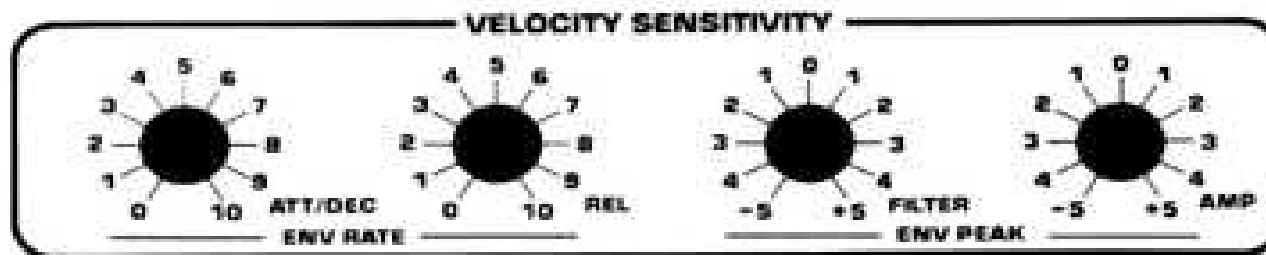


Figure 5-16

ATK/DEC ENV RATE knob: Adjusts effect of key-depression velocity on both the filter and amplifier EG attack and decay rates.

REL ENV RATE knob: Adjusts effect of key-release velocity on both the filter and amplifier EG release rates.

FILTER ENV PEAK knob: Adjusts depth of filter envelope velocity control.

AMP ENV PEAK knob: Adjusts depth of amplifier envelope velocity control.

5-12 VELOCITY NOTES

There are two types of velocity controls, envelope rate and envelope peak. The ENV RATE knobs can be thought of as inputs to the envelope generators (see above), which modify the timings. The ENV PEAK knobs can be thought of as amplifiers of the resulting envelopes.

As shown on Figure 5-1, the ATK/DEC ENV RATE knob routes the "key down" velocity signal to the attack and decay inputs. Of course if the key-down velocity is high, the attack and decay times are accelerated. If the key is pressed more slowly, the times are extended. The applied velocity supplements the initial settings of the filter and amplifier envelope generator ATTACK and DECAY knobs. These remain effective, even if the ENV RATE controls are at maximum.

Similarly, the REL ENV RATE knob routes the "key up" velocity signal to both release inputs. Naturally, if the key-up velocity is high, the release time is shortened. Release time lengthens as the key is released more slowly. Here too, the envelope generator RELEASE knobs will still be effective in establishing the initial control range. It should be noted that this velocity sensitivity is "bidirectional," then, unlike a piano, which is only sensitive to attack.

See Figure 5-17. The normal envelope, without velocity, has a maximum value of about +2V. While this is low for typical synthesizers, this value becomes the dynamic center when velocity is applied. Given a basic sound, increasing velocity sensitivity does not only mean that the sound gets louder. Actually, the ability of the sound to become softer is increased as well. Therefore when the ENV PEAK knob is set to 0, the envelope operates over its 2-volt range. As ENV PEAK is raised, the whole envelope is reduced or amplified. It can be driven to the standard +10V maximum, or only as high as about ½V, according to the touch. This results in a dynamic range of about 30 dB. The filter and amplifier envelopes are independently adjustable.

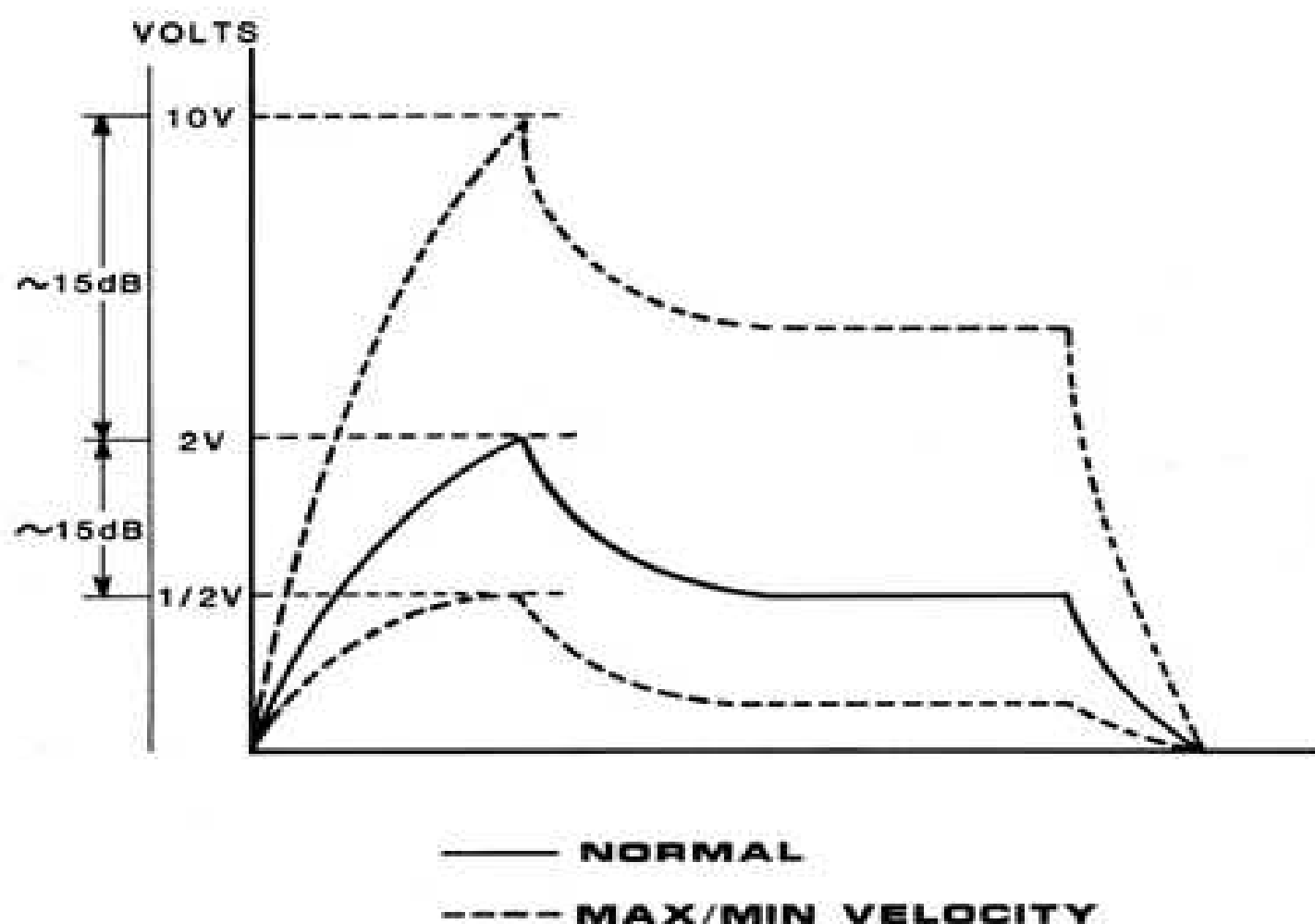


Figure 5-17
VELOCITY ENVELOPE

In other words, if ENV PEAK is maximum and you play with average velocity, the envelope levels operate in the same, average range as when ENV PEAK is set to 0.

In order to maintain consistent envelope shapes as the envelope peak varies with velocity, the sustain level must change accordingly. The sustain level can be regarded as a fraction of the normal peak level. The velocity system constantly maintains this ratio according to the normal SUSTAIN knob setting, regardless of velocity.

So as the ENV PEAK knobs are set positive, faster velocity means bigger envelope peaks. But these knobs also have a negative range. When set negative, the effect of velocity is reversed. Faster velocity gives smaller envelope peaks, although the envelope value is still positive. At first this may seem odd, since it is not clear why you want a program to get softer when you play harder, and vice versa. But consider two programs, one with positive, the other with negative ENV PEAK settings. In Double Mode it will be possible to mix the programs in and out by how hard you play. The program change can be subtle or total. This "velocity mixing" is demonstrated in some of the Factory Programs. (A similar trick is possible with Pressure Modulation, see paragraph 5-14.)

To summarize the envelope system, the envelope generators impart to sounds their identities of transient beginnings, sustained timbres and volume and final release characteristics. The envelopes therefore mingle intimately with your keyboard technique. For example the speed at which notes are played has a great deal to do with the appropriateness of certain envelopes. Programs with short envelope timings invite faster playing than those with longer timings. With velocity applied the relationship becomes that much more complex.

5-13 LFO-MOD

A synthesizer's expressiveness stands on its modulation facilities. "Modulation" refers to the control of one sound parameter by a periodic, random, or transient signal. This involves a signal-generating source and a modulated destination. Electronic controllers serve as modulation sources 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-T8 contains three distinct modulation systems: LFO-MOD, POLY-MOD, and PRESSURE-MOD. The difference between these systems is that LFO-MOD uses a single low-frequency oscillator (LFO) as source, while POLY-MOD is called polyphonic because it uses the eight OSC B's or eight envelope generators as sources within each voice itself. The PRESSURE-MOD system is also polyphonic, treating each key as a separate modulation source.

The LFO-MOD section contains an independent low-frequency oscillator, whose output can modulate various aspects of the voice. (There are actually two independent LFO'S, one for the Left and one for the Right.) Notice that only one LFO waveshape can be selected at a time.

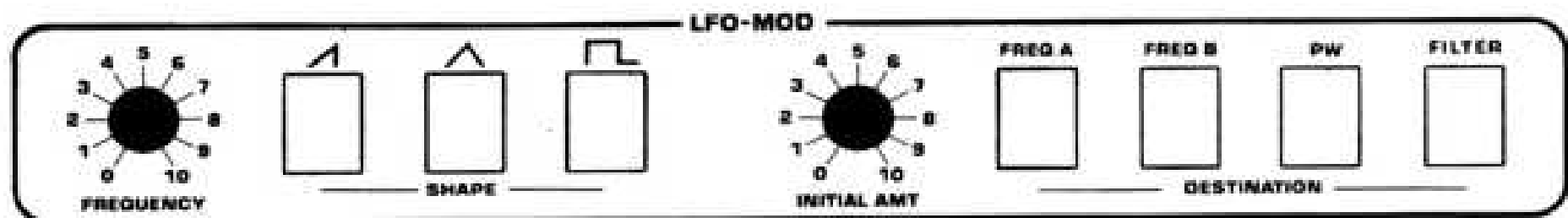


Figure 5-18

FREQUENCY knob: Adjusts LFO frequency from .005 to 40 Hz.

SAWTOOTH SHAPE switch: Enables ramp modulation.

TRIANGLE SHAPE switch: Enables vibrato. This waveform is centered about ground so that the modulation will be symmetrical.

PULSE SHAPE switch: Enables a trill.

INITIAL AMT knob: Controls minimum modulation depth, that is, modulation applied even when modulation wheel is fully down.

FREQ A DESTINATION switch: Applies modulation to frequency of OSC A.

FREQ B DESTINATION switch: Applies modulation to frequency of OSC B.

PW DESTINATION switch: Applies modulation to pulse width of both OSC A and OSC B.

FILTER DESTINATION switch: Applies modulation to filter cutoff frequency.

The overall LFO-MOD depth is set by a combination of the programmed INITIAL AMOUNT setting, the MOD wheel, and, by pressure of each note, if PRESSURE-MOD LFO AMT is on. These all operate independently.

Like the envelope generators, the actual LFO waveforms are generated by the computer system.

5-14 POLY-MOD

The POLY-MOD system provides routings within each voice for two sources, the filter envelope generator or OSC B, to modulate three destinations: OSC A frequency, OSC A pulse width, 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.

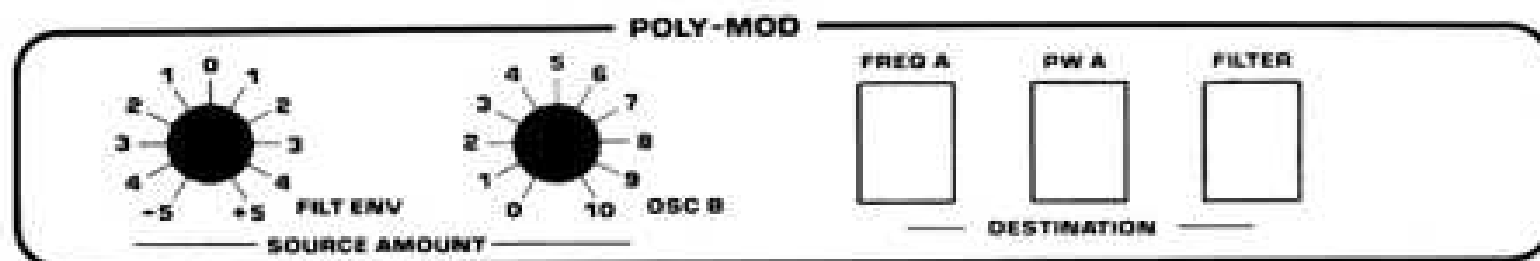


Figure 5-19

FILT ENV SOURCE AMOUNT knob: Adjusts level and polarity of filter envelope generator source.

OSC B SOURCE AMOUNT knob: Adjusts level of OSC B source.

FREQ A DESTINATION switch: Applies modulation to frequency of OSC A.

PW A DESTINATION switch: Applies modulation to pulse width of OSC A.

FILTER DESTINATION switch: Applies modulation to filter cutoff frequency.

Note that the FILTER DESTINATION switch is a redundant path for the positive filter envelope--which is already controlled by the FILTER ENVELOPE AMOUNT knob. However it is not redundant when FILT ENV knob is set negative. The path also allows OSC B to modulate the filter.

The FILT ENV will provide various pitch and timbre sweeps of OSC A or the FILTER. The knob can change the sweep direction, which will be useful for FREQ A and FILTER destinations, but not particularly for PW A.

Normally, OSC B is set-up as an audio source with LO FREQ off and KEYBOARD on. The MIXER OSC B knob is up while the POLY-MOD OSC B knob is turned down. When used for modulation, the MIXER OSC B knob is usually turned down, and the POLY-MOD OSC B knob is raised. (Nothing except the usual result prevents OSC B from being used simultaneously as an audio and modulation source.)

If OSC B KEYBOARD is switched off (and LO FREQ is off), OSC B will function as a fixed-frequency oscillator in the audio range. As a modulation source, this is useful for creating clangorous sounds such as bells, chimes, percussion, and "ring modulation" effects, through frequency modulation.

If OSC B KEYBOARD is switched off, and LO FREQ is on, the function will be similar to that of LFO-MOD. The OSC B FREQUENCY knob will solely determine the POLY-MOD modulation rate.

If both LO FREQ and KEYBOARD are on, OSC B will operate as a tracking LFO. It is in this mode that POLY-MOD can be setup to increase the modulation rate while ascending the keyboard.

5-15 PRESSURE-MOD

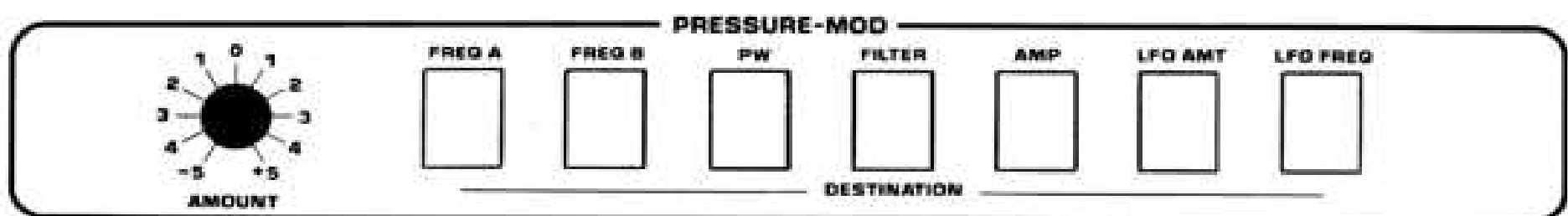


Figure 5-20

AMOUNT knob: If the AMOUNT knob is rotated positive, increased pressure will push selected modulation destinations upwards. If the AMOUNT knob is rotated negative, increased pressure will subtract or reduce from programmed settings.

FREQ A DESTINATION switch: Applies pressure modulation to OSC A frequency, for bending notes.

FREQ B DESTINATION switch: Applies pressure modulation to OSC B frequency, for bending notes.

PW DESTINATION switch: Applies modulation to pulse width of both OSC A and OSC B, for changing timbre.

FILTER DESTINATION switch: Applies pressure modulation to filter cutoff frequency, for articulating "wahs."

AMP DESTINATION switch: Applies pressure modulation to amplifier, to modify loudness.

LFO AMT DESTINATION switch: Applies pressure modulation to LFO amount amplifier, for supplementary control of LFO-MOD depth.

LFO FREQ DESTINATION switch: Applies pressure modulation to LFO frequency, for independent supplementary control of LFO-MOD rate.

When several pressure modulation destinations are selected, it will be necessary to carefully balance all relevant controls for the best effect. For example it may be desired to have a vibrato which speeds up as it also gets deeper. Either LFO-MOD FREQ A or FREQ B would have to be on, and the PRESSURE-MOD LFO AMT and LFO FREQ switches would be on. The desired sensitivity would then have to be worked out with the LFO FREQ, LFO INITIAL AMOUNT, and PRESSURE-MOD AMOUNT knobs.

Similar to the way that two programs can be setup for velocity mixing in Double Mode (see paragraph 5-12), two programs can be setup for "pressure mixing." If PRESSURE-MOD AMP is on, programmed positively for one program and programmed negatively for the other, pressure will mix one in while it mixes the other out. This is demonstrated with a pair of the Factory Programs.

CASSETTE INTERFACE

6-0 GENERAL

The Prophet-T8 microcomputer transforms the instrument's sonic identity into digital data stored in semiconductor memory (RAM). The cassette interface enables this sonic data to be transferred to and from common audio cassettes, enabling you to build up an unlimited stock of programs and sequences. Three independent cassette modes allow storing either all 128 programs, or eight sequences, or one "bank" of eight programs. This last mode makes it easy to assemble a new 128-program set from banks of previous sets. With this interface it becomes easy to change the T8's vocabulary at any time, since reprogramming by tape takes less than two minutes (for 128 programs or eight sequences). For example, if a Prophet-T8 is going to be at your performance destination, you can leave your T8 home and bring only the cassettes you need to personalize the instrument. But the most important benefit of tape storage is program protection from accidental erasure, component failure, or instrument damage.

The Factory Programs and demonstration sequences are included on a cassette with each Prophet-T8. 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.

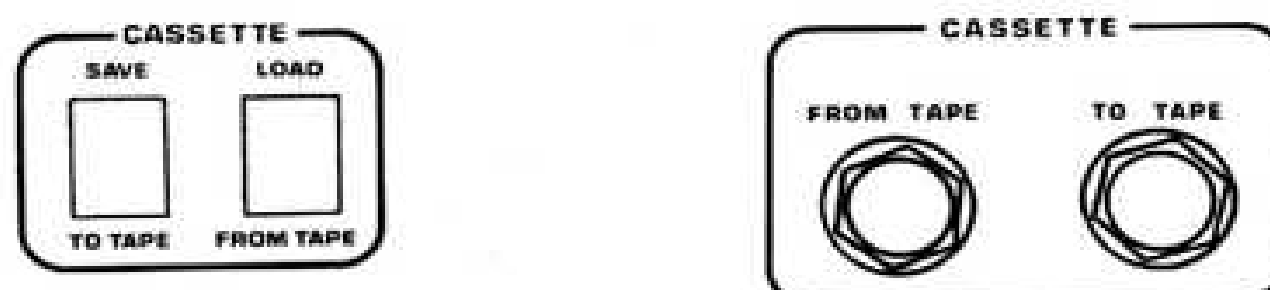


Figure 6-0

SAVE TO TAPE switch: When RECORD MODE is switched on and back-panel RECORD switch is set to ENABLE, initiates tape storage procedure. Blinking indicates "ready for verification test."

LOAD FROM TAPE switch: When RECORD MODE is switched on and back-panel RECORD switch is set to ENABLE, initiates tape recovery procedure. Blinking indicates an error in loading.

FROM TAPE jack: Standard 1/4-inch mono (tip-sleeve) phone jack. Accepts input from recorder EAR, MONITOR, or LINE OUT jack.

TO TAPE jack: Standard 1/4-inch mono (tip-sleeve) phone jack. Drives recorder MIC or LINE IN input.

6-1 RECORDER AND TAPE SELECTION

Virtually any portable cassette recorder will work satisfactorily with this interface. High-fidelity cassette decks will work, too. But 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-T8, 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.
- Adjustable record level.
- 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 important 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.

6-2 PRECAUTIONS

Assume that it is always possible for a computer error to occur. You don't have to always have 128 perfect programs and eight perfect sequences before storing them. Backup any program or sequence into which you've invested time which you don't want to spend reworking.

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-T8.

Clean and demagnetize your recorder at least every 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).

6-3 SAVE PROGRAMS OR SEQUENCES TO TAPE

1. Switch the back-panel RECORD switch to ENABLE.
2. Connect recorder to Prophet-T8 as diagrammed in Figure 1-0.
3. Insert cassette into recorder and rewind to start of tape.
4. Choose storage mode:
 - 128 programs: Check that SEQUENCER SELECT/STOP is off and two program digits are displayed. Or,
 - 8 sequences: Press SEQUENCER SELECT/STOP. Or,
 - 8 programs: Select LEFT or RIGHT, then enter one program digit for the desired "bank." (E.g. Select RIGHT and 6 to store R61 through R68.)
5. Switch the Prophet-T8 RECORD MODE switch on.
6. Place recorder into record and wait 5 seconds for the tape leader to pass.
7. Press the SAVE TO TAPE switch. The control panel will go dark, except the SAVE TO TAPE LED will remain lit.
8. Check the record level. When the SAVE TO TAPE operation is initiated, an 8-second "sync" tone appears at the TO TAPE jack, which precedes the actual data and can be used to set record level to 0 dB.

NOTE: Tape interface data recording is quite different from typical audio practice, where the tape is rarely allowed to saturate. Data recording is done at saturation level. Using the pilot tone as a reference, recorders with VU meters should be at 0 dB or above. Recorders with single-LED peak detectors should be set so the LED stays lit. Recorders with automatic level control (ALC) can't be adjusted, but usually work fine.

9. When the LOAD FROM TAPE LED blinks, stop the recorder. Saving requires about 14 seconds for 8 programs, or 94 seconds for 128 programs or 8 sequences.

Tape Verification

10. Now the recording must be verified. Rewind to start of tape.
11. 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).
12. Place recorder into play and wait 8 seconds for the tape leader to pass, or until the pilot tone appears.
13. Press the (blinking) LOAD FROM TAPE switch. The LED will stay lit. If it doesn't, then you have missed the pilot tone. Repeat from step 10.
14. When the LOAD FROM TAPE LED goes out, stop the recorder. With tape verification completed, the Prophet returns itself to the current program.
15. If the LOAD FROM TAPE LED instead blinks, a tape error has occurred. Try verification again, by repeating from step 10.
16. If verification fails a second time try re-recording by repeating from step 3.
17. If the tape will still not verify, try different record, playback, or tone levels or try a new cassette.
18. It is possible to store several program or sequence files on a cassette. Just be careful to leave plenty of blank time (1-2 minutes) between them on the tape. You may wish to voice-announce each file, for example, "T8 file number 4, containing 128 piano programs, follows in ten seconds."

6-4 LOAD PROGRAMS OR SEQUENCES FROM TAPE

1. Switch the back-panel RECORD switch to ENABLE.
2. Connect recorder to Prophet-T8 as diagrammed in Figure 1-0.
3. Insert cassette into recorder and rewind to start of tape.
4. Choose mode:
 - 128 programs: Check that SEQUENCER SELECT/STOP is off and two program digits are displayed. Or,
 - 8 sequences: Press SEQUENCER SELECT/STOP. Or,
 - 8 programs: Select LEFT or RIGHT, then enter one program digit for the desired "bank." (E.g. Select RIGHT and 5 to load R51 through R58.)
5. Switch the Prophet-T8 RECORD MODE switch on.
6. 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).

7. Place recorder into play and wait 8 seconds for the tape leader to pass, or until the pilot tone appears.
8. Press the LOAD FROM TAPE switch. The control panel will go dark, except the LOAD FROM TAPE LED will be lit.
9. When the LOAD FROM TAPE LED goes out, stop the recorder. With tape loading completed, the Prophet returns itself to the current program.
10. If the LOAD FROM TAPE LED instead blinks, a tape error has occurred. Try loading again, by repeating from step 3.

6-5 RECORDER COMPATIBILITY TESTING

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.

To identify the problem, try cross-verification. First save and verify programs to a cassette, using recorder A. Then initiate a second SAVE operation, but ignore the save routine. Instead, connect recorder B, and use the second verification routine to verify the cassette, played-back on recorder B.

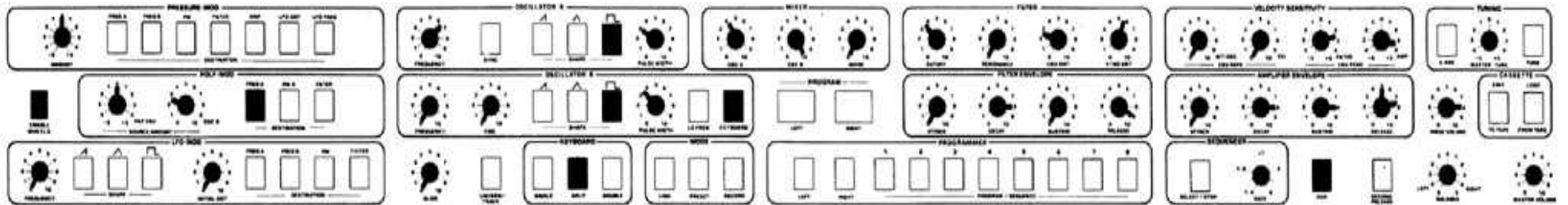
1. Save and verify the file to recorder A, according to Save instructions 1 through 14.
2. Disconnect cable from TO TAPE jack.
3. Move the FROM TAPE cable from recorder A to recorder B.
4. Transfer cassette to recorder B.
5. Perform Save steps 1 through 5.
6. Do not place recorder B into record mode (step 6). But continue with Save steps 7 through 9. Note that with the TO TAPE cable disconnected, nothing is recorded. This step simply brings up the verification test again.
7. Verify the cassette in recorder B as in Save steps 10 - 13.
8. If the LOAD FROM TAPE LED goes out, cross-verification is successful. The recorders have been proven to have reasonably close tape speeds.
9. If the LOAD FROM TAPE LED instead blinks, cross-verification was not successful. Provided that the playback level of recorder B was adjusted correctly, the speed difference between recorders A and B evidently exceeds the range of the interface. Tapes made on these recorders will therefore not be interchangeable.

T-8 PROGRAMS

	LEFT 1 RIGHT		LEFT 2 RIGHT		LEFT 3 RIGHT		LEFT 4 RIGHT		LEFT 5 RIGHT		LEFT 6 RIGHT		LEFT 7 RIGHT		LEFT 8 RIGHT	
1	ACOUSTIC PIANO I (LOW END)	ACOUSTIC PIANO I (HIGH END)	STRINGS I VELOCITY ATTACK	STRINGS I	BRASS I	BRASS II	GOLLIWOG CAKEWALK	POLYGLIDE	VIBALIMBA	VIBALIMBA	CHORUS with PRESSURE VIBRATO	CHORUS	-UNISON-BASS with PITCH BEND	-UNISON-LEAD with VIBRATO by PRESSURE	PERCUSSIVE ORGAN	KEY CLICK
	SPLIT (E ^{b3})		DOUBLE		SINGLE	SINGLE	SINGLE	SINGLE E	DOUBLE		DOUBLE		SPLIT (E ^{b3})		DOUBLE	
2	HONKY TONK	HONKY TONK	VIOLIN I	VIOLIN II	ENSEMBLE BRASS	ENSEMBLE BRASS	SHIN-SHEN	HOMAGE 2E	PIANO/ STRING	PIANO/ GUITAR PRESSURE-VIBRATO	CROSS FADING PATCHES by VELOCITY	CROSS FADING PATCHES by VELOCITY	CROSS FADING PATCHES by PRESSURE	CROSS FADING PATCHES by PRESSURE	PIED PIPER	PIED PIPER
	DOUBLE		SINGLE	DOUBLE	DOUBLE		SINGLE	SINGLE E	SINGLE	SINGLE	DOUBLE		DOUBLE		DOUBLE	
3	ACOUSTIC PIANO II	ELECTRIC TINE I	VIOLA	CELLO	BRASS III	BRASS IV	HARP I	HARP II II	JOSEF	FILTER with VELOCITY on ATT/DEC	GRUNGE SLIDE	MUNCHKIN-LAND	-UNISON-LUCKY MAN	-UNISON-PITCH BEND and VIBRATO	FILTER FUNK	DIGITAL SYNC with INVERTED PITCH BEND
	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE E	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE
4	ELECTRIC PIANO I	ELECTRIC TINE II	CELLO-SINGLE LINE	STRING-SINGLE LINE (HIGHER OCTAVE)	COMIC WOW	MAYNERD PITCH BEND by PRESSURE	SYNC A	XYLOPHONE	CLAY I	CLAY II	PULSE WIDTH OCTAVE by PRESSURE	PULSE WIDTH OCTAVE by PRESSURE	ALBEDO 8.0	-UNISON-LEAD with PITCH BEND by PRESSURE	SUPER PERCUSSIVE I with PRESSURE	THE RDW SOUND
	SINGLE	SINGLE	DOUBLE		SINGLE	SINGLE	SINGLE	SINGLE E	SINGLE	SINGLE	DOUBLE R ₃₆	DOUBLE L ₄₆	SINGLE	SINGLE	SINGLE	SINGLE
5	ELECTRIC PIANO II	ELECTRIC TINE III	STRINGS with PRESSURE VOLUME	STRINGS with PRESSURE (ONE OCTAVE UP)	STRINGS COMBINATION	BRASS	SYNC SWEEP with PRESSURE	ELECTRIC TINE with HEAVY (LESLIE) EFFECT	CLAY/PIANO	CLAY III	STEEL DRUM	STEEL DRUM	-UNISON-STRING BASS	FLUTE	RELEASE-OCTAVE	RELEASE-OCTAVE
	SINGLE	SINGLE	SINGLE	DOUBLE L ₅₂	DOUBLE		SINGLE	SPLIT (E ^{b3})	SINGLE	SINGLE	DOUBLE		SPLIT (A ^{b3})		DOUBLE	
6	PIANO COMBINATION	STRING	ORGAN I	ORGAN I	CATHEDRAL ORGAN	CATHEDRAL ORGAN	ORGAN II	ORGAN II II	SYNTH-A-CHORD	HARPSI-CHORD	CROSSFADE II (STRINGS)	CROSSFADE II (PLUCKY)	DRONE IN A	-UNISON-SYNC SWEEP	PRESSURE COOKER	RANDOM SAWTOOTH ARPEGGIATOR
	DOUBLE		DOUBLE		DOUBLE		DOUBLE		SINGLE	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE
7	ACOUSTIC PIANO-BOTTOM III	ACOUSTIC PIANO TOP III	STRING COMBINATION	BRASS	POLY-MOD LFO to PULSE WIDTH	POLY-MOD LFO to FILTER	HORN BLIP	HORN TONE	PLEIDES	METALLIC I	RHODESY	ANGELIC GLIDE	DUPLICATE of R77 DETUNED for CHORUSING	SUPER PERCUSSIVE II with VELOCITY	VOCAL HARMONICA	NEW FLUTE
	SPLIT (E ^{b3})		DOUBLE		SINGLE	SINGLE	DOUBLE		SINGLE	SINGLE	SINGLE	SINGLE	DOUBLE R77	SINGLE	SINGLE	SINGLE
8	MOON WAVES	-UNISON-ALIEN	VIDEO GAMES	POLY-WIND	CATS UNDER PRESSURE	CHOPPER with PRESSURE	BIG BELLS	BIG BELLS ₁₅	-UNISON-TYMPANI	TOMS	VELOCITY SOUND EFFECT	PRESSURE SOUND EFFECT	SPACE TREK	SPACE TREK	METALLIC PERCUSSIVE	METALLIC PERCUSSIVE
	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE	DOUBLE		SINGLE	SINGLE	SINGLE	SINGLE	DOUBLE		DOUBLE R77	DOUBLE L77

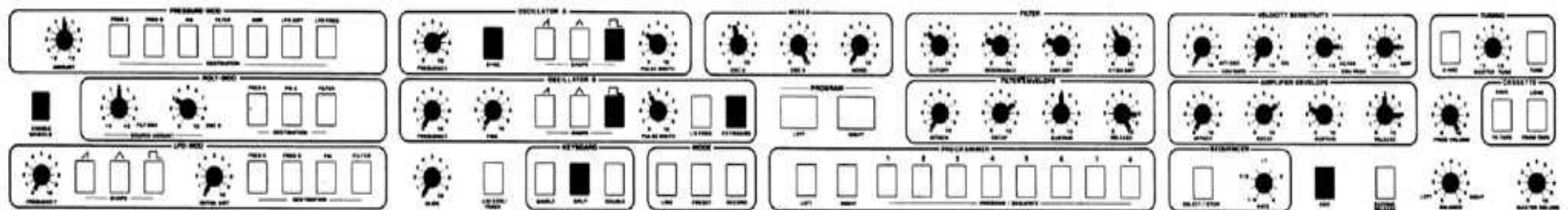
T-8 PROGRAMS

	LEFT 1 RIGHT	LEFT 2 RIGHT	LEFT 3 RIGHT	LEFT 4 RIGHT	LEFT 5 RIGHT	LEFT 6 RIGHT	LEFT 7 RIGHT	LEFT 8 RIGHT	
1									1
2									2
3									3
4									4
5									5
6									6
7									7
8									8
	1	2	3	4	5	6	7	8	



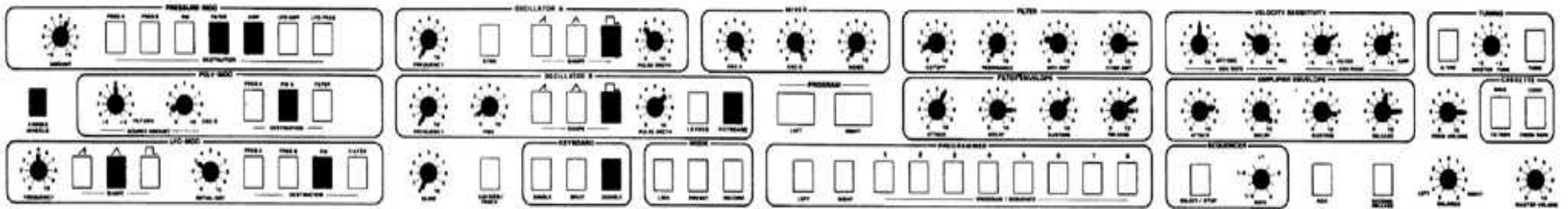
L11 ACOUSTIC PIANO I (LOW END)

OSC A: up 3 octaves + major 6th
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



R11 ACOUSTIC PIANO I (HIGH END)

OSC A: up 3 octaves + major 6th
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



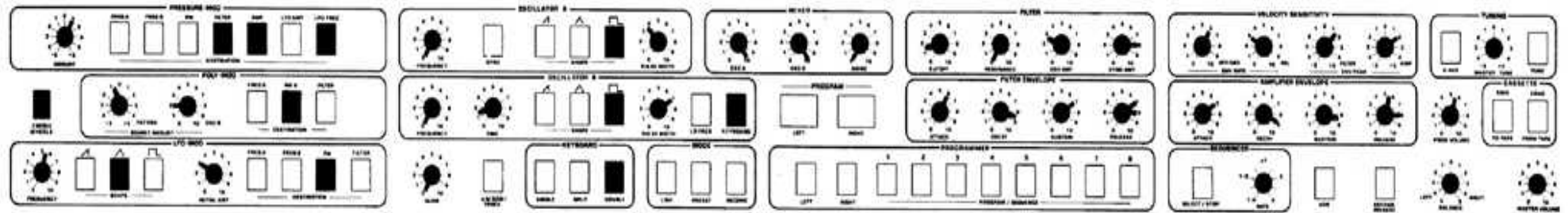
L12 STRINGS I VELOCITY ATTACK

OSC A: up 0 octaves

OSC B: up 0 octaves

VELOCITY: Playing slowly builds slowly. Playing faster builds more quickly.

PRESSURE:



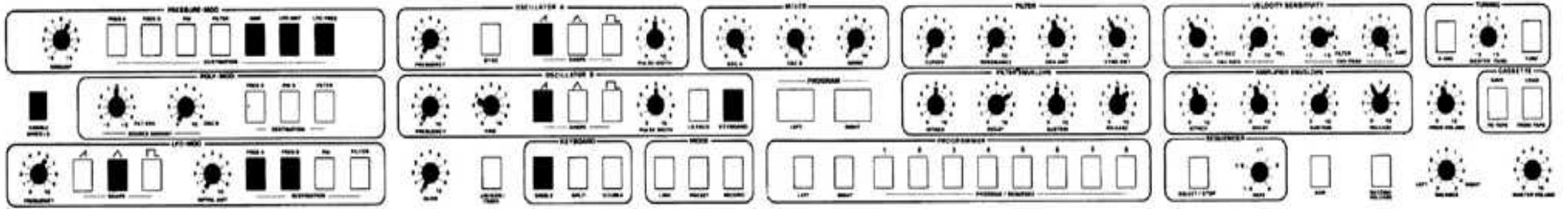
R12 STRINGS I

OSC A: up 0 octaves

OSC B: up 0 octaves

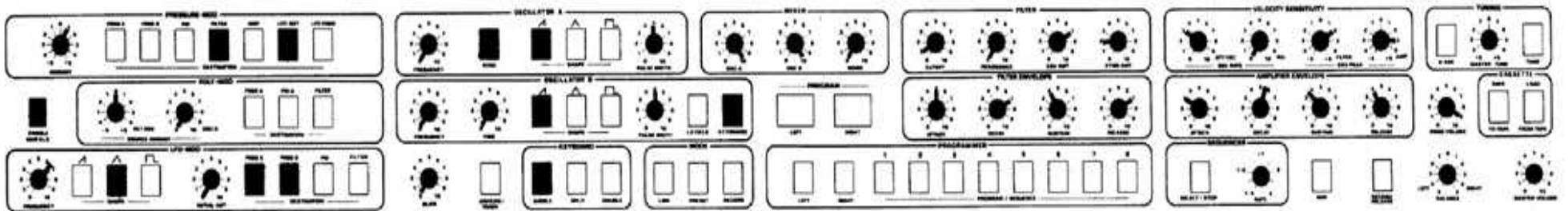
VELOCITY:

PRESSURE:



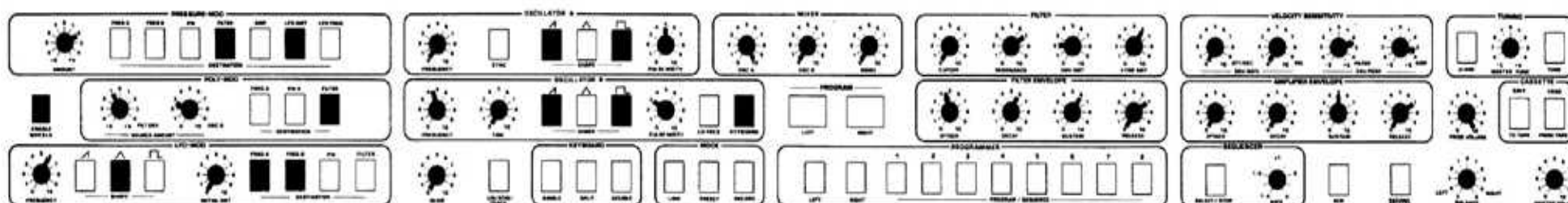
L13 BRASS I

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



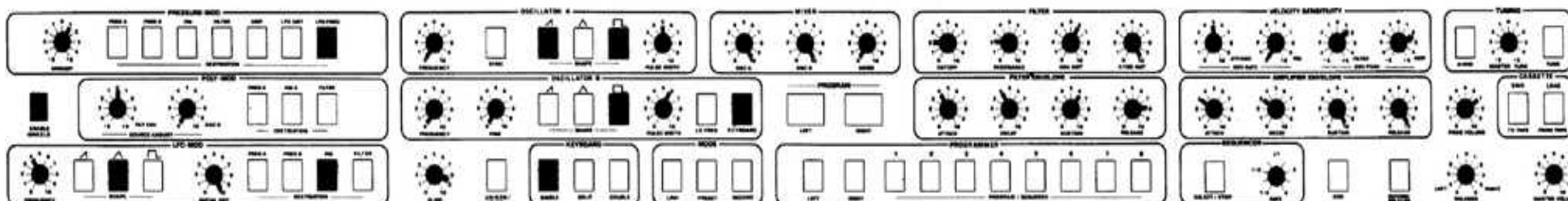
R13 BRASS II

OSC A: up 0 octaves
 OSC B: up 2 octaves
VELOCITY:
PRESSURE:



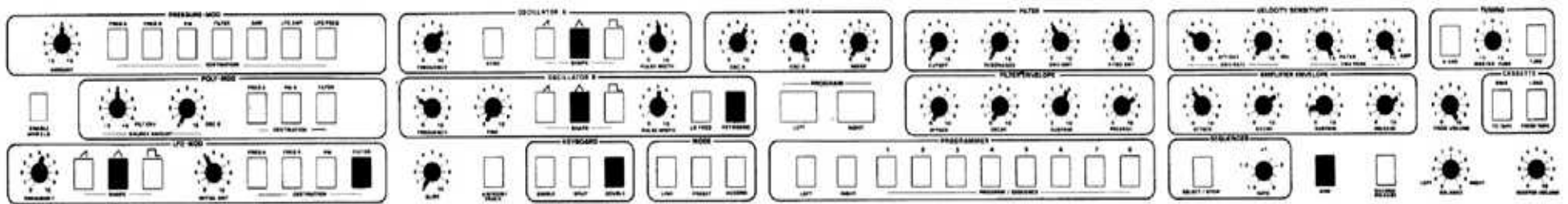
L14 GOLLIWOG CAKEWALK

OSC A: up 0 octaves
OSC B: up 2 octaves
VELOCITY: filter and amplitude
PRESSURE: filter sweep and vibrato



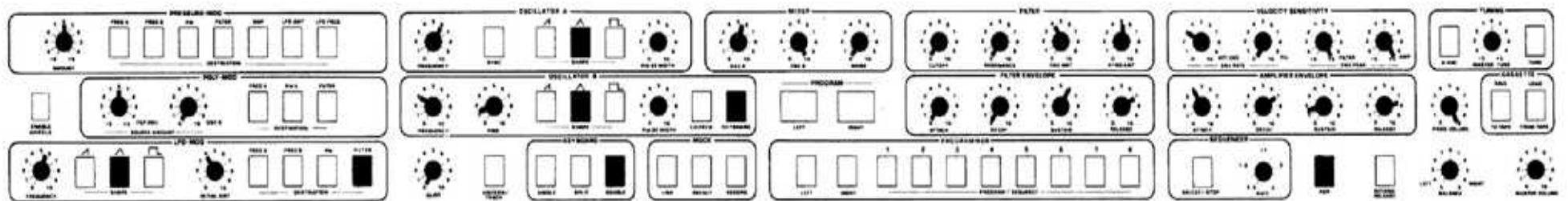
R14 POLYGLIDE

OSC A: up 0 octaves
OSC B: up 0 octaves
VELOCITY: filter and amplifier
PRESSURE:



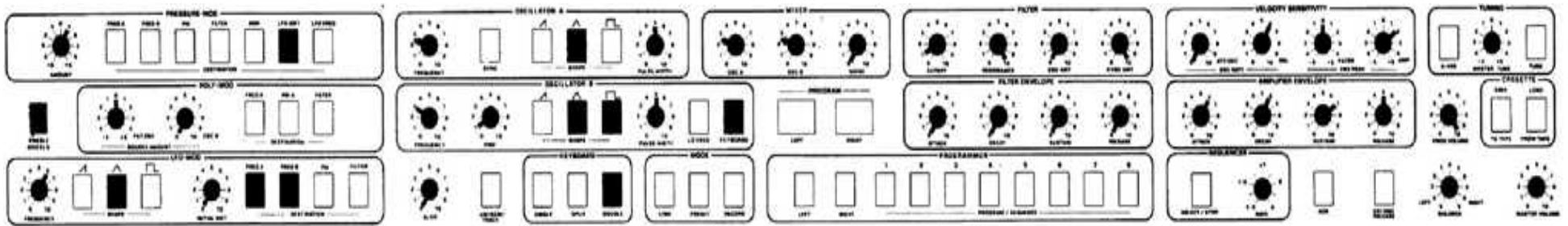
L15 VIBALIMBA

OSC A: up 3 octaves + major 3rd
 OSC B: up 1 octave
VELOCITY:
PRESSURE:



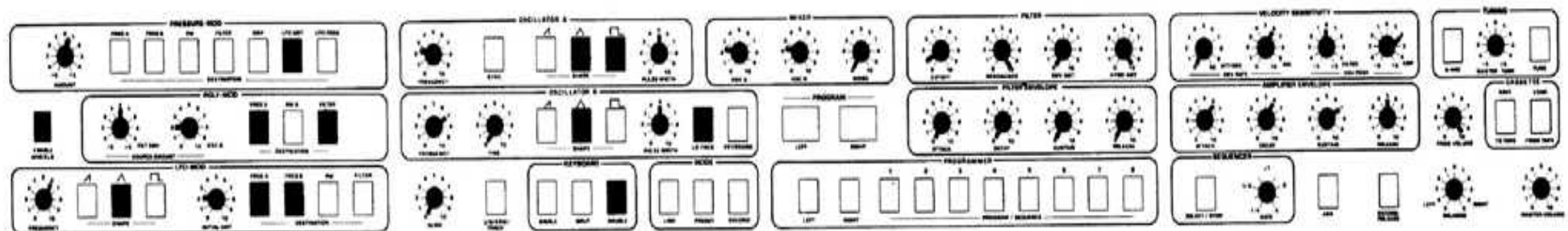
R15 VIBALIMBA

OSC A: up 3 octaves + major 3rd
 OSC B: up 1 octave
VELOCITY:
PRESSURE:



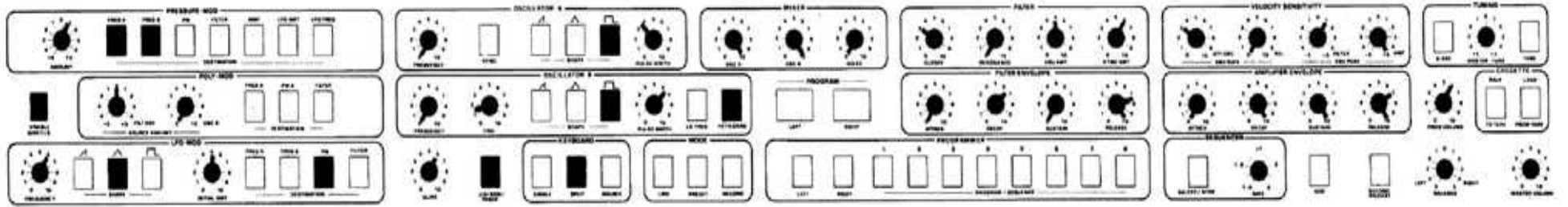
L16 CHORUS with PRESSURE VIBRATO

OSC A: up 1 octave
OSC B: up 1 octave
VELOCITY:
PRESSURE:
 Filter is tuned to be 1 octave above oscillators.
 Filter is used as oscillator.



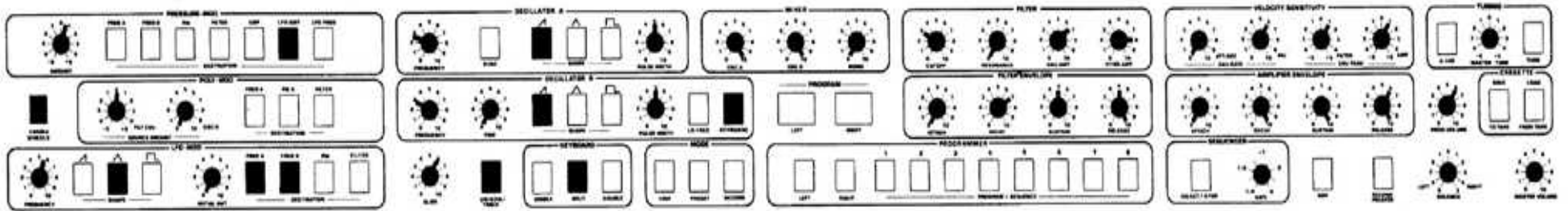
R16 CHORUS

OSC A: up 1 octave
OSC B: LFO
VELOCITY: on release
PRESSURE:



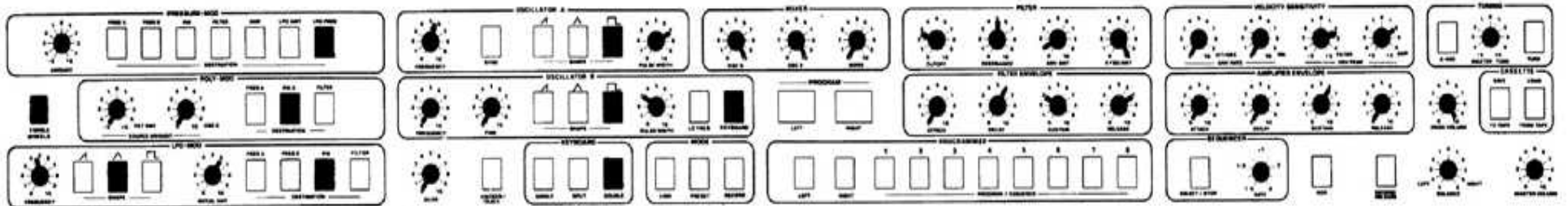
L17 —UNISON—BASS with PITCH BEND

OSC A: up 0 octaves
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



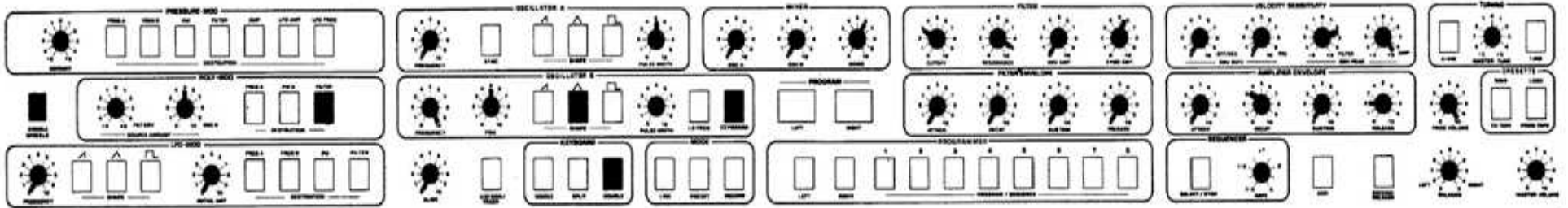
R17 —UNISON—LEAD with VIBRATO by PRESSURE

OSC A: up 1 octave
 OSC B: up 1 octave
 VELOCITY: filter and amplifier release
 PRESSURE: vibrato



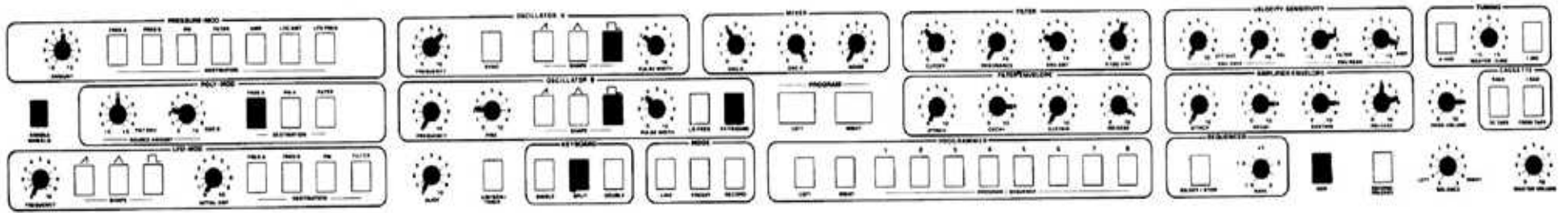
L18 PERCUSSIVE ORGAN

OSC A: up 2 octaves + 5th
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



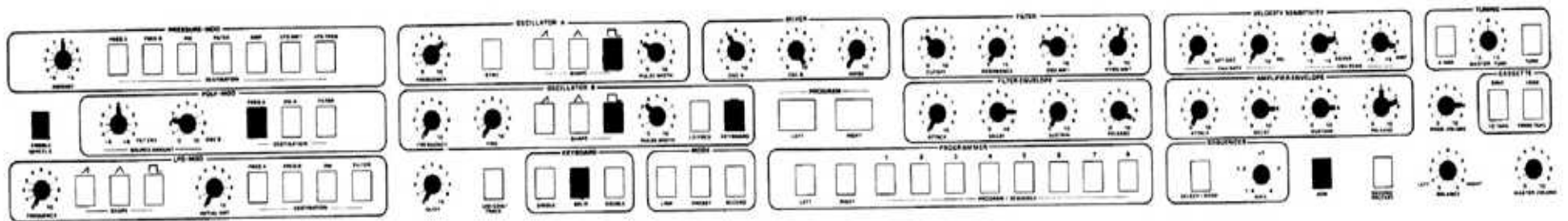
R18 KEY CLICK

OSC A: up 0 octaves
 OSC B: up 4 octaves + one half semitone
 VELOCITY:
 PRESSURE:



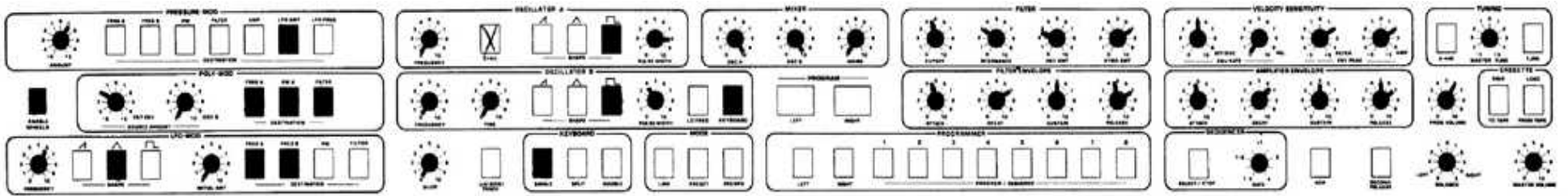
L21 HONKY TONK

OSC A: up 4 octaves
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



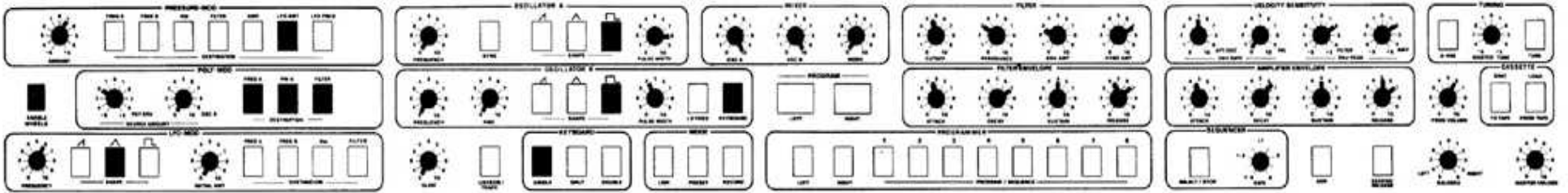
R21 HONKY TONK

OSC A: up 4 octaves
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



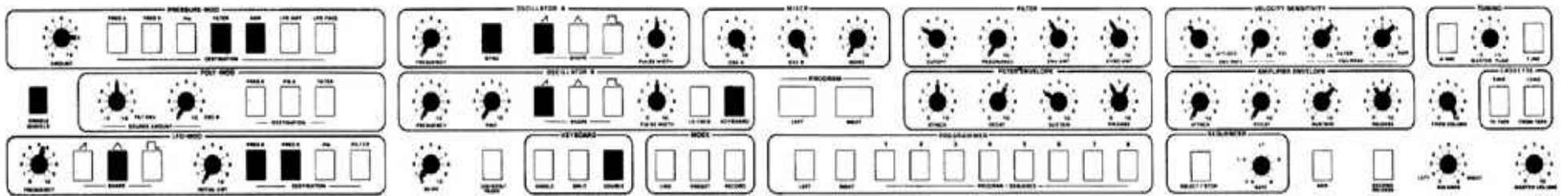
L22 VIOLIN I

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



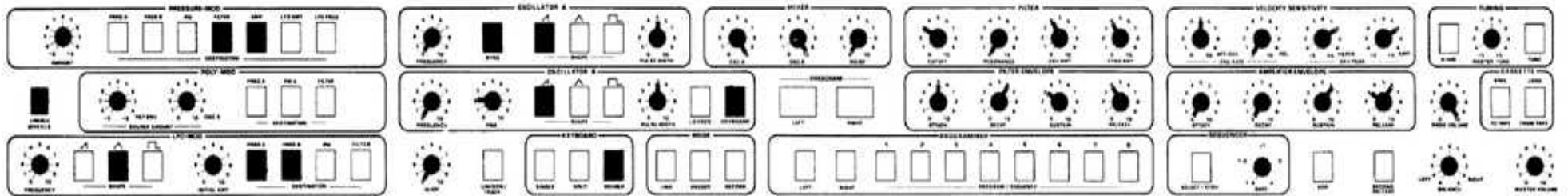
R22 VIOLIN II

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



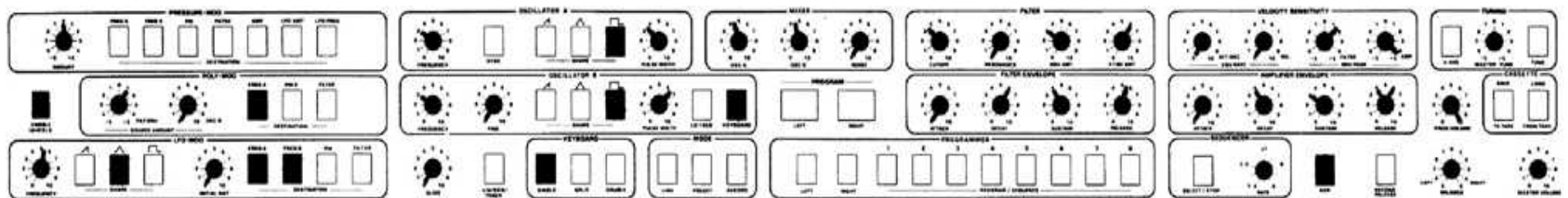
L23 ENSEMBLE BRASS

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



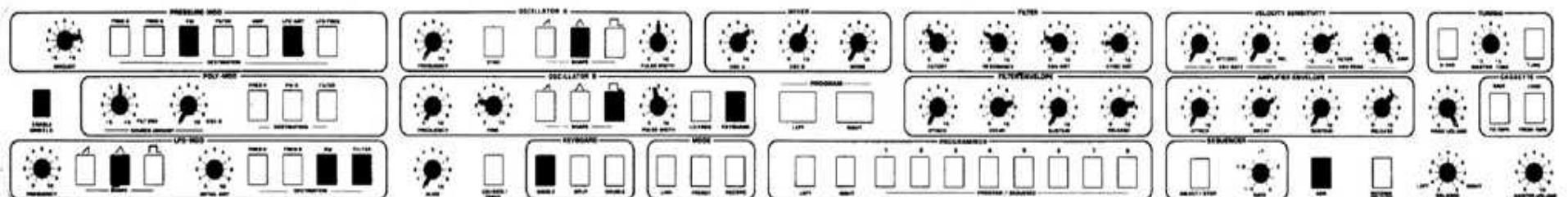
R23 ENSEMBLE BRASS

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



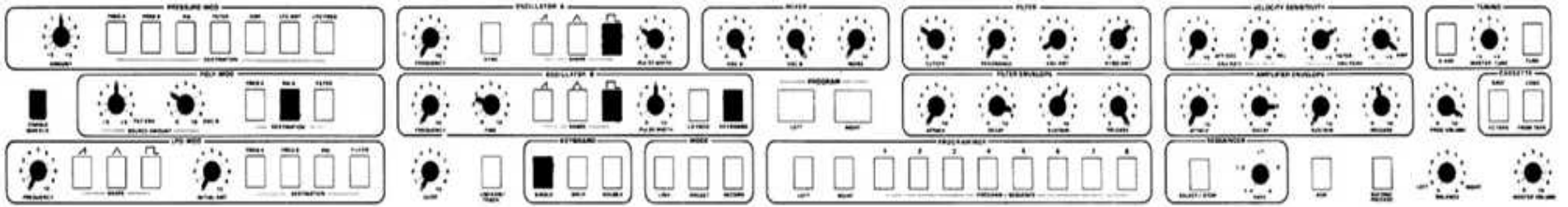
L24 SHIN-SHEN

OSC A: up 1 octave
 OSC B: up 1 octave
 VELOCITY:
 PRESSURE:



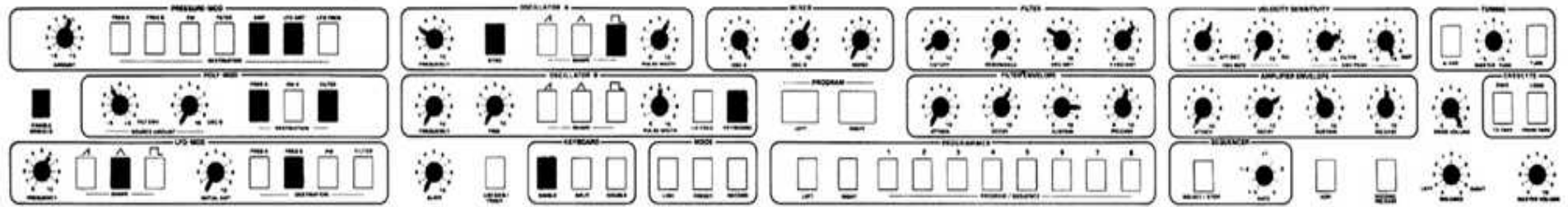
R24 HOMAGE

OSC A: up 0 octaves
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



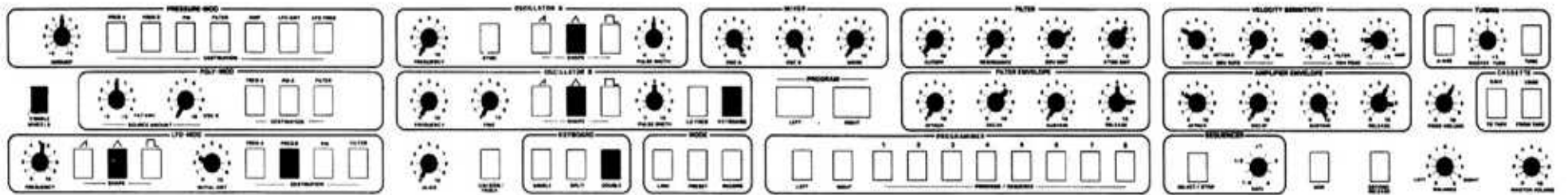
L25 PIANO/STRING

OSC A: up 0 octaves
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



R25 PIANO/GUITAR PRESSURE- VIBRATO

OSC A: up 1 octave
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



L26 CROSS FADING PATCHES by VELOCITY

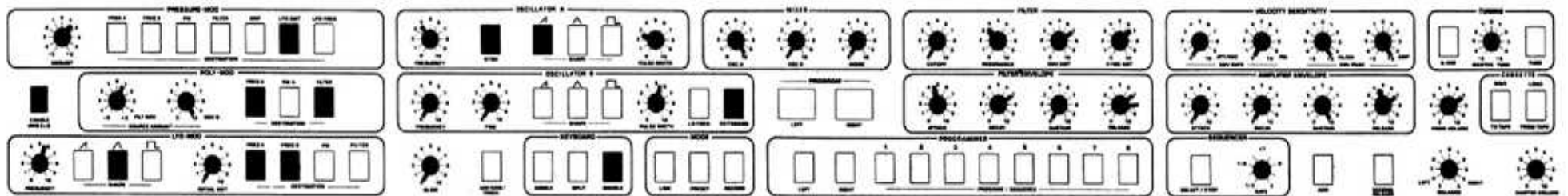
OSC A: up 0 octaves

OSC B: up 0 octaves

VELOCITY:

PRESSURE:

This Double Patch uses the inverted envelope function. If you play lightly, program L26 is heard. As you play harder program R26 gets louder, while L26 fades out.



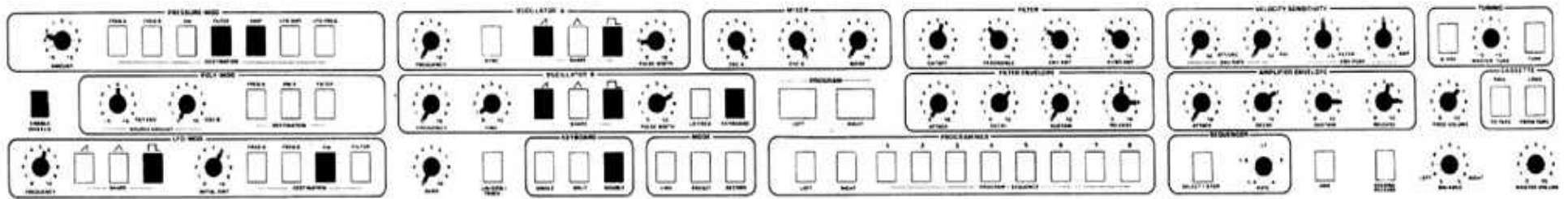
R26 CROSS FADING PATCHES by VELOCITY

OSC A: up 1 octave + minor 7th

OSC B: up 0 octaves

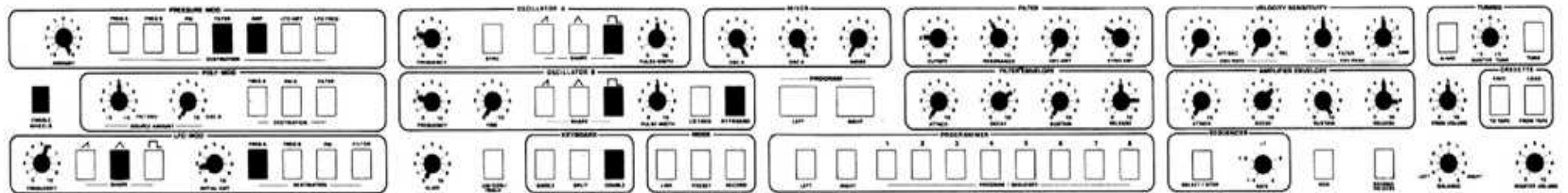
VELOCITY:

PRESSURE:



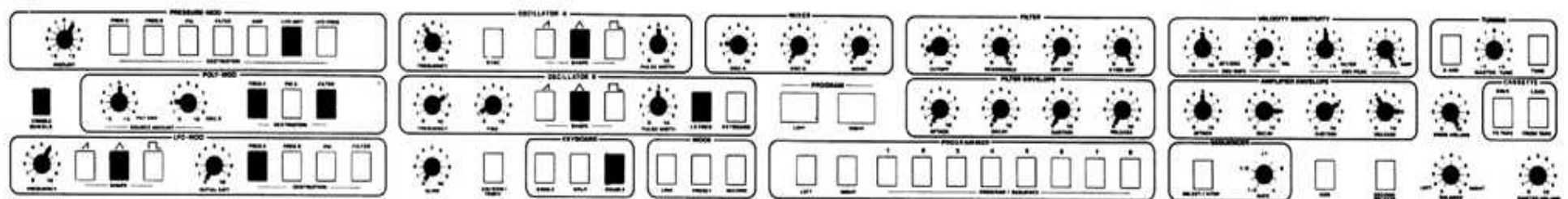
L27 CROSS FADING PATCHES by PRESSURE

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE: cross fading through filter and amplifier



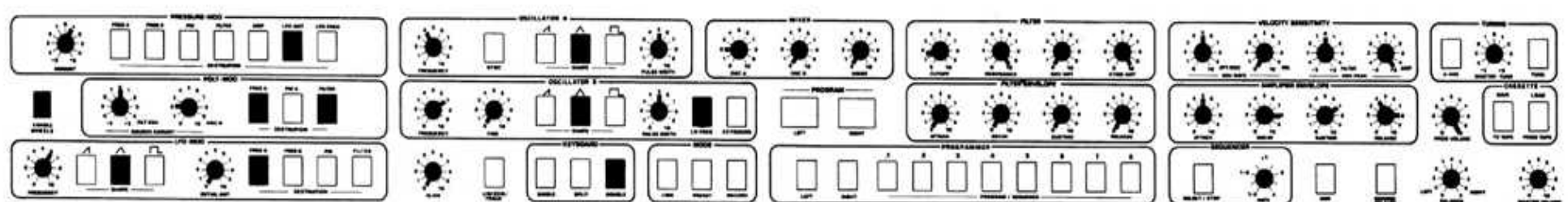
R27 CROSS FADING PATCHES by PRESSURE

OSC A: up 1 octave, square wave
 OSC B: up 1 octave, square wave
VELOCITY:
PRESSURE:



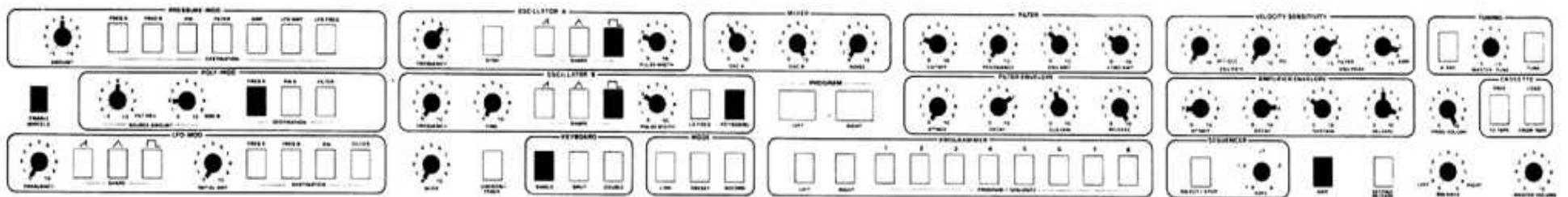
L28 PIED PIPER

OSC A: up 2 octaves
 OSC B: LFO
 VELOCITY:
 PRESSURE:



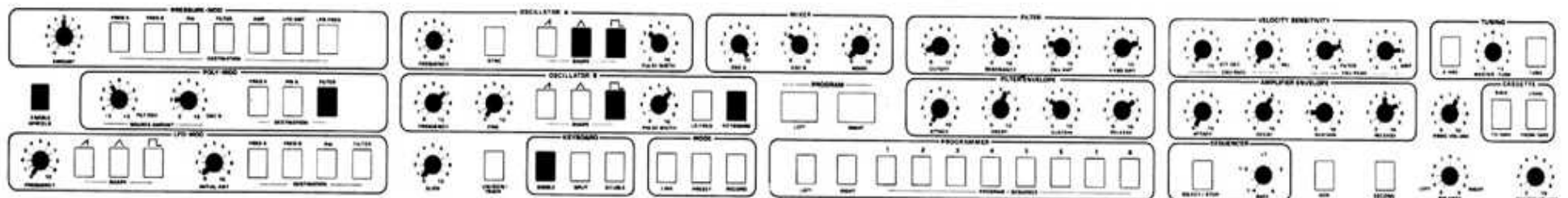
R28 PIED PIPER

OSC A: up 2 octaves
 OSC B: LFO
 VELOCITY:
 PRESSURE:
 Filter is tuned to unison with left oscillators.



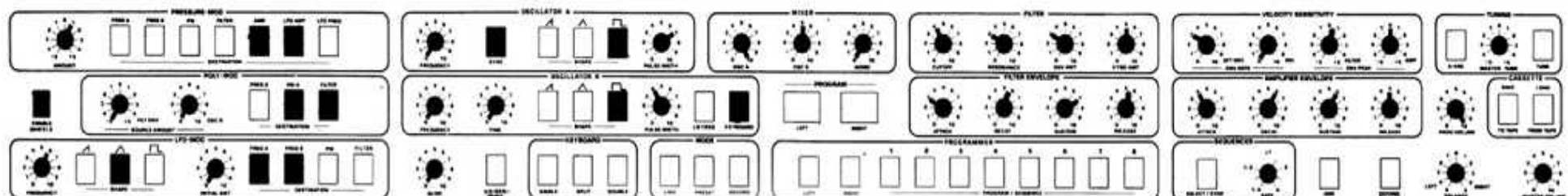
L31 ACOUSTIC PIANO II

OSC A: up 3 octaves + major 6th
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



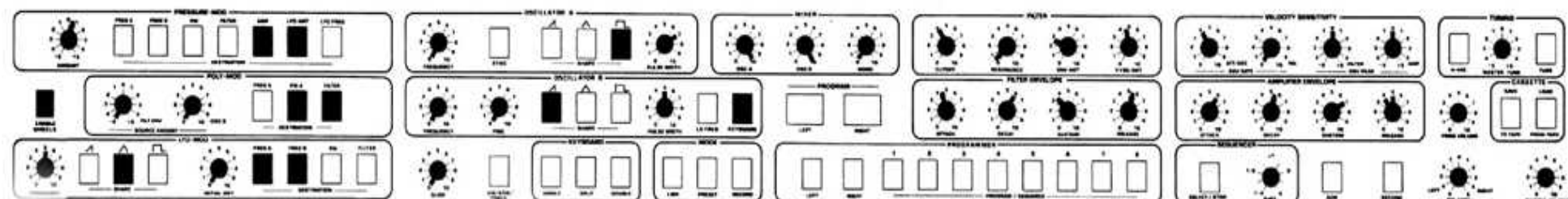
R31 ELECTRIC TINE I

OSC A: up 0 octaves
 OSC B: up 3 octaves + perfect 4th
 VELOCITY:
 PRESSURE:



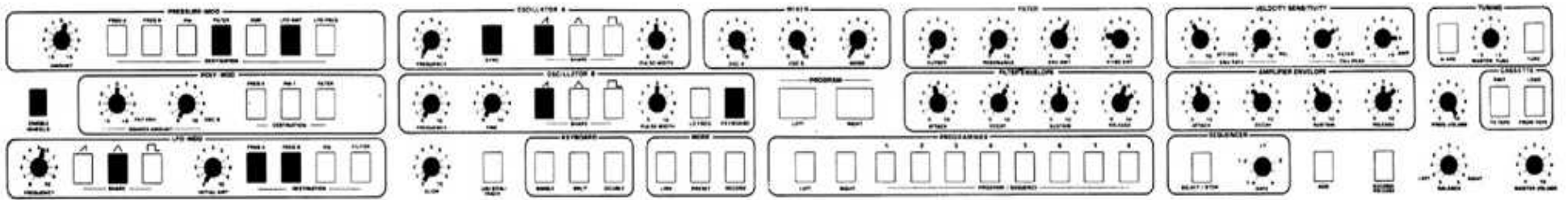
L32 VIOLA

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



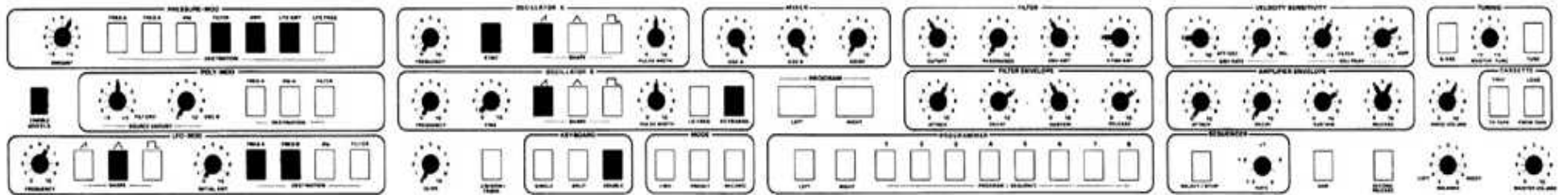
R32 CELLO

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE: vibrato



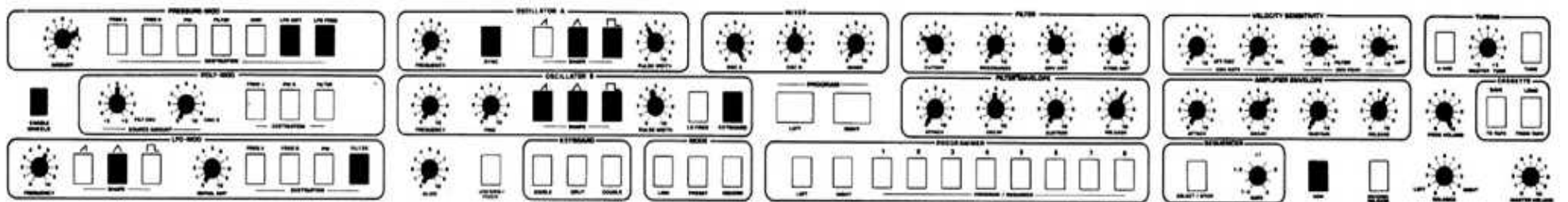
L33 BRASS III

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



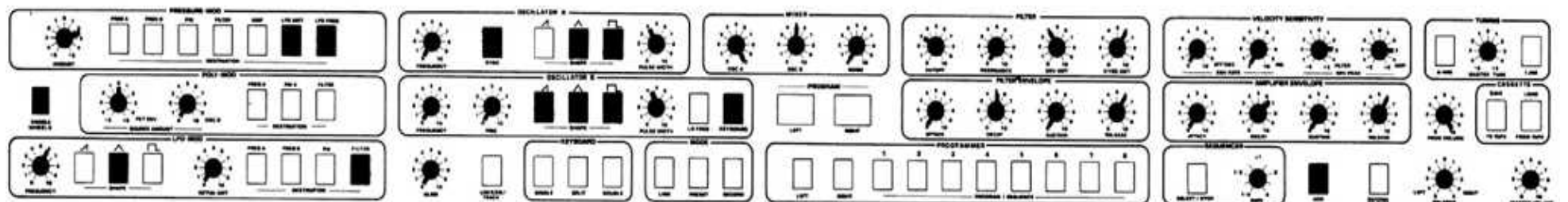
R33 BRASS IV

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:
 To be doubled with R11, slightly detuned.



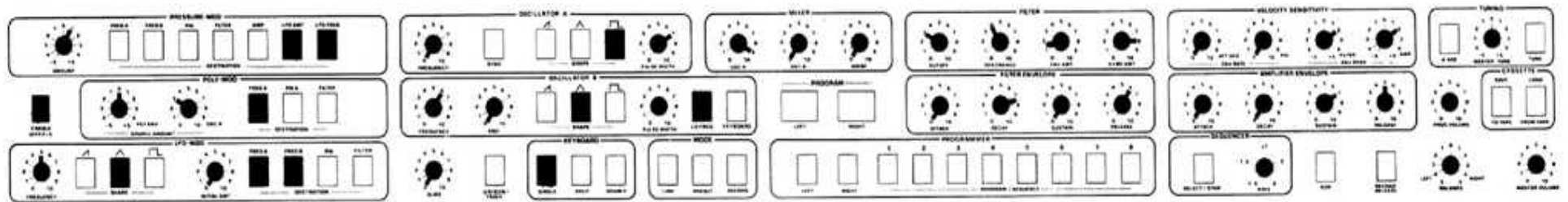
L34 HARP I

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



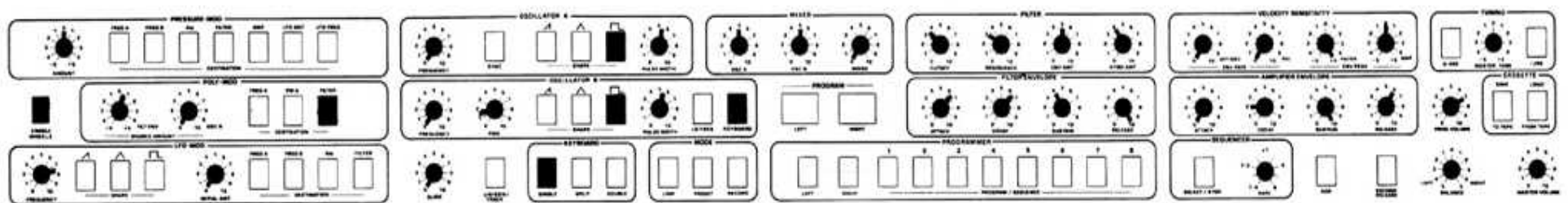
R34 HARP II

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



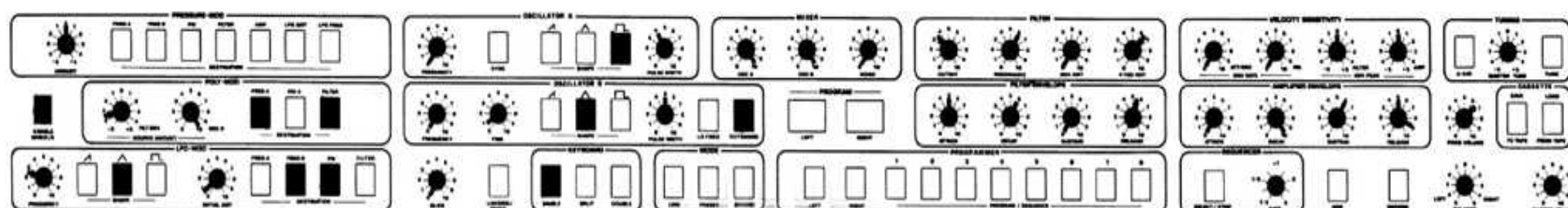
L35 JOSEF

OSC A: up 0 octaves
 OSC B: up 4 octaves
 VELOCITY:
 PRESSURE:



R35 FILTER with VELOCITY on ATT/DEC

OSC A: up 0 octaves
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



L36 GRUNGE SLIDE

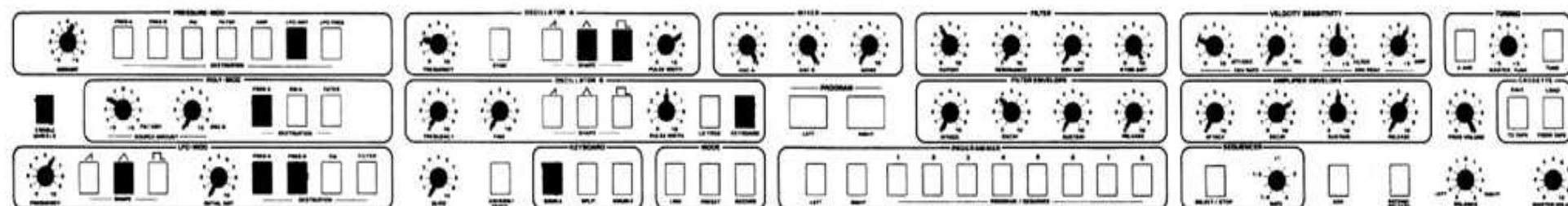
OSC A: up 0 octaves

OSC B: up 0 octaves

VELOCITY:

PRESSURE:

This program uses negative filter envelope pitch sweep through the polymod section. Try adding velocity of ATT/DEC: this will change rate of pitch sweep by keyboard velocity.



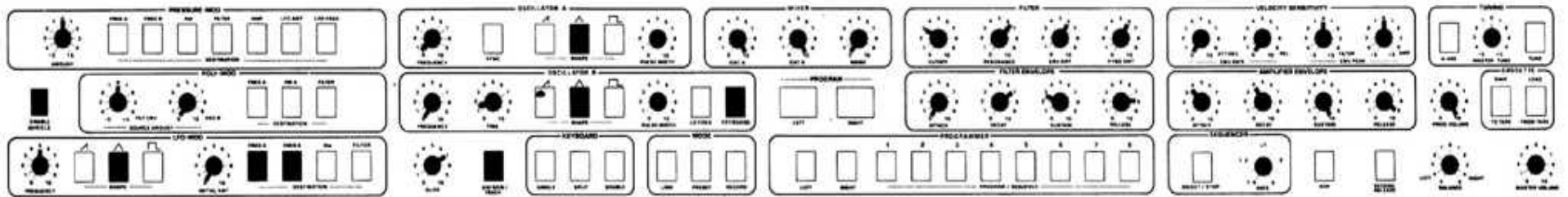
R36 MUNCHKIN-LAND

OSC A: up 1 octave

OSC B: up 0 octaves

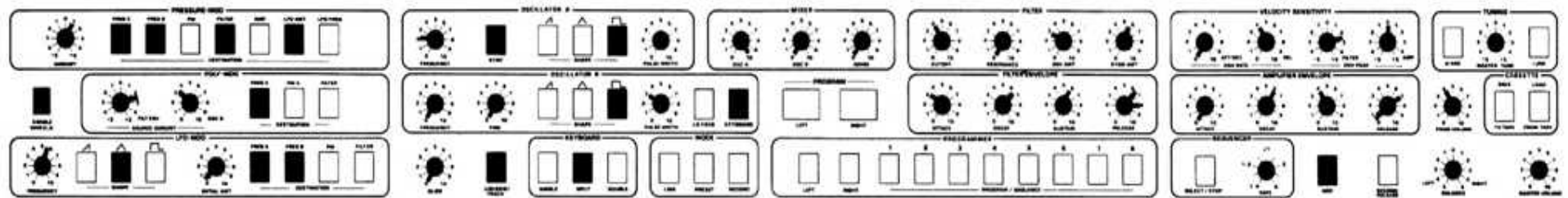
VELOCITY:

PRESSURE: vibrato



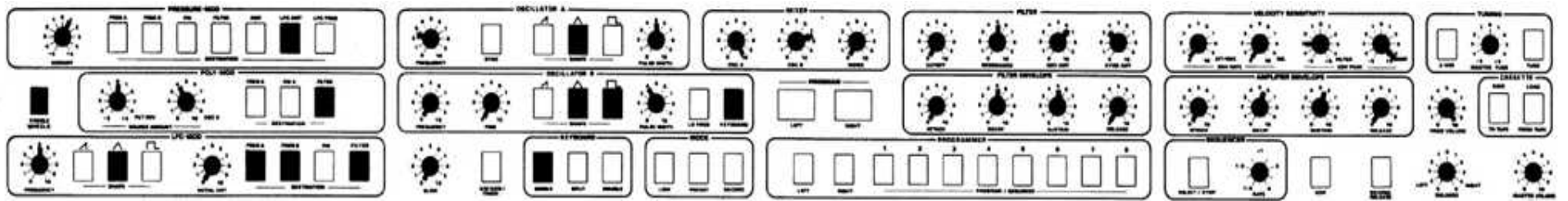
L37 —UNISON— LUCKY MAN

OSC A: up 0 octaves
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



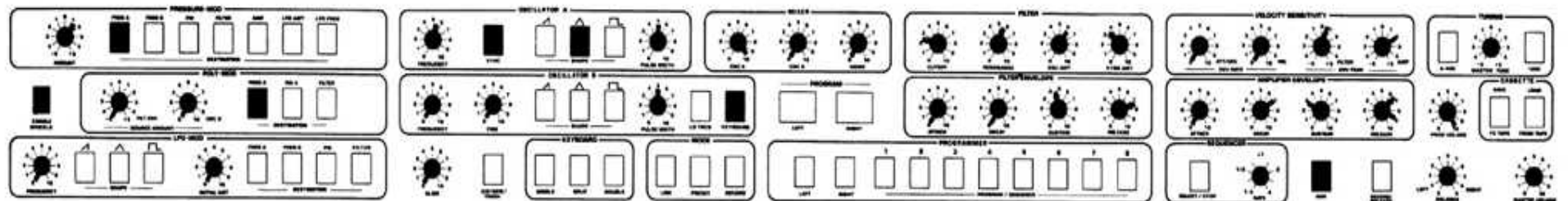
R37 —UNISON— PITCH BEND and VIBRATO

OSC A: up minor 3rd
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



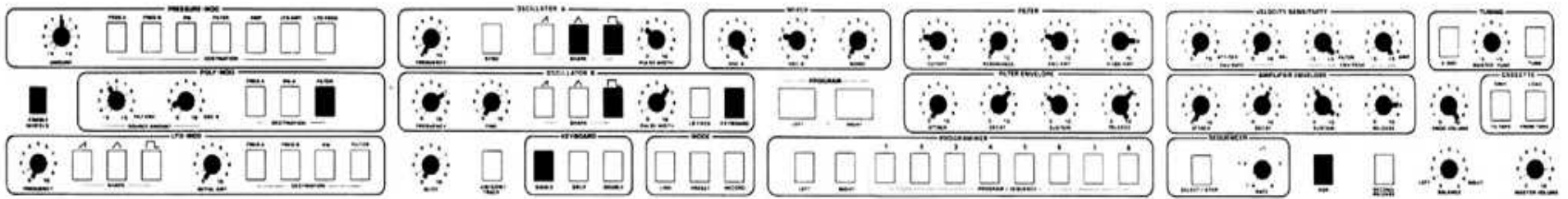
L38 FILTER FUNK

OSC A: up 1 octave
 OSC B: up 0 octaves
 VELOCITY: negative on filter envelope
 PRESSURE:



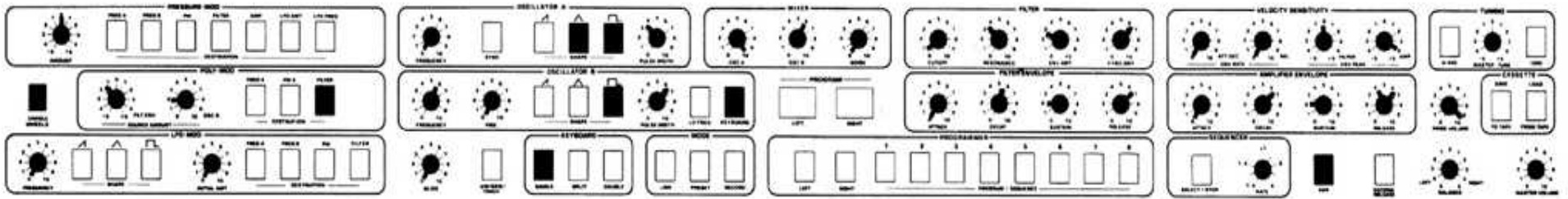
R38 DIGITAL SYNC with INVERTED PITCH BEND

OSC A: up 2 octaves + minor 7th
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



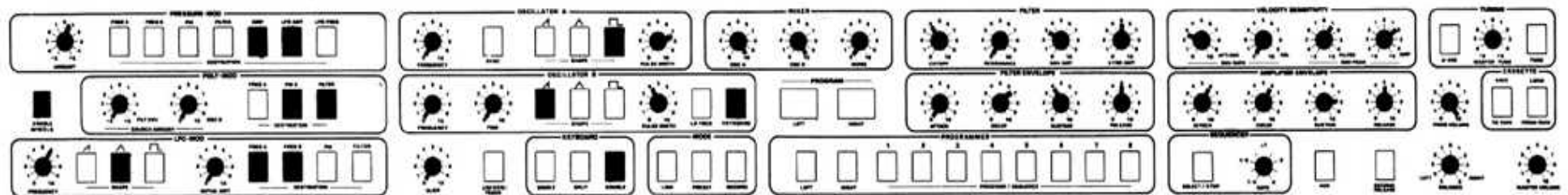
L41 ELECTRIC PIANO I

OSC A: up 0 octaves
 OSC B: up 3 octaves + minor 7th
 VELOCITY:
 PRESSURE:



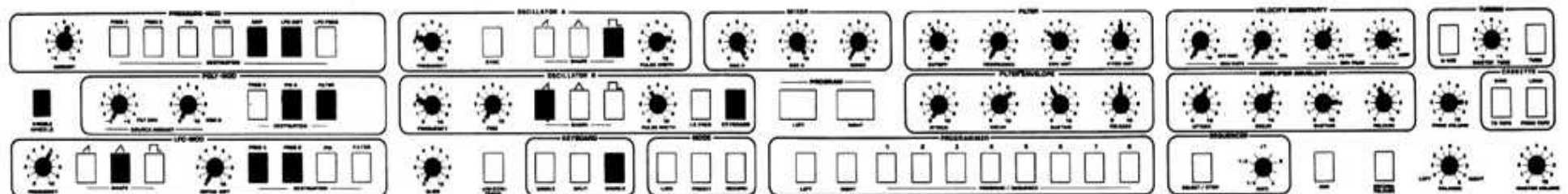
R41 ELECTRIC TINE II

OSC A: up 0 octaves
 OSC B: up 3 octaves + perfect 4th
 VELOCITY:
 PRESSURE:



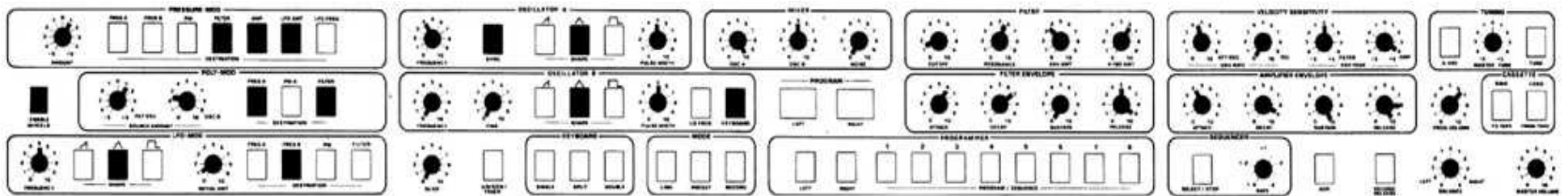
L42 CELLO— SINGLE-LINE

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



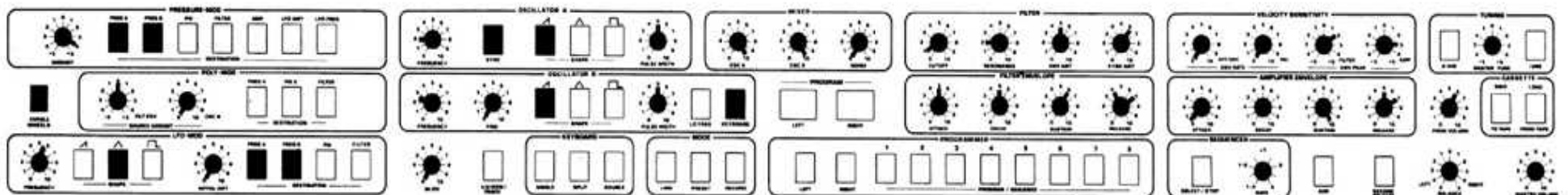
R42 STRING— SINGLE-LINE (HIGHER OCTAVE)

OSC A: up 1 octave
 OSC B: up 1 octave
VELOCITY:
PRESSURE:
 With this pair of programs the first harmonic is louder when the cellist bows harder.



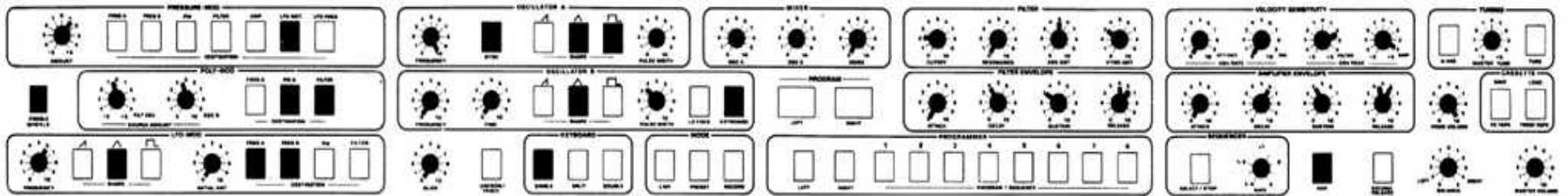
L43 COMIC WOW

OSC A: up 2 octaves
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE: vibrato, filter, amplifier



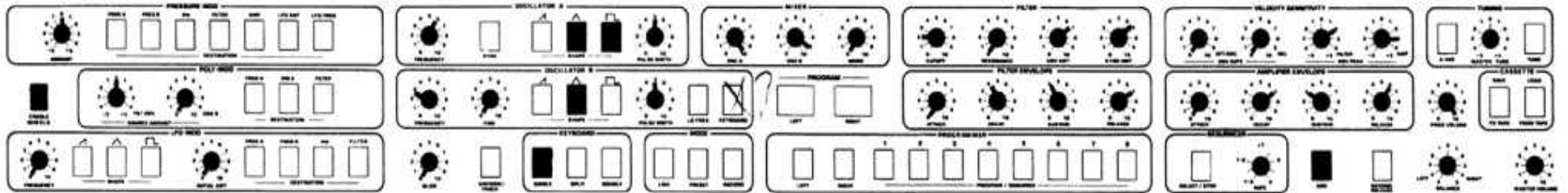
R43 MAYNERD PITCH BEND by PRESSURE

OSC A: up 1 octave
 OSC B: up 1 octave
 VELOCITY:
 PRESSURE: shows off extreme pitch bending



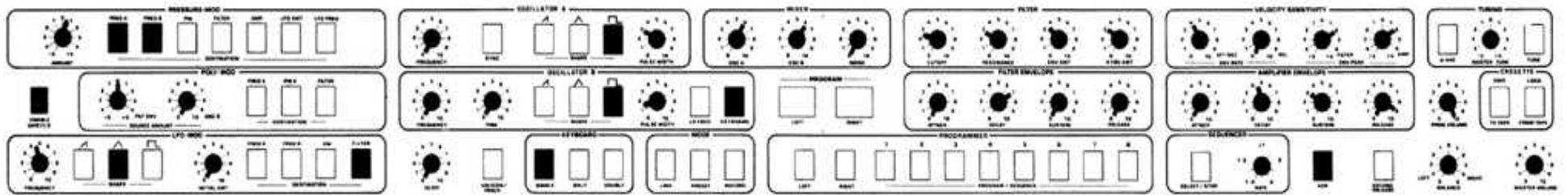
L44 SYNC A

OSC A: up 4 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



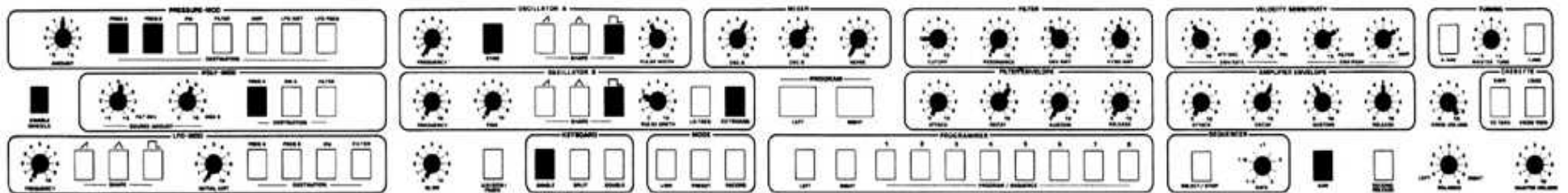
R44 XYLOPHONE

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



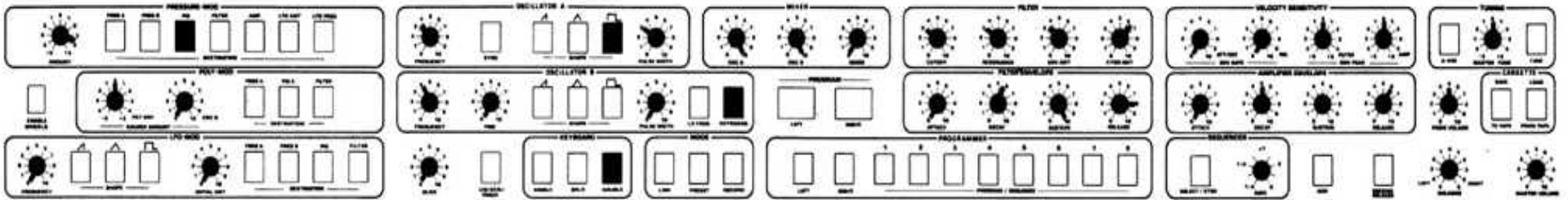
L45 CLAV I

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE: slight pitch bend (like real clav)



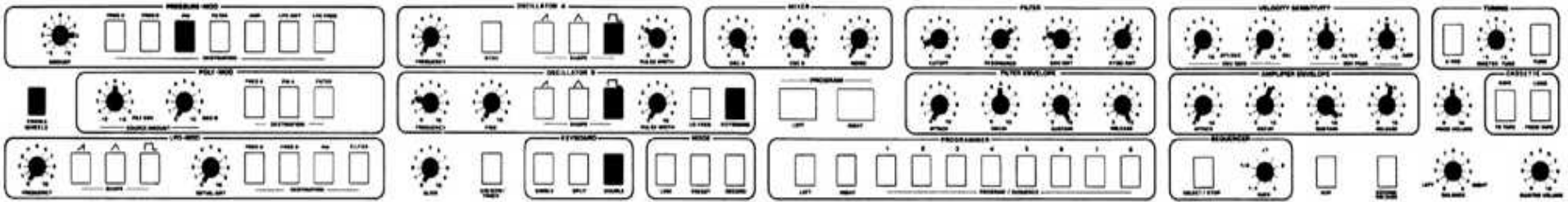
R45 CLAV II

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE: slight pitch bend



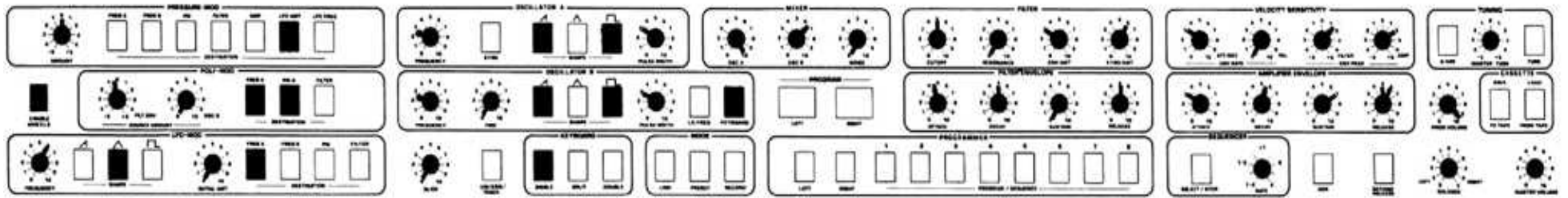
L46 PULSE WIDTH OCTAVE by PRESSURE

OSC A: up 0 octaves
 OSC B: up 1 octave
VELOCITY:
PRESSURE: sweeps pulse width, bringing-in upper octave



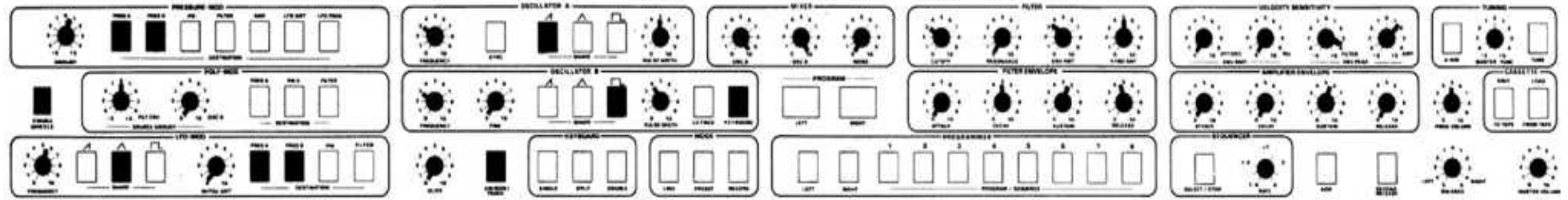
R46 PULSE WIDTH OCTAVE by PRESSURE

OSC A: up 1 octave
 OSC B: up 2 octaves
VELOCITY:
PRESSURE: sweeps pulse width, bringing-in upper octave



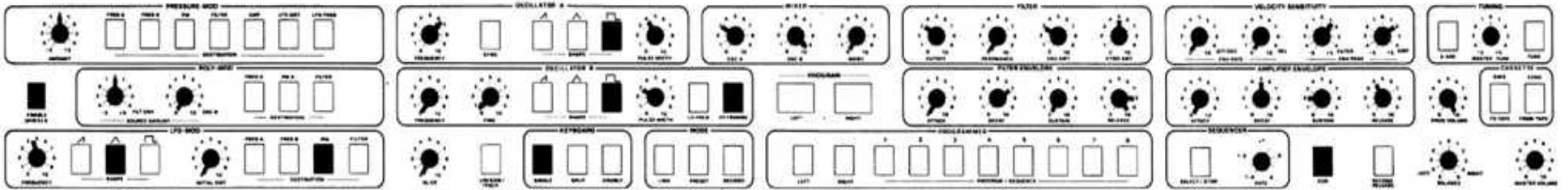
L47 ALBEDO 8.0

OSC A: up 1 octave
 OSC B: up 1 octave
 VELOCITY:
 PRESSURE:



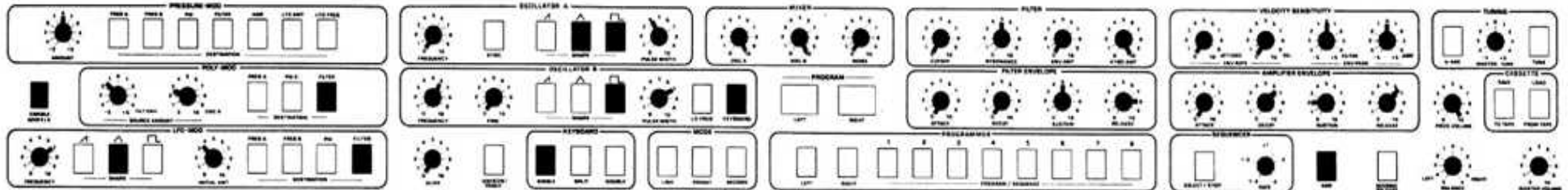
R47 —UNISON— LEAD with PITCH BEND by PRESSURE

OSC A: up 1 octave
 OSC B: up 1 octave
 VELOCITY:
 PRESSURE: pitch-bend tuned to one whole step



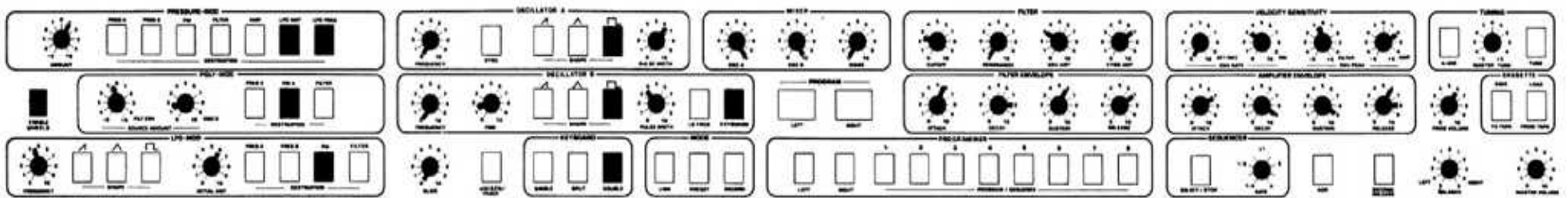
L51 ELECTRIC PIANO II

OSC A: up 3 octaves + minor 7th
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



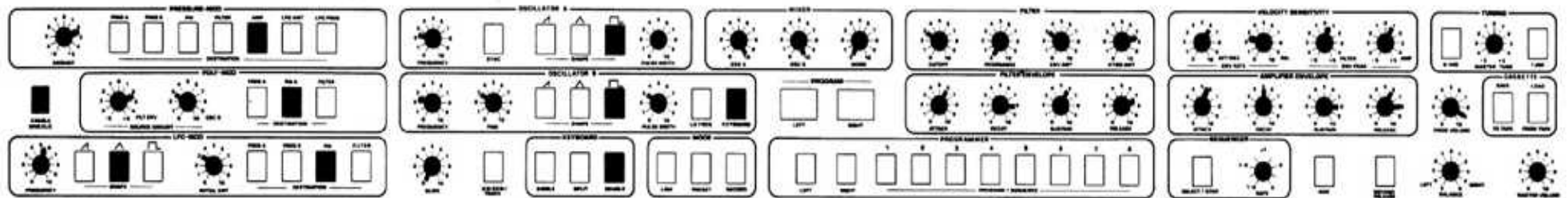
R51 ELECTRIC TINE III

OSC A: up 0 octaves
 OSC B: up 3 octaves + major 3rd
VELOCITY:
PRESSURE:



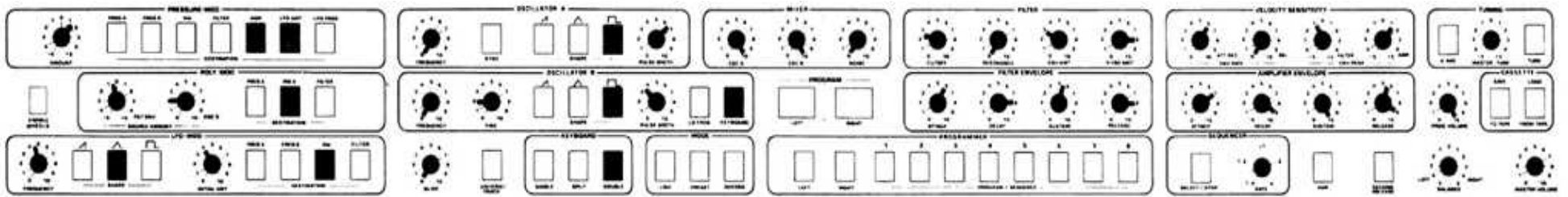
L52 STRINGS with PRESSURE VOLUME

OSC A: up 0 octaves
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE: amplifier



R52 STRINGS with PRESSURE (ONE OCTAVE UP)

OSC A: up 1 octave
 OSC B: up 1 octave
 VELOCITY:
 PRESSURE: amplifier



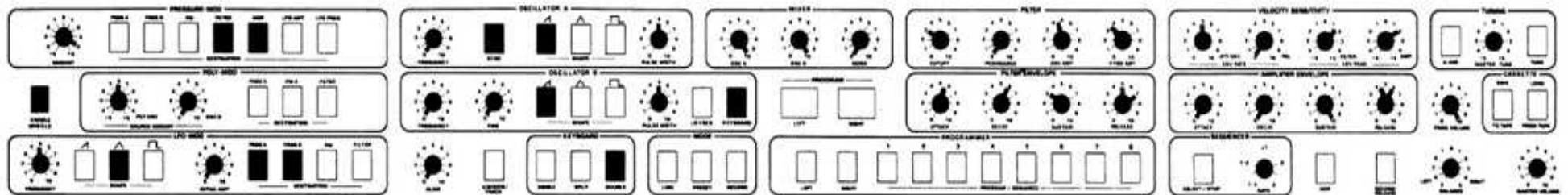
L53 STRINGS

OSC A: up 0 octaves

OSC B: up 0 octaves

VELOCITY:

PRESSURE: LFO amount and amplifier



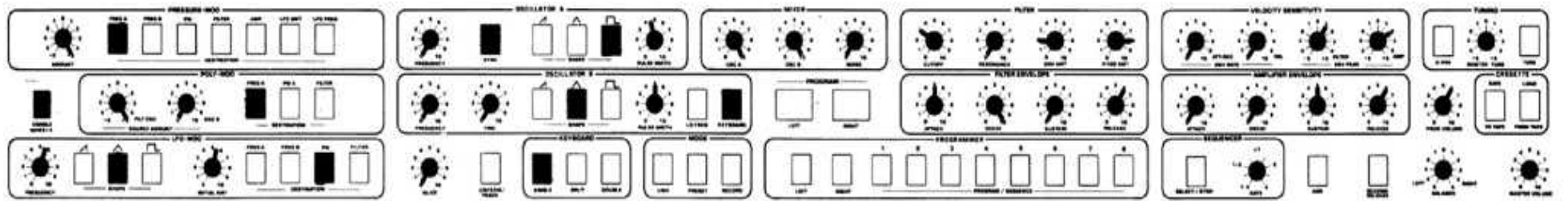
R53 BRASS

OSC A: up 0 octaves

OSC B: up 0 octaves

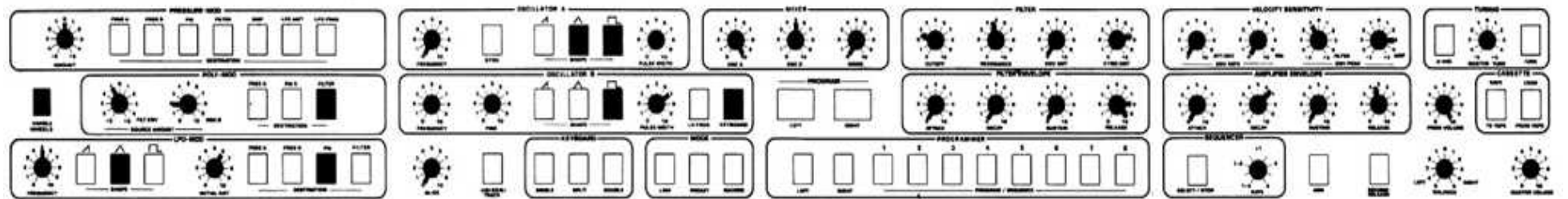
VELOCITY:

PRESSURE: filter and amplifier



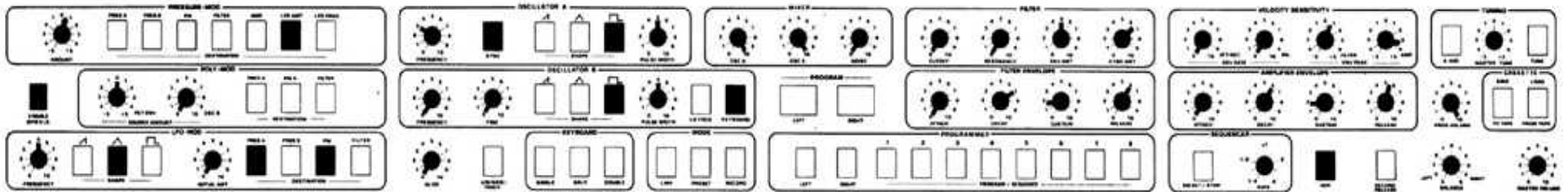
L54 SYNC SWEEP with PRESSURE

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE: Sync sweep



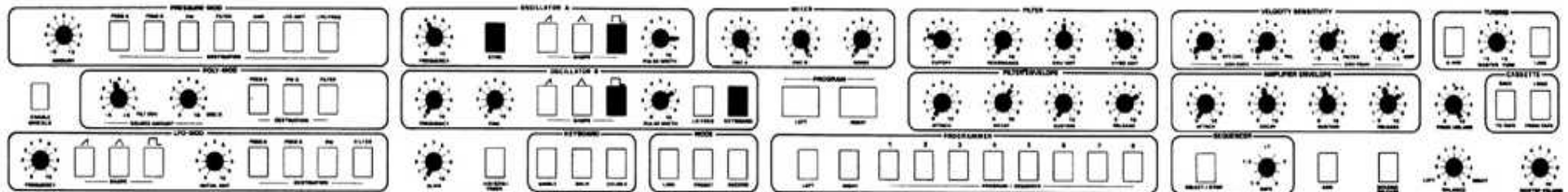
R54 ELECTRIC TINE with HEAVY LESLIE EFFECT

OSC A: up 0 octaves
 OSC B: up 3 octaves + major 3rd
VELOCITY:
PRESSURE:



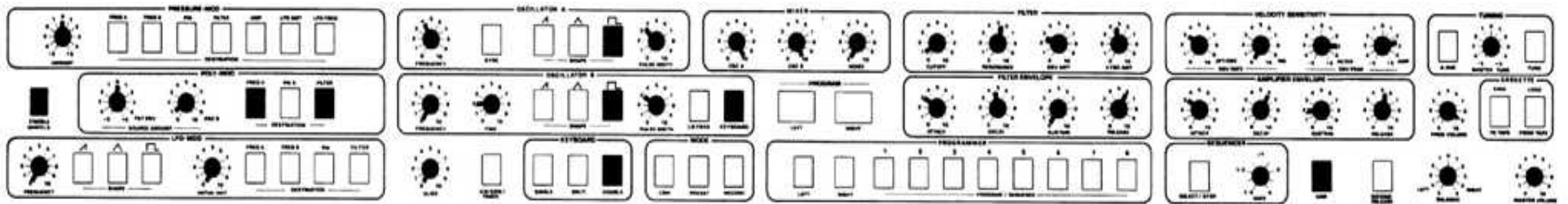
L55 CLAV/PIANO

OSC A: up 1 octave + major 3rd
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



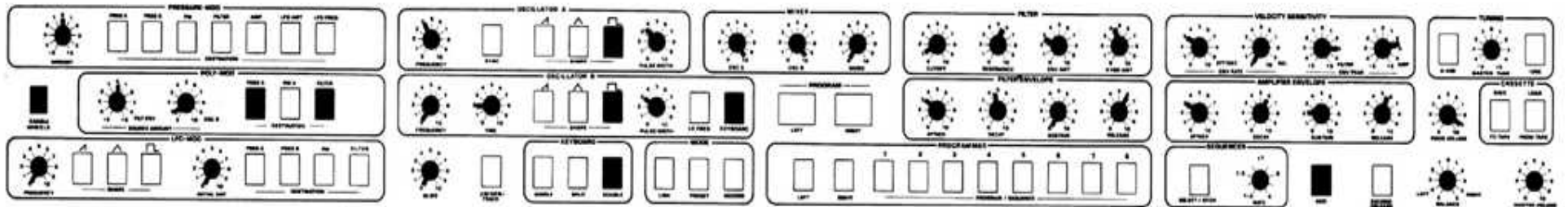
R55 CLAV III

OSC A: up 2 octaves + minor 2nd
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



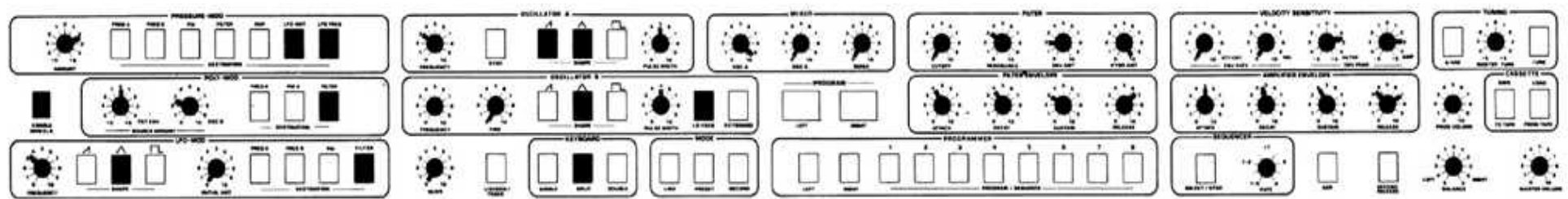
L56 STEEL DRUM

OSC A: up 2 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



R56 STEEL DRUM

OSC A: up 2 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



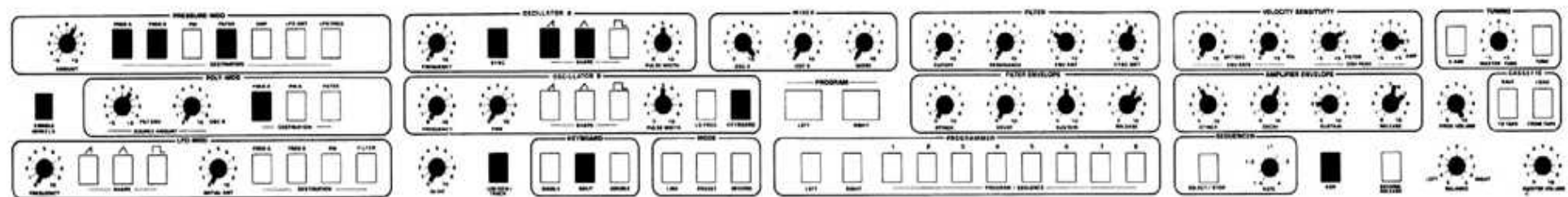
L57 -UNISON- STRING BASS

OSC A: up 0 octaves

OSC B: up 0 octaves

VELOCITY:

PRESSURE: pitch bend tuned to one whole step



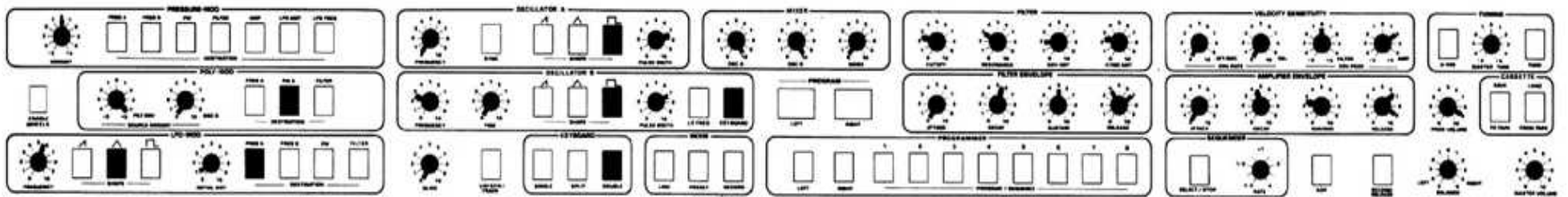
R57 FLUTE

OSC A: up 1 octave

OSC B: LFO

VELOCITY:

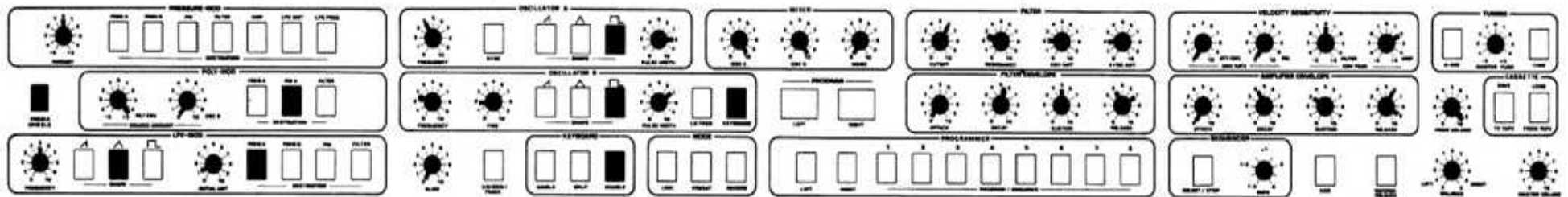
PRESSURE: accelerates LFO and increases vibrato depth, for flutter-tongue effect



L58 RELEASE OCTAVE

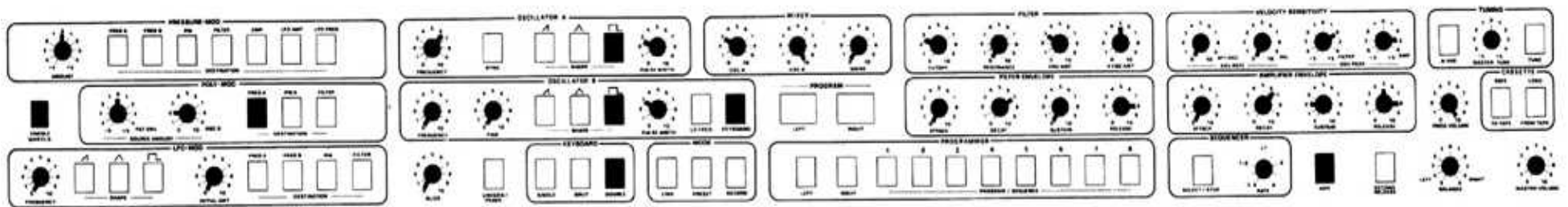
OSC A: up 0 octaves
 OSC B: up 1 octave
VELOCITY:
PRESSURE:

On both of these programs, the filter envelope drives OSC A to DC. On release, the octaves appear.



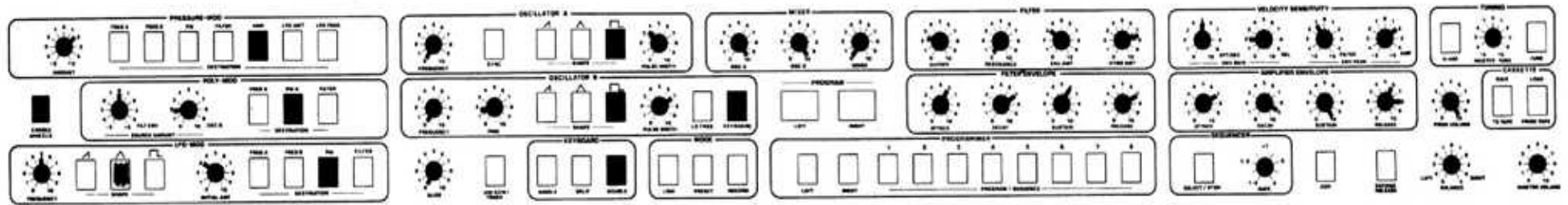
R58 RELEASE OCTAVE

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



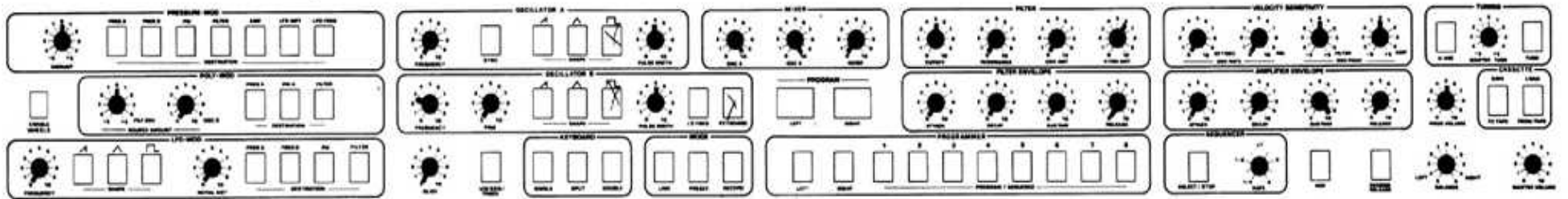
L61 PIANO

OSC A: up 3 octaves + major 6th
 OSC B: up 0 octaves
VELOCITY:



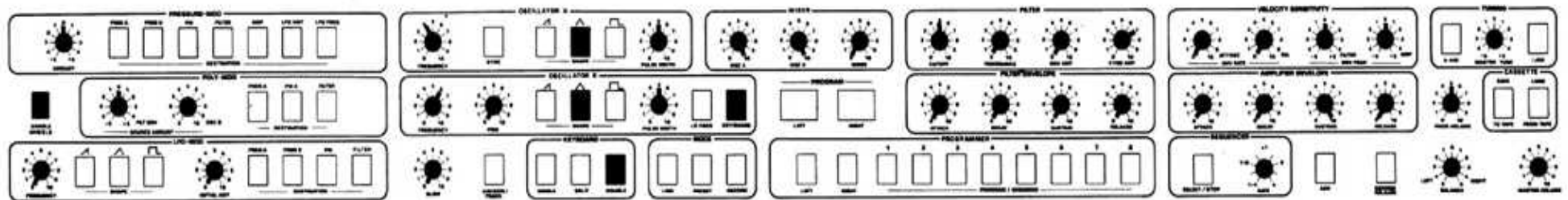
R61 STRING

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



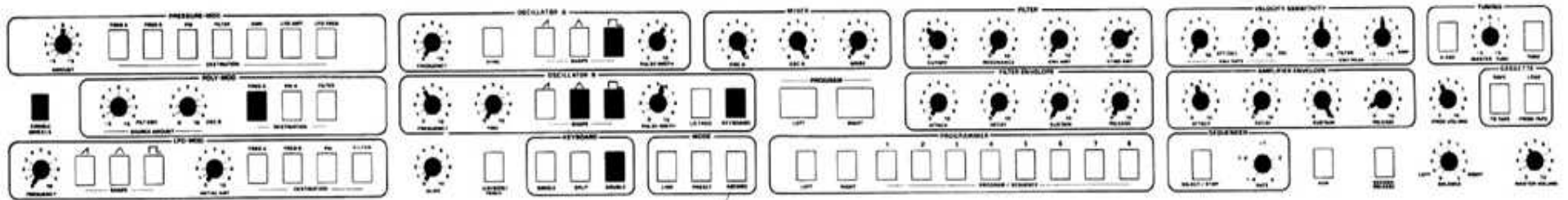
L62 ORGAN I

OSC A: up 0 octaves
 OSC B: up 1 octave
VELOCITY:
PRESSURE:



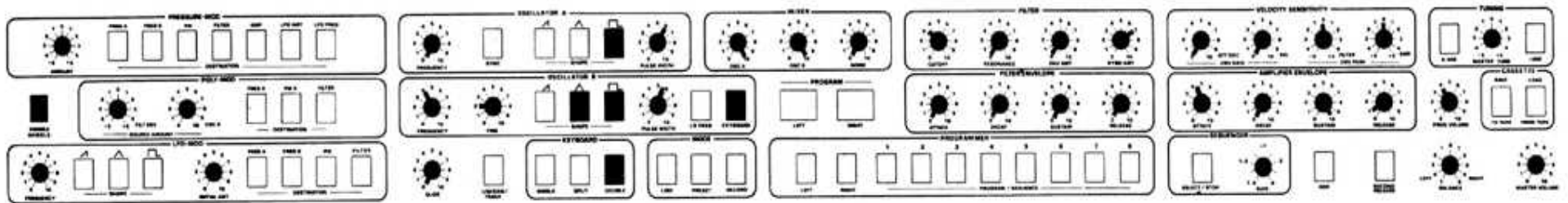
R62 ORGAN I

OSC A: up 2 octaves
 OSC B: up 3 octaves
VELOCITY:
PRESSURE:



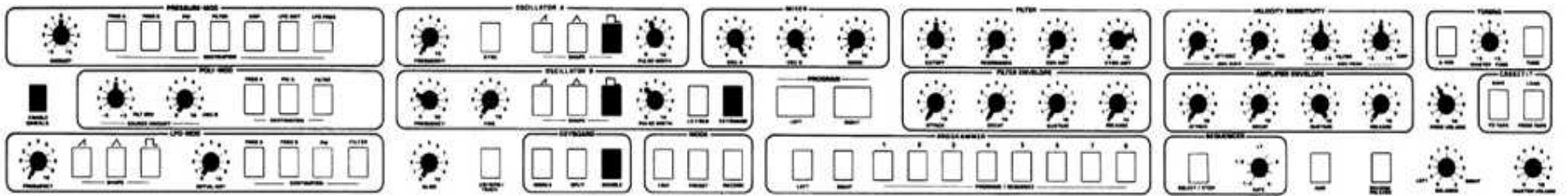
L63 CATHEDRAL ORGAN

OSC A: up 0 octaves
 OSC B: up 2 octaves
VELOCITY:
PRESSURE:



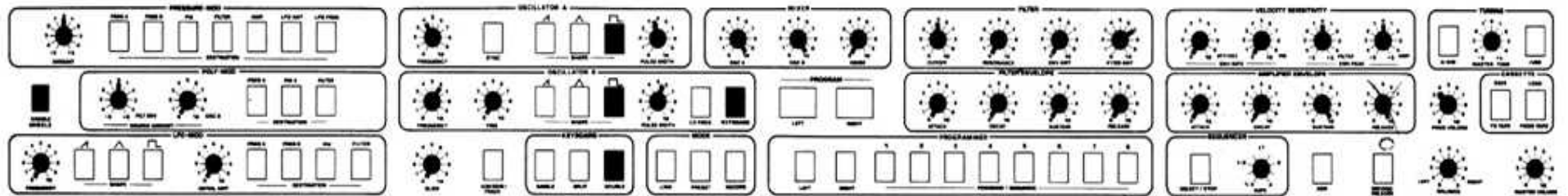
R63 CATHEDRAL ORGAN

OSC A: up 0 octaves
 OSC B: up 2 octaves
VELOCITY:
PRESSURE:



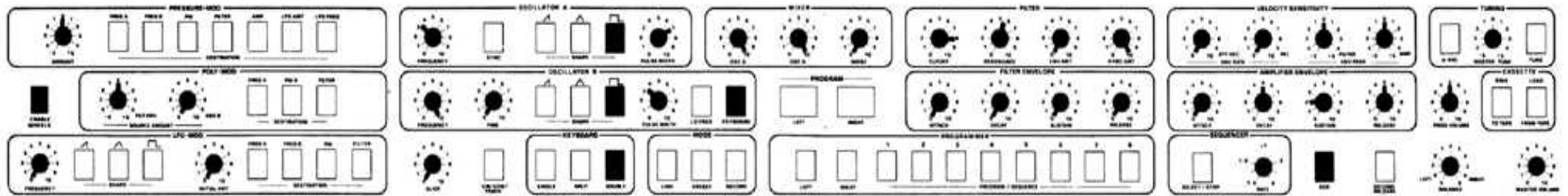
L64 ORGAN II

OSC A: up 0 octaves
 OSC B: up 1 octave
VELOCITY:
PRESSURE:



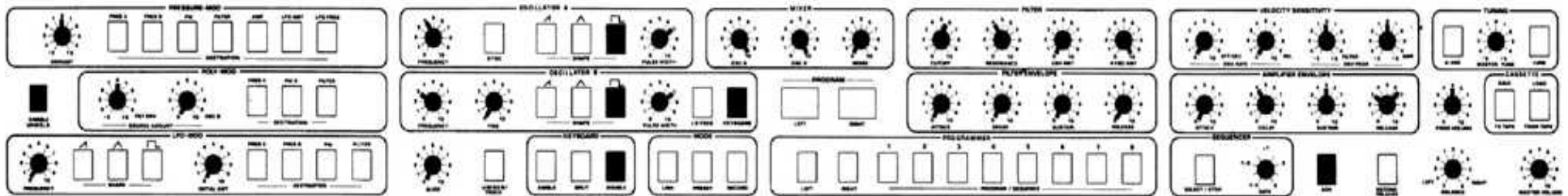
R64 ORGAN II

OSC A: up 2 octaves
 OSC B: up 3 octaves
VELOCITY:
PRESSURE:



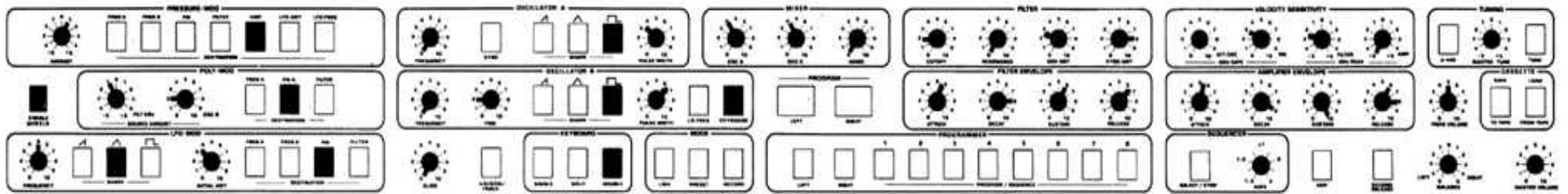
L65 SYNTH-A-CHORD

OSC A: up 2 octaves
 OSC B: up 4 octaves
VELOCITY:
PRESSURE:



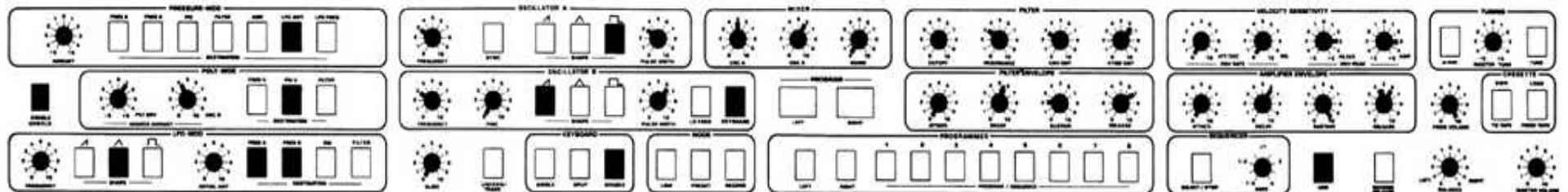
R65 HARPSICHORD

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



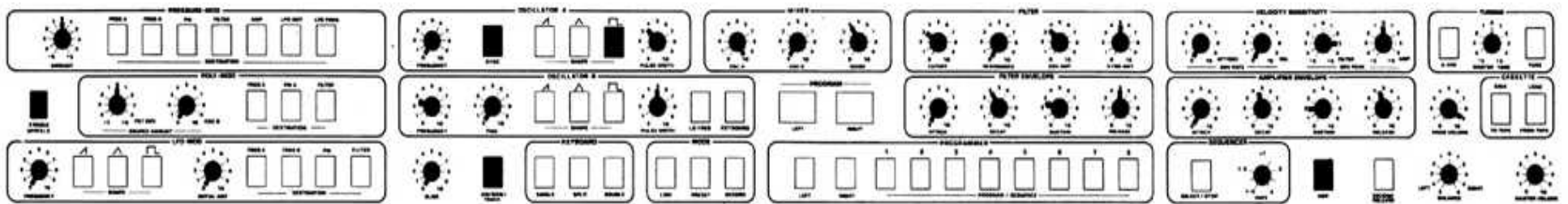
L66 CROSSFADE II (STRINGS)

OSC A: up 0 octaves
 OSC B: up 0 octaves
 VELOCITY: negative on amplifier
 PRESSURE:



R66 CROSSFADE II (PLUCKY)

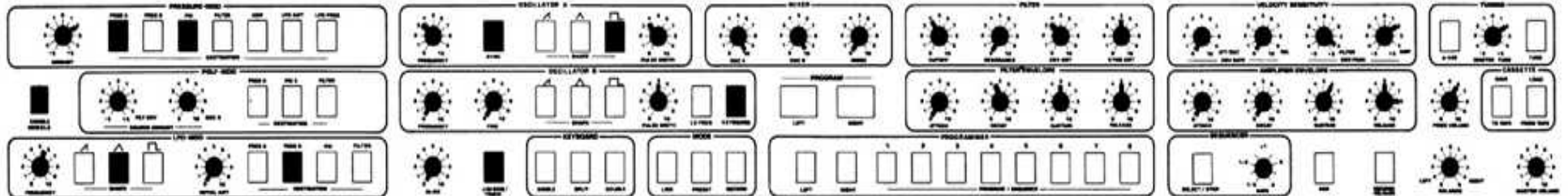
OSC A: up 1 octave
 OSC B: up 1 octave
 VELOCITY: positive on amplifier
 PRESSURE:



L67 DRONE IN A

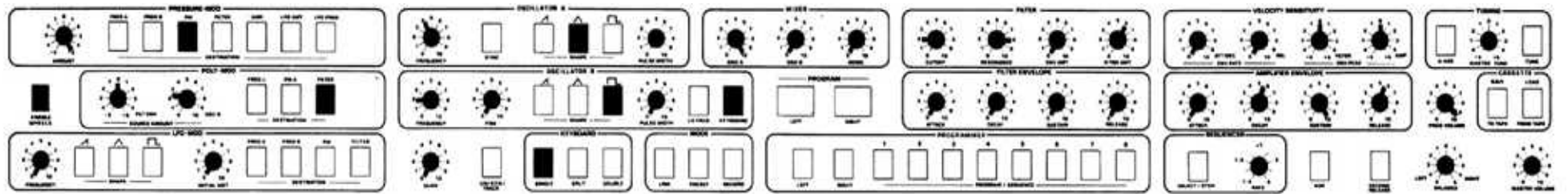
OSC A: up 0 octaves
 OSC B: tuned to low A, keyboard off
VELOCITY:
PRESSURE:

This is a drone program. OSC A is synced to B, so playing keyboard changes OSC A but not B.



R67 —UNISON—SYNC SWEEP

OSC A: up 1 octave + diminished 5th
 OSC B: up 0 octaves, no waveshapes on
VELOCITY:
PRESSURE:



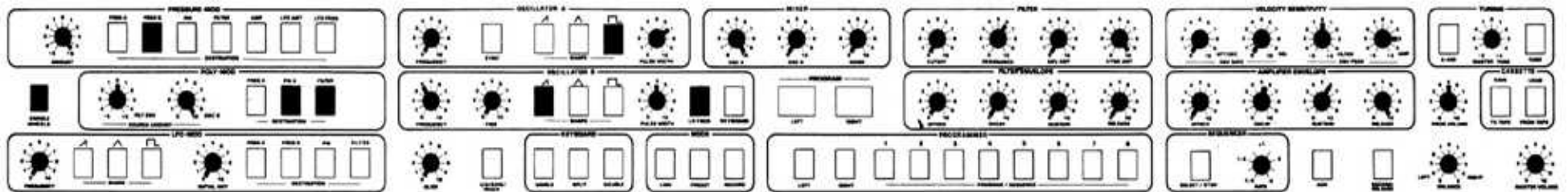
L68 PRESSURE COOKER

OSC A: up 2 octaves

OSC B: up a perfect 5th

VELOCITY:

PRESSURE: applies OSC B pulse wave (with no pressure, pulse is at dc)



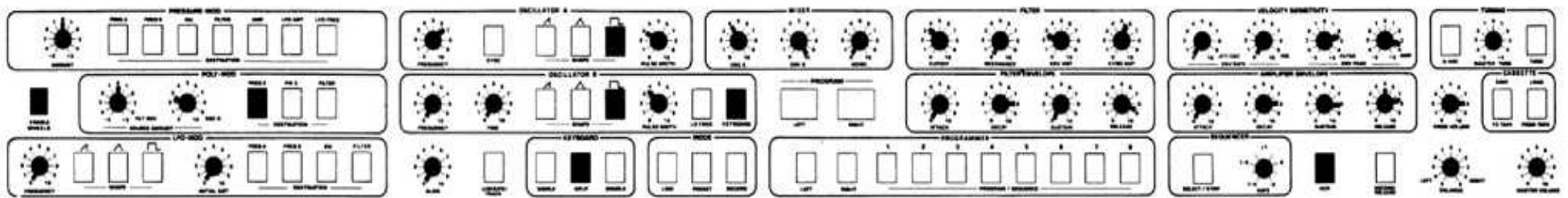
R68 RANDOM SAWTOOTH ARPEGGIATOR

OSC A: up 0 octaves

OSC B: LFO, modulates OSC A PW and filter

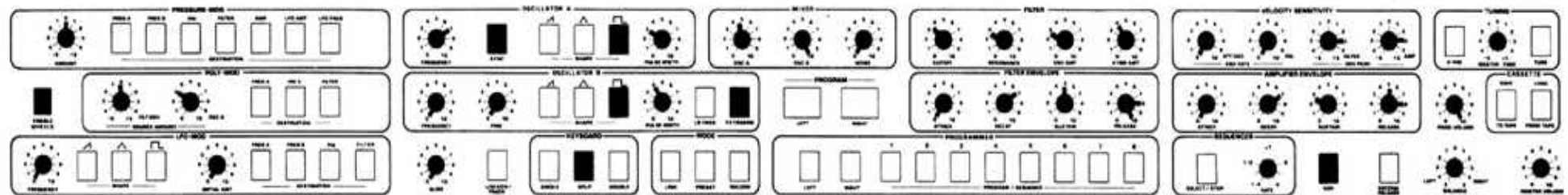
VELOCITY:

PRESSURE: accelerates modulation



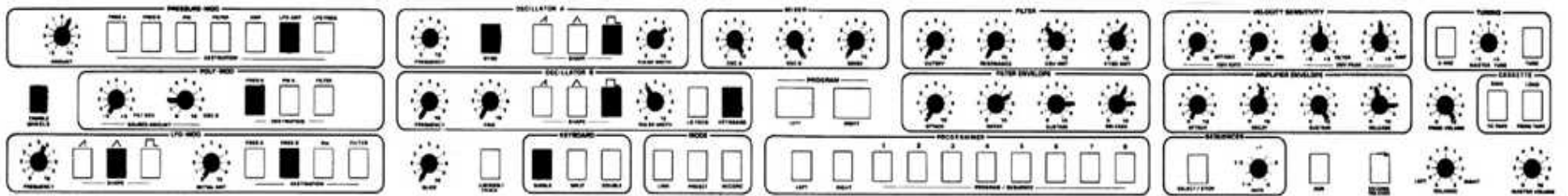
L71 ACOUSTIC PIANO—BOTTOM III

OSC A: up 3 octaves + major 6th
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



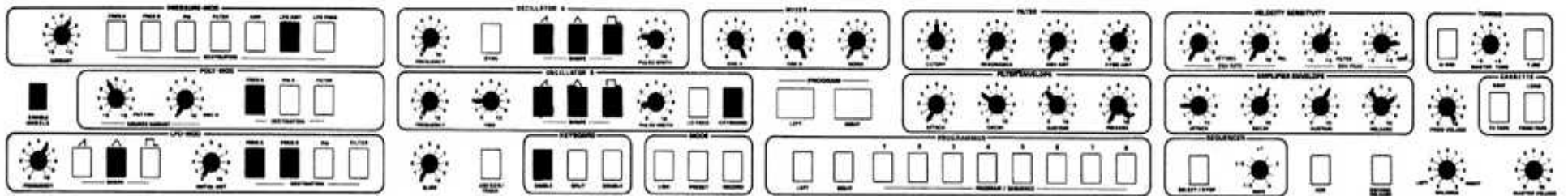
R71 ACOUSTIC PIANO TOP III

OSC A: up 3 octaves + major 6th
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



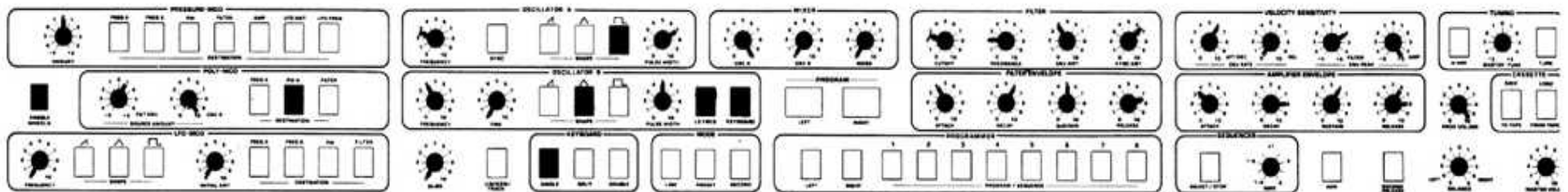
L72 STRING

OSC A: up 1 octave + 5th
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE: vibrato



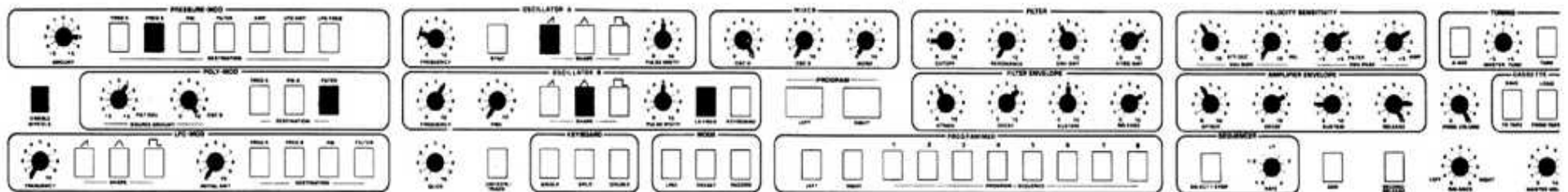
R72 BRASS

OSC A: up 0 octaves
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



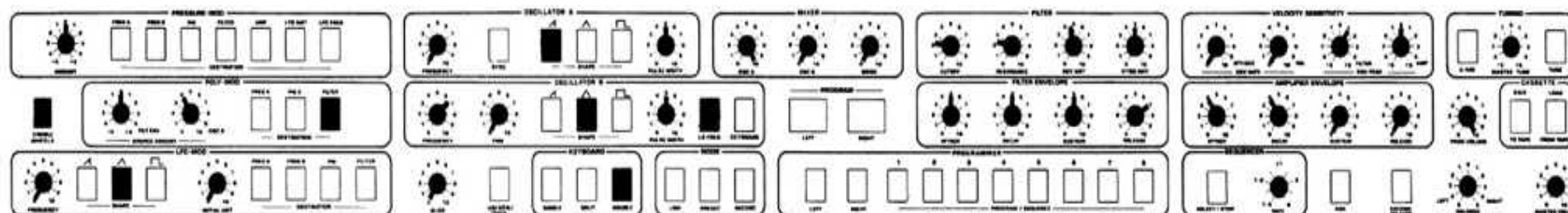
L73 POLY-MOD LFO to PULSE WIDTH

OSC A: up 1 octave
 OSC B: LFO
 VELOCITY:
 PRESSURE:



R73 POLY-MOD LFO to FILTER

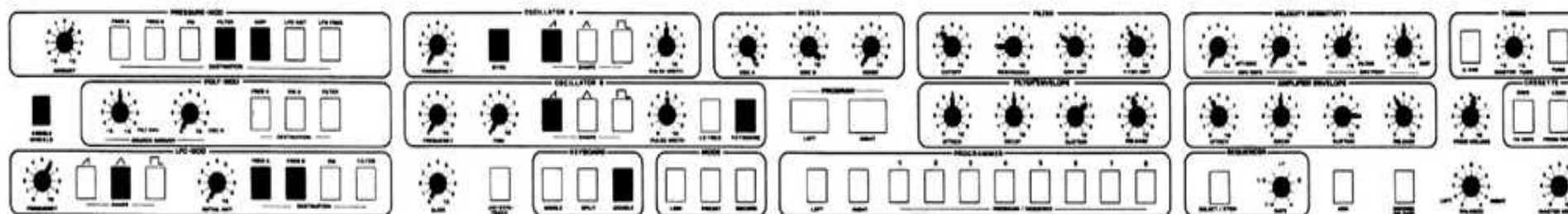
OSC A: up 1 octave
 OSC B: LFO
 VELOCITY:
 PRESSURE:



L74 HORN BLIP

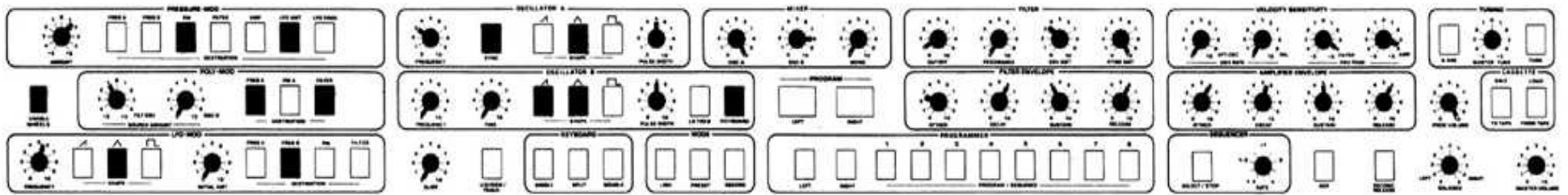
OSC A: up 0 octaves
 OSC B: LFO
 VELOCITY:
 PRESSURE:

These two programs are used together to create one sound, thus, they will not work well with a stereo output. The beginning of the sound (the "blip") comes from the Left while the actual tone comes from the right.



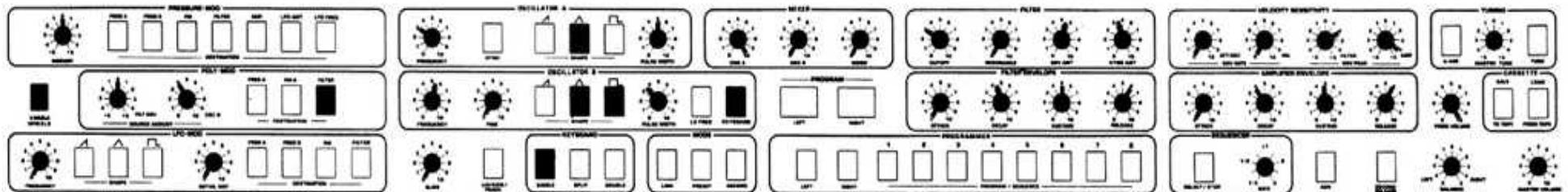
R74 HORN TONE

OSC A: up 0 octaves
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



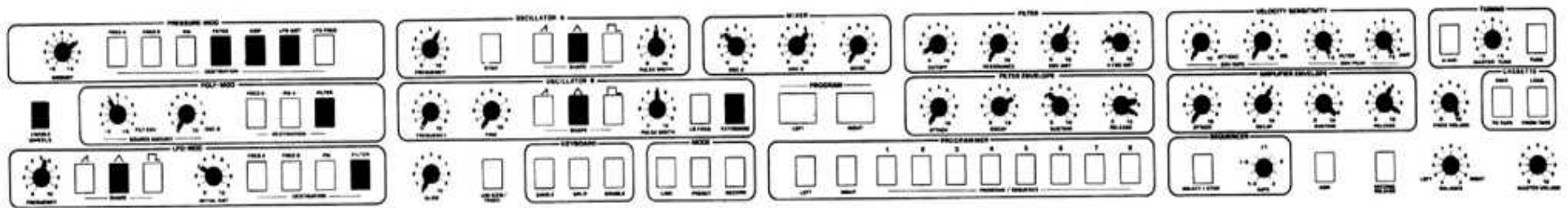
L75 PLEIDES

OSC A: major 9th
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



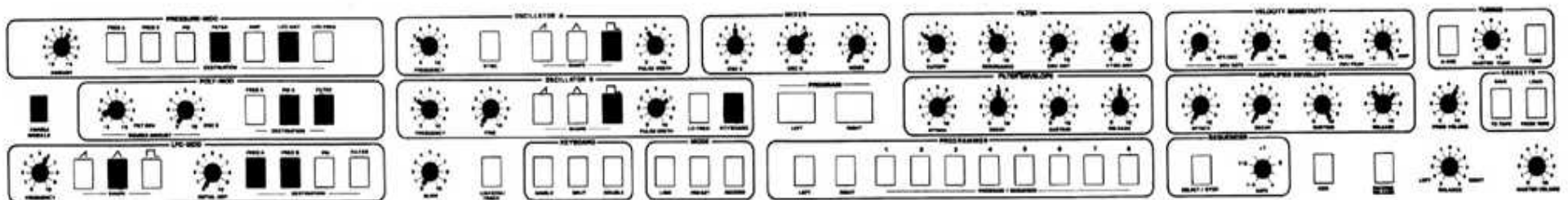
R75 METALLIC I

OSC A: up 1 octave
 OSC B: up 2 octaves + major 6th
 VELOCITY:
 PRESSURE:



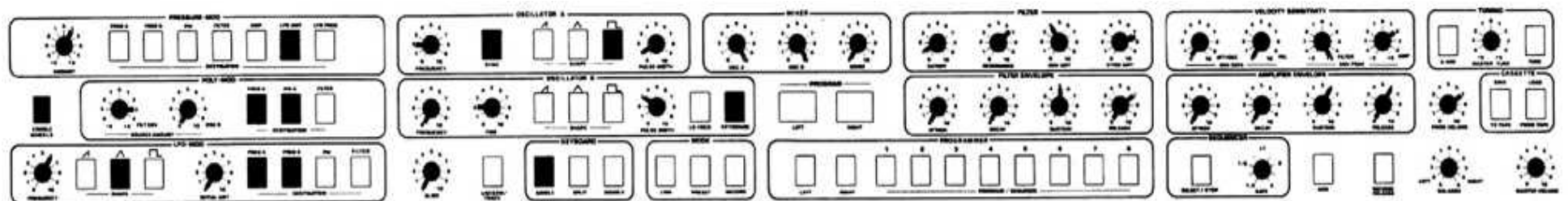
L76 RHODESY

OSC A: up 3 octaves
 OSC B: up 0 octaves
 VELOCITY:
 PRESSURE:



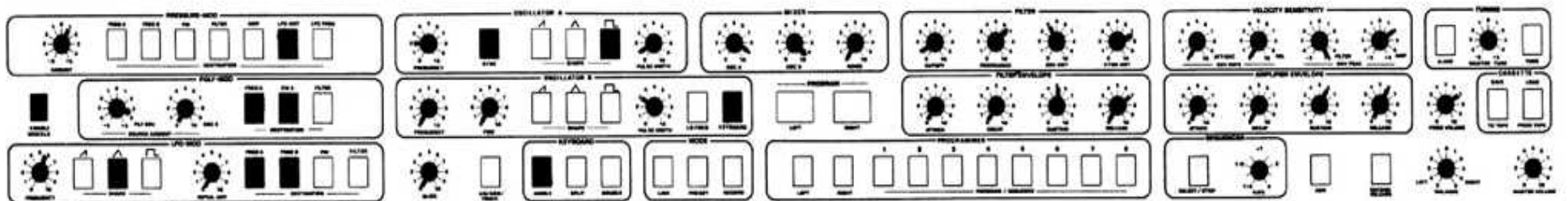
R76 ANGELIC GLIDE

OSC A: up 1 octave
 OSC B: up 1 octave
 VELOCITY:
 PRESSURE:



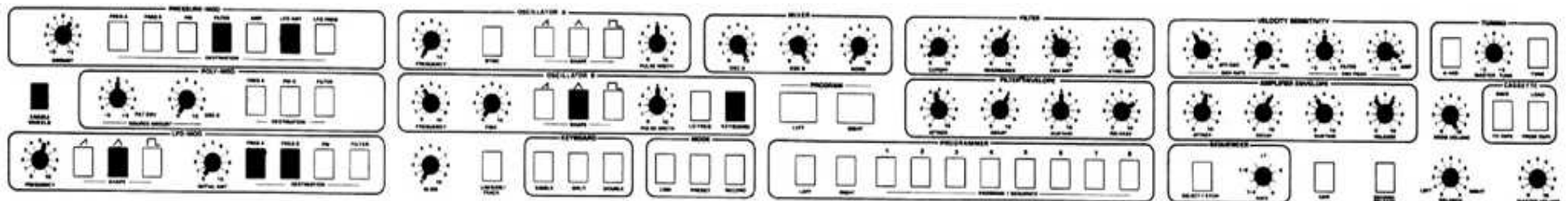
L77 DUPLICATE of R77 DETUNED for CHORUSING

OSC A: up major 6th
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:
 Duplicate of R77 with OSC B detuned.



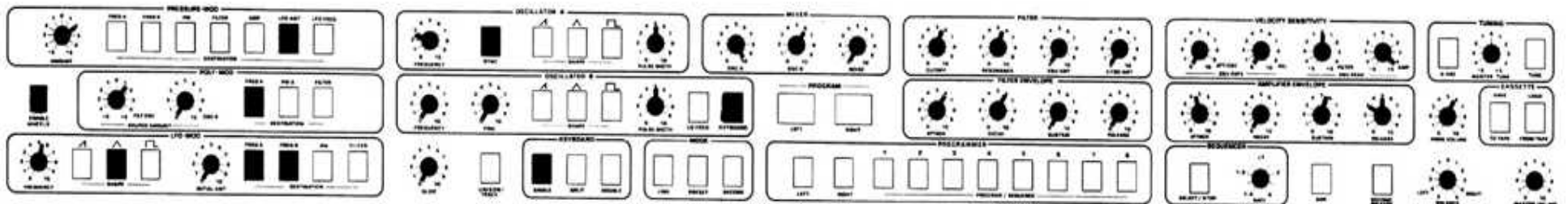
R77 SUPER PERCUSSIVE II with VELOCITY

OSC A: up major 6th
 OSC B: up 0 octaves
VELOCITY: changes timbre
PRESSURE:



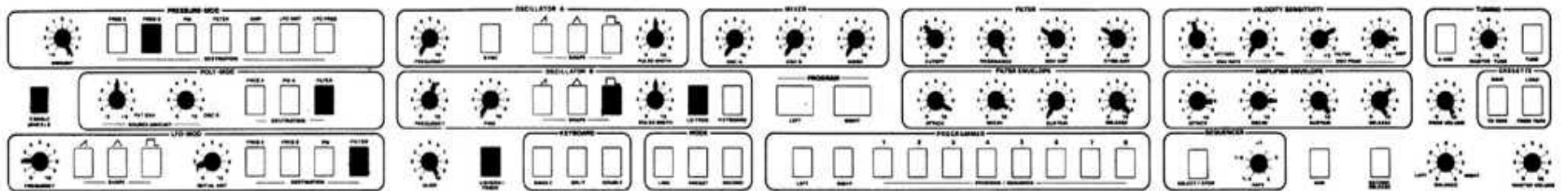
L78 VOCAL HARMONICA

OSC A: up minor 7th
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:



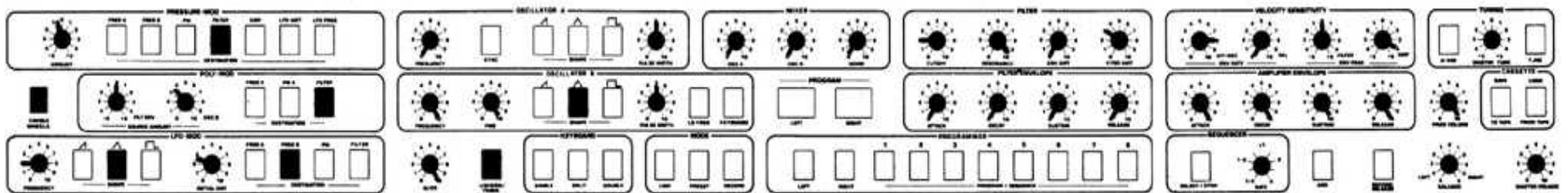
R78 NEWT FLUTE

OSC A: not used
 OSC B: up 2 octaves
VELOCITY:
PRESSURE:



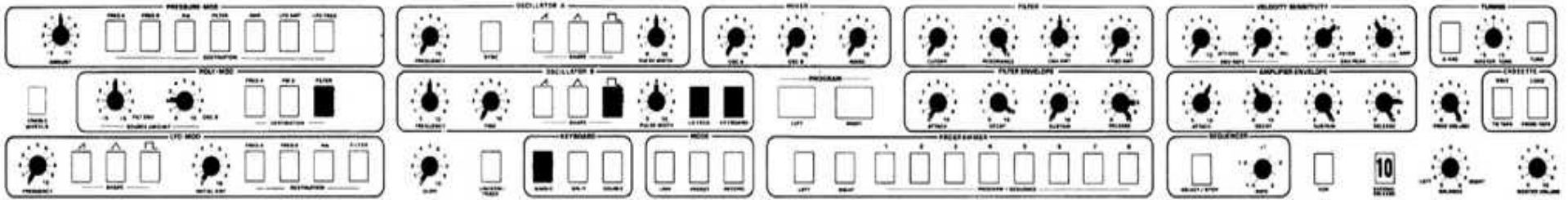
L81 MOON WAVES

OSC A: not used
OSC B: LFO square wave
VELOCITY: affects ATT/DEC, filter envelope peak and loudness
PRESSURE: varies speed of square-wave modulation



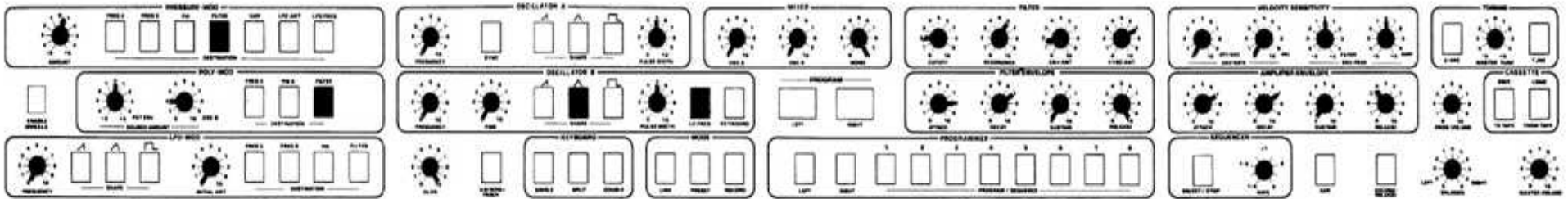
R81 -UNISON--ALIEN

OSC A: not used
OSC B: filter modulation
VELOCITY: amplifier attack time and loudness
PRESSURE: negative to the filter



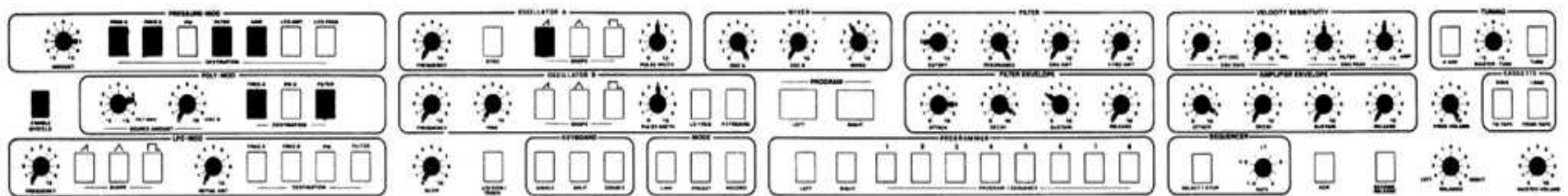
L82 VIDEO GAMES

OSC A: up 0 octaves
OSC B: up 2 octaves
VELOCITY: controls height of pitch drop
PRESSURE:



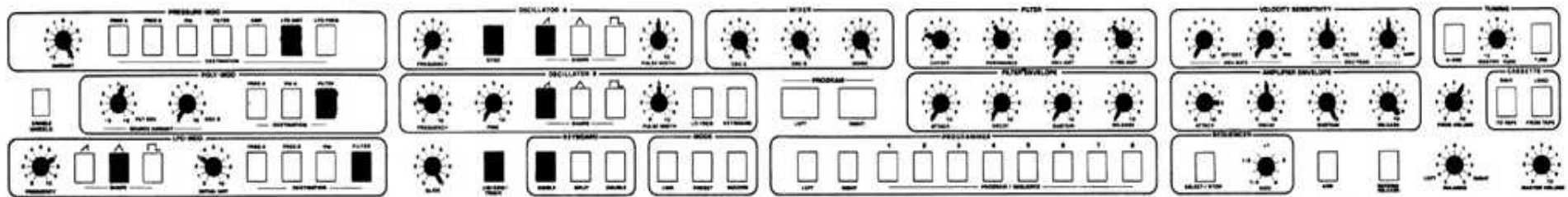
R82 POLY-WIND

OSC A: up octaves
OSC B: up octaves
VELOCITY:
PRESSURE: modulates filter
 Filter range changes slowly over keyboard.



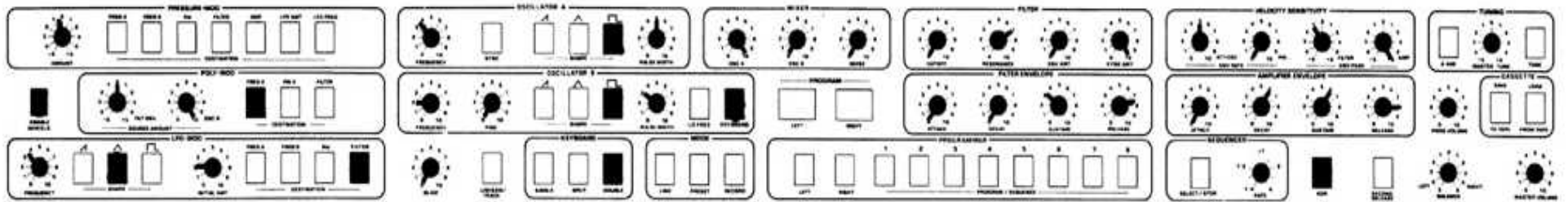
L83 CATS UNDER PRESSURE

OSC A: up 0 octaves
 OSC B: up 0 octaves
VELOCITY:
PRESSURE:
 Push down hard on keys, preferably in the middle range of the keyboard.



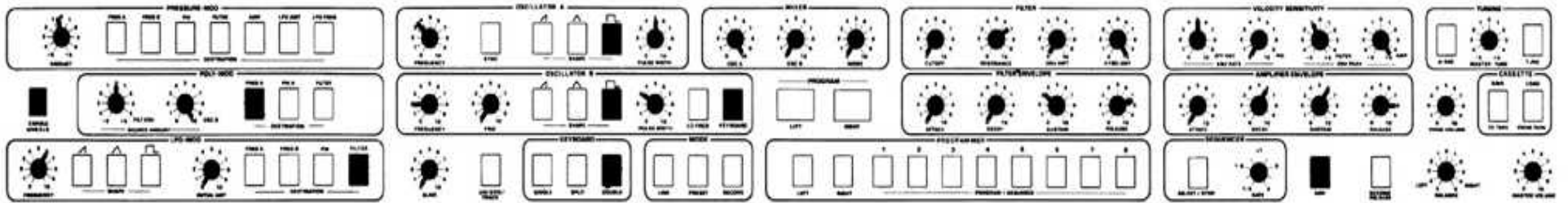
R83 CHOPPER with PRESSURE

OSC A: up 0 octaves
 OSC B: keyboard off, tune to low F#
VELOCITY:
PRESSURE: Controls rotor intensity.



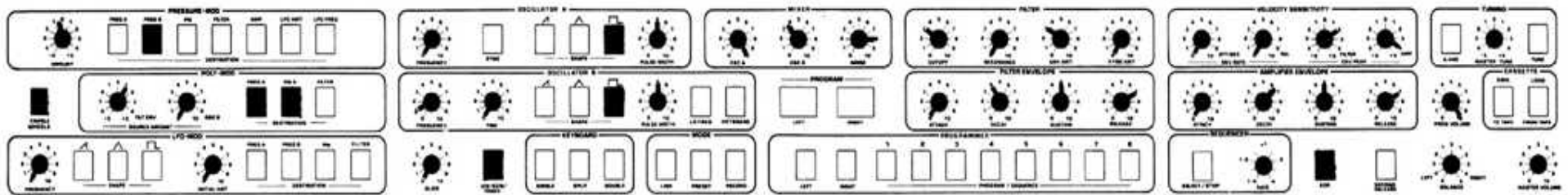
L84 BIG BELLS

OSC A: up 1 octave
 OSC B: up 1 octave
 VELOCITY:
 PRESSURE:



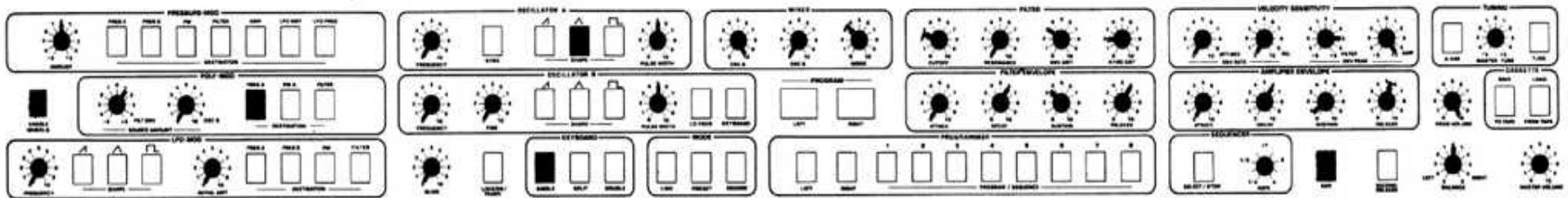
R84 BIG BELLS

OSC A: up 1 octave
 OSC B: up 1 octave
 VELOCITY:
 PRESSURE:



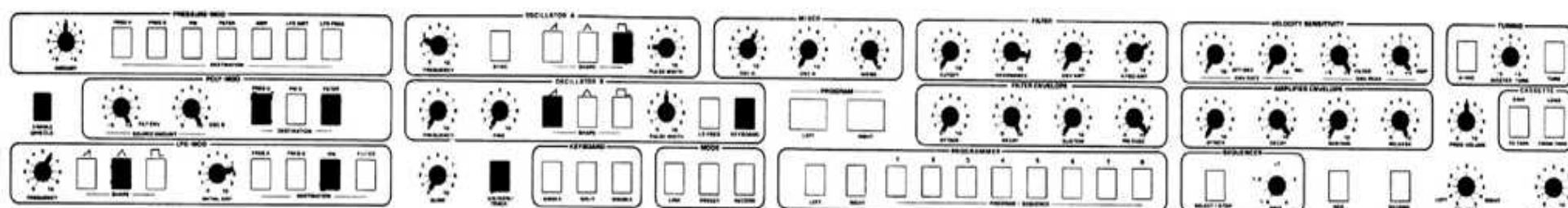
L85 --UNISON--TYMPANI

OSC A: up 0 octaves, square wave
 OSC B: keyboard off, tune to low B^b, square wave
 VELOCITY:
 PRESSURE:



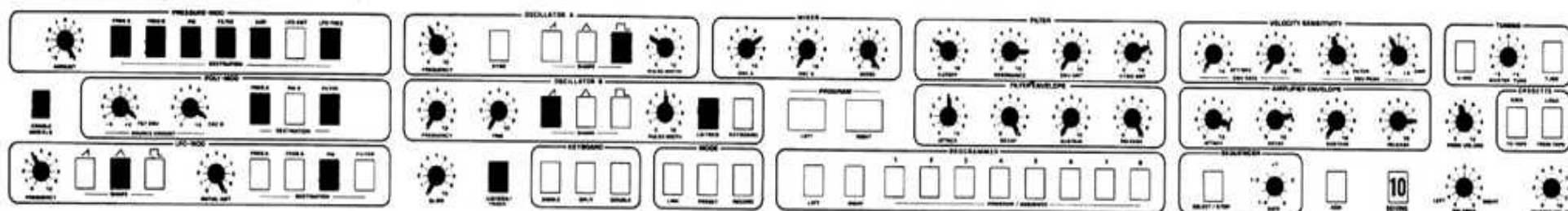
R85 TOMS

OSC A: up 0 octaves
 OSC B: not used
 VELOCITY:
 PRESSURE:



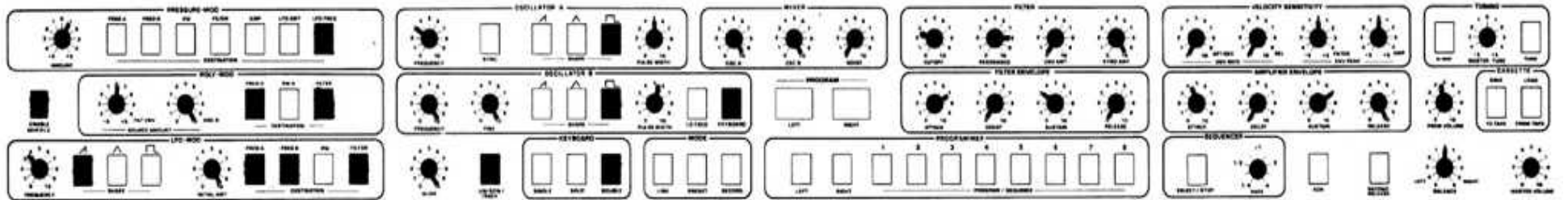
L86 VELOCITY SOUND EFFECT

OSC A: up 1 octave
 OSC B: up 0 octaves
 VELOCITY: sound effect
 PRESSURE:



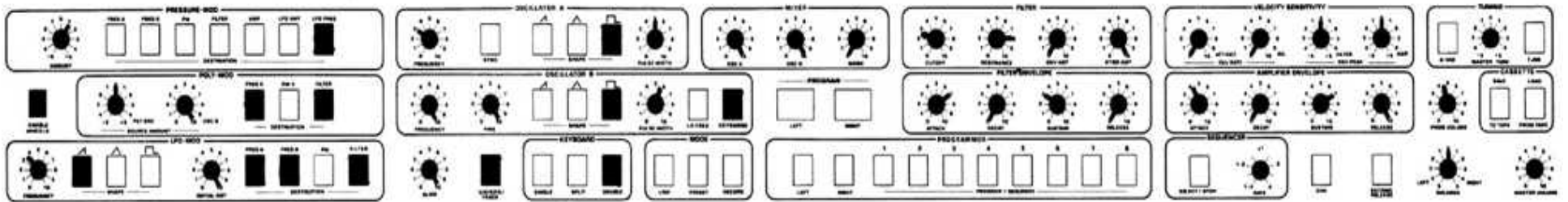
R86 PRESSURE SOUND EFFECT

OSC A: up 1 octave minor 6th
 OSC B: LFO
 VELOCITY:
 PRESSURE: sound effect



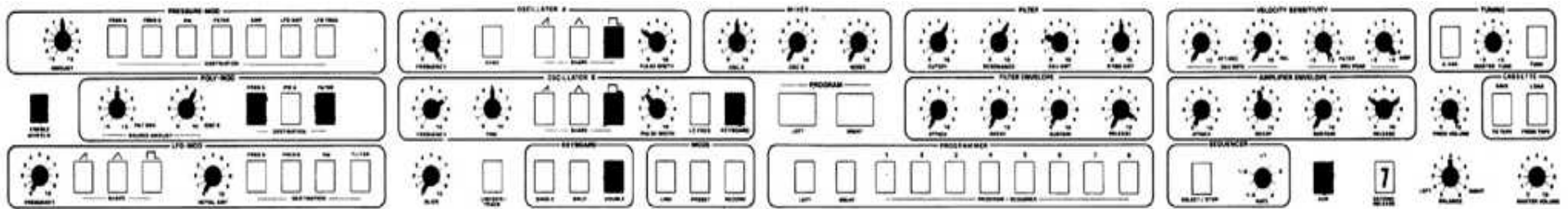
L87 SPACE TREK

OSC A: up 1 octave
OSC B: up 4 octaves + 1 whole step
VELOCITY:
PRESSURE: accelerates LFO



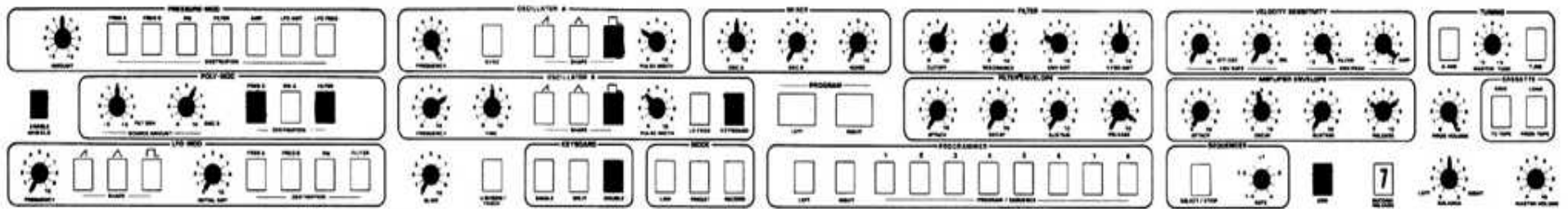
R87 SPACE TREK

OSC A: up 1 octave
OSC B: up 4 octaves + 1 whole step
VELOCITY:
PRESSURE: accelerates LFO



.L88 METALLIC PERCUSSIVE

OSC A: up 4 octaves
 OSC B: up 3 octaves + minor 6th
 VELOCITY:
 PRESSURE:



R88 METALLIC PERCUSSIVE

OSC A: up 4 octaves
 OSC B: up 3 octaves + minor 6th
 VELOCITY:
 PRESSURE:

These programs are linked to 77, however, the idea is to have this metallic sound in both Left and Right programmers so that you can easily try out sounds in either programmer doubled up with 88. The link with 77 is just one example of how the metallic chiff can add to a sound.
 Remember: to try other programs, first switch Link off.

