Owner's Manual

OB-X

Polyphonic Synthesizer

First Edition
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CONGRATULATIONS!

- on the purchase of a new Oberheim OB-X Polyphonic Synthesizer. We believe that you will find this instrument to be an outstanding combination of value, versatility and reliability.

The OB-X was developed using an unique combination of Oberheim circuitry, proven by use in hundreds of polyphonic synthesizers, and the latest in microprocessor circuitry, resulting in a product capable of producing a myriad of polyphonic sounds with unheard of ease.

FEATURES

* Totally Programmable with Storage for 32 Programs
* Automatic Tuning
* A-440 Pitch Reference
* Edit Mode
* Cassette Interface Built-In
* Five Octave Keyboard
* Polyphonic Portamento and Polyphonic Sample/Hold
* Unique Transposable "Unison Chord" Feature
* Two Oscillators per Voice
* Two Full ADSR Envelope Generators per Voice
* Pitch and Modulation Levers
* Five Foot Control Inputs: Volume, Filter, Vibrato, Sustain, Program Advance
* Voice Hold
* Noise Generator
* 115/230 Volt Power Switch

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To get started with your OB-X, do the following:

1) First, make sure the 115/230 switch on the rear panel is set for the local AC power;

2) Apply power and plug into your sound system;

3) Make sure the Cassette ENABLE switch is in the position toward the audio output jacks;

4) Press "AUTO" to tune all oscillators;

5) Select a programmed sound by pressing a GROUP (A thru D) and a PROGRAM (1 thru 8);

6) Play!

The unit comes from the factory pre-programmed with 32 sounds. These include a great variety of sounds which will quickly acquaint you with the capabilities of your instrument.

You can adjust the output volume of the OB-X with the VOLUME control in the upper left hand corner. This control simultaneously controls both the stereo outputs and the mono output. The MASTER TUNE control allows the instrument to be fine-tuned to other instruments. When this control is within the "dead-zone" near the top center, the instrument is tuned to standard A-440 pitch.

---IMPORTANT NOTE---

If a mono amplifier is plugged into either stereo output, a low volume will most likely be experienced on certain voices due to the factory setting of the Pan Pots. If only a mono amplifier is available, be sure to plug it into the mono output.

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If the positions of the Pan Pots are not to your liking, they can be changed by the following procedure:

1) Remove the top two screws on each end bell and lift the cover;

2) If the unit has an extra voices tray, disconnect the cable connecting the two mother boards, remove the three screws holding down the extra voices tray, and tilt it into a vertical position;

3) Determine the sequencing positions of the Voices by alternately pressing single keys on the keyboard while simultaneously turning back and forth the Pan Pot for Voice 1; (when a change in volume is heard while a given Pan Pot is being turned, you have located the Voice associated with that Pan Pot)

4) Set Voice 1 Pan Pot as desired, sequence to Voice 2 and set its Pan Pot, and repeat for Voices 3 and 4;

5) Return the extra voice tray to its normal position, secure with the screws and set the remaining Pan Pots as described above;

6) Close the cover and replace the end bell screws.

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After you have tried the pre-programmed sounds supplied with the OB-X, you may want to modify them or create a completely new sound. This can be done by using either MANUAL mode or EDIT mode. It is important to understand the difference between these two modes of operation.

MANUAL MODE

You may have noticed that when a program is selected, most of the front panel controls are inoperative. However, these controls again become operative after entering the MANUAL mode or EDIT mode. When you press the MANUAL button, the OB-X circuitry responds to the absolute settings of the controls. For instance, if the OSC 1 FREQUENCY control is set at around 11 o'clock, upon entering MANUAL mode the pitch of this oscillator will be one octave above its base pitch. In general, when one enters the MANUAL mode from one of the programs, the sound of the instrument will change to reflect the actual physical settings of the controls. The various on-off states of the switches will be those that existed the last time the OB-X was in the MANUAL mode.

EDIT MODE

The EDIT mode also makes the front panel controls operate, but allows for incremental changes of these controls from a programmed setting. That is, when you enter EDIT mode, there is no change of the sound of the instrument. But if any control is altered, the sound then changes to reflect this alteration. For instance, if a sound has originally been programmed with a FILTER FREQUENCY setting around 12 o'clock, but later EDIT mode is entered from this program with the above control set at 9 o'clock, the sound will be the same as if the instrument was in MANUAL mode with the FILTER FREQUENCY control set at 12 o'clock. If a modification of the sound is desired, the controls operate incrementally from their present physical positions. If it is desired to further increase or decrease a control setting, and that control is already at its maximum or minimum position, simply rotate the control all the way in the opposite direction and then make your desired setting.

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PROTECT SWITCH

Contained inside the OB-X, on the printed circuit board which holds the microprocessor and the memories, is a switch which, when set properly, prevents a user from writing into Program Memory. This allows one to protect programs from accidental erasure. To set this switch, follow this procedure:

1) Remove the top two screws on each end bell;

2) Raise the OB-X cover;

3) Locate the PROTECT switch on the processor board;

4) To protect programs, position the switch toward the front of the OB-X;

5) To allow program changes, position the switch away from the front of the OB-X.

WRITING A PROGRAM

A program existing in the front panel controls, in either MANUAL or EDIT mode, may be saved by writing it into the memory. This is done by using the following procedure:

1) Press and hold WRITE and wait for the WRITE light to come on;

2) Continue to hold WRITE and select a GROUP (A thru D);

3) Continue to hold WRITE and select a PROGRAM (1 thru 8).

The write operation actually occurs when both the WRITE switch is being pressed at the same time a PROGRAM switch is pressed, with the WRITE light on. Take note that a write operation cannot be performed if the PROTECT switch inside the unit is on.

MOVING PROGRAMS

Occasionally it may be desireable to move a complete program from one program memory location to another. To do this, simply select the program you wish to move, and then write into the desired new program location, as described above.

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CREATING A NEW PROGRAM FROM AN EXISTING PROGRAM

One of the most commonly used methods of creating a program, especially for users just learning the OB-X, is to use an existing program as the basis for a new program and then incorporating the Edit feature. This is accomplished with the following procedure:

1) Select the program which will be the basis for your new program;

2) Enter the EDIT mode;

3) Make changes to the present program as necessary to create the new program;

4) Write this new program into memory using the procedure described above.

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The controls in the MANUAL section are NOT programmable.

VOLUME

This control affects the output volume of the OB-X simultaneously from the LEFT, MONO, and RIGHT outputs. It actually produces a non-programmable control voltage which drives the voltage-controlled output amplifiers, but this parameter cannot be input into the programmer. The voltage control feature allows for automatic shut-off of the instrument output signal during AUTO TUNE, as well as the provision for a VOLUME pedal input without an increase in hum or noise.

AUTO

When this button is pressed, the microprocessor automatically tunes all OB-X oscillators. While this process is occurring, the output amplifier is shut-off. All controls affecting pitch are disabled during AUTO TUNE except the PITCH BEND lever. Therefore, if this lever is moved while the tuning process is taking place, the oscillators will end up out of tune.

HOLD

This button is used to produce a sustained note or chord. To use, press the HOLD button and simultaneously press one or more notes, and then release the HOLD button. The note or notes played will now be sustained indefinitely. If it is desired to hold several notes, they may be played either one at a time or simultaneously, while holding down the HOLD button. To cancel the hold function, press HOLD a second time, but be sure not to hold down any keys.

RESET

When this button is being held, it has the effect of setting the RELEASE parameter on both envelope generators at their shortest times. That is, with RESET on, the envelope generators die out instantly as keys are released.

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"UNISON CHORD"

The HOLD and RESET switches can be used together to produce a very useful "UNISON CHORD" effect. First, select a desired chord by using the HOLD function as described above. Then, press the RESET switch. The held chord will cease sounding until a note on the keyboard is played. When this is done, the chord previously held will sound, transposed by the amount that the played note is above the lowest note on the keyboard. The held chord will always be transposed by the lowest note being played on the keyboard. To exit the "Unison Chord" mode, simply press the HOLD switch.

MASTER TUNE

When this control is moved left or right of "center", all oscillators are tuned down or up. This allows the OB-X to be tuned to another instrument. A "dead-zone" exists near the center of this control's travel. When it is set in this dead zone, the instrument will be tuned to standard A-440 pitch, providing auto-tune has been performed.

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The controls in the CONTROL section are all programmable.

PORTAMENTO

This control determines the rate of portamento or "glide" of each voice as that voice's pitch is changed. Note that the portamento of the OB-X is polyphonic, so each voice will portamento from note to note independently of all other notes. Portamento also functions in UNISON mode.

UNISON

When switched on, causes all voices to be sounded by one key depression. In UNISON mode, the OB-X keyboard operates with low note rule, which means that the lowest note played on the keyboard will always have priority.

UNISON with HOLD

If it is desired to hold all voices in unison, use the following procedure:

1) Press UNISON;

2) Press and hold HOLD;

3) Press and release desired key;

4) Release HOLD.

To cancel the UNISON/HOLD function, simply press any key on the keyboard.

OSC 2 DETUNE

This control allows Oscillator 2 to be tuned either flat or sharp with respect to Oscillator 1. Turning the control to the left makes Oscillator 2 go flat and to the right makes it go sharp. The associated LED turns on whenever the second oscillator is being detuned.

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The controls in the MODULATION section are all programmable and are of 2 basic types. The control and switches in the first column, labeled "LFO", are used to select the low frequency oscillator characteristics. The controls and switches in the other two columns, labeled "FREQUENCY" and "PULSE WIDTH", are used to select amounts and destinations of the modulations.

---LFO---

RATE — This control determines how fast the LOW FREQUENCY OSCILLATOR (LFO) oscillates. Its range is from approximately 1/10 oscillation per second to 20 oscillations per second.

SINE — When switched on, selects sine wave modulation from the LFO. This effects a smooth rising and falling of pitch during frequency modulation or smooth changing of the pulse width during pulse width modulation.

SQUARE — When switched on, selects square wave modulation from the LFO. This produces a discrete downward interval during frequency modulation or a discrete pulse width change during pulse width modulation.

S/H — When switched on, selects a random output from the LFO. This produces a sequence of random pitches during frequency modulation or a sequence of random pulse widths during pulse width modulation.

---FREQUENCY---

DEPTH — This control determines the amount of selected LFO waveform to be sent to modulate the frequency of Oscillator 1, Oscillator 2 or the Filter, as controlled by the destination switches below it.

OSC 1 — When on, this switch selects Oscillator 1 as a destination for frequency modulation. The amount of modulation by the selected LFO waveform is determined by the DEPTH control.

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OSC 2

When on, this switch selects Oscillator 2 as a destination for frequency modulation. The amount of modulation by the selected LFO waveform is determined by the DEPTH control.

FILTER

When on, this switch selects the Filter as a destination for frequency modulation. The amount of modulation by the selected LFO waveform is determined by the DEPTH control.

---PULSE WIDTH---

DEPTH

This control determines the amount of selected LFO waveform to be sent to modulate the pulse width of Oscillator 1 or Oscillator 2, as controlled by the destination switches below it.

OSC 1

When on, this switch selects Oscillator 1 as a destination for pulse width modulation. The amount of modulation by the selected LFO waveform is determined by the DEPTH control.

OSC 2

When on, this switch selects Oscillator 2 as a destination for pulse width modulation. The amount of modulation by the selected LFO waveform is determined by the DEPTH control.

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The controls in the OSCILLATORS section are all programmable.

1 FREQUENCY	This control determines the initial frequency of Oscillator 1 in one octave increments over a four octave range.
SAW/PULSE WAVEFORM	This switch allows selection of either a sawtooth or pulse waveform from Oscillator 1.
PULSE WIDTH	This control allows selection of initial pulse width of both oscillators. When it is set fully counter-clockwise a square wave (50 % duty cycle) is selected. When it is set fully clockwise a 5% duty cycle is selected.
X-MOD	When switched on, causes Oscillator 2 to modulate Oscillator 1. This allows for production of "ring-modulator" type sounds.
SYNC	When switched on, causes Oscillator 2 to lock onto a harmonic of Oscillator 1.
2 FREQUENCY	This control determines the initial frequency of Oscillator 2 in half-step increments over a five octave range.
SAW/PULSE WAVEFORM	This switch allows selection of either a sawtooth or pulse waveform from Oscillator 2.

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The controls in the FILTER section are all programmable.

FREQUENCY — This control determines the initial cut-off frequency of the Filter. The Filter is a two-pole, low-pass type.

RESONANCE — This control determines the amount of resonance ("Q" or "emphasis") of the Filter. Note that even in its maximum position, the Filter cannot be put into oscillation.

MODULATION — This control determines the amount of Filter Envelope which modulates the Filter. The control works independently from and in addition to the amount of LFO modulation from the MODULATION section.

OSC 1 — This switch controls whether or not the output from Oscillator 1 is input into the Filter.

OSC 2 HALF/FULL — These switches control whether or not the output from Oscillator 2 is input into the Filter. The FULL switch selects the full output of the Oscillator and the HALF switch selects a signal level approximately 5 db. below full output.

NOISE HALF/FULL — These switches control whether or not the output from the Noise Generator is input into the Filter. The Full switch selects the full output of the Noise Generator and the HALF switch selects a signal level approximately 5 db. below full output.

KBD — This switch determines whether or not the keyboard control voltage going to each voice(which sets the pitch of the oscillators of that voice) is applied to the frequency control input of the Filter. When on, causes the Filter in each voice to "track" the keyboard.

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The controls in the ENVELOPES section are all programmable.

---FILTER ENVELOPE---

ATTACK — This control determines the initial rise time of the Filter Envelope. The shortest time is selected by setting it fully counter-clockwise.

DECAY — This control determines the fall time of the Filter Envelope down to the level set by the Sustain control, while a key on the keyboard is is being held down. If the Sustain control is at its maximum position this control has no effect on the sound. If the Sustain control is set completely off this control determines completely the decay characteristics of the Filter Envelope.

SUSTAIN — This control determines the level the Filter Envelope goes to following the initial decay (set by the Decay control).

RELEASE — This control determines the fall time of the Filter Envelope of a particular voice after the key controlling that voice is released. If the Sustain control is set at its maximum position this control determines completely the decay characteristics of the Filter Envelope.

---LOUDNESS ENVELOPE---

ATTACK — This control determines the initial rise time of the Loudness Envelope. The shortest time is selected by setting it fully counter-clockwise.

DECAY — This control determines the fall time of the Loudness Envelope down to the level set by the Sustain control, while a key on the keyboard is being held down. If the Sustain control is set at its maximum position this control has no effect on the sound. If the Sustain control is set completely off this control determines completely the decay characteristics of the Loudness Envelope.

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SUSTAIN

This control determines the level the Loudness Envelope goes to following the initial decay (set by the Decay control).

RELEASE

This control determines the fall time of the Loudness Envelope of a particular voice after the key controlling that voice is released. If the Sustain control is set at its maximum position this control determines completely the decay characteristics of the Loudness Envelope.

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Your OB-X is equipped with a Cassette Interface which allows the programs contained in the program memory to be stored externally on an audio cassette. All that is required to use the Cassette Interface feature is an audio cassette recorder with reasonable frequency response and a pair of mini-plug to mini-plug audio connecting cables.

The operating controls for the Cassette Interface (RECORD, PLAY, CHECK), share switches and lights with three normal controls (WRITE, MANUAL, EDIT). On the rear panel of the unit is an ENABLE switch. When this switch is off (positioned toward the audio output jacks) the WRITE, MANUAL, and EDIT functions are operative. When the ENABLE switch is on (positioned away from the audio output jacks) the RECORD, PLAY and CHECK functions are operative. When the ENABLE switch is on, all normal functions on the OB-X are turned off, and the CASSETTE light turns on.

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* IMPORTANT OPERATING NOTES *
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To assure correct cassette interface operation, the OB-X should be powered on and the AUTO switch pressed BEFORE turning on the cassette ENABLE switch. Also, for the Cassette PLAY operation to function, the PROTECT switch must be off. DO NOT USE ATTENUATING TYPE MINI-PLUG CABLES. We recommend Switchcraft type 40DK40 or equivalent.

RECORD

When in the cassette enable mode, pressing this switch starts a transfer of the program memory out to the the cassette recorder. Ten seconds of a "leader" tone will be sent out followed by four seconds of the actual memory information. During these fourteen seconds, the light on the RECORD switch will be on.

PLAY

When in the cassette enable mode, pressing this switch allows a transfer from the cassette recorder into program memory. At least three seconds of the "leader" tone must come after the the pressing of the PLAY switch and before the rough sound of the memory information. The light on the PLAY switch will be lit from the time the switch is pressed until the first of the memory information is recognized. At that point, the PLAY light goes out and the GROUP lights (A, B, C, D) come on in sequential order, indicating that information transfer is taking place.
If an error is detected during the PLAY process, the PLAY light will flash.

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CHECK

When in the cassette enable mode, pressing this switch allows for the verification of a just-recorded cassette tape. No actual information transfer into memory takes place. As with the PLAY switch, at least three seconds of "leader" tone must follow pressing of the switch and preceed the rough sound of the memory information. The CHECK light will be on during the reception of the leader tone and the GROUP lights will sequence, just as during the PLAY operation. A CHECK error is indicated if the PLAY light flashes at the end of the operation.

CAUTION

Press and RELEASE the PLAY and CHECK switches. Do not hold then down continuously during cassette operations.

---REAR PANEL FEATURES---

MONITOR

It it usually desirable to be able to listen to the cassette tone while performing information transfers between the recorder and the memory, and while cueing the tape. This three position switch allows for two volume levels during cassette operations. The monitoring takes place through the audio output jacks.

TO MIC INPUT

If the recorder does not have an "AUX" input, connect this jack to the "MIC" or microphone input of the recorder. Only one input should be used and the "AUX" input is preferable.

TO AUX INPUT

Use an audio connecting cable from this jack to the "AUX INPUT" jack on the recorder, if it has such a jack.

TO OUTPUT

Use another audio connecting cable from this jack to the "MONITOR", "EXT. SPRAKER" or "EARPHONE" jack on the recorder.

ENABLE

Positioning this switch away from the audio output jacks places the OB-X into the cassette enable mode of operation. All normal operations on the instrument are turned off at this time. To return to normal operation, position the ENABLE switch toward the audio output jacks.

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Use the following procedure to transfer your patches out of program memory onto the cassette tape:

1) Connect the cables as described in the previous section.

2) Position the ENABLE switch away from the audio output jacks.

3) Place the recorder into the record mode. If the MONITOR switch is in either of its ON positions, and the instrument is connected to an amplifier, a steady tone should be heard.

4) If the recorder has a recording level meter, set it to 0 VU.

5) Press the RECORD switch on the OB-X. The RECORD light will come on. The steady tone will continue for ten seconds producing the "leader", followed by approximately four seconds of a rough tone which is the actual memory information being sent out. Following the four second information transfer the steady tone will return and the RECORD light will go out.

6) Press the STOP button on the recorder.

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If there is a bad spot on the oxide of the cassette tape, or if the recorder is not functioning properly, the information cannot be stored correctly. Therefore, the information transfer to tape should always be checked before assuming that the patches have been preserved. Use the following procedure to check the data on the tape:

1) Connect the cables as previously described.

2) Position the ENABLE switch away from the audio output jacks.

3) Position the tape to the beginning of the leader of the just-recorded section.

4) Set the volume control on the recorder to about 3/4 of full setting, and if the recorder has a tone control, set it at 1/2 of full setting.

5) Press the PLAY button on the recorder.

6) Press the CHECK switch. The CHECK light will come on.

7) When the "rough" tone of the memory information is heard, the GROUP A light should go on, followed by the B, C and D lights. When all memory information has been played, all lights will be out.

8) Press the STOP button on the recorder.

If errors are found during the check process, the PLAY light will flash. If this happens, one of the following reasons might be responsible:

A) There is a bad spot on the tape.

B) The playback volume is too high or too low. Some trial and error may be required.

C) The batteries in the recorder are run down.

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Use the following procedure for transferring program information from tape into program memory:

1) Connect the cables as proviously described.

2) Position the ENABLE switch away from the audio output jacks.

3) Position the tape to the beginning of the leader of the desired section of tape.

4) Set the volume control on the recorder to about 3/4 of full setting and if the recorder has a tone control, set it at 1/2 of full setting.

5) Press the PLAY button on the recorder.

6) Press the PLAY switch. The PLAY light will come on.

7) When the "rough" tone of the memory information is heard, the GROUP A light should go on, followed by the B, C and D lights. When all memory information has been played, all lights will be out.

8) Press the STOP button on the recorder.

If errors are found during the playback process, the PLAY light will flash.

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In addition to the Audio outputs and the Cassette Interface inputs and outputs, the inputs and outputs described below exist on the rear panel of the OB-X. These consist of three types. There are two inputs for foot switches, three inputs for foot pedals and four input/outputs which interface the Control Voltage and Gate of Voice 1 with the outside world.

FOOT SWITCH CIRCUITRY — Both foot switch inputs are configured for a foot switch assembly which causes an electrical connection to occur between the signal lead and the ground lead of the jack when the foot switch is pressed.

FOOT PEDAL CIRCUITRY — All three foot pedal inputs are configured for a foot pedal assembly which contains a 50 K Ohm linear potentiometer with its wiper connected to the signal lead of the jack and the "off" or most counter-clockwise connection connected to the ground lead of the jack. In all three cases the wiper must make contact with the ground terminal when the foot pedal is in the completely "off" position. The third potentiometer connection is not used.

SUSTAIN — This is an input for a Sustain foot switch. When activated, it causes the Release parameters on both Envelope Generators to be set at their longest times.

PROGRAM ADVANCE — This is an input for a Program Advance foot switch. When activated, it causes the Programmer to advance to the next program. For example, if program A6 is presently selected and this switch is pressed, the Programmer moves on to program A7. If program D8 is selected and this switch is pressed, the Programmer moves on to program A1.

VOLUME — This is an input for a Volume foot pedal. It controls the instrument volume from completely off to a maximum set by the VOLUME control on the front panel. This allows the user to preset a maximum volume on the front panel and then control this volume easily with a foot pedal.

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VIBRATO

This is an input for a Vibrato foot pedal. It controls the amount of programmed vibrato from completely off to a maximum determined by the amount of vibrato presently programmed.

FILTER

This is a master filter foot pedal. It allows the cutoff frequency of all filters to be controlled from a slightly lower frequency than that which exists when the pedal is not attached, to a frequency significantly higher.

---VOICE 1---

CV-IN

This jack allows an external 1 Volt per Octave control voltage to control the Frequency parameters on Voice 1. When a plug is inserted into this jack, the Keyboard Control Voltage to Voice 1 is disconnected.

CV-OUT

This jack provides a 1 Volt per Octave control voltage from the Voice 1 section of the Keyboard circuitry to the outside world.

GATE-IN

This jack allows a 0 to +5 volts or more Gate signal from external equipment to gate Voice 1. When a plug is inserted into this jack, the internal Gate signal to Voice 1 is disconnected. If this plug is a standard mono type plug, the Keyboard circuitry automatically skips Voice 1. If this plug is a stereo type, and the "ring" connection is not connected, then Voice 1 will not be skipped.

GATE-OUT

This jack provides a 0 to +10 Volt Gate signal from the Voice 1 section of the Keyboard circuitry to the outside world.

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