

KORG POLYSIX

PROGRAMMABLE POLYPHONIC SYNTHESIZER

Owner's Manual

Congratulations and thank you for purchasing the new Korg PS-6 "Polysix" Programmable Polyphonic Synthesizer.

This versatile six-voice synthesizer offers the wide range of sounds and enormous ease of use that only a programmable synthesizer can offer, at a revolutionary price.



Handling precautions

- Always be sure to use the correct AC line voltage. If line voltage is 90% or less of rated voltage, S/N ratio and stability will suffer. If you have any reason to believe the AC voltage is too low, have it checked with a voltmeter before you turn on the power supply switch.
- Do not use any type of plug except for standard phone plugs (guitar type) in the KORG POLYSIX input and output jacks.
- Avoid using or storing your KORG POLYSIX in very hot, cold, or dusty places.

Important note

Because this unit employs a microprocessor, abnormal performance may occur if you switch the power on too soon after turning it off. Should this occur, turn off the power, wait about ten seconds, then turn the power back on again.

Features

32 programs stored in memory allow the user to create his own sounds for instantaneous recall at the push of a button.

Full edit capabilities allow the user to make temporary changes to any program, and to move programs about in memory.

Rapid, 8-second Cassette Tape Interface capabilities provides unlimited additional program storage, allowing you to create program libraries for later use.

Both UNISON and POLY modes, to create incredibly fat six-VCO soloing and bass sounds as well as versatile six voice polyphonic sounds.

Built-in full featured ARPEGGIATOR, with 3 selectable patterns and ranges, and with automatic "Latch" mode.

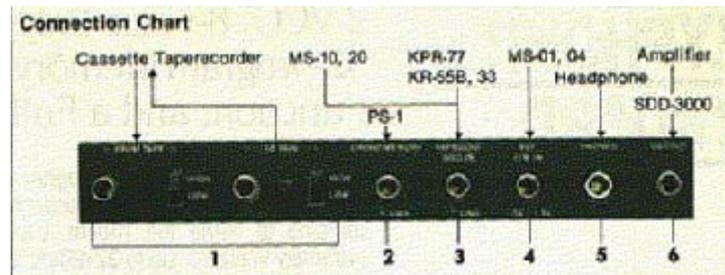
CHORD MEMORY memorizes intervals and chords, to produce exciting parallel harmonies by depressing single keys. Memorized chords can be arpeggiated as well. HOLD sustains notes and chords indefinitely.

Programmable Modulation and Chorus/Ensemble effects create rich, fat sounds.

Lightweight 11.5kg instrument with 5-octave, 61 note keyboard plus Pitch Bend and Mod Wheels, for expressive playing.

Connections

Rear panel facilities



1) FROM TAPE TO TAPE

For connection to a tape recorder. This interface lets you store unlimited sets of programs on tape. These can then be loaded back into the synthesizer's programmer as needed even in the middle of a set. Connect FROM TAPE to the recorder's output jack (line out, earphone, or headphone terminal). Connect TO TAPE to the tape recorder's input jack (line in, mic in, etc.). Set switches to HIGH or LOW positions as needed to match recorder input and output levels. HIGH is line or earphone level; LOW is microphone level.

2) CHORD MEMORY

Foot switch (S-1, PS-1, etc.) input jack for remote control of CHORD MEMORY, so you do not have to press the key assign mode switch. Particularly useful for putting chords in the memory when you are using both hands to finger the chord. A chord of up to six notes can be memorized and then the same structure can be reproduced by playing single keys.

3) ARPEGGIO TRIG IN

Lets you use an external device to control arpeggio tempo. A trigger output from a rhythm box, sequencer, or synthesizer may be connected to this jack. The trigger should be negative-going (short to ground). There is an internal high impedance pullup to +5V.

4) VCF fcM IN

For external control over VCF cutoff frequency (using MS-01, -04 footpedal, etc.). This varies the timbre of the sound, and permits "waa-waa" pedal effects when VCF is set at medium-high resonance.

5) PHONES

The phone jack is not silenced by setting the front panel "OUTPUT" switch to OFF. This makes checking or modify sound programs less obtrusive during recording or performance.

6) OUTPUT

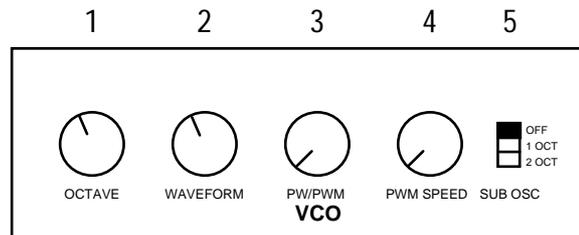
High level or low level, controlled by front panel switch.

Features and Functions

PROGRAMMABLE CONTROLS (CAN BE STORED IN MEMORY)

VCO

The Voltage Controlled Oscillator (VCO) is the basic sound source for the synthesizer. There are 6 VCOs in the Polysix, one per voice. The VCO waveform you select has a large effect on the timbre or tone quality of a particular sound. The VCO may be set to operate in several different octaves, extending the range of the keyboard. Pulse width modulation and Sub OSC tones are included, allowing a wide range of fat, satisfying sounds to be produced.



1) OCTAVE

This control has three settings, 16', 8', and 4'. At the 8' setting, the middle A on the keyboard produces A440 (with Tune control set properly). 16' and 4' settings produce sound one octave lower and one octave higher, respectively. The keyboard is therefore extended to the equivalent of a 7 octave range.

2) WAVEFORM

A. Sawtooth

This waveform is rich in both even and odd harmonic overtones. Because of this, the VCF can be used to "shape" the tone color over a wide range by selectively emphasizing different harmonics of the waveform (see VCF section for more details). Sawtooth waveforms are good for bass, strings, brass, and many other sounds.

B. PW/PWM (Pulse Width/Pulse Width Modulation)

These settings produce various types of rectangular waveforms, such as square waves, pulse waves, "chorus", etc., depending on the setting of the PW/PWM and PWM SPEED controls. An extremely wide range of sounds are available using these controls.

- **PW Waveform**

The width, or "duty cycle" of the VCO waveform may be varied manually using the PW/PWM control (PWM SPEED has no effect in this position). At 0, the VCO waveform is square wave (50% duty cycle), and possesses the typical dull and "hollow" sound of the clarinet (only odd harmonics are present). Advancing the PW/PWM control reduces the duty cycle, and hence the width of the VCO waveform. This produces a dramatic shift in the tone quality towards a brighter and more "nasally" sound similar to oboe or harpsichord. At 8 or above the pulse width becomes so narrow as to collapse, which produces sound and in effect shuts off the VCOs. This is useful when the VCFs are used as sound sources in their self oscillating mode.

Note: The SUB OSC tone is not shut off when the VCO is shut off due to zero pulse width.

- **PWM Waveform**

The width of the VCO pulse waveform is continuously changed, or "modulated" by a variable speed oscillator. This creates a fat "chorusing" type of sound, similar to multiple oscillators due to the constantly shifting harmonic balance. The PW/PWM control now determines the depth of the effect. At 0, there is no modulation (constant square wave). Between 8 and 10, modulation depth is so great that the VCO shuts off part of the time (because pulse width becomes 0 for part of each cycle). The speed of the effect is controlled by the PWM SPEED knob. The PWM oscillator is completely separate from the MG oscillator used for vibrato (see MG section), thus allowing vibrato and PWM effects to occur simultaneously.

3) PW/PWM

This controls the pulse width of the PW waveform, and the modulation depth of the PWM waveform (see above).

4) PWM SPEED

This controls the speed of the modulation effect in the PWM waveform (see above). It has no effect on the PW waveform.

5) SUB OSC

This switch allows you to add a second tune either one octave or two octaves below the VCO pitch. This is useful for producing fatter and fuller sounds, particularly with solo or base Unison playing, organ sounds, and full orchestra effects, etc.

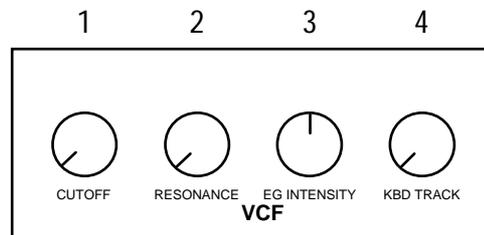
While the waveform of both sub oscillator tones is a square wave, a phenomenon called "waveform staircasing" causes the 1 octave sub tone to take on much of the timbral quality of the primary waveform. This makes it sound like an octave "duplicate" of the main waveform. With a sawtooth as the main waveform, a very full String Orchestra patch can be created using this principle, many other sounds can also be enhanced in this fashion.

VCF

The VCF is perhaps the single most expressive module in the Polysix. Its basic function is to modify the tonal quality (timbre) of the waveforms produced by the VCOs by eliminating certain harmonics (overtones) and emphasizing other ones. Understanding how to use it is a key part of getting the most of your instrument.

There are 6 VCFs in the Polysix, one for each voice. Each VCF is a 4 pole, 24dB/octave low pass filter with voltage controlled cutoff frequency, variable resonance, positive and negative EG modulation ("enveloping"), and variable keyboard tracking. Each of these terms will be explained in detail below.

How does a filter modify timbre? There are two basic functions: cutoff frequency and resonance.



1) CUTOFF

The cutoff frequency is the point in the audio spectrum where the filter starts to affect sounds passing through it. The Polysix filters are termed Low Pass, which means that they pass frequencies which are lower than the cutoff point.

Any frequencies above the cutoff frequency of the filter are progressively rolled off, or reduced in level. The higher a frequency is above the cutoff point, the more it gets rolled off. This rolloff can occur at different rates. The Polysix filters have a 24dB/octave rolloff. This means that a harmonic an octave above the cutoff point would be about 16 times softer coming out of the filter than going in. At two octaves above the cutoff point, a harmonic would be about 256 times softer! This very sharp rolloff helps to produce realistic imitations of most instruments, a wide variety of punchy synth voicings, and many special effects. Since the cutoff point can be varied throughout the audio spectrum, you can choose to remove no harmonics, upper harmonics only, everything but the fundamental, or anything in between. It can also remove everything, silencing the instrument, if the cutoff point goes much below the fundamental pitch.

There are five ways to vary the cutoff frequency of the six VCFs: manually, via the VCF CUTOFF control; or automatically via each voice's Envelope Generator, the Keyboard Tracking function, or the Modulation Generator; or via any external device plugged into the rear panel VCF fcM IN jack. The actual cutoff frequency of the VCF will be proportional to the sum of the voltages (control signals) from these five sources at any moment.

VCF CUTOFF control

This determines the initial cutoff frequency of the filter. At 0, the cutoff is so low that no sound will be passed. As you turn the control clockwise (towards higher numbers), the cutoff frequency increases and the note will begin to sound, first with a dark, muted timbre and then with a brighter one. At 10, the cutoff point is above any audible harmonic and the sound will be very bright.

2) RESONANCE

The second way that a filter modifies timbre is by adding resonance, (also known as "Q", "Peak", or "Emphasis") at the cutoff point. Resonance is useful for a wide variety of sounds, such as organ, french horn, classic synth bass and lead sounds, and many special effects. The RESONANCE control allows you to vary the amount of resonance from 0 to self-oscillation.

At 0, there is no resonance, and frequencies above the cutoff point are rolled off smoothly. Changing the cutoff point with no resonance simply varies the brightness or high frequency content of the sound.

Advancing the Resonance control clockwise (towards higher numbers) creates a resonant "peak" which serves to strongly emphasize the frequencies near the cutoff point (frequencies above the cutoff point are still rolled off). This results in much more dramatic changes to the timbre of the sound. Medium resonance produces the characteristic "waa-waa" sound when the filter cutoff is swept by the EG, footpedal or manually.

At high resonance, the filter will self-oscillate, producing a pure sine wave at the cutoff frequency. This can be used as a second sound source along with the VCO, or by itself if the VCO is shut off. The purest tone is generated at about 7.

3) EG INTENSITY

This controls how much the cutoff frequency is varied by the EG. It also determines whether the filter is swept up (positive modulation) or down (negative modulation) during the attack phase of the EG. Maximum sweep depth is plus or minus 10 octaves. Wide sweep depths are usually associated with dramatic effects, "electronic" lead bass sounds, clav type sounds, etc. Small sweep depths are often used to add a subtle extra dimension to more "natural" sounds like french horn, woodwinds and other orchestral sounds. However, there are certainly no hard and fast rules and anything that sounds good to you should be used freely.

4) KBD TRACK

This controls the degree to which the filter "tracks" the keyboard, over a range of approximately 0% to 150%. Keyboard tracking is an extremely useful function in which the VCF is made to "follow" the note as it is played on the keyboard. This produces more even and realistic sounds by insuring that the tonal quality (timbre) of a given sound remains constant over the full 5 octave range (100% tracking). Without keyboard tracking, a given sound played at "C" would sound bright and buzzy at the lowest "C", and muted or even non-existent at the highest "C".

The Polysix also allows deliberate over- and under-tracking. This produces smooth and controlled tone quality changes as you move up and down the keyboard, for special effects, or to simulate instrument with changing timbres (e.g., many orchestral and keyboard instruments). At settings of approximately "7", the VCF follows the note on a 1 for 1 basis (100%). Below 7, the VCF in effect "legs behind" the note played; this causes notes to sound brighter as you go down in pitch, and rounder or mellower as you ascend. Conversely, at settings above 7, the VCF cutoff increases "faster" than does the keyboard pitch, which causes notes to sound brighter as you go up in pitch and darker as you go down. The further the control is from 7, the more pronounced this tonal change will be.

When the VCFs are self-oscillated and used as sound sources, the KBD TRACK control allows you to "play" the filters from the keyboard as if they were regular oscillators (100% tracking). Additionally, special scales known as Microtonal (e.g., "quartertone") and Macrotonal can be created at settings less than, or greater than 7, respectively.

Variable keyboard tracking is extremely useful in producing realistic instrumental sounds, and in helping to make any particular program sound good over a full five octave keyboard range.

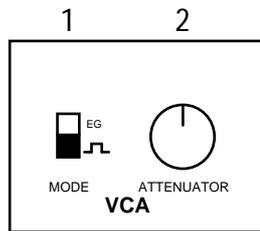
MG (with MOD switch set to VCF)

This provides repetitive filter modulation or automatic "waa-waa" effects. Low settings of the MG LEVEL control can give a subtle but very useful animation to the sound.

External control voltage (MS-01 pedal, etc.) applied to VCF fcM IN jack (nominal sensitivity is 1V/octave).

VCA

The voltage controlled Amplifier (VCA) controls the amplitude (volume) of the sound. It is used to produce volume contours (volume changes over time) similar to the timbre or tone color changes produced by the VCF. There are 7 VCAs in the Polysix, one for each voice plus one overall VCA for the programmable attenuator.



1) MODE

In the EG position, volume changes are determined by the EG, for fully contoured effects.

In the lower position, a simple on-off gate-type envelope is produced (like an organ). This envelope is not related to the EG settings in any way, and allows the VCA to be enveloped separately from the VCF. This can produce much more "punchy" sounds, especially for brass and other sounds using heavy filter sweeps.

2) ATTENUATOR

This controls the overall volume of a given program over a 20dB range relative to the other programs. It can be used to prevent jarring changes in volume when you change programs (e.g., from a flute patch to a massive orchestral patch). It can also be used to preset "lead" and "rhythm" volume changes, if desired.

EG

The Envelope Generator (EG) is used to create contouring effects, in combination with the VCF, VCA, or both. Contouring effects allow the sound of a note to change and evolve as time passes. This evolution in timbre (tonal quality) can take anywhere from a small part of a second to thirty seconds or more, different parts of the contour (attack, decay, etc.) can proceed at a different rate. These effects are extremely important in producing expressive sounds - sounds that are punchy, gentle, sassy, funky, orchestral, futuristic, or just about anything you want.

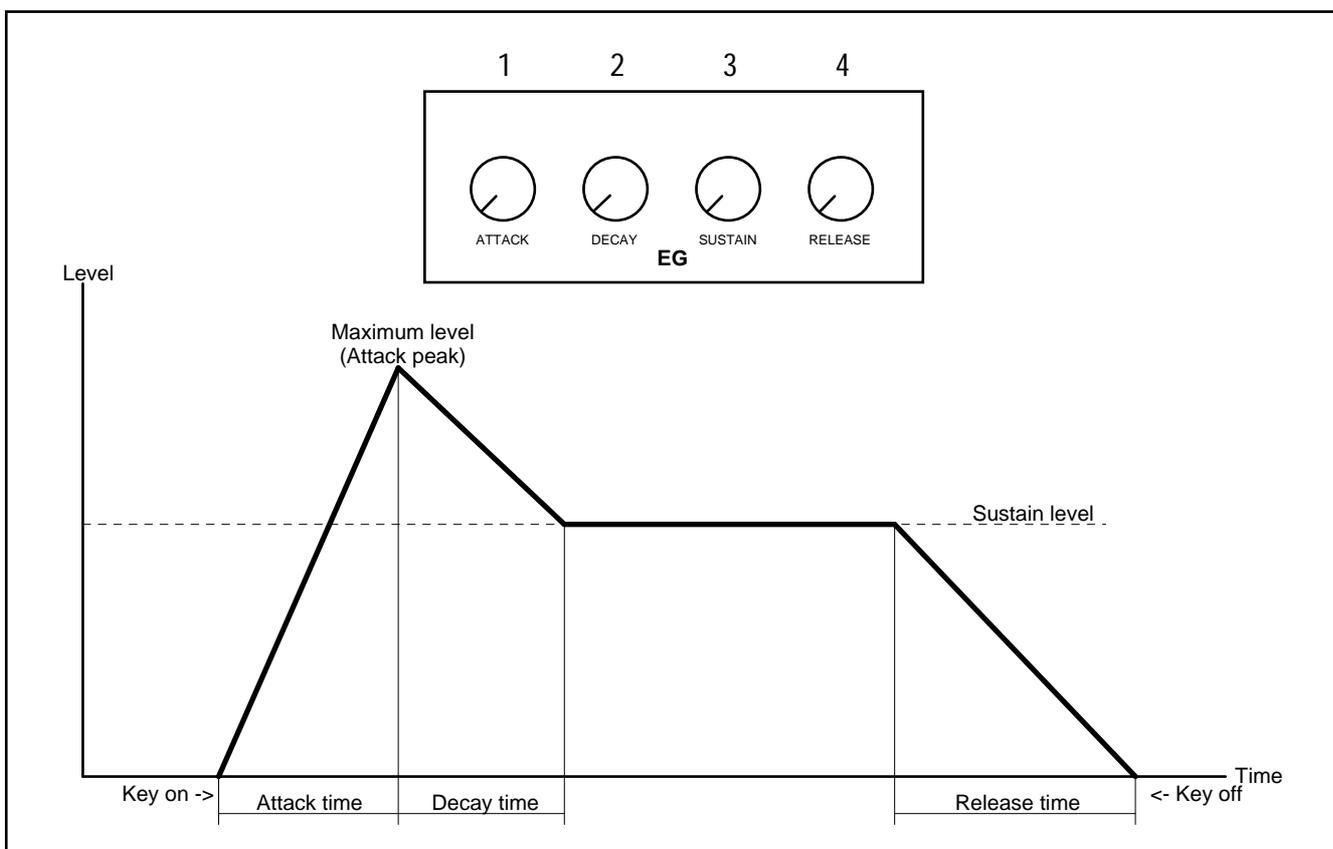
A contour is a pattern of changes that begins when you depress a key. It attacks up to a certain point (the attack peak), then decays down to a sustain level, remains at the sustain level as long as you hold the key down, and finally releases to 0 when you release the key.

There are six EGs in the Polysix, one per voice, so that each voice may be independently articulated.

The VCF EG Depth control allows the amount of contouring (enveloping) to be continuously varied and either normal or inverted (reverse, negative) envelopes to be used. The VCA envelope can be controlled by either a full depth non-inverted (normal) contour from the EG, or by an independent gate-type envelope.

Controls

The Attack, Decay, and Release controls can be independently adjusted over a range of about 1 milli-second (1/1000 of a second) to over 15 seconds. All controls are fully programmable.



1) ATTACK

Varies the length of time it takes for the contour to rise from 0 to the attack peak. Longer attack times are produced as the control is moved clockwise towards higher numbers.

2) DECAY

Varies the length of time it takes for the contour to fall from the attack peak to the sustain level. Higher numbers produce longer decay times.

3) SUSTAIN LEVEL

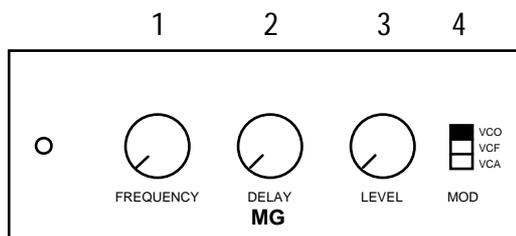
Varies the sustain level of the EG from 0% to 100% of the attack peak. Higher number produce higher sustain levels. Once the attack and decay portions are completed, the EG contour remains at the sustain level until the key is released. (If HOLD more is selected, the EG contour will remain at the sustain level indefinitely).

4) RELEASE

Varies the length of time it takes for the contour to fall from the sustain level to 0 after the key is released. Higher numbers produce longer release times.

MG

The Modulation Generator (MG) is used for cyclic or repetitive modulation effects like VCO frequency modulation (vibrato); VCF cutoff frequency modulation (waa-waa); and VCA amplitude modulation effects (tremolo).



1) FREQUENCY

Determines the cyclic speed of the effect, as indicated by the LED next to the knob. As the knob is turned clockwise, the speed increases from a minimum of about 1 cycle every 30 seconds to a maximum of approximately 50 cycles per second.

2) DELAY

Adjusts the time delay between when you play a key and the effect (vibrato, etc.) begins. At 0, the effect begins simultaneously with the pressing of a key. Delay time increases as you turn the knob up towards 10, to a maximum of about 8 seconds. The delay function is single-triggered, which means that a delay is initiated whenever all keys are released and new key(s) are then depressed.

3) LEVEL

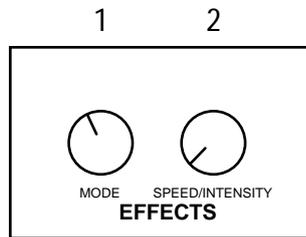
Controls the basic depth of the modulation effect under program control. (Note that the Modulation Wheel to the left of the keyboard functions independently of the MG section by manually adding a vibrato effect to the VCOs. Thus, the Mod Wheel will either add to the vibrato level programmed by the MG "LEVEL" control, or will cause two modulations occur simultaneously: vibrato plus either "waa-waa" or tremolo.)

4) MOD

Lets you select which kind of effect the modulation will produce: VCO (vibrato), VCF (waa-waa), VCA (tremolo). If you want two effects at once, use the control wheel for vibrato, and set MG MOD to VCF or VCA.

EFFECTS

This section applies chorus, phasing, or ensemble effects to the basic program. It is very helpful in creating fat sounds, rotary speaker effects, and textures that range from warm and realistic to shimmering and futuristic. All settings can be stored in program memory along with the other control settings.



1) MODE

This selects the desired effect:

CHORUS: relatively subtle, "ambience" type of effect,

PHASE: more pronounced, with a mild resonant edge,

ENSEMBLE: produces a heavy, complex modulation, which is very useful for strings, orchestral sounds, and similar massive textures.

OFF: (no effects processing).

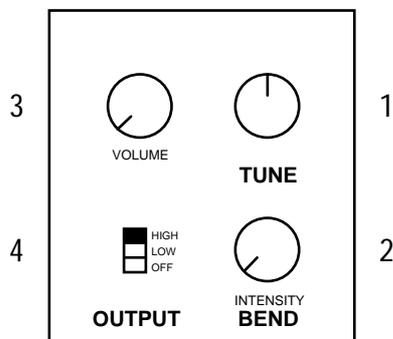
2) SPEED/INTENSITY

This control functions differently for Chorus and Phase than for Ensemble. In Chorus and Phase modes, it determines both the cyclic speed (frequency) and the depth of the effect (there is a built-in MG just for the effects section). The speed of the effect increases as you turn the control clockwise (towards 10). In order to avoid unnatural effects, the modulation depth is reduced automatically as speed increases. This allows deep sweeping effects at low speeds and pulsating effects with the proper depth at higher speeds.

In Ensemble mode, this control determines only the intensity of the effect. Lower settings produce milder effects. Maximum intensity is produced at 10. The complex modulation patterns used in this mode make it unnecessary to adjust speed.

(Control settings not storable in the memory)

OUTPUT/TUNE/BEND



1) TUNE

Adjusts pitch over a range of +/-50 cents (1/2 semitone). Use this knob when you want to tune the Polysix to match other instruments.

2) BEND

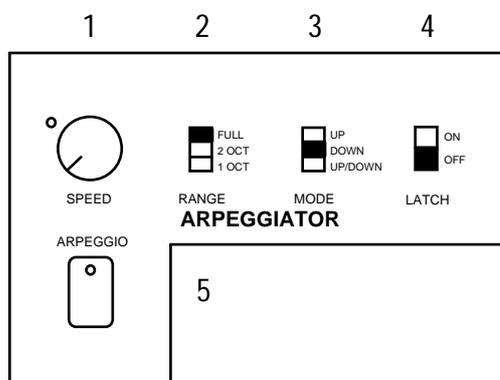
Knob adjusts the range of pitch bends controlled by wheel to a maximum of +/-13 semitones.

3) 4) OUTPUT

Knob adjusts final output volume. The switch (4) should be set to LOW for guitar or keyboard amps; set to HIGH for audio amps, audio mixers, or PA console inputs. At OFF, you can use headphones to monitor the sound without any output going to the amp or PA.

ARPEGGIATOR

The Polysix Arpeggiator automatically "sequences" (i.e. plays in sequence, one after the other) individual notes of a chord being held down, at any desired speed and in three different patterns. This effect is often used to create a feeling of musical "movement" via a rapid cascade of notes. Chords may be latched so as to arpeggiate indefinitely, if desired. Any Assign mode can be used (except "Hold"), including Chord Memory, which allows you to produce "sequences" of parallel chord or intervals.



1) SPEED

Controls the rate at which the arpeggio is played (flashing LED gives visual indication of this rate). Alternatively, the Arpeggiator may be advanced ("clocked") by an external device such as a footswitch, sequencer, rhythmmer, or other device, via the rear panel ARPEGGIATOR TRIG In jack. This disconnects the Arpeggiator from the internal clock. (The LED does not indicate external triggering). All of the above controls, as well as the assign mode switches and synthesizer controls (via Edit), can be used freely at any time to modify the sound or the arpeggio pattern being played. This provides great performance flexibility.

2) RANGE

One octave: arpeggiates only the notes you are currently depressing, or have latched.

Two octaves: arpeggiates only the notes you are holding, plus the same notes one octave higher.

Full: arpeggiates the notes held, plus the same notes in all higher octaves up to the 5 octave limit of the keyboard. Notes played in the lower octave would be repeated 4 times; notes played in the highest octave would not be repeated at all.

3) MODE

Up, Down and Up/Down. This switch sets the arpeggio to be ascending, descending, or both.

4) LATCH

On, Off. With Latch mode Off, only the notes currently being played on the keyboard will be arpeggiated. (Note: Octave repetitions may occur, depending on the setting of the Range switch). With Latch mode on, any notes played are automatically "memorized" (latched), and will continue to be arpeggiated even after you lift your fingers completely from the keyboard. To change the arpeggio pattern, simply play one or more new keys. This cancels the old pattern and latches in a new interval or chord. To stop the Arpeggiator, turn either the Latch or the Arpeggio switch off.

The use of the Latch has two major advantages:

1. You can latch a chord into the arpeggiator and then play a solo on another instrument against the background provided automatically by the Polysix. You can then change the arpeggio at any time by simply playing a new chord on the Polysix.
2. You can build up a complex arpeggio by holding down at least one key and then adding any other notes desired, one at a time. In this way you can start with a simple arpeggio and gradually make it as complex as you like. Of course you can start a new arpeggio at any time by lifting all fingers from the keyboard and then playing at least one new note to cancel the old arpeggio and begin the new one.

Note: Latched key information is forgotten whenever Latch mode or the Arpeggiator is turned off.

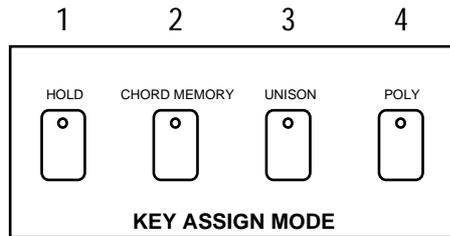
5) ARPEGGIATOR button

Turns arpeggiation effect on and off, with LED indication. The arpeggio begins as soon as the keyboard is played; with Latch mode "on", the arpeggio will repeat indefinitely until stopped.

KEY ASSIGN MODE

The advent of micro-computer technology has had a profound effect on the relationship of the keyboard to the synthesizer, and allows a greater degree of flexibility and versatility than ever before. In the past, synthesizer keyboards were able to produce one, or at best two, notes at a time. Today, an integrated circuit approximately the size of a pack of matches can perform a huge number of diverse tasks in a split second. Among other things, the micro-computer can "scan" a keyboard of any size, and assign each key depression to one of several synthesizer "voices" (6 for the Polysix). This is called channel assigning, and the micro-computer that performs that task is called the Assigner. Since musicians do not normally play more than five to eight notes at the same time, this allows considerable economy because each note on the keyboard does not need a synthesizer voice permanently assigned to it. This lets us build a better and more portable instrument at a lower price.

In addition to the normal polyphonic one voice per key-depression playing mode, the Polysix assigner can perform a number of other useful functions, such as: Unison mode (all 6 voices sounding the same note), Hold (infinite sustain), Chord Memory (for parallel harmonies), and arpeggiation. Each of these will be described below.



1) HOLD

This mode "holds" played note(s). This function can be activated before or after key(s) are depressed on the synthesizer keyboard. It works with any Key Assign Mode (Chord Memory, Unison, and Poly).

2) CHORD MEMORY

This mode allows you to "memorize" an interval or chord of up to 6 notes, and then produce parallel harmonies based on that interval or chord with monophonic ("one-finger") playing. It effectively eliminates the need for manual tuning oscillators to form intervals or chords, for greater user convenience.

To enter an interval or chord into Chord Memory:

1. Select POLY Assign mode.
2. Play and hold the desired chord.
3. Depress CHORD MEMORY.

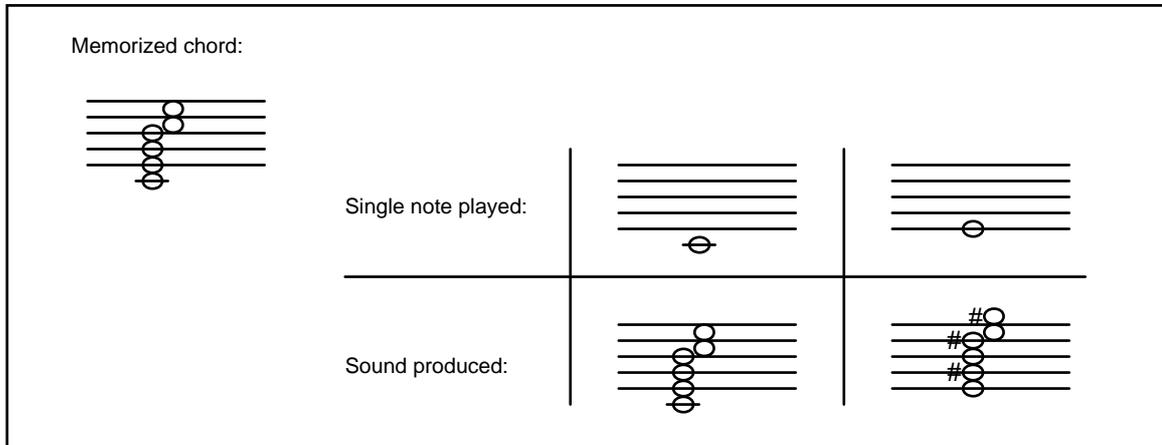
Note: If chord is too big to play with one hand, depress HOLD, play the individual notes of the chord one at a time, and then depress CHORD MEMORY.

With CHORD MEMORY on, a single key depression transposes the memorized chord or interval so that its lowest note is the same as the note you just played. Playing a new note will retranspose the chord so that its lowest note again coincides with the new note played, and so forth. The lowest note of the chord will always be the same as the last key depressed. In effect, the synthesizer behaves as if in UNISON mode, except that the oscillators are automatically tuned to memorized intervals instead of the same note. "Last Note Priority" and "Return to Previous Note" capabilities all apply in CHORD MEMORY, as with UNISON mode.

The user may freely select other Keyboard Assign modes (e.g. POLY or UNISON) without erasing the memorized chord, which can be later recalled by repressing CHORD MEMORY (with no keys depressed). A memorized chord will be erased if CHORD MEMORY is depressed while in POLY mode and keys are held down. It will also be erased when the synthesizer is turned off.

In addition to being played from the keyboard, a memorized chord may also be arpeggiated using the built-in Arpeggiator. After the desired chord is memorized, switch on the Arpeggiator and play the note pattern you wish to be arpeggiated. The "memorized" chord will then move in parallel harmony, according to the notes in the arpeggiator pattern. For example, first memorize any major triad (e.g., C, E, G) using CHORD MEMORY then activate the Arpeggiator and play a C Major 7th (C, E, G, B) on the keyboard. You will hear a C Major triad, E Major triad, G Major triad, and B Major triad in sequence, according to the pattern and range selected. Furthermore this sequence of chords can also be memorized by the Arpeggiator in its "Latch" mode (see ARPEGGIATOR section), and then advanced using a footswitch plugged into the rearpanel ARPEGGIO TRIG IN jack, or other triggering device, for spectacular effects!

Note: If the chord to be memorized is less than 6 notes, the remaining oscillators will not sound when in CHORD MEMORY mode, thereby reducing the instrument's overall output. Use the HOLD mode to "double up" notes, for fattest sounds (see HOLD mode).



3) UNISON

This mode provides monophonic lead and bass line capabilities, with all 6 voices assigned to one note. Individual voices are automatically detuned slightly to produce a thick, fat texture. For maximum flexibility, "Last Note Priority" is used and "Return to Previous Note" capabilities are provided.

Last Note Priority causes the instrument to always sound the last note played, regardless of how many other keys are still depressed, or whether the new note is higher or lower than the previous note.

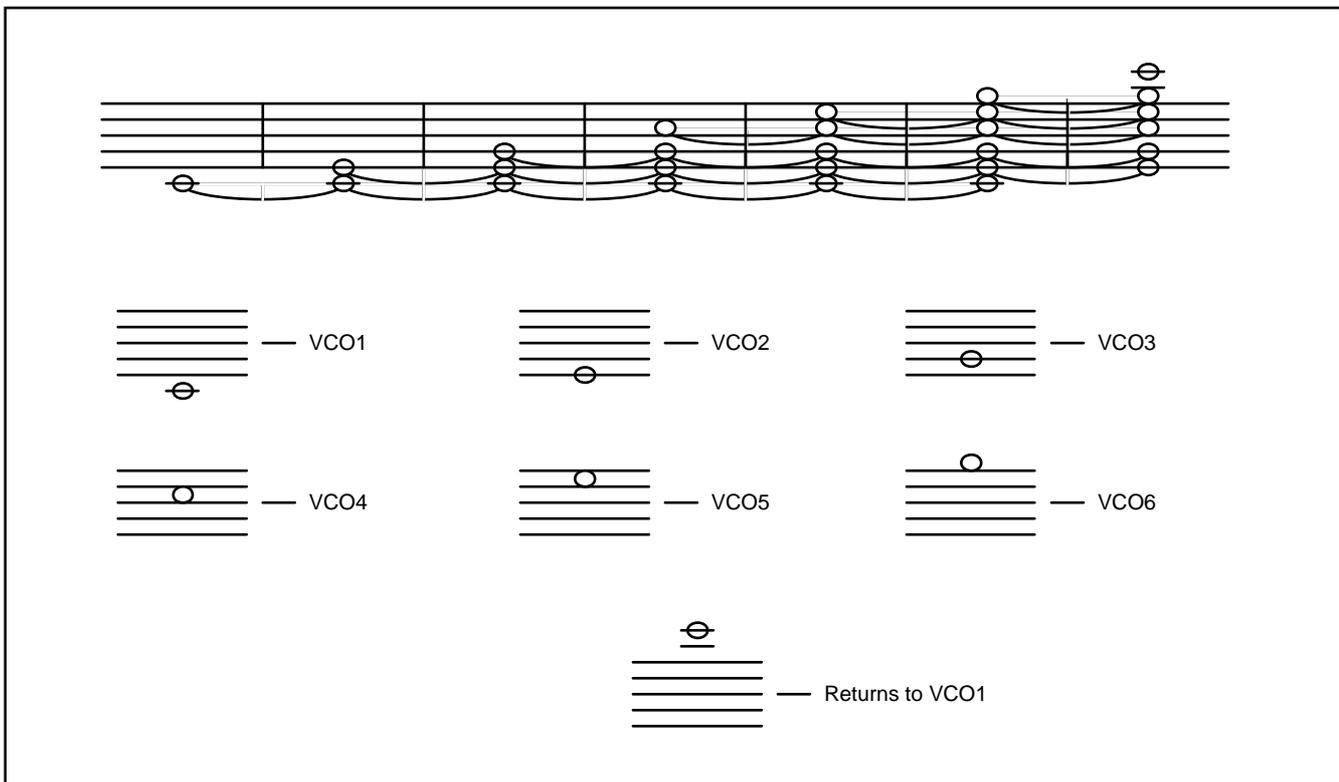
Return to Previous Note capability allows you to easily produce trills, slurs and arpeggios. If one or more notes are played and held down in succession, the instrument will sound the last note played as described above. If the current note is released, the previous note will be automatically replayed if it is still held down, without having to restrike that note. If that note is then released, the next previous note will be replayed, and so forth up to a maximum of five notes. For example, if you play and hold down C, E, D, G, F in sequence, and then release F, G, D, E in sequence, you will hear C, E, D, G, F, G, D, E, C. If you have more than 5 notes depressed, only the last 5 notes played will be "remembered"; previous notes will be "forgotten".

Trills may be easily played by holding one note down and rapidly playing and releasing one or more other notes. This is especially effective when you manually arpeggiate an interval or chord above or below the held note, letting the held note sound between every other note. Rolled arpeggios may be performed by playing and holding down the notes of a chord in sequence and then releasing them in reverse sequence.

4) POLY

This mode allows up to 6 notes to be played simultaneously, using "rotary" assignment with last-note priority. Each key pressed activates a new voice; thus, the old voices can continue to sound or release for a more natural or spacious sound. If more than six notes are held down at once, the "oldest" voice (or voices) are reassigned to the new key(s), while the more recently assigned voices are undisturbed. For example, if voices 1, 2, 3, 4, 5 and 6 are assigned in order to six keys, then when you play two more keys, voices 1 and 2 stop sounding the old notes and are reassigned to the new keys. Please note: the voices that are dropped when new keys are played will not return when the new keys are released, even if the old keys are still held down. This is the opposite of how the Unison mode works (see above).

If less than 6 notes are held down at any one time, the notes that are held down will continue to sound (assuming that EG settings do not make them fade away "automatically"). For example, if you play a 3-note chord, hold it down, and play a melody line, the chord will continue to sound. Three voices will stay assigned to the chord, and the other three will rotate between the melody notes. You do not have to worry about voices "dropping out" from a chord or bass note you want to hold, as long as you hold down the note(s) you want to keep and do not have more than six keys depressed at any one time. This results in a very natural sound, with an absolute minimum of limits or restrictions on your playing style.



PROGRAMMER

The Polysix is a programmable polyphonic synthesizer which uses advanced microcomputer circuitry to store a large number of user-programmed sounds in digital memory, for instant recall by the performer at the push of a button. This system combines the flexibility of a fully variable synthesizer with the speed and ease of use of a preset instrument, and thus is a great help and convenience to the busy multi-keyboardist.

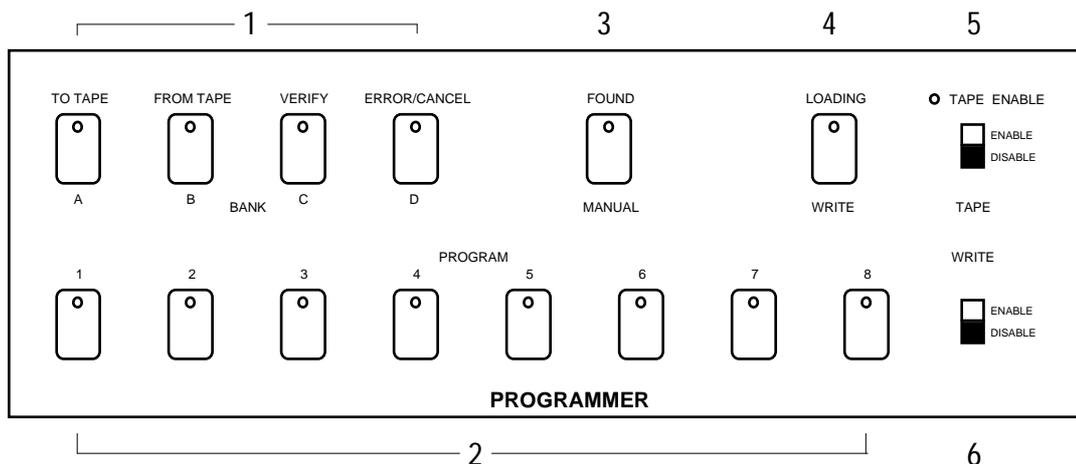
All sounds produced by the Polysix are determined by the combined settings of the controls and switches in the VCO, VCF, VCA, MG, EG, and EFFECTS sections. The act of setting up the controls for a specific sound is called programming, and the group of control settings that result in that sound is called a program. Once a desired sound is created, the settings of all controls in the above-mentioned sections (whose knobs are color-coded white, to distinguish them from non-programmable controls) can be stored in one of 32 program locations for later use. A battery backup system retains program information whenever the Polysix is unplugged and transported.

Additionally, all programs can be altered, either temporarily or permanently, through the use of a powerful, highly flexible and easy to use editing system. The altered program can replace the original program or moved to a new location, thus allowing a whole series of different programs to be created from a single starting program. Finally, the entire contents of memory can be rapidly transferred to and from tape in 8 seconds, thus allowing unlimited program libraries to be created and stored. [And, partial tape loading capabilities allow programs from different libraries to be combined, for even greater flexibility.]

Programmer controls

14 LED pushbutton switches and 2 slide switches control all operations of the Polysix's Programmer and Tape Interface. The Programmer section functions in two different mode, depending on the setting of the TAPE ENABLE switch: Normal Programming mode and Tape Interface mode. The switches and LEDs in this section serve dual functions, depending on the mode selected, and are fully explained below.

The Polysix's 32 programs are divided into four banks of eight programs each. A specific program is selected by depressing one of four Program BANK pushbuttons (A through D) and one of eight Program NUMBER pushbuttons (1 through 8).



1) BANK Select Switches

Selects one of four program BANKs (A - D).

2) PROGRAM Select Switches

Selects one of eight program locations (1 - 8) within the selected Bank.

3) MANUAL

Sound is determined entirely by front panel control settings.

4) WRITE

Initiates the storing of the currently sounding program into a designated memory location. (WRITE ENABLE switch must be activated).

5) TAPE ENABLE

Selects either Programming mode ("Disable") or Tape Interface mode ("Enable").

A small LED above the switch indicates the selection of Tape Interface mode; normal synthesizer and programming functions are suspended during tape operations. The LED switches function as Tape Interface switches and indicators in this mode (see TAPE INTERFACE section below).

6) WRITE ENABLE

Allows the user to write or rewrite programs or load new programs from tape. Prevents accidental erasure of program memory.

OPERATIONS

The following instructions describe how to use the various functions of the Programmer.

1. Manual mode

To use the front panel controls exclusively to create sounds, depress the MANUAL button. Program memory has no effect in this mode.

Manual mode may be used for experimenting with different synthesizer functions, building new sounds from scratch, or recreating sounds from patch diagrams.

2. To Write a Program into Memory

- (1) Set WRITE ENABLE to the "Enable" position.
- (2) Depress the red WRITE LED switch. LED indicator will flash, showing that the Programmer is ready to write the currently sounding program into memory.
- (3) Select desired Program Bank (if not already selected). BANK selection (A - D) must always be made before PROGRAM selection.
- (4) Depress desired PROGRAM button (1 - 8). This stores the currently sounding program into the designated memory location; the WRITE LED will cease flashing, indicating completion of the write operation.
- (5) Set WRITE ENABLE switch to "Disable" position to prevent accidental memory alteration.

3. To Recall a Stored Program.

Depress the desired BANK and PROGRAM buttons, This cancels the Manual mode (if selected). Note: it is not always necessary to depress two buttons to change programs. If the new program is located in the same bank as the current one, simply depress the new PROGRAM button. If going from program B5 to D5, just press the BANK D button.

Editing

The Polysix also allows the user to alter any program either temporarily or permanently via a powerful and easy to use EDIT system. The user may:

- Make any number of temporary changes to any program parameters or settings previously stored in memory, without changing the memory itself.
- Cancel all changes and return to the stored program settings.
- Make permanent alterations to programs stored in memory.
- Move programs from one memory location to another.
- Modify a program and move the altered version to a new location in memory.

The Polysix's Programmer is automatically in EDIT mode whenever a program is selected. The initial front panel settings of the programmed controls and switches have no effect on the sound produced, which is determined only by the values stored in memory. However, changes made to front panel controls and switches after you select a program will have an effect on the sounds produced. The Edit system incorporates a two stage modification system which allows both small "incremental" changes and large alterations of program values.

4. To Change a Programmed Control Setting:

Simply move the control in the desired direction. The Programmer will recognize the change and will make a corresponding change to the actual value of that particular synthesizer function. This is called Incremental Editing.

For example, if the filter Cutoff Frequency (fc) was programmed at "4", and the control was at "6" at the time the program was selected, moving the control to "7" causes the effective fc value to become "5".

If the physical endpoint of the control is reached, turning the control slightly in the opposite direction will cause the Programmer to revert that control to its absolute setting. The control may now be adjusted over its full range, with the physical setting corresponding exactly to the actual value of that synthesizer function. This is called Absolute Editing.

Thus, you make as many changes as you like to as many control as you like, even to the point of making a program totally different from its original state.

5. To Change a Programmed Switch Setting:

Simply move the switch to the desired position. Moving any switch causes the Programmer to change that switch back into its absolute state: the stored switch setting is disregarded. (Note that it is possible to move a switch with no apparent change in sound occurring. This is because that switch was moved into the same position as it was stored in memory. Moving that switch again will cause the sound to change accordingly.)

6. To Make Temporary Changes to Programs:

Move controls and switches as desired. Each change will be reflected in the sound heard. You can adjust and readjust control settings in an unlimited manner this way.

7. To Cancel Temporary Changes:

Simply depress the lighted PROGRAM button. All temporary changes are erased, restoring the program to its original sound.

8. To Make Changes Permanent:

To make changes permanent, you must execute a Write into memory sequence:

- (1) Set WRITE ENABLE to its "Enable" position.
- (2) Depress WRITE LED switch. LED will flash.
- (3) Depress the lighted PROGRAM button. The altered program is now permanently stored in the original location, erasing the original program.
- (4) Set WRITE ENABLE to its "Disable" position.

9. To Move a Program from one Location to another:

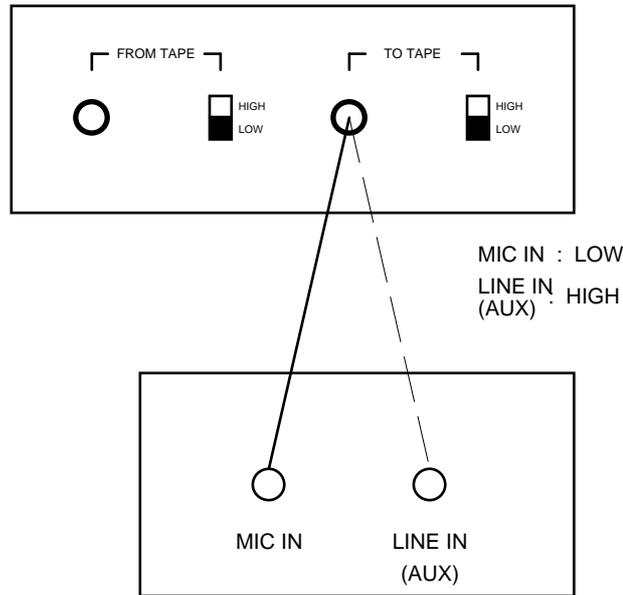
- (1) Select the desired program in its current location using the BANK and PROGRAM buttons.
- (2) Set WRITE ENABLE to the "Enable" position.
- (3) Depress the WRITE button. The LED indicator will flash.
- (4) Depress first the BANK button and then the PROGRAM button indicating the new program location desired. This moves the entire program, unaltered, into the new location. The program previously stored in that location is erased. If you want to save that program, you must first move it to an unused location.
NOTE: The program you moved now exists in two locations: The original and the new location. You must write something else into the original location to erase the old program.
- (5) Set WRITE ENABLE to the "Disable" position.

10. To Move an Altered Program to a new Location:

- (1) Select the desired program using the BANK and PROGRAM buttons.
- (2) Make all desired changes to the program, using the front panel controls and switches.
- (3) When the program is altered as desired, set WRITE ENABLE to the "Enable" position.
- (4) Depress the WRITE button (LED will flash).
- (5) Depress the BANK and PROGRAM buttons for the new location desired (BANK button must be depressed first). This moves the altered program to the new location. The program previously stored at that location is erased. If you want to keep that program, you must first move it to an unused location. The original version of the program you altered is still in its original location.
- (6) Set WRITE ENABLE to the "Disable" position.

TAPE INTERFACE

1) How to store program data on tape

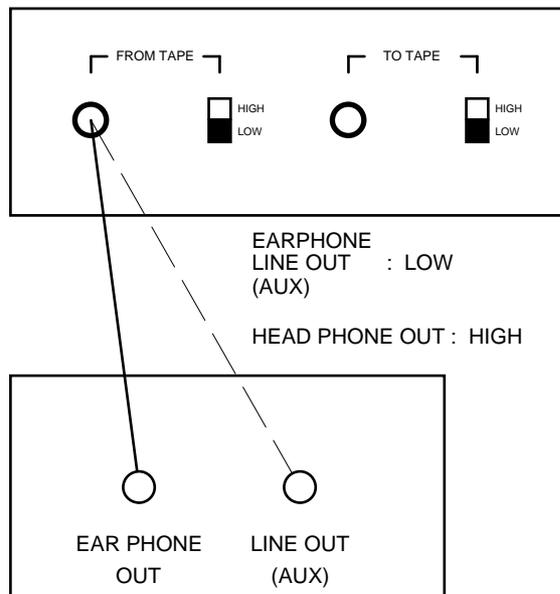


1. Make connections as shown in the chart. Connect TO TAPE to the recorder's input jack (mic, aux in or line in). Set rear panel switch to HIGH for line in or aux in; set to LOW for microphone input. Use the accessory cord and plug adapter to match the recorder's input jack (which may be mini, RCA or standard phone, depending on the unit).
2. Set the TAPE ENABLE (5) switch to the ENABLE position (so the LED lights up). Note that in this position the instrument cannot be played.
3. If your recorder has a limiter or AVC circuit, switch it on. Dolby should be switched off for best results.
4. Begin recording. Be sure the tape has advanced past the leader tape section at the beginning.
5. Press the TO TAPE (BANK A) button so its LED lights up. The PROGRAM button LEDs will then light up one at a time in order to indicate that program data is being sent to the tape. If you listen to the sound, you will hear a steady leader tone for 3 seconds, then the program data for 2.5 seconds, and finally the trailer tone (same as leader tone) for 0.7 seconds.

All LEDs go out when the Tape Dump operation has been completed.

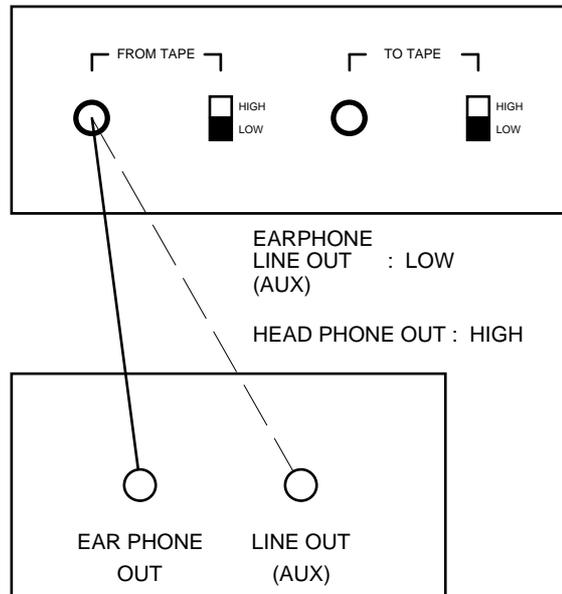
To prevent any possible problems due to tape dropouts, we recommend that you record the data several times with a 4 or 5 second gap between recordings (so you can find the beginning of each recording easily). After completing this procedure stop the tape. To make sure that the recorded data is correct, you should compare it with the original data. This is called verification and is performed as follows.

2) Verification (VERIFY)



1. Make connections as shown in the chart. Connect tape recorder's output (earphone, headphone or line out) to the FROM TAPE jack. Set rear panel switch to HIGH for earphone or line outputs; set to LOW for headphone output. Use accessory cord and plug adapter as necessary to match tape recorder jack.
2. Rewind the tape and begin playback from the leader tone, or a little earlier. Adjust recorder's volume and tone to usual listening levels.
3. Press the VERIFY (BANK C) button so that its LED lights up.
4. Continue playback from the leader tone. When the leader tone ends and data playback begins, the FOUND (MANUAL) LED will light up. As each program is verified, the PROGRAM LEDs will light up in series. All LEDs will go out if the data was correct. If an error (tape dropout, etc.) was detected, the ERROR/ CANCEL (BANK D) LED will light up and the PROGRAM LEDs will stay lit at the point that the first error was detected. If errors are detected, try verification again with the recorder's tone and volume controls at different settings (see below). If you cannot achieve an error free result after performing verification several times with various settings of the recorder's controls, record the data again from the beginning. You may need to use better tape or a better recorder, but most will do the job.
5. If verification went okay and no errors were detected, then set the TAPE ENABLE switch to the DISABLE position.

3) To load recorded data from tape into the programmer.



1. Make connections as shown in the chart (same as for verification).
2. Set TAPE ENABLE switch to ENABLE position so its LED lights up. The keyboard cannot be played in this condition. Set WRITE ENABLE to ENABLE position.
3. Rewind the tape, begin playback and set the recorder's volume and tone to usual levels using the leader tone as reference.
4. Press the FROM TAPE (BANK B) button so its LED lights up.
5. Play the tape. When the beginning of the data is found, the FOUND (MANUAL) and LOADING (WRITE) LEDs will light up to indicate that loading of data into the programmer has begun. The LEDs of PROGRAM buttons 1-8 will light up in order as the loading procedure continues. When data loading is completed, all LEDs except TAPE ENABLE will go out.

6. Set TAPE ENABLE to DISABLE position. Set WRITE ENABLE to DISABLE position.

* The ERROR/CANCEL (BANK D) LED will light up if data is missing (due to tape dropout, etc.) PROGRAM LEDs will stay lit at the point where the error appeared. When this happens, rewind the tape, check your connection cord and recorder's volume and tone setting, then perform the loading procedure again.

If you ever make an error during data storage, verification or loading, simply press the CANCEL (ERROR/CANCEL) button. This interrupts the procedure and turns off all LEDs except TAPE ENABLE. Then you can begin again from the beginning.

Note however, that with data loading (from tape into the programmer), program contents will already have been changed if the LOADING (WRITE) LED has lit up before you hit the CANCEL button.

4) Finding the correct recorder volume level

This has to be determined for each recorder individually. Proceed as follows and make a note of your findings for future use.

1. Connect recorder's output to FROM TAPE (as described in section on verification). Put in supplied accessory tape (section that has recorded program data on it).
2. Set TAPE ENABLE switch to ENABLE position so that its LED lights up.
3. Set recorder's volume to normal listening level and set tone control to central (flat) position (a bit on the treble side may give better results).
4. Press VERIFY (BANK C) so its LED lights up.
5. Begin data playback (of supplied accessory tap) and gradually turn down the recorder's volume. Note the point when the ERROR/CANCEL LED lights up. This is the volume control's lower limit.
6. Repeat the procedure, this time slowly turning up the recorder's volume until the ERROR/CANCEL LED lights up. This is the upper limit. Set the volume control midway between the lower and upper limits, as determined by the above procedure.

Specifications:

KEYBOARD	61 keys (C - C)
VOICES	6
(Program and edit functions are possible for items marked *)	
VCO*	Octave Selector (16', 8', 4') Waveform (Saw, PW, PWM) Pulse Width/PWM Sensitivity PWM Speed
SUBOSCILLATOR*	OFF 1 oct Down 2 oct Down
VCF*	Cutoff Frequency Adjustment Resonance Adjustment Envelope Generator Modulation Sensitivity Adjustment Keyboard Tracking Adjustment (0 - 150%)
ENVELOPE GENERATOR*	Attack Time Decay Time Sustain Level Release Time
VCA*	Mode Switch (EG, Gate) Attenuator (-10dB - +10dB, 11 Steps)
MODULATION GENERATOR*	Frequency Delay Time Level Modulation (VCO, VCF, VCA)
EFFECT*	Mode (Off, Chorus, Phase, Ensemble) Speed/Intensity Adjustment
KEY ASSIGN MODE	Poly Unison Chord Memory Hold
ARPEGGIATOR	Speed (0.2Hz - 20Hz) Range (Full 2 oct, 1 oct) Mode (Up, Down, Up/Down) Latch (On, Off) Arpeggio (On, Off)
TUNE	+/-50 Cents
BEND	Sensitivity Adjustment (MAX. +/-800 Cents)
OUTPUT	Level Selector (Off, Low, High) Volume
PROGRAMMER	Bank (A, B, C, D) Program (1 - 8) Write Switch (Enable, Disable) Write Button
TAPE INTERFACE	Switch (Enable, Disable) To Tape From Tape Verify Error/Cancel Tape Indicator x 2 (Found, Loading)
CONTROL WHEEL x 2	Bend MG
INPUT JACKS	From Tape (With HIGH/LOW Switch) Chord Memory (close to GND) Arpeggio Trigger In (close to GND) VCF fcM In (-5V - +5V)
OUTPUT JACKS	To Tape (With HIGH/LOW Switch) Headphone Output
DIMENSIONS	980 (W) x 373 (D) x 132 (W) mm
Weight	11.5kg
ACCESSORIES INCLUDED	Connection Cord Plug Adapter (Phone-To-Mini) Memory Cassette
Power Consumption	Voltage (Local Voltage 50/60Hz) Wattage (25W)

KORG

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